

Health Care Costs and Access Disparities in Appalachia

Prepared for:

Appalachian Regional Commission

1666 Connecticut Avenue NW
Suite 700
Washington, DC 20009-1068

January 2012

Contract #CO-16835-2010



APPALACHIAN
REGIONAL
COMMISSION

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FOR HEALTH SERVICES RESEARCH

HEALTH CARE COSTS AND ACCESS DISPARITIES IN APPALACHIA

January 2012

ACKNOWLEDGEMENTS

This report was prepared by PDA, Inc. in Raleigh, North Carolina in collaboration with The Cecil G. Sheps Center for Health Services Research at the University of North Carolina Chapel Hill. It was developed for the Appalachian Regional Commission under contract CO-16835-2010. The principal authors of this report and the related research study include: Nancy M. Lane, PDA, Inc.; Thomas R. (Bob) Konrad, PhD, Tomas C. Ricketts, III, PhD, Randy Randolph, MRP, Charles Tran, BS, and Christopher A. Beadles, MD from The UNC Sheps Center; Andrew Y. Lutz, BS and Kimberly Baker, BS at PDA, Inc. In addition, this report has been reviewed by David Carrier, PhD of the Appalachian Regional Commission.

The authors wish to thank our program officer David Carrier for his insights and review comments on various technical aspects of the report. In addition, we are indebted Paulette Pack, Administrative Assistant, PDA, Inc., for countless hours of assistance editing the report and to Laurie Leadbetter and Christiane Voisin at The UNC Sheps Center for assistance with the literature search.

APPALACHIAN REGIONAL COMMISSION

Funding for this project was provided by the Appalachian Regional Commission (ARC) to PDA Inc. through a competitive solicitation led by David Carrier, PhD and John Cartwright, PhD.

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GLOSSARY OF ACRONYMS

ACA	Affordable Care Act
AFDC	Aid to Families with Dependent Children
AHA	American Hospital Association
AHRQ	Agency for Healthcare Research and Quality
AHW	Average Hourly Wage
AMMS	Advanced Maintenance Management System
ARC	Appalachian Regional Commission
ARC_EDI	Appalachian Regional Commission Economic Distress Index
ARF	Area Resource File
ARRA	American Resource Recovery Act
ASEC	Annual Social and Economic
BLS	Bureau of Labor Statistics
BRFSS	Behavioral Risk Factor Surveillance System
CBO	Congressional Budget Office
CBP	County Business Patterns
CBSA	Core-Based Statistical Areas
CDC	Center for Disease Control
CHAI	Combined Health Access Index
CHIP	Child Health Insurance Program
CHSI	Community Health Status Indicator
CMF	Compressed Mortality File
CMMI	CMS Center for Innovations
CMS	Centers for Medicare and Medicaid Services
COBRA	Consolidated Omnibus Budget Reconciliation Act
CPS	Census Population Studies
DDS	Doctor of Dental Surgery
DHHS	Department of Health and Human Services
DSH	Medicaid disproportionate share
ECI	Employment Cost Index
EDI	Economic Distress Index
EMUP	Exceptional Medically Underserved Population
ESRD	End Stage Renal Disease

ESRI	Environmental Systems Research Institute
FDA	U.S. Food and Drug Administration
FMAP	Federal Medical Assistance Percentage
FPL	Federal Poverty Level
FQHC	Federally Qualified Health Centers
FT	Federal Trade Commission
FY	Fiscal Year
GAF	Geographic Adjustment Factor
GDP	Gross Domestic Product
GDSC	Governor's Designation Secretary Certified
GPCI	Geographic Practice Cost Index
GPO	Government Printing Office
GSP	Gross State Product
HCCA	Healthcare Costs, Coverage, and Access Index
HCC	Health Care Cost
HCRA	Health Care Resource Availability
HCUP	Healthcare Costs and Utilization Project
HI	Hospital Insurance
HIC	Health Insurance Coverage
HOSPBEDS	Acute Hospital Beds
HRSA	Health Resource and Service Administration
HSA	Health Savings Account
HWI	Hospital Wage Index
IOM	Institute of Medicine
IPPS	Inpatient Prospective Payment System
IRS	Internal Revenue Source
J-1 Visa	Non-immigrant visa issued by the U.S., esp. for medical or business training within the U.S.
JAMA	Journal of the American Medical Association
KCMU	Kaiser Commission on Medicaid and the Uninsured
KFF	Kaiser Family Foundation
MAX	Medicaid Analytic Extract
MEPS	Medical Expenditure Panel Survey
MSA	Metropolitan Statistical Areas
MUA	Medically Underserved Areas

MUA/P	Medical Underserved Areas & Populations
MUP	Medically Underserved Population
NASBO	National Association of State Budget Officers
NCHS	National Center for Health Statistics
nda	No data available
NHE	National Health Expenditures
NHSC	National Health Service Corps
NIS	National Immunization Survey
NPCP	Non-Primary Care Physicians
NPRM3	Notice of Proposed Rule Making
nrf	No report, survey sample size fewer than 50
OA	Old Age
OCC	Occupational Mix
OHRM	Office of the Actuary Health Reform Model
OMB	Office of Management and Budget
OSCAR	Online Survey, Certification and Reporting
PCP	Primary Care Physicians
PCSA	Primary Care Service Area
PHC	Personal health care
PHCE	Personal Health Care Expenditures
PPACA	Patient Protection and Affordable Care Act
ResDAC	Research Data Assistant Center
RHC	Rural Health Clinic
RIMS II	Regional Input-Output Modeling System
RN	Registered Nurse
RSA	Rural Service Area
RTP	Research Triangle Park
SAHIE	Small Area Health Insurance Estimates
SAMSA	Substance Abuse and Mental Health Administration
SCHIP	State's Children's Health Insurance Program
SES	Socioeconomic status
SGR	Sustainable Growth Rate
SHADAC	State Health Access Data Assistance Center
SID	State Inpatient Databases

SMI	Supplementary Medical Insurance
SSA	Social Security Administration
SSI	Supplemental Security Income
TRH	Tennessee Rural Health
TRICARE	VA and Department of Defense health insurance plan
UNC	University of North Carolina at Chapel Hill
VA	Veterans Administration
VHA	Veterans Health Administration
VISN	Veterans Integrated Service Networks
VISTA	Veterans Health Information Systems and Technology Architecture
WIC	Woman, Infants, and Children Program
YPLL	Years of Potential Life Lost
YPLL_75	Years of Potential Life Lost under age 75 per 100,000 population
ZBP	Zip Code Business Patterns

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EXECUTIVE SUMMARY AND KEY FINDINGS

HEALTH COST AND ACCESS INDEX

The Appalachian Regional Commission (ARC) contracted for development of an index that would consistently measure healthcare access and cost disparities of the Appalachian Region compared with the rest of the United States. The goal was a metric of comparable depth and scope to the ARC Economic Status Index that ARC uses to measure Economic Distress levels in the Appalachian Region. PDA, Inc. and the Cecil G. Sheps Center for Health Services Research of the University of North Carolina at Chapel Hill developed the Healthcare Cost Coverage and Access Index (HCCA), which includes components describing relative availability of health care resources, level of health insurance coverage and cost of providing health services. Sources of data for the index are publicly available and updated annually.

TABLE 1 - HEALTHCARE COST, COVERAGE AND ACCESS INDEX COMPONENTS

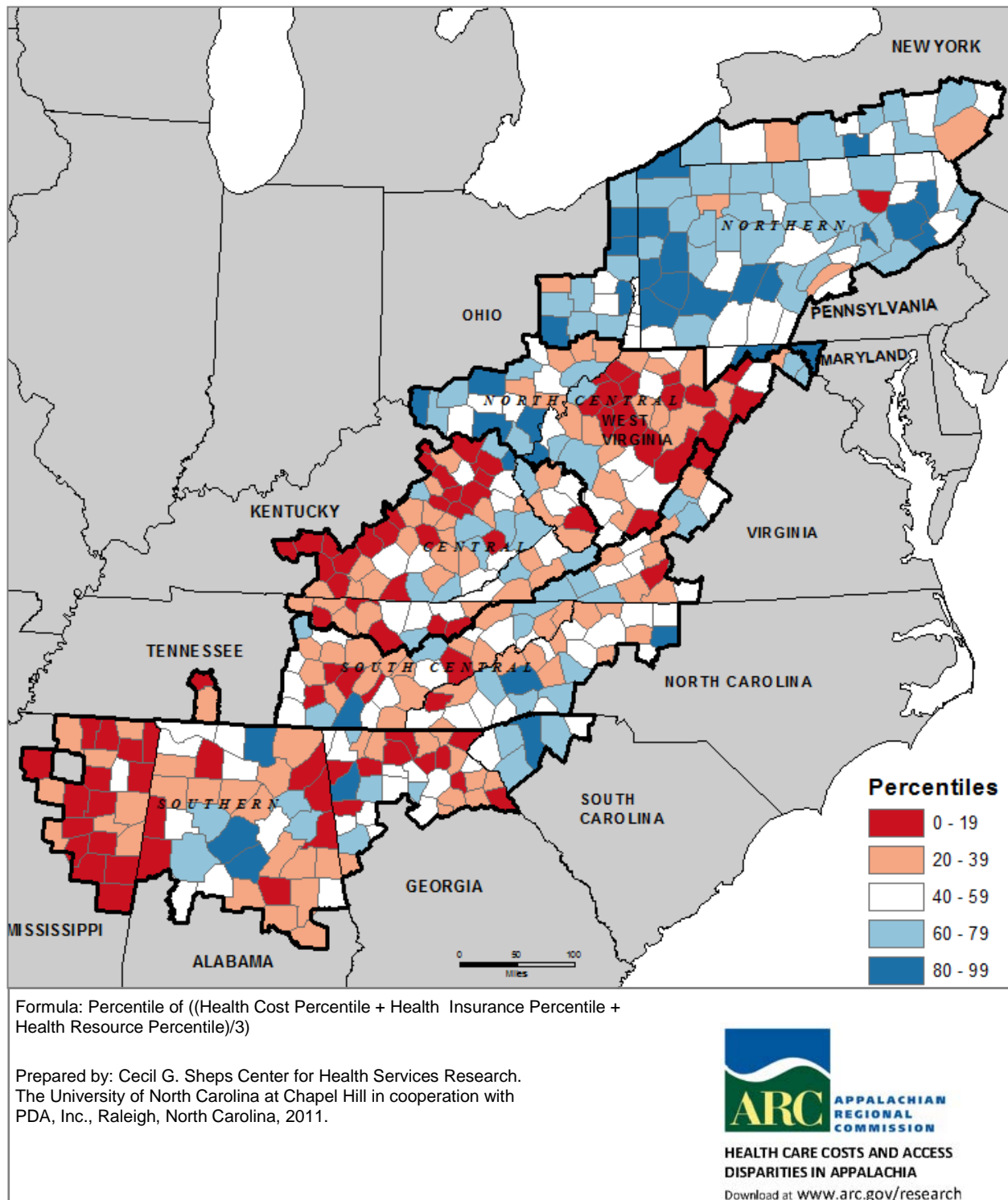
Component Name	Measures	Currency of Data
Health Care Cost (HCC)	CMS Medicare Hospital Geographic Wage Index	2005
Health Insurance Coverage (HIC)	Percentage of Persons Under 65 who report having health insurance	2007
Health Resource Availability (HCRA)	Acute short term hospital beds, primary and specialty physician and dentist supply	2007

The index is designed to show the status of Appalachian counties relative to one another, to other counties in Appalachian states, and to the rest of the counties in the United States. This report describes these county comparisons at the level of the HCCA summary index and each individual component index. All index data are scaled as percentiles of all counties in the U.S.

The report tests relationships of the index and its components to county health status, economic status, and persistent poverty. It also explores medical bankruptcy and the impact of health reform on state budgets.

Figure 1 maps the HCCA Index in the Appalachian Region. The blue to red scale separates counties in quintiles where blue represents good access, coverage, and payment compared to the national average, white indicates the county is close to the national average and red, that its index or measure is well below the national average.

FIGURE 1 – COUNTY HEALTHCARE COST, COVERAGE AND ACCESS INDEX IN APPALACHIA, 2011



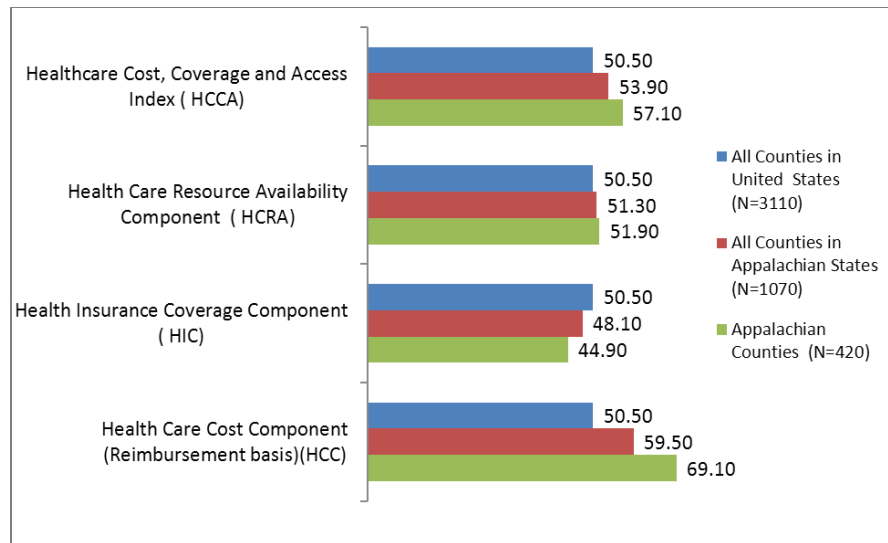
On average, counties in Appalachia ranked slightly below the national norm on HCCA, but pockets of good and poor access occur in Appalachian counties in every state except Maryland and South Carolina.

KEY FINDINGS

HEALTHCARE COST, COVERAGE, AND ACCESS INDEX

The HCCA shows Appalachian counties have, in the aggregate, more healthcare cost, coverage, and access disparities than their respective states' or the United States' average. For the health care payment and health care resources components of the HCCA, the average values for counties in the Appalachian Region are worse than all counties in the United States. Insurance coverage in the region is slightly better than the U.S. average; this is helped by high Medicare Disability enrollment and high Medicaid participation.

FIGURE 2 – AVERAGE OF HCCA INDEX AND COMPONENTS BY GEOGRAPHIC GROUP



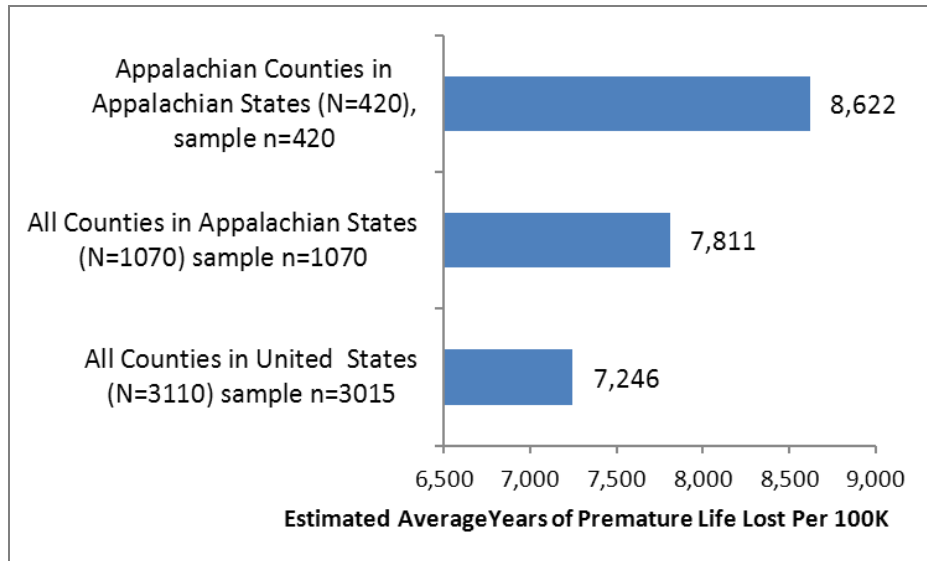
Values are national percentiles with highest representing least desirable score

Close to half of ARC counties (48 percent) ranked in the lowest quintile of healthcare reimbursement summarized by the cost component (HCC). The mean percentile for Appalachian counties was 31.87 compared to 49.54 for the U.S. The HCC is based on the Centers for Medicare and Medicaid (CMS) Hospital Geographic Wage Index, which, in turn sets the baseline for payment by most other payers, government and private. The Appalachian Region's rates on the index are among the lowest in the U.S.

TESTS OF RELATIONSHIPS BETWEEN THE HCCA AND HEALTH AND ECONOMIC STATUS

Preventable mortality rates, measured in age-adjusted Years of Potential Life Lost from preventable causes for people younger than 75, per 100,000 people (YPLL_75), is often used to compare health status among different groups. The County Health Rankings project (www.countyhealthrankings.org) publishes these by county. This index, though controversial, is recognizable by a lay audience, and its use as a measure of health outcomes is supported by the National Center for Health Statistics in its summaries and discussions of comparative health outcomes. This project benchmarked YPLL rates for the three groups: 1,070 counties in the Appalachian states, 420 counties in the Appalachian Region, and all US counties and county equivalents. Rates for the Appalachian Region county group were about 19 percent higher than for all U.S. counties, indicating that residents of Appalachian counties die younger from preventable causes.

**FIGURE 3 –COMPARISON OF ESTIMATED PREVENTABLE MORTALITY RATES IN 2005-2007
AVERAGE OF YEARS OF POTENTIAL LIFE LOST UNDER AGE 75 PER 100,000 POPULATION**



Source: University of Wisconsin County Health Rankings, Premature mortality was estimated with the equation: County YPLL_75 / 100K x county population 2008 / 100,000. Mortality was summed for all counties and divided by the total population times 100,000

The research team looked at relationships of this health status measure to the ARC Economic Distress Index (ARC_EDI) and to measures of healthcare cost and access, (HCCA and its components). Because of the high rate of enrollment in Medicare Disability support in the Appalachian Region, the research team also examined relationship between YPLL_75 rates and Medicare Disability enrollment.

Regardless of geography, there is high correlation between premature mortality and both the ARC_EDI and the level of county population enrolled in Medicare Disability. Table 2 shows a relative preventable mortality score for the geographic groups for 2005 through 2007. As would be expected, the U.S. has a mean of 49.5 on a 99 percentile scale. The Appalachian mean score is 19 percent lower than the U.S.

When we examined groups of counties, we found that preventable mortality rates were highly correlated with the HCCA and the health cost component, HCC. High preventable mortality was associated with low HCCA and low healthcare cost. There was no correlation between YPLL_75 rates and the health insurance component (HIC) in the Appalachian counties, and some correlation between the health resources component (HCRA) and YPLL_75 in the three comparison geographies. However, there is high correlation between low reimbursement (HCC) and poor health outcomes (YPLL_75). At the county level, some areas with high insurance had low resource access and cost scores, indicating that health insurance coverage alone is not the key to good care access, but access to healthcare resources may affect preventable mortality.

We found that for all counties in the United States and for counties in Appalachian states, there were positive relationships among the YPLL_75, the ARC_EDI, the HCCA, and components (HCC, HIC, and HCRA). This means that where there is economic distress, there is poor health and factors that are associated with less access to healthcare. Conversely, where there is a better economy there are better health outcomes.

TABLE 2- CORRELATION OF HCCA AND ITS COMPONENTS, THE ARC_EDI, AND MEDICARE DISABILITY ENROLLMENT WITH PREMATURE MORTALITY

Location (number of counties)	Mean YPLL-75 (std. dev.)	Community Health Status: Medicare Disability Enrollment	Economic Distress: ARC EDI	Proposed Index and components			
				HCCA	HCC	HIC	HCRA
United States (n=3110)	49.5 (28.9)	.669	.669	.490	.465	.284	.288
Appalachian states (n=1070)	60.74 (26.8)	.755	.735	.487	.492	.188	.301
Appalachian Region (N=420)	63.9 (21.0)	.728	.560	.301	.368	-.040 NS	-.209

Correlations between YPLL_75: per 100,000 Population--Averaged over 2005-2007 and expressed as a percentile Disability expressed as enrollees per population. All other indices and components scaled such that 1 is best and 100 is worst.

These associations are strong; in technical terms, they are highly statistically significant. The probability that they are due to chance is less than one in a thousand ($p < .001$). Taken together this pattern is very consistent with the notion that there is an underlying relationship between general socioeconomic factors, the robustness of the healthcare system, and overall population health status when measured at the county level. Moderately strong relationships (above 0.45) exist between the HCCA and both the established measure of economic distress (ARC_EDI) and the measure of population health status (YPLL_75). Further, the relationships between the HCCA and the YPLL_75 and ARC_EDI are greater than the relationships between any of the HCCA components and the two validating measures. For detail of this analysis, please see Appendix M. The HCCA Index is validated statistically by the correlations among each of the HCCA components. Statistical correlations are low, but positive, suggesting that the components are tapping related, but distinct aspects of the healthcare system.

INFLUENCE OF SOCIOECONOMIC STATUS ON RELATIONSHIPS BETWEEN HCCA AND HEALTH STATUS IN APPALACHIA

The research team explored the overall influence of socioeconomic status on the relationship between the HCCA and preventable mortality rates. Using multivariate regression analyses, the team measured the extent to which either the ARC Economic Distress Index or the U.S. Department of Agriculture Persistent Poverty County status was associated with the HCCA or its components and the premature mortality rates (YPLL_75). At the national level, the HCCA Index exhibits an independent relationship to preventable mortality rates, that is, the HCCA Index varies along with premature mortality no matter how other variables change. This is important because, in all three geographies, all U.S., Appalachian state and Appalachian Region counties, the socioeconomic status of counties, as reflected in the ARC Economic Distress Index, also has a substantial relationship to preventable mortality rates but there appears to be an independent effect related to costs of care and access to care at the national level. In Appalachian counties this pattern of association was not significant and suggests that something other than economic distress, healthcare cost and access are influencing health outcomes in the Appalachian states. The HCCA components, for insurance (HIC) and cost access (HCC), explained almost half the variance in preventable mortality (46.2 percent), which is very significant. When equations included a variable to test the influence of a county's location in the Appalachian Region on preventable mortality, rates of preventable mortality in Appalachian counties

compared to other counties in Appalachian states were higher than would be predicted on the basis of their scores on ARC_EDI and HCCA alone, suggesting that there may be another factor beyond the combined impact of socioeconomic status and health system characteristics access, cost and coverage, that accounts for variations in preventable mortality in Appalachia.

OTHER HEALTHCARE USE MEASURES

The study also reviewed other measures of healthcare use and expenditures in the Appalachian Region as reported by the CMS and the Veterans Health Administration (VHA). Most of the Appalachian Region had high Medicare expenditures per capita in 2009. This may be affected by a combination of the region's particularly high per capita enrollment in Medicare Disability programs and its lower health status. Parts of Central and Southern Appalachia rank in the highest national quintile of per capita enrollment in Medicare Disability in 2007, and Disability enrollees are heavy healthcare users. In central and southern Appalachia, as much as 15.6 percent of the population received Medicare Disability payments. Information from 2007 VHA use files showed military veterans in the Appalachian Region, particularly the central sub-region and western Pennsylvania were among the highest users of VHA services in the U.S.

