

Rural Data for Action

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

**Second Edition
October 2014**





Mission: “The New England Rural Health RoundTable is a forum for promoting healthy rural communities and solutions to the unique health challenges facing rural New England.”

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Massachusetts	H95RH00145	\$177,548	\$6,000	0%
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Foreward

On behalf of the New England Rural Health RoundTable and its members, I am pleased to present this Second Edition of our report, *Rural Data For Action – A Comparative Analysis of Health Data for the New England Region*. The audience for this information includes the diverse group of community leaders, legislators, health care providers, administrators, and others who work to address the complex issues related to supporting and enhancing the region's rural health care system. The first report, released in 2006, has been widely used as a resource for education, policy, and planning in this regard. This edition of the report updates many of the elements examined in the earlier publication, examines the trend in these elements over time, and incorporates a range of additional metrics now available.

As our mission statement notes, identifying and addressing the unique health challenges facing rural New England is the reason for the RoundTable's existence, and is the impetus behind the development of this report. Just as we leverage the combined power of the otherwise fragmented rural communities across the six New England states to identify issues and promote solutions that will work in the rural context of the region, this analysis combines the statistical power the data describing these small communities into rural 'tiers' to highlight health related differences tied to rurality.

There are several reasons for updating the analysis at this time. First, much of the data in the original report is now well over a decade old, and much has happened in the region during that time. Rising health care and insurance costs were already issues when the 'Great Recession' of 2008 hit, causing the loss of jobs and industries upon which many relied for both income and insurance while straining public resources. Conversely, the past decade also saw efforts aimed at increasing access, including a significant expansion of federal resources for Community Health Centers and the National Health Service Corps, as well as the implementation of fundamental health reform in Massachusetts, which became a model for health reform nationally.

The Patient Protection and Affordable Care Act (ACA) marks the largest effort at improving access nationally since the creation of Medicare nearly 50 years ago. Many aspects of the ACA are intended to address key issues faced by rural communities, but the law is also built largely on a model of private market insurance competition and large employer incentives, which can often be a challenge in rural areas, and the decision regarding Medicaid expansion for those most in need is being made at the state level. The data in this report largely describes the situation prior to the implementation of the ACA's major provisions, and is intended to serve as both a planning tool, and a benchmark against which to measure and monitor the implementation of the ACA in rural areas across many dimensions.



Kim Mohan
Executive Director
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I. Executive Summary

The New England region is an iconic part of the American landscape, with a history dating back before the founding of the nation itself. While some parts of the region have become urban centers of education and commerce, the term New England still evokes primarily rural images; ranging from its rocky shoreline, beaches, and coastal fishing tradition, to pristine lakes, rivers, forested mountains and winding roads dotted by small towns and farms. To visitors, even from urban parts of the region itself, rural New England may appear idyllic, and in many ways that is true. But rural living also presents a unique set of challenges, and addressing them is the key to preserving the viability of these communities in the long term. The challenges of demographic and economic factors, physical distance, sparse population, and resource availability in rural areas combine most acutely in terms of health and health care delivery. Establishing and maintaining health care resources in rural areas is an ongoing struggle, and solutions that may work in more urban settings are often not practical in a rural context. As a result, rural communities often fail to benefit from initiatives intended to address issues they face.

The unique health needs of rural areas of the region are also easily overlooked, as data on small populations is suppressed or excluded, and inherently small population numbers are quickly overwhelmed when combined with data from more metropolitan areas. By aggregating the data pertaining to small and fragmented rural communities across the region into rural ‘tiers’, this analysis is able to produce results that validly quantify the differences between communities of differing levels of rurality and compare them to metropolitan areas. The analysis breaks the ‘Rural’ areas of the region into three sub-tiers of increasing rurality; termed ‘Large Rural’, ‘Small Rural’, and ‘Isolated Rural’. The Rural results are then compared to those for ‘Metro’ areas of the region, which are broken into two sub-tiers of increasing urbanization; termed “Small Metro” and “Core Metro”. This approach permits overall Rural: Metro differences to be examined, but also quantifies the impact of increasing rurality within the aggregate tiers.

In the largest sense, the results of this analysis paint a picture of a rural health in the region that is similar to the top level findings from the prior report, which described it as, “a functioning yet fragile system struggling to overcome a variety of underlying challenges”. The trends observed were decidedly mixed, with notable improvements in some areas, as well as some notable declines and growing gaps. The overall self-assessed health status of the rural population remained generally comparable to that of the Metro population of the region, and considerably better than the national average, though the portion reporting ‘fair/poor health’ increased in all areas. Age-adjusted total mortality also remains generally comparable between rural and metro areas, though the rate declined regionally and fell somewhat less in rural areas.

While it appears that the rural health delivery system is functioning to uphold the overall health status of the population measured broadly, this masks some notable differences and troubling trends in key demographic, access, and outcome indicators. These differences often follow a pattern strongly associated with increasing rurality.

The rural population is different from the metro population along key demographic measures related to health status and access to care. The rural population is aging at a faster rate than in Metro areas, with greater gains in the portion of elderly residents and greater declines in youth. Average incomes have risen notably, but this has not benefited those at the lower end of the income scale, as the percentage of people living in poverty or with low income has increased and is particularly high in the more remote rural areas. In spite of the passage of health reform in one of the region's largest states, the overall level of uninsurance has increased across the region; remaining higher and rising faster in rural areas, which are also notably more dependent on Medicaid for coverage.

Discrepancies regarding the availability and mix of primary care providers, and related access indicators, persist and are likely to expand. Primary medical care provider levels are up regionally, but remain lower in Rural areas. The rural physician workforce is also older, suggesting that this gap could widen in coming years. Rural areas continue to be more dependent on non-physician providers for primary care, which may help offset losses of physicians in the future, but the level of growth in Physician Assistants was faster in Metro areas. Rural residents are far more likely to have gone without a checkup or routine preventive tests, such as cholesterol levels, within the past 5 years. Expectant women in Rural areas continue to smoke at a much higher rate than in Metro areas. Chronic disease rates, which had been largely equivalent between Rural and Metro areas, have begun to diverge due to faster rates of increase in Rural areas.

The picture is significantly worse for dental and mental/behavioral health access and outcomes in rural areas. Dentist availability per capita is notably lower in rural areas. Rural dentists are also considerably older and more likely to work part time, further expanding the gap, both currently and likely in the future. Dental Health Professional Shortage Area (DHPSA) designations cover nearly half of the population in the more remote rural areas. The result is reflected in lower portions of rural residents reporting a dental visit in the past year.

Mental/behavioral health findings include nearly half of the population in isolated rural areas covered by a Mental Health Professional Shortage Area (MHPSA) designation, and a dramatically higher and rising suicide rate in rural areas overall, despite comparable portions of the population reporting having mental health problems. This finding may be partially associated with the higher and increasing rate of firearm deaths in rural communities. Alcohol and substance use and dependency rates are somewhat lower in rural areas of the region, but the rates in New England overall are considerably higher than national rates.

Rural access is heavily dependent on the support of federal programs, without which rural results might look much worse. In the small and isolated rural areas more than a third of the total population and nearly three quarters of the low income population are seen at Federally Qualified Health Centers (FQHC) each year. The majority of all primary care for the elderly in isolated rural areas takes place at a Rural Health Clinic or Federally Qualified Community Health Center. Rural populations are much more likely to live 15+ miles from the nearest hospital, or to be reliant on a single hospital within that distance. Maintaining even this level of access depends heavily on hospitals which are supported by Critical Access Hospital (CAH) status, which has come under threat recently.

Rural communities are home to a greater proportion of military veterans. Data obtained from the Veterans Health Administration (VA) suggests that rural veterans are more likely to rely on the VA for care, but may have greater trouble accessing these services effectively, as reflected in lower individual utilization rates for mental/behavioral health care and a range of other VA services.

These results point toward issues that must remain the focus of efforts aimed at assuring rural access and improving rural health in the region. Some rural strengths are clearly evident, but many challenges continue to exist. Many of the issues highlighted raise as many questions as they answer, and continued focus on these issues will be needed to develop effective solutions. As the nation moves forward with the implementation of health reform, and climbs out of the recent recession, there is reason to be hopeful that rural communities may benefit from these changes, but this is by no means guaranteed. The New England Rural Health RoundTable will continue to monitor progress, share information, advocate for change, and bring rural communities and stakeholders together to assure continued progress.



II. Methods

A. The Rural Definition for New England

1. Updating the New England Rural Definition

Just as this report is intended to update and expand upon the data elements summarized in the last version of the New England Rural Health RoundTable's Data Book: *Rural Data For Action*, it was also important to update the underlying definition of what areas of the region are classified as rural and to what degree. It might seem desirable to keep the geographic definition of rurality constant to permit any trends in common data elements to be cleanly defined within those same communities, but it was acknowledged at the outset that doing so would fail to reflect the changing and evolving nature of the region and its rural areas. Looking forward, a static definition would grow increasingly outdated as this process is repeated in future cycles.

Instead of keeping the final classification of communities constant, it was decided that the analysis should keep the underlying methods for classifying communities constant, by continuing to base the definition on the Rural Urban Commuting Area (RUCA) "secondary-level" codes, developed by the WWAMI Rural Health Research Center for the USDA's Economic Research Service and Federal Office of Rural Health Policy.¹ This definition was selected because it met a variety of requirements for this analysis, in terms of being a definition that: 1) is a widely accepted standard, 2) is objective and independent of health related factors, 3) is sufficiently detailed to support sub-rural classifications that reflect the diversity of New England, and 4) produces geographic clusters that do not overly fragment the region and maintain sufficient population in the most rural tier to be capable of supporting statistically meaningful results.

The NERHRT rural definition is created by grouping the 21 RUCA codes into the Rural and Metro (called 'Non-Rural' in the prior analysis) 'tiers' to be used for the data aggregation and analysis in this report. See Technical Appendix A for the list of RUCA codes and their assignment to the Rural tiers. Here again, the preference was to keep codes consistent with the prior analysis, however there was one exception. RUCA code 7.1* had been defined as "Non-Rural" (Metro) in the prior report but was seen to fit more logically into the 'Small Rural' tier in both the RUCA schema overall, and with the new coding in which these areas were fragmented and no longer adjacent to Metro communities. This shift impacted only 14 Census Tracts in the region, covering approximately 67,000 residents.

The only other change in RUCA classification was to further subdivide the Metro tier into two sub tiers: Core Metro (RUCA 1.0) and Small Metro (RUCA 1.1). This change does not impact the prior definition as both tiers are still aggregated into a combined "Metro" tier, equivalent to the "Non-Rural" tier used previously. Having some sense of the diversity of results in the much more populous Metro tier was felt to be beneficial to the overall understanding of the Rural-Metro impact on each measure. Also, it should be noted that the RUCA schema only provides two Metro codes, providing no flexibility in defining sub-categories and producing some non-obvious groupings. For example, outlying areas around Boston (Plymouth, Taunton, Framingham, Newburyport, etc.) fall within Core Metro due to commuting patterns, while larger cities like Providence are classified as Small Metro. Still the distinction means that cities such as Boston and Hartford will be differentiated from smaller less connected cities such as Worcester, Springfield, and Manchester NH. See the map and tables that follow for the results of the current definition.

* RUCA 7.1 is defined as Small town core: primary flow within an Urban Cluster of 2,500 to 9,999 (small UC), Secondary flow 30% to 50% to an Urbanized Area

Figure 1 - Map of Revised New England Rural Definition

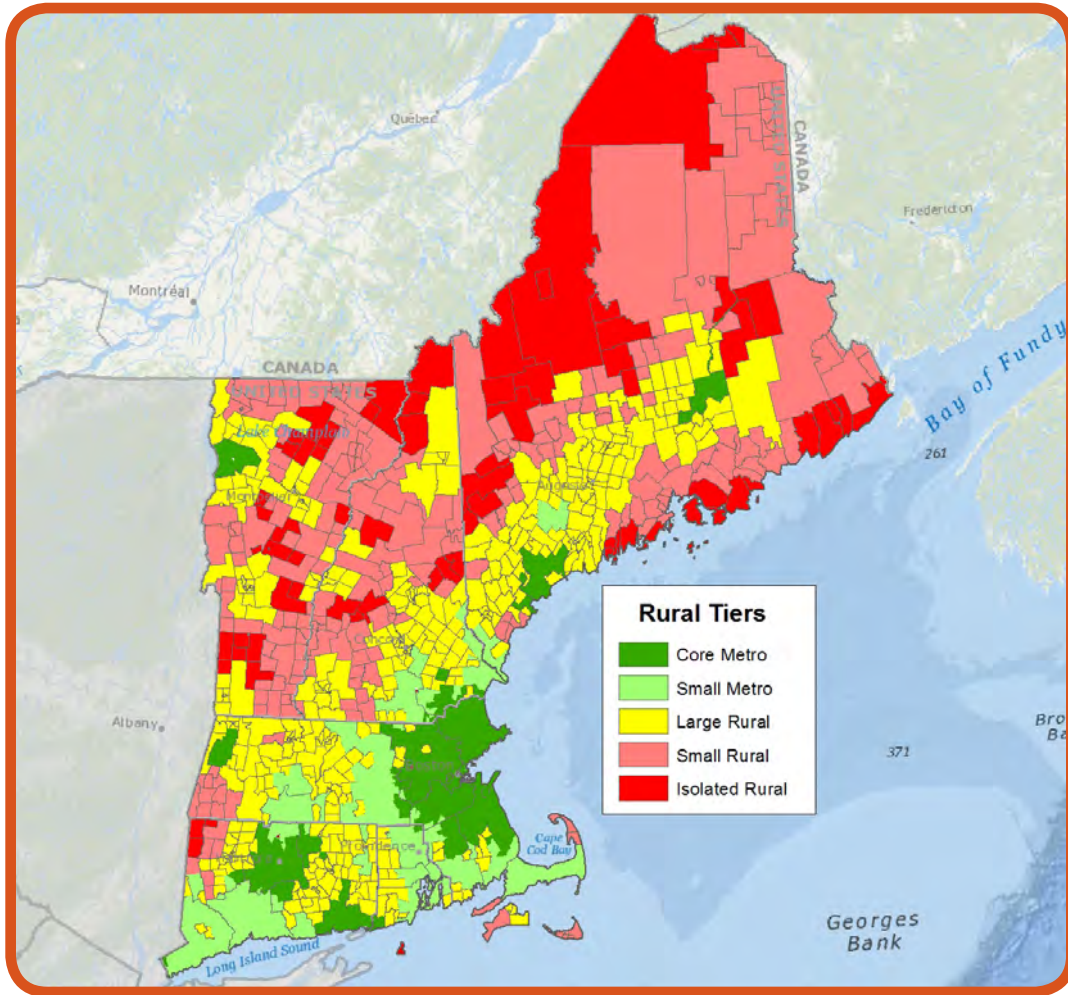


Figure 2 - Land Area, Population, and Density by Rural Tier

Rural tier	Population	Percent of Population	Land Area	Percent of Land Area	Population Density
Isolated Rural	184,447	1%	13,313	21%	14
Small Rural	849,375	6%	22,590	36%	38
Large Rural	1,810,411	13%	16,923	27%	107
All Rural	2,844,233	20%	52,827	84%	54
Small Metro	5,578,705	39%	5,337	9%	1,045
Core Metro	6,034,320	42%	4,524	7%	1,334
All Metro	11,613,025	80%	9,861	16%	1,178
New England	14,457,258	100%	62,687	100%	231

Looking at the numbers shown in Figure 2, one can clearly see the divide between the Rural and Metro tiers in the region and the relatively sharp divide that separates them. Collectively, the 3 Rural tiers cover 84% of the land area of the region, yet only 20% of the population lives in these rural areas. The average population density in the Metro areas of the region is over 20 times as high as in the combined Rural areas. While there is a range in population density within the Rural and Metro sub tiers, the change in population density

between Rural and Metro areas is unambiguous; with the Small Metro tier having a density approximately 10 times higher than the Large Rural tier. Within the Rural tiers, there are also significant differences in density, though not as sharply drawn as with the Metro areas. The Isolated Rural tier covers more than 20% of the region’s land, but contains just 1% of the population. While these maps and figures highlight the rural nature that characterizes much of New England, they also serve to emphasize the need to focus on rural areas separately, as they often face unique challenges that can be easily overlooked when statistics are aggregated with the much larger number of people that make up the Metro areas.

1. Comparison to Prior Rural Definition and Coverage

Beyond the one minor reclassified RUCA code noted, the rural definition itself was the same as that used in the prior report. That said, there were significant shifts in which areas of the region fell into which rural tiers. These are the result of three underlying factors: 1) the geographic units used, 2) the underlying data sources, and 3) actual shifts in the population in the region. The net effect of these changes was that approximately half of the geographic units in the region were in a different RUCA class than they were for the prior report, including 53% of tracts classified as rural. The impact on the final New England rural definition was less, with only 6% of total tracts changing the rural tier they would have been assigned in the prior report, however the change was more concentrated in rural areas, where 21% of tracts in the rural tiers changed class (excluding the purposeful reclassification of RUCA 7.1), with 7% of these switching to a Metro tier.

The prior NERHRT data book had incorporated RUCA version 2.0, which was based on 2000 Census population and commuting data, and the zip code approximation of this definition was selected for geographic units. For this new analysis, an updated version of the RUCAs was used (RUCA 2010), which incorporates the 2006-2010 5-year American Community Survey (ACS) data and is based on a census tract level of detail, as the zip code version was not available at the time of the analysis. Had the boundaries of the former definition been used and the population updated to the 2010 Census, the population shifts shown in Figure 3 would have taken place.

Figure 3 – Population Trend from Prior Rural Definition, 2000–2010

Basis	Prior Boundaries, 2000 Pop	Change from 2000 Pop		Prior Boundaries, 2010 Pop	
		#	% or Prior		
Population	All Metro	11,158,425	376,633	3.4%	11,535,058
	All Rural	2,764,092	145,715	5.4%	2,909,807
	Large Rural	1,734,076	122,014	7.0%	1,856,090
	Small Rural	782,924	18,499	2.4%	801,423
	Isolated Rural	247,092	5,202	2.1%	252,294
	New England Total	13,922,517	522,348	3.8%	14,444,865
% of Total	All Metro	80.1%	-0.2%	79.9%	
	All Rural	19.9%	0.2%	20.1%	
	Large Rural	12.6%	0.2%	12.8%	
	Small Rural	5.6%	-0.1%	5.5%	
	Isolated Rural	1.7%	0.0%	1.7%	

*Note: Population numbers differ slightly from report tables as 2010 1-year block level data was needed for these comparisons and a slight correction was needed in the total population in the prior report

One sees that, in the most recent past decade, the New England region overall added 3.8% population, or just over one half million residents. Areas that had been classified as Rural in the prior data book experienced population growth of 5.3% - a nearly 60% greater growth rate than in the Metro tier, which added 3.4% population. Looking deeper, however, one sees that this difference is entirely the result of 7% growth in the Large Rural tier, which grew at more than twice the rate of the Metro tier, while the Small and Isolated tiers lagged Metro at 2.4% and 2.1% growth respectively.

This report, as noted above, does not simply use the former RUCA codes and rural boundaries, but rather adopts the new RUCA 2010 coding and the census tract based geography instead of zip codes. Examining the actual changes in RUCA coding of communities, and the resulting shift in the New England definition, it is clear that changes other than simple population growth were involved. The following table shows the actual change in population classified in the rural tiers between the prior definition and the updated definition for this report. Keep in mind that the tiers do not cover the same communities between the old and new definition, and the population has changed as well.

Figure 4 – Population Difference from Prior to Current Rural Definition

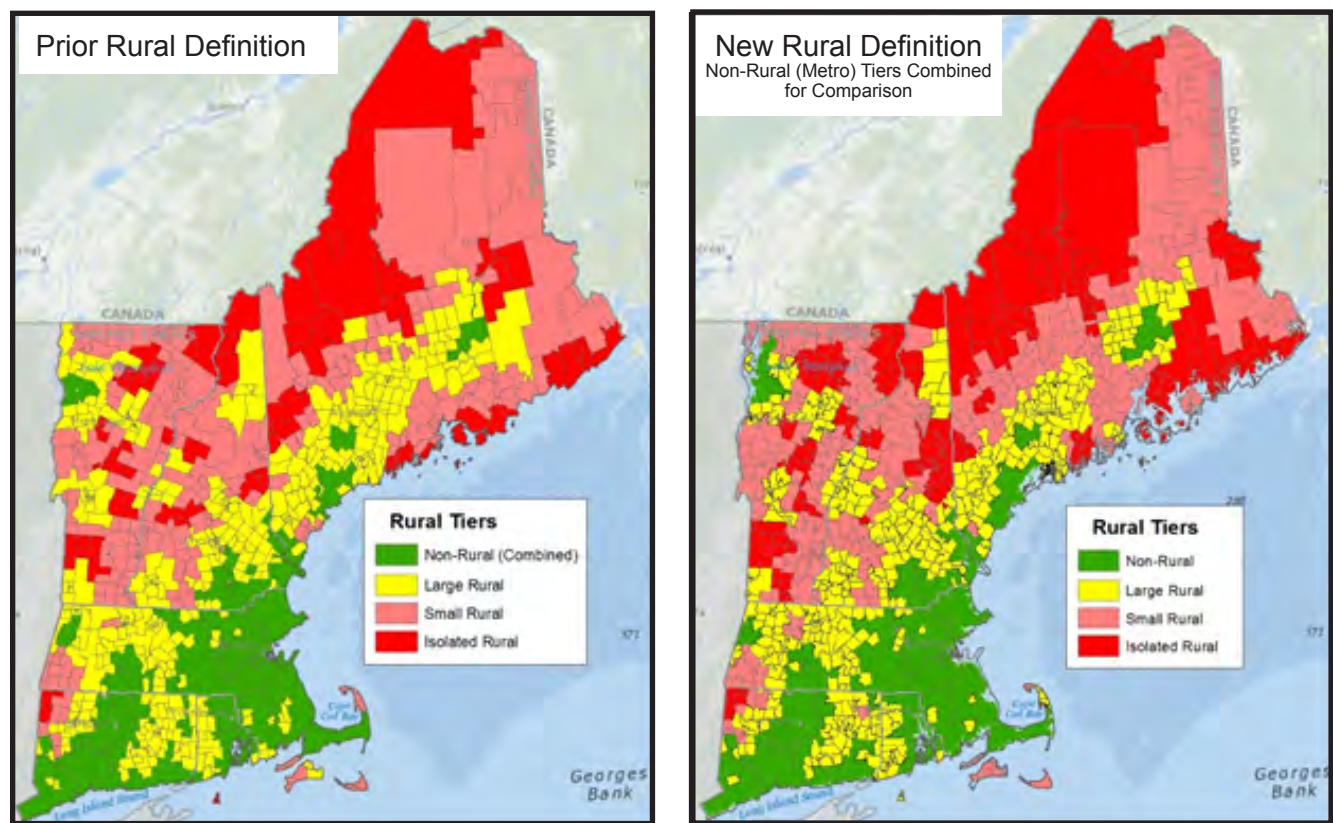
Basis	Geography	Zip Code 2000	Change from Prior Boundaries & 2000 Pop		Tract 2010
	RUCA Version	2.0			2010
	NERHRT Classification	Prior Report			Shift 7.1
	Population Basis	2000	#	% of Prior	2010
Population*	All Metro	11,158,425	441,966	4.0%	11,600,391
	All Rural	2,764,092	80,382	2.9%	2,844,474
	Large Rural	1,734,076	76,142	4.4%	1,810,218
	Small Rural	782,924	64,658	8.3%	847,582
	Isolated Rural	247,092	(60,418)	-24.5%	186,674
	New England Total	13,922,517	522,348	3.8%	14,444,865
Percent of Total	All Metro	80.1%	0.2%		80.3%
	All Rural	19.9%	-0.2%		19.7%
	Large Rural	12.6%	-0.1%		12.5%
	Small Rural	5.6%	0.3%		5.9%
	Isolated Rural	1.7%	-0.4%		1.3%

*Note: Population numbers differ slightly from report tables as 2010 1-year block level data was needed for these comparisons and a slight correction was needed in the total population in the prior report

Looking at this comparison, one sees that the overall distribution of the population between the tiers by percentage is largely similar to the prior definition. A slightly higher portion of the population is classified as Metro under the revised coding and rural definition, even though the new definition reclassifies the 7.1 RUCA code from Metro to Small Rural (which is largely responsible for the greater growth in the Small Rural tier which would otherwise have lost population slightly). This might be expected to some degree, as growth in the formerly rural areas would move some communities out of the rural category naturally. More interesting, however, is the degree to which the new classification impacts the most rural areas. Isolated Rural areas are reduced by 24.5% compared to the prior classification, and Small Rural would have seen a slight reduction (about 2,300 people or 0.3%) had 7.1 not been reclassified.

