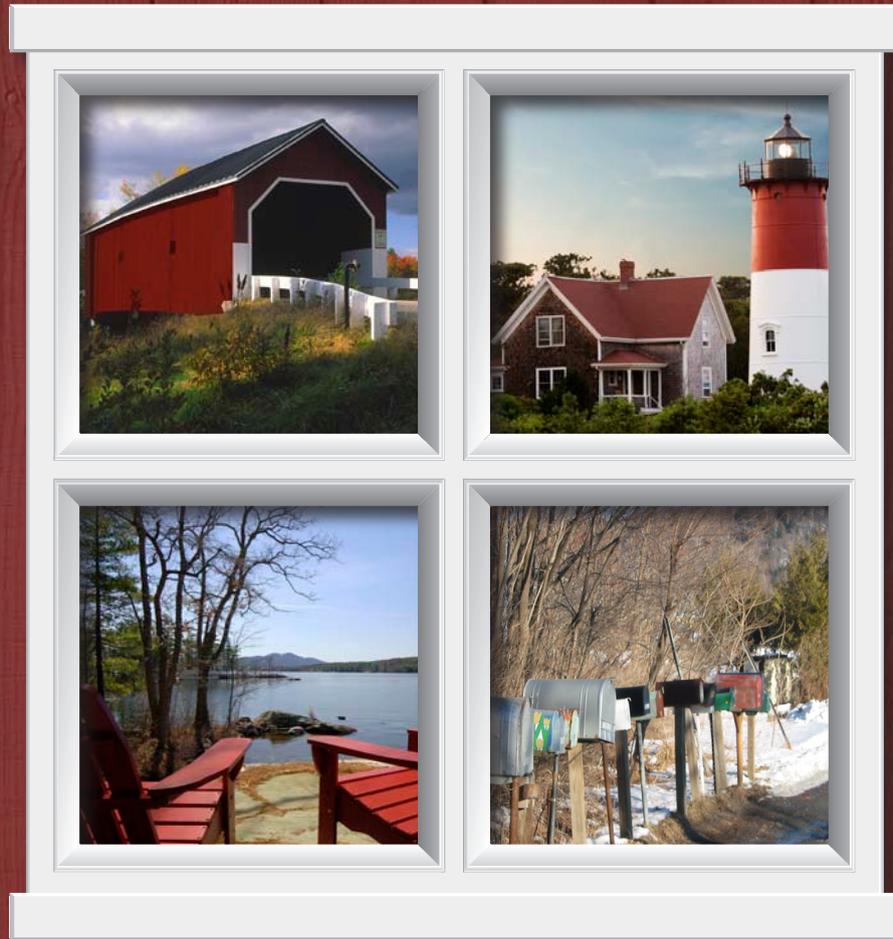
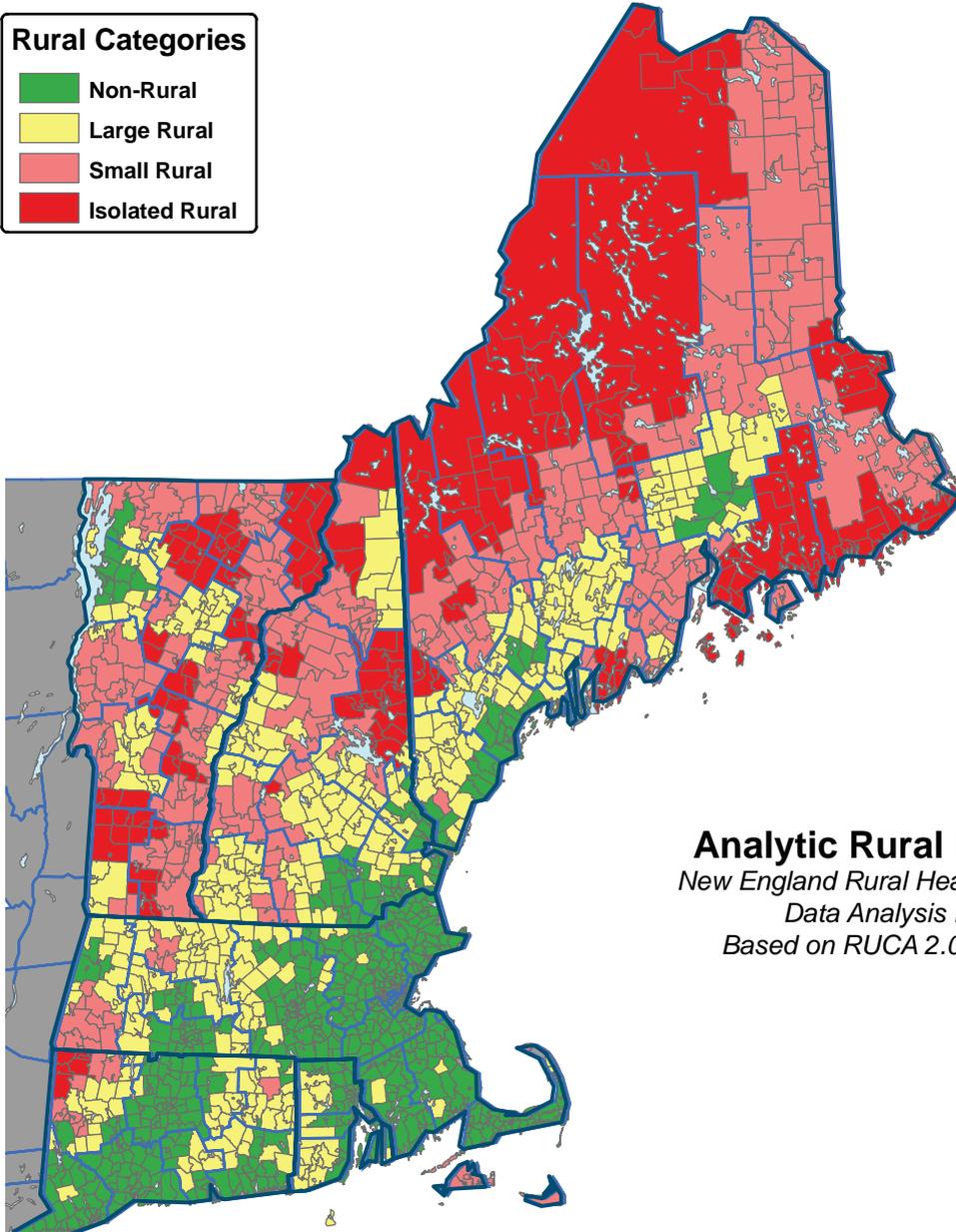
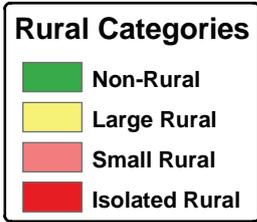


Rural Data for Action



**A Comparative Analysis of Health Data
for the New England Region**



Analytic Rural Definition
*New England Rural Health RoundTable
 Data Analysis Project
 Based on RUCA 2.0 Categories*



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Foreward

New England is often considered a somewhat urbanized region, with cities such as Boston, Providence, and Hartford anchoring sprawling and intensively developed communities containing some of the best health care facilities in the world. While there are clearly many developed areas of New England and a wealth of medical resources located there, this fact makes it easy to overlook the significant rural areas and communities within the region and the challenges they face. While rural communities in New England are certainly distinct from the farm belt of the Great Plains or mountains and deserts of the western states, the reality is that New England has a long rural tradition and most of the area can still be categorized as rural.

This report is an attempt to use various data sources to present a picture of rural health in New England, focusing on characteristics of the population and the delivery system, as well as risk factors, and ultimately outcomes for those living in rural areas. While there is much data showing that those living in rural areas experience greater difficulty accessing health care, there is little data that looks at rural New England as a region to explore how those factors play out in this unique area. Because the rural areas of New England are fragmented and split across several states, the regional approach to the study is the key to developing population numbers sufficient to describe the most remote areas.

We do hope that this report will be of value and interest to the various stakeholders in New England's rural health system. It is intended to inform communities, legislators, health care providers, administrators, and other decision makers who are addressing the complex issues related to improving and enhancing our health care system. As organizational, legal, and policy decisions are made with respect to health care, it is important to consider the implications for the portion of the region's population that live beyond the metropolitan areas.



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Executive Summary

The New England Region Rural Health Data Analysis is a unique examination of the health care and health related data that describe a range of demographic, access, utilization, and health outcome parameters for rural communities across the six-state region and compare these to the non-rural areas of the region. This approach is consistent with the mission of the New England Rural Health RoundTable (NERHRT), which employs a regional strategy to support and promote high quality and accessible health care for rural residents of the area and to address the challenges presented by the unique character of New England's rural communities. While available data cannot describe all aspects of the region's rural health situation, nor provide great depth of insight into underlying causes or potential solutions directly, it is a valuable and important first step in targeting attention and efforts to further explore, and ultimately to address, the most pressing problems and vulnerabilities in the system.

The study is based on a rural definition developed in consultation with rural health policy leaders representing each of the New England states. The definition balances and unifies the differing views of rurality across the region into a consistent schema that reflects the rural character of New England. The definition produces a four-tiered rural stratification, of which three tiers define varying levels of 'rurality', and the fourth reflects the non-rural areas. Notably, this approach characterizes only 2.7 million (20%) of the region's nearly 14 million residents as rural, though the rural communities in which they live account for 83% of all the land in New England. The population density in the non-rural areas of the region is nearly 20 times as high as in the combined rural tiers.

The results of the analysis provide a mixed picture of the rural health landscape in New England—a functioning yet fragile system struggling to overcome a variety of underlying challenges. On one hand, by the broadest measures of health status, it appears that rural residents of the region are not significantly sicker than their non-rural counterparts. Age adjusted overall mortality rates—perhaps the ultimate outcome measure of a health care system—are consistent across the region. Self-assessed health status is also reasonably comparable between rural and non-rural areas, as are all measures of self-reported chronic disease status.

On the other hand, the data show significant disparities between rural and non-rural areas on a variety of key factors associated with health care access problems, as well as evidence of some ongoing access issues. On many of these measures, the data also show a notable correlation with the increasing degree of rurality, where the small and isolated rural areas show greater degrees of adversity than the large rural areas. The rural population was characterized by lower income and educational attainment, and greater reliance on self-employment and in occupations unlikely to offer health benefits. Survey data demonstrates that rural residents are 37% more likely to be uninsured than their non-rural counterparts, with higher disparities in the more remote areas. Geographic access was also an issue, with public transportation generally not available, significant numbers of households with no vehicle available, and higher proportions of the population living more than 15 miles from the nearest hospital.

Rural areas were shown to be highly dependent on support from programs designed to help sustain the health care infrastructure. Nearly all hospitals in the small and isolated rural areas were participating in the Critical Access Hospital program. In general, primary care providers were reasonably available on a per-capita basis, though such availability was highly linked to the support of programs such as the rural health clinics and federally qualified health centers, which collectively delivered the great majority of the care in the more remote rural areas. Rural primary care was also highly dependent on family practice providers, with a relative paucity of more specialized internists, pediatricians and obstetrician/gynecologists. Despite a reasonable ratio of providers to the population, there were several data points indicating that rural residents were still experiencing greater access barriers to primary care compared with their non-rural counterparts. This includes more individuals going five or more years without a checkup, elderly patients foregoing routine annual exams and individuals claiming to have foregone needed care because of cost. Primary care providers in residency training were also not proportionally distributed in rural areas, pointing to potential issues in maintaining the rural workforce going forward.

In the realm of more specialized services, the picture was worse. Dental and mental health access was clearly problematic in rural areas, based on the much higher proportion of residents living in federal shortage areas for these services. The high rate of rural suicide also tends to confirm the need for rural mental health services. Specialized medical providers were also clearly concentrated in the non-rural areas of the region. There is also some evidence that public health and prevention issues may need additional emphasis in rural areas of the region, including nearly twice the rate of maternal smoking during pregnancy, and higher rates of teen pregnancy and late entry into prenatal care. Also, the rates of death from accidents and firearms were notably higher in rural areas.

The data highlight both the ongoing challenges in providing equitable access to health care services for residents of rural New England, as well as the results of the ongoing efforts put forth by rural communities and health care providers to meet those challenges. The region's rural health care system shows some ongoing disparities in access, however, the evidence suggests that some of these disparities would likely be much greater without the ongoing support of a network of programs that help maintain the fragile rural health infrastructure, and the work of providers to access these resources. Going forward, there are clearly several areas where improvements in access are needed. Addressing these will likely require the collaborative efforts of providers, community-based organizations, businesses, and policy makers. Stakeholders in the region's rural health care system must be as equally vigilant in protecting and building upon the resources currently available as in addressing the challenges that remain.

Lastly, one must note that additional study is necessary to further explore some of the key issues highlighted in this report. The readily available data were sufficient to provide a broad overview of many health and health-related statistics across the region and to highlight a range of key differences and disparities worthy of being addressed. An in-depth exploration of these areas, however, would require more detailed access to existing data maintained at the state level, and potentially research designs requiring unique information to be collected. We encourage the use of this report as a framework for ongoing examination of existing data on a rural-specific basis and to direct future efforts in addressing the key challenges identified for rural health in the New England region.