The research team also reviewed the scientific literature on relationships between personal healthcare expenditures and bankruptcy, finding that healthcare costs are associated with bankruptcy, though the extent is not clear. Several studies noted that social policy design flaws in many government safety net health insurance programs not only discourage individual economic pursuits; they also leave many people at risk of bankruptcy from expensive, uncovered medical care costs if they are not treated in clinics and hospitals with safety net programs.

HEALTH REFORM POLICY ISSUES

Health reform will change health insurance coverage and the structure of the healthcare delivery system. Among the issues under study is the CMS Medicare Hospital Geographic Wage Index, the HCC component of the HCCA. This index establishes a baseline rate for 60 percent of Medicare payments and, by reference, for other payers as well. Presently the average county in the Appalachian Region receives lower payments than the U.S. average. Moreover, in general, Appalachian counties have not benefited as much from the work-arounds that have helped other rural communities to side-step low rates. A "Frontier" adjustment, for example, brings communities in several states in the west to the lower of their own or the national average index. ARC may wish to consider advocacy to give rural Appalachian counties parity with Frontier counties when policy makers consider adjustments to the index.

Federal health reform will increase insurance coverage. A review of the scientific and policy literature indicates that the Affordable Care Act's coverage initiatives will have a direct impact on state Medicaid budgets. Most reports indicate that Appalachian states' total Medicaid costs will increase, although the amounts are a function of a state's current coverage policies. Individual Appalachian states may see costs increase 1.4 to 15.4 percent¹ to cover six to 41 percent more people². This will occur when health reform is fully implemented in 2014. In that year, each state Medicaid program must cover all persons with incomes under 133 percent of the national poverty level. Because HCCA results show low correlation between health insurance coverage and preventable mortality rates, more coverage alone may not result in health status improvements. The study's demonstrated relationships between payment and resource availability suggest that without payment changes many people with new coverage may have trouble getting service.

¹ Table 26 of this report.

² Table 22 of this report, Kaiser Commission on Medicaid and the Uninsured, on line, 2010.

Health reform initiatives will clearly require more healthcare resources in Appalachia. Two programs championed by ARC, the Rural Health Clinics Act and the J-1 visa waiver program for foreign medical graduates can improve resource availability. For different reasons, both merit renewed attention in the health reform environment. The former addresses payment for primary healthcare providers and the latter addresses supply of healthcare providers to underserved areas.

ARC encouragement of broadband communications to rural areas will also help with the technology needed to support contemporary health care delivery, thus expand resource access. Finally, encouragement of expanded roles for entry workers in health care labor force will be similarly beneficial.

CHAPTER 1 INTRODUCTION

1.1. CONTEXT FOR ARC HEALTHCARE ACCESS INDEX

In 2010, federal health reform statutes, PL 111-148 and PL 111-152, (ACA) changed the landscape of healthcare delivery. More people will be covered; new delivery systems will be required, demonstrations will be funded, and staffing requirements will change. Because much of the coverage reform involves the Medicaid program, states' healthcare cost burden will increase. Reform changes will work within the framework of existing programs, many of which favor areas outside of the Appalachian Region.

The Appalachian Regional Commission (ARC) has a rich history of improving healthcare access. Initiatives supported by the Commission's Section 202 program include development of regional infrastructure with an emphasis on primary care, workforce development, development of the framework for Medicare and Medicaid programs to recognize and reimburse for services in Rural Health Clinics, strengthening the J-1 Visa program for physicians who agree to serve in underserved Appalachian communities, calling attention to health status disparities in the region, and leveraging Center for Disease Control (CDC) funding for an Appalachian cancer disparity program. Health reform calls for a new look at an old problem.

A literature review explored several dimensions of healthcare cost and access including:

- Access to health resources,
- Medical bankruptcy,
- Medicare/Medicaid participation rates,
- Impact of healthcare reform on state budgets, and
- Measures of healthcare disparity.

1.2 LITERATURE REVIEW

1.2.1 HEALTHCARE ACCESS

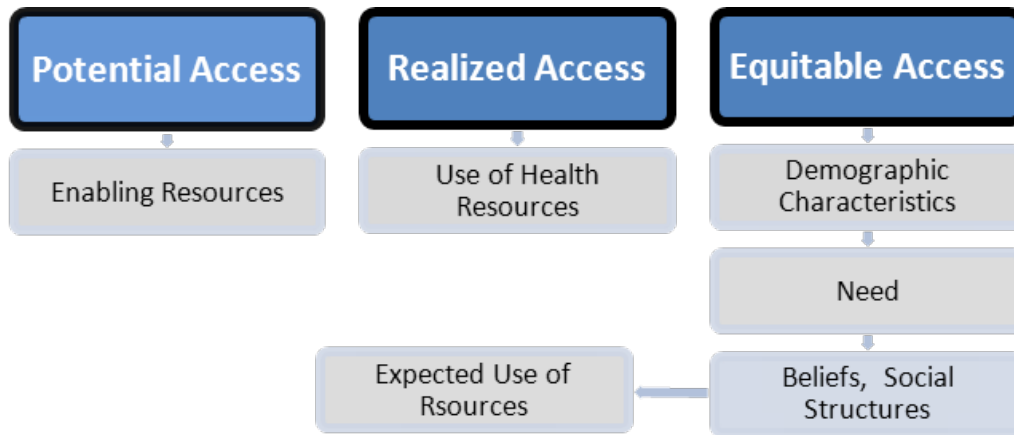
Sources for the review include policy briefs, annual expenditure reports, policy analyses, government projections, and actuarial reports. Given the timing of passage of ACA, when this report was compiled, few useful articles dealing with healthcare reform impact on state budgets were available in the peer-reviewed journals.

Odin Anderson explored the definition of healthcare access in a classic paper first published in the late 1960's and the concept has been revisited in the context of appropriate care versus quantity of care.³ Healthcare social research has asked repeatedly, "Is it better to measure realized access, or utilization, rather than supply?"

³ Anderson, Ronald M., Revisiting the Behavioral Model and Access to Medical Care: Does it Matter, Health and Social Behavior Vol. 36 (March): 1-10, 1995.

Figure 4 displays the evolution of healthcare access definitions from simple supply measures to an understanding that other barriers may prevent use of services and, that need for services may not be uniform across all populations.

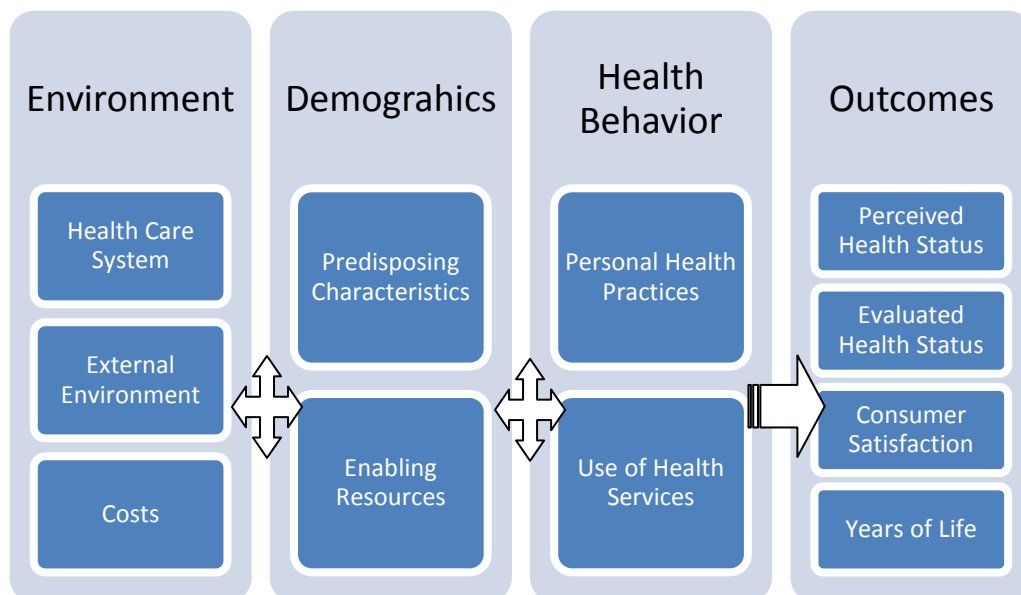
FIGURE 4 – HEALTH CARE ACCESS EARLY DEFINITIONS



Source: Odin Anderson 1967, modified by PDA

Four decades later, as illustrated in Figure 5, we realize that access to health care is determined by many more complex factors involving behavior, cost, and system organization as well as resource availability. We have also learned that equal access may not produce equal outcomes.

FIGURE 5- EMERGING MODEL OF HEALTH CARE ACCESS



Source: Ronald Anderson 1995, modified by PDA

In this report, we examined sources suggested in the ARC solicitation and supplemented these with literature and resources in which geographic health disparities were the substantive or methodological focus. The U.S. Agency for Healthcare Research and Quality (AHRQ) disparities report cites extensive prior research that indicated people who are uninsured experience negative health effects.

The uninsured are less likely to receive medical care, more likely to have higher mortality rates, and more likely to experience adverse health outcomes. Lack of adequate insurance can also lead to greater financial burdens for families and individuals faced with health crises.⁴

In *An Analysis of Disparities in Health Status and Access to Medical Care in the Appalachian Region*, an examination of the health disparities in the Appalachian Region indicated an uneven distribution of health resources across counties in the region.⁵ Although counties in metropolitan regions have greater access to medical services, many counties do not have access to critical medical specialty resources such as those for cardiovascular care, cancer treatment, and rehabilitation. The lack of cardiovascular resources could help to explain the high mortality rate from heart disease, lung cancer, and chronic obstructive pulmonary disease that have been found in the central Appalachian Region.

The report also looked at various socioeconomic factors in the Appalachian Region to determine the impact on health disparities. *Underlying Socioeconomic Factors Influencing Health Disparities in the Appalachian Region* selected five factors to focus on as potential determinants of health disparities: Percent Urban Population, Median Family Income, Unemployment Rate, Percent of Persons Living in Poverty, and the Percent of Persons without Health Insurance. The two factors that “consistently define localized areas that suffer the highest rates of premature mortality” were the percent of persons living in poverty and persons without health insurance.⁶

This report challenges some of those earlier findings about insurance and socioeconomic influences on healthcare access.

1.2.2 COSTS OF CARE AND BANKRUPTCY

At one time, cost was a minor issue and supply issues dominated. Now, healthcare costs are escalating, and are a more critical access factor, representing 17.3 percent of the Gross Domestic Product (GDP) in 2009. Of greatest concern is the rate of increase, with Medicaid costs increasing almost 10 percent over the prior year, and Medicare growing 8 percent. Private costs grew only 3 percent. These increases occurred during a major national recession. In 2009, the economy grew less than one percent; yet, private insurance rates increased 13 to 40+ percent that year. This is unsustainable and presents economic challenges at the individual, corporate and government level. The 2010 health reform statutes, ACA, contain hundreds of initiatives aimed at reducing the cost and increasing the effectiveness of the nation’s healthcare system. ACA also mandated study of ways to measure national health status.

⁴ Ibid.

⁵ Joel Halverson, Lina Ma, and E. James Harner, “An Analysis of Disparities in Health Status and Access to Medical Care in the Appalachian Region,” Appalachian Regional Commission, November 2004.

⁶ Joel Halverson and Greg Bischak, “Underlying Socioeconomic Factors Influencing Health Disparities in the Appalachian Region,” Appalachian Regional Commission, March 2008.

Cost of services drives up the burden of healthcare access. Taking the societal viewpoint, AHRQ cites costs of \$65 billion to \$130 billion as the result of early death and poor health outcomes for the uninsured. Yet costs can also become a burden through increasing individual and family debt, especially in rural areas or among farming communities.⁷ A survey produced by the Access Project shows that while 95 percent of family members who were farmers were insured, 29 percent of the non-elderly respondents had medical debt. Several studies show that medical debt can lead to “housing problems, increased credit card debt, ruined credit records, and in the worst cases, bankruptcy.”⁸

One survey of 2007 bankruptcy filers shows that 62 percent of all bankruptcy filings in 2007 were due to medical problems. The percentage of bankruptcies that reported medical problems rose 50 percent between 2001 and 2007.⁹

A review of the research literature and consultation with the Health Law and Policy staff of the University of North Carolina and the Sanford Policy Research Center at Duke University produced no information about medically related bankruptcies for smaller geographic areas and the national sample was of insufficient size to generate even state level estimates. The Himmelstein study referenced by the ARC request for proposals was based on a national survey of bankruptcy filers related to their perception of medical debt. There is no national database or synthetic estimate of medical bankruptcy. This issue is discussed in more detail in Chapter 5.

1.2.3 FEDERAL FUNDING FOR HEALTHCARE

Understanding the source of funding for healthcare is important to building an index of Healthcare Access and Cost. The federal government supports healthcare directly in the form of insurance coverage for Medicare, Department of Defense and Veterans Administration beneficiaries, and indirectly for Medicaid beneficiaries. It also supports healthcare services in the way of grants that are used to offset costs of serving uninsured persons. Grants from the National Institutes of Health, largely to academic medical centers, and from the Bureau of Community Health Services/ Health Resources and Services Administration (HRSA), largely to Community Health Centers, National Health Service Corps, and Substance Abuse and Mental Health Administration (SAMSA) represent the majority of these payments.

The major insurance programs include: Medicare for persons over 65 and for disabled persons, Medicaid for certain low income, elderly, blind and disabled persons and private health insurance.

The lack of affordable healthcare carries tremendous social and economic costs for the insured and uninsured alike. Uninsured persons are less likely to access treatment for preventable illnesses, and when they require treatment, their health condition is often worse than others. When uninsured people access emergency services, the cost is often passed on to hospitals and insured patients in the form of higher healthcare costs and insurance premiums.

⁷ “National Healthcare Disparities Report, 2009”. Agency for Healthcare Research and Quality. Rockville, MD. 2009. Accessed December 2010. www.ahrq.gov/qual/nhdr09/nhdr09.pdf

⁸ The Access Project, “2007 Health Insurance Survey of Farm and Ranch Operators”, September 2007.

⁹ David U. Himmelstein, Deborah Thorne, Elizabeth Warren, and Steffie Woolhandler. Medical Bankruptcy in the United States, 2007: Results of a National Study. *American Journal of Medicine*, Volume 122, Issue 8 (August 2009).

The latest data from the Census Bureau has the percentage of U.S. population without health insurance at 16.7 percent in 2009, which is an increase from 15.4 percent in 2008.¹⁰ This is equal to 50.7 million uninsured individuals in 2009. There were a total of 253.6 million insured individuals, but this is a decrease from 255.1 million in the prior year, the first time since 1987 – the first year where comparable insurance data was collected – where the number of people with health insurance has decreased.

Full-time workers had an uninsured rate of 15.2 percent versus non-workers, who had an uninsured rate of 29.1 percent. This was up 4.7 percent from 2007. For full-time workers, the change in uninsured was not statistically significant from 2007. The rate of employment-based coverage is 63.9 percent and is the lowest rate since 1987, the latest year for which statistics are available.¹¹

The number of individuals covered by government health programs increased in 2009, with 30.6 percent of insured people covered under a government program. This is the highest government coverage rate since 1987. In 2009, 93.2 million individuals under a government health program with 47.8 million under Medicaid and 43.4 million were covered under Medicare. While the Medicaid coverage rate is the highest since 1987, the change in Medicare coverage rate was not statistically different from 2008.¹²

Geographic location had some impact on uninsured rates; individuals living in metropolitan statistical areas had an uninsured rate of 16.8 percent. Those living outside of metropolitan areas had an uninsured rate of 16.0 percent.¹³

Medicaid is a state/ federal insurance program for low income persons who are also old, blind, disabled, or dependent children. It also includes a State Children’s Health Insurance Program option (SCHIP or CHIP) that expands coverage for low income families. Medicaid is mandated by Title XIX of the Social Security Act and the federal government matches the state investment, but the state provides coverage to the beneficiary. The federal match, called the Federal Medicaid Assistance Percentage (FMAP) is based on relative economic wealth of the state. It is highest in states with the lowest socioeconomic status (SES), but is never less than 50 percent. Appendix C contains the current FMAP rates.

To encourage states to expand Medicaid coverage, with programs like SCHIP and the expanded benefits in health reform, as part of the 2009 stimulus legislation, American Recovery and Reinvestment Act, ARRA, the FMAP was temporarily subsidized by a federal contribution that increased all states base federal participation by 6.2 percent in through 2010. Congress later extended the FMAP increase through 2011. Once this expires, states will return to their prior level of federal match. The highest federal match in 2011 is 82.31 percent, available to the Appalachian state of Mississippi. West Virginia and Kentucky have the next highest match rate in Appalachia with 81.27 percent and 80.04 percent, respectively. See Appendix C. In addition to ARRA, health reform, ACA significantly changed the landscape of Medicaid expenses for states. There are new FMAP rates that apply just to the expected Medicaid expansion.

¹⁰ US Census Bureau, “Income, Poverty, and Health Insurance Coverage in the United States: 2009.” US Census Bureau, September 2010. <http://www.census.gov/prod/2010pubs/p60-238.pdf>. Accessed January 3, 2011.

¹¹ Ibid, p. 27.

¹² Ibid, p. 24.

¹³ Ibid, p.28.

1.2.4 STATE AND LOCAL SPENDING ON HEALTHCARE

States bear a significant portion of healthcare cost. State payments occur in public health programs, state employee health insurance and Medicaid. Many state health department programs are partially or wholly funded by federal grants. State employee programs are largely contracted to private insurers, but paid by the states. Medicaid is the largest state health cost. State Medicaid burden is shared with the federal government, based on a distributive formula that includes both state average income and the number of options offered in a state's Medicaid program.

It is often reported that states spend, on average, almost 22 percent of their state budgets on Medicaid, but this figure can be misleading because it considers federal as well as state funds. On average, federal funds account for 56.2 percent of all Medicaid spending. Average state spending on Medicaid as a share of state general fund budgets is actually 16.8 percent, and just 13.4 percent as a share of spending from all state funds. (2007)¹⁴

In some states with more favorable federal Medicaid matching rates, the different measures can result in dramatically different stories because federal funds can account for as much as two-thirds to three-quarters of total Medicaid spending. For example, using the measure commonly cited, Medicaid accounts for 22.4 percent of total spending in Mississippi, but when only state general funds are counted and federal funds are excluded, Medicaid's share of the Mississippi budget drops to just 7.8 percent.¹⁵

Some argue that rather than preventing states from spending on other priorities, federal funds coming into a state to pay for Medicaid services actually help states finance other priorities. For example, Medicaid often pays for the medical services associated with special education services for children and covers the cost of services, such as community mental healthcare, that states or localities would pay for in the absence of Medicaid; this helps stretch their state and local dollars. In addition, federal dollars to states for Medicaid services free up state dollars for other priorities that would otherwise have been spent on healthcare.¹⁶

These distinctions are critical in reviewing reports like National Association of State Budget Officers (NASBO) recent State Expenditure Report that Medicaid made up 20.7 percent of total state expenditures in 2008.¹⁷ Other state health programs and CHIP were included in a separate "other" category, which included non-health expenditures. Medicaid expenditures were the second largest state spending category behind elementary and secondary education. NASBO estimates \$310.9 billion was spent on Medicaid in 2008 and this was a 4.4 percent increase over 2007.¹⁸

A Kaiser Family Foundation policy brief on the Medicaid financing responsibilities of federal and state government cites Congressional Budget Office (CBO) estimates that the federal government will be financing the "vast majority" of Medicaid expansion costs that come from health reform mandates. Prior to health reform, expansion would cover an additional 16 million individuals under Medicaid and CHIP by 2019. After health reform, CBO projected the federal government will spend \$434 billion on Medicaid and CHIP expansion from 2010 through 2019 and states will provide an additional \$20 billion in the same time span.

¹⁴ Georgetown Center for Health Policy, Medicaid and State Budgets, Looking at the Facts, May 1, 2008. <http://ccf.georgetown.edu/index/cms-filesystem-action?file=ccf+publications%2Fabout+medicaid%2Fnasbo+final+5-1-08.pdf>. Accessed document 2010.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ National Association of State Budget Officers, "Fiscal Year 2008 State Expenditure Report," December 2009.

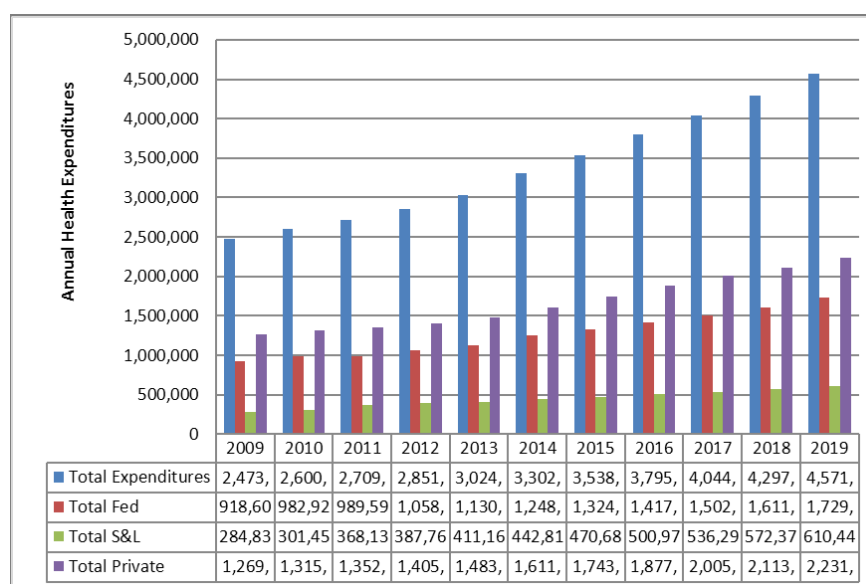
<http://www.nasbo.org/LinkClick.aspx?fileticket=%2fZWfTtVJG8j0%3d&tabid=107&mid=570>. Accessed January 3, 2011.

¹⁸ Ibid, p. 44.

The federal government will be financing 96 percent of all Medicaid and CHIP costs associated with healthcare reform according to these estimates; states will be financing the remaining 4 percent.¹⁹ The brief notes that “states that have the furthest to climb in terms of meeting the new eligibility requirements will see the largest increases in federal financing.”²⁰ CBO estimates for state-level costs were at an aggregate level and not reported on a state-by-state basis.

Andrea Sisko, et al. reported on revised projections of the national health expenditures through 2019. The projections are based on the CMS Office of the Actuary Health Reform Model and actuarial cost estimates. These state and local estimates include Medicaid, Child Health Insurance Program (CHIP), and other spending combined. Based on legislative and regulatory impact from the passage of ACA, CMS is projecting public state and local funds will account for \$284.8 billion of the total \$2.5 trillion in national health expenditures in 2009.²¹ Of this amount, \$134.2 billion is for Medicaid and CHIP while the remaining \$150.7 billion is for other public spending at the state and local level. See Appendix E.

FIGURE 6 – FORECAST OF STATE AND LOCAL TOTAL HEALTH EXPENDITURES, 2009 -2019



Source: Truffer, et al.

All expenditures will grow. State and local share will rise to 14 percent of total, then level off after 2013 to 12 percent total. By 2019, public state and local spending will increase to \$610.4 billion, representing a projected annual growth rate of 7.0 percent between 2009 and 2019.

The state and local growth rate is similar to federal funds, which are projected to grow at 7.1 percent in the same time period, but are higher than total national health expenditures growth of 6.3 percent and private fund growth at 6.0 percent. An annual breakout of the forecast health expenditures is in Appendix A.