It is impossible to know or describe the many factors behind these shifting patterns in the RUCA coding fully. The changes were discussed with staff at the USDA Economic Research Service, which is responsible for developing the RUCAs. The discussion highlighted changes in several possible drivers that underlie the RUCAs, even though the method was not changed. These include the change to the continuously sampled ACS for commuting data compared to the former long form Census collected primarily in the spring, the recalculation of Census Urbanized Areas and Urban Clusters to account for shifting population, the impact of the recession on commuting patterns, and the decreasing portion of the population that commutes as the population ages. These factors, combined with the shift from Zip Code to Census Tract units, which can be larger in rural areas, and the purposeful reclassification of RUCA 7.1, produced the changes in the rural definition shown in the maps below:

Figure 5 - Prior and Current Rural Definition Comparison Maps



1. Transformations to Alternate Geographic Units

Lastly, while the base rural definition is defined based on a census tract unit of geography, only certain data elements of interest are available at that level of specificity. As with the prior data book, it was necessary to transform the base rural definition into approximations using other units of geography for which needed data was available. See Technical Appendix A for a complete discussion of the geographic transformations.

B. Data and Analytic Methods

The rural definitions developed were used to aggregate a wide array of available data into comparable statistics describing the distinct rural tiers across the region. The sources and years of data are presented in Technical Appendix B sources and the Detailed Tables Of Results. With the exception of total population and land area, all statistics are reported as normalized values (rates, ratios, or percentages) composed of an aggregate numerator and denominator (universe). This permits comparison across the rural tiers regardless of the size

of the population in each. Many statistics were composed of data where the numerator and denominator could be aggregated directly to obtain the rate. Where only pre-calculated rates were available, statistics were aggregated using weighted means based on the appropriate population denominator. Where survey data and underlying weights were available at the case level, statistics were run directly by assigning cases to the appropriate rural tier based on geographic information about that case.

The primary focus of the analysis is the difference in values between the major Rural and Metro tiers, however examination of the sub-tiers within each major tier is presented and is used to examine any pattern relative to increasing or decreasing rurality which can be masked at the aggregate level.

This iteration of the data book also incorporates two additional reference statistics not available in the prior iteration of the report. First, where practical, equivalent national data was collected and used to provide an external reference for the United States overall, against which to judge rates observed within the region, which is often considered one of the healthiest parts of the country.² Second, where statistics in this data book were also collected and analyzed in a comparable manner to elements in the prior data book, trend data is presented showing the degree and direction of change between the data reporting periods. While these will be described as ‘trend’ data, it is important to keep in mind that the differences described are not truly ‘trends’ as the underlying areas falling within each tier are not held constant between the two reports. Note that many statistics are newly reported and it was not possible to provide prior period data. There are also a small number of elements that appear consistent with elements reported in the prior data book but which are suppressed for reasons related to technical differences in the calculations or underlying data.

A mix of crude and age-adjusted statistics are reported, based on data availability and the relevance of age to the measure. Some statistics are age stratified for similar reasons. For a study such as this, neither approach is clearly correct as the interpretation depends on the use of the result. Crude rates accurately reflect the per-capita statistics for the populations in a given tier, but can make inter-tier comparisons difficult where age differences are a factor. Age-adjusted rates attempt to better isolate the impact of ‘rurality’ between the tiers absent the impact of age differences, but can mask the magnitude of the issue within a given tier.

The data sets, and individual data elements, incorporated were constrained by certain requirements for inclusion. First, the data had to be uniformly available from a single source for all areas of the region. While agencies such as individual state health departments likely have more current or detailed data available, it was not practical to make individual data requests and integrate data in different formats within the scope of this project. Second, data needed to be available at sub-state levels that could reasonably distinguish rural and Metro areas in the region, and data suppression had to be manageable at a level where the rural tiers could be clearly distinguished and described fully. Last, the data had to report statistics uniformly at the population level, and not related to the users of a given provider organization.

The time period described by each measure also varies somewhat due to data availability and the need to aggregate years. The base population data from the American Community Survey was 5-year information covering 2008–2012 and we generally tried to keep data within that time-frame. There are a two birth statistics that predate 2008 due to changes in the birth certificate after that, which prevent aggregation of more recent results. These were felt to be important factors from the prior report. Measures more recent than 2012 generally reflect data that could not be obtained earlier or where current status was most relevant.

While this data book seeks to examine a broad range of issues, the range of potentially available information can be quite large, and potential subsets within each data set by characteristics such as age, gender, poverty, etc. would be vast. As such, this analysis sought data that could describe a representative range of factors covering 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. Additional attention was given to certain topical issues currently in focus and for which this report is intended to serve as a base. These include substance abuse, veteran’s health, and providing baseline data against which to measure the impact of the Affordable Care Act as it is implemented. There is not, however, good data available describing all elements of rural health and the rural delivery system, and additional depth on any given finding can likely be derived through a more focused examination of that issue.



III. Findings

The following sections summarize key patterns and relationships identified in the results, with a primary focus on areas where Rural communities exhibit notable differences from Metro areas, or within different levels of rurality. The Detailed Tables Of Results, contains the full output of the analysis. This includes additional information about the data elements discussed, as well as information on statistics that may have been examined but not highlighted in the narrative. As such, readers are encouraged to refer to the detailed results table as needed. The results table is organized by data source and information category, however the narrative that follows will attempt to draw together potentially related elements from across the available information to present the most comprehensive picture of each topic. The findings presented here do not typically lend themselves to answering the underlying question of *why* differences or trends exist in the data. As such, they are intended as a first step in the process of understanding and quantifying differences and disparities in the health of rural New England, but further exploration would likely be necessary to fully understand the underlying causes for many of the results, and to target efforts towards change.

A. Demographic/Socioeconomic Characteristics

While the demographic attributes of a population do not directly describe the population's health status or access to care, it is generally accepted that demographic characteristics have a dominant influence over ultimate health outcomes. Such factors are often referred to as the Social Determinants of Health, which the CDC defines as "*The complex, integrated, and overlapping social structures and economic systems that are responsible for most health inequities.*"³ Examining differences in underlying factors such as the age, income, education, housing, and employment is essential to understanding many of the direct health and health care system characteristics observed; and are critical to formulation of any plans to address them. Demographic differences are often considered confounding factors in comparative analyses, and techniques such as age adjusting are used to minimize their effect and allow the effect of other, less obvious, factors to be examined. While such approaches have a role in this type of analysis, it is important that demographic differences between rural and Metro areas not be overlooked and that the actual magnitude of the challenges not be forgotten. The statistics below highlight some key differences observed in the region's rural communities.

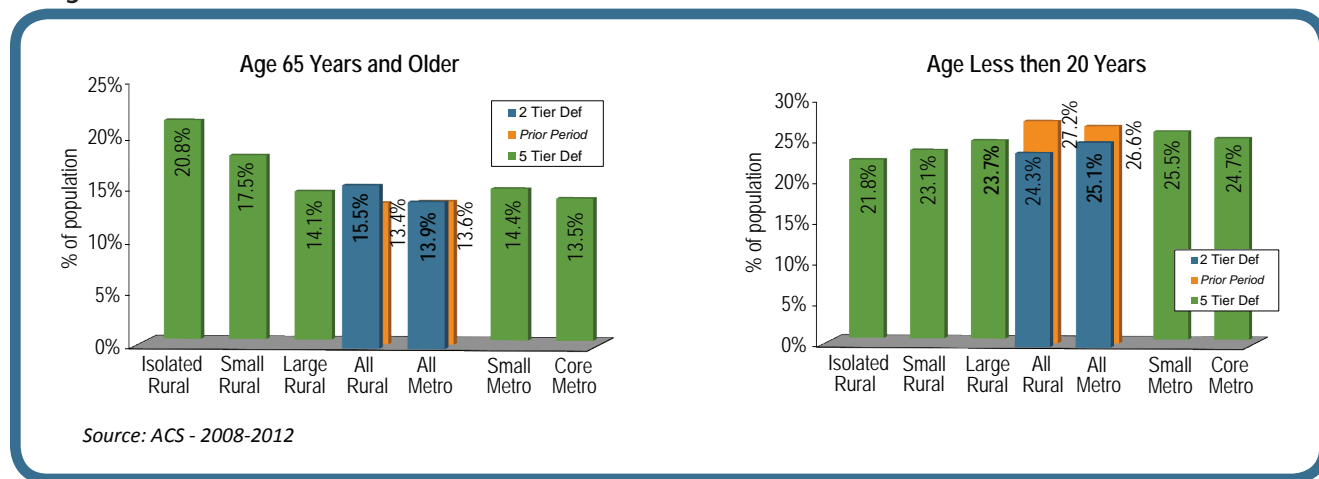
1. Age

The age profile of a population obviously impacts health in many ways. Most obviously, the natural aging process is linked to the incidence of many diseases and the ability of individuals to live and function independently. Different life cycles require different types of health care resources and social supports. Age also influences access to insurance coverage, including Medicare and, prior to the implementation of the Affordable Care Act, Medicaid (assuming states opt into Medicaid expansion). Age is also strongly correlated with other demographic characteristics, such as income and workforce participation.

The most rural areas of the region are characterized by a high and increasing proportion of elderly residents and a decreasing portion of youth under the age 20.

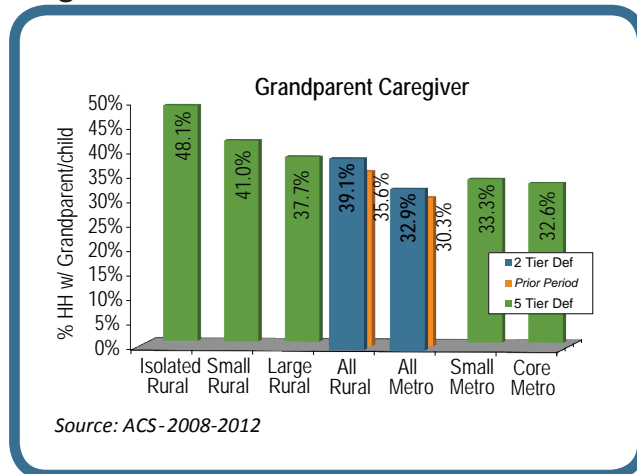
There is a strong pattern related to age observed across the rural tiers, particularly in the most rural areas of the region, which are characterized by a high and increasing proportion of elderly residents and a decreasing portion of youth under age 20 (Figure 6). While the Large Rural tier has approximately the same portion of elderly residents as the Metro tiers, the portion in the Isolated Rural tier is nearly 50% greater (20.8% vs 13.9% and up from 16.7% in 2000). This pattern was observed in the prior data book as well, for the year 2000, but the differences have widened as the portion of youth in the Rural tiers has decreased at about twice the rate of Metro areas, while the portion of elderly has increased far faster in rural areas.

Figure 6



Not only is the portion of elderly residents greater in the most rural areas, the degree of independence and reliance on the elderly is also greater. While we note that nearly 21% of residents in the Isolated Rural tier are elderly, they represent over 30% of the householders in that tier – a proportion 35% greater than in Metro areas (22.4%); again with a pattern strongly tied to the level of rurality. The reliance on grandparents as caregivers is also much higher in rural areas, with nearly half of households where grandparents and grandchildren are present relying on the grandparents in the Isolated Rural tier (48.1%), compared to just under one third (32.9%) in Metro areas (Figure 7). Given the issues related to distance and transportation in remote areas, a high and accelerating rate of independent elderly will be difficult to sustain.

Figure 7



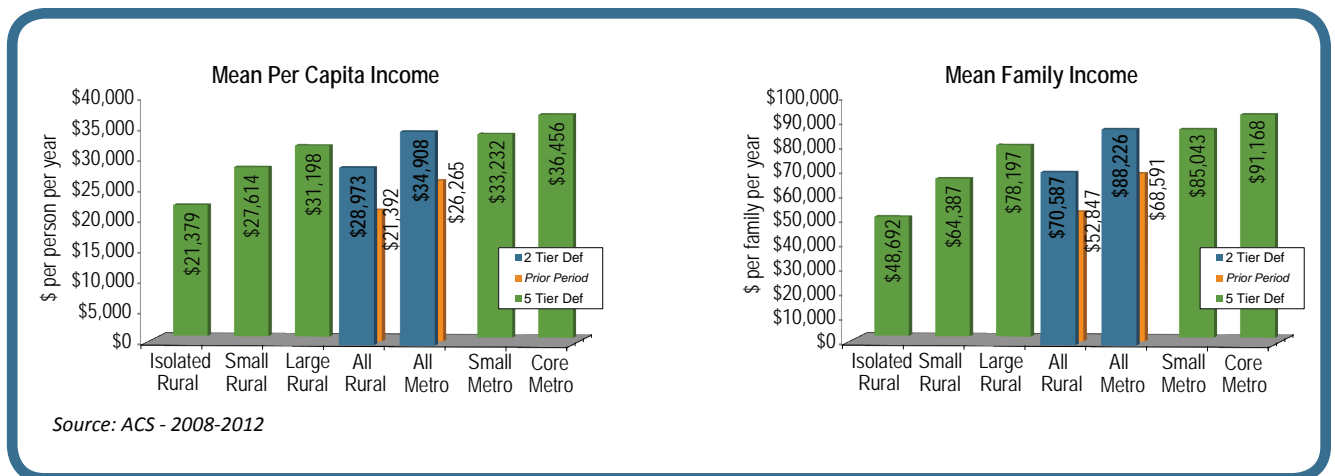
1. Income/Poverty/Assistance

Income and poverty have also long been associated with health, and access to care in particular. Unlike age, which has a largely organic association to health and need for care, income dictates a wide range of health related options and opportunities available, ranging from food and transportation to the ability to pay for health insurance and/or care. At the lower range of the income scale, certain forms of assistance become available to those meeting certain other criteria, in an attempt to provide a social safety net. The nature and amount of one's income also changes with life cycle, as many older individuals rely on

‘fixed’ income from Social Security and savings. Each of these factors contributes to the ability of an individual or family to access basic necessities, including health care, and how they are able to respond to unexpected changes.

In terms of total income, Rural areas continue to exhibit lower mean income levels compared with Metro areas of the region. Mean family income in Rural areas was 20% lower than the mean in the Metro tiers (\$70,587 vs. \$88,226), and mean individual income was 33% lower (\$28,973 vs \$34,908) – See Figure 9. Overall between 2000 and the 2008-2012 period measured here, family and individual income increased by 34% and 35% respectively in Rural areas, compared to 29% and 33% in Metro areas of New England. This led to a slight narrowing of the income gap between Rural and Metro areas. It should be noted, however, that an examination of the trend within the detailed rural tiers shows that, while income growth was strong in the Small and Large Rural tiers, the Isolated Rural areas showed just 10% growth in family income and 6% growth in individual income – less than a third of the increase in other parts of the region.

Figure 8



It should be noted that only mean income can be aggregated for this report. Much attention has been given to growing income inequality in the country, and other results suggest that the growth in income was not experienced across all income levels. One must also keep in mind that the 5-year ACS data combines years 2008-2012 during which time a relatively strong economy fell into a deep recession and then experienced a lengthy recovery.

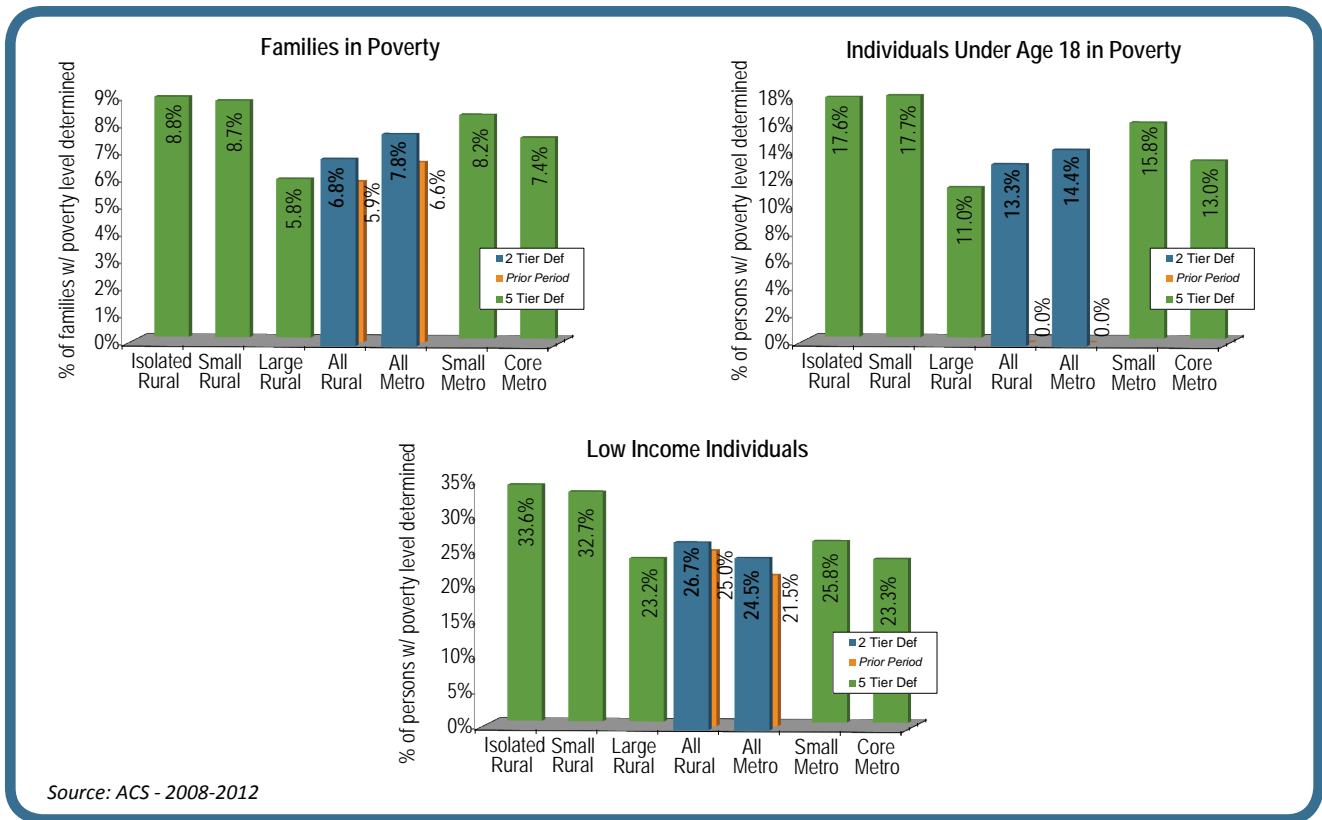
It is perhaps more useful to focus on those at the lower end of the income spectrum, as this is the population that faces the greatest challenges and is most at risk economically. The federal poverty level is set annually and is defined by family size and income level. In 2010 (the central year for the 5-year ACS data used) the poverty rate was set at an income of \$11,344 for an individual and \$ 22,113 for a two parent family of four. Looking at the aggregate Rural tiers it appears that poverty levels are slightly lower than in Metro areas (10.3% vs 11.1%) however, looking at Figure 10 one can see that this masks a sharp divide between the Large Rural tier, which has the lowest poverty level of all tiers (5.8%) and the Small and Isolated rural areas which have the highest poverty levels at 8.7% and 8.8% respectively. Metro areas also exhibit a split on poverty, though less pronounced, which may relate to the practical ability to live in certain areas at this very low income level.

Despite the increases in income noted above, the percent of families in poverty is actually higher than it was in 2000, suggesting that the gains were not felt at the lower income levels, or that they have not kept pace with the cost of living (individual poverty was \$8,959 in 2000). A similar but more exaggerated pattern is observed for individuals in poverty and

across age ranges, but it is most pronounced among the young, where the poverty rates are more than double the rate for the community overall. Nearly 18% of children under 18 and approximately 22% of families with children under 5 years old live in poverty in the Small and Isolated Rural tiers. Low income, defined as double the poverty threshold, also exhibits this pattern. Approximately one third of individuals in the two most rural tiers are low income – a rate over 35% greater than in Metro areas. The low income level is particularly important as it relates to the limit at which sliding fee discounts can be offered at Federally Qualified Health Centers – discussed later.

Approximately one third of individuals in the two most rural tiers are low income – a rate over 35% greater than in Metro areas.

Figure 9



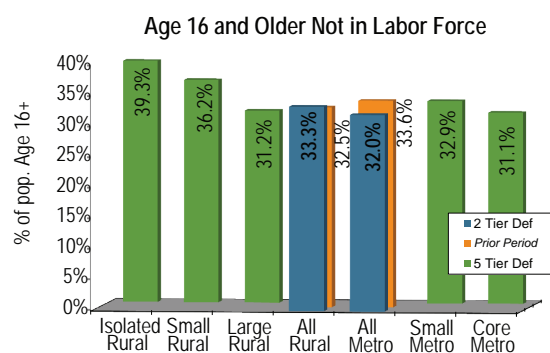
As one might expect, reliance on public assistance also follows a similar pattern to the levels of poverty and low income. The portion of the population using the Supplemental Nutrition Assistance Program (SNAP or food stamps) and Public Assistance income are both about 15% higher in the Isolated Rural tier and 25% higher in the Small Rural tier compared to the Metro areas. Medicaid can also be considered a form of public assistance for the low income, but it will be discussed separately with other insurance. Reliance on fixed sources of income is also a potential source of financial vulnerability, particularly related to health expenses. The elderly typically rely on a mix of Social Security and retirement income and, as one would expect, both are higher in Rural areas, though retirement income is relatively even across the rural tiers (at about 19% vs 16% in Metro areas), while Social Security income rises from 30% in Large Rural areas to over 39% in the Isolated Rural tier, compared to 28% in Metro areas.