Methods

A. A Rural Definition for New England

The first step in any analytic assessment of data along rural lines is to select or develop a rural definition that reflects the nature of the inquiry, as well as the rural nature of the area being studied. In planning the study, the New England Rural Health RoundTable (NERHRT) examined the range of existing rural definitions to determine which, if any, were of utility for this undertaking. The data advisory group discussed a series of principles felt to be of importance for any definition used. To be considered, the group agreed that the definition must

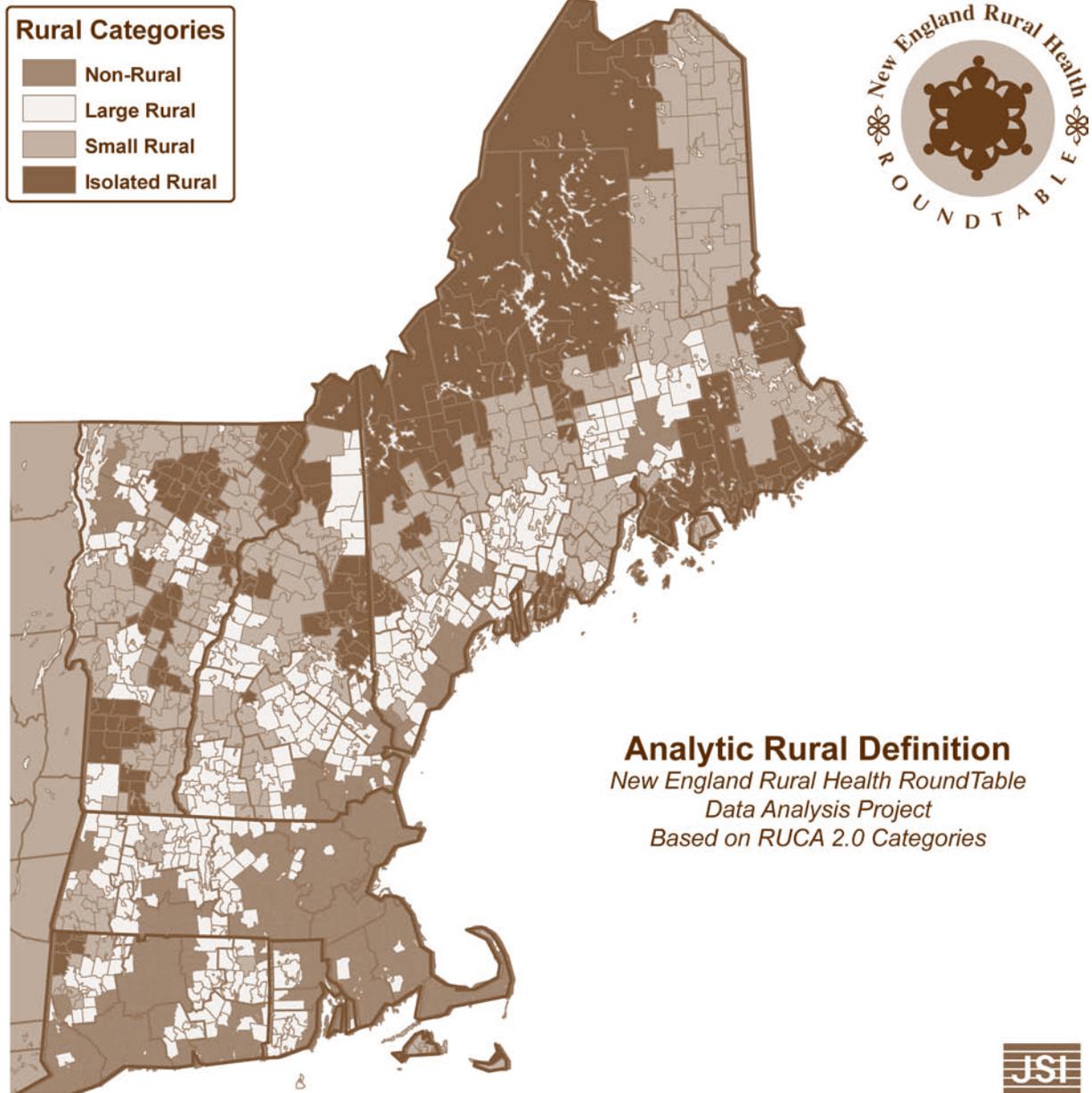
- be based on methods broadly acknowledged as relevant for rural definitions;
- be based on objective data, independent of underlying health-related statistics;
- treat rural communities as discrete groupings on a continuum, allowing for sub-analysis of more and less rural areas of the region;
- reflect the range of rural communities that exist within the New England states;
- produce geographic clusters that do not overly fragment the region;
- maintain a population size in the most rural tier that is statistically meaningful; and
- be capable of being transformed to conform with the structure/content of existing and available data.

It was determined that the Rural Urban Commuting Area (RUCA) codes (version 2.0), developed by the Federal Office of Rural Health Policy and WWAMI Rural Research Center, provided the best ability to meet these objectives. The RUCA codes are a series of over 30 designations, assigned to each zip code based on a combination of community size and the proportion of the population that commutes to a Census defined Urbanized Area or Urban Cluster. The RUCA codes are explicitly a non-linear set of designations intended to be grouped according to the nature of the rural study. According to the creators of the RUCA taxonomy at the WWAMI Rural Research Center, “The large number of codes facilitate the aggregation of the codes to fit specific needs of those using them for health, demographic, geographic, and other types of uses.”¹

Starting with one of the general grouping strategies recommended, the data advisory group engaged in a series of meetings to review and modify the categories to reflect the rural nature of communities in New England. Ultimately, the group agreed upon a clustering strategy for the RUCA codes yielding a four-tier rural definition for the study. This includes a non-rural tier, as well as three rural tiers, designated large rural, small rural, and isolated rural to follow common RUCA naming conventions. By further combining the three ‘rural’ tiers into a single group, this approach also yields a two-tier definition which permits the aggregate statistics (termed ‘all-rural’) to be compared to those for the non-rural areas. See Appendix A for detail on the RUCA codes and their assignment to the NERHRT analytic rural definition.

The map in figure 1 shows how the analytic definition applies across the region at the zip code level. Note that the rural tier definitions are applied regionally. As such, they combine populations across state lines and not all tiers exist in all states. A full color version of the map is available on the inside cover.

Figure 1



The table in figure 2 shows the results of the definition in terms of population, land mass, and resulting population density for each of the defined tiers. Note that 83% of the land mass of the New England region is rural based on this definition, yet this area encompasses only 20% of the population in the region. The average population density for the non-rural tier is nearly twenty times as high as the density in the combined rural tiers. As we move down through the rural tiers, the sparsity of the population continues to increase, with the isolated rural tier representing only 2% of the New England population, yet 27% of the land. The figures clearly demonstrate the rural nature of much of the New England region. It also highlights the need to focus on the unique health care challenges faced by relatively small portions of the total population which might otherwise be overlooked.

83% of the land mass of the New England region is rural based on this definition, yet this area encompasses only 20% of the population in the region.

Figure 2

NERHRT Rural Definition: Population, Land Area, and Density					
Zip Code Level Definition	Population	Percent of Population	Land Area	Percent of Land Area	Average Population Density
Isolated Rural	246,628	2%	17,265	27%	14
Small Rural	782,233	6%	21,117	34%	37
Large Rural	1,734,076	12%	13,945	22%	124
Non-Rural	11,140,122	80%	10,471	17%	1,064
All Rural	2,762,937	20%	52,326	83%	53
Non-Rural	11,140,122	80%	10,471	17%	1,064

While the zip code based definition provided the best level of detail for aggregating RUCA codes, most data is not directly available at the zip code level. As such, it was necessary to transform this base definition into a series of alternate geographic units. These include the following:

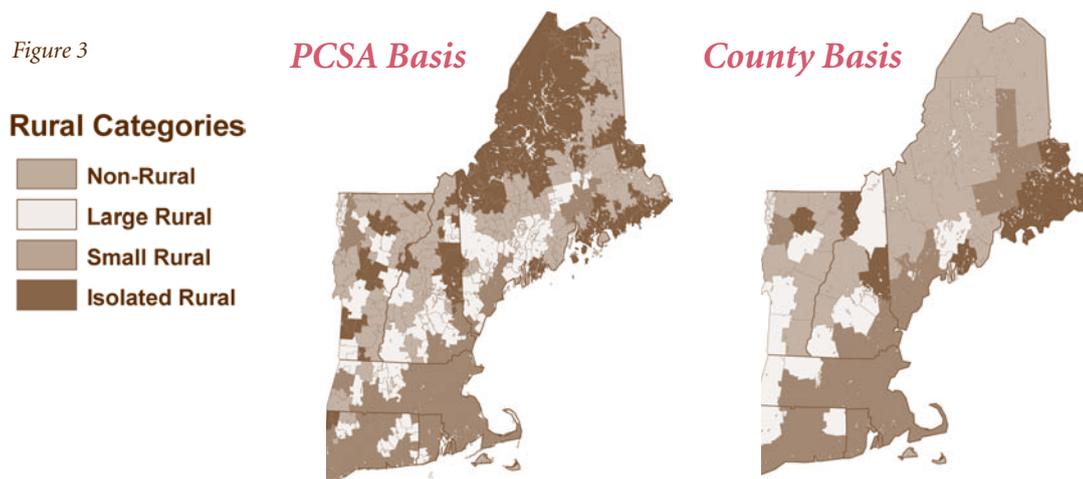
Zip Code Tabulation Areas (ZCTAs) – Census representations approximating one or more zip code areas. Reported for the first time in the 2000 decennial census, this definition is very close to the base (zip code) definition.

Primary Care Service Areas (PCSAs) v.2.0 – Aggregations of ZCTA units intended to represent rational service areas for the delivery of primary care. These units and underlying statistics were created by the Dartmouth Center for Evaluative Clinical Studies, under contract to the Health Resources and Services Administration (HRSA) by analyzing patient origin and destination information in the Medicare outpatient claims data.

Counties – Census-defined county boundaries

Because these alternate geographic units do not directly conform to the underlying zip code boundaries, transformations were performed by coding a detailed population-block layer according to the rural-definition tier of the zip code they are located in and then re-aggregating population units based on the alternate boundaries. As such, the population of a given PCSA or county may come from several different underlying rural tiers. The resulting population was then analyzed to determine which tier represented the greatest proportion of the residents (all-rural was first compared to non-rural before the sub-rural tiers were assigned). Because a portion of the population/area was forced to ‘shift’ between the tiers with different definitions, the level of ‘rurality’ varied slightly between the definitions, with the combined rural tiers representing 17% of the PCSA based definition and 15% of the county-based transformation, compared to 20% at the zip code level. Data was always collected at the finest level of detail possible. The maps in figure 3 show the PCSA and county transformations of the definition.

Figure 3



B. Analytic Method

Once created, the rural definitions developed for the project were used to aggregate a wide array of available data into statistics describing the distinct rural tiers and permitting comparison between the tiers. Where possible, statistics were aggregated directly to obtain the numerator (incidence) and denominator (population) for a given rate. Where only precalculated rates were available, statistics were aggregated using weighted means based on population. Survey data was aggregated at the case level, with results weighted to reflect the population at the state level where the data was collected. The report examines both crude and age-adjusted statistics, based on data availability and the relevance of age. Crude rates accurately reflect the per-capita statistics for the populations in a given area, while age-adjusted rates attempt to better isolate the impact of ‘rurality’ where age differences are a dominant factor.

Because the report is focused on describing rural health statistics across the rural continuum, each measure is compared across the four tiers individually (except where limited by data availability), as well as for the three rural tiers combined compared to the non-rural tier (termed the two-tier definition). The accompanying charts in this report show both the two-tier rural statistics, as well as the sub-category four-tier rural statistic analysis. The sub-category statistics are of particular importance as many differences are masked or diluted by variations within the rural groupings.

The report focuses on areas where notable differences or disparities in rural health statistics were identified. Please refer to Appendix B for a full listing of the detailed statistics examined and for the results of the sub-categories within the rural tiers.

C. Data Sets

The focus of the study is an examination of the health and health-related characteristics of rural communities in New England, and how they differ internally and compared with the non-rural areas of the region. This broad analytic approach necessitates that a wide variety of data sources be incorporated, in order to describe the region as completely as possible. As such, the data for this report is derived from a range of disparate sources, often available at different levels of geographic specificity and covering somewhat different time frames. Appendix B describes each of the data sources used for the study and provides details concerning the parameters and specificity of the data. The available data provided information concerning the three basic components of the health care system: the population; the delivery system; and the resulting patterns of access, utilization and outcomes that result from the interaction of the first two.

There were several requirements for data accessibility and content in order for the data set to be incorporated into the study. First, the data needed to be available uniformly across the entire New England region. Second, the data needed to be available at the county level or below to allow the application of the rural definitions. Third, due to resource limitations of the project, the data had to

“Not everything that can be counted counts, and not everything that counts can be counted.”

-Albert Einstein

be available from a single source across the region—as opposed to procurement from individual state data repositories for example— and without an extensive research application process. Due to these constraints, readers will likely identify statistics from data sets or rural studies conducted in their state or local area that are not included in this study. Some of the findings from these sources have been incorporated by reference in this report where relevant and appropriate. In addition, there are many areas of interest or concern to the health care environment in rural communities for which statistics are not available. Due to these constraints, the absence of statistics on a particular topic should not be considered to imply that there are not valid concerns in these areas. Also, the statistics that are reported here are intended to be a starting point for identification and description of rural health characteristics and disparities, but additional depth of analysis may be required to more fully explore the issues identified.



Findings

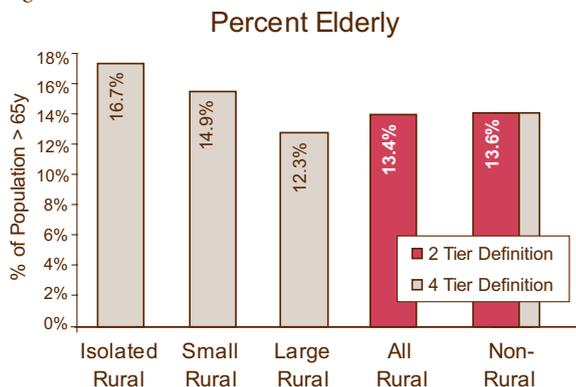
A. Demographic/Socioeconomic Characteristics

Population demographics do not directly describe attributes of health or the health care system in a community, however numerous studies have shown that these underlying characteristics are often the key factors influencing health status, access, and outcomes. The New Hampshire *Barriers to Primary Care* report, released in January 2005, demonstrated correlations with avoidable Emergency Department visits in the state related to income/poverty, education, and lack of vehicle availability amongst others.² Understanding differences in underlying factors such as the age, income, education, and employment characteristics of the population, therefore, is key to understanding observed differences in other characteristics more directly tied to health services. While techniques such as age adjusting are intended to minimize the impact of underlying demographic characteristics to permit other influences to be more clearly examined, in reality the demographic differences between rural and non-rural areas cannot, and should not, be overlooked when looking at rural health care issues. As the statistics below demonstrate, notable differences exist in several key demographic characteristics of rural communities.

1. Age

Age distribution is one of the most important determinants of health status and service utilization, as well as being directly related to eligibility for public insurance programs such as Medicare and Medicaid, and even strongly influencing other demographic factors, such as employment and income characteristics. As shown in figure 4, the proportion of elderly in the population varies significantly across the rural tiers. Although the proportion of elderly in the combined rural areas is nearly the same as the proportion in non-rural areas, this fact masks the fact that the proportion of elderly residents increases sharply with increased rurality with the proportion in the isolated rural tier 23% greater than in the non-rural areas. It is also these areas where distance to services and availability of transportation options are the greatest challenges. Over 40% of all households in the most remote areas have one or more elderly residents present.