¹⁹ Kaiser Family Foundation, “Financing New Medicaid Coverage under Health Reform: The Role of the Federal Government and States,” May 2010. <http://www.kff.org/healthreform/upload/8072.pdf>. Accessed January 3, 2011.

²⁰ Ibid, p. 1.

²¹ Truffer CJ, et al. Health spending projections through 2019: the recession's impact continues. *Health Aff (Millwood)*. 2010; 29(3):522-529. <http://content.healthaffairs.org/cgi/content/abstract/hlthaff.2009.1074>. Accessed November 29, 2010.

A review by Sisko and others noted potential new state costs associated with the setup and administration of Health Insurance Exchanges. The study projects \$4.4 billion in startup costs associated with the exchanges from 2011 through 2013. These costs would total \$37.7 billion in administrative costs through 2019 and would be approximately 0.2 percent of the national health expenditures. The assumptions used for the exchange costs had some empirical basis as they were drawn upon administration costs for Massachusetts's health insurance exchanges.²²

1.2.5 IMPACT OF MEDICAID ON STATE ECONOMIC ACTIVITY

The Federal Medical Assistance Percentage (FMAP) for Medicaid has four benefits for states, according to a Kaiser Family Foundation policy brief by Wachino, et al. Medicaid would help states pay for the healthcare costs of low-income citizens, ensure federal matching funds are automatically directed to state budgets, support state administration of the program, and provide fiscal support for both state budget and economies.²³ Research produced for the Kaiser Family Foundation claims that Medicaid spending generates economic activity at a state level and has a positive economic effect.

The economic impact on a state is proportionate to the state's FMAP level. For example, a state with a 60 percent matching rate must cut overall Medicaid spending by \$2.40 to save \$1 in state Medicaid spending. At a 70 percent matching rate, the required cut in spending increases to \$3.33 to save \$1 in state funding. The Wachino brief included a review on the state level impact (if available), which is recreated in Appendix D for states in the Appalachian Region. Calculation from Families U.S.A. determined that state spending in Medicaid produced almost a three-fold return on new business activity.²⁴ According to the group's calculation, state Medicaid spending, in 2001, generated 3 million jobs across the nation. The calculations were based on state Medicaid spending in 2001, and economic multiplier rates were determined from the Regional Input-Output Modeling System (RIMS II) economic model created by the U.S. Department of Commerce.

The economic downturn in 2009 and 2010 created budget shortfalls in many states. Increased unemployment, lower tax revenue, and rising demand for government programs have put states under fiscal pressure.

An analysis by the Kaiser Commission found almost all states forecast a budget gap from 2009 through 2011; 46 states will continue that gap into 2011.²⁵ Medicaid spending is counter-cyclical, with rising costs and enrollments during weak economic periods. Spending for Medicaid increased by 8.8 percent in 2010, which is the highest growth rate since the prior recession in 2001 and 2002.

²² Truffer, Christopher J., Sean Keehan, Sheila Smith, Jonathan Cylus, Andrea Sisko, John A. Poisal, Joseph Lizonitz and M. Kent Cleme. "Health Spending Projections Through 2019: The Recession's Impact Continues". Health Affairs (Millwood) 2010, 29. No. 3. Office of the Actuary, CMS. (2010): 522-529. Accessed November 29, 2010. <http://content.healthaffairs.org/cgi/content/abstract/hlthaff.2009.1074>.

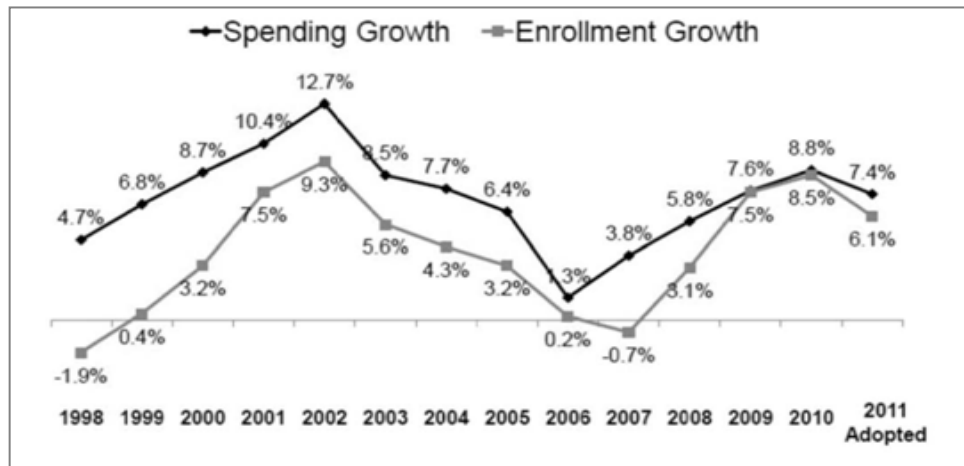
²³ Wachino, Victoria, Andy Schneider and David Rousseau. "Financing the Medicaid Program: The Many Roles of Federal and State Matching Funds". Kaiser Family Foundation, January 2004. <http://www.kff.org/medicaid/upload/Financing-the-Medicaid-Program-The-Many-Roles-of-Federal-and-State-Matching-Funds-Policy-Brief.pdf>. Accessed January 3, 2011.

²⁴ "Medicaid: Good Medicine for State Economies". Families USA. January 2003. http://www.familiesusa.org/assets/pdfs/Good_Medicine_2004_update93b7.pdf. Accessed January 3, 2011.

²⁵ Vernon K. Smith, et al. "Hoping for Economic Recovery, Preparing for Health Reform: A Look at Medicaid Spending, Coverage and Policy Trends -- Results from a 50-State Medicaid Budget Survey for State Fiscal Years 2010 and 2011". Kaiser Family Foundation. September 2010. <http://www.kff.org/medicaid/upload/8105.pdf>. Accessed January 3, 2011.

For 2011, the adopted growth rate for Medicaid is expected to be 7.4 percent, a decrease from the prior year.²⁶ The largest factor driving spending growth remains increasing enrollment. Figure 7 from the Kaiser Commission shows the relationship between spending and enrollment growth since 1998. The two periods with high Medicaid spending and enrollment reflect the weak economic situation at those respective points.²⁷

FIGURE 7 – PERCENT CHANGE IN TOTAL MEDICAID SPENDING AND ENROLLMENT, KAISER COMMISSION ON STATE MEDICAID, FY 1998 - FY 2011



Note: Enrollment percentage changes from June to June of each year. Spending growth percentages in state fiscal year.

Source: Enrollment Data for 1998-2009: *Medicaid Enrollment in 50 States*, KCMU. Spending Data from KCMU Analysis of CMS Form 64 Data for Historic Medicaid Growth Rates. FY 2010 and FY 2011 data based on KCMU survey of Medicaid officials in 50 states and DC conducted by Health Management Associates, September 2010.

Chapter 6 in this report looks at the Appalachian states' burden for Medicaid coverage and how that would change under ACA requirements.

1.3 INDEX CONSTRUCTION

To benchmark success of reform and impact on the Appalachian Region, ARC solicited a research study to develop an index to show healthcare access and cost disparities in the region, and to present an overview of the economic challenges and opportunities represented by healthcare expenditures.

This study examines whether the lack of access to medical care is a greater problem in Appalachia, than in the rest of the United States, not only in the way of fewer medical professionals and hospitals, but also reflected in lower rates of health insurance coverage, lower labor force participation rates, a higher proportion of low-wage and part-time jobs, and higher rates of unemployment and underemployment. Alone or together, these factors might reduce access to healthcare.

²⁶ Ibid. p. 6.

²⁷ Ibid. p. 6.

As mandated by Congress to assure that ARC investments are targeted to the communities most in need, ARC publishes the ARC Distressed County Index annually. Based on the ARC economic status index, the Distressed County Index is prepared from national data and includes three measures of economic health: unemployment, per capita market income and poverty rate. All of these data are available at the county level and are published by federal sources. For inter-census population data, ARC uses Census estimates.

In this report, PDA and UNC Sheps Center developed an ARC healthcare cost / access index in a manner similar to the ARC Distressed County Index and measured correlations between the two. Scalability, uniformity of definition and longitudinal availability are important aspects of a good index. This report has concentrated on building the index from databases that are available to the general public at reasonable cost. ARC sets policy and allocates resources at the county level. Working within this context, this report also focuses on measures that are available, consistent and reliable at the county level.

Adequate access to healthcare requires the ability to gain entry into the system, gain access to sites of care, and find providers who can meet the needs of patients.²⁸ Successful accomplishment of such activities presumes that an adequate number and type of health providers are geographically accessible to a potential patient base, and that some form of health insurance coverage or other payment mechanism exists to enhance the probability that an appropriate transaction actually take place. The proposed healthcare cost / access index measures all of these.

1.4 EXISTING MEASURES OF HEALTHCARE ACCESS AND DISPARITIES

1.4.1 HEALTHCARE DISPARITIES SCORECARDS

A quantitative source of information on health related disparities comes from summary measures of health resources which have been constructed by several national health policy groups for purposes of uniformly comparing state-level information. Three state-based health scorecards in particular, i.e., State Health Access Data Assistance Center (SHADAC), America's Health Rankings, and the Commonwealth Fund State Scorecard, measure health insurance access through the insurance component of the Medical Expenditure Panel Survey. These reports provide estimates at a state or metropolitan level only and are not estimated at a county-level. However, two county-based health scorecards, i.e., the County Health Rankings and the Center for Disease Control's (CDC) annually published Community Health Status Indicator (CHSI)²⁹ use the Small Area Health Insurance Estimates (SAHIE) to obtain insured and uninsured numbers at the county-level. These estimates are constructed to cover only people who are below the ages of 64 and would not be eligible for Medicare. These county-level estimates are also available on the Health Resource and Service Administration (HRSA's) Area Resource File (ARF). See Appendix H for a sample county.

Health outcome disparities in Appalachia are only partially consistent with conventional wisdom regarding the supply of health resources. Not surprisingly, the earlier report, *An Analysis of the Financial Conditions of Health Care Institutions in the Appalachian Region and their Economic Impacts* describes provider supply as more concentrated in higher income areas, with correspondingly more pronounced shortages in rural areas.³⁰

²⁸ National Healthcare Disparities Report, 2010. Chapter 9. Access to Health Care Agency for Healthcare Research and Quality. Rockville, MD. <http://www.ahrq.gov/qual/nhdr10/Chap9.htm>

²⁹ "Community Health Status Indicators (CHSI) Report". U.S. Department of Health and Human Services. 2009. <http://www.communityhealth.hhs.gov/>. Accessed January 3, 2011.

³⁰ Jeffrey Stensland, Curt Mueller and Janet Sutton. "An Analysis of the Financial Conditions of Health Care Institutions in the Appalachian Region and their Economic Impacts". Appalachian Regional Commission. December 2002.

The analysis shows that certain services including home health, mental health, and drug/alcohol treatment are less available in rural areas.

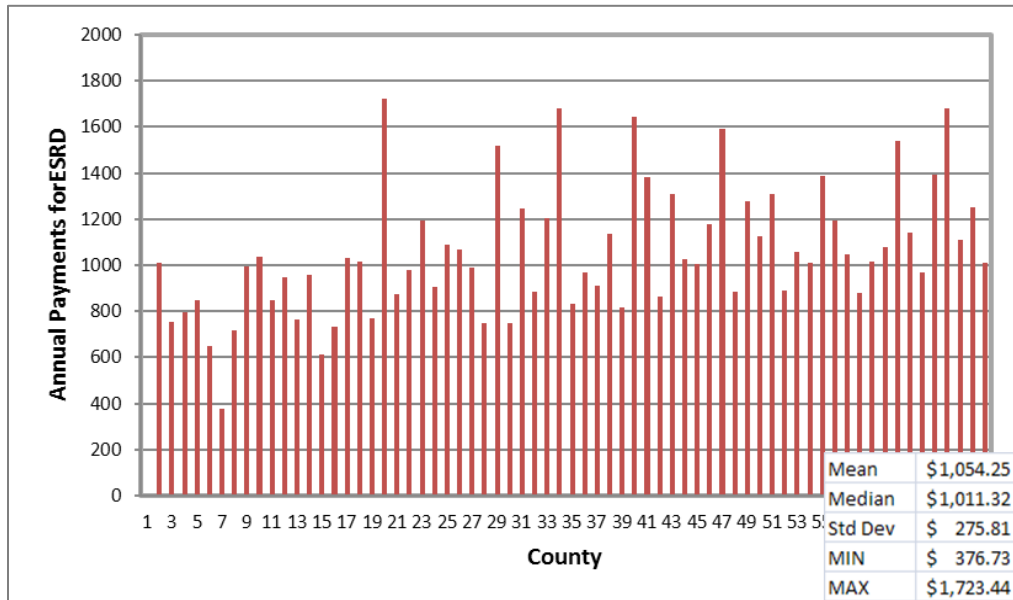
All of the previously described scorecards have also measured the supply of health professionals using a simple per capita calculation as the basis for comparison. These scorecards predominantly use the number of primary care physician per 100,000 population as a means of calculating access to supply because the measure repeatedly tests well as a good index of appropriate access. The number of dentists per 100,000 population was also included in the CHSI scorecard. Dental care is directly related to positive health status. None of the state- or county-based scorecards have examined the extent of geographic variation in the distribution of more specialized medical resources.

Finally, although synthetic estimates produced from the CDC's Behavioral Risk Factor Surveillance System (BRFSS) data, could be, and have been, constructed and might yield interesting and valuable information, doing so would require extensive statistical modeling that is clearly beyond the scope of this project. A review of the various scorecard documentation sources and other quantitative literature revealed that relatively few quantitative indicators can be obtained at the county-level. Many prior studies used survey based measures obtained from BRFSS-based questions. Such items describe health risks or health behaviors or involve reports of actual experiences of patients and potential healthcare consumers about their own access and cost barriers. Unfortunately, as useful as such data might be for assessing barriers to care, BFRSS samples are typically designed to yield valid and reliable estimates only at state or national levels. As a consequence, the sample sizes are so small that direct estimates cannot be made at most sub-state levels, particularly at the level of a typical rural county. Further, because the content of BRFSS questions frequently changes over time, future comparability of estimates generated from BRFSS questions cannot be guaranteed. To address the rural county issue, we recommend that ARC request CDC and BRFSS staff to oversample surveys in the rural areas of the nation.

National county-level healthcare expenditure data are not available on a timely basis. The Centers for Medicare and Medicaid Services (CMS) maintain files on Medicare expenditures per capita at the county level. Medicare has three programs: Old Age, Disabled and End State Renal Disease.

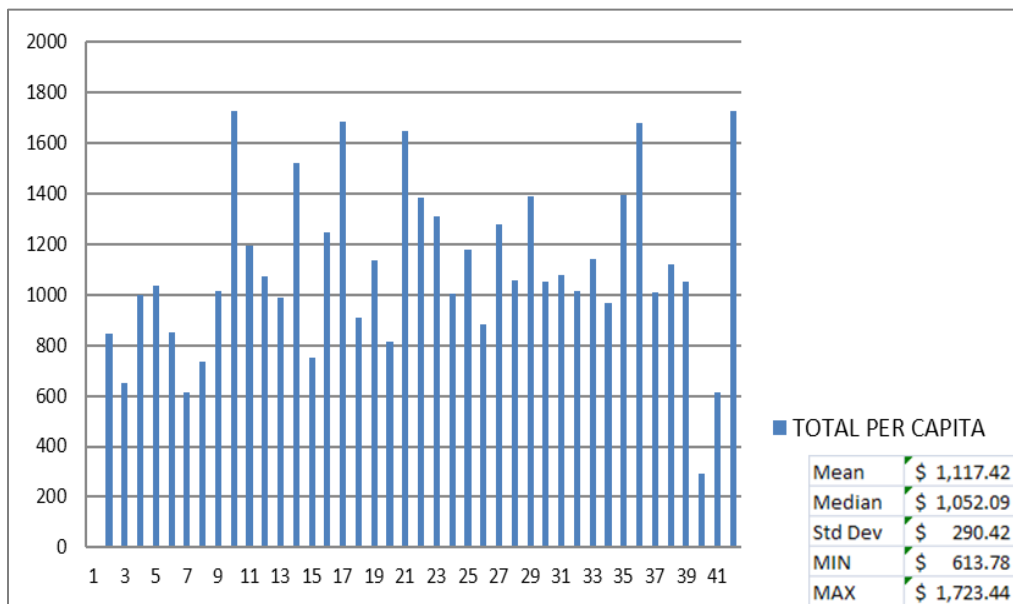
Each has a skew that makes it less than fully representative of the population as a whole. Renal disease coverage is the only truly national health insurance program in the U.S. and services can be well distributed even at very rural levels. These data could be normalized to a national per capita average in construction of an index. Figure 8 shows, as an example, the wide county-to-county variation in one state, Alabama. In Figure 9, the average Alabama Appalachian county spends more Medicare dollars than the average state county, \$1,117 compared to \$1,054. Unfortunately, by the time the CMS data are aggregated for public use, they are many years old. Data in Figures 8 and 9 are the most currently available in 2011, and those data are for the Year 2003.

FIGURE 8 – TOTAL PER CAPITA MEDICARE ESRD PAYMENTS, WHOLE STATE ALABAMA (2003)



Source: CMS ESRD 2003 Total Part A Per Capita by State and County

FIGURE 9 – TOTAL PER CAPITA ESRD PAYMENTS APPALACHIAN COUNTIES, ALABAMA (2003)



Source: CMS ESRD 2003 Total Part A Per Capita by State and County

Generally, expenditure data have several built in issues. They include utilization patterns and allowable charge structures, as well as the availability of services. Utilization may also reflect practice patterns of providers, rather than specific care requirements of the population served.

The Dartmouth Atlas Working Group of the Dartmouth Institute for Health Care Policy and Clinical Practice have extensively documented variations in Medicare utilization by hospital referral regions, hospital service areas and primary care service areas, across the United States.³¹ Their results are drawn from the five percent sample of Medicare data made available for public research. Because their research reflects the behavior of only people who are over 65, disabled or have end stage renal disease, their conclusions about patterns of use must be extended with caution to other parts of the population.

Chapter 4 of this report demonstrates that the patterns are not the result of high unit payments. Lead researcher for the Dartmouth Atlas project, Elliot Fisher, has noted that utilization may be proportional to physician practice patterns including physician expectations of number of times he or she will see a patient for the same condition. He has also observed that this varies by geography.³² He further notes that 30 percent of unnecessary health spending is supply sensitive; more supply generating more unnecessary spending.

Appendix K details measures of access, insurance and health cost that were explored in the course of preparing this report. Key measures are reviewed in the following sections.

1.4.2 HEALTH COST MEASURES

National data on healthcare cost (largely measured in payments for services) are collected uniformly for only Medicare and Veterans Administration beneficiaries. Medicare data, primarily concerning persons over 65, are maintained at the county level by the Centers for Medicare and Medicaid Services (CMS).

Data for Medicaid, a state-federal program for low-income dependent children and their mothers, elderly, blind and disabled persons are collected by CMS but only for a few states.³³ Two private entities, the Kaiser Family Foundation and the UNC Sheps Center, Rural Health Resource Center maintain payment and utilization data on all states.

Insurance payment data for persons under age 65 and not on Medicaid are less uniform, because claims are paid by multiple private entities that guard their proprietary databases. A few companies like Milliman and Mercer receive these data in return for providing actuarial forecasts to the insurance industry. Even Medicare claims data take years to assemble. In 2010, the most current data on payments are from the year 2007. However, because many reimbursement programs are based on Medicare's payment schedule and expressed as a multiple of Medicare, Medicare has been considered a relatively good proxy for payment by others. A recent comparison of Dartmouth Atlas Medicare data with claims data from private insurers, suggests that the parallels may not be as strong as once thought.³⁴

Medicare also employs a Geographic Wage Index to adjust its national base payment to the local economy. The wage index is assembled from cost reports filed by entities that receive facility fees from Medicare and is organized by the Office of Management and Budget Core-Based Statistical Areas (CBSAs) boundaries for metropolitan, micropolitan, and other non-core geographic designations within each state. Counties are assigned to areas and indices are established for each. Recently, a new Index, the Frontier Index was introduced to override the Geographic Wage Index and give very rural counties an index of at least 1.0. The

³¹ The Dartmouth Atlas of Health Care <http://www.dartmouthatlas.org/data/region/>.

³² Fisher, Elliot. Keynote Presentation. Meeting of Patient Centered Primary Care Collaborative. March 30, 2011. Washington, D.C.

³³ "Medicaid Data Sources, Medicaid Analytic Extract (MAX) General Information". Centers for Medicare and Medicaid Services. December 2010. https://www.cms.gov/MedicaidDataSourcesGenInfo/07_MAXGeneralInformation.asp.

³⁴ Ginsburg, Paul, Wide Variation in Hospital and Physician Payment Rates Evidence of Provider Market Power. Center for Studying Health System Change. Research Brief No. 16. November 2010.

Frontier index heavily favors states like Minnesota, South Dakota and North Dakota. No Appalachian counties qualify for his population density based status. Other than the Medicare Geographic Wage Index, no uniform national measures of cost to provide services exist. See Appendix A for the Year 2010 Medicare Hospital Geographic Wage Index.

1.4.3 INSURANCE COVERAGE MEASURES

Medical access can be measured in resource availability and in number of persons who have insurance coverage to pay for resource use. Data on insurance coverage including all private insurance and Medicare/Medicaid coverage for persons over 65 are collected uniformly at the county level. Individual data elements lag the calendar year by two to five years. These are maintained in the Area Resource File (ARF) by the U.S. Department of Health and Human Services / Health Resources and Services Administration (HRSA). HRSA charges an annual fee of \$50 for use of the files, which takes a significant amount of time to assemble.

UNC Sheps center acquires the HRSA files annually and assembles them into usable files. Most recent data in the file are from 2008. Insurance coverage data are drawn from long form Census Population Studies (CPS). These sample data are synthetically manipulated to get county-level estimates. The most recent of these insurance coverage data are for the year 2006. They are also included in the ARF.

Any estimates of insurance coverage must be treated as point in time snapshots, because health insurance coverage changes quickly. Private insurance coverage changes month to month. Medicaid eligibility can change in 30 days. Even Veterans Affairs (VA) and Department of Defense TRICARE coverage provided to military and dependents have limited durations of coverage. Only Medicare Part A is stable, because that federal program covers individuals continuously from age 65 on, without charge. Any other measure of insurance coverage has built-in error.

Anticipating that the Health Insurance Exchanges mandated by the health reform act will require more uniform information on health insurance coverage, The Robert Wood Johnson Foundation is sponsoring an initiative to assemble an All-Payer Claims Database. The foundation offers a website with information on what is available in each state.³⁵ In fall 2010, the initiative is in start-up mode and shows the inconsistency of data availability for non-Medicare expenditures across states. Until this database matures, or Health Insurance Exchanges become a reality, there will be no standardized measures of total healthcare coverage across states. Every index will be based on a proxy measure.

1.4.4 HEALTHCARE RESOURCE MEASURES

Measures of access to healthcare resources are typically calculated on a per capita basis. The resource measured (e.g., primary care physicians, beds, etc.) is the numerator, and the denominator is the population size for the region measured. Beds per 1,000 population is one such measurement of access with the nationwide average of 2.7 hospital beds per 1,000 population in 2008.³⁶ This is a decrease from prior years with the ratio steadily declining from 3.0 beds per population in 1999. In 2008, Mississippi had the highest number of beds with 4.5 per 1,000 population, while Maryland had the lowest ratio at 2.1, among the Appalachian states. As the nation shifts from inpatient-based care to outpatient, hospitals are de-emphasizing beds. However, no comparable measure of outpatient capacity has emerged.