1. Employment

Employment encompasses another set of factors that can have significant impacts on health and access to care in rural areas. Employment is, of course, related to one's income, discussed above, but the presence and type of employment has also been a key determinant of the cost and accessibility of health insurance in the period prior to the ACA.

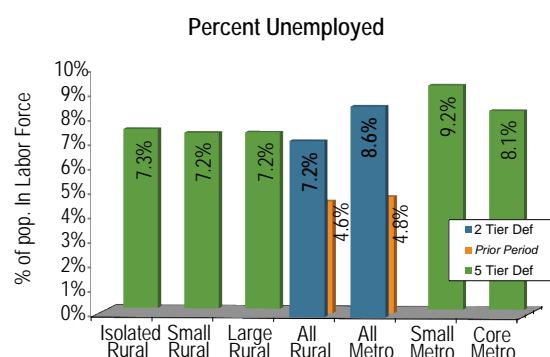
First, participation in the labor force overall is lower in the more rural areas (Figure 10), perhaps due in part to the level of retired elderly, but much attention has also been paid to those that left the labor force during the recession and were, therefore, not considered unemployed. The unemployment rate for the period measured at just over 7% and was consistent across the rural tiers, which had lower unemployment compared to the Metro tiers at 8.8% (Figure 11). These rates represent sizable increases in unemployment over the prior data period when unemployment was historically low at around 4-5%. While the increase in unemployment impacted rural areas somewhat less, the recession clearly represented a setback for the region, and likely relates to the findings on insurance status discussed later in this report.

Figure 10



Source: ACS - 2008-2012

Figure 11

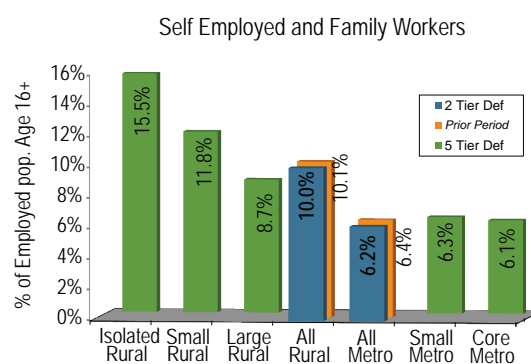


Source: ACS-2008-2012

In terms of employment situation, perhaps the most notable difference between the Rural and Metro tiers is the degree of self and family-based employment. This type of employment is typically related to small businesses, which often have difficulty offering health insurance with competitive rates and benefits. Overall about 10% of Rural employment is in this setting, compared to 6.2% in Metro areas, however the portion increases with rurality, reaching 15.5% - nearly one out of 6 workers- in the Isolated Rural tier.

Another factor related to benefits is part time work. Here Small and Isolated Rural areas are slightly higher than Metro areas but not to a great degree. Work in the Service industry follows a similar pattern, while work in the natural resources (forestry fishing), construction, and maintenance industries is much higher in Rural areas compared to Non-Rural (11.3% vs 7.1)

Figure 12



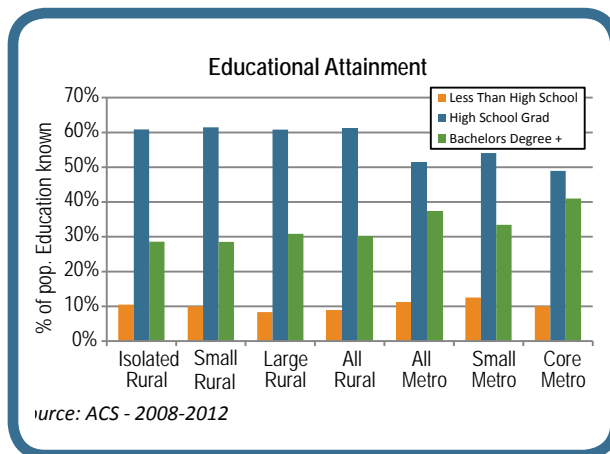
Source: ACS - 2008-2012

and grows higher with increasing rurality – accounting for 14.6% of jobs in the Isolated Rural tier. These employment situations are more often jobs without benefits, or where insurance is offered at high cost. They were also industries hit hard by the recession, as well as the limits placed on off shore fishing and the closure of many pulp and paper mills in rural areas.

1. Education

Education levels have also been associated with health status and outcomes, and often have direct implications for other demographic factors such as income and employment.⁴ In general, education levels remain lower in Rural areas of the region compared with the Metro tiers (Figure 13). Rural residents are approximately 20% less likely to have a college or higher level of education, and about 20% more likely to have a high school diploma. It should be noted, however that education levels rose notably since 2000 across the region, with about one third less individuals below high school level, offset largely by 16-17% increases in college graduation. This may be partly due to the aging out of generations where college attendance was less common, combined with an increased emphasis on advanced degrees in employment, particularly in metro areas.⁵ New England continues to exhibit college education levels well above the country as a whole.

Figure 13



1. Transportation

The percent of the population commuting to work by public transportation can be used as a rough proxy for the availability and effectiveness of public transportation overall, though it is often underutilized even where it is available. While there may also be privately operated transportation services associated with individual provider organizations, public transportation provides an important option for accessing care for those unable to drive or without access to a vehicle. As Figure 14 shows, public transportation availability is highly associated with Metro status, and with the Core Metro tier in particular. Use of public transportation by commuters does not register at 1% in any of the Rural tiers, likely indicating that these services are not available at all in those communities locally. As such, public transportation is really only a viable option to a personal vehicle in the most populous areas of the region.

Figure 14

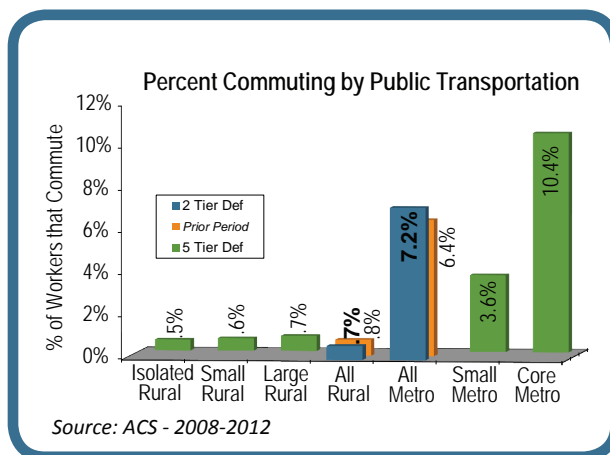
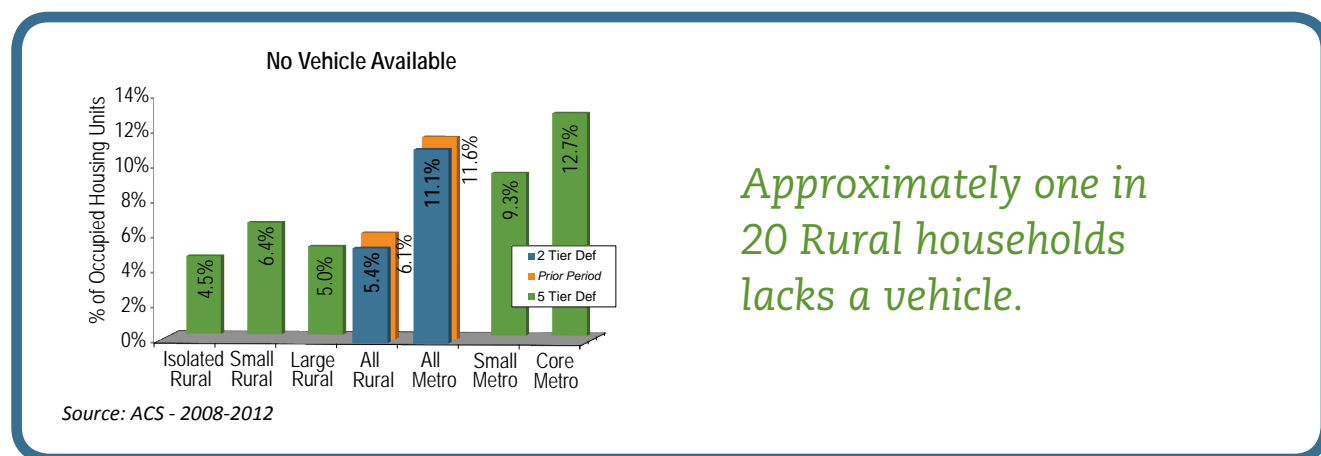


Figure 15 shows the portion of households with no vehicle available. The higher rate of this situation in metro areas is expected, as distances are shorter, parking is more limited/expensive, and public transportation is more available. In all areas, however, some portion of the population does not own a vehicle – often due to old age/disability and the cost of purchasing and maintaining one. The fact that lack of vehicle availability in Rural areas

approaches half the rate in Metro, and even Core Metro, areas highlights the challenge this presents in Rural communities. Approximately one in 20 Rural households lacks a vehicle and this rate is relatively consistent across the Rural tiers. Without public transportation most of these individuals will likely live too far from services to walk or bike, forcing them to rely on rides from family/friends or other privately operated services by individual provider organizations. It should be noted that the statistic on lack of any vehicle may understate the issue, as many more likely rely on a single vehicle which may be used for commuting, and therefore not available during the day for others in the household.

Figure 15

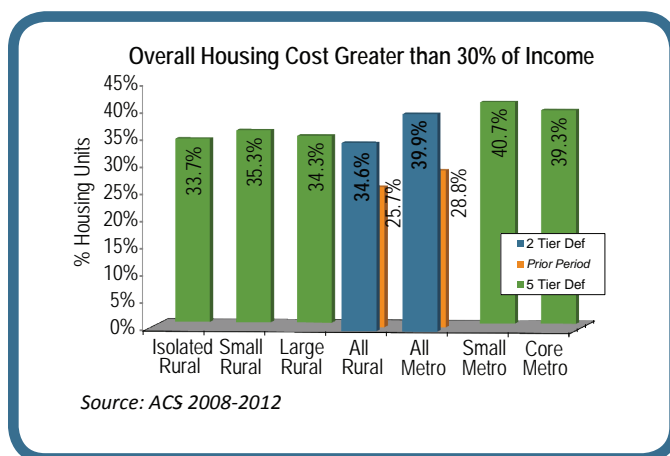


Approximately one in 20 Rural households lacks a vehicle.

Housing and Tenure

Affordable housing of good quality can have direct impacts on one's health, but it is also typically the largest portion of the household budget and dictates the degree of excess income available for other necessities, which can include health care and insurance when purchased directly. The results show that housing costs exceeding 30% of total income is slightly less common in rural areas and relatively consistent across the Rural tiers (about 35% compared to 40% in Metro areas) - Figure 16. It is notable, however, that the prevalence of this situation has increased since the 2000 Census in all areas of the region. While this should be cause for concern in all areas, the fact that overall income levels are considerably lower in rural areas suggests that this leaves less resources remaining for those at the low end of the income scale. Also, the rates are considerably higher for those that rent as opposed to own, with 45% of rural renters paying more than one third of income for housing.

Figure 16



1. Tourism and Visitors

Many New England's rural areas are renowned destinations for tourism and recreation. Celebrated for its extensive coast line and beaches, pristine lakes, rivers, and forested mountains, and quaint towns, rural New England has much to offer visitors. The economy of many rural areas is heavily dependent on tourism, which can be a great asset, but can also bring challenges in terms of health care access and delivery. Figure 18 shows the por-

tion of housing dedicated to seasonal and recreational use, as opposed to permanent residence. One sees that nearly 18% of housing units in Rural areas overall are for seasonal/recreational use - nearly seven times the level of non-resident stock in Metro areas. This figure climbs steeply with rurality, reaching 38.5% of housing units in the isolated rural areas.

One key challenge of tourism, in terms of health care delivery, is the need to maintain services capable of meeting the needs of a large influx of people during peak seasons, and then needing to carry those resources through the 'off seasons'. Services such as emergency departments and EMS teams involve significant fixed costs and are needed at a level far above the requirements of the resident population during peak tourism season. Tourism also brings seasonal employment and jobs that are less likely to offer health benefits.

1. Race/Ethnicity, and Language

As one might expect, there is considerably less racial and ethnic diversity in Rural areas compared to the Metro parts of the region. About 6% of Rural residents are racial/ethnic minorities (and just 3.6% in Isolated Rural areas), compared to about 25% in Metro areas. Interestingly, the portion of racial/ethnic minorities has increased by about one third in both Rural and Metro areas since 2000, though that represents a much larger practical increase in Metro communities. The growth in the foreign born and non-English speaking population has been largely concentrated in the Metro areas, with Rural rates nearly flat or falling as a percentage of the population. While this may reduce the degree to which linguistic access and cultural diversity are factors in the health care delivery system, it may actually highlight the greater degree of isolation experienced by cultural and linguistic minorities living in rural areas. Also, some rural areas of the region experience an influx of migrant workers during certain seasons of the year. While population-level data is not available to quantify this, several federally-supported migrant health services are operated in the region to help meet the needs of this population.

B. Health Care Delivery System

The health care delivery system comprises the range of providers, facilities, and resources responsible for providing medical services to the population. These services can range from the provision of routine screening and preventive care through the full range of outpatient and inpatient services, including the most specialized and intensive care needed. Rural residents require the same full range of services that those in more populated areas need, and the challenge for the rural delivery system is to provide these services in ways that

Figure 17 - Seasonal/Recreational Housing

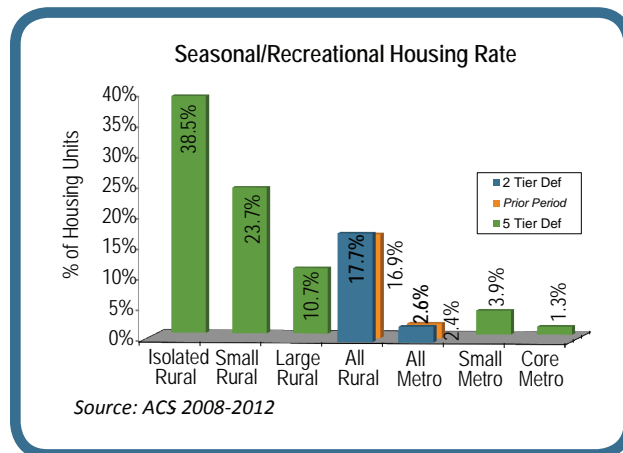
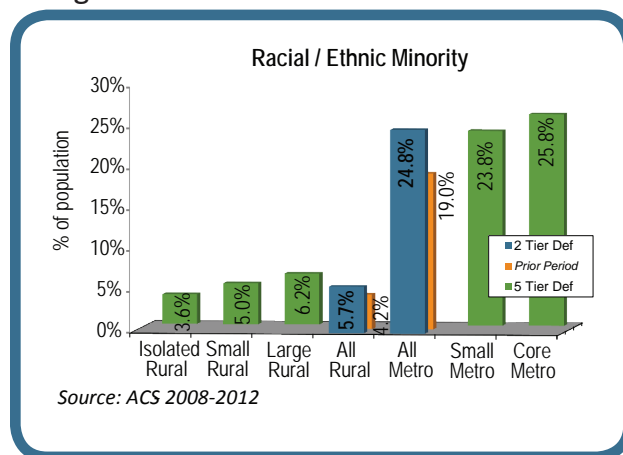


Figure 18



are sustainable and of high quality. The resources must not only be available in the community, but they must be accessible to the population both physically and economically, and must be well matched to the needs of the community, as choice is often more limited in rural areas.

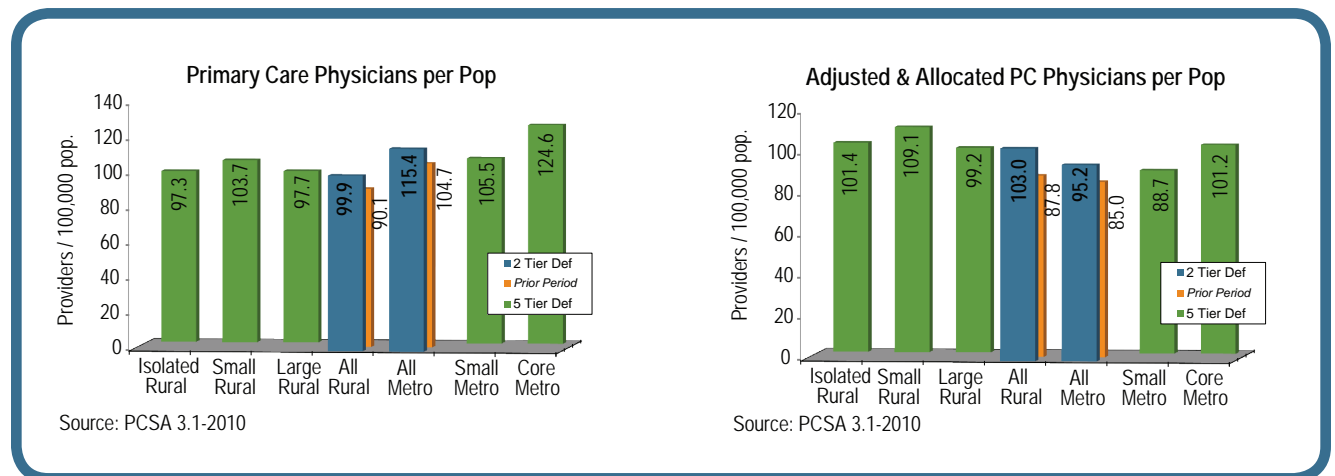
1. Provider Workforce

The provider workforce represents the essential building blocks upon which the health care delivery system rests. At the foundation of this entire workforce is the primary care provider, responsible not only for providing direct preventive and episodic care, but also for coordinating the patient’s overall needs as they move through the delivery system. This essential function is intended to serve as the point of entry into the system and has implications for both the cost and the quality of care received.

Data from the Primary Care Service Area (PCSA) project shows a level of primary care provider availability in Rural areas that is about 13% lower than in Metro areas, due primarily to the notably higher numbers in the Core Metro areas. (Figure 19) It is noteworthy that primary care provider availability overall has increased in the region by about 10%, though examination of the prior data shows that the rate in the Isolated Rural areas has actually fallen slightly (from 99.3) in contrast. This first measure is based simply on the physical location of the providers and the population as a whole. Another measure provided in the PCSA adjusts the population based on age and gender, and allocates the providers out to the areas where the patients they serve are from, based on access patterns in the Medicare data. In this view (Figure 20) one sees that provider availability in Rural areas measures slightly higher than in the Metro areas. This would seem to suggest that rural residents are achieving comparable total access to primary care providers, but that they may be traveling out of the rural areas for part of these services.

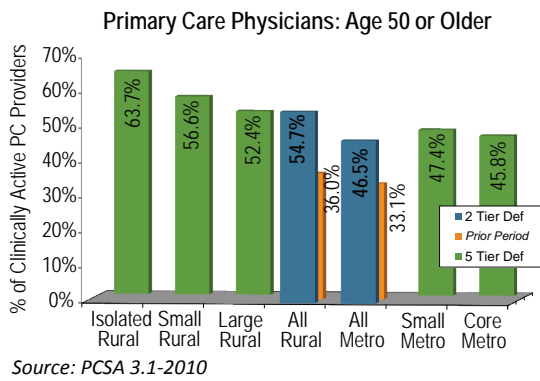
Figure 19

Figure 20



The picture is somewhat less comforting looking forward, when one examines the age of the primary care physician workforce in Rural areas. (Figure 22) One sees that Primary Care physicians in the combined Rural areas are somewhat more likely to be over age 50, but that the pattern is notably correlated with increasing rurality. Nearly two thirds (63%) of physicians in the Isolated Rural tier are age 50+; a rate nearly 40% greater than for Metro areas. Note that the portion of physicians over 50 has jumped sharply since the prior data book and now represent a 52% greater share of providers in Rural areas than they did at that time. As these physicians begin to retire the availability of primary care providers could decline rapidly unless younger providers move in to fill these positions.

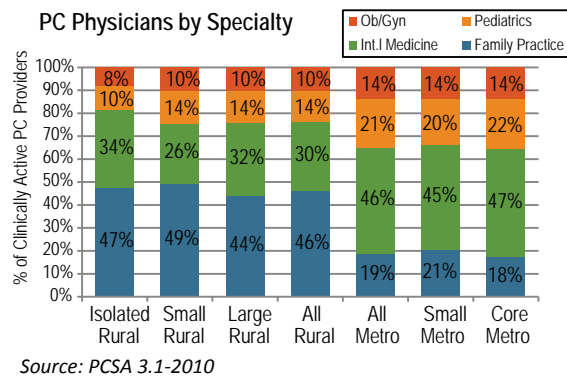
Figure 21



Nearly two thirds (63%) of physicians in the Isolated Rural tier are age 50+; a rate nearly 40% greater than for Metro areas. This has jumped sharply since the prior data book

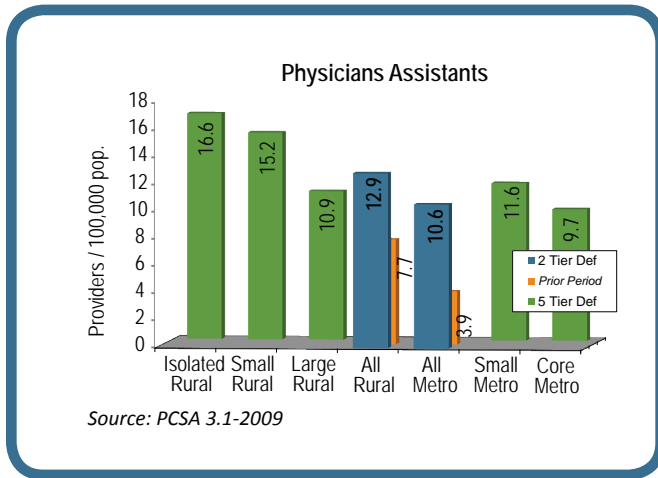
The specialty mix of primary care providers in Rural areas is also distinctly different from the mix in Metro areas. As seen in Figure 22, the mix of providers across the Rural tiers is relatively consistent, with nearly half of the care being provided by Family Practice physicians. In contrast, both of the Metro tiers show only about 20% of the care being provided by Family Practitioners. The balance of the primary care in the Metro areas is made up by higher presence of the other, more narrowly focused primary care specialties, including Internists, who often focus on adults, as well as Pediatricians and Ob/Gyn providers focused on children and women’s health issues respectively. This observation is likely the result of the need for rural providers to see the whole population to support a critical mass of patients, and the Family Practice model is designed to integrate care across generations and treat the family as a unit. That said, the other primary care specialties are needed as a referral resource when complications arise. For example, a Family Practitioner that does deliveries may refer a patient to an Ob/Gyn practice if a pregnancy becomes complicated. The results suggest that such referral resources may be less available in the Rural parts of the region.

Figure 22



Physicians, of course, are not the only source of primary care services. Non-physician providers, such as Nurse Practitioners, Physician Assistants, and Certified Nurse Midwives provide many of the same primary care services, and have been a growing component of the primary care team since the professions were created. The PCSA data provides statistics on Physician Assistant availability and indicates that these providers are an important part of the primary care workforce in the region’s Rural areas. The availability of Physician Assistants climbs steadily with increasing levels of rurality, from a rate nearly on par with Metro areas in the Large Rural tier, to a rate nearly 60% higher in the Isolated Rural tier. (Figure 23) The availability of Physician Assistants is also expected to grow sharply in coming years.⁶

Figure 23



This phenomenon is already in evidence in the data for the region, having grown by 67% in Rural areas and nearly tripling in the Metro parts of the region, though the total numbers remain low compared to physicians. Nurse Practitioners are also a large and rapidly growing component of the primary care workforce, with some predicting that they will double in number by 2025.⁷ Unfortunately there is not currently a reliable source for local data on NP capacity for use in this study.