Figure 4



Source: U.S. Census 2000

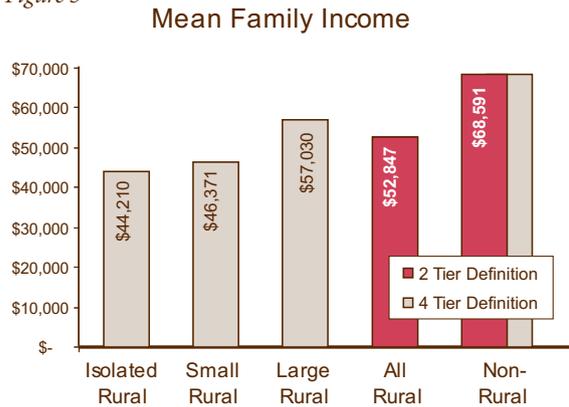
23% “The proportion of elderly residents increases sharply with increased rurality, with the proportion in the isolated rural tier 23% greater than in the non-rural areas.”

While elderly residents in the isolated rural tier represent 17% of residents, they represent 26% of householders in these areas—also a considerably higher proportion than in non-rural areas and likely indicating that many live alone or as couples, as opposed to with an extended family. In households where the elderly do live with young children, however, they are 17% more likely to be the caregiver to those children in rural communities, and 45% more likely to do so in the isolated rural areas, compared with the non-rural elderly.

2. Income

Another demographic factor with proven links to health, and particularly health care access, is income. Looking at figure 5, it is clear that there is a significant income disparity between the rural and non-rural areas, with the difference increasing with the degree of rurality. Mean family incomes in rural areas overall are over \$15,000 or 23% less than in non-rural communities in the region, and over \$24,000 (36%) less in the isolated rural areas. A similar pattern is observed when income is examined at the per capita level.

Figure 5



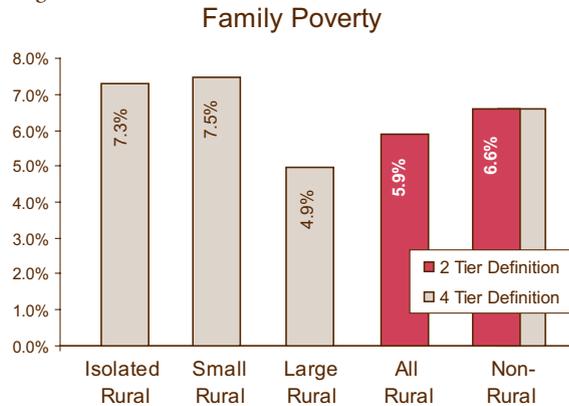
Source: U.S. Census 2000

36% “Mean family incomes in rural areas overall are over 23% less than in non-rural communities in the region, and over 36% less in the isolated rural areas.”

While differences in overall income levels in a community are important, it is obviously those at the low end of the income spectrum that face the greatest challenges. In the Census data, this population is best described in relation to the federal poverty threshold, set each year by the U.S. Department of Health and Human Services (HHS), as the minimum income needed to meet basic needs. Beyond a simple way to gauge economic stress, the poverty guidelines have also become metrics that determine eligibility for a variety of government programs aimed at improving access to health care. Most notably, eligibility for Medicaid is set in relation to poverty thresholds, amongst other factors, at varying levels within each state. Also, the Federally Qualified Health Center program, operated by the HHS Bureau of Primary Health Care, mandates that its grantees provide sliding fee discounts for low income patients at varying levels up to 200% of the poverty threshold. Many other forms of assistance also hinge on this definition.

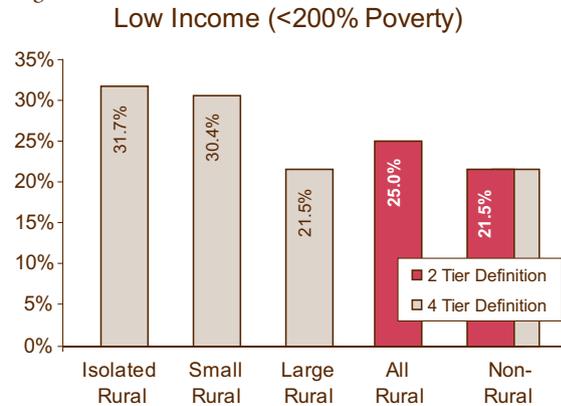
Looking at figure 6, one sees that there is clearly a split within the rural continuum in terms of poverty, with the small and isolated rural tiers characterized by notably higher poverty levels than the large rural tier, which has a poverty level falling below that in the non-rural areas. Because of this split, the overall rural poverty level is below that in the non-rural areas, but this masks a notable underlying pattern.

Figure 6



Source: U.S. Census 2000

Figure 7



Source: U.S. Census 2000

This is seen even more clearly when one examines the low income population (persons up to 200% of FPL), as in figure 7. Here we see a similar split within the rural tiers, however, the proportion of low income in non-rural areas does rise as it does at the lower poverty threshold. As a result, the proportion of low income individuals in rural areas is actually 17% higher than in urban areas and fully 47% higher in the isolated rural regions. Nearly one third of individuals living in the most rural parts of New England are classified as low income.

Another way of looking at income is to look at the proportion of families that rely on various types of fixed and/or entitlement income. The study examined reliance on social security, retirement, public assistance, and supplemental security income categories. Of these, the statistics for reliance on public assistance and social security in particular, show a similar pattern to the low income rates—with the heaviest reliance in the most rural areas.

Nearly one third of individuals living in the most rural parts of New England are classified as low income.

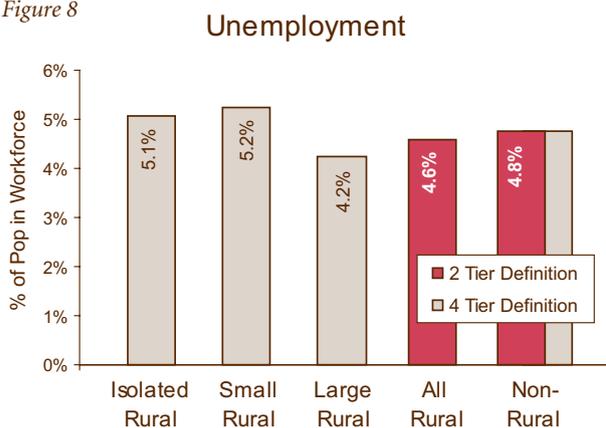
One must also note that differences in the cost of living can compensate for differences in income and related factors between rural and non-rural areas. This is partially borne out by examining the proportion of the population paying more than 30% of their wages for housing, which shows residents of the rural tiers approximately 9-10% less likely to be in this category. The recently released *New Hampshire's Basic Needs and Liveable Wage Report* provides additional insight in this regard, comparing the state's rural 'North Country' to other areas. The report indicates that the annual costs of living for a two-parent working family of four is approximately 10% lower in the rural north, compared to the state overall, with housing/utilities representing the greatest proportion of the difference.³ It should be noted that this difference in cost of living does not fully account for the difference in median family incomes, noted above, and likely cannot be generalized to the less isolated rural areas of the region. Also the 'Liveable Wage' report finds that the cost of health care is equivalent between the North Country and the state overall.

3. Employment

There are several factors within employment that are of relevance to the health care situation in rural communities. Because insurance is often obtained through one's employment, and because the size and industry of that employer have a strong bearing on whether that employer offers coverage and what the price of that coverage will be, employment had direct impacts on access that go beyond one's income.

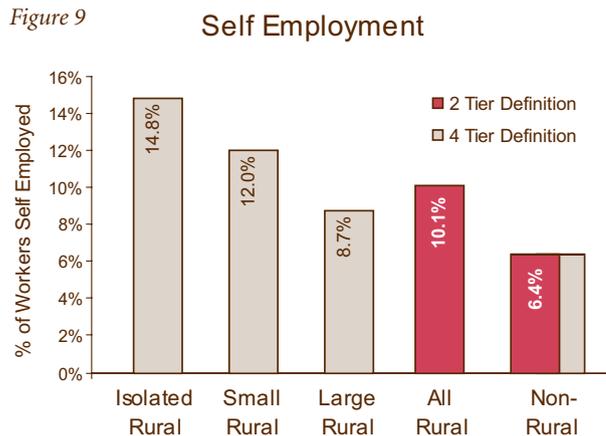
Obviously unemployment produces a combination of loss of income and potential loss of existing coverage that can make health care access particularly difficult. Figure 8 shows the unemployment rates for the rural tiers. While unemployment across the region is fairly low, one can see that the rate in the more remote rural tiers is 6–10% greater than in non-rural areas. Here again, there is a split within the rural regions, with the rate in the large rural areas being more favorable than the other areas. The proportion of the population classified as 'not in the labor force' (and therefore not part of the unemployment statistic) also follows a similar pattern across the rural tiers.

Figure 8



Source: U.S. Census 2000

Figure 9

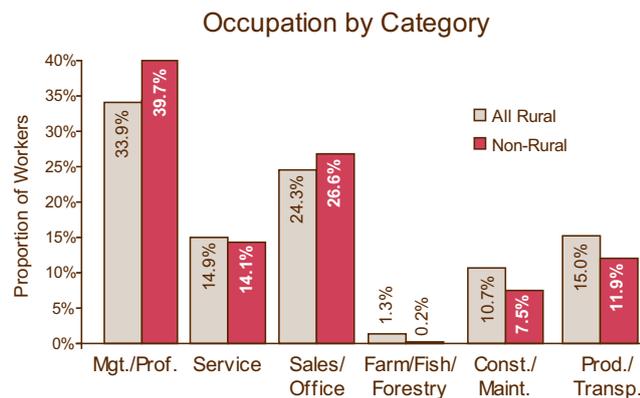


Source: U.S. Census 2000

Likely of even greater importance in rural areas, is the level of self employment (in an unincorporated or family business). In addition to income vulnerability, insurance rates for individually purchased insurance plans are often prohibitively costly, causing many of the self employed to remain uninsured. Figure 9 shows the significant increase in the prevalence of self employment as the level of rurality increases. Compared with the non-rural tier, self employment is nearly 60% more prevalent amongst workers in New England’s rural areas and well over twice the rate in the isolated rural tier.

60% “Compared with the non-rural tier, self employment is nearly 60% more prevalent amongst workers in New England’s rural areas and well over twice the rate in the isolated rural tier.”

Figure 10



Source: U.S. Census 2000

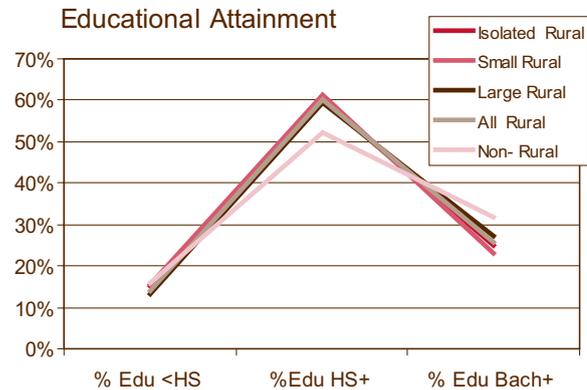
The type of employment in rural and non-rural areas is also different in terms of occupation. Certain occupations such as management, professional, and office work, are more commonly associated with offering benefits such as health insurance. Looking at figure 10, one can see that it is these occupations that are less prevalent in rural areas of the region. Additionally, while agricultural jobs are what people often think of in rural areas, they represent a very small proportion of the rural workforce (1.3% overall). Rural workers outside of the professional/office occupations are considerably more likely to be engaged in the service, construction/maintenance, or production/transportation occupations, which are often not associated with health benefits. While there is some variability in these rates across the three rural tiers, the pattern of the occupations cited as higher or lower compared to the non-rural area tends to be true across the sub-categories of rural.

4. Education

Educational attainment is also a key demographic factor with implications for income, employment, and ultimately health status.

Figure 11 shows the educational attainment profile curve for residents of the New England region in a line graph. Unlike many other demographic characteristics noted above, there is a great degree of consistency within the three rural tiers with regard to educational attainment statistics, though there are notable differences compared to the non-rural areas. Rural residents are approximately 15% more likely to have only a high school diploma, and nearly 20% less likely to have a college degree or beyond, compared with residents in the non-rural tier.

Figure 11

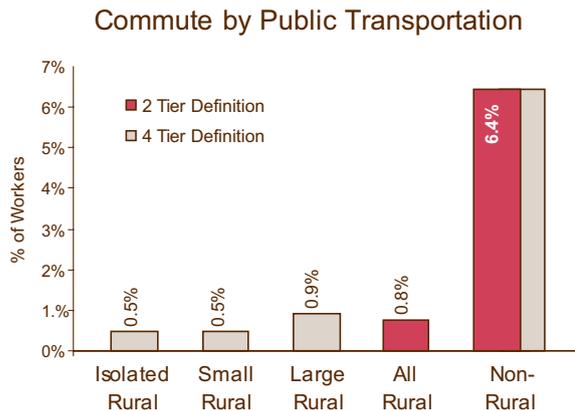


Source: U.S. Census 2000

5. Transportation

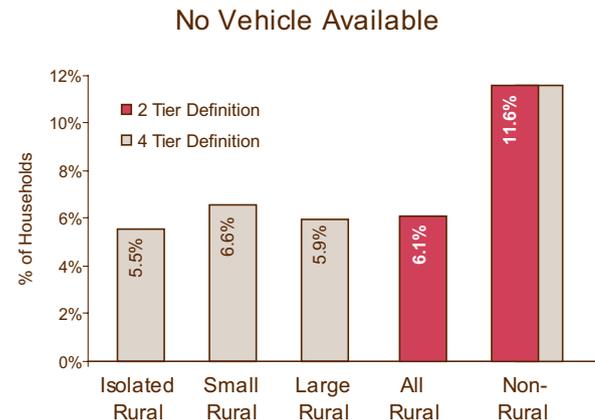
Figure 12 shows the percentage of the workforce utilizing public transportation for their commute. While public transportation is not well utilized even in the non-rural areas and is not a direct measure of availability, it is clear that there is a significantly greater potential for the non-rural population to access this option. Less than 1% of the population in any of the rural tiers makes use of any form of public transportation for commuting, compared with 6% of the residents of the non-rural tier. At this level of utilization, it is likely that public transportation is only a viable option for a portion of the non-rural tier, and not available elsewhere.