³⁵ <http://www.statecoverage.org>.

³⁶ Kaiser Family Foundation. "Beds per 1,000 Population, 2008". March 2010. <http://www.statehealthfacts.org/comparemaptable.jsp?ind=384&cat=8>. Accessed January 3, 2011.

An additional resource access measure is the number of physicians or dentists per 1,000 population.³⁷ The nationwide average of primary care physicians per 1,000 population was 1.4 in 2009. Among the Appalachian states, Mississippi had the lowest ratio of 0.9, while New York had the highest rate at 1.8 per 1,000 population. Among dentists, the ratio per 1,000 population was 0.8 nationwide in 2009.³⁸

The ARF also contains county-level data for healthcare facilities (hospitals, nursing homes and clinics), and for healthcare professionals (specialty and non-specialty physicians and physician assistants, Osteopaths and dentists). Counts of nurses are available from ARF, but the most current estimates of nurse supply are from the year 2000.

Appalachian counties are tagged in this ESRI-based database. Data in the Sheps Center database have also been used in North Carolina for more than 35 years in the identification of underserved communities, for the purpose of targeting medical and mental health investments. The Sheps index of under-service is updated annually. This index is based on actual service use compared to expected use by a middle income household. Please see Appendix B for a national map of the index. Elements of the index can function as a foundation for reflecting the intensity of cost and facility access at the county level, because it can accept other county-level variables.

CMS has a file called OSCAR, for Online Survey, Certification and Reporting, that contains addresses of every provider certified to bill Medicare. The OSCAR file includes all hospitals and healthcare facilities that participate in Medicare.

VA has begun to code the locations and service areas of all of its hospitals and satellite facilities. These are catalogued at the county level, and maintained in the VA's extensive national VISTA medical record system and VA AMMS billing system. Data are assembled by the VA Health Economic Research Center and maintained on a website.³⁹

1.4.5 HEALTH STATUS MEASURES

Traditional measures of health status focus on a single issue like infant mortality, death rates overall or associated with a particular disease. Recent attention to the nation's chronic problem with obesity and the high cost of care for persons with diabetes has called attention to these two measures. In healthcare, there is no equivalent of the Gross Domestic Product. Many health researchers rely on variations of the measure, Years of Potential Life Lost (YPLL).

During the course of this study, the National Institute of Medicine, in cooperation with the Robert Wood Johnson Foundation, has convened a Committee to develop a Health Adjusted Life Expectancy index to track trends, mark progress and encapsulate an overall picture of health of communities and of the nation. This committee should file three reports by the end of calendar year 2011. Already, the committee has recommended restructuring of the National Center for Health Statistics, which is the repository of the nation's data on disease and health service utilization.⁴⁰

³⁷ Kaiser Family Foundation, "Nonfederal Primary Care Physicians per 1,000 Population, 2009". December 2009. <http://www.statehealthfacts.org/comparemaptable.jsp?ind=690&cat=8>. Accessed January 3, 2011.

³⁸ Kaiser Family Foundation, "Dentists per 1,000 Population, 2009". December 2009. <http://www.statehealthfacts.org/comparemaptable.jsp?ind=691&cat=8>. Accessed January 3, 2011.

³⁹ VA Health Economic Resource Center. www.herc.research.med.va.gov.

⁴⁰ "The Role of Measurement in Action and Accountability Report". Institute of Medicine for the Public's Health. Brief 10. December 2010.

1.5 STRUCTURE OF THE REPORT

This report is organized into eight chapters followed by appendices. Following this Introduction, Chapter 2 discusses the elements of the proposed index of healthcare cost and access. Chapter 3 describes how Appalachian counties compare in the region and with the United States on the index and its three components: healthcare cost, health insurance coverage, and healthcare resources. Chapter 4 explores how the index correlates with economic distress and persistent poverty. Chapter 5 addresses ARC policy issues raised by the index. Chapter 6 addresses best practices in providing health insurance and describes the impact of ACA health reform on Appalachian state Medicaid programs. Chapter 7 provides a summary of the report. And, Chapter 8 provides a bibliography of references used. Appendices provide supporting materials. Specifically, Appendices K through M provide details of the HCCA structure and the statistical tests of its relationships.

CHAPTER 2 HEALTHCARE COST, COVERAGE, AND ACCESS INDEX

2.1 INDEX CRITERIA

The Healthcare Cost, Coverage and Access Index (HCCA) includes a small number of core indicators selected in a way that provides comparable values among counties throughout the United States. The properties of the HCCA are based on ARC's Economic Status Index. These properties include: First, the HCCA is simple and straightforward in its composition and highly intuitive in interpretation. Second, the HCCA makes use of data sources that are reliable, publicly available, and periodically constructed and validated by federal government sources using nationally uniform data collection and data manipulation strategies. This characteristic increases confidence that the index can be updated and replicated with a minimum of effort and expense. Third, the HCCA makes use of sources that are transparent and rely upon justifiable and generally well accepted and well validated small area analysis techniques in those instances where county-level estimates, as opposed to actual population measures, are required. Fourth, the HCCA values consistency and reliability over currency or recentness in choosing among different potential measurement items to be used to construct the index. This approach helps to assess local or regional trends relative to similar trends at a state or national level.

2.2 INDEX COMPONENTS

The HCCA reflects three distinct but related dimensions: (1) access to health professionals and facilities, (2) health insurance coverage among all individuals, and (3), healthcare cost. As noted above, these three dimensions were used to create three components. All data were converted to percentiles. The components were then combined to form the final HCCA.

2.3 HEALTH CARE COST (HCC) COMPONENT

Costs are often measured by the expenditures of public and private parties in per capita terms. The healthcare cost component (HCC) measures relative cost to provide services. Generally this means aggregate expenditures over an annual period divided by the number of "participants" (users and nonusers who were eligible to use the service over the time period observed). In some cases, particularly where relatively few eligibles actually make use of the service, the appropriate denominator might be the number of actual users, rather than the eligibles. For each payer, the population covered must be carefully specified (e.g., Private Insurance, Uninsured, Medicaid, Medicare, and Veterans Administration (VA)) to assure denominators are available and consistently applied for the same years as is numerator data. Because of the lack of uniform public data sources for all covered and not covered populations, the HCC component has only one input; the CMS Hospital Geographic Wage Index. The Geographic Wage Index was used in its raw form. Each county has an Index based on a 1.0 national average. Because the data are aggregated into three clusters in each state: metropolitan, micropolitan, and other non-core, distinctions of true cost differences within states are blurred. Some argue that the aggregation misrepresents the actual cost of care at the county level.

Nonetheless, this component is the basic foundation on which Medicare bases its payments; and most insurance companies base their payments on a multiple of Medicare. Medicaid varies from state to state.

Although it has only one input, the HCC component has equal weight with the other subcomponents. The HCC itself is comprised of multiple elements of salary payments reported by hospitals on their cost reports.

Salary data are aggregated for hospitals in a specific Core Based Statistical Area (CBSA), which can be an aggregation of counties, and an index is assigned to each hospital. Hospitals were assigned to counties to produce county indices. Counties without hospitals were assigned the value of the nearest county.

Data for the HCC component were drawn from raw Medicare hospital wage index data files by state and assigned to the counties associated with the Medicare area. Counties with no hospital were assigned to the nearest county associated with a hospital.

2.4 HEALTH INSURANCE COVERAGE (HIC) COMPONENT

HRSA’s Area Resource File (ARF) routinely assembles Small Area Health Insurance Expenditures (SAHIE) for persons under 65. This was used for the health insurance coverage component (HIC).

Insurance coverage data on persons age 65 and older was excluded from the HIC component. Analysis of county-level data from the 2009 American Community Survey showed that the percent of persons over 65 insured varies very little from county to county in Appalachia and the United States. Approximately 98 percent to 100 percent of this population has some coverage because of the virtually universal coverage of this age group by the Medicare program. A significant differentiation occurs only in the groups under age 65. Therefore, data on persons 65 and over was excluded from the HIC. The HIC makes no distinction about the quality or comprehensiveness of the coverage. It measures only the existence of coverage, whether private or public insurance.

2.5 HEALTH CARE RESOURCES AVAILABILITY (HCRA) COMPONENT

Resource availability refers to the physical presence of certain resources within a local community (e.g., short term general hospital beds, physicians of various types and specialties). The following four inputs were included in the HCRA:

TABLE 3 – HCRA INPUT DATABASE

Input	Per Population	Data Source	Time Period
Primary Care Physicians (PCP)	100,000	ARF	2006, 2007, 2008 (Average of 3 most recent years available)
Non-Primary Care Physicians (NPCP)	100,000	ARF	2006, 2007, 2008 (Average of 3 most recent years available)
Dentists (DDS)	100,000	ARF	2007 (Most recent year available)
Acute Hospital Beds (HOSPBEDS)	10,000	ARF	2005, 2006, 2007 (Average of 3 most recent years available)

Source: ARF is compiled from multiple national databases by the HRSA of the U.S. DHHS.

CHAPTER 3 APPALACHIAN HEALTHCARE ACCESS

3.1 APPLICATION OF INDEX

Data for each component for each county in the United States were rank ordered and assigned a percentile. The rank ordered percentiles are assigned an extension “_R.” The following tables document the metrics, method, source, variable name and date for the data elements in each component of the HCCA. Following publication, raw data for these analyses will be available from www.ARC.gov/research. Maps in Section 3.2 of this report reflect choroplethic ratings of the percentile distribution of values in the HCCA and its subcomponent indices. All maps are scaled in quintiles and adjusted so that red represents low percentiles and blue represents high percentiles. White is average.

TABLE 4 - HEALTHCARE COST, COVERAGE AND ACCESS (HCCA) INDEX CALCULATION

Equation	Basic Scaling Method	Input Item	Final Rescaled Variable Name
$HCCA = (HCRA_R + HIC_R + HCC_R) / 3$	Percentile Value	Rank ordered then converted to a percentile	HCCA_R

TABLE 5 – HEALTH CARE COSTS (HCC) COMPONENT CALCULATION

Input Item Definition	Data Source	Time Periods	Basic Scaling Method	Input Item	Final Rescaled Variable Name
HCC = CMS Hospital Wage Index Rescaled	CMS	FY 2009 Wage Index – calculated from 2005 Wage Data	Percentile Value	The CMS labor cost Index Rank ordered then converted to a percentile. Tied counties are given tied ranks for percentile ranking	HCC_R

TABLE 6 - HEALTH INSURANCE COVERAGE (HIC) COMPONENT CALCULATION

Input Item Definition	Data Source	Time Periods	Basic Scaling Method	Input Item	Final Rescaled Variable Name
HIC = Percent of residents 0 to 64 years old insured by public or private sources Rescaled	SAHIE	2007	Percentile Value	Insured residents 0 -64 years old as percent of 0-64 year-olds from SAHIE. Rank ordered then converted to a percentile	HIC_R

TABLE 7 – HEALTH CARE RESOURCE AVAILABILITY (HCRA) COMPONENT CALCULATION

Input Item	Input Item Definition	Data Source	Time Periods	Basic Scaling Method	Computation Refinements	Final Rescaled Variable Name
PCP	Primary Care Physicians per Census Bureau 100K pop	ARF	Averaged across the 3 most recent years (2006, 2007, 2008)	Percentile value	Counties without physicians (tied at zero) will be arrayed so most populated counties have a greatest degree of physician shortage	PCP_R
NPCP	Non-primary care Physicians per Census Bureau 100K pop	ARF	Averaged across the 3 most recent years (2006, 2007, 2008)	Percentile Value	Counties without physicians (tied at zero) will be arrayed so most populated counties have a greatest degree of physician shortage	NPCP_R
DDS	Dentists per Census Bureau 100K pop	ARF	2007 (latest available data)	Percentile Value	Counties without dentists (tied at zero) will be arrayed so most populated counties have a greatest degree of physician shortage	DDS_R
HOSP BEDS	Short term general hospital beds per Census Bureau 10K population	ARF	Averaged across the 3 most recent years (2005, 2006, 2007)	Percentile value	Counties without hospitals (tied at zero) will be arrayed so most populated counties have a greatest degree of physician shortage.	HOSBEDS_R
HCRA= (PCP_R + NPCP_R + DDS_R + HOSPBEDS_R)/4				Average of the 4 percentile values	The average of the 4-item summed percentile scores is then again rank ordered and converted to a percentile across all U.S. counties	HCRA_R

Throughout the rest of the report, for ease of reading, we have dropped the “_R” extension. Tables above are useful only for persons using the data tables that accompany this report. Maps in the following section compare the United States and the Appalachian Region for the HCCA Index and its subcomponents. Note that Lafayette County, Mississippi is outside the Appalachian Region; so it appears blank on the ARC maps.

3.2 MAPS OF HEALTHCARE COST, COVERAGE AND ACCESS INDEX (HCCA) AND COMPONENTS

The following pages contain maps of counties in the United States and the Appalachian Region showing geographic differences for the Health Care Cost, Coverage and Access Index (HCCA) and its components. All maps are scaled in five quintiles with red the least desirable and blue the most desirable score.

3.2.1 HEALTHCARE COST, COVERAGE AND ACCESS (HCCA) INDEX

FIGURE 10 – COUNTY HCCA INDEX IN THE U.S., 2011

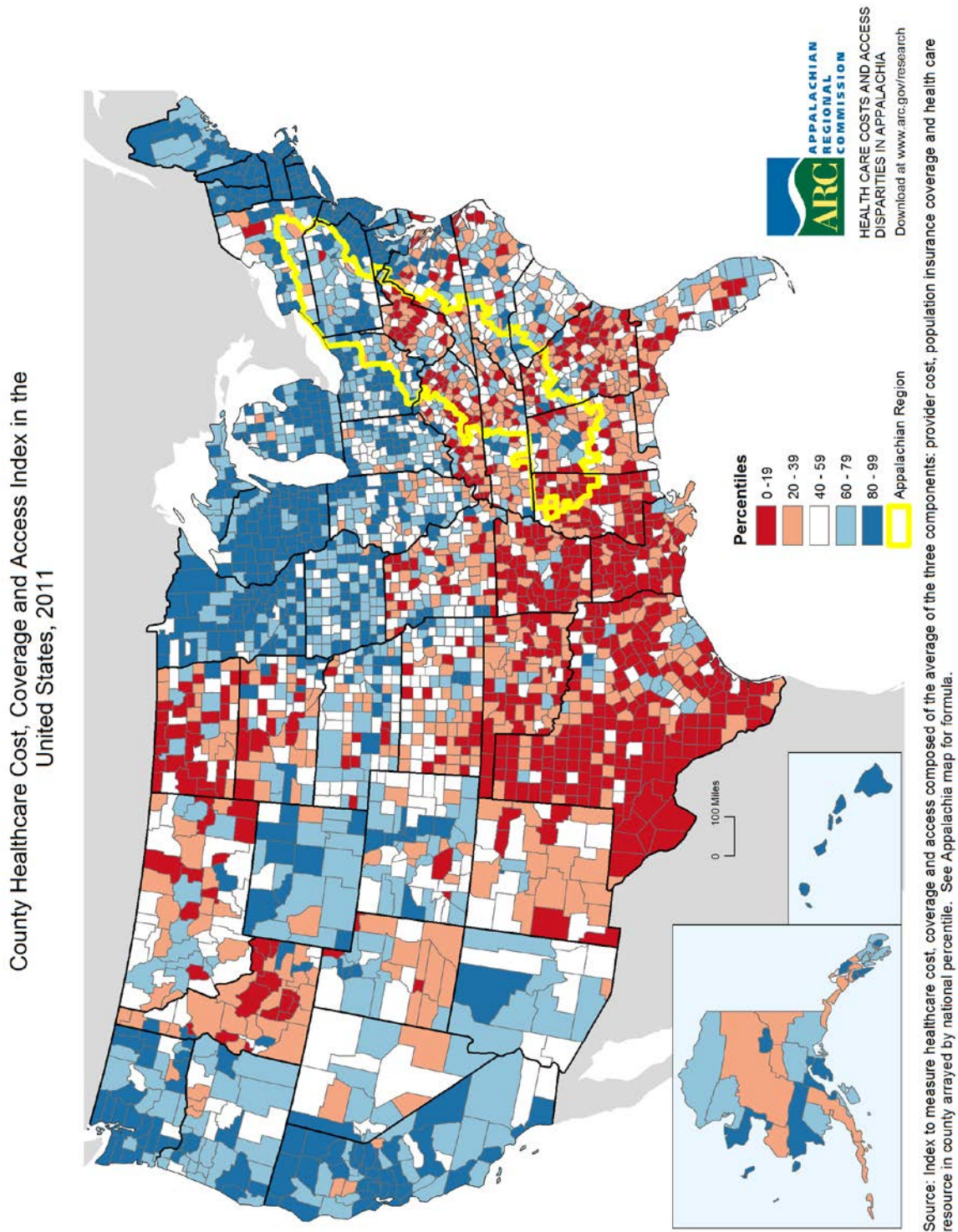
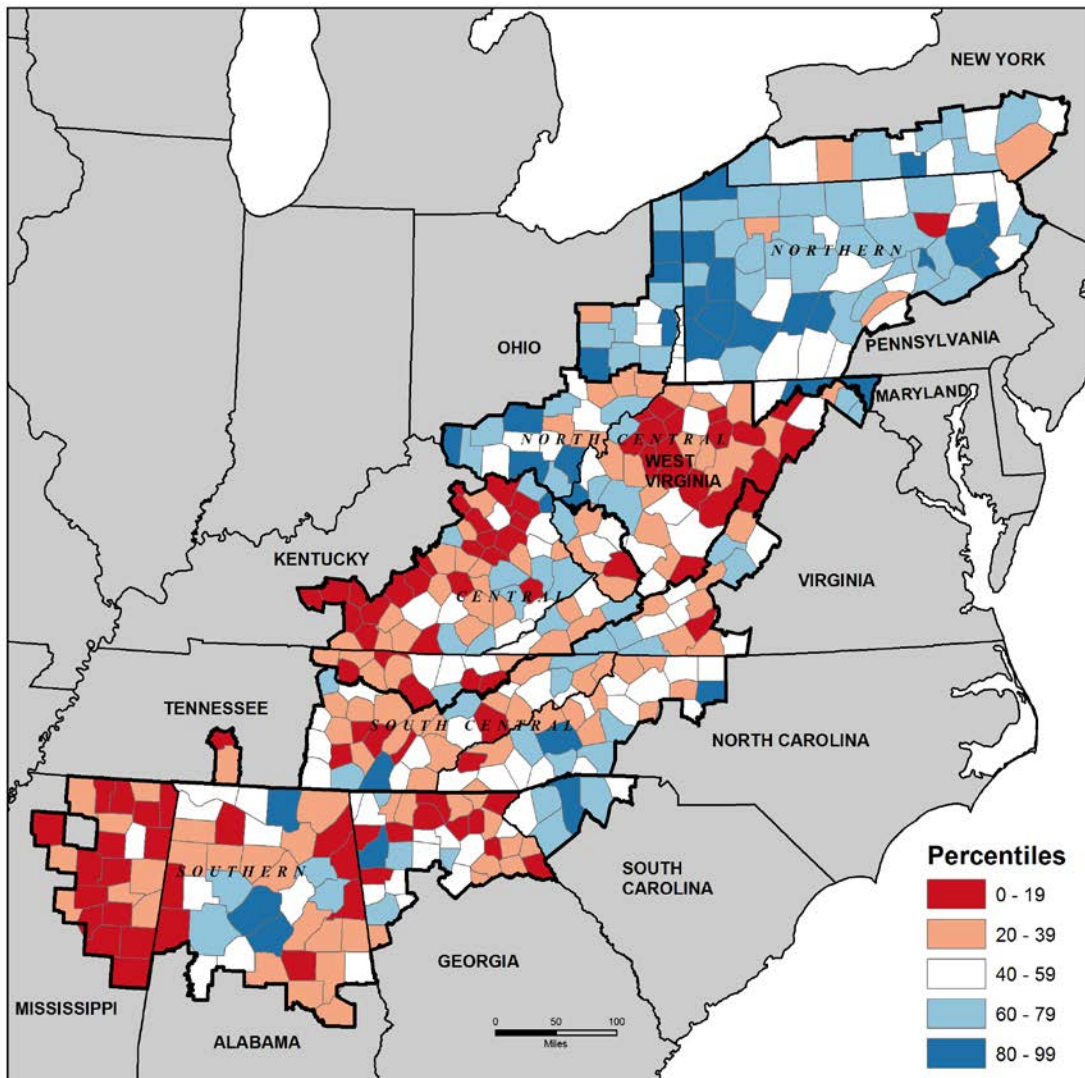


FIGURE 11 - COUNTY HEALTHCARE COST, COVERAGE AND ACCESS (HCCA) INDEX IN APPALACHIA, 2011



Formula: Percentile of ((Health Cost Percentile + Health Insurance Percentile + Health Resource Percentile) / 3)

Prepared by Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill in cooperation with PDA, Inc, Raleigh, North Carolina, 2011



The HCCA does not follow traditional patterns of distress in Appalachia, or elsewhere. Extremely low scores in broad areas of Texas and Louisiana are consistent with immigrant patterns. Those same extremely low scores in Appalachia occur in very rural areas. Every Appalachian state, except South Carolina and Maryland, has a pocket of extremely low HCCA score. Generally, northern states fare better than those in central Appalachia and the south. These maps show percentiles; the whole nation is compared to itself. Top performers are in the 80th percentile and above.