Nativity data from the Centers for Disease Control and Prevention (CDC) data includes the portion of deliveries attended by Certified Nurse Midwives. Here again we see increased reliance on non-physician providers for care in the Rural areas, where the portion of midwife deliveries was 60% greater than in Metro areas. (Figure 25) Data was not available for analysis within the sub-rural tiers. One must keep in mind that the portion of deliveries is also not equivalent to the presence of midwives overall, as deliveries are just a portion of the services they provide, and not all deliveries are appropriate to be attended by a midwife.

Figure 24

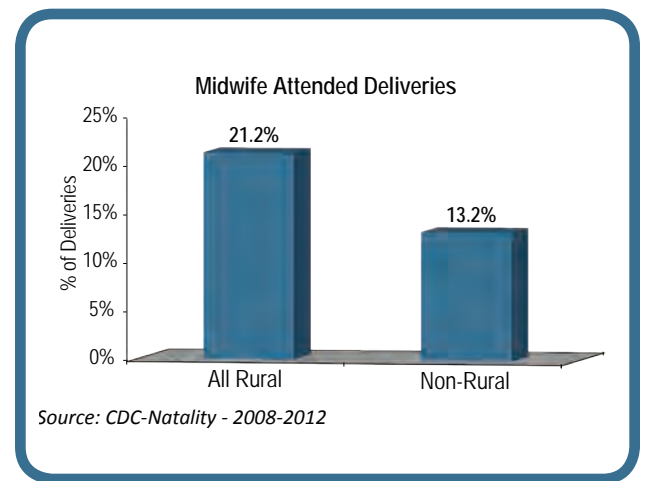
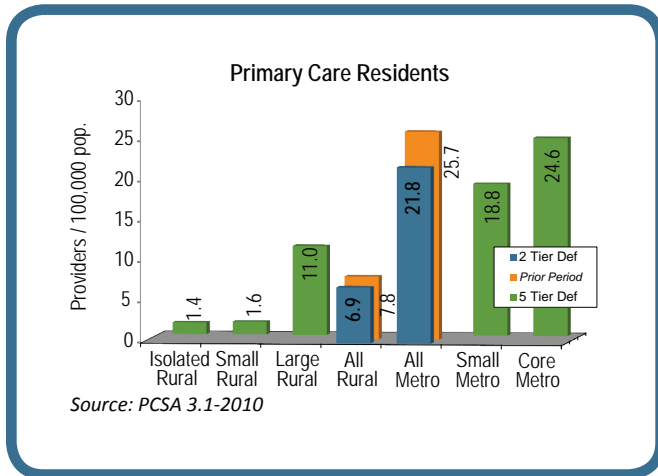


Figure 25

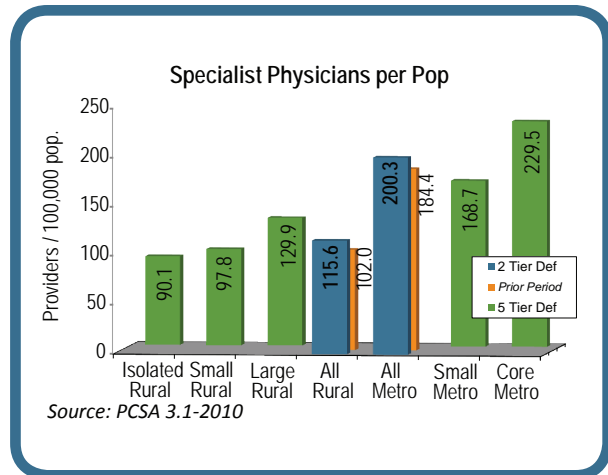


Physicians in their primary care residency training are another category of provider contributing to primary care capacity. While there is some debate as to the practical contribution they make compared to the resources needed to precept their training, and due to the short-term nature of their status in the area, residents clearly shape the short term future supply of providers, if not current capacity directly. Efforts to familiarize and incentivize future practice in rural areas have focused around establishing rural residency programs,

which have been found to increase the likelihood of future rural practice threefold.⁸ As Figure 25 shows, the level of residents compared to population located in Rural areas is considerably lower than in Metro settings, despite the much higher population. To some degree this would be expected, as a critical mass is needed to serve the population while also providing training, yet rural experience is important to factor into workforce planning initiatives. It should also be noted that the level of residents per capita fell throughout the region since the last data period (2000-2001).

Lastly, while primary care is an important and fundamental component of health care access and quality in Rural communities, access to specialty care is also a critical element of the health care delivery system. While one must acknowledge that not all specialties can be practiced adequately or effectively in rural areas, it remains important to monitor specialist availability for rural populations. As with primary care providers, similar recruitment and retention challenges exist for rural specialists, for whom professional isolation and maintaining a critical mass of patients are likely even more difficult to overcome. Figure 26 shows the degree to which specialists tend to locate in more urban settings, with a particular focus around the Core Metro tier. That said, the specialist capacity per capita still exceeds the primary care capacity in total numbers, even in rural areas, and there has been an upward trend in specialist availability in both Rural and Metro regions. The exception, however, was in the Isolated Rural tier, where the capacity per capita dropped slightly (from 93.3/100k population).

Figure 26



Looking at dental, the access picture looks notably worse in several ways. First, examining the dentist to population ratio (office based practice) in Figure 27, one sees that the combined Rural areas have 32% fewer dentists per capita compared to Metro areas. There is a notable drop in the more remote rural tiers in particular, with Small and Isolated Rural tiers having just 61% of the dentists per capita that exist in the Metro tiers. Looking at pediatric dentist availability in Figure 28, the difference is even more pronounced, with Rural areas having just above one third the level of access compared to Metro areas, and the Isolated Rural tier registering no pediatric dentists. As with primary medical care, other types of dentists can treat children, but pediatric dentists also represent a potential referral resource for general dentists and a preference for some patients.

Figure 27

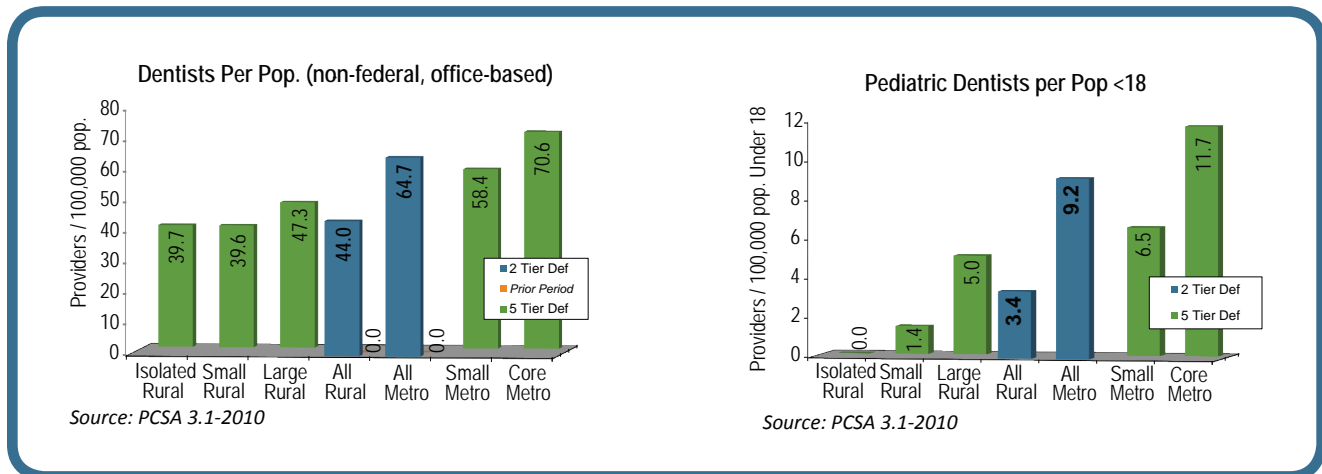
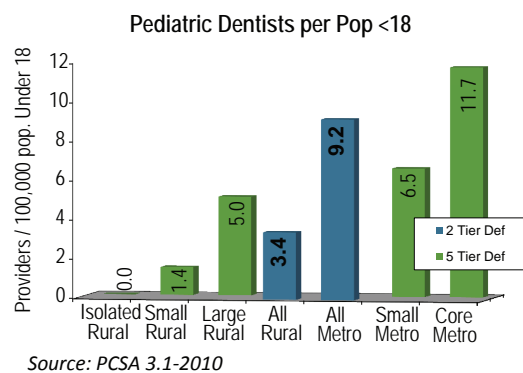
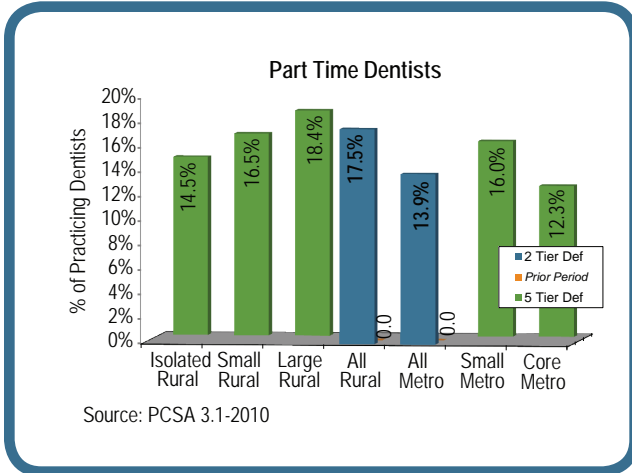


Figure 28



The charts above represent a count of all office based dentists, however not all dentists work full time. The pattern of part time dental practice is more complex (Figure 29), with Rural areas showing a 26% greater degree of part time (17.5% vs 13.9%), however the level of part time practice decreases with increasing rurality, and part time practice is lowest in the

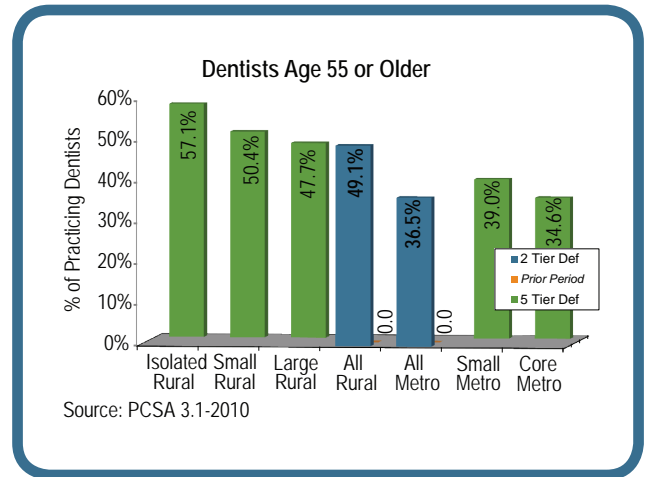
Figure 29



Core Metro areas. This suggests that the pattern may be the result of two different phenomena; combining need to maximize these services where they are scarce, and provider preference for part time practice where the resources are more plentiful. Regardless of the reason, greater levels of part time practice, combined with lower levels of dentist availability in Rural tiers overall, further diminish dental availability, though perhaps less so in the more remote rural areas.

As with primary care, the age profile of dentists is also less favorable in rural areas. Figure 30 shows that nearly half of rural dentists are over age 55, compared to just over a third of dentists in Metro areas, with increasing levels associated with increasing rurality. Statistics on dentists over age 65 did not indicate as strong of a rural pattern, suggesting that aging out of providers may be less of a short-term problem in rural areas, but that the problem may expand over the next decade.

Figure 30



1. Health Professional Shortage Areas (HPSAs)

A concept related to the comparison of total provider availability to the population in an area is the federally defined Health Professional Shortage Designation (HPSA) process, which has separate designations and methods for Primary Care, Dental, and Mental Health access. The value of the HPSA process over provider lists is that it measures accessibility, rather than just presence, of providers. Each provider is assessed individually for their contribution to primary care capacity, in terms of hours worked and populations seen, as well as their location compared to the population. Separate methods are used to assess overall availability (Geographic HPSA) versus the problem of accessibility to certain sub-populations (Population HPSA) based on specific barriers to care. These can include language or, more commonly, the ability of the low income population to pay for care. By matching the financial barriers faced by the population to the willingness of each provider to see patients on Medicaid or on a Sliding Fee Scale discount, the HPSA can identify need that might otherwise not be detected when looking at access for the total population. Conversely, one should not assume that only populations covered by HPSAs have need, as the process involves other requirements, and the evaluation of an area is often only initiated by an entity in the community requesting assistance. That said, HPSAs determine where the federal government is able to place resources to assist with workforce shortages, through the National Health Service Corps (NHSC) and the J-1 visa waiver program which both incentivize providers to work in under-served communities. Rural provider practices in HPSAs can also

opt to become a Rural Health Clinic (RHC), which brings enhanced Medicaid and Medicare payments, and all providers in areas of community-wide (geographic) shortage receive a 10% increase in Medicare payments. Other incentives have recently been added for general surgeons and rural training programs.

Looking at the total population covered by either a Geographic or Population HPSA, one sees that the Isolated Rural tier population is considerably more likely to be covered by a provider shortage designation compared to those in the Metro tiers across all three disciplines, however there are notable differences between the disciplines. For Primary Care, the Metro tiers have a slightly higher portion of the population covered by designation overall (18% vs 14.3% in Rural areas), due largely to a high portion of Small Metro areas being designated. Only the Isolated Rural tier is higher, by a considerable margin. Nearly 30% of the population in the Isolated Rural tier is covered by a Primary Care HPSA. It should also be noted that the designation proportion in both the Rural and Metro tiers has dropped by 20-25% compared to the prior measurement period. This is likely due to a combination practical gains in access as well as some of the other federal requirements that have made New England less favorable to designation due to rising overall income levels.

Figure 31

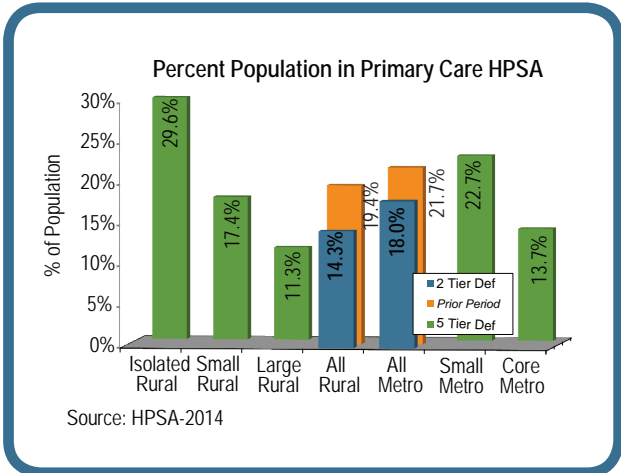
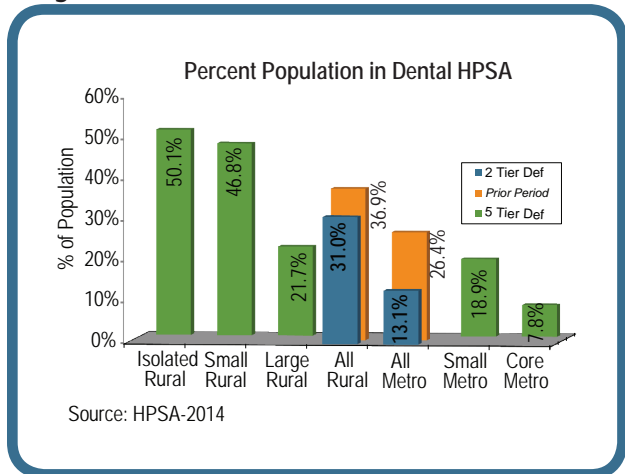


Figure 32

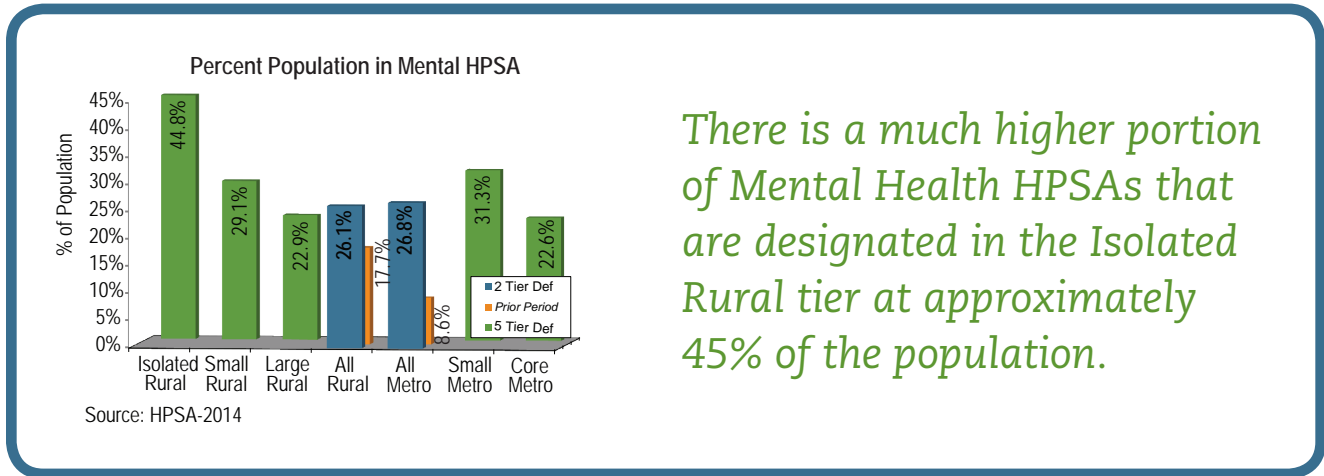


The picture is more severe for Dental HPSA (DHPSA) coverage, where the portion of the Rural population living in an area designated as a DHPSA is more than double the portion in Metro areas. DHPSAs cover nearly one third of the region's rural population and nearly half of the population in the Small and Isolated Rural tiers. Rural populations are nearly three times as likely as Metro populations to live in a Dental HPSA. Furthermore, Dental HPSA coverage has fallen half in Metro areas in since the last data book was produced, but has dropped by a

much smaller amount in Rural areas. As noted above, there are several types of pressure weighing on dental access in Rural areas of the region.

Mental Health HPSAs are nearly equal between Rural and Metro areas, but as with many results, this masks a much higher portion designated in the Isolated Rural tier at approximately 45% of the population. It is also noteworthy that, while designation has fallen in the medical and dental designation categories, it has risen notably in the mental health discipline, though by more in the Metro than Rural areas.

Figure 33



1. Community Health Centers and Rural Health Clinics

Safety net providers play a key role in the rural delivery system. Community Health Center grantees and 'Look-Alikes' (also referred to as Federally Qualified Health Centers or FQHCs based on their status with CMS) are community governed non-profit clinics which receive enhanced Medicaid and Medicare reimbursement levels, and Health Center grantees also receive ongoing grant support to offset the cost of caring for the uninsured and maintaining comprehensive enabling services for medically indigent patients. While FQHCs are more numerous in urban areas, which may have several grantees serving the same area, FQHC providers deliver a much larger portion of the total primary care accessed in rural communities. Since the last data book was produced, the Bureau of Primary Health Care (BPHC) has begun collecting annual patient origin data by zip code from all FQHC/Look-Alike organizations and

Figure 34

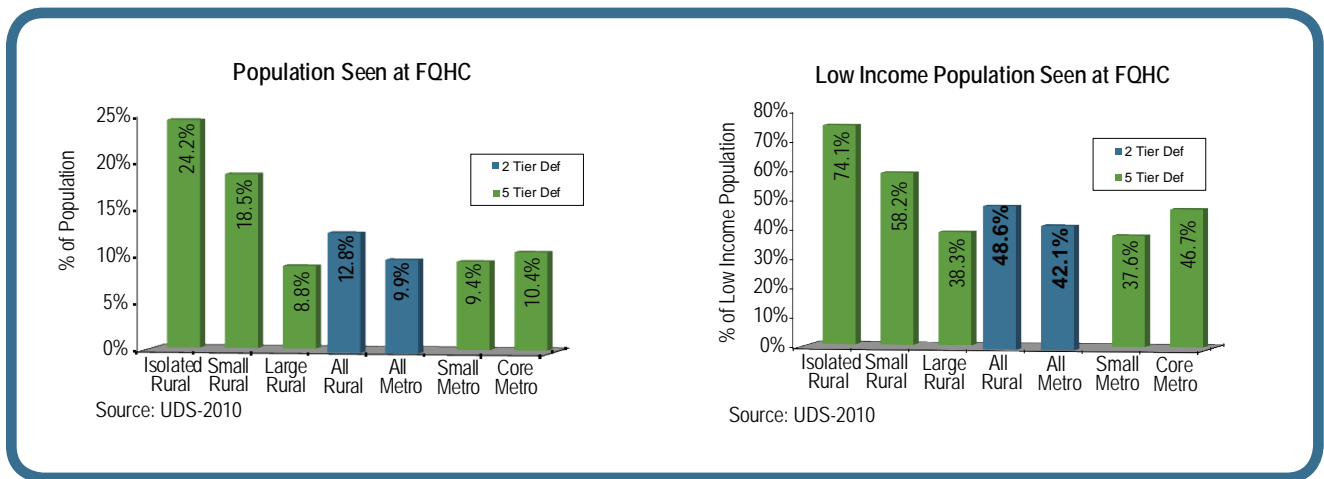
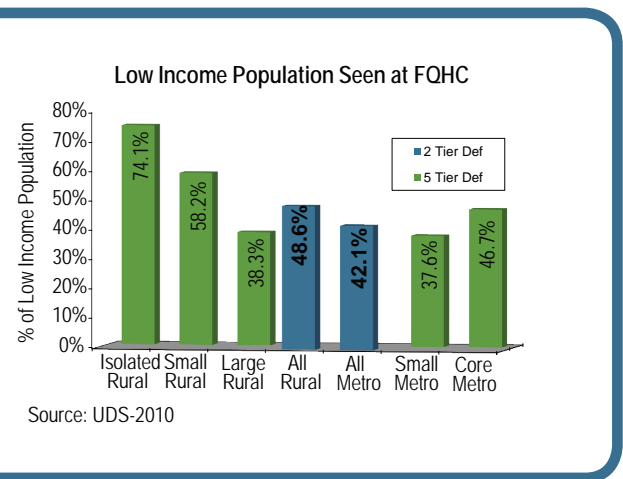


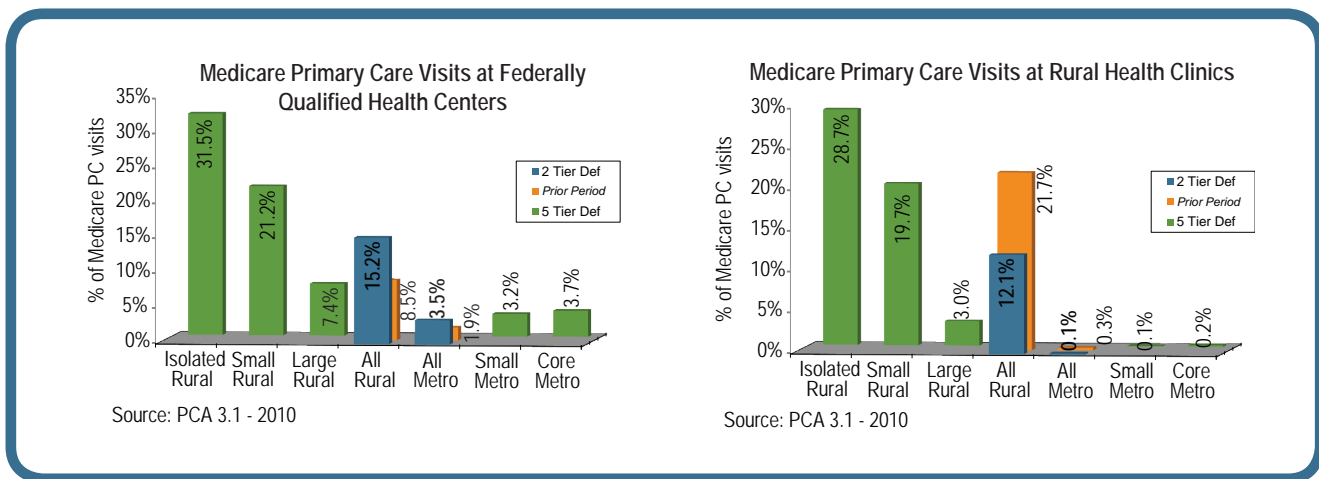
Figure 35



this is analyzed to produce nationwide maps and data at the Zip Code Tabulation Area (ZCTA) level, showing service areas and program penetration amongst the low income population. Figure 36 shows the portion of the total population from each tier. While the Rural levels are about one third higher overall, at 12.8% vs 9.9%, the portion climbs quickly in the more remote rural tiers, with 18.5% of the Small Rural population, and nearly one fourth of the Isolated Rural population visiting a health center for care in a one year period.