Figure 12



Source: U.S. Census 2000

Figure 13



Source: U.S. Census 2000

More than 1 out of 20 households in the combined rural areas have no vehicle and no practical public transportation option.

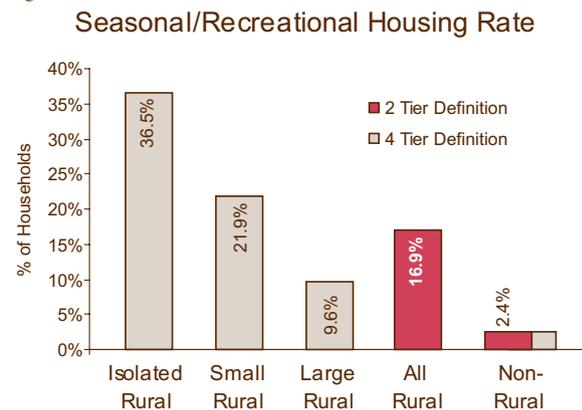
Of course, the context of public transportation as a measure in a rural health report relates to access to medical care. This is particularly relevant for those with no other option. Having no vehicle can be a result of age or disability precluding driving, vehicle affordability for the low income, or more practical issues of cost/benefit if public transportation is a viable option. Figure 13 shows the households in each of the tiers that have no vehicle available. Clearly the prevalence of having no vehicle is approximately twice as high in the non-rural tier compared to any of the rural tiers. While this difference is likely due to a combination of economics and public transportation availability, the true importance of the data is the fact that a large number of households in the rural tier have no vehicle and no practical public transportation option as shown in figures 12 and 13. The data shows that more than one out of 20 households in the combined rural areas have no vehicle, necessitating that residents have alternative means of transportation to overcome the increasing distance to services characteristic of rural areas. Lastly, one must keep in mind that this statistic does not capture the many families that have a single vehicle which is used for work and may not provide a practical option for other family members during the day.

6. Tourism

Rural areas of New England are famous for their beauty and recreational opportunities. Unlike rural parts of the country which rely directly on farming and agriculture, many rural areas of New England are linked to tourism. The statistics on seasonal and recreational housing shown in figure 14 are a proxy for gauging the degree of tourist influx. While such housing represents just over 2% of the households in the non-rural tier, it represents nearly 17% of housing in the rural areas of New England, and there is a strong pattern correlated with increasing rurality. One can see that more than one of every three housing units in the isolated rural tier is dedicated to seasonal or recreational purposes.

The impact of a large tourist population on health services can be significant. Services such as Emergency Departments and EMS must be maintained at a level considerably higher than what would be required to serve the resident population and must

Figure 14



Source: U.S. Census 2000

also be capable of surviving during ‘off seasons’ when the tourist population can drop sharply. Expectations for staffing availability and response times are often based on an urban model that is difficult to provide in remote rural regions. Tourism also introduces a degree of risk and variability to income and employment, as well as being characterized by service, retail, and other occupations that tend not to offer benefits. The report, *Making Kids Count in Rural Northern New England* noted that income from tourism has increased sharply in rural areas of the region over the past 30 years, bringing seasonal and part-time work that typically pays under \$20,000 per year with few benefits.⁴

7. Race/Ethnicity & Language

Issues relating to racial and ethnic differences and linguistic needs are considerably less prevalent in the rural areas of the region. Residents of the combined rural areas of the region are only about one fifth as likely to be members of a racial or ethnic minority as residents in the non-rural tier (4.2% vs. 19.0% respectively) and there is also a pattern of decreasing racial/ethnic diversity with increased rurality within the rural tiers. Rural residents are also about one third as likely to be foreign born (3.4% vs. 11.5%), and about one quarter as likely to be less-than-fluent in speaking English (1.8% vs. 7.6%). While these statistics generally describe challenges to health care delivery that are less prevalent in rural areas, it may also highlight the greater degree of cultural and linguistic isolation experienced by minority residents living in rural communities. Also, the Census does not capture the migrant workforce that exists in the region’s agricultural areas during harvest seasons and is typically comprised largely of foreign born and linguistically isolated individuals. While not quantified here, the region has several federally funded migrant health programs to assist in addressing the needs of this population.

B. Health Care Delivery System

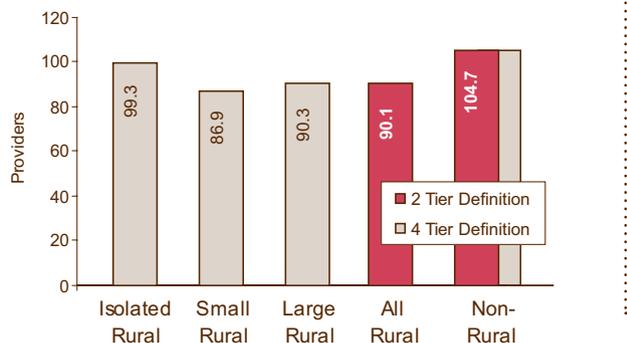
1. Provider Workforce

At the heart of the health care delivery system is the provider workforce. While the delivery system is comprised of a complex network of providers and resources, access typically begins with one’s primary care provider. In addition to providing the routine and preventive care that helps maintain health, the primary care provider is increasingly responsible for directing access to other parts of the delivery system, as well as coordinating its many components for the patient. There are, however, many dimensions to the basic concept of the primary care workforce, which can comprise a variety of provider categories with varying specialties and degrees.

The Primary Care Access Area data provides some insight into the primary care workforce in the New England region through analysis of Medical Association (AMA/AOA) data on provider characteristics and location.

Figure 15

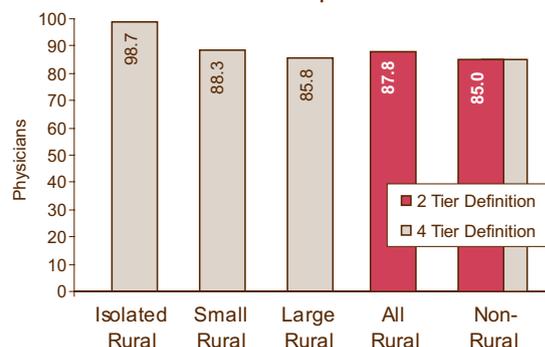
Primary Care Physicians Per 100K Population



Source: PCSA - AMA/AOA 2000–2001

Figure 16

Age-Adjusted & Allocated PC Physicians Per 100K Population

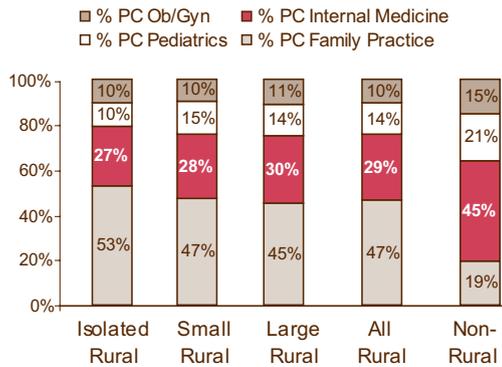


Source: PCSA - AMA/AOA 2000–2001

Figure 15 shows the crude ratio of primary care physicians per 100,000 population in each of the tiers. Using this method, we see a 14% lower ratio of primary care providers in rural areas compared to the non-rural tier. Interestingly, while all rural tiers are lower, the isolated rural tier appears to show a slightly better ratio. Because the Medical Association lists provide only a single address for each provider, attempts were made in developing the PCSA data to spread the providers according to the locations where a provider’s Medicare claims were submitted, as well as age/sex/race adjusting to reduce the impact of differences in the base population. Figure 16 shows the results of this process, which also seems to suggest that there may be a slightly better ratio of providers in rural communities. It should also be noted that the AMA/AOA lists do not make adjustments for productivity differences, part time practice, or providers that are partially retired but listed as actively practicing, and there is no mechanism for correcting for this. Studies cited in the national *Rural Healthy People 2010* report suggest that these factors may ultimately negate the advances made in the primary care workforce over the past decade.⁵ It should also be noted that the PCSA statistics show a somewhat higher proportion of primary care providers over 50 years of age in the rural areas, compared to the non-rural tier (36% vs 33% respectively), and the difference is also greater in the more remote rural tiers. These findings suggest that maintaining the primary care provider workforce may become more challenging in the years ahead.

Figure 17

Primary Care Physician Composition by Specialty



Source: PCSA - AMA/AOA 2000–2001

50% “The data clearly shows a much greater reliance on family practice physicians, representing nearly 50% of the primary care workforce in rural areas, compared to less than 20% in the non-rural tier.”

Looking deeper into the makeup of the primary care physician workforce, one sees more pronounced differences between the rural and non-rural tiers. Figure 17 shows the specialty composition of the primary care physician workforce across the tiers. While there is a great deal of consistency within the three rural tiers with regard to the specialty mix of the primary care workforce, one notes a sharp difference in comparison to that of the non-rural tier. The data clearly shows a much greater reliance on family practice physicians in rural areas, representing nearly half of the primary care workforce in rural areas, compared to less than 20% in the non-rural tier. This greater representation of family practice providers is offset by a relative deficit of providers from the more targeted primary care specialties of internal medicine, pediatrics, and obstetrics/gynecology in rural areas. Each of these specialties has approximately 50% less representation in the rural primary care workforce compared to the non-rural areas. High penetration of family practice providers can represent a strength in terms of integrating care across generations and genders within a family, though it is often also a practical consideration in rural communities, based on the population needed to support a more specialized provider. The availability of the more narrowly specialized primary care providers is also essential as a referral resource to support the family practice model when more complicated conditions arise. The data suggest that such primary care referral resources may be scarce in rural communities.

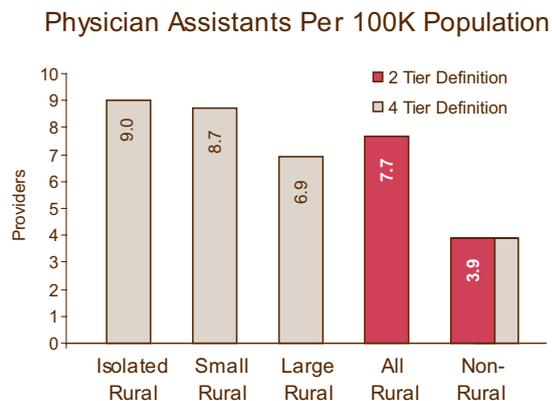
Physicians are not the only provider resource for primary care. The services of non-physician primary care professionals (NPPCP, also referred to as ‘allied-health’ or ‘mid-level’ providers), typically encompassing physician assistants, nurse practitioners, and certified nurse midwives, has become an increasingly important component of the primary care delivery system. A paper on workforce in the journal *Pediatrics* stated, “Nurse practitioners and physician assistants have a particularly important role in rural underserved communities, the setting least likely to attract or support a pediatrician. While data was not

available on all NPPCP specialties, the PCSA data set did include statistics on the availability of physician assistants (PAs), as shown in figure 18. The graph shows the much greater presence of this category of mid-level providers in rural communities overall (on a per-capita basis), as well as an increasing pattern of PAs in the workforce as the rurality of the area increases. The national *Rural Healthy People 2010* report examined this class of providers more broadly and also noted that “NPPCP-to-population ratios appear to slightly favor rural settings”.⁷

The primary care workforce ‘pipeline’ is also an important component of sustaining the delivery system. Medical residency training programs provide key clinical training for new medical graduates, but are also important in providing experiences that will help new providers determine where to practice their specialty. This highlights the importance of rural primary care residency programs. Also, although residents are still in training for their specialty, they are also physicians who provide a significant degree of direct patient care and should be considered as part of the workforce.

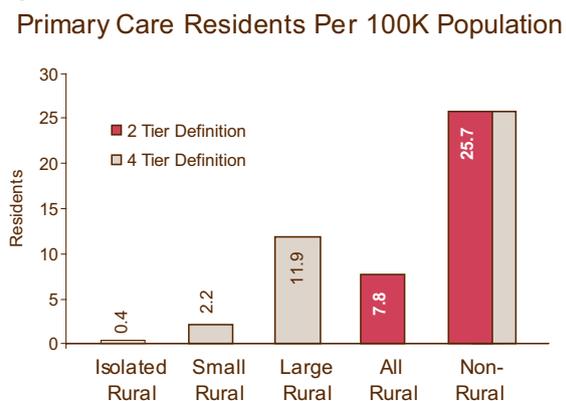
Figure 19 shows the striking difference in the per-capita prevalence of primary care residents in rural vs. non-rural areas, with non-rural areas showing more than three times the availability of residents compared to the combined rural areas. Looking within the three rural tiers, one also notes that nearly all of the primary care resident availability is located within the large rural tier, with a level only one-fifth as large in the small rural tier, and nearly non-existent in the isolated rural areas. When examined on a residents-per-provider vs. per-capita basis, one sees a similar pattern; indicating that it is not the lack of potential providers to precept residents in the rural areas that underlies this disparity. When the capacity of medical residents is factored in with the availability of physicians and PAs, the per-capita ratio of primary care providers is approximately 20% lower in the rural tiers collectively, compared to the non-rural tier.

Figure 18



Source: PCSA - AMA/AOA 2000–2001

Figure 19

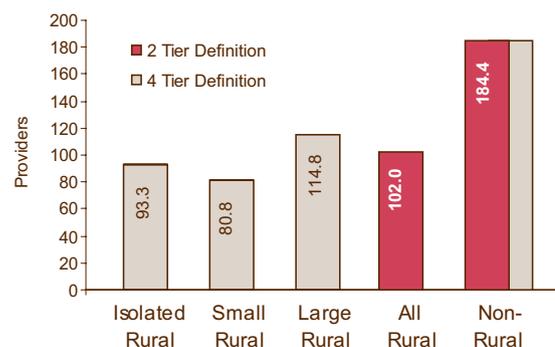


Source: PCSA - AMA/AOA 2000–2001

Obviously, primary care providers are only part of the medical workforce and the range of services necessary to provide comprehensive medical care. Figure 20 shows the differences in specialist availability in rural and non-rural areas of the New England region. Just as the breakdown of providers within the primary care specialties showed a lower prevalence of more narrowly specialized providers in rural areas, this pattern continues in the non-primary care specialties taken collectively. The ratio of specialist providers to the population in the non-rural tier is approximately 80% higher than in the rural tiers overall. While this issue is likely mediated by the ‘critical mass’ of patients necessary to support specialized physician practices, the need for such providers for any given person is the same. This implies that rural residents are likely to need to travel to non-rural areas to access specialist services.