3.2.2 HEALTH CARE COST (HCC) COMPONENT

FIGURE 12 – COUNTY HCC COMPONENT IN THE U.S., 2011

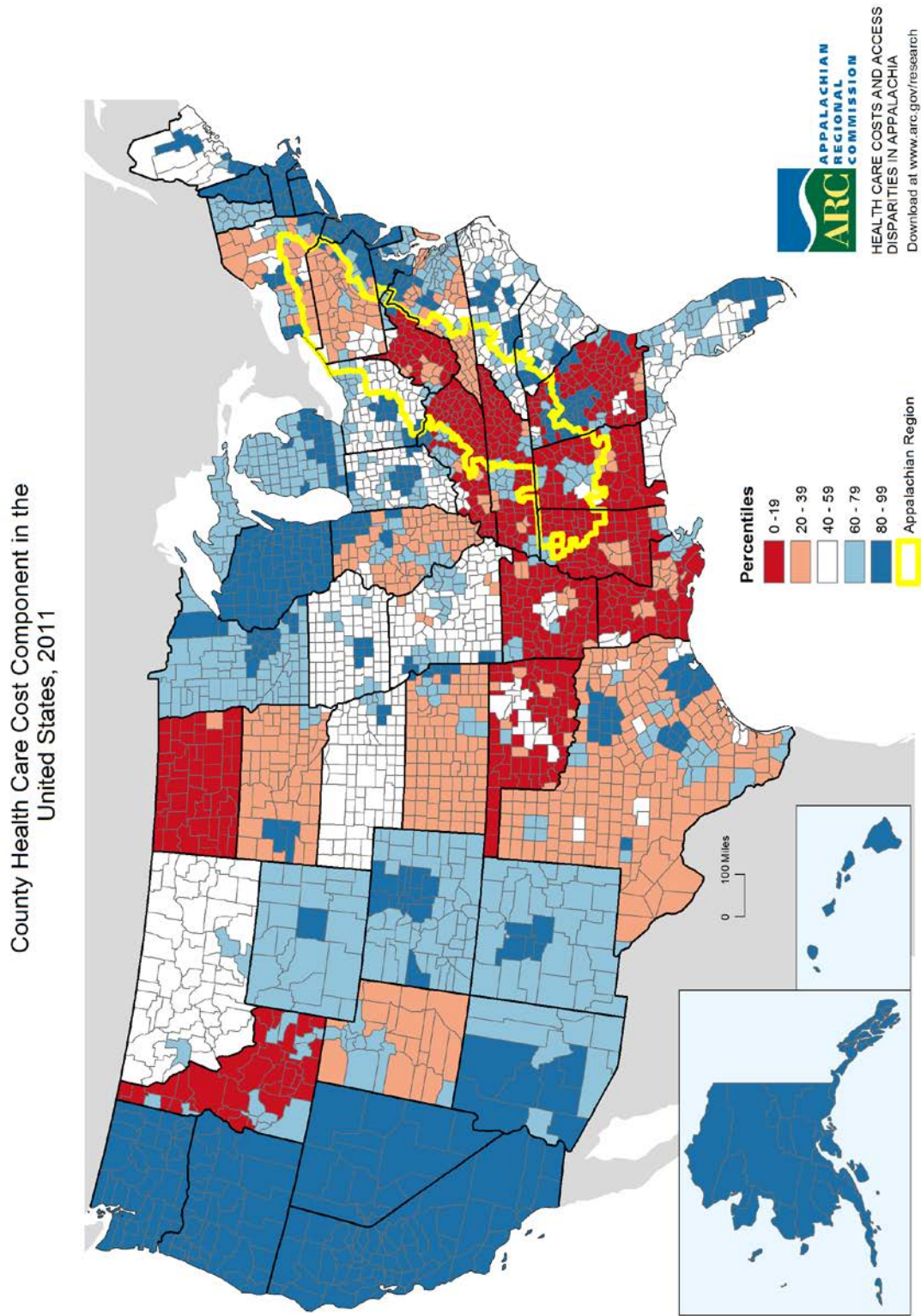
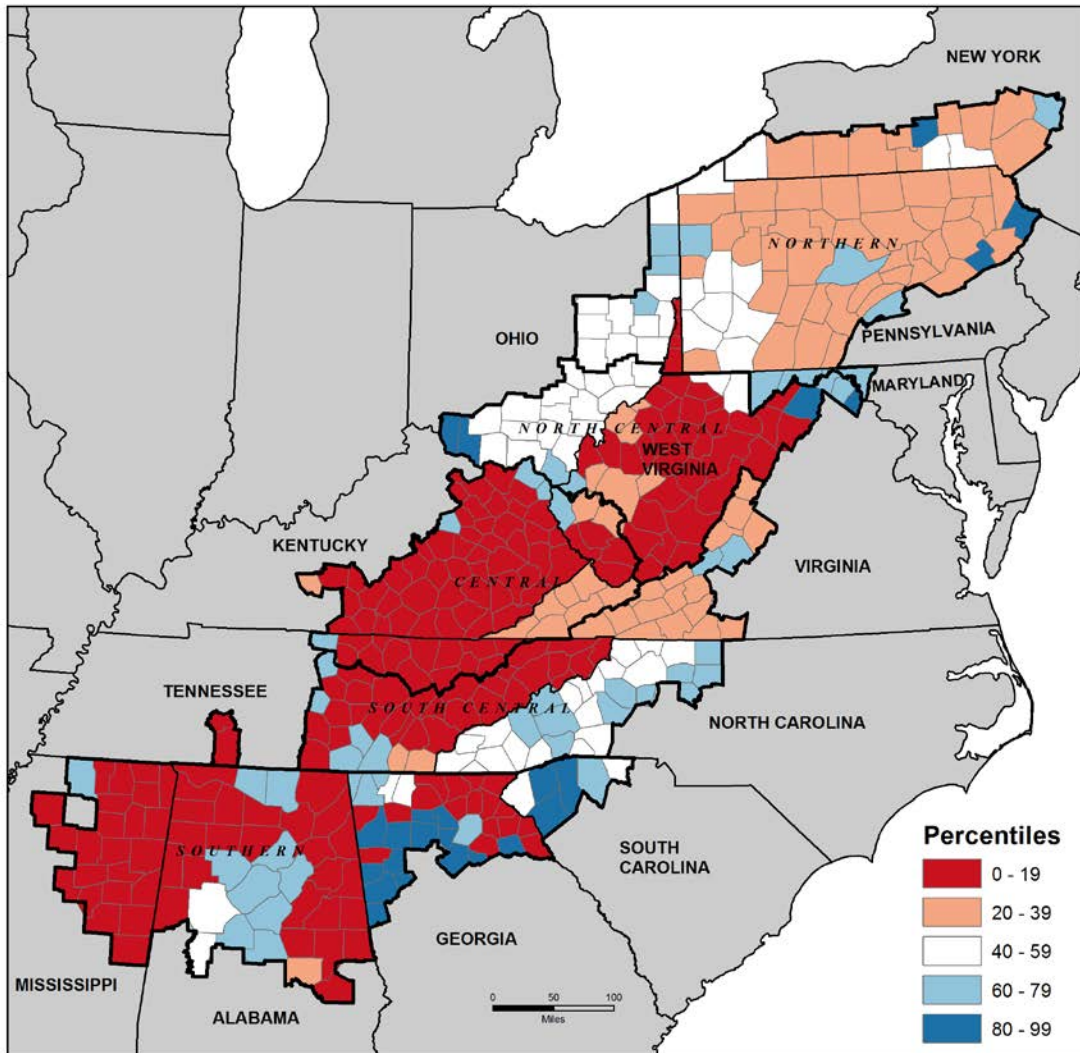


FIGURE 13 – COUNTY HEALTH CARE COST (HCC) COMPONENT IN APPALACHIA, 2011



Source: 2009 CMS Hospital Geographic Wage Index (calculated by CMS from year 2005 Wage Data). Department of Health and Human Services, Centers for Medicare & Medicaid Services 2010, Wage Index and Capital Geographic Adjustment Factor by CBSA 2009.

Prepared by Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill in cooperation with PDA, Inc, Raleigh, North Carolina, 2011



HCC reflects and reinforces severe disparities in Central and Southern Appalachia and the southern United States in general. This means that wages paid by hospitals are lowest here. This low wage sets the benchmark for 60 percent of the Medicare payment rate for hospitals and by reference for most other Medicare healthcare services. Other payers set payments on a percent of Medicare, thus low wages beget low payments, as other insurers benchmark to Medicare.

3.2.3 HEALTH INSURANCE COVERAGE (HIC) COMPONENT

FIGURE 14 - COUNTY HIC COMPONENT IN THE U.S., 2011

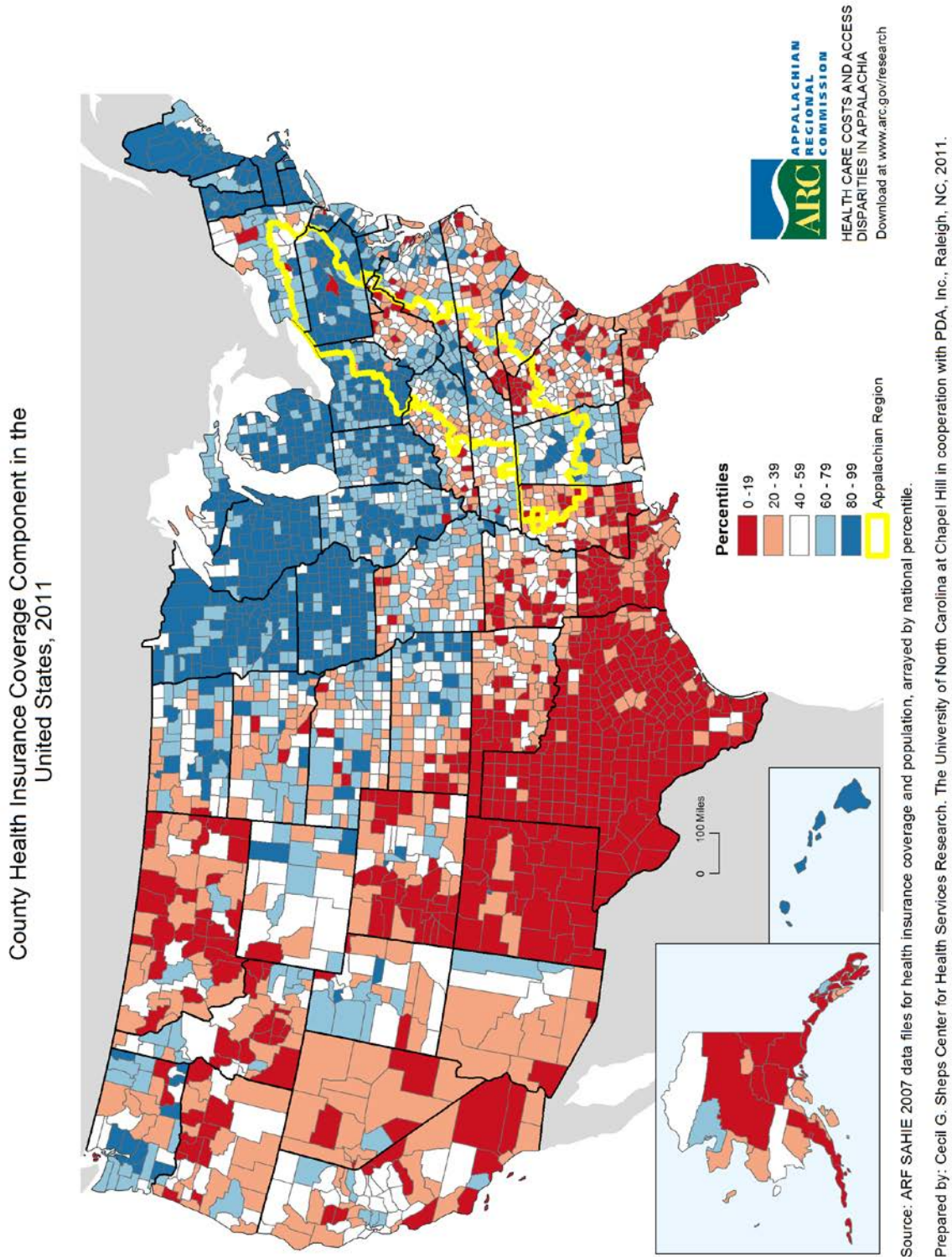
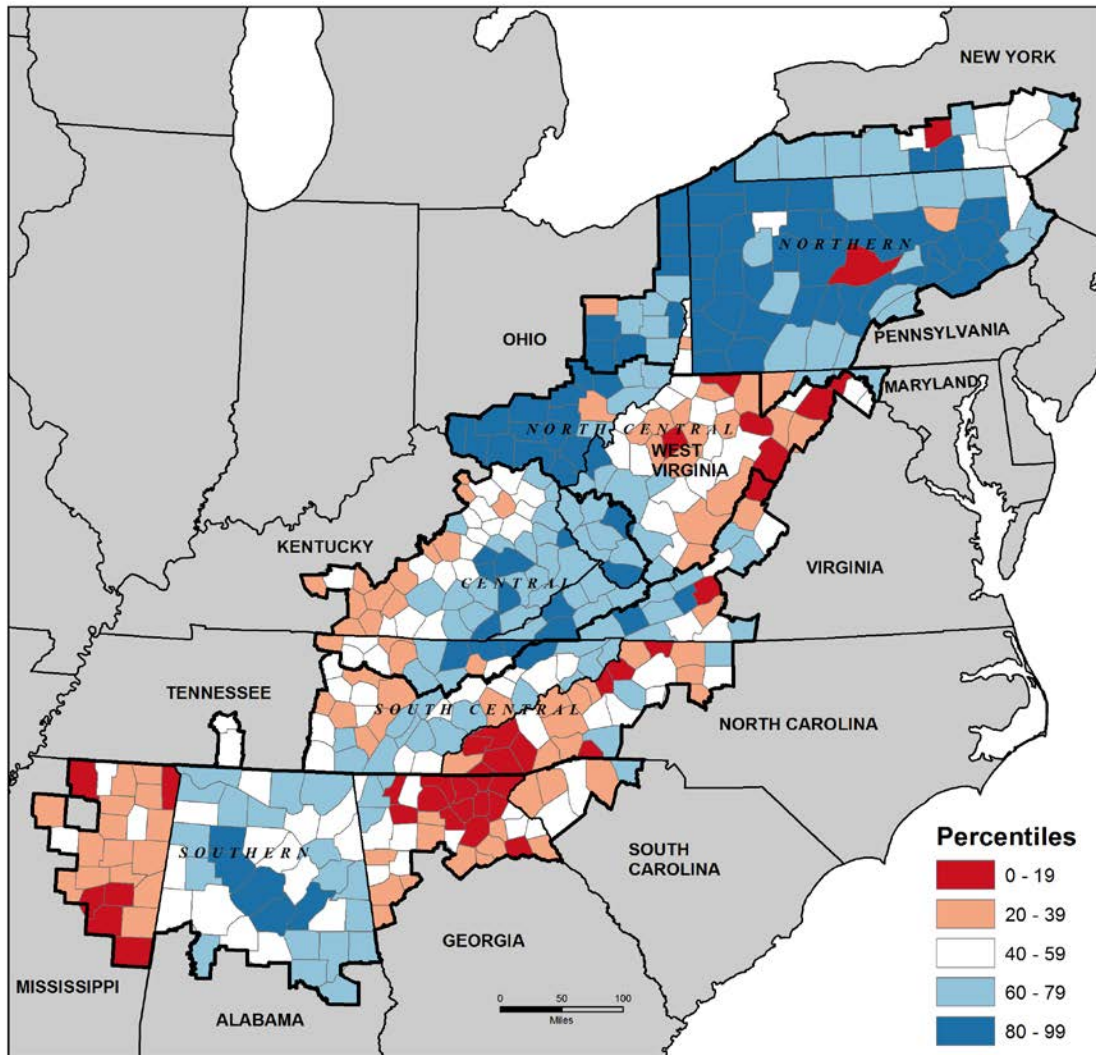


FIGURE 15 – COUNTY HEALTH INSURANCE COVERAGE (HIC) COMPONENT IN APPALACHIA, 2011



Source: Composite of the percent of residents under 65 years old with health insurance from at least one public or private source. Analysis of county data from the 2009 American Community Survey showed that 98 to 100 percent of persons over 65 have insurance coverage. Differentiation occurs only in age groups below 65. Numerator and denominator from Model-based Small Area Health Insurance Estimate (SAHIE) for Counties, and States; U.S. Census Bureau with support from other Federal Agencies; 2007.

Prepared by Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill in cooperation with PDA, Inc, Raleigh, North Carolina, 2011



As reflected in the HIC component, health insurance coverage in the Appalachian Region is actually better than many parts of the country. Nationally, the health insurance coverage patterns are closely aligned with union presence and with the philosophy of state Medicaid programs. Very rural, non-mining areas, particularly in states that focus on depth rather than breadth of Medicaid eligibility, tend to have less coverage. Severe disparities in Florida, Texas and New Mexico are consistent with high levels of immigrant populations in those areas.

3.2.4 HEALTH CARE RESOURCE AVAILABILITY (HCRA) COMPONENT

FIGURE 16 - COUNTY HCRA COMPONENT IN THE U.S., 2011

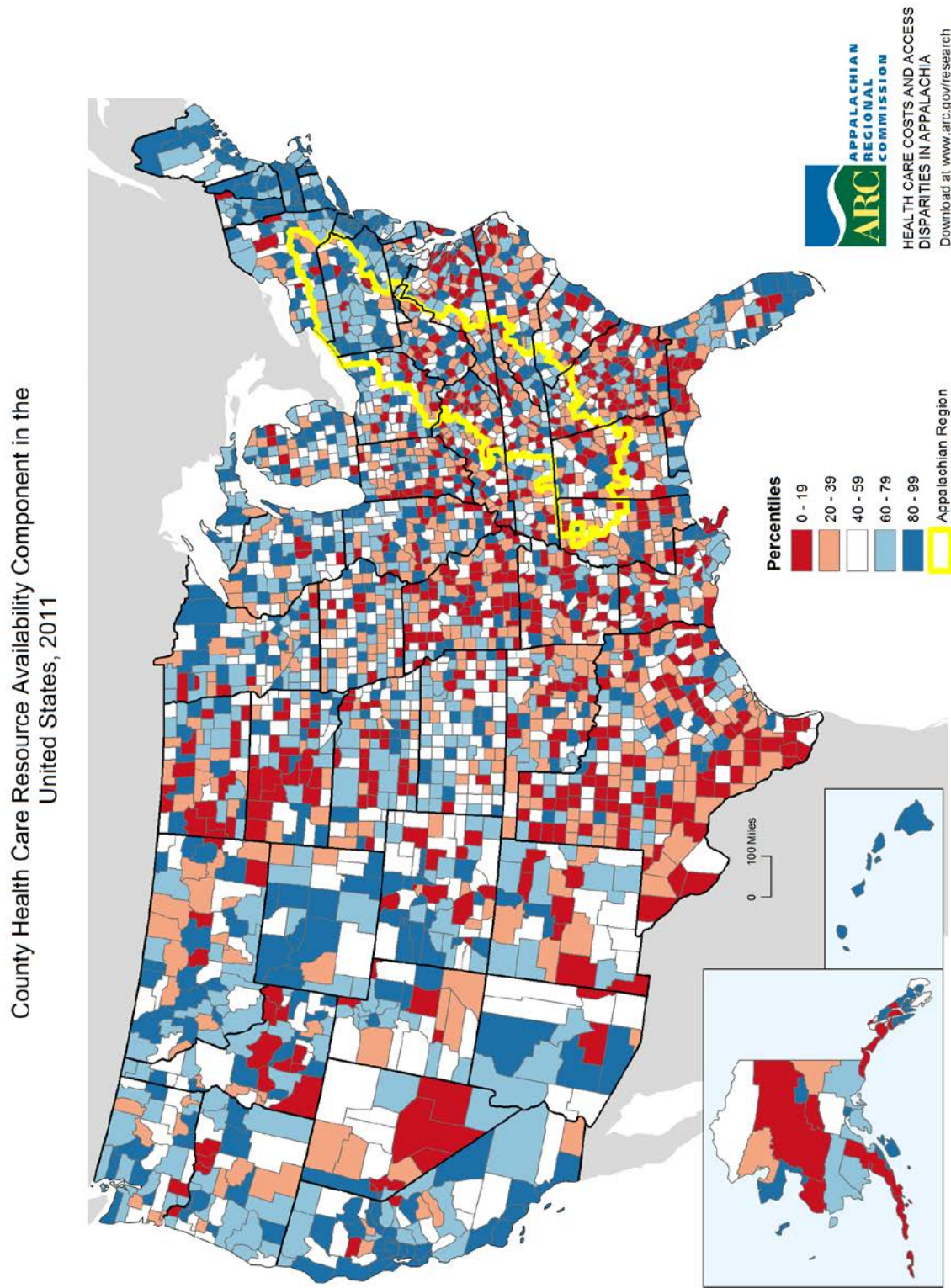
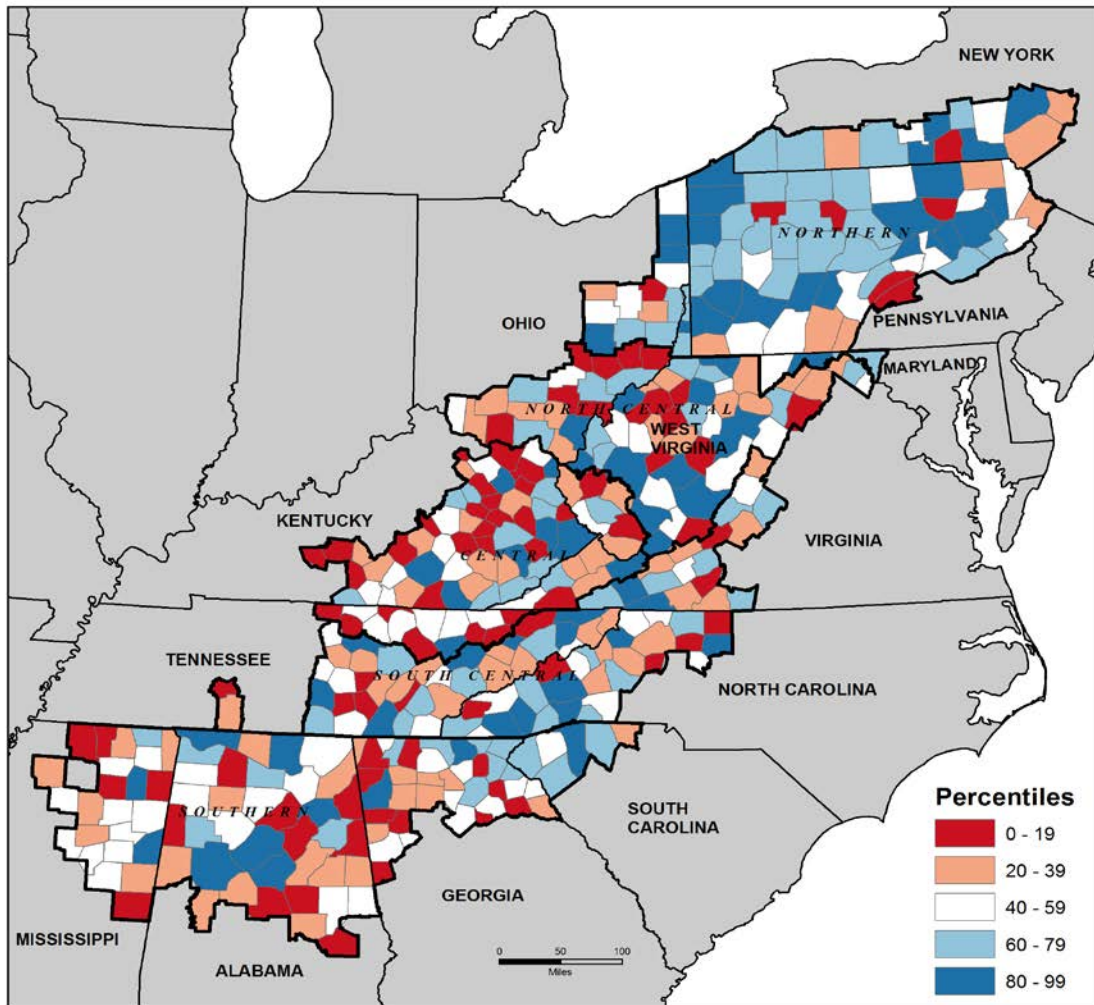


FIGURE 17 - COUNTY HEALTH CARE RESOURCE AVAILABILITY (HCRA) COMPONENT IN APPALACHIA, 2011



Source: Composite of Subindexes of Population-based rates of Primary Care Physicians, Dentist, and Short-Term General and Critical Access Hospital Beds. Area Resource File 2009-2010; Department of Health and Human Services, Health Resources and Services Administration, Bureau of Health Professions, Office of Workforce Policy and Performance Management 2010.