Figure 36

Figure 37



While a greater portion of Rural residents rely on FQHC providers for care overall, the true focus of these programs is primarily on access for the low income Medicaid and uninsured populations; and the great majority of users are typically below 200% FPL. Using the low income population as the denominator, the level of reliance on FQHCs is apparent, with nearly half the Rural population being seen at an FQHC within the past year. While this is slightly higher than the low income portion using FQHCs in Metro areas, here again we see a sharp increase in the Small and particularly the Isolated rural areas, where health center users amount to three quarters of the low income population in the area. Interestingly the proportion of the low income population using FQHC services climbs to nearly 50% in the Core Metro areas as well, likely based on the concentration of FQHC services and higher cost of living in these areas.

FQHC providers are also a key resource for the rural elderly. The PCSA data provides information on the portion of Medicare primary care visits taking place at FQHC locations. In Metro areas just 3.5% of Medicare primary care visits take place at an FQHC, while

this portion jumps more than 4 times, to 15% of the care in rural areas, and climbs to nearly one third of all Medicare visits in the Isolated Rural areas. It is also noteworthy that the portion of rural FQHC utilization has nearly doubled since the prior data book analysis was done.

Similar data is also available from the PCSA data on Rural Health Clinics. Because these clinics can only be established in rural areas (as defined by

Taken together, providers in the RHC and FQHC programs provide over 60% of the Medicare visits in the Isolated Rural tier of the region and nearly 30% of all Medicare visits in Rural parts of the region.

the Office of Rural Health Policy), the use of RHC services is almost definitively rural in nature. It is, however, still instructive to examine the degree to which rural residents rely on these clinics, which receive enhanced reimbursement from Medicare and Medicaid. Figure 37 shows negligible RHC by Metro Medicare patients, but use climbs rapidly in the Small and Isolated Rural areas, where 20% to nearly 30% of the elderly, respectively, rely on RHC services for primary care. Taken together, providers in the RHC and FQHC programs provide over 60% of the Medicare visits in the Isolated Rural tier of the region and nearly 30% of all Medicare visits in Rural parts of the region. These figures still represent a drop in RHC care since the prior report, though this may have to do with some of these clinics converting to FQHC status, which have increased as noted.

1. Hospitals

Maintaining hospital access in rural areas is a complex balance of critical volume, quality, and reimbursement, with the size and mix of services determined by what is sustainable and what resources must be local vs available by transfer. Rural hospitals have long struggled with this balance and many have opted to adopt Critical Access Hospital (CAH) status, in which the facility agrees to limit bed capacity and length of stay, maintain emergency care access, and establish a referral relationship with a larger facility. In return CAHs receive reimbursement based on their costs, rather than the standard fixed Medicare rates. This program is credited with keeping many rural hospitals viable, but the program remains under threat, and a recent federal DHHS Inspector General's report suggested changes that many predicted would eliminate participation by a great majority of the region's current CAH hospitals if adopted.⁹ Rather than examine bed capacity compared to population, which is highly skewed by the services offered locally, the analysis for this report focused on the distance between CAH and other Short-Term, non-VA hospitals, and population block points coded to the defined Rural tiers.¹⁰ A 10 and 15 mile¹¹ 'buffer' was created around each hospital based on the local road network and the portion of the population outside these limits was assessed. Because access in rural areas is often defined by a single facility dependent on difficult finances, the number of hospitals accessible within the defined drive distance was also assessed, and those with a single hospital option were quantified. Measurements were not corrected for speed limits or traffic. Figure 38 shows a map of the results. Areas not covered by either light or dark purple hospital buffers are outside the 15 mile distance limit and populated block points are shown as gray shaded areas. Figure 39 shows the same map but the buffers around CAH hospitals have been removed to reveal the population whose access is dependent on facilities covered and sustained by this program.

Quantifying the implications of these results, one sees that hospital distance and dependency jumps sharply in the Rural tiers compared to the Metro areas. In the Metro tiers this is not a consideration, with only 2% of the population being more than 15 miles from a hospital and another 8% dependent on a single hospital within 15 miles, with no CAH implications. This compares to 21% of all Rural residents living beyond the 15 mile range for any hospital, and an additional 52% within range of just one hospital. This means that nearly three quarters of Rural tier residents of the region are dependent on, at best, a single local hospital. As with many statistics cited, there is also a strong pattern related to increasing rurality, with nearly half of Isolated Rural residents beyond 15 miles from any hospital, and most of the remainder dependent on a single facility.

Figure 38

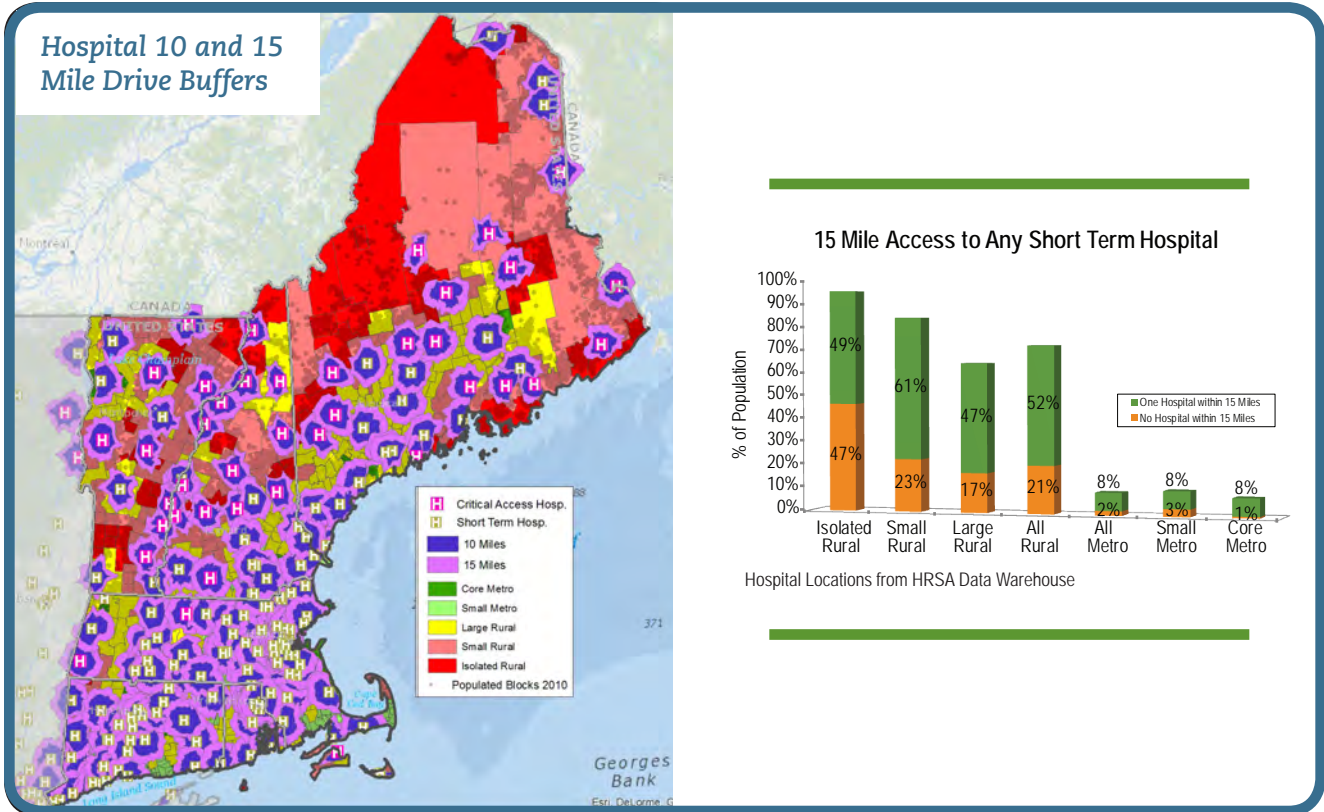
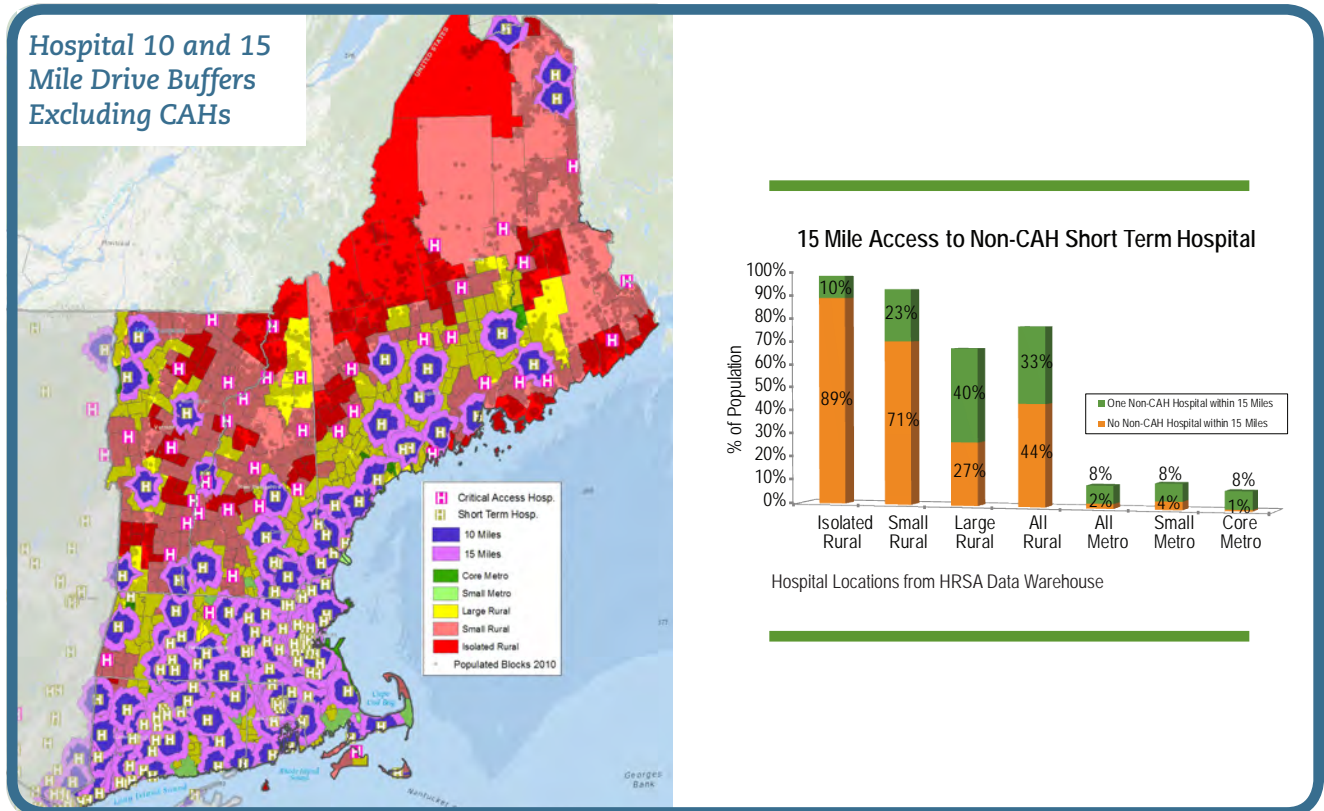


Figure 39



Even this limited level of local hospital accessibility is highly dependent on the support of the Critical Access Hospital program. If one eliminates CAH facilities, rural hospital accessibility declines quickly. The portion of all Rural residents beyond 15 miles from any facility more than doubles to 44%, and this figure jumps to 71% and 89% respectively in the Small and Isolated Rural tiers. While all CAH's clearly would not close without program support, one must keep in mind that most of Rural residents are dependent on a single facility at best, as noted above, meaning that these implications would generally apply locally for any rural community that loses one of these hospitals.

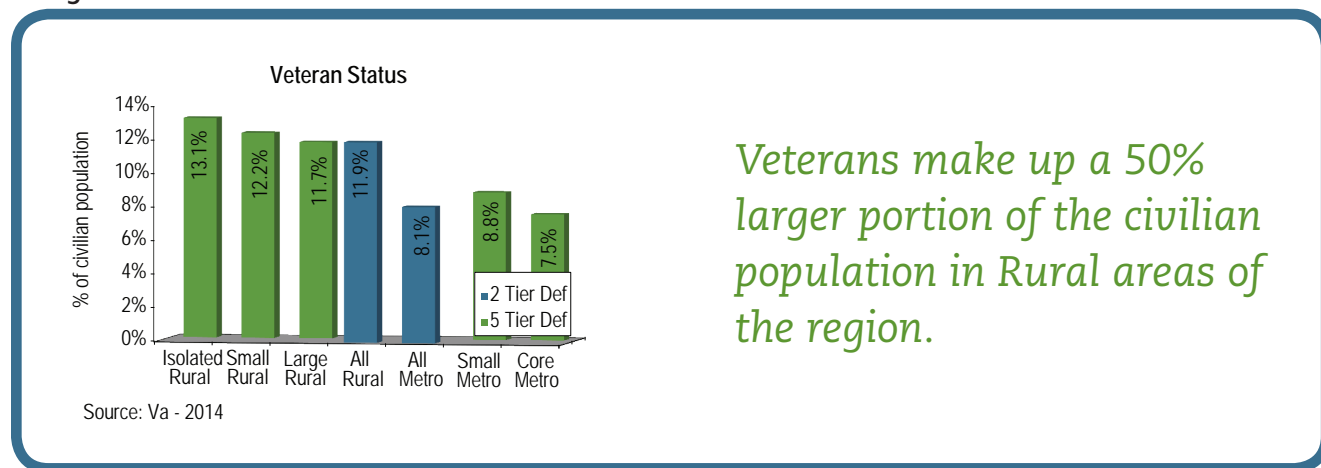
1. The Veteran's Health Administration

The Veteran's Health Administration is operated by the United States Department of Veterans Affairs (VA) to provide care for those that served in the country's armed services. The VA's health services are an important, but often overlooked resource for health care, providing important access to a wide range of services to qualifying military veterans. These include traditional hospital-based services, such as surgery and critical care, as well as other services including primary care, mental health, orthopedics, pharmacy, radiology, physical therapy, and extended care/ hospice. Eligibility is dependent on a minimum service requirement with honorable discharge and is based on a priority system. Enhanced eligibility is awarded to those with service related conditions or meeting specific additional service requirements. Veterans without rated service-connected conditions may become eligible based on financial need.

While the VA is an important resource to veterans, particularly those without other forms of health care coverage, it has also been criticized, at points in its history, for being cumbersome to access due to a combination of geography, bureaucracy, and capacity. Most recently, in 2014, the VA has come under intense scrutiny nationally due to long waits for service that were not fully disclosed.

Veteran's health is particularly important in rural areas for several reasons. As Figure 40 shows, veterans make up a 50% larger portion of the civilian population in Rural areas of the region compared to Metro areas (approximately 12% vs 8%), with a notable gradient associated with increasing rurality.

Figure 40

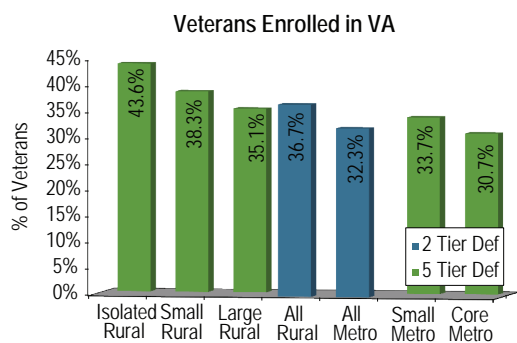


Veterans make up a 50% larger portion of the civilian population in Rural areas of the region.

Data was obtained directly from the VA quantifying enrollment with, and utilization of, VA services based on the zip code of the veteran. By matching enrollment and unique utilization to ACS data at the ZCTA level, it was possible to examine the degree to which Veterans rely on the VA. As VA enrollment is optional, it can be considered a proxy for the

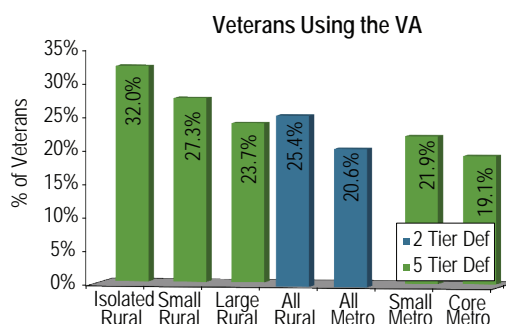
need/desire amongst veterans to access VA services compared to other options they may have available. As Figure 41 and Figure 42 show, Rural veterans are notably more likely to enroll with the VA and to use the VA for one or more services (unique users in a one year period), also with a pattern linked to increasing rurality. In the most Isolated Rural tier, nearly one third of veterans enrolled and used services, a rate more the 50% greater than the rate in Metro tier.

Figure 41



Source: Va - 2014

Figure 42

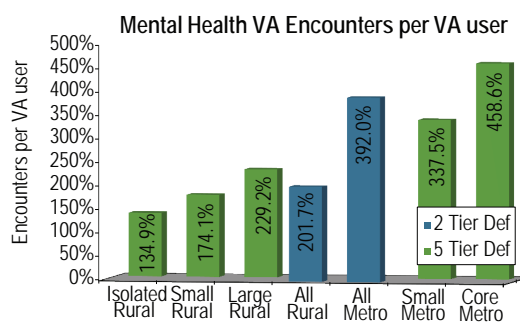


Source: Va - 2014

These initial findings might lead one to believe that rural accessibility to VA health services is robust, however when one looks at the degree of utilization the picture is notably different, with all indicators showing a distinct downward utilization pattern associated with increasing rurality. Outpatient visits per VA user show the least variation, falling from 4.5 visits in the Metro tiers to 3.9 in the Isolated Rural tier. The rural difference for mental health service utilization is far greater. As Figure 43 shows, Rural veterans enrolled with and using the VA for at least some type of service make approximately half the number of mental health visits as their Metro counterparts. The pattern of decreasing utilization increases steadily with rurality, from a high of 4.6 visits per veteran user in the Core Metro tier, down to just 1.3 visits per user in the Isolated Rural tier; a relative utilization difference of 350% compared to Core Metro veterans.

A similar pattern is seen in the inpatient utilization data, where Rural veterans using the system are admitted at a rate 30% lower than their Metro counterparts (87 admits per 1000 vs. 123 in Metro areas) and, once admitted, stay for 15% fewer days (8.3 vs 9.9). See Figure 46 and Figure 47. Combined these two factors equate to 40% less hospital use by Rural VA users. Both of these patterns intensify with increasing rurality, with Isolated Rural veteran users having 34% fewer admissions and 28% fewer days per admission, or over 50% less total VA hospital utilization. Extended care admissions are also 50% lower for Rural VA users and less than one third in the Isolated Rural tier.

Figure 43



Source: Va - 2014

It should be noted that these results come from a complex interaction of veteran status, eligibility, need, access, and alternatives, making it difficult to clearly assess the underlying drivers and meaning of these patterns. Lower hospital admissions and shorter stays might be considered positive findings at the community level, but might indicate accessibility and resource issues in a constrained system where outside alternatives exist for some.

Figure 44

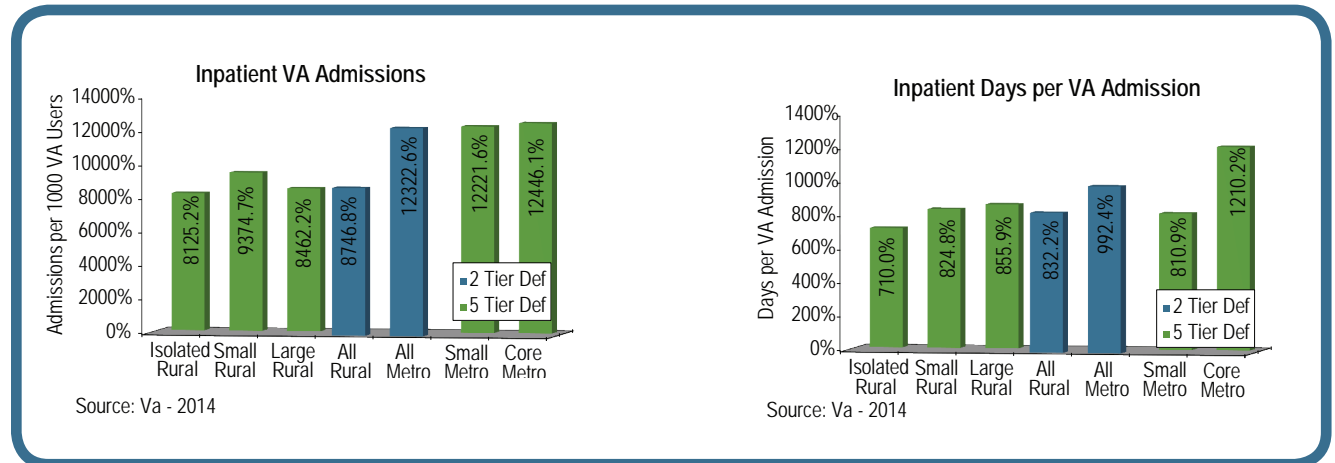
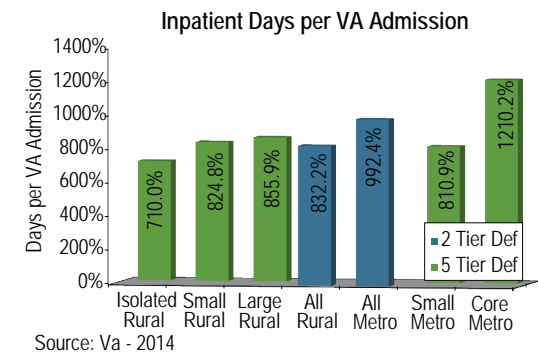


Figure 45



C. Utilization and Access

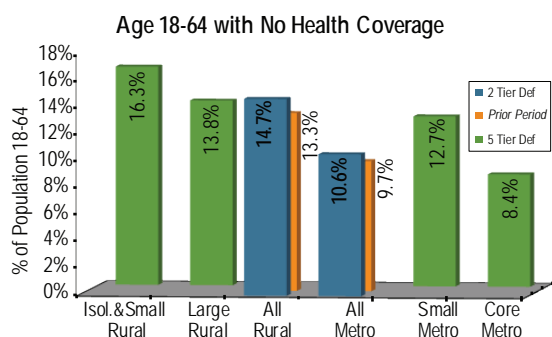
Utilization of health services takes place when an individual has, or perceives, the need for health services, expresses that need in terms of demand for services, and ultimately connects with a provider willing and able to meet that demand. Thus need, demand, and utilization can be very different concepts, with ultimate utilization often mediated both by factors that promote appropriate utilization (such as outreach and health education), and factors that thwart/misdirect it - to include a range of barriers such as limited provider supply and distance, financial constraints, and other factors such as language. Barriers to care are particularly important for utilization of primary care medical, dental, and mental health services, as these are easily delayed or avoided leading to more significant issues later on.