Figure 20

Specialist Providers Per 100K Population



Source: PCSA - AMA/AOA 2000–2001



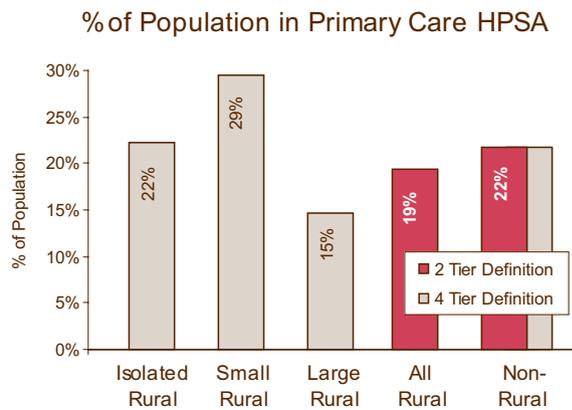
2. Health Professional Shortage Areas (Primary Care, Dental, Mental Health)

While statistics on provider to population ratios based on licensing lists can provide some insight into issues of access and availability across all parts of the region, there is also a formal federally-prescribed process for demonstrating and certifying that a specific area is experiencing provider shortages. Through a process set forth and managed by the Shortage Designation Branch in the HRSA Bureau of Health Professions National Center for Health Workforce Analysis, an application can be made to obtain an official Health Professional Shortage Area (HPSA) designation for a defined region in the disciplines of primary care, dental, or mental health services. Obtaining such a designation permits providers in the area to access federal programs to enhance provider capacity and/or financial viability, including the National Health Service Corps, J-1 visa waiver program, Medicare incentive payments, and rural health clinic status. The designation process requires that a specific service area be defined, and that the actual provider capacity be assessed, typically through a survey of providers. While the data is more precise because of this process, it can be somewhat confounded by the fact that federally placed providers, resulting from the designation, are excluded from the capacity shown. Also, while designations cover all residents of the service area, the designation calculation can be based on either the entire population or a segment of the population facing specific (typically financial) access barriers. A requirement that a population segment designation must cover at least 30% of the total population of an area can mask identified need in communities that fall just below this threshold. Lastly, designations are not assessed uniformly across all areas, but rather to support the needs of certain providers wishing to access the related programs. As a result, there may be many areas that have not been assessed for designation potential which might otherwise meet the criteria for a provider shortage.

By examining the proportion of the population covered by the various categories of HPSA designation, one can assess what portion of the residents in each of the tiers live in communities facing access issues.

Figure 21 shows the proportion of the population living in a primary care HPSA. At the two-tier level of analysis, the proportion of residents in primary care HPSAs is slightly lower than the proportion in non-rural areas, however this masks some significant differences across the rural tiers. The proportion in the small rural tier is nearly twice the proportion in the large rural tier where nearly one third of residents live in a HPSA.

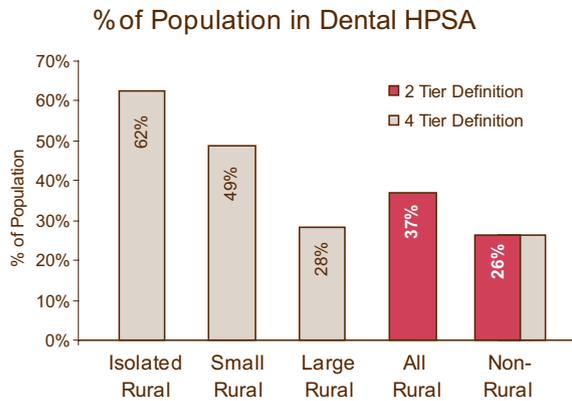
Figure 21



Source: Health Professional Shortage Designations as of 9/06, 2000 Census Population

Access to oral health resources is a key component of overall health care and can be particularly problematic in rural areas. Oral health is one of the focal areas of the national *Rural Healthy People 2010* report, which noted that it is recognized as a serious rural health problem and priority for national and state experts.⁸ More locally, the 2006 *Massachusetts Oral Health Report* listed lack of access to dental care providers in rural areas as one of the major findings.⁹

Figure 22



Source: Health Professional Shortage Designations as of 9/06, 2000 Census Population

37% of the population in the combined rural tiers is covered by a DHPSA. This is 40% greater than the proportion in the non-rural tier. About half of residents in the small rural tier are covered by a DHPSA.

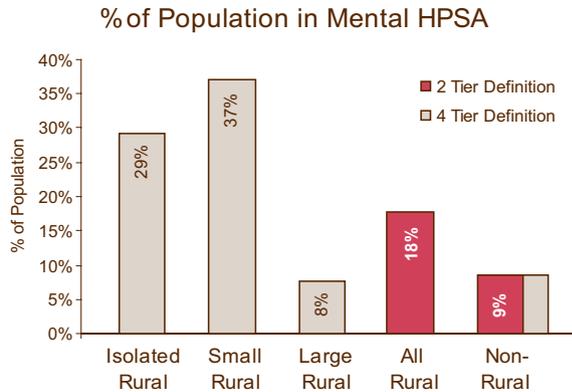
62% of the population in the isolated rural tier is covered by a DHPSA; that's nearly two and a half times the rate in the non-rural tier.

Looking at the proportion of the population residing in a Dental Health Professional Shortage Area (DHPSA) shown in figure 22, one sees that dental access issues affect a greater portion of the New England population overall compared with primary care and that there is also a much clearer disparity for rural communities. Overall, 37% of the population in the combined rural tiers is covered by a DHPSA. This is 40% greater than the proportion in the non-rural tier and there is a notable pattern as rurality increases. About half of residents in the small rural tier are covered by a DHPSA and this jumps to 62% of the population in the isolated rural tier; nearly two and a half times the rate in the non-rural tier. Additionally, by calculating the weighted average of the population/provider ratios for the designations, one obtains a ratio of 12,818 per dental FTE, 18% greater than in non-rural areas. While this statistic describes access only for the low-income population in many instances, it is nonetheless several times the threshold needed for designation as a Dental HPSA.

Access to mental health services is also a key area of concern, widely recognized as a rural health priority, including within the national *Rural Healthy People 2010* report. In their 2006 report on the topic, the National Association for Rural Mental Health noted that, “mounting needs, a lack of available professional staff, and restricted/limited resources strain existing services and limit access to rural residents in need”.¹⁰ The report also notes that the problems with mental health in rural areas are unique and distinct from those of more urban areas, both in terms of need and the service delivery system.

The data on the portion of the population living in Mental Health Professional Shortage Areas (MHPSA), examined in this study, also bears out that mental health access is a rural issue in New England. Overall, 18% of residents in rural tiers of the region live in a designated MHPSA. This is double the percentage in the non-rural areas, and even that fact masks a significant difference within the rural tiers. While the proportion of the population residing in a MHPSA in the large rural tier is approximately the same as in the non-rural tier, the proportion in the small and isolated rural tiers is three to four times as high.

Figure 23



Source: Health Professional Shortage Designations as of 9/06, 2000 Census Population



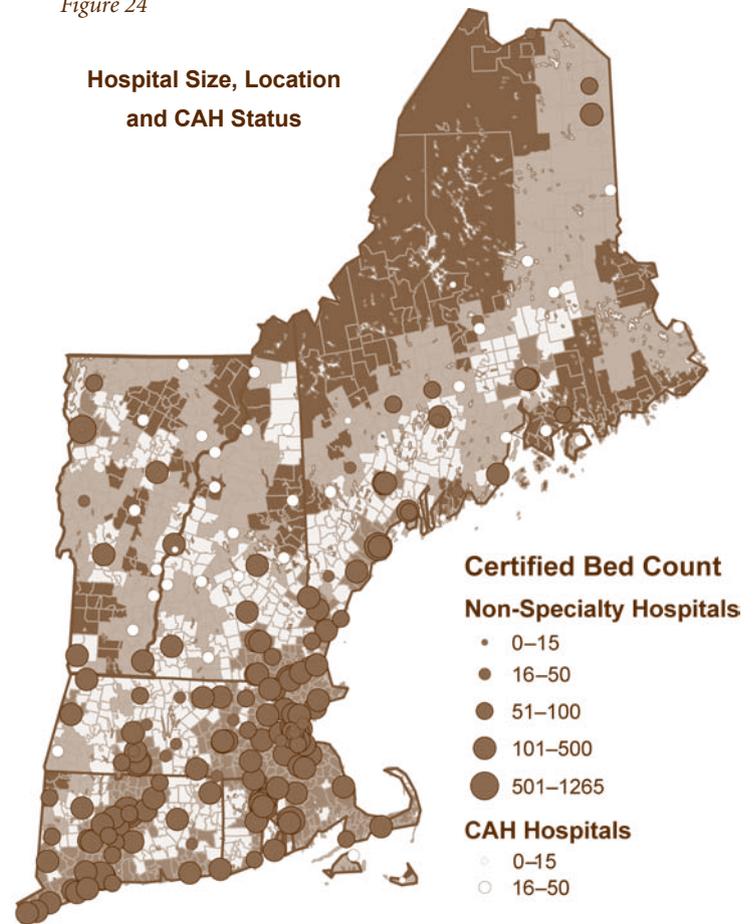
3. Hospitals

Looking at the distance between hospitals and the population that relies on them may provide some insight into potential access barriers to hospital services. Figure 24 shows the locations and relative bed size of hospitals throughout New England (excluding specialty, rehabilitation, psychiatric, and military/VA facilities) based on data derived from the HRSA Geospatial Data Warehouse. One can see from this map that residents of rural areas of the region must travel greater distances to reach the nearest hospital, and potentially further to reach a larger hospital with more specialized services.

Figure 25 quantifies the proportion of each tier that may experience geographic barriers by looking at those that must travel more than 15 miles to get to a hospital. The 15 mile radius represents the half way point for the 30 mile inter-hospital distance in the Critical Access Hospital (CAH) regulations. More than 9% of rural residents live beyond 15 miles from any hospital, compared to only 0.5% of the non-rural population. Predictably, there is also a strong pattern across the rural tiers, with approximately 25% of the isolated rural population living more than 15 miles from any hospital. Nearly half of the residents in this tier live more than 10 miles from a hospital.

The issue of hospital distance is exacerbated in rural areas due to persistent structural issues with the Emergency Medical Services (EMS) system, as cited in many studies. The *New Hampshire Rural Health Report* examined EMS runs over a three-year period and found that the response time for emergent runs was 77% longer in rural areas and nearly double in the most remote regions. The study further found that EMS runs in rural areas of the state were more than twice as likely to be for non-emergent/transportation purposes, further stretching the system.¹¹

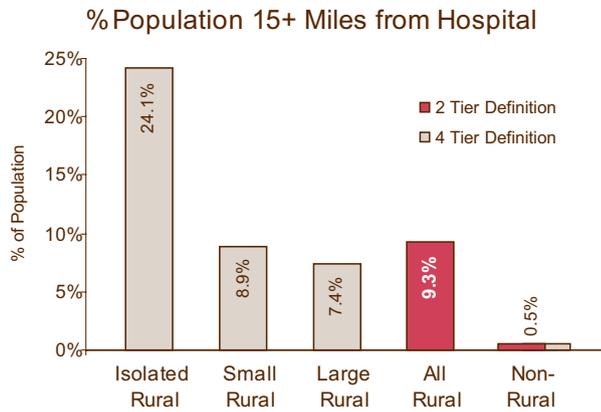
Figure 24



Source: HRSA Geospatial Data Warehouse 9/06

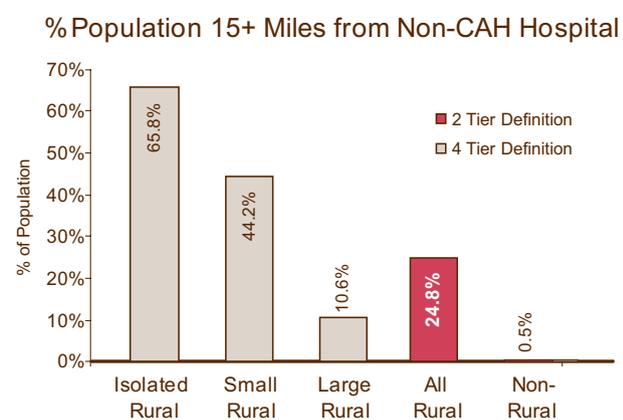
The map in figure 24 also shows which hospitals are designated as CAH; a program which provides enhanced reimbursement to support the viability and effectiveness of small, isolated, rural hospitals. Examining the map, one notes that virtually all CAH designated hospitals fall within the small and isolated rural tiers, with much of the large rural tier served by rural hospitals which have not adopted CAH status. To quantify the importance of this program, figure 26 shows the results of the same 15 mile access calculation as in figure 25 if one excludes CAH hospitals. Note that without CAH designated facilities, the proportion of rural residents without a nearby hospital jumps from 9% to 25%, and the proportion in the small and isolated rural tiers jumps from 9% and 24% to 44% and 66% respectively. Clearly the most remote areas of New England are highly dependent on hospitals supported by this program.

Figure 25



Source: HRSA Geospatial Data Warehouse 9/06, 2000 Census Population

Figure 26



Source: HRSA Geospatial Data Warehouse 9/06, 2000 Census Population

C. Utilization

There are many factors that contribute to the patterns of utilization for health care services. Utilization is mediated both by the need/demand for services, as well as factors promoting or limiting access to those services, such as availability, cost, and convenience. The latter factors are particularly important for services such as primary care and even elective hospitalization, which can be purposefully avoided, delayed, or shifted to other resources.

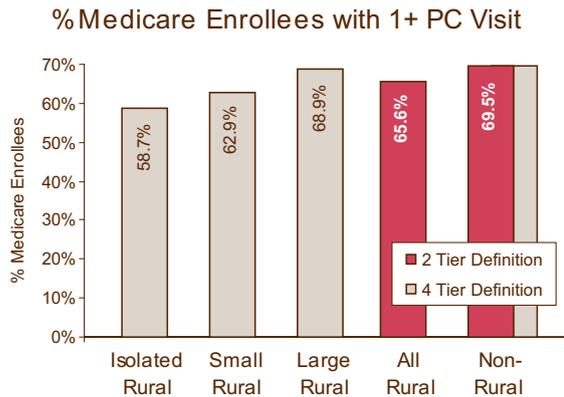
1. Primary Care

While population-based utilization statistics for services such as primary care visits are not collected in a comprehensive way, the Primary Care Service Area (PCSA) data provides some insight into such utilization through analysis of claims data within the Medicare program. Though this data focuses on the elderly population, it reflects nearly all utilization within this population, and research has been done showing that geographic utilization patterns generally correlate moderately well with utilization by the Medicaid and private insurance population in several states.¹²

Figure 27 shows the proportion of Medicare enrollees having at least one primary care visit within the past year, across each of the defined tiers. Because the data pertains to the elderly, for whom an annual physical is generally indicated, variations in population and practice variations in clinical demand are largely eliminated. Based on this data, Medicare beneficiaries are approximately 6% less likely to have a primary care visit in rural areas, compared to those in the non-rural tier, and there is a notable pattern with increasing rurality. Notably, only 59% of elderly residents in the isolated rural tier had a primary care visit within the one-year time frame—a rate 15% lower than in the non-rural tier.