Prepared by Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill in cooperation with PDA, Inc, Raleigh, North Carolina, 2011



As reflected in the HCRA, resource disparities occur throughout the region and are more severe in very remote counties of Appalachia, the northern midwest and southwest Texas. Most of the high disparity communities have no hospital, or the hospital is very small. In cases where a high resource county is adjacent to a severe shortage county, residents may have better access than in areas in central and southern Appalachia, which have clusters of severe to high resource disparity.

The Dartmouth Atlas staff has tried to address this issue by defining the United States in terms of hospital service areas. Implicit in such analyses is the assumption that, in rural areas, traveling across county lines to get hospital care is inevitable. By contrast the HCRA component is a simple statement of fact about a county's relative resources.

3.3 SUMMARY OF FINDINGS FOR HEALTHCARE COST, COVERAGE, AND ACCESS (HCCA) INDEX IN APPALACHIAN REGION

Counties in Appalachian states and in the Appalachian Region favor the lower percentiles of the HCCA and most of its components.

FIGURE 18 - DISTRIBUTION OF COUNTIES IN ARC STATES BY INDEX AND COMPONENT (N=1070 COUNTIES)

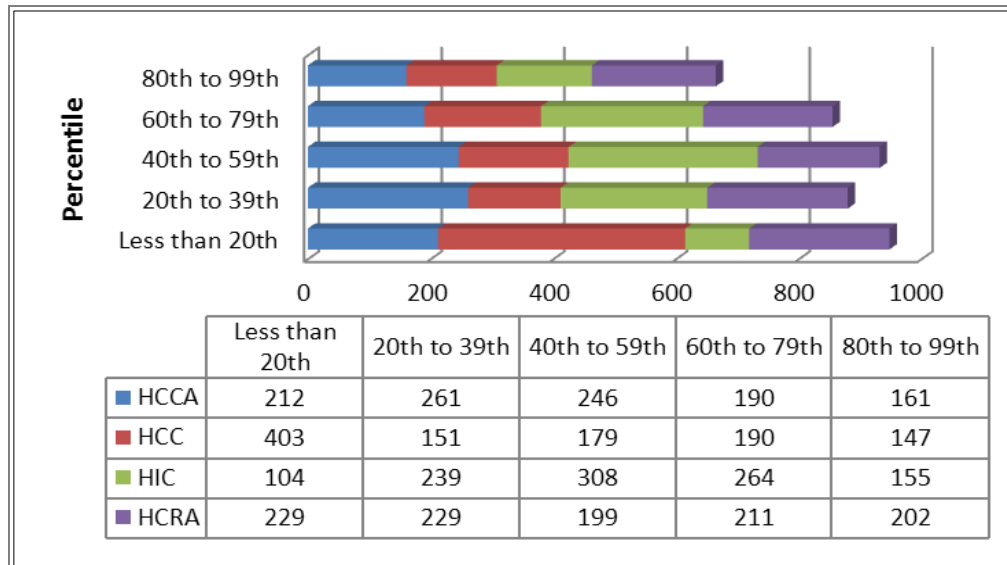
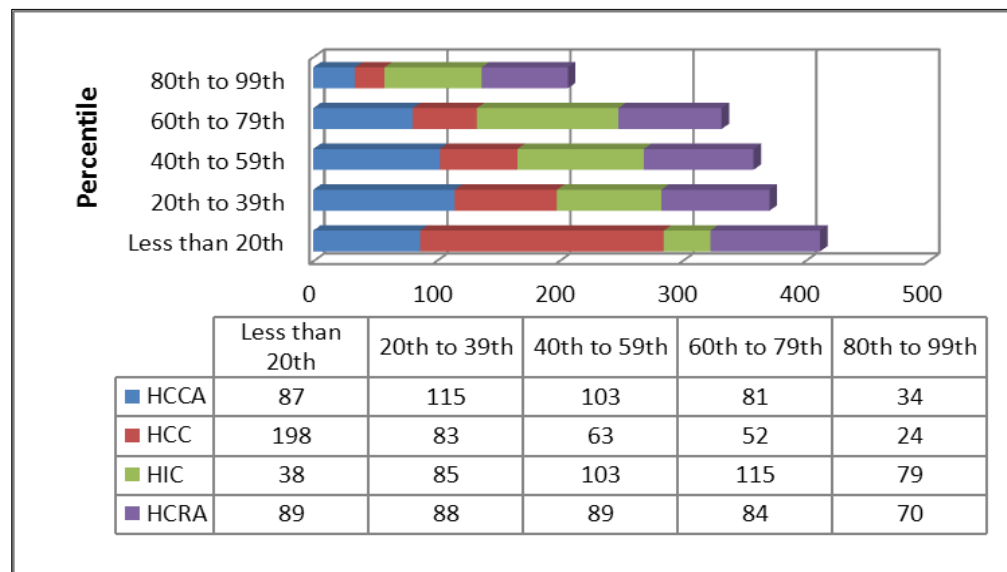


FIGURE 19 - DISTRIBUTION OF ARC COUNTIES BY INDEX AND COMPONENT (N=420)



To understand these distributions, it helps to understand that taken together, the 3,110 counties in the U.S. distribute evenly among the percentile groupings, as would be expected.

To put the percentiles in context, it is important to understand the variance between the values of highest and lowest percentiles. The spread of raw values in the HCRA and HCCA is very wide. The spread in HCC is smaller, because the value itself is indexed. HIC, insurance coverage, differences are the smallest nationwide.

TABLE 8 - RAW VALUES FOR HCCA AND SUBCOMPONENTS – ALL U.S. COUNTIES (N=3110 COUNTIES)

	HCCA	HCC	HIC	HCRA
Max	98.3	1.58	93.4	97.5
Min	3.3	0.73	50.4	2.5
Variance	95.0	0.84	43.0	95.0
Variance %	2850%	115%	85%	3800%

TABLE 9 - RAW VALUES FOR HCCA AND SUBCOMPONENTS – APPALACHIAN STATES (N=1070 COUNTIES)

	HCCA	HCC	HIC	HCRA
Max	96.0	1.30	91.0	97.5
Min	4.7	0.76	62.4	2.5
Variance	91.3	0.54	28.6	95.0
Variance %	1957%	71%	46%	3800%

TABLE 10 - RAW VALUES FOR HCCA AND SUBCOMPONENTS – APPALACHIAN COUNTIES (N=420 COUNTIES)

	HCCA	HCC	HIC	HCRA
Max	82.3	1.16	91.0	97.0
Min	8.0	0.76	71.2	3.5
Variance	74.3	0.39	19.8	93.5
Variance %	929%	52%	28%	2671%

According to the HCCA index, ARC counties have lower than average healthcare resources, insurance coverage, and reimbursement when compared to the nation as a whole. In the vocabulary of the ARC Economic Distress Index, if the lowest two quintiles are Distressed and At Risk, of the 420 ARC Counties, 202 (48.1 percent) are either Distressed or At-Risk while only 115 (27.4 percent) are either Competitive or at Attainment. This means that, compared to the nation as a whole, ARC counties are 20.2 percent more likely to have a lower than normal HCCA (48.1 percent / 40.0 percent – 1 = 20.2 percent). It also means ARC Counties are 31.5 percent less likely to have a higher than normal HCCA ((27.4 percent / 40.0 percent) – 1 = -31.5 percent). Patterns for individual states vary substantially.

3.4 RESULTS IN APPALACHIAN STATES

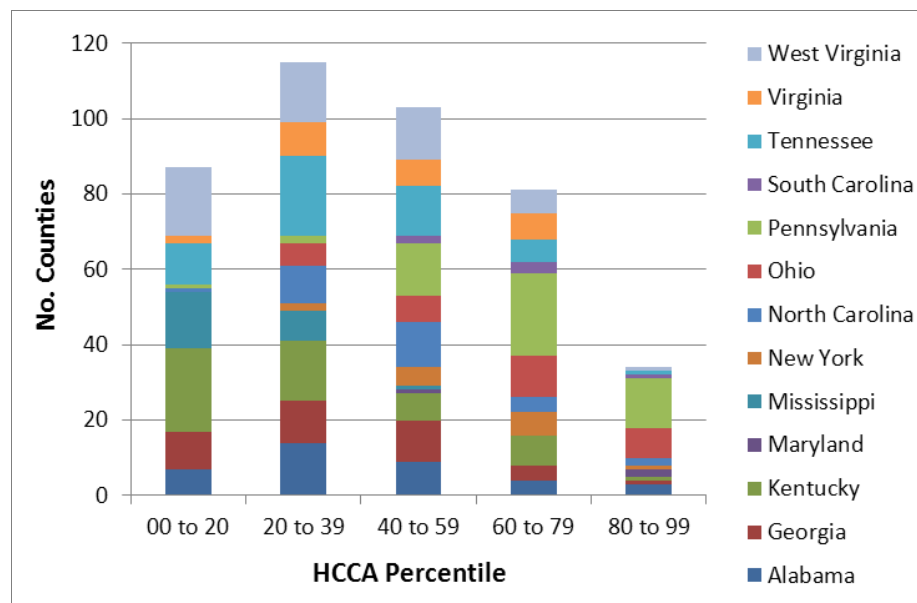
3.4.1 HEALTHCARE COST, COVERAGE, AND ACCESS (HCCA) INDEX

Individual states that skewed towards Attainment (high percentile) on the HCCA had low scoring counties or scored low on one of the components. South Carolina and Maryland counties in Appalachia have the best healthcare access, cost and coverage.

TABLE 11 – COUNT OF ARC COUNTIES BY HCCA PERCENTILE GROUP

Appalachian State	Percentile Group					Total
	00 to 20	20 to 39	40 to 59	60 to 79	80 to 99	
Alabama	7	14	9	4	3	37
Georgia	10	11	11	4	1	37
Kentucky	22	16	7	8	1	54
Maryland	0	0	1	0	2	3
Mississippi	15	8	1	0	0	24
New York	0	2	5	6	1	14
North Carolina	1	10	12	4	2	29
Ohio	0	6	7	11	8	32
Pennsylvania	1	2	14	22	13	52
South Carolina	0	0	2	3	1	6
Tennessee	11	21	13	6	1	52
Virginia	2	9	7	7	0	25
West Virginia	18	16	14	6	1	55
Total	87	115	103	81	34	420

FIGURE 20 - HCCA INDEX OF COUNTIES IN APPALACHIAN STATES



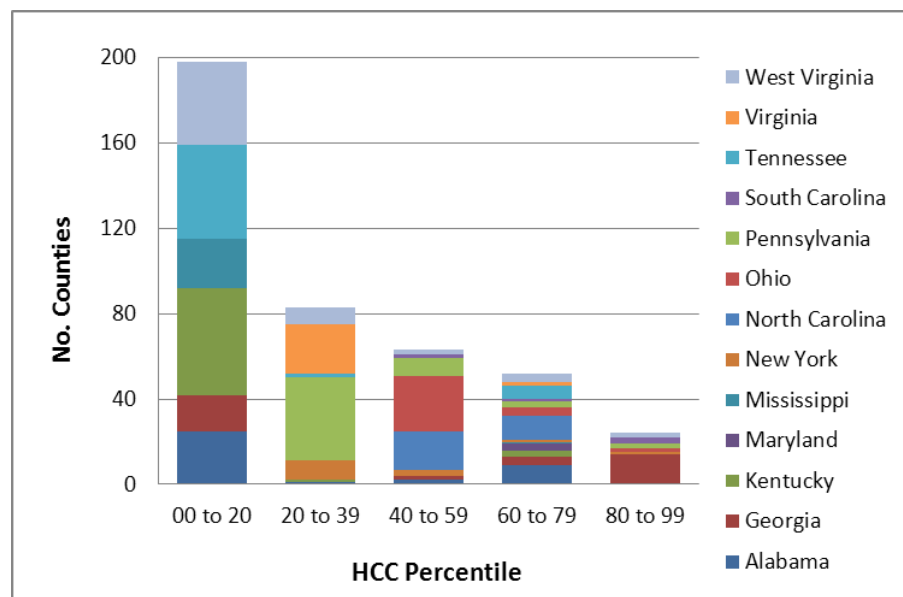
3.4.2 HEALTH CARE COST (HCC) COMPONENT

Overall, ARC counties have extremely poor reimbursement when compared to the nation. Of the 420 ARC counties, 198 (47.1 percent) could be called Distressed while only 24 (5.7 percent) would be at Attainment. In Kentucky and Mississippi, nearly all ARC counties are “Distressed”. It appears that only the greater Atlanta area and ARC counties in South Carolina reached consistent Attainment reimbursement.

TABLE 12 – COUNT OF ARC COUNTIES BY HCC PERCENTILE GROUP

Appalachian State	Percentile Group					Total
	00 to 20	20 to 39	40 to 59	60 to 79	80 to 99	
Alabama	25	1	2	9	0	37
Georgia	17	0	2	4	14	37
Kentucky	50	1	0	3	0	54
Maryland	0	0	0	3	0	3
Mississippi	23	0	0	1	0	24
New York	0	9	3	1	1	14
North Carolina	0	0	18	11	0	29
Ohio	0	0	26	4	2	32
Pennsylvania	0	39	8	3	2	52
South Carolina	0	0	2	1	3	6
Tennessee	44	2	0	6	0	52
Virginia	0	23	0	2	0	25
West Virginia	39	8	2	4	2	55
Total	198	83	63	52	24	420

FIGURE 21 - HCC PERCENTILE DISTRIBUTION OF COUNTIES IN THE APPALACHIAN STATES



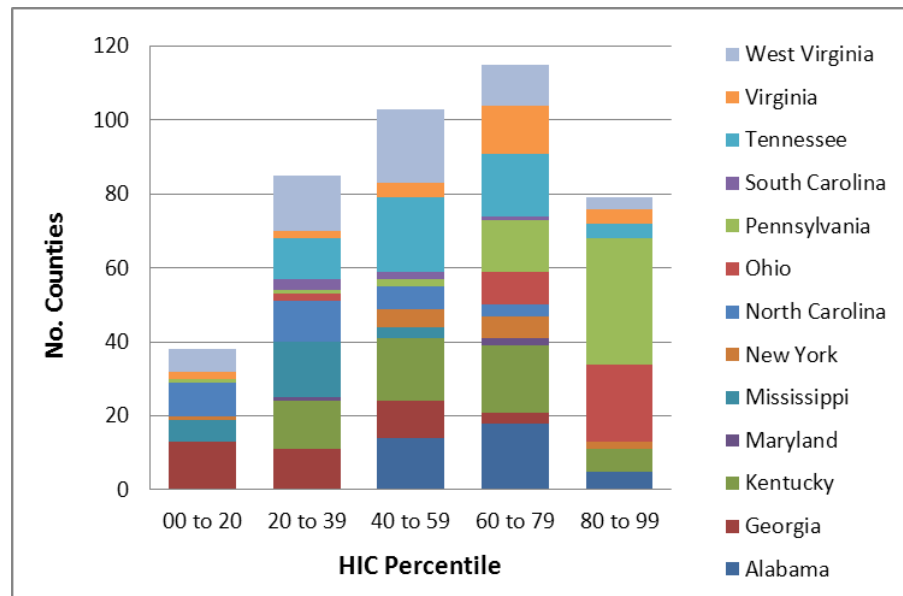
3.4.3 HEALTH INSURANCE COVERAGE (HIC) COMPONENT

When all types of health insurance are considered (public and private), ARC counties have higher than average coverage when compared to the nation. This may reflect the higher rates of Medicaid and Medicare Disability insurance coverage in ARC counties. The national average is affected by large populations in non-Appalachian states such as Texas, Florida and California, which have an abnormally high percentage of uninsured residents. These states also have large numbers of migrant and immigrant populations who would not qualify for federal programs.

TABLE 13 – COUNT OF ARC COUNTIES BY HIC PERCENTILE GROUP

Appalachian State	Percentile Group					Total
	00 to 20	20 to 39	40 to 59	60 to 79	80 to 99	
Alabama	0	0	14	18	5	37
Georgia	13	11	10	3	0	37
Kentucky	0	13	17	18	6	54
Maryland	0	1	0	2	0	3
Mississippi	6	15	3	0	0	24
New York	1	0	5	6	2	14
North Carolina	9	11	6	3	0	29
Ohio	0	2	0	9	21	32
Pennsylvania	1	1	2	14	34	52
South Carolina	0	3	2	1	0	6
Tennessee	0	11	20	17	4	52
Virginia	2	2	4	13	4	25
West Virginia	6	15	20	11	3	55
Total	38	85	103	115	79	420

FIGURE 22 – HIC DISTRIBUTION OF COUNTIES IN APPALACHIAN STATES



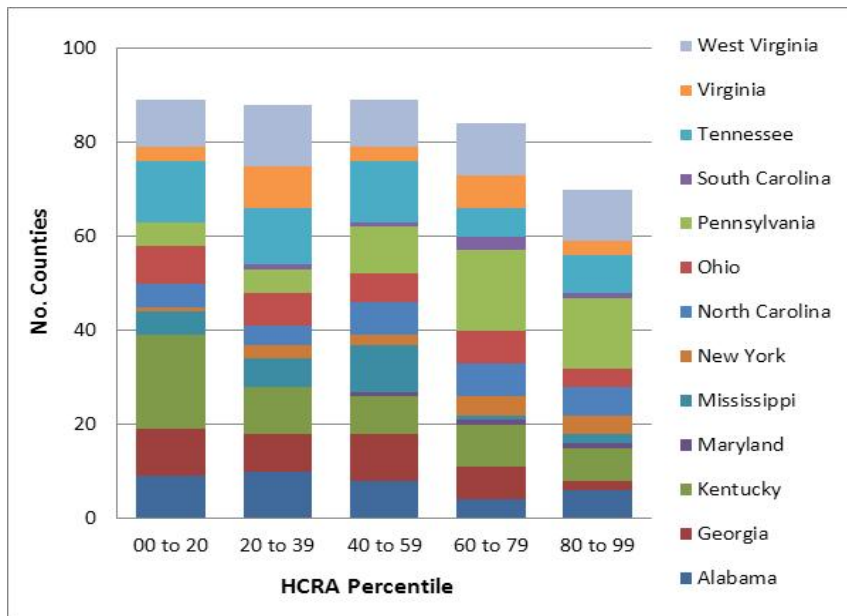
3.4.4 HEALTH CARE RESOURCE AVAILABILITY (HCRA) COMPONENT

Overall, ARC counties have slightly lower than normal access to healthcare resources when compared to the nation as a whole. Of the 420 ARC counties, 177 (42.1 percent) are either Distressed or At-Risk while only 154 (36.7 percent) are Competitive or at Attainment.

TABLE 14 – COUNT OF ARC COUNTIES BY HCRA PERCENTILE GROUPS

Appalachian State	Percentile Group					Total
	00 to 20	20 to 39	40 to 59	60 to 79	80 to 99	
Alabama	9	10	8	4	6	37
Georgia	10	8	10	7	2	37
Kentucky	20	10	8	9	7	54
Maryland	0	0	1	1	1	3
Mississippi	5	6	10	1	2	24
New York	1	3	2	4	4	14
North Carolina	5	4	7	7	6	29
Ohio	8	7	6	7	4	32
Pennsylvania	5	5	10	17	15	52
South Carolina	0	1	1	3	1	6
Tennessee	13	12	13	6	8	52
Virginia	3	9	3	7	3	25
West Virginia	10	13	10	11	11	55
Total	89	88	89	84	70	420

FIGURE 23 - HCRA DISTRIBUTION OF COUNTIES IN APPALACHIAN STATES



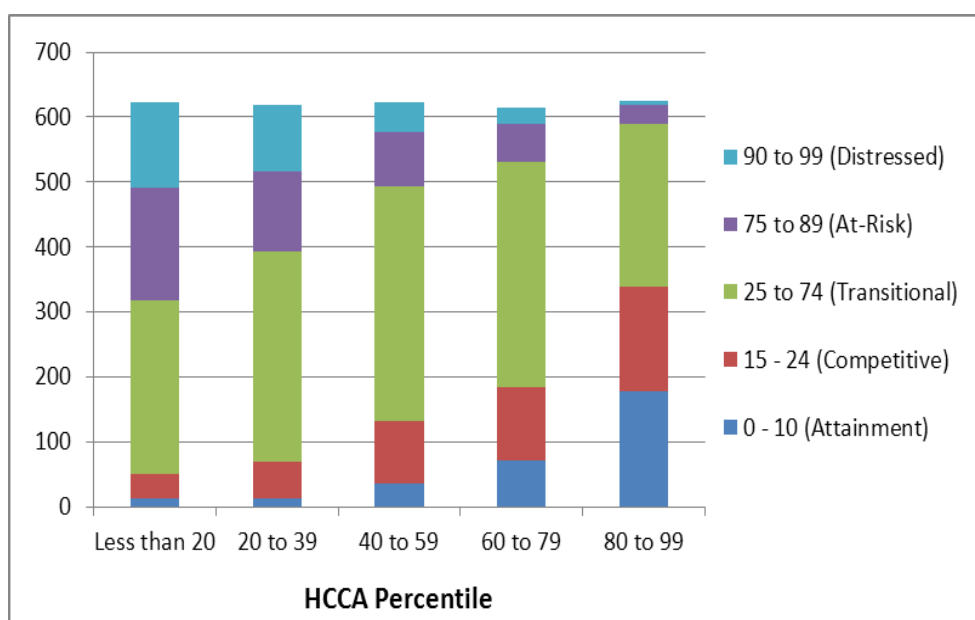
3.5 HEALTHCARE COST, COVERAGE, AND ACCESS (HCCA) INDEX AND DISTRESSED APPALACHIAN COUNTIES

We examined relationships among the HCCA Index components individually, and between the HCCA and ARC’s 2011 Economic Status Index expressed in terms of Economic Distress. The following tables show that within the sub-indices, poor scores on one are generally associated with poor scores on another index. The exception is HIC, the insurance component index. Areas of high insurance coverage have low access and cost scores, indicating that people are covered but they do not have access to resources equivalent to the national average. In reading these tables, note that the Economic Distress Index is ranked such that 99 is most distressed. The HCCA and components are in normal percentiles, where the 99th percentile reflects a more desirable situation.

TABLE 15 –HCCA BY ARC ECONOMIC DISTRESS INDEX 2011 FOR THE UNITED STATES (N=3110)

HCCA (Combined Healthcare Cost, Coverage and Access Index - percentile)	ARC Economic Distress Index (ArcEconSTATUS2011)					Total
	0 - 10 (Attainment)	15 - 24 (Competitive)	25 to 74 (Transitional)	75 to 89 (At-Risk)	90 to 99 (Distressed)	
Less than 20 (low)	13	37	269	172	132	623
20 to 39	12	57	325	123	101	620
40 to 59	36	96	362	83	45	624
60 to 79	72	113	345	59	26	618
80 to 99 (high)	177	162	251	29	6	625
Total	310	465	1552	466	310	3110

FIGURE 24 – COMPARISON OF HCCA PERCENTILE RANKING TO DISTRESS LEVEL FOR ALL COUNTIES IN U.S.



All percentiles in these charts are national rankings. Thus, in the national distribution of the HCCA, there is approximately the same number of counties in each percentile. Table 15 and Figure 24 show that even some high attainment counties scored low on the HCCA index. The dissociation of economic status and HCCA is more notable among competitive and transitional counties, the red and green bars in Figure 24. These counties have better economic status, but one in five (688 total) rank below the 40th percentile on the HCCA. These locations may have low Medicare hospital wage indices, be too small to have significant health resources or many of their workers may not have health insurance. Generally, however, the better economic counties (blue, red and green) dominate the top HCCA percentile.