1. Health Insurance

The presence or absence, and coverage/cost-sharing arrangements of health insurance have a significant influence over the level of service utilization and the appropriateness and timeliness of that utilization. The influence of insurance is often greater than that of low income in terms of immediate financial access to health care because Medicaid and CHIP are available to some at the lowest end of the income spectrum, Medicare is available to all elderly including the poor, and individual coverage can be prohibitively expensive even for workers earning a reasonable wage. The Affordable Care Act was passed largely to address the problem of uninsurance and inadequate health plans through the expansion of Medicaid to all individuals below 138% FPL, combined with subsidized insurance marketplaces up to 400% FPL, and a penalty for remaining uninsured. It also includes several other provisions concerning pre-existing conditions and the ability of parents to cover children further into adulthood. There are also non-insurance provisions aimed at improving quality and availability of providers. Establishing a baseline against which to measure the many potential impacts of ACA implementation was part of the impetus for updating the NERHRT data book at this time. Because the ACA is based on market competition in the health exchanges for the non-Medicaid eligible population, and because states have the option to opt out of expanding Medicaid based on a ruling by the Supreme Court, it will be important to monitor how rural areas in particular fare as the law takes effect.

In the prior data book, rural areas were seen to have 37% higher relative levels of uninsurance amongst non-elderly adults compared to Metro areas of the region. Since that time a number of conflicting forces have been at work in the region. Most notably, Massachusetts passed its own form of health reform in 2006, which greatly reduced uninsurance in that state (down to 5.6% of adults in the 2012 five-year ACS). Conversely, the impact of the recession that started in the fall of 2008, along with increasing costs for insurance overall, drove many from the insurance roles. Looking at the comparable data source used in the prior release of this report, the Behavioral Risk Factor Surveillance Survey, one sees that the net effect of these forces was an increase in the portion of the population without health insurance since 2005, with a somewhat greater increase in Rural areas. Figure 48 shows that, by 2011-2012, the uninsured in Rural areas had risen by about 1.5% of the adult population, and by about 1.0% of the Metro adult population - proportional increases of 11% and 9% respectively. The relative likelihood of being uninsured as an adult was 39% greater in rural areas, and 54% higher in the Small and Isolated Rural tiers combined. The ACS shows a similar pattern for Uninsurance amongst children, though at a much lower level (3-4%) due to access to Medicaid and CHIP.

Figure 46

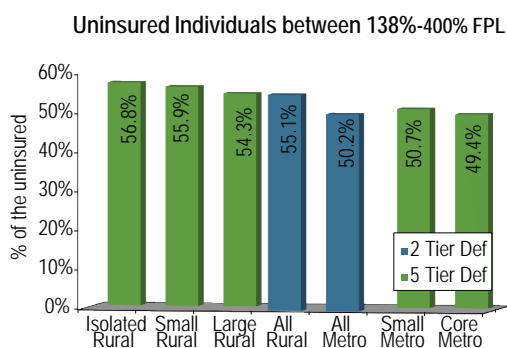


Source: BRFSS - 2011-2012

The relative likelihood of being uninsured as an adult was 39% greater in Rural areas, and 54% higher in the Small and Isolated Rural tiers

The Affordable Care Act is making new options available to the uninsured, based primarily on income levels established in the ACA, at 138% FPL and below for expanded Medicaid, and 138% to 400% for potential exchange plan subsidies. The portion of the uninsured that fall below 138% FPL is nearly equal across all Rural and Metro tiers at about 30% of the total. In the subsidized marketplace range there is a small but consistent pattern associated with increasing rurality, with the portion of uninsured in this range rising from 49.4% in the Core Metro tier to 56.8% in the Isolated Rural tier. (Figure 49) This suggests that the availability of, and enrollment in, subsidized exchange plan options will be a somewhat more important option for the rural uninsured. The remainder of the uninsured (those above 400% FPL) are a somewhat greater proportion of the uninsured in the Metro parts of the region. While not eligible for subsidies, these individuals may still enroll in newly available plans through the exchange marketplaces.

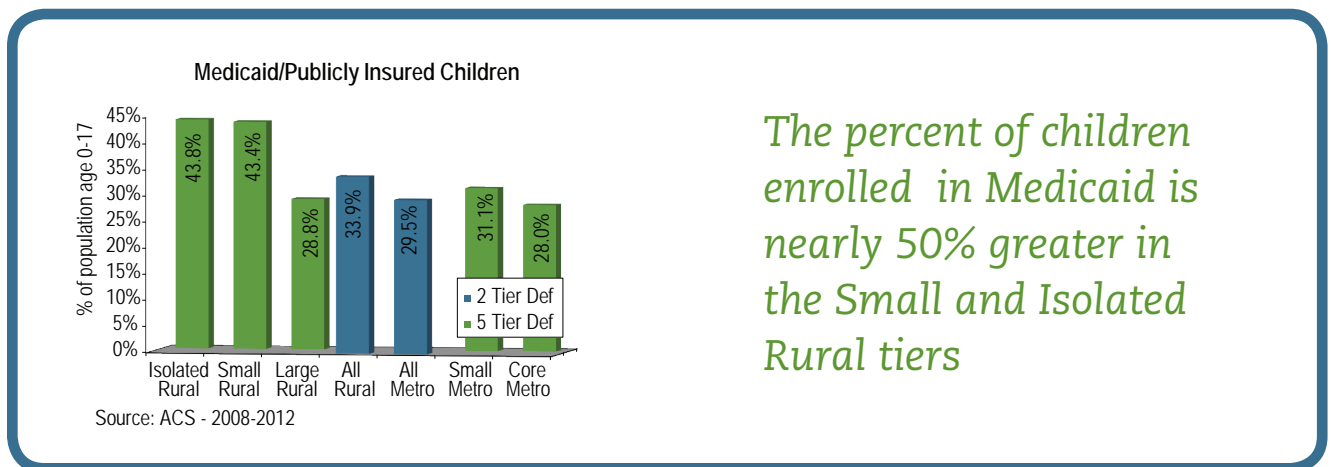
Figure 47



Source: ACS - 2008-2012

The rural population is already notably more dependent on Medicaid and means tested public insurance, such as CHIP. This type of insurance has traditionally been restricted to children, expectant mothers, parents of young children, with eligibility varying from state to state in terms of the income limits. Looking specifically at children under 18 year of age, the Medicaid enrollment levels in rural areas are proportionally about 15% greater in Rural areas than in Metro parts of the region, however the enrolled percent of children is nearly 50% greater in the Small and Isolated Rural tiers; at about 43% of children compared to 30% in Metro areas. The pattern is similar amongst adults, but the level of enrollment and difference between Rural and Metro areas is both lower as adult Medicaid eligibility is limited. About 14% of adults are enrolled in Medicaid throughout the region. The levels of Medicaid enrollment are expected to change significantly under the ACA for states that elect to adopt Medicaid expansion, as the family structure requirements will be removed and eligibility set at a minimum of 138% FPL, meaning many poor and near-poor single and childless adults may enroll. Currently all New England states except for Maine have opted for expansion in some form.

Figure 48

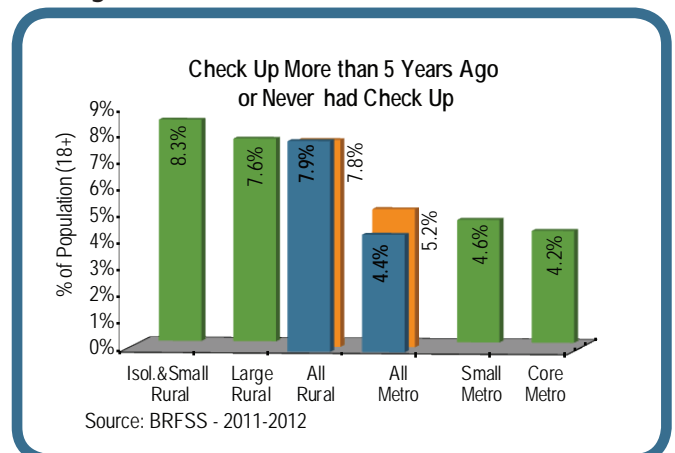


The percent of children enrolled in Medicaid is nearly 50% greater in the Small and Isolated Rural tiers

1. Primary and Preventive Care

The most direct impact of uninsurance is avoiding needed care due to cost. In spite of the higher levels of uninsurance in Rural areas, the BRFSS data shows that the likelihood of avoiding needed care due to cost was statistically insignificant between the Rural and Metro tiers and amongst the Sub-Rural tiers (approximately 11- 12% for both tiers). That said, it is worth noting that the portion stating that they avoided care due to cost was up by 17-18% in both the Rural and Metro areas of the region, highlighting the impact of the insurance losses overall. The odds of not having a 'personal health care provider', which is also associated with uninsurance, was nearly the same between Rural and Metro areas (just over 12% for both tiers). Interestingly, however, the rate for this metric fell by 35% since the prior data book in both Rural and Metro areas.

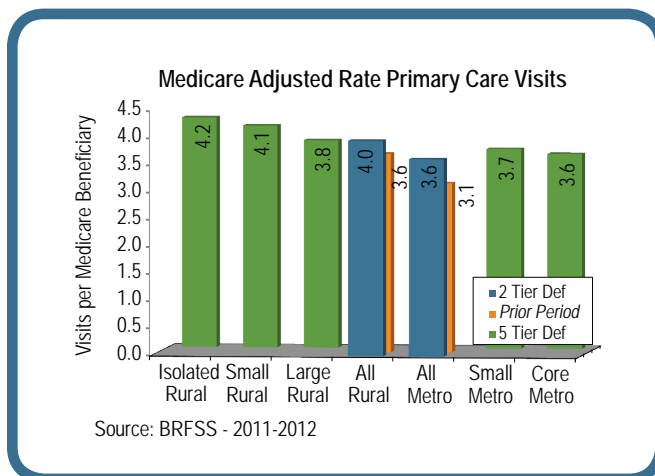
Figure 49



Looking more deeply into actual use of routine and preventive care, rural areas fare less well. The portion of Rural residents that has not had a check-up in the past 5 years is nearly 80% greater than for Metro residents. This gap grew since the prior analysis, but largely because the portion stayed nearly stable in Rural areas while falling in Metro areas. - Figure 49.

Use of routine care appears more comparable between Rural and Metro areas for the elderly. Unlike some younger portions of the population that can go several years between checkups, Medicare beneficiaries would be expected to have a primary care visit each year based on their age. Looking at the results from the PCSA data, it appears that the Rural elderly are approximately as likely as Metro elderly to have at least one primary care visit annually (approximately 80% having done so in all tiers – up from the prior analysis and rising slightly with rurality). The age adjusted rate of primary care visits by the Rural elderly is somewhat higher than for the Metro tiers - Figure 50.

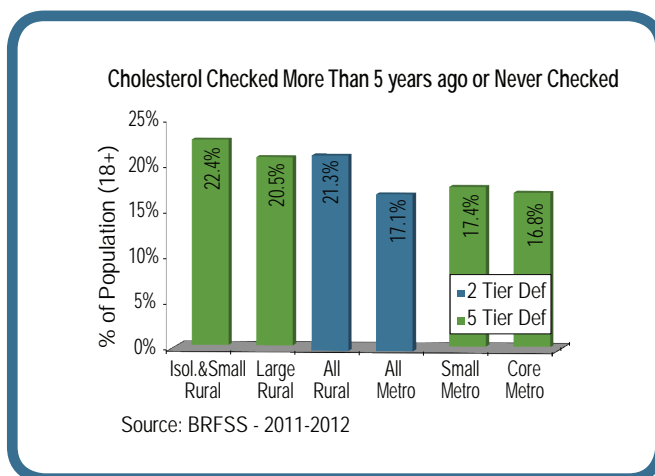
Figure 50



In line with these findings, one also observes that the rate of Hospitalization for Ambulatory Care Sensitive conditions amongst the Rural Medicare population is also somewhat lower for the Rural population (54.8 per 1000 beneficiaries vs 67.0 for the Metro population).

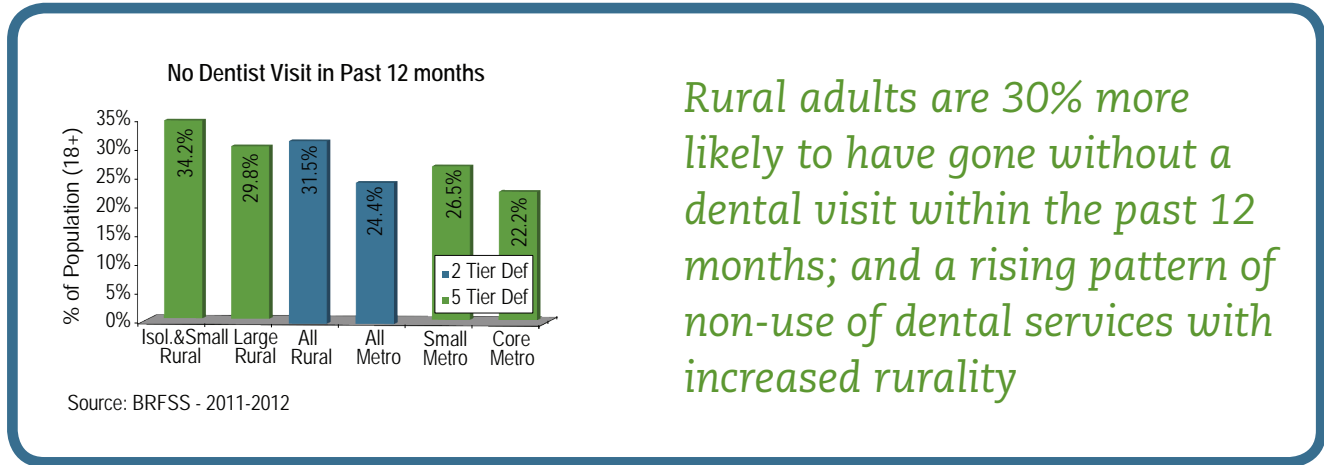
Examining the data on use of individual preventive services for the total population, there are signs that use of preventive care is somewhat lower in Rural areas. The pattern for a range of routine tests is similar, with marginally but statistically higher odds of Rural residents going without these tests within the prescribed period of years, and a progressively higher level of non-testing with increasing rurality. This includes cholesterol screening in adults greater than 5 years ago or never (25% more likely for Rural residents - Figure 51), women 50+ without a mammogram in the past 2 years (20% more likely for Rural), and women 18+ without a pap test in the past 3 years (15% more likely for Rural). Related to pap testing, it is interesting to note that the County Health Rankings data shows that the chlamydia rate in Rural areas is notably lower, by about 40%, compared to Metro areas, suggesting that the risk of cervical cancer and pre-cancer may be lower, however lower risk does not justify foregoing the test. The rate of diabetics receiving hemoglobin A1C testing is nearly identical across the Rural and Metro tiers at about 87-88%.

Figure 51



The evidence of issues with dental access in Rural areas is also borne out in terms of utilization, with Rural adults being 30% more likely to have gone without a dental visit within the past 12 months; and a rising pattern of non-use of dental services with increased rurality - Figure 52. Over one third of those in the Isolated Rural tier went without a dental visit, compared to about one quarter of Metro residents.

Figure 52



1. Hospitalization and Emergency Department Use

Looking at use of hospital services among the Medicare population one observes a notable drop in the rate of Rural hospitalization since the prior data analysis, resulting in a rate of Rural Medicare hospitalization approximately 14% lower for the Rural areas overall, as seen in Figure 53. Combined with a decreasing length of stay per hospitalization, this brings the total Rural hospital days per 1000 Medicare beneficiaries to a level 20% below Metro beneficiaries - Figure 54. The Rural to Metro difference in hospital use is slightly greater for “Medical” hospitalization, but the drop since the prior report is greater for “Surgical” hospitalization.

Figure 53

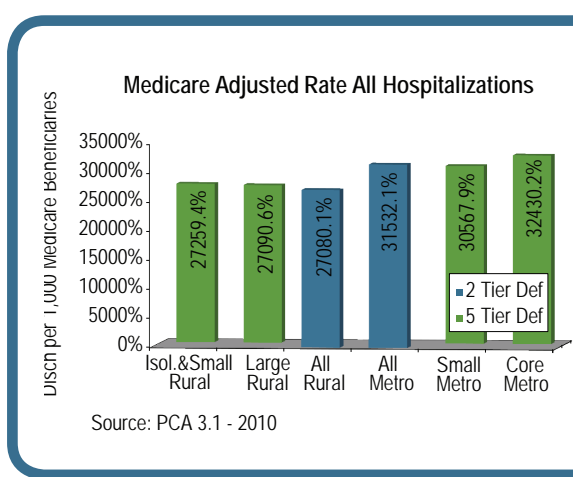
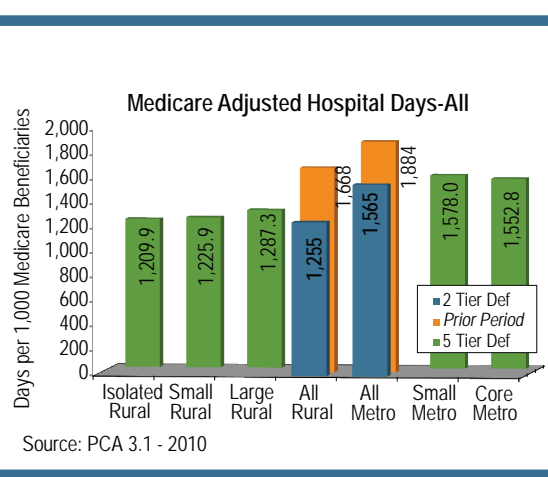
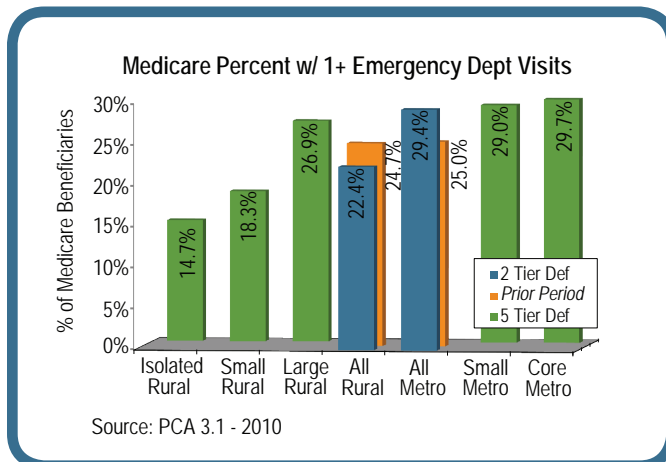


Figure 54



The increase in Medicare primary care utilization levels, noted above, is coupled with a sharply lower rate of Emergency Department utilization by the elderly in more rural areas, with Rural elderly being 24% less likely to have used the ER in the past year overall, and half as likely in the Isolated Rural tier (22% vs 29% and falling to about 15% in Isolated Rural areas) – Figure 55. The adjusted rate of ER use by the elderly also echo this pattern. Rural Medicare use of the ER has fallen since the last analysis while it has risen in Metro areas. Coupled with higher rates of primary care use this appears to be a positive trend for the Rural elderly.

Figure 55



D. Health Related Behavior and Health Risks

Ultimately it is the choices that individuals make regarding their health that have the most profound influence over one’s health status. As discussed above, the use of routine and preventive care is one aspect of such behavior, though it is somewhat mediated by the structure and accessibility of care available. Other decisions are of a personal/lifestyle nature, though access to primary care, health education, and public health messaging has a great deal to do with the decisions that individuals make.

1. Weight and Exercise

The Rural population has approximately the same proportion of overweight individuals as the Metro population, with both groups having just over one third of the population above normal weight. Looking at the more serious condition of obesity, however, Rural residents are statistically more likely to be obese than Metro residents, by about 14% (27.5% vs 24.2% in Metro areas), with similar rates of obesity across the Rural tiers. See Figure 56. Lack of physical activity is one of the factors leading to obesity, however the portion of the population reporting no physical activity in the past 30 days is nearly the same, or slightly lower, in Rural areas.. This suggests that the other major contributor, the quantity or quality of food intake, may be an issue.

Figure 56

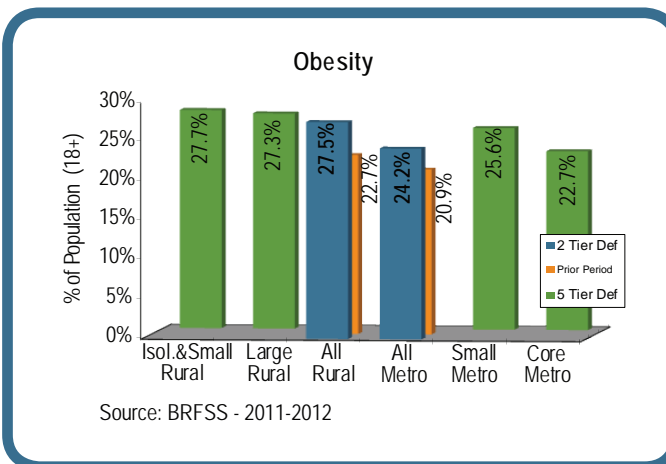
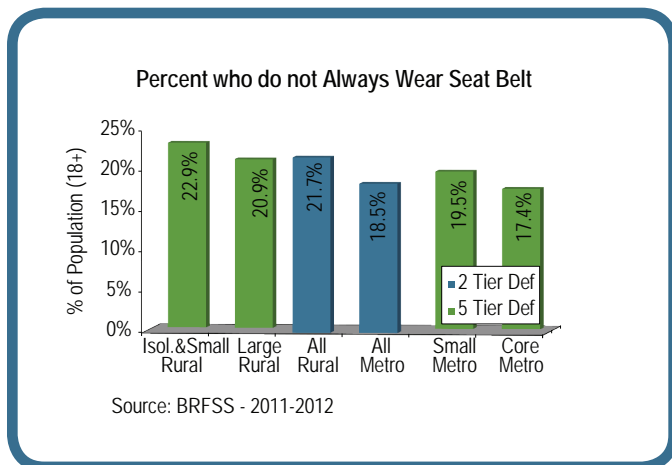


Figure 57 Seat Belt Use



1. Personal Safety

There is little data available on use of personal safety equipment, however the non-use of seat belts is higher in Rural areas, by about 17%, with a rising pattern related to the level of rurality - Figure 57. This may relate to the findings on motor vehicle deaths to be discussed below.