15% “Only 59% of elderly residents in the isolated rural tier had a primary care visit within the one-year time frame—a rate 15% lower than in the non-rural tier.”

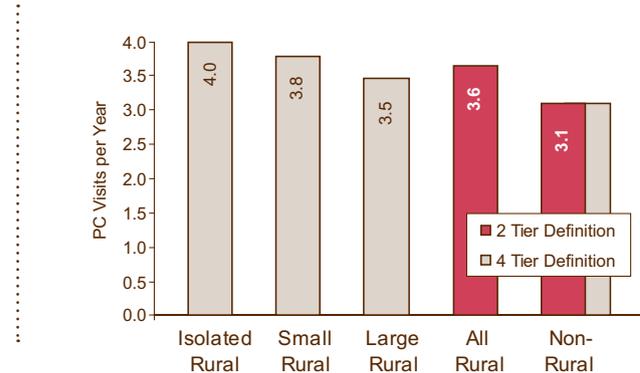
Figure 27



Source: PCSA - CMS/Medicare 1999

Figure 28

Age-Adjusted Medicare Primary Care Visit Rate

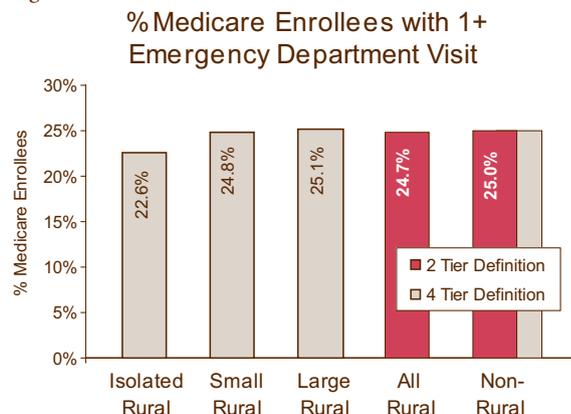


Source: PCSA - CMS/Medicare 1999

Interestingly, while the proportion of the population having one or more primary visits appears lower in rural areas, the statistics indicate that the frequency of utilization is higher. Figure 28 shows that the age-adjusted visit frequency for primary care services is approximately 17% higher in rural areas compared with the non-rural tier. Also there is a notable pattern of increasing visit frequency as rurality increases, with the enrollees in the isolated rural tier averaging 0.5 visits more per year than those in the large rural tier.

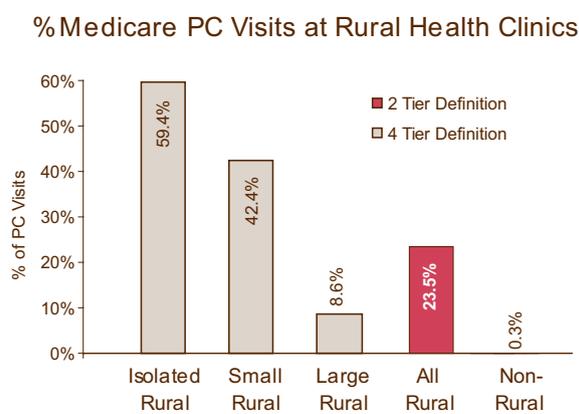
Figure 29 shows the proportion of the Medicare population with at least one visit to a hospital emergency department (ED) visit within the past year. In the context of this report, the figure is most notable for the lack of differences observed between rural and non-rural areas, particularly in light of the patterns observed for primary care utilization. Those with barriers to primary care tend to display higher rates of ED utilization.

Figure 29



Source: PCSA - CMS/Medicare 1999

Figure 30



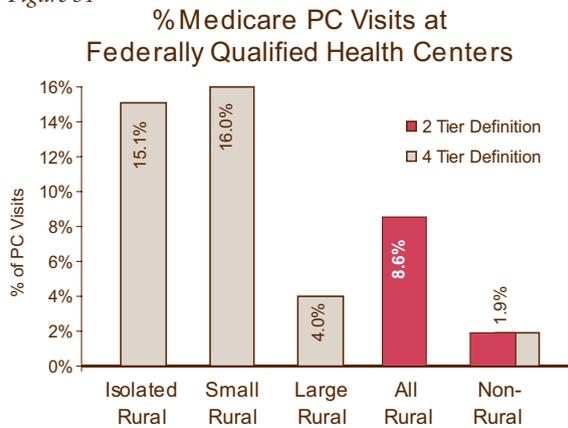
Source: PCSA - CMS/Medicare 1999

This is due in part to redirected routine access and in part to increases in visits for ambulatory care sensitive (ACS) conditions that are best controlled through primary care services. This, however, does not appear to be the case in rural areas of the region. Rural and non-rural areas have nearly identical rates, and the isolated rural tier, which had a notably lower rate of primary care utilization within the Medicare population as shown above, also has a slightly lower rate of ED utilization. The frequency of ED utilization is also essentially identical across all tiers. The data tend to suggest that lower proportions utilizing primary care may be offset by higher utilization rates (or other differences in the nature of the primary care relationship in rural areas not identified here) and that it is not being offset by higher ER utilization.

There are several federal programs in place to support rural access to primary care, which significantly support the observed access to services in these areas. The HPSA designations, noted above, permit an area to access several such programs. While the study does not have direct statistics on all of these, the PCSA data does provide a measure related to one of the more significant programs: Rural Health Clinics. Rural Health Clinics (RHCs), which may also be established in areas designated by a state's governor or, in a Medically Underserved Area, receive enhanced Medicare and Medicaid reimbursement to promote the establishment and sustainability of services in these areas. Figure 30 demonstrates the importance of RHCs as a resource in rural areas, using Medicare beneficiaries as a proxy.

Obviously, these clinics provide virtually no service to non-rural residents (likely only when they are traveling away from their place of residence). Looking within the rural tiers, it is clear that reliance on RHCs is strongly tied to the level of rurality. RHCs provide over 20% of all Medicare primary care visits in New England's rural areas overall. While impressive in itself, that statistic belies the fact that RHCs provide nearly 35% of the primary care visits in the small rural tier and over half of the visits in the isolated rural areas. Clearly, the primary care access in these remote rural areas is highly tied to the presence of this program.

Figure 31



Source: PCSA - CMS/Medicare 1999

Another key program related to primary care access is the Federally Qualified Health Center (FQHC) program—also commonly referred to as Community Health Centers (CHCs), though this term may be applied to a somewhat broader group of practices. FQHCs are key resources for low-income patients, as these organizations receive significant grant funding to support the cost of providing care to uninsured patients unable to pay for services, as well as enhanced Medicare and Medicaid rates. Figure 31 shows the importance of these providers in rural areas. While the absolute proportion of total visits is smaller than for the RHC program in rural areas, the pattern clearly shows that they are key resources for these communities. Overall, residents of the rural tiers are more than four times as reliant on the FQHC program compared to the non-rural tier. In the small and isolated tiers, FQHCs provide approximately 14–15% of all primary care visits; approximately eight times the reliance in the non-rural tier.

Because an organization cannot participate in the RHC and FQHC programs simultaneously, these proportions are additive. Combined, the RHC and FQHC programs account for approximately one-third of all Medicare primary care visits in the rural tiers, and 50%–65% of the visits in the small and isolated rural tiers respectively. Clearly, rural residents of the New England region are highly dependent on these programs for their primary care access.

2. Hospitalization

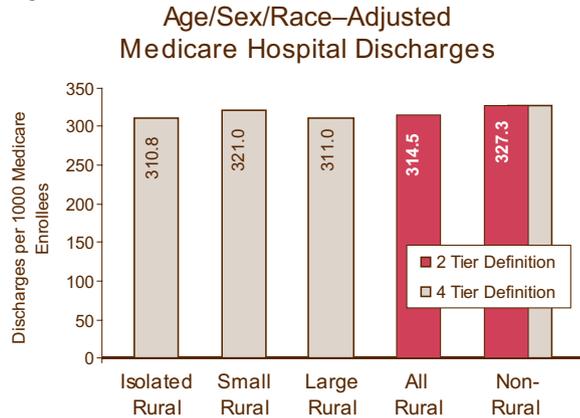
Figure 32 shows the age/sex/race adjusted hospital discharge rates for residents of the New England region. The data indicate very similar rates of hospitalization across all tiers, though the rate for persons residing in each of the rural tiers is slightly lower than the non-rural rate, with a collective rural tier rate approximately 4% lower. The crude (non age-adjusted) hospitalization rates also follow this pattern, with a

50%–65%

“Combined, the RHC and FQHC programs account for approximately one-third of all Medicare primary care visits in the rural tiers, and 50%–65% of the visits in the small and isolated rural tiers respectively. Clearly, rural residents of the New England region are highly dependent on these programs for their primary care access.”

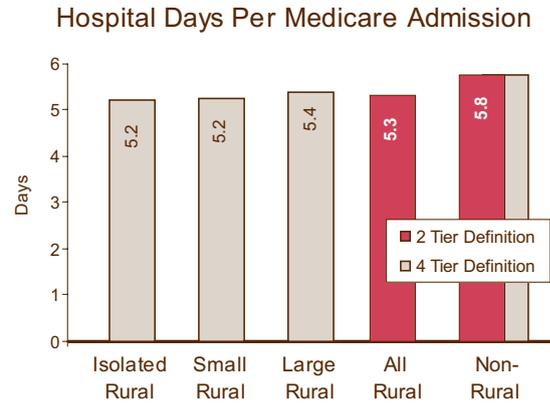
rural rate approximately 8% lower than in the non-rural tier. This pattern of similar, though slightly lower, hospital discharge rates is also observed when hospitalizations are separated between medical and surgical admissions, with the age-adjusted rural rates being 4% and 3% lower than the non-rural rate respectively.

Figure 32



Source: PCSA - CMS/Medicare 1999

Figure 33

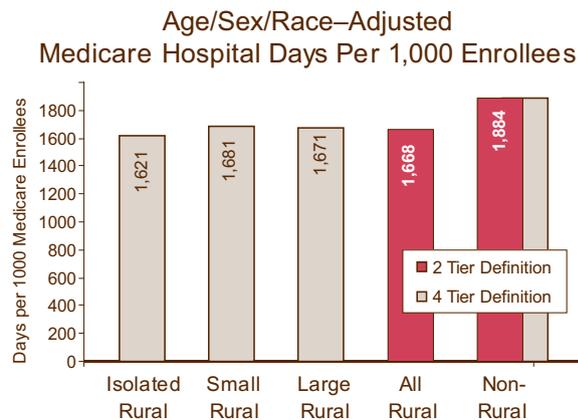


Source: PCSA - CMS/Medicare 1999

Figure 33 shows the length of hospital admissions. Here again, one observes slightly lower length of admission for residents of the rural tiers, with the age-adjusted days per admission approximately 8% lower than the length for admissions of non-rural residents. Note that, as with other statistics in the report, the data are based on the patient’s place of residence, not the location of the hospital, so this should not be impacted directly by service mix or length of stay restrictions placed on CAH hospitals.

Taken in combination, the slightly lower rates of hospitalization and slightly shorter length of stay produce a more prominent difference in overall age-adjusted utilization of hospital services between the rural and non-rural tiers, as shown in figure 34. Medicare residents in the rural tiers collectively used 216 fewer hospital days per 1,000 compared with their non-rural counterparts; a difference of approximately 11%. Because the study did not have access to a statistic on hospitalization for ‘marker’ conditions, which are less prone to variations by financial or geographic access barriers, it is not possible to determine to what degree the difference is linked to either demand or access.

Figure 34

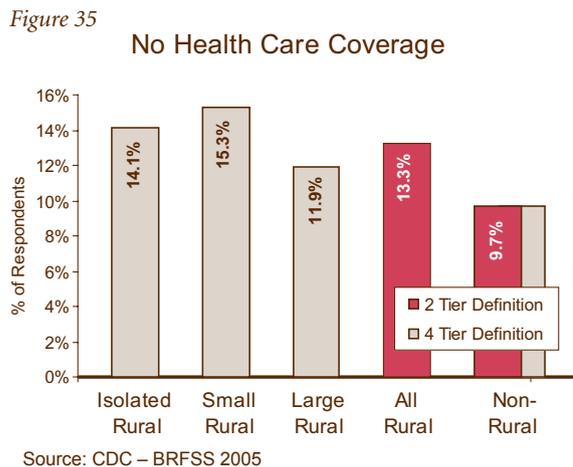


Source: PCSA - CMS/Medicare 1999

D. Risk Factors

1. Health Insurance and Routine Care

Health insurance has obvious implications for access to care, particularly with respect to routine services for families with limited income. The demographic statistics noted earlier in the report indicate that the rural areas of New England are characterized by lower family incomes, and a greater degree of self employment and employment in occupations commonly associated with the absence of health insurance benefits. Access to health insurance is one of the key areas addressed in the national *Healthy Rural People 2010* report, which noted it as the focus area most frequently selected as a rural health priority in a survey of state and local rural health leaders. Furthermore, studies have shown that the uninsured suffer from worse health status than people with coverage, use fewer services, face higher out-of-pocket spending, and that ultimately, a large percentage of uninsured adults simply cannot afford insurance coverage.¹³



37% “Collectively, residents of the rural tiers were 37% more likely than their non-rural counterparts to lack health insurance. The differences are even greater when the small and isolated rural tiers are examined separately.”

A measure of insurance availability and the resulting impact on access can be obtained via analysis of the Behavioral Risk Factor Surveillance Survey (BRFSS) data.* Figure 35 shows the disparity in health care coverage (including any public or private form) between rural and non-rural areas. Collectively, residents of the rural tiers were 37% more likely than their non-rural counterparts to lack health insurance. The differences are even greater when the small and isolated rural tiers are examined separately, with mean rates of uninsurance 45% and 57% higher than in the non-rural areas. These results are similar to other findings from the region, including the 2004 *New Hampshire Rural Health Report*, which found that rural residents (under age 65) were 48% more likely to be uninsured¹⁴.