TABLE 16 – HCCA BY ARC ECONOMIC DISTRESS INDEX 2011 FOR APPALACHIAN STATES (N=1070 COUNTIES)

HCCA (Combined Healthcare Cost, Coverage and Access Index - percentile)	ARC Economic Distress Index					Total
	0 - 10 (Attainment)	15 - 24 (Competitive)	25 to 74 (Transitional)	75 to 89 (At-Risk)	90 to 99 (Distressed)	
Less than 20 (low)	1	2	53	80	76	212
20 to 39	2	10	113	68	68	261
40 to 59	8	20	147	49	22	246
60 to 79	14	19	132	16	9	190
80 to 99 (high)	52	33	69	6	1	161
Total	77	84	514	219	176	1070

FIGURE 25 – COMPARISON OF HCCA PERCENTILE RANKING TO DISTRESS LEVEL FOR ALL COUNTIES IN APPALACHIAN STATES

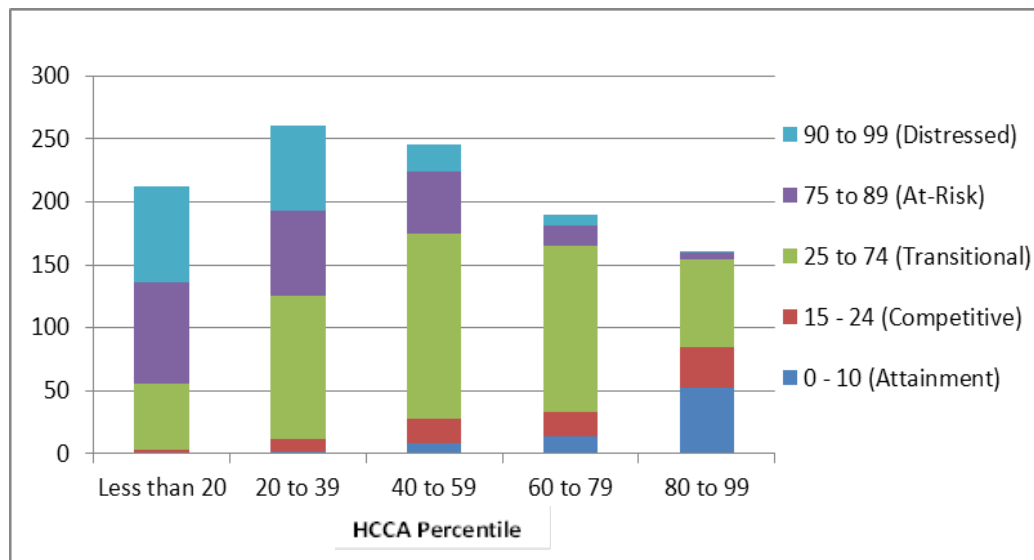


Table 16 and Figure 25 show that counties in Appalachian states tend to have lower HCCA scores. In Appalachia, only 17 percent (178) of the transitional and competitive counties ranked below the 40th percentile nationally. Nonetheless, they represent a third (37%) of the Appalachian states' low HCCA counties.

TABLE 17 -- HCCA BY ARC ECONOMIC DISTRESS INDEX 2011 FOR APPALACHIAN COUNTIES (N=420 COUNTIES)

HCCA (Combined Healthcare Cost, Coverage and Access Index - percentile)	ARC Economic Distress Index					Total
	0 - 10 (Attainment)	15 - 24 (Competitive)	25 to 74 (Transitional)	75 to 89 (At-Risk)	90 to 99 (Distressed)	
Less than 20 (low)	0	0	21	33	33	87
20 to 39	0	1	54	24	36	115
40 to 59	2	6	67	20	8	103
60 to 79	2	3	64	7	5	81
80 to 99 (high)	2	8	22	2	0	34
Total	6	18	228	86	82	420

FIGURE 26 - COMPARISON OF HCCA PERCENTILE RANKING TO DISTRESS LEVEL FOR APPALACHIAN COUNTIES

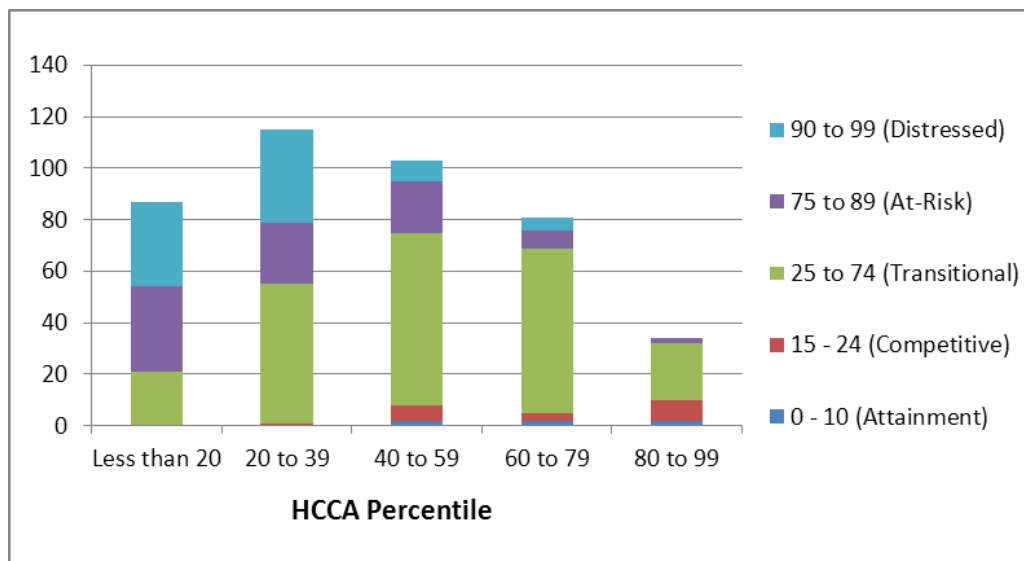


Table 17 and Figure 26 show almost half of the Appalachian counties (202 or 48%) are below the 40th percentile, with Distressed and At-Risk counties dominating the lower percentiles. Transitional counties in Appalachia distribute in a normal bell curve on the HCCA. Two distressed counties and two at risk counties defy the trend and rank in the highest HCCA percentile. Understanding why requires looking closer at how those counties ranked on the individual indices.

Relationships between ARC Economic measures and the HCCA and its sub-indices are explored in more depth in Appendix M.

3.6 OTHER MEASURES OF HEALTH CARE ACCESS

3.6.1 INDEPENDENT MEASURES

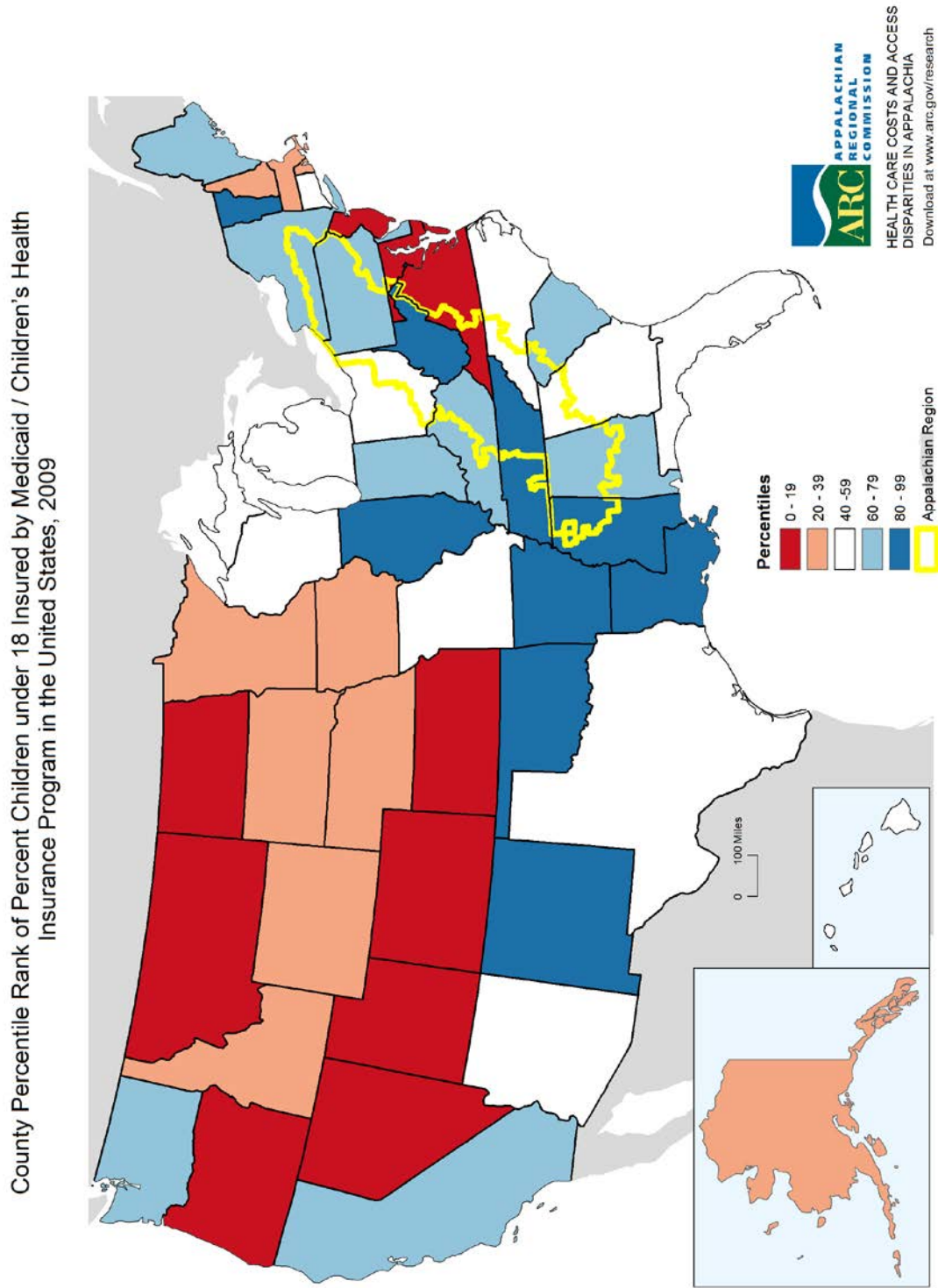
Independent of the HCCA, the research team compared Appalachian and non-Appalachian counties on five other measures of healthcare access and found some unexpected results.

TABLE 18 – INDEPENDENT MEASURES CALCULATION

Item Summary	Input Item Definition	Data Source	Time Periods	Basic Scaling Method	Computation Refinement
National Percentile of Percent of Children under 18 Insured by Medicaid	State-level estimates of Children under 18 Enrolled in Medicaid/Children's Health Insurance Program (CHIP)	Kaiser Family Foundation (KFF)	2009	Percentile Value	Percent Children Enrolled calculated with KFF child enrollment and child population data. Rank ordered then converted to a percentile.
National Percentile of Percent of Children Under 20 Insured	Percent of children 0 -19 years old insured by public or private coverage.	SAHIE	2007	Percentile Value	Percent Enrolled calculated with SAHIE data. Rank ordered then converted to a percentile
National Percentile of Percent of Population Insured by Medicare Disability	Percent of Census Population on Enrolled for Medicare Disability Coverage (Parts A and/or B)	CMS and Census Bureau	2007	Percentile Value	Percent Medicare Disability Enrollment calculated as percent of same-year Census population estimates. Rank ordered then converted to a percentile
National Percentile of Years of Potential Life Lost from Preventable Causes under 75 per 100,000 population (YPLL_75)	Calculated by source: premature deaths compared to standard population patterns	University of Wisconsin Population Health Institute. County Health Rankings	2005-2007	Percentile Value	Values in source data rank ordered then converted to a percentile
National Percentile of VA Utilization	Unique Patients in the VA system in reference to number of Veterans	Department of Veterans Affairs	2009	Percentile Value	Number of Individuals listed by Veterans Affairs living in county accessing VA health system as percent of Veterans living in county. Rank ordered then converted to a percentile

3.6.2 CHILDREN INSURED

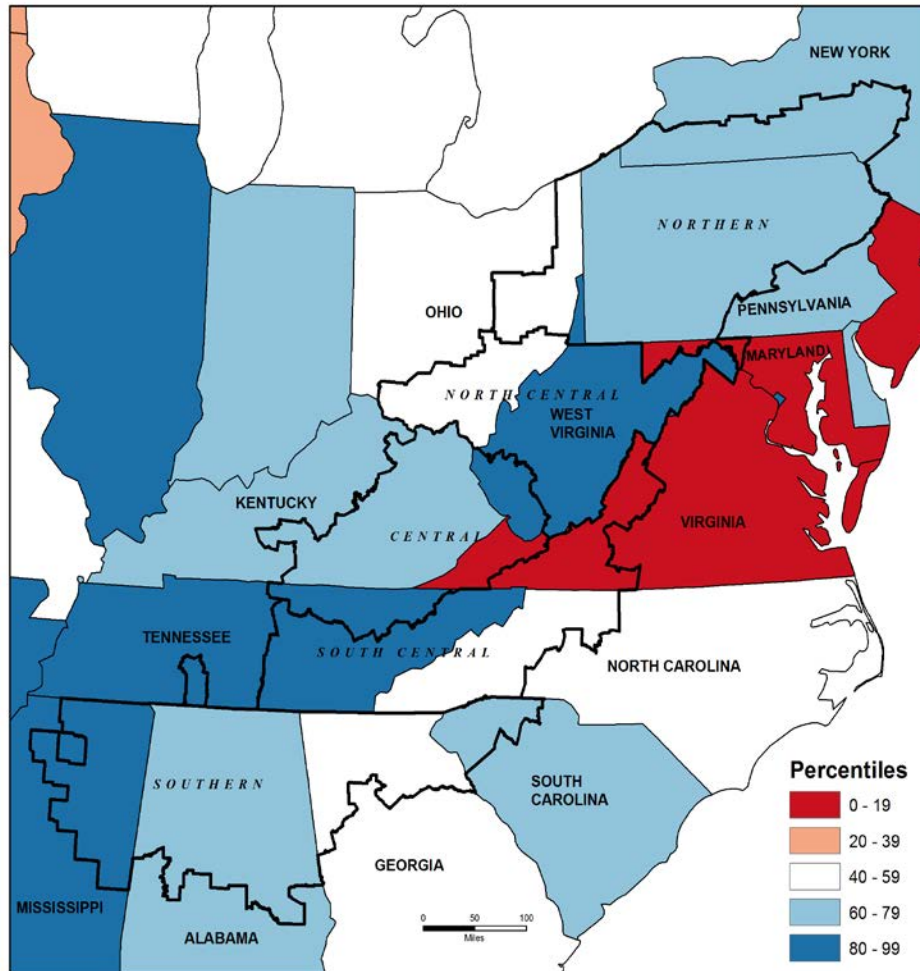
FIGURE 27 – COUNTY PERCENTILE OF CHILDREN UNDER 18 INSURED BY MEDICAID / CHIP IN THE U.S., 2009



Source: Children Enrollment in Medicaid/CHIP from Kaiser Family Foundation (KFF) in reference to total child population estimates from same source. Compiled by the Health Management Associates from state Medicaid enrollment reports for the Kaiser Commission on Medicaid and the Uninsured, 2011.

Prepared by: Cecil G. Sheps Center for Health Services Research. The University of North Carolina at Chapel Hill in cooperation with PDA, Inc., Raleigh, NC, 2011.

FIGURE 28 – COUNTY PERCENTILE RANK OF PERCENT CHILDREN UNDER 18 INSURED BY MEDICAID / CHILDREN’S HEALTH INSURANCE PROGRAM (CHIP) IN APPALACHIA, 2009



Source: Children Enrollment in Medicaid/CHIP from Kaiser Family Foundation (KFF) in reference to total child population estimates from same source. Compiled by the Health Management Associates from state Medicaid enrollment reports, for the Kaiser Commission on Medicaid and the Uninsured, 2011.

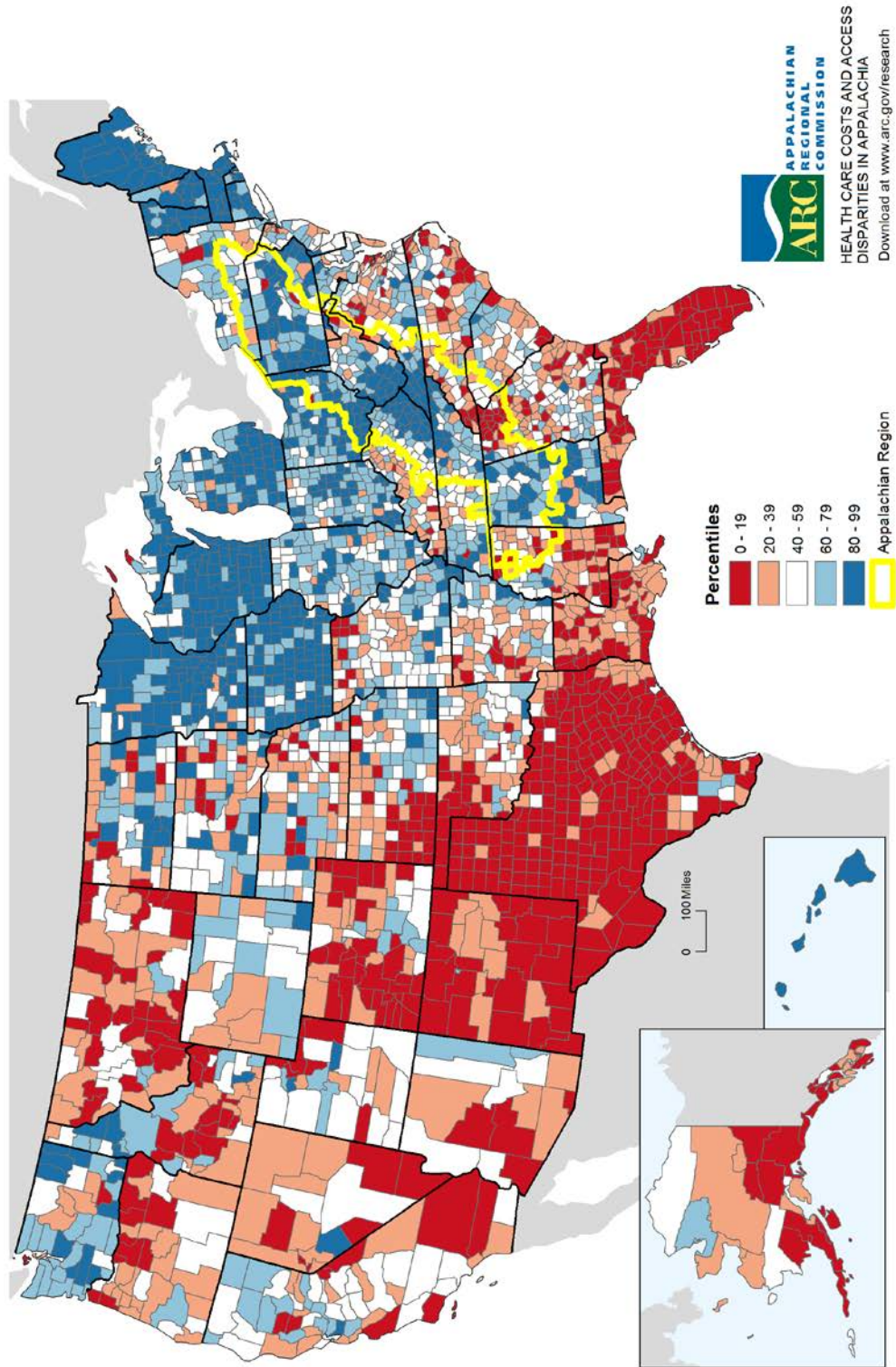
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Medicaid is funded by the state and federal governments, but, with the exception of minimum requirements, coverage and entitlement policies are set by the states. Most (ten of 13) Appalachian states rank at or above the national median in Medicaid coverage of children. An Appalachian map thus serves only to compare adjacent regions in the mountain area. It does highlight extreme differences for children in border areas, for example, where West Virginia, Kentucky and Virginia come together.

FIGURE 29 – COUNTY PERCENTILE OF CHILDREN UNDER 20 INSURED IN THE U.S., 2007

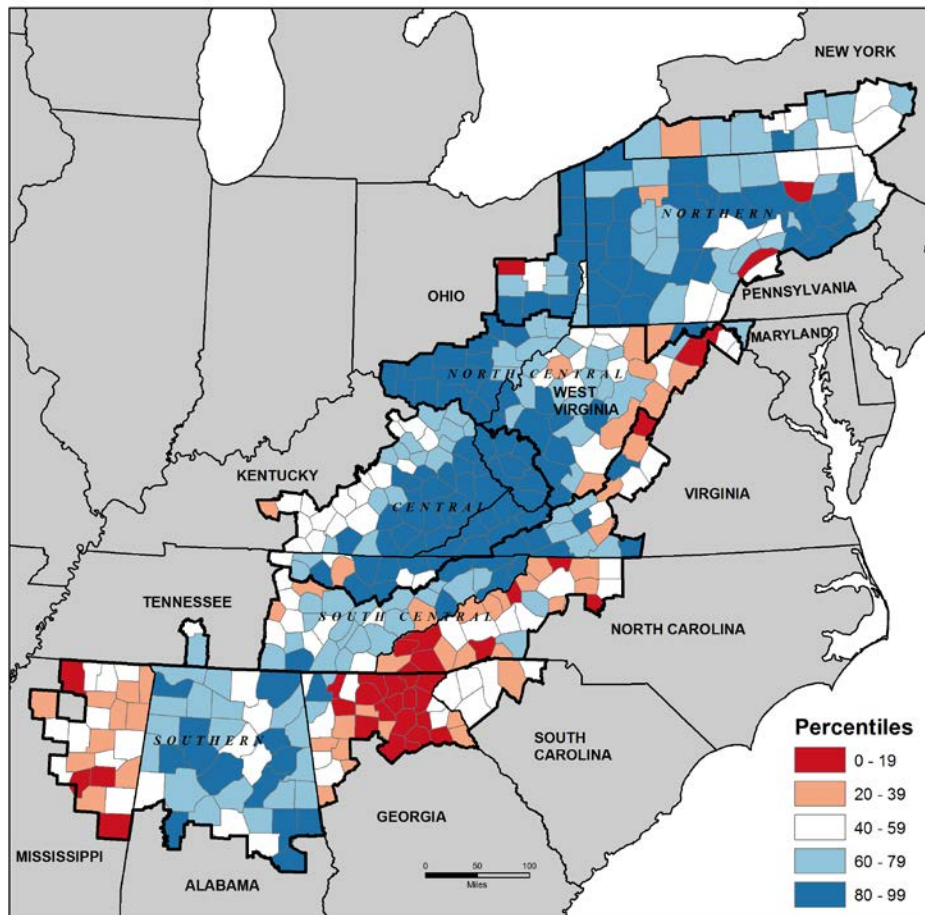
County Percentile Rank of Children under 20 Insured
in the United States, 2007



Source: See detail on the Children under 20 Insured in Appalachia map.