2. Pregnancy Related Risks

While the rate of low birth-weight and premature delivery are lower in Rural areas, there are several troubling patterns related to prenatal care and personal health risks seen in Rural parts of the region. Rural areas are notably higher in terms of teen births, late/no prenatal care, and particularly the portion of expectant mothers smoking during pregnancy.¹² Teen deliveries are 24% more likely in Rural areas, Late/No Prenatal Care is 12% more likely proportionally, while smoking during pregnancy is more than double the rate in Metro areas. (Figure 58). The Rural rate of maternal smoking is nearly as high as the overall smoking rate in Rural areas (just over 20%) while the Metro rate is less than half the Metro smoking rate overall (17.4%). These same factors were notable findings from the prior analysis and continue to be a cause for concern. Figure 59 shows that the trend for these measures has been in a positive/downward direction for all three of these statistics, though the remaining gap between Rural and Metro areas has widened with respect to maternal smoking. Refer to Figure 64 for results related to birth outcomes.

Figure 58

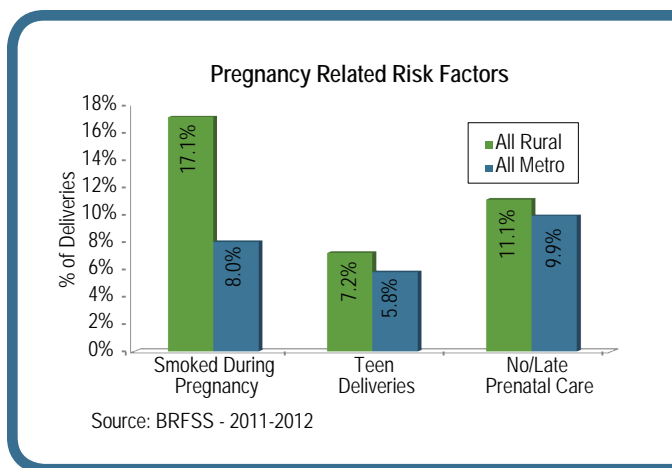
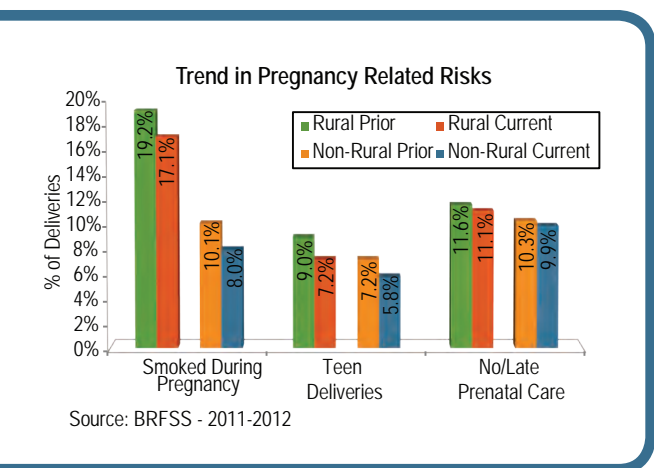


Figure 59

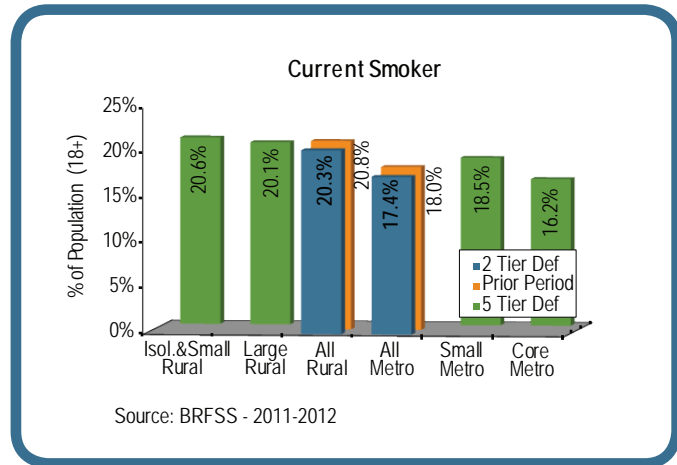


3. Tobacco, Alcohol, and Substance Abuse

Some of the greatest health risks within the control of individual behavior relate to the use of drugs, alcohol, and tobacco. Looking first at smoking, despite years of public health efforts, nearly one in five adults in New England continue to smoke. The smoking rate in

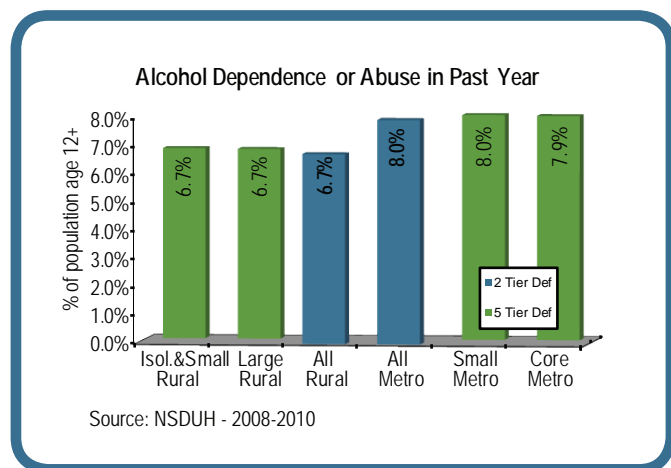
Rural areas (20.3% of adults) remains 17% higher than the rate in Metro areas of the region (17.4% of adults), and rises slightly with increasing rurality (Figure 60). The rate is down slightly in both Rural and Metro areas, but the Rural rate is still above the national average. Data from the National Survey on Drug Use and Health (NSDUH) echoes the finding that smoking is higher in rural areas, and estimates an even higher smoking rate of approximately 25% of those 12+. When asked about the use of all tobacco products, the Rural rate jumps to 29.4% and the gap with Metro communities widens slightly. Rural residents were slightly less likely to “Perceive Great Risk’ from smoking. Promisingly, however, the rate of ‘former smoker’ status is also higher in Rural areas and has increased slightly since the prior analysis.

Figure 60



Across all measures related to alcohol use, both the BRFSS and the NSDUH show that rural areas experience lower rates of use, less dependence, and less difficulty in finding treatment when needed. Rates are lower in rural areas for all drinking, heavy and binge drinking, number of drinks in the past month, and, importantly, underage drinking, the latter of which is about 6% less likely in rural areas. The rate of alcohol abuse or dependence was also about 15% lower as a proportion (Figure 61), and the perceived risk of having 5 or more alcoholic beverages once or twice a week is about equivalent between Rural and Metro areas. Rural residents were also 14% less likely to report needing but not receiving treatment for alcohol use in the past year.

Figure 61



The use of marijuana was approximately equivalent between Rural and Metro areas, as was abuse of pain relievers. The use of all other illicit drugs (excluding marijuana) was about 10% lower for Rural areas. Reported abuse of, or dependence on, illicit drugs in the past year was approximately 16% lower proportionally in the Rural tiers, and needing but not receiving treatment in the past year was 7% lower in Rural areas.

While these findings suggest that Rural areas of the region have somewhat fewer issues with drugs and alcohol compared to Metro areas, it is also worth noting that New England, as a whole, shows notably higher use rates compared to the nation. New England has about 18% more heavy drinking, about 30% greater use of marijuana, and nearly 30% higher use of illicit drugs and cocaine. Dependence on illicit drugs, in particular, is also about 20% higher in the region. In most cases this still places the Rural substance use and abuse rate in New England above the national average.

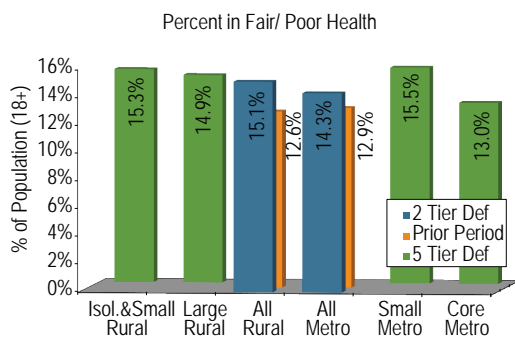
E. Health Status and Outcomes

Health status and outcomes are the ultimate measure of the interaction between the needs of the population and the accessibility and effectiveness of the public health and health care delivery system in place to meet those needs. More is not necessarily better, and a well-structured network of resources can overcome very significant challenges in terms of needs and access among the population. It is often difficult, however, to disentangle the underlying components of health status to determine the key drivers and most effective approach to improving results. A high rate of a particular adverse outcome can be the result of high organic need in the population, or shortcomings in the system of care needed to meet average needs. The statistics reported thus far in the report can give clues about what may underlie health status results, and ultimately it is often a combination of factors that must be considered.

1. Overall Physical & Mental Health Status:

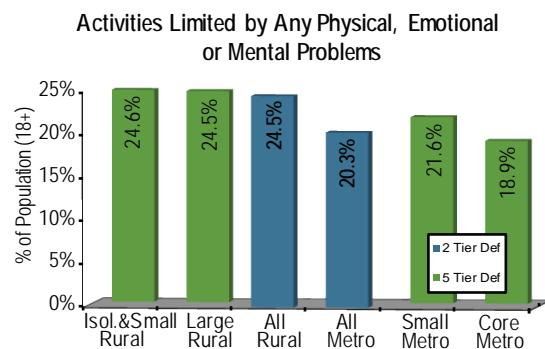
The association between self-rated health status and ultimate outcomes, such as mortality, are well established and thought to be an inclusive and context-based assessment of a wide range of underlying social and biological contributing factors.¹³ As such, it is a good starting point for exploring the many potential indicators of health status in detail. In general the Rural population of the region appears to have relatively comparable levels of ‘fair’ or ‘poor’ health status to those in the Metro tiers – Figure 64. As this statistic is not adjusted for age, this likely indicates that the rural population enjoys relatively good health in aggregate. It is also noteworthy that this portion has risen by nearly 20% proportionally since the last report in Rural areas, perhaps due to the aging of the population or external factors such as the impacts of the recession. The portion of the population that reports experiencing greater than 15 days per month of Fair/Poor health is somewhat greater in the rural areas – by about 17%, but this represents less than 10% of the population overall.

Figure 62



Source: BRFSS - 2011-2012

Figure 63



Source: BRFSS - 2011-2012

Broadening the focus, the BRFSS asks if respondents are “limited in any way in any activities because of physical, mental, or emotional problems”. Here Rural areas show a statistically higher portion of the population stating that this is the case. The Rural rate of 24.5% is relatively consistent across the rural tiers, and about 20% higher relative to the Metro proportion of 20.3%. - Figure 63

The data provide several specific elements describing the mental health status of Rural populations. In general, Rural populations report similar overall rates of mental health issues compared to Metro populations across a range of dimensions. The portion stating that mental health was not good for 15+ days in the past month was approximately the same in Rural and Metro areas (8.5% and 8.4% respectively). A similar pattern is seen in the NSDUH measures for any mental illness (20.7% and 20.4%), major depressive episode in past year (7.1% and 6.9%), and serious mental illness in the past year (5.2% to 4.8%). The portion reporting serious thoughts of suicide in the past year was 4.3% in Rural areas and 4.0% in Metro areas. These similarities in self-assessed mental health, however, belie the large and persistent observed difference in the Rural suicide rate discussed under Mortality below.

1. Pregnancy/Birth Outcomes

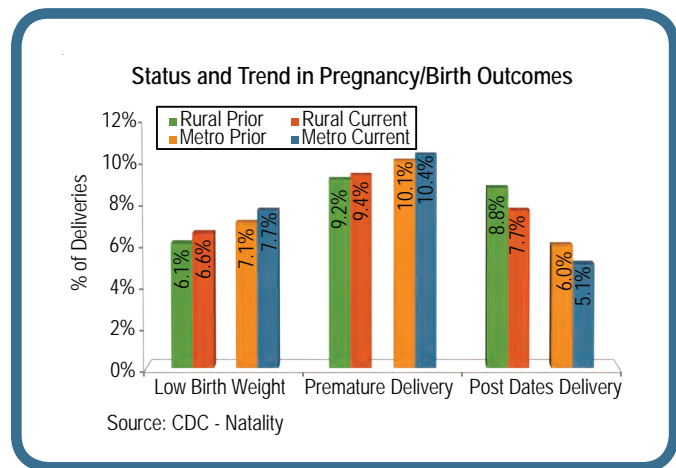
A variety of pregnancy related risks were observed in the data, as discussed above. While these risks are often associated with certain adverse birth outcomes, that result does not seem to have materialized in Rural areas thus far. The March of Dimes notes that, “Pregnant women who smoke are nearly twice as likely to have a low-birthweight baby than women who don’t smoke.”¹ and smoking is associated with premature delivery in a related point. That said, the odds of these conditions remain somewhat

lower in Rural areas compared to Metro communities as seen . As seen in Figure 66, the rate of low birthweight is approximately 15% lower in Rural areas compared to Metro areas, and premature delivery is nearly 10% lower in relative terms.

One other pregnancy related outcome/risk is post-dates (or post term) delivery, defined as a baby delivered after the 42nd week of pregnancy, which increases the risk to the mother and infant . Unlike premature delivery, which is not always possible to avert and sometimes clinically indicated, post dates delivery can be averted via induction of labor and other means, and is generally contraindicated, though there is the option for increased monitoring if the mother and provider prefer. It may also be the result of incorrect dating of the pregnancy in some cases. In general, this persistent finding may indicate a gap in the active management of pregnancy and options available in rural settings, and may relate to the relative scarcity of Ob/Gyn providers in rural communities.

Looking at the trend in these statistics over time – also in Figure 66 – one does see, troublingly, that the rate of low birthweight has actually risen by nearly 10% since the prior analysis was conducted, in both Rural and Metro areas. Conversely, while the rate of post dates delivery remains higher in rural areas, it is down overall – by approximately 12% in Rural areas and 16% in Metro areas relative to the prior measurement.

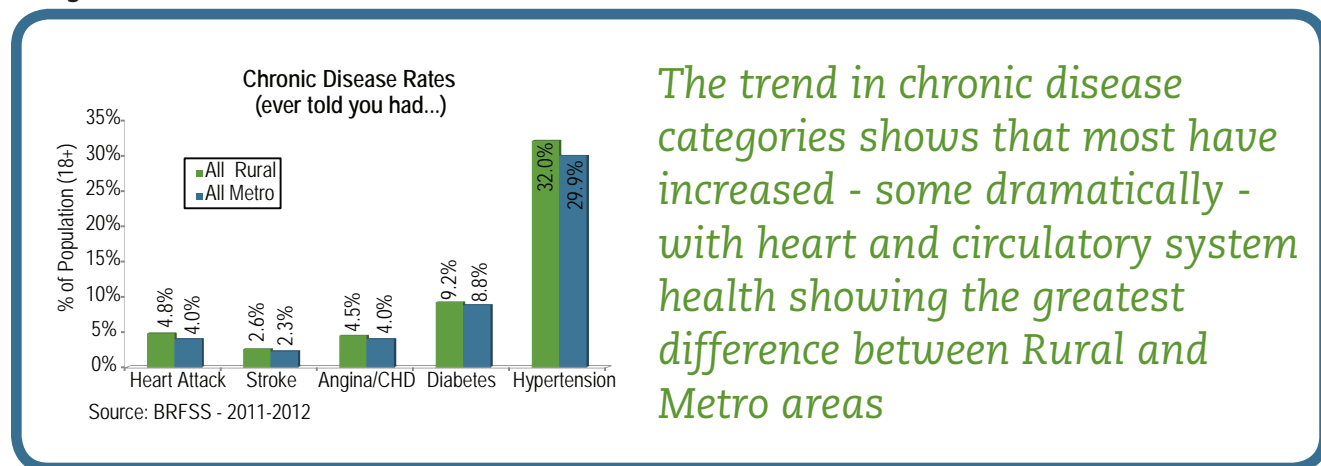
Figure 64



1. Chronic Disease

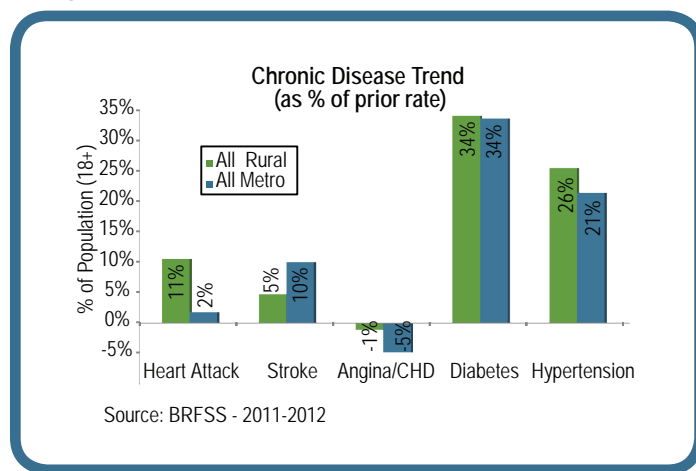
The issue of chronic disease is a large and growing issue nationally. Figure 67 shows the 'prevalence' of a variety of chronic conditions among adults based on self-reporting as to whether they have been told they have the condition by a health professional. Across all measures shown, Rural areas exhibit a slightly higher rate compared to the Metro tiers. This ranges from a 20% greater prevalence of heart attack, a 13% greater prevalence for stroke and angina/CHD, and a single digit percent difference for diabetes and hypertension. These differences may be associated with age differences as these data are not age adjusted.

Figure 65



Examining the trend in these chronic disease categories since the prior report - Figure 66, one sees that most have increased – in some cases dramatically. Diabetes rates increased the most, however the increase in diabetes was relatively similar between Rural and Metro areas with just over one third greater prevalence in each. The greatest disparities in the rate of change between Rural and Metro areas related to heart and circulatory system health. While angina/coronary heart disease decreased in both tiers, the decrease in Metro areas was 5% compared to a 1% drop in rural areas. The change in the rate of heart attack increased by 11% in Rural areas compared to just a 2% increase in Metro areas. While the difference in hypertension was not as pronounced, it also experienced a higher rate of increase in Rural areas. These differential increases have begun to open up gaps in the Rural: Metro rate of chronic disease status, which had been largely equivalent in the prior analysis.

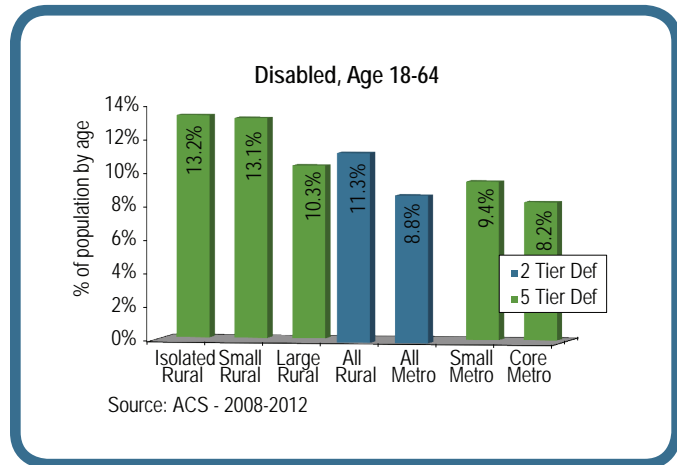
Figure 66



1. Disability

Disability is also a more common condition in Rural areas, particularly amongst non-elderly adults, who are 28% more likely to be disabled in Rural communities, and particularly in the Small and Isolated Rural tiers, where the disability rate is approximately 50% greater. See Figure 67. The more severe status of having a ‘self-care difficulty’ is also higher among rural adults, particularly in the 18-34 age range, though the portion of the population impacted is very small. Self-care difficulty is actually lower among the elderly in rural areas, which may suggest some are having to leave rural communities once disabled. Disability is a particularly difficult issue for those living in rural settings due to lack of transportation other than personal vehicles.

Figure 67

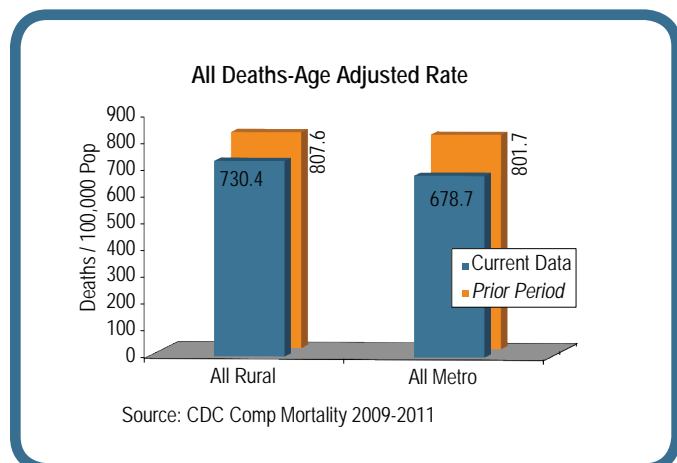


1. Mortality

Mortality is the ultimate health outcome, representing the balance of various underlying diseases, risk factors, and personal/social influences against the ability of the public health and medical system to prevent and treat conditions to delay death. Mortality can also be divided along different lines including the underlying organic cause of death, the external cause of death, and the issue of ‘intent’ surrounding the circumstances of death. Statistics on both crude and age adjusted mortality rates are provided in the data table. The analysis will focus on the age adjusted rates for internal causes, to mute the impact of age differences in Rural areas to provide a truer picture of the health and system implications, while external cause mortality is best examined in terms of crude rates that show the true impact. Due to data suppression issues it was not possible to aggregate data for the less common causes of death, nor was it possible to examine mortality using the detailed (5 tier) rural definition.