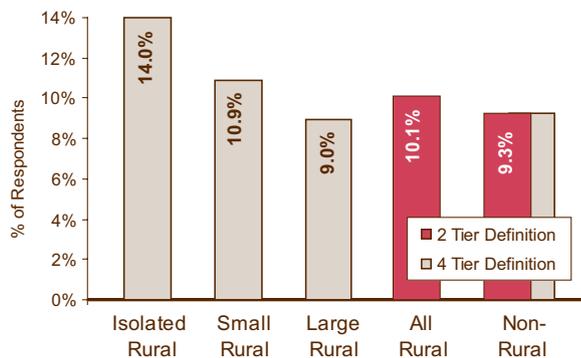
*NOTE: Unlike other data in this report, which are based on direct population-based rates, the BRFSS is based on a sample, requiring a weighting strategy and producing results within a broader confidence interval around the mean. Results are tested at the 95% confidence level, and means reported where statistical differences exist. See Appendix B for details on the use of BRFSS data for this study.

Perhaps an even more relevant statistic from the BRFSS survey is the question regarding instances where respondents reported being unable to see a doctor due to the cost. This measure combines the concepts of income and insurance, as well as accounting for the growing problem of under-insurance. Figure 36 shows the mean percentages reporting such an instance in the past year. While the difference between all-rural and non-rural tiers does not meet the 95% test of significance, the pattern increases notably with the degree of rurality to the point that residents of the isolated rural tier are statistically 51% more likely to have gone without care due to cost, compared to non-rural residents.

51% “Residents of the isolated rural tier are statistically 51% more likely to have gone without care due to cost, compared to non-rural residents.”

Figure 36

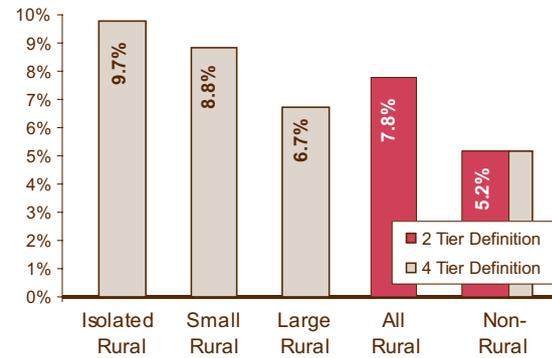
Could Not See Doctor Because of Cost



Source: CDC – BRFSS 2005

Figure 37

No Checkup in Past 5 Years



Source: CDC – BRFSS 2005

One of the most likely components of health care access to suffer as a result of cost is the routine checkup. Failure to access routine and preventive care can lead to late identification of emerging health care issues and can result in more costly and complicated illness. Figure 37 shows the proportion of the population stating that they have not had a routine checkup within the past five years, as would be indicated for any person regardless of age. The data indicates a 50% greater proportion of rural residents going five or more years without a checkup, and the degree of difference increases with the level of rurality. In the small and isolated rural areas, the rates are 71% and 88% higher than in the non-rural area respectively; representing nearly 10% of the population in the latter tier. The statistics from the PCSA data on the Medicare population’s primary care access also seem to show this pattern, though to a lesser degree—possibly related to the presence of Medicare coverage and the age of the enrollees.

Interestingly, the issues of care avoidance noted above do not appear to relate to lacking a routine or usual source of care, as is often the case. Those that report having no or multiple routine sources of health care are virtually identical (at approximately 19%) across all tiers in the study. This ties to the findings, noted on previous page, that indicate comparable provider availability in rural areas. Together, these statistics would indicate that provider availability is a less important factor in limiting access to routine primary care services compared with factors related to insurance and cost.

2. Personal/Behavioral Risks

While data was not available on illicit substance use, the BRFSS data did provide some insight into the levels of alcohol and tobacco use.

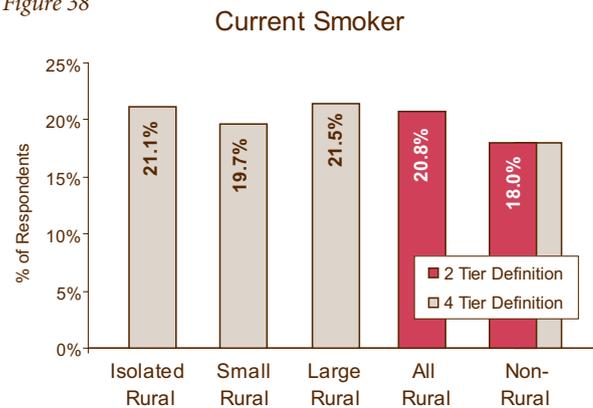
Figure 38 shows the proportion of survey respondents (all adults) that identify themselves as current smokers. All of the rural tiers showed a somewhat higher rate of smoking, resulting in a statistically significant 17% greater proportion of the population smoking in the rural tiers compared with the non-rural tier (20.8% vs 18% respectively). On a more positive note, however,

rural areas also showed a greater proportion of residents identifying themselves as former smokers, indicating that the smoking rate disparity between rural and non-rural areas is narrowing. Note, however, that the statistic on smoking during pregnancy, discussed on next page, points to a significant ongoing issue in rural areas.

In terms of alcohol consumption, the BRFSS data examined parameters including binge drinking, heavy drinking, and the mean number of drinks consumed in a month. For all of these factors, the data did not support any notable difference between rural and non-rural tiers, or within the rural tiers.

The issue of overweight/obesity was also examined with the BRFSS via a calculated Body Mass Index (BMI). While the mean values for rural areas were slightly higher than in non-rural areas, the statistics did not support a difference at the 95% confidence level.

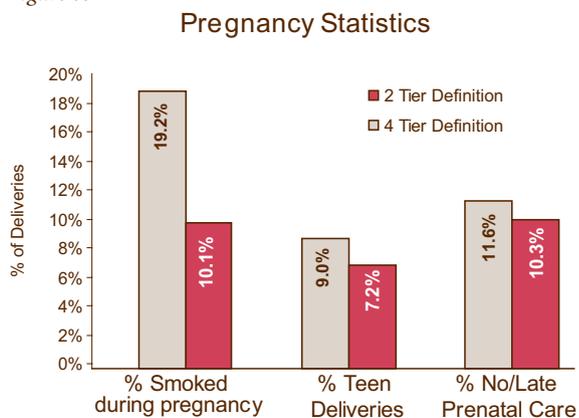
Figure 38



Source: CDC – BRFSS 2005

Figure 39 looks at statistics derived from CDC birth records over a three-year period, related to maternal factors, that relate to birth outcomes (note that data is not available to support the four-tier rural analysis). The most notable difference is in the rates of maternal smoking during pregnancy. Mothers in rural areas of New England are nearly twice as likely to report smoking during their pregnancy compared to mothers in non-rural areas. The observed rate of smoking amongst pregnant women in the rural tiers (19.2%) approaches the overall adult smoking rate from the BRFSS (20.8%). While smoking is somewhat more prevalent in rural areas, the maternal smoking rate in non-rural areas is only about half the overall smoking rate. The data also show a 26% higher rate of teen pregnancy in rural areas, as well as a 13% higher rate of absent or late entry into prenatal care. These findings point to a potential gap in the public health, family planning, and/or maternal education resources in place in rural communities.

Figure 39



Source: CDC/NCHS – WONDER Vital Statistics 1999–2001

“Mothers in rural areas of New England are nearly twice as likely to report smoking during their pregnancy compared to mothers in non-rural areas.”

E. Health Status and Outcomes

Ultimately, the socio-economic and demographic factors influencing need and access to care interact with the public health and health service delivery system in place to deliver that care, to produce a population with a given health profile. Health status and outcomes are the ultimate measure of the delivery system’s ability to meet the underlying needs of the population, though such measures ignore disparities in the degree of effort and/or resources needed to achieve those outcomes.

1. Overall Health Status

At the most basic level, health status can be assessed based on how an individual feels regarding their personal health. The BRFSS provides several measures in this regard. Figure 40 shows the proportion of respondents describing their health status as fair or poor. Though some slight variations appear, the data did not support a statistical difference between the rural and non-rural tiers, nor within the three rural tiers. The same lack of statistical difference is observed for the mean number of days that respondents reported that their physical health and separately, their mental health, was not good in the past month. It should also be noted that the data were weighted to the population, but could not be age-adjusted. These results seem to indicate that, overall, rural residents do not report experiencing worse physical and mental health status than those in non-rural areas.

2. Birth Outcomes

Figure 41 shows statistics on birth outcomes from the CDC birth records, based on the mother's place of residence at the time of delivery. Despite the potentially negative maternal perinatal behavior seen in figure 39, the low birth weight rate in the rural areas is 14% lower than in the non-rural tier. This may partially relate to a similarly low rate of premature delivery in rural areas, the incidence of which is 9% lower in rural vs. non-rural areas. Interestingly, the rate of 'post date' delivery (calculated as the proportion of deliveries at 42+ weeks gestational age) is notably 46% higher in the rural tiers. Because post-date delivery is essentially avoidable through induction and cesarean section, this statistic may be more directly linked to the degree of active prenatal oversight intervention compared to the premature and low birth weight rates. Also, these procedures are generally beyond the scope of family practice providers, necessitating specialist intervention. The relative lack of obstetrician resources compared to family practitioners in the rural areas (see figure 17) may have some bearing on this finding.

Figure 40

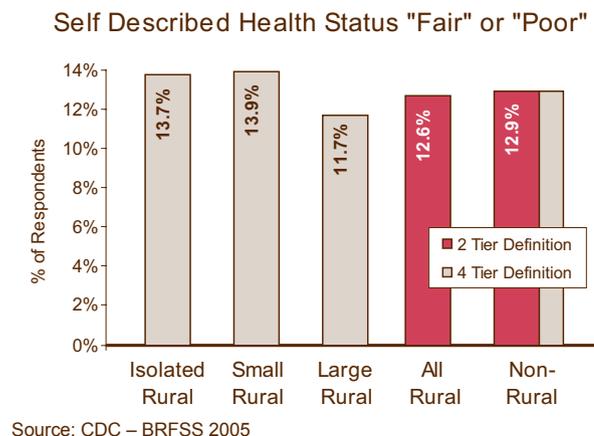
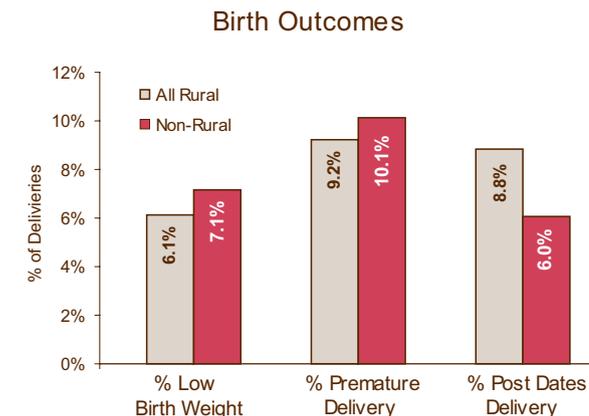


Figure 41



3. Chronic Disease

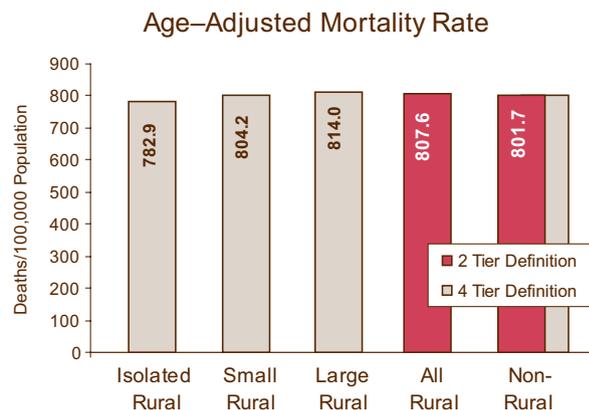
The BRFSS data provides a variety of measures of self-reported chronic disease status and management. The survey asked respondents if they had ever been told by a health care provider that they had diabetes, high blood pressure, high cholesterol, coronary heart disease, or asthma. The survey also asked about height and weight to permit a body mass index to be calculated to determine overweight/obesity status. Though the percentage of respondents stating that they had these conditions was slightly higher (by about 4% for most, 8% for coronary heart disease, and 9% for obesity) none of these differences was statistically significant. One must also keep in mind that the survey permitted weighting to the population in each state, but not age-adjusting of the statistics.

Questions were also asked regarding the detection, management, and outcomes of chronic diseases. Respondents were asked if they had ever had their cholesterol checked and those with hypertension were asked if they were currently taking medications to control the condition. For both of these statistics the rates were nearly the same, which would seem to indicate that access to care and medication was equitable between rural and non-rural areas. In terms of outcomes, the questionnaire asked if respondents had ever been told that they had had a myocardial infarction or a stroke. Here again, the rural percent with these conditions was higher (by 10% and 19% respectively) but the differences were not statistically significant.

4. Mortality

The ultimate measure of health status and outcomes within a population is the mortality rate. The mortality rate is the result of underlying disease and injury rates balanced against the availability, accessibility, and quality of the health care system in place to respond to and manage these health issues. Both of these components are mediated by a wide variety of underlying factors, many of which are discussed in this report. Figure 42 shows the age-adjusted mortality rate for the population across the rural tiers. Because the risk of dying increases dramatically with advanced age, crude death rates—which do not account for age differences—are naturally higher in the more rural tiers, where the proportion of elderly is higher; as shown previously in figure 4. When age is taken into account, however, we observe that the mortality rates are effectively equal across the three rural tiers and the non-rural tier. The 2004 *New Hampshire Rural Health Report* produced similar findings for comparative death rates in that state, including total deaths and deaths in all major internal/diagnostic categories.¹⁵

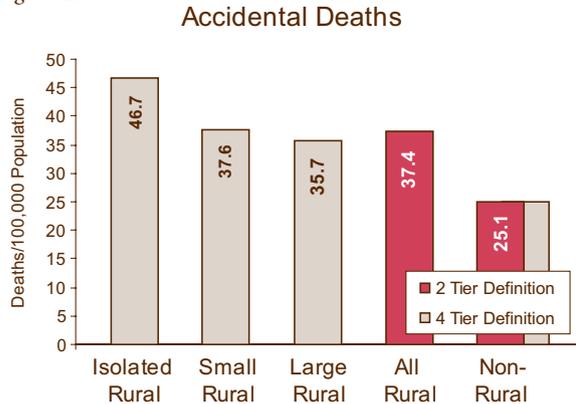
Figure 42



Source: CDC/NCHS – WONDER Vital Statistics 1999–2001

While region-wide age-adjusted data was not available for all of the internal/diagnostic causes of death at a detailed level of geography, one can examine the crude rates for ‘external’ causes of death, which are less directly linked to the aging process.