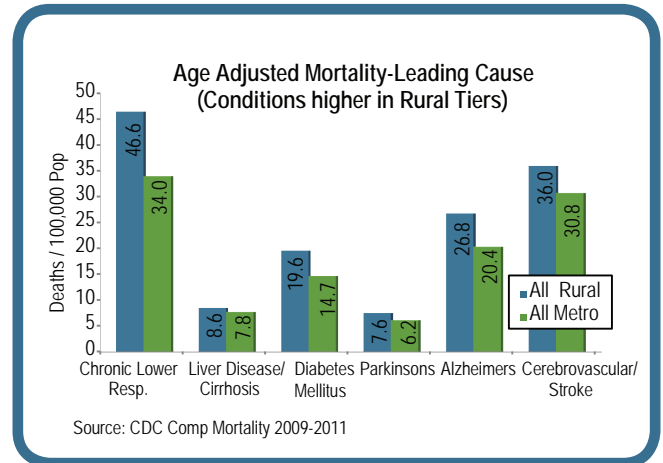
Figure 68 shows the current and prior period age adjusted mortality rates for Rural and Metro areas of the region. Note that the rate in Rural areas is slightly higher than in Metro areas, by approximately 8%. The total mortality rate has fallen in both the Rural and Metro tiers since the prior report, but declined faster in the Metro areas (-15% vs -10% in Rural areas). As a result, the 8% difference in the current data actually represents a widening of the difference between Rural and Metro areas, which were only 1% apart previously.

Figure 68



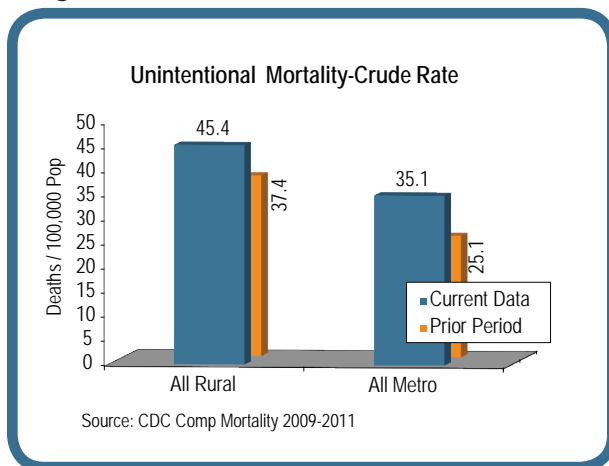
Looking at the major cause classifications, it is first noteworthy that the two leading causes of death overall, heart disease and cancer, have rates that are very similar in Rural and Metro areas, with the age adjusted rates 5% and 4% higher in rural areas respectively. Figure 69 shows other causes for which Rural areas are somewhat higher overall, on an age adjusted basis. Differences of greater than 30% are observed for lower respiratory causes, diabetes, and Alzheimer's disease, with lower respiratory diseases representing the greatest number and percent difference. This may relate to the historical degree of smoking, evidenced by a higher 'former smoker' rate in rural areas.

Figure 69



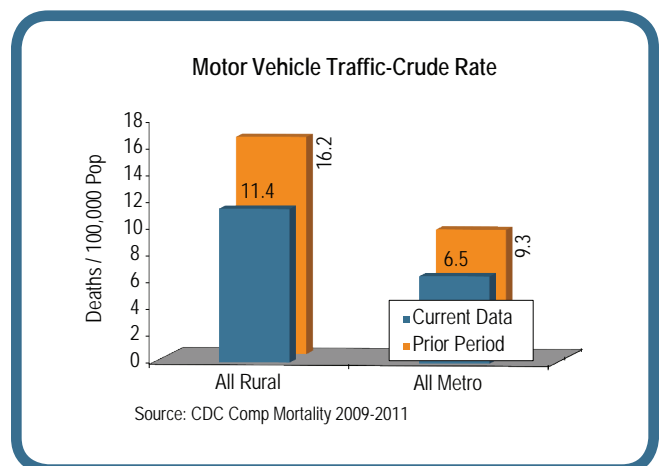
Looking beyond internal causes, the unintentional (accidental) mortality rate in Rural areas remains notably higher than in Metro areas, by nearly 30% (45 deaths per 100k pop vs 35 in Metro areas). The Rural rate exceeds the rate for the nation overall. As Figure 72 shows, not only is the rate higher in Rural areas but unintentional death rates have risen notably since the prior data analysis period, a phenomenon acknowledged nationally in recent years². Accidental death encompasses a wide range of circumstances ranging from motor vehicle accidents to falls among the elderly to drug overdoses, the latter of which is noted as the fastest rising cause nationally. The rate of fall-related deaths is approximately 30% higher in Rural areas, but the rate of poisonings, and drug related poisonings in particular, are lower in Rural areas.

Figure 70



Approximately half of the observed difference in the accidental death rate between Rural and Metro areas can be explained by the higher rate of motor vehicle fatalities in Rural areas, however this does not explain the observed rise. As Figure 71 shows, the rate of motor vehicle fatalities is fully 76% higher in Rural areas compared with Metro parts of New England. This persistent difference likely lies in the distances driven by Rural residents combined with the nature of rural roads and winter travel.

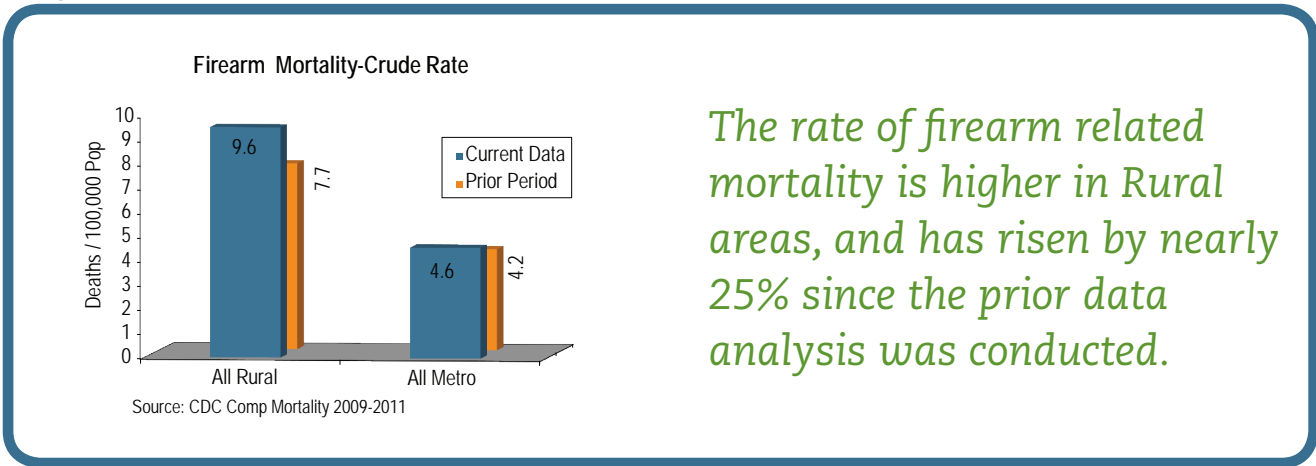
Figure 71



Here, however, we see that the rate of motor vehicle fatalities has fallen by 30% region-wide since the prior analysis, even as concerns about distracted driving accidents receive much attention.

Another area where Rural residents suffer higher rates of mortality is deaths caused by firearms. Firearm deaths are typically part of the accidental death rate, but they also encompass intentional deaths such as homicide, suicide, and acts of law enforcement. The Rural rate of firearm related mortality is more than double the rate observed in Metro areas. As Figure 72 shows, not only is the rate of firearm related mortality higher in Rural areas, it has also risen by nearly 25% since the prior data analysis was conducted – more than twice the rate of increase seen in Metro areas.

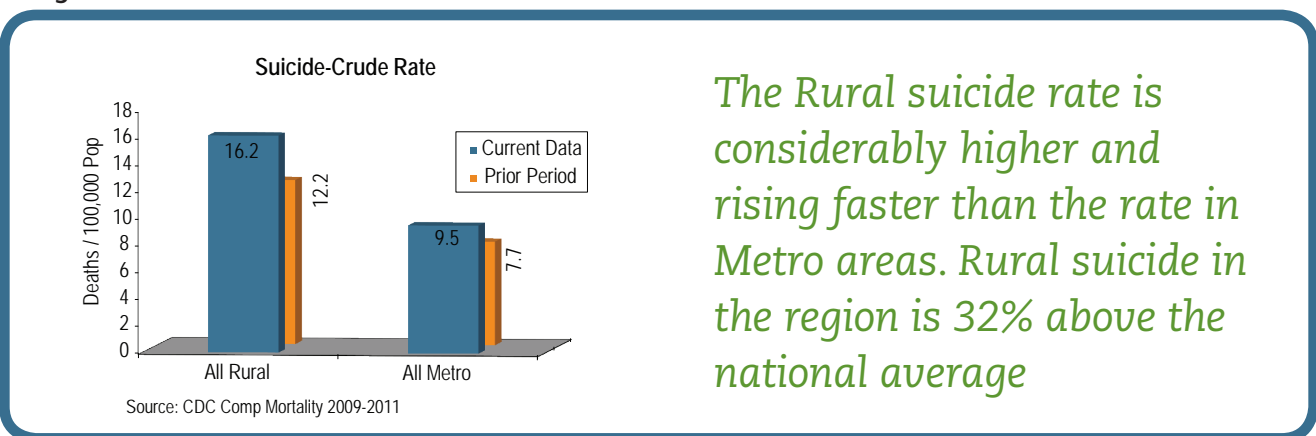
Figure 72



The rate of firearm related mortality is higher in Rural areas, and has risen by nearly 25% since the prior data analysis was conducted.

Finally, as noted above in the discussion of mental health, the suicide rate in rural areas is notably and persistently higher than in Metro communities in the region, exceeding the Metro suicide rate by fully 70 percent. The Rural suicide rate in New England is 32% above the national average rate, while the Metro rate falls well below the national rate. Equally troubling is the rise in the Rural suicide rate since the prior report, during which time the suicide rate has risen by a third; a trend more than 40% greater than the Metro increase. The analysis of this issue is complex, as the rate of mental illness and even contemplation of suicide did not approach the difference in mortality observed. This may tie back to the findings on firearms, which are known to increase the degree to which suicide attempts are successful, or it may relate back to the higher rate of Mental Health Provider Shortage Designation in rural areas, which could make obtaining treatment for mental illness more difficult.

Figure 73



The Rural suicide rate is considerably higher and rising faster than the rate in Metro areas. Rural suicide in the region is 32% above the national average

Technical Appendices

A. Rural Definition Codes and Transformations

The Table below shows the Census Tract based RUCA codes and the Rural Tier assignment of each for the Rural Definition Used in this report:

Figure 74 – RUCA 2010 Crosswalk to New England Rural Definition

Secondary RUCA Codes, 2010	NERHRT Rural Tier Assignment 2014
1 Metropolitan area core: primary flow within an urbanized area (UA)	Core Metro
1.1 Secondary flow 30% to 50% to a larger UA	Small Metro
2 Metropolitan area high commuting: primary flow 30% or more to a UA	Large Rural
2.1 Secondary flow 30% to 50% to a larger UA	Large Rural
3 Metropolitan area low commuting: primary flow 10% to 30% to a UA	Large Rural
4 Micropolitan area core: primary flow within an Urban Cluster of 10,000 to 49,999 (large UC)	Large Rural
4.1 Secondary flow 30% to 50% to a UA	Large Rural
5 Micropolitan high commuting: primary flow 30% or more to a large UC	Large Rural
5.1 Secondary flow 30% to 50% to a UA	Large Rural
6 Micropolitan low commuting: primary flow 10% to 30% to a large UC	Large Rural
7 Small town core: primary flow within an Urban Cluster of 2,500 to 9,999 (small UC)	Small Rural
7.1 Secondary flow 30% to 50% to a UA	Small Rural
7.2 Secondary flow 30% to 50% to a large UC	Small Rural
8 Small town high commuting: primary flow 30% or more to a small UC	Small Rural
8.1 Secondary flow 30% to 50% to a UA	Small Rural
8.2 Secondary flow 30% to 50% to a large UC	Small Rural *
9 Small town low commuting: primary flow 10% to 30% to a small UC	Small Rural
10 Rural areas: primary flow to a tract outside a UA or UC	Isolated Rural
10.1 Secondary flow 30% to 50% to a UA	Small Rural
10.2 Secondary flow 30% to 50% to a large UC	Small Rural
10.3 Secondary flow 30% to 50% to a small UC	Small Rural

To accommodate various units of geography for which data was available, the base Census Tract based definition had to be transformed to match alternate geographic units. The rural classification of each geographic unit in the transformed definitions was based on the plurality of the population falling within it. To accomplish this, census block-level populations was first assigned to the rural tier of the tract that the block falls within. The block-level population was then aggregated to the alternate geographic units, permitting units incongruous with tracts, such as ZCTAs, to be accurately assessed based on the classification of the population they contain. Often the transformed geographic units would contain population from several rural tiers. To account for the different number of Rural and Metro tiers, each transformed unit was first classified into one of these two major tiers based on the majority of the population contained, before being assessed for which sub-tier they would be classified into based on plurality within that major tier.

Transformations included the following geographic units:

Zip Code Tabulation Areas (ZCTAs) - Census representations approximating one or more zip code areas.

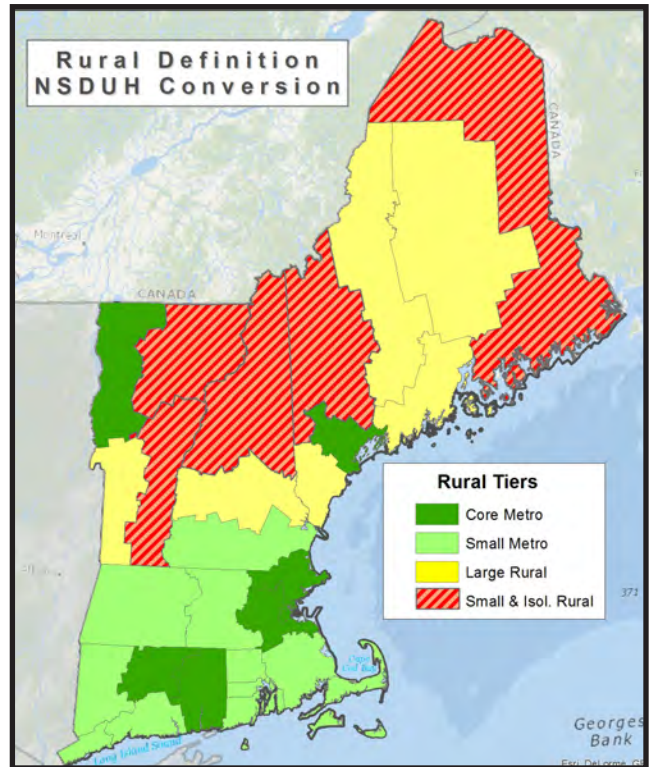
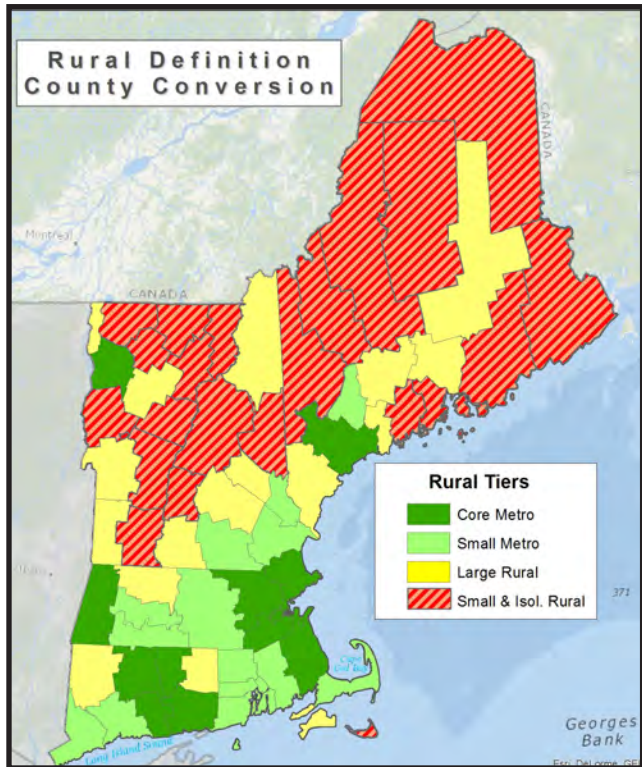
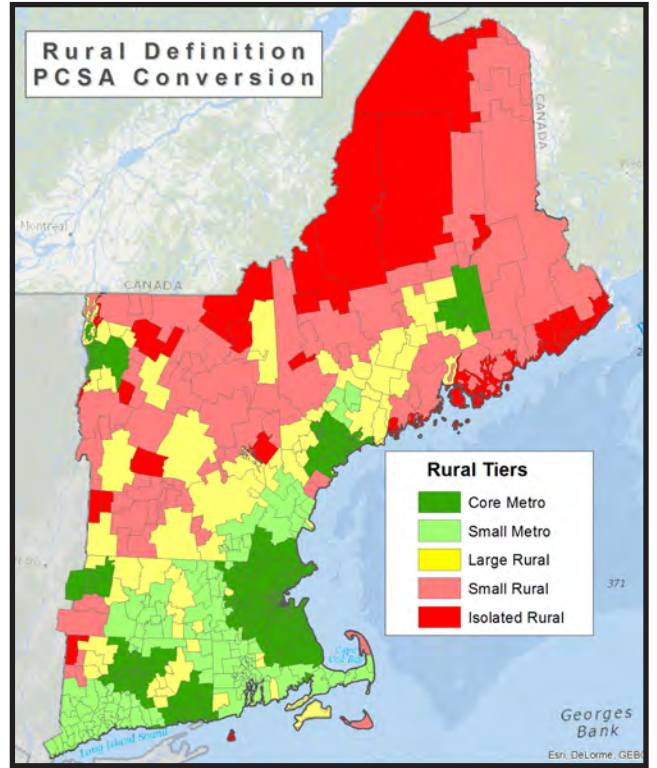
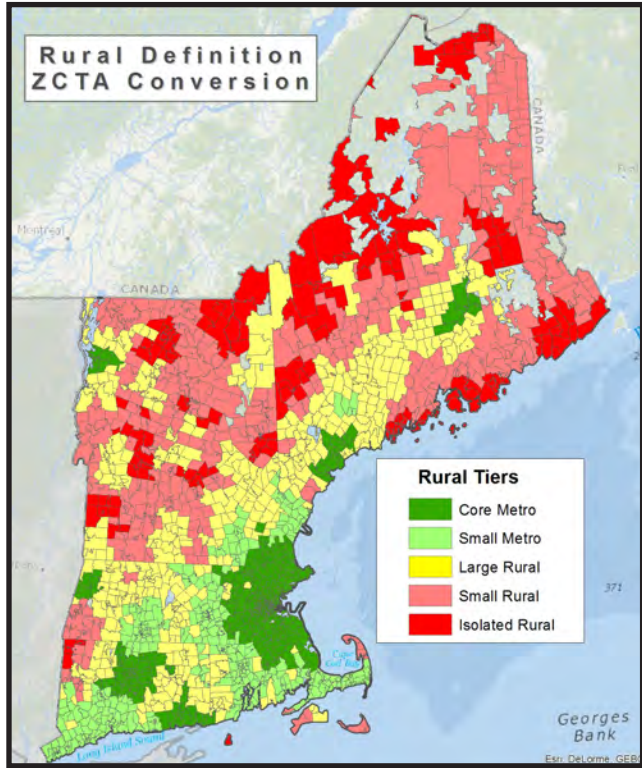
Primary Care Service Areas (PCSAs) v.3.1 – Aggregations of census tracts intended to represent objectively defined service areas for the delivery of primary care, based on patient origin and destination for Medicare outpatient claims. These units, and underlying statistics, are developed by The Dartmouth Institute for Health Care Policy & Clinical Practice, under contract to the Health Resources and Services Administration (HRSA).

Counties – Census-defined county boundaries.

National Survey on Drug Use and Health (NSDUH) Sub-State Regions – State specified regions for the aggregation and estimation of data from the survey – typically based on groups of counties or census tracts

It should be noted that, while these transformations are based on the base definition, the resulting areas covered can be quite different, particularly for larger units such as Counties and NSDUH regions. Also, for these larger geographic unit definitions, it was not always possible to maintain the most rural tiers as separate categories, so some statistics have the detailed tiers aggregated.

See Maps on following page.



B. Data Sources

Data File: American Community Survey (ACS)
Years: 2008-2012
Source: US Census
Geographic Units: Census Tracts
URL: <http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t>

Data File: Primary Care Service Area (PCSA) v.3.1
Years: 2010
Source: HRSA Data Warehouse / The Dartmouth Institute
Geographic Units: Primary Care Service Areas (comprised of Census Tracts)
URL: <http://datawarehouse.hrsa.gov/Data/datadownload/pcsa2010Download.aspx>
Data File: Health Professional Shortage Areas (HPSA) – Primary Care, Dental, Mental Health
Years: 2014
Source: HRSA Data Warehouse
Geographic Units: Designated HPSAs
URL: <http://datawarehouse.hrsa.gov/>

Data File: FQHC UDS Service Area Analysis
Years: 2013
Source: Bureau of Primary Health Care / JSI / UDS Mapper
Geographic Units: Zip Code Tabulation Areas (ZCTAs)
URL: <http://www.udsmapper.org/>

Data File: Hospital Location/Classification
Years: 2014
Source: HRSA Data Warehouse
Geographic Units: Hospitals
URL: <http://datawarehouse.hrsa.gov/>

Data File: Natality Information – Live Births
Years: 2008-2012, 2003 for certain birth certificate measures
Source: Centers for Disease Control and Prevention (CDC) / WONDER
Geographic Units: County
URL: <http://wonder.cdc.gov/natality.html>

Data File: Compressed Mortality File
Years: 2009-2011
Source: Centers for Disease Control and Prevention (CDC) / WONDER
Geographic Units: County
URL: <http://wonder.cdc.gov/mortsql.html>

Data File: Behavioral Risk Factor Surveillance Survey (BRFSS)
Years: 2011-2012
Source: Centers for Disease Control and Prevention (CDC)
Geographic Units: County
URL: <http://www.cdc.gov/brfss/>

Data File: National Survey on Drug Use and Health (NSDUH)
Years: 2008-2010
Source: Substance Abuse and Mental Health Services Administration (SAMHSA)
Geographic Units: NSDUH Substate-Regions (defined by each state)
URL: <http://www.samhsa.gov/data/NSDUH/substate2k10/toc.aspx>

Data File: Veterans Health Administration Enrollment and Utilization
Years: FY 2012
Source: Veteran's Administration (Unique Runs)
Geographic Units: Zip Code
URL: <http://www.va.gov/health/>

Data File: County Health Rankings
Years: 2014 Release – various underlying years – see detailed data table
Source: Robert Wood Johnson Foundation
Geographic Units: County
URL: <http://www.countyhealthrankings.org/rankings/data>

Endnotes

1. <http://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/documentation.aspx>
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9. Levinson D.; Most Critical Access Hospitals Would Not Meet The Location Requirements If Required To Re-Enroll In Medicare; DHHS/OIG; OEI-05-12-00080, August 2013
10. Note that North Adams Regional Hospital in northwestern Massachusetts is shown but with no drive buffer as the facility was known to be closed at the time of this analysis.
11. 15 miles is the CAH inter-hospital distance standard for CAH locations in mountainous terrain as is the case in many rural areas of the region.
12. Note that smoking during pregnancy and late/no prenatal care are based on 2003 statistics, as that was the latest year for which data from all New England states is available, due to a change in the birth certificate that states have not uniformly adopted.
13. Jylhä M ; What is self-rated health and why does it predict mortality? Towards a unified conceptual model ; Soc Sci Med. 2009 Aug;69(3): 307-16



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