Figure 43



Source: CDC/NCHS – WONDER Vital Statistics 1999–2001

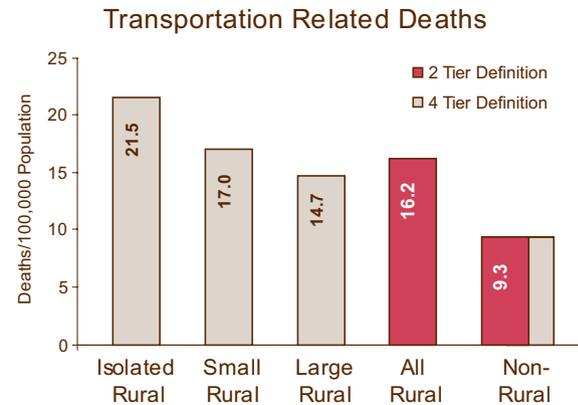
50% “The rural rate of accidental death is nearly 50% higher than in the non-rural areas and the rate in the isolated rural areas is effectively double.”

One of the most notable differences between rural and non-rural areas of the region is in the area of accidental deaths. The rural rate of accidental death is nearly 50% higher than in the non-rural areas and the rate in the isolated rural areas is effectively double.

While some of the difference in the accidental death rate may be attributable to factors related to rural lifestyle and infrastructure, in terms of recreation, occupation, and transportation; there are reasons to believe that medical resources may also be a factor. The *Healthy Rural People 2010* report cited studies showing that injuries in rural areas tend to be more severe than in urban areas and that the trauma patients needing advanced care in these areas were less likely to receive it due to the EMS infrastructure.¹⁶ The *New Hampshire Rural Health Report* found that the eight-minute emergency call response time goal was exceeded on 44% of runs in rural parts of the state and over 60% of the time in the most remote areas, compared to 24% of the time in the non-rural communities.¹⁷

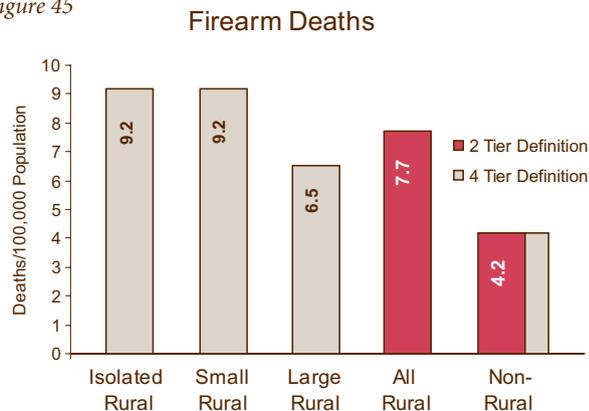
Looking more deeply into the issue of accidental deaths, one of the greatest contributing factors appears to be transportation-related accidents (mostly motor vehicle fatalities). Figure 44 shows that deaths due to transportation accidents are 73% more likely in the rural tiers, and there is also a strong pattern related to the degree of rurality. The rate of transportation related deaths in the isolated rural tier is more than double the rate in the non-rural tier. The natural assumption here might be to imagine that the roads or vehicles used in rural areas result in more accidents. However, nationally, data show that only one-third of motor vehicle accidents occur in rural areas, yet two-thirds of motor vehicle-related deaths occur there.¹⁸ Examining the proportion of accidental deaths related to transportation in New England, one sees that transportation accounts for 43% of the accidental deaths in rural areas, compared to 37% in non-rural areas; a 16% difference.

Figure 44



Source: CDC/NCHS – WONDER Vital Statistics 1999–2001

Figure 45



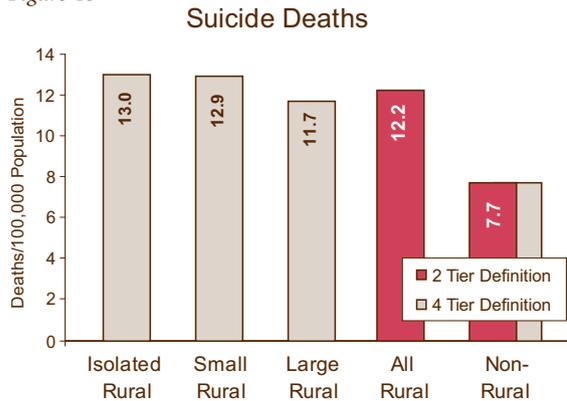
Source: CDC/NCHS – WONDER Vital Statistics 1999–2001

84% “There is a notably higher rate of firearm-related deaths in the rural tiers, where the rate is 84% higher than in non-rural areas.”

Another external factor leading to higher mortality in rural areas is the presence and use of firearms. While firearm-related deaths can be either accidental or intentional (suicide/homicide), there is a notably higher rate of firearm-related deaths in the rural tiers, where the rate is 84% higher than in non-rural areas.

A final area of importance for rural communities is the rate of suicide. As shown in figure 46, the suicide rate in rural areas of New England is nearly 60% higher than in the non-rural parts of the region. While slightly higher in the more rural tiers, the finding is basically consistent across the rural tiers and is also consistent with national rural suicide statistics. The National Association for Rural Mental Health (NARMH) noted that rural-urban differences are one of the most significant variables with regard to suicide in all areas of the United States.

Figure 46



Source: CDC/NCHS – WONDER Vital Statistics 1999–2001

60% “The suicide rate in rural areas of New England is nearly 60% higher than in the non-rural parts of the region.”

While this difference is partially attributed to variations in isolation, age, and socioeconomic stress; the NARMH asserts that, “perhaps one of the most obvious explanations, given that one of the biggest risk factors for suicide is untreated mental disorder, is the lack of access to mental health services and the shortages of specialized mental health practitioners in rural areas”.¹⁹ This is very consistent with the indication of provider shortages evidenced by the proportion of the New England rural population covered by a Mental Health Professional Shortage Area (figure 23).



Appendix

Appendix A: RUCA Designations and Crosswalk to NERHRT Definitions

1. Metropolitan area core: primary flow within an urbanized area (UA)
 - 1.0 No additional code
 - 1.1 Secondary flow 30% to 50% to a larger UA
2. Metropolitan area high commuting: primary flow 30% or more to a UA
 - 2.0 No additional code
 - 2.1 Secondary flow 30% to 50% to a larger UA
3. Metropolitan area low commuting: primary flow 10% to 30% to a UA
 - 3.0 No additional code
4. Micropolitan area core: primary flow within an Urban Cluster of 10,000 to 49,999 (large UC)
 - 4.0 No additional code
 - 4.1 Secondary flow 30% to 50% to a UA
 - 4.2 Secondary flow 10% to 30% to a UA
5. Micropolitan high commuting: primary flow 30% or more to a large UC
 - 5.0 No additional code
 - 5.1 Secondary flow 30% to 50% to a UA
 - 5.2 Secondary flow 10% to 30% to a UA
6. Micropolitan low commuting: primary flow 10% to 30% to a large UC
 - 6.0 No additional code
 - 6.1 Secondary flow 10% to 30% to a UA
7. Small town core: primary flow within an Urban Cluster of 2,500 to 9,999 (small UC)
 - 7.0 No additional code
 - 7.1 Secondary flow 30% to 50% to a UA
 - 7.2 Secondary flow 30% to 50% to a large UC
 - 7.3 Secondary flow 10% to 30% to a UA
 - 7.4 Secondary flow 10% to 30% to a large UC

8. Small town high commuting: primary flow 30% or more to a small UC

- 8.0 No additional code
- 8.1 Secondary flow 30% to 50% to a UA
- 8.2 Secondary flow 30% to 50% to a large UC
- 8.3 Secondary flow 10% to 30% to a UA
- 8.4 Secondary flow 10% to 30% to a large UC

9. Small town low commuting: primary flow 10% to 30% to a small UC

- 9.0 No additional code
- 9.1 Secondary flow 10% to 30% to a UA
- 9.2 Secondary flow 10% to 30% to a large UC

10. Rural areas: primary flow to a tract outside a UA or UC

- 10.0 No additional code
- 10.1 Secondary flow 30% to 50% to a UA
- 10.2 Secondary flow 30% to 50% to a large U
- 10.3 Secondary flow 30% to 50% to a small UC
- 10.4 Secondary flow 10% to 30% to a UA
- 10.5 Secondary flow 10% to 30% to a large UC

Key

- Non-Rural
- Large Rural
- Small Rural
- Isolated Rural
- N/A for New England

Appendix B: Data Sources and Tables of Findings

The full set of tables developed in the analysis for this report will not be included in the report directly, however they can be accessed on the NERHRT web site at www.newenglandruralhealth.org.

The tables detail all data elements examined in the development of this report, and show the data points for each of the 3 rural tiers, the combined all rural tier, and for the non-rural tier. The tables also show the calculated difference between the all rural and non-rural tiers in absolute and ratio terms.

The following data sources formed the basis for the analyses in this document:

Data File:	United States Census – Summary File 3
Year:	2000
Source:	US Bureau of Census
Geographic Unit:	Zip Code Tabulation Area (ZCTA)
Data File:	Primary Care Service Area
Years:	AMA/AOA 2000–2001, AAPA 2001, CMS/Medicare 1999
Source:	Federal Bureau of Primary Health Care & Dartmouth College Center for Evaluative Clinical Studies: based on several underlying sources – see http://knox.dartmouth.edu/pcsa/downloads/data_sources.pdf
Geographic Unit:	Primary Care Service Areas (PCSA)
Data File:	Births
Years:	1999–2001
Source:	HHS / Centers for Disease Control and Prevention (CDC) National Center for Health Statistics (NCHS), Division of Vital Statistics, Natality public-use data via CDC WONDER On-line Database
Geographic Unit:	County (small population counties grouped)
Data File:	Deaths
Years:	1999–2001
Source:	HHS / Centers for Disease Control and Prevention (CDC) National Center for Health Statistics (NCHS), Division of Vital Statistics, Compressed Mortality public-use data via CDC WONDER On-line Database
Geographic Unit:	County

Data File:	Health Professional Shortage Areas
Year:	Current Designations – September 2006
Source:	HHS/HRSA – Bureau of Health Professions, Shortage Designation Branch – via Geospatial Data Warehouse
Geographic Unit:	Designations comprised of various underlying geographic units
Data File:	Hospitals (bed size/location)
Year:	Current Listing – September 2006
Source:	HRSA Geospatial Data Warehouse
Geographic Unit:	Point Facility Locations
Data File:	Behavioral Risk Factor Surveillance Survey (BRFSS)*
Year:	2005
Source:	HHS / Centers for Disease Control and Prevention (CDC).
Geographic Unit:	County

*Note on the Analysis and Weighting of the BRFSS Data

The 2005 BRFSS data for all six New England states were downloaded from www.cdc.gov/brfss. Cases were coded to the tiers of the rural definition based on the respondent’s county of residence (the most detailed geographic level available). Results were then adjusted for the complex sampling design, using the CDC-supplied 2005 BRFSS weights, which account for region, number of residential telephones, number of adults in households, and post-stratification non-response by age/gender/race. Each state has its own set of weights and they were applied to respondents from the corresponding state. Regional results were computed by then combining the weighted data for the six states, treating each state as a stratum in the sample design. State population estimates for 2005 are from the US Census. Analyses were conducted in SAS, which has procedures (e.g., PROC SURVEYFREQ, PROC SURVEYMEANS) which can accommodate complex survey designs in the computations of point estimates and standard errors.

Results are reported as mean cell values based on weighted data and, in parentheses, the 95% confidence interval around the mean based on the Standard Error (SE) values. The 95% confidence intervals were computed using the formula Mean +/- 1.95*SE.

End Notes

1. WWAMI Rural Health Research Center. The Use of RUCAS (Version 1.11) in Health Care. Jan 06: http://depts.washington.edu/uwruca/ruca1/use_healthcare.html
2. Bott, D. Bazos, D. Townsend, C. Marth, N. Barriers to Primary Care - The New Hampshire Access Indicator Project. NH Endowment for Health January 31, 2005
3. New Hampshire's Basic Needs and Liveable Wage Report. University of New Hampshire Office of Economic Initiatives. 2006
4. Making KIDS COUNT in Rural Northern New England, New England Kids Count Collaborative, Fall 2004.
5. Gamm, Larry D., Htuchinson, Lianne L., Dabney, Betty J., Dorsey Alicia M., eds. (2003). Rural Health People 2010: A Companion Document to Healthy People 2010. Volume 1. College Station, Texas; The Texas A&M University System Health Science Center, School of Rural Public Health, Southwest Rural Health Research Center. p. 46
6. Goodman, David C., The Committee on Pediatric Workforce; The Pediatrician Workforce: Current Status and Future Prospects; Pediatrics, Jul 2005; 116: e156 - e173.
7. Rural Healthy People 2010, p.47
8. Rural Healthy People 2010, p.10
9. Massachusetts Oral Health Report: Mapping Access to Oral Health Care in Massachusetts; Oral Health Collaborative of Massachusetts. October 2006
10. Sawyer, D. Gale J. Lambert D., Rural and Frontier Mental and Behavioral Health Care: Barriers, Effective Policy Strategies, Best Practices; National Association for Rural Mental Health. 2006.
11. New Hampshire Rural Health Report. New Hampshire Department of Health and Human Services. 2004. p 17.
12. Goodman, D. Primary Care Service Areas: A New Tool for the Evaluation of Primary Care Services; Health Services Research. 38:1 Feb. 2003. p. 287-309
13. Dubay, L. Holahan, J. Cook, A. The Uninsured And The Affordability Of Health Insurance Coverage Health Affairs 26, no. 1 (2007): w22-w30
14. New Hampshire Rural Health Report, p 22.
15. New Hampshire Rural Health Report, p 25.
16. Rural Healthy People 2010, p.77-78
17. New Hampshire Rural Health Report, p 17.
18. Rural Healthy People 2010, p.77
19. Beeson, P. Some Notes and Data on Rural Suicide (<http://www.narmh.org/pages/resnotes.html>)



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A Report by the New England Rural Health RoundTable