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FIGURE 30 - COUNTY PERCENTILE RANK OF PERCENT OF CHILDREN UNDER 20 INSURED IN APPALACHIA, 2009



Source: Percent of children 0-19 years old insured by public or private coverage in reference to total 0-19 population from same source. Small Area Health Insurance Estimates (SAHIE) for counties and States, 2007. Department of Commerce, U.S. Census Bureau. 2010

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The SAHIE data shed very favorable light on access to some form of health insurance coverage for children in most of the Appalachian Region. The index makes no distinction about the extent of coverage, only that some form of insurance exists. The Index is missing data for one county in Mississippi. Coverage gaps occur in every state, but more in Georgia, North Carolina and Mississippi parts of the Appalachian Region. Nationally, the most severe gaps occur in Florida, Louisiana, Texas, Arizona, southern California and the Dakotas. Much of this reflects the influence of non-citizens and migrant workers.

3.6.3 DISABILITY COVERAGE

FIGURE 31 - COUNTY MEDICARE DISABILITY ENROLLMENT IN THE U.S., 2007

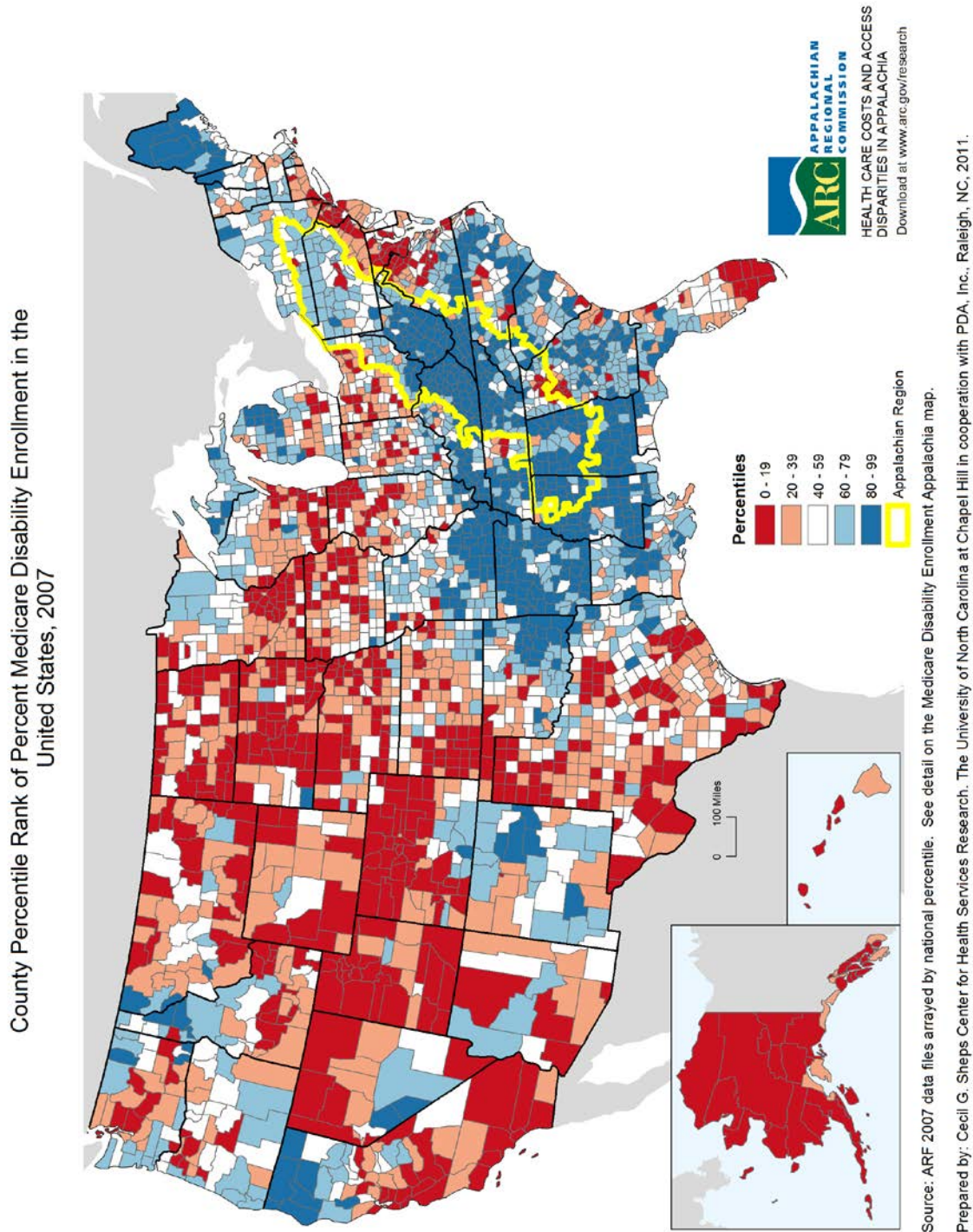
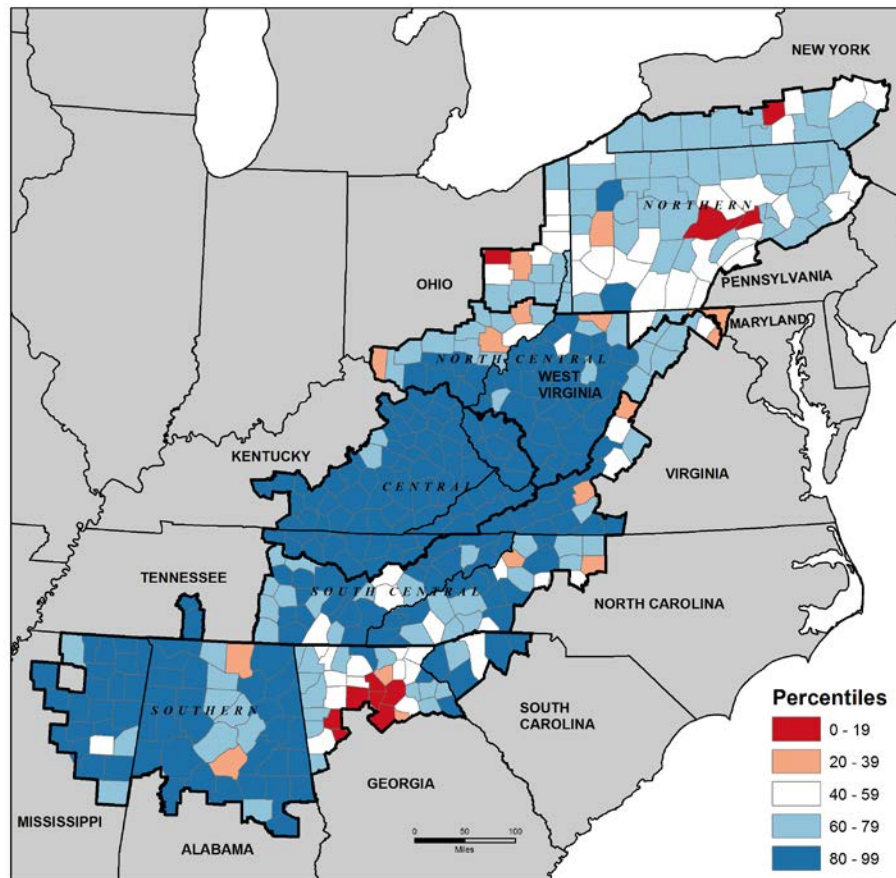


FIGURE 32 - COUNTY PERCENTILE RANK OF PERCENT MEDICARE DISABILITY ENROLLMENT IN APPALACHIA, 2007

Source: Percent Medicare Disability Enrollment calculated as percent of same-year census population estimates from the Area Resource File (ARF), Medicare Aged and Disabled by State and County 2007, Department of Health and Human Services, Center of Medicare & Medicaid Services (2010), ARF 2009-2010, Health Resources and Services Administration, Bureau of Health Professions, Office of Workforce Policy and Performance Management 2010.

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In addition to persons over 65, Medicare covers persons who are certified by the Social Security Administration as Disabled. Though counted in the HIC component, to the extent they are under 65, they are examined here as a stand-alone group. In Appalachian counties, Disability enrollment ranged from 0.9 to 15.6 percent of the population, with the average at 4.7 percent. Generally speaking central and southern Appalachia and the Delta counties of Arkansas, Louisiana, Alabama and Georgia have the highest proportion of their populations on Medicare Disability. Counties in Central and Southern Appalachia are in the top quintile of U.S. counties in this regard. In Figures 31 and 32, the blue colors indicate high Medicare Disability enrollment in 2007. The high concentration of Medicare Disability coverage in central Appalachia has significant economic implications. The process of qualifying can take years. This naturally makes a person reluctant to lose the coverage. Yet, people with Medicare Disability coverage must remain unemployed to retain the coverage. The very safety net that provides health coverage and income security also discourages return to the workforce. This may partially explain the low labor force participation in counties with high Medicare Disability enrollment.

3.6.4 HEALTH OUTCOMES

FIGURE 33 – COUNTY YEARS OF PREVENTABLE POTENTIAL LIFE LOST UNDER AGE 75 IN THE U.S., 2007

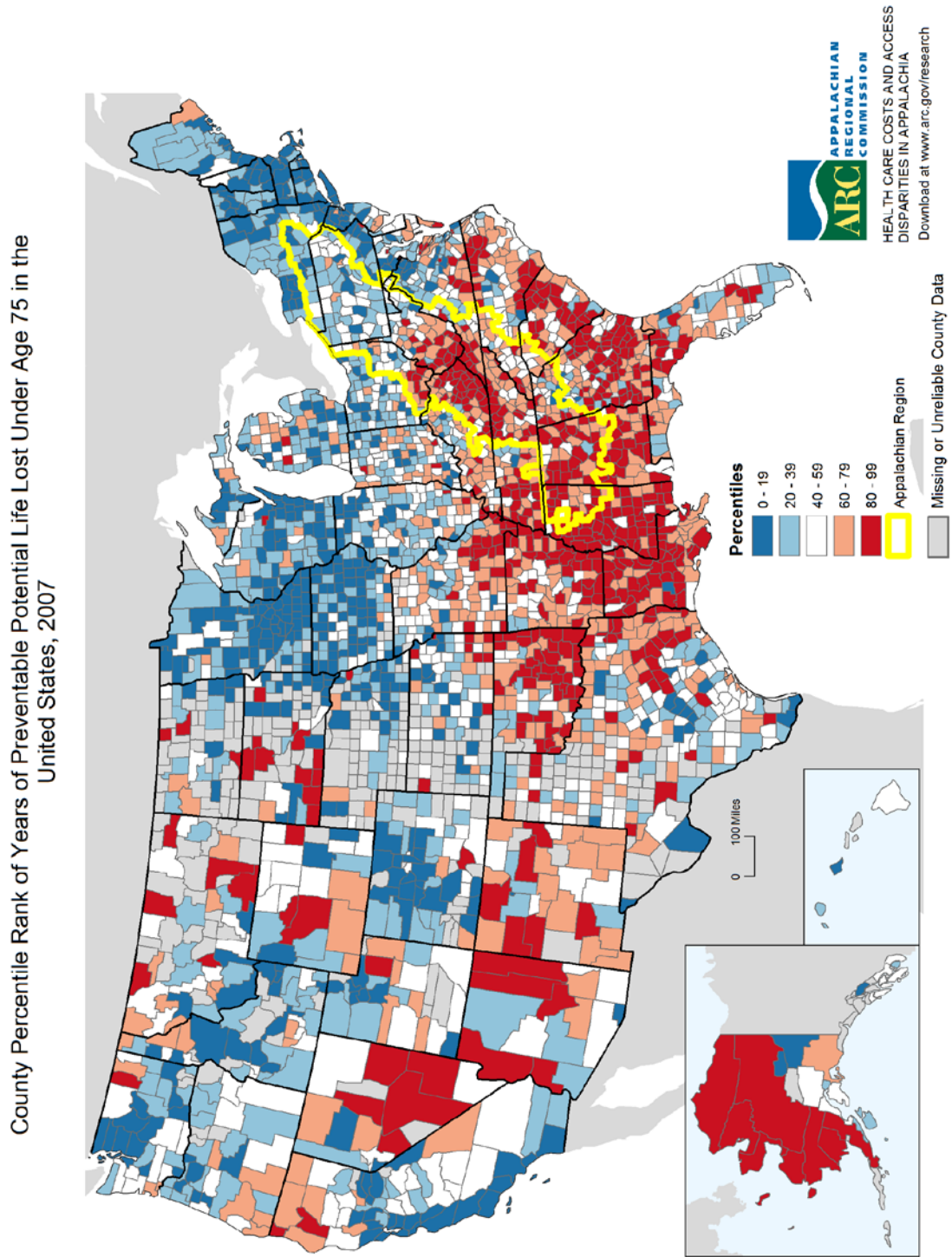
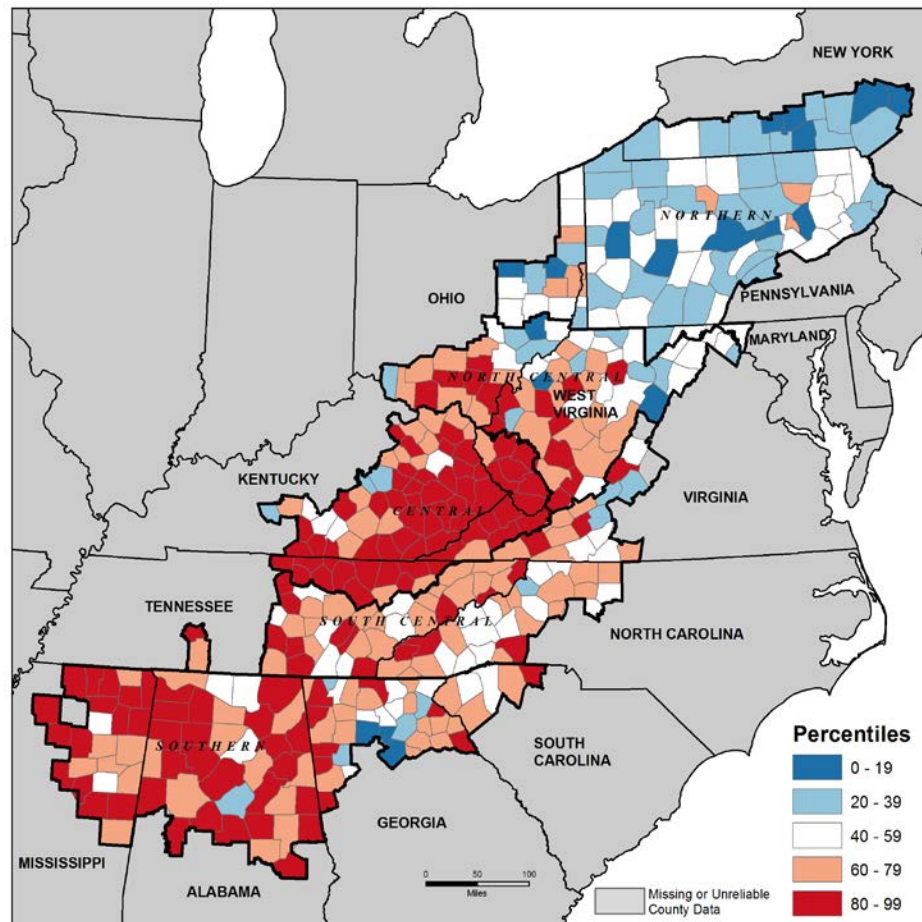


FIGURE 34 – COUNTY PERCENTILE RANK OF YEARS OF PREVENTABLE POTENTIAL LIFE LOST PER 100,000 POPULATION UNDER AGE 75 IN APPALACHIA, 2005-2007



Source: National Percentile of Years of Potential Life Lost per 100,000 population, 2005-2007, applies premature death (compared to standard population patterns) as a measure of local health status. Values in source data rank ordered and converted to a percentile. Source Data and further documentation available from University of Wisconsin Population Health Institute. County Health Rankings 2011.

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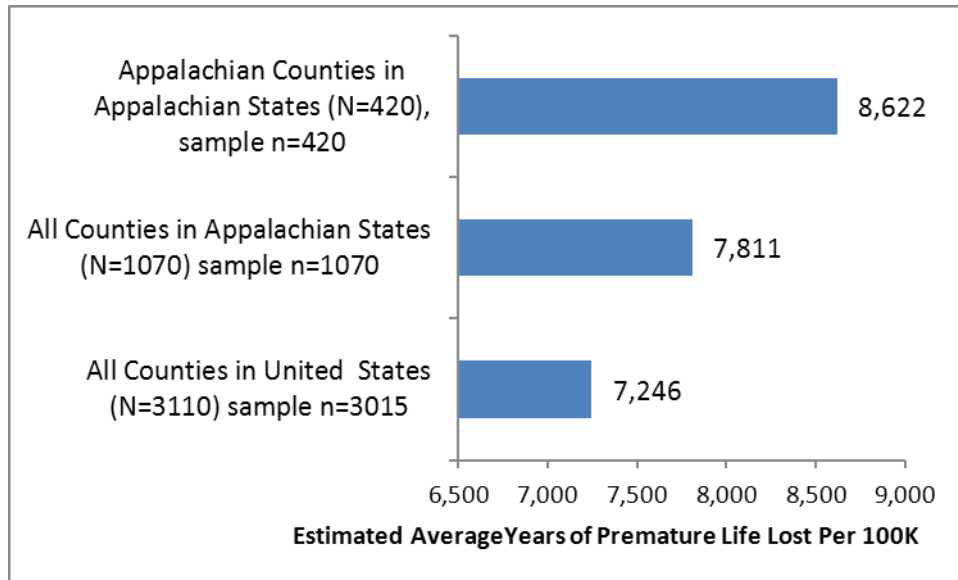


The health outcomes measure Years of Potential Life Lost from preventable causes, per 100,000 population under age 75. YPLL₇₅ is a standard used in public health to evaluate health outcomes. The YPLL index measures premature death at any age. These maps show that in Central Appalachia, the Delta and the south, people do not live as long as average Americans; northern Appalachians, the upper midwesterners and upper westerners live longer than average. Yet, these statements are not uniformly true. Every Appalachian state has at least a few counties at the national average. A few counties in central and southern Appalachia actually have longer than expected life spans relative to the nation as a whole (blue counties in Figure 34).

Figures 33 and 34 show areas in which the Appalachian Region might work in cooperation with other regional groups to address health status.

Wisconsin County Health Rankings publishes these by county, cautioning about aggregating them across states. Nevertheless, there is strong acceptance of the YPLL_75 estimates as a measure of health outcomes and their use is supported by the Wisconsin group in published reports and by the National Center for Health Statistics in their summaries and discussions. With caution, the project deconstructed and benchmarked rates for counties in the three comparison geographies. Rates for the Appalachian Region were about 19 percent higher than those for the U.S.

**FIGURE 35 – COMPARISON OF ESTIMATED PREVENTABLE MORTALITY IN 2005-2007
AVERAGE OF YEARS OF POTENTIAL LIFE LOST UNDER AGE 75 PER 100,000 POPULATION**



Source: University of Wisconsin County Health Rankings, Premature mortality for each county in the three geographies were estimated with the equation: County YPLL_75 / 100K x county population 2008 / 100,000. Mortality was summed for all counties and divided by the total population times 100,000

3.6.5 VETERANS HEALTH AFFAIRS UTILIZATION

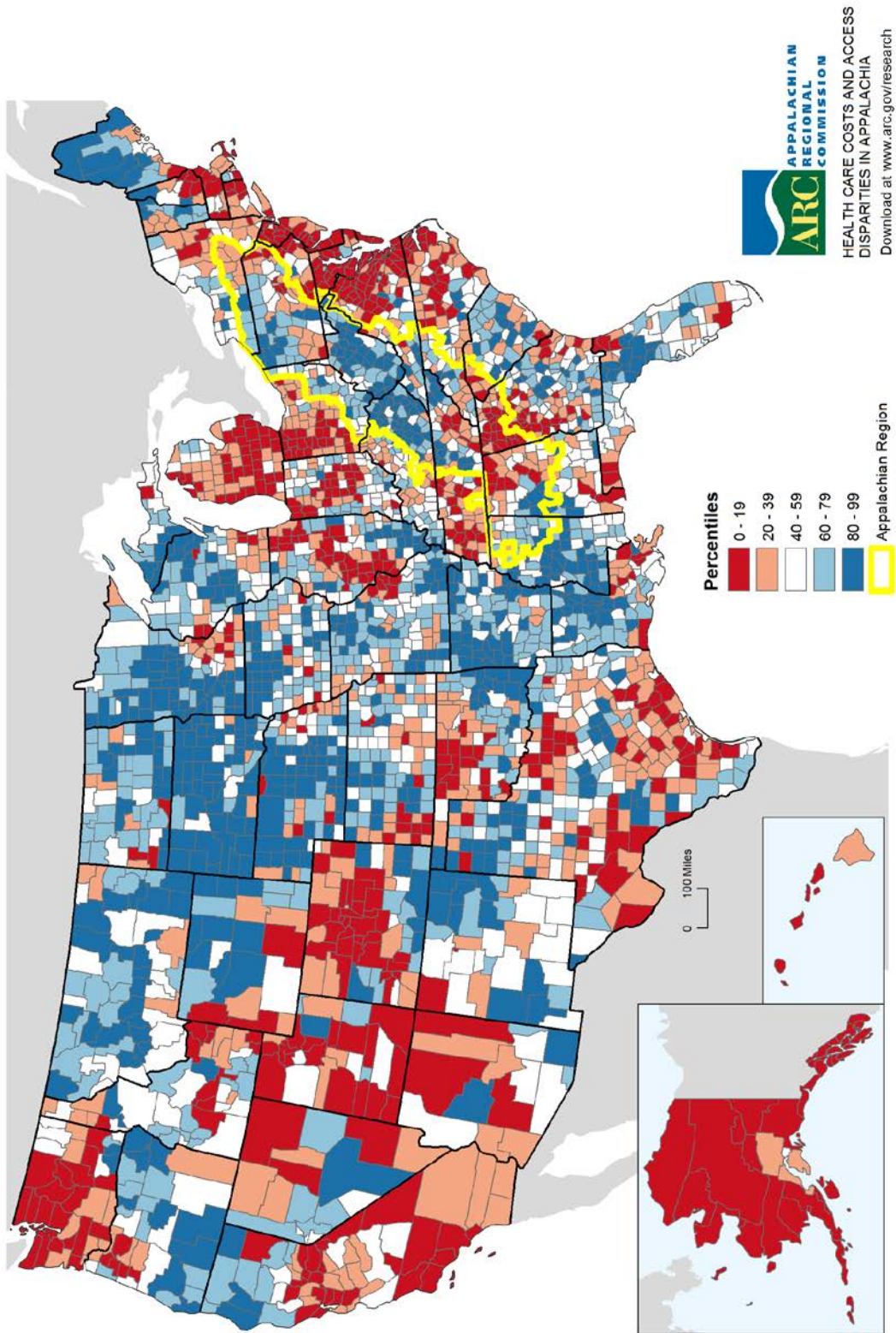
Veterans Health Administration (VHA) services are distributed nationally in 23 Veteran Integrated Services Networks (VISNs). They represent an element of healthcare cost, coverage, and access that is excluded from the HCCA.

Until the last decade, Veterans Administration healthcare resources were concentrated in VA hospitals, most of which were located adjacent or close to academic medical centers. A policy shift that began in the mid-nineties caused the VA to invest in outpatient facilities closer to where veterans live. Budgets and decisions are controlled at the VISN level. Veteran eligibility requirements are uniform throughout the country. A veteran may, however, elect to use private rather than VA services, if he/she has other coverage and choice.

Data and maps on the following pages illustrate the extent to which eligible veterans use this federally-subsidized healthcare system.

FIGURE 36 – COUNTY VETERAN USE OF VHA SERVICES IN THE U.S., 2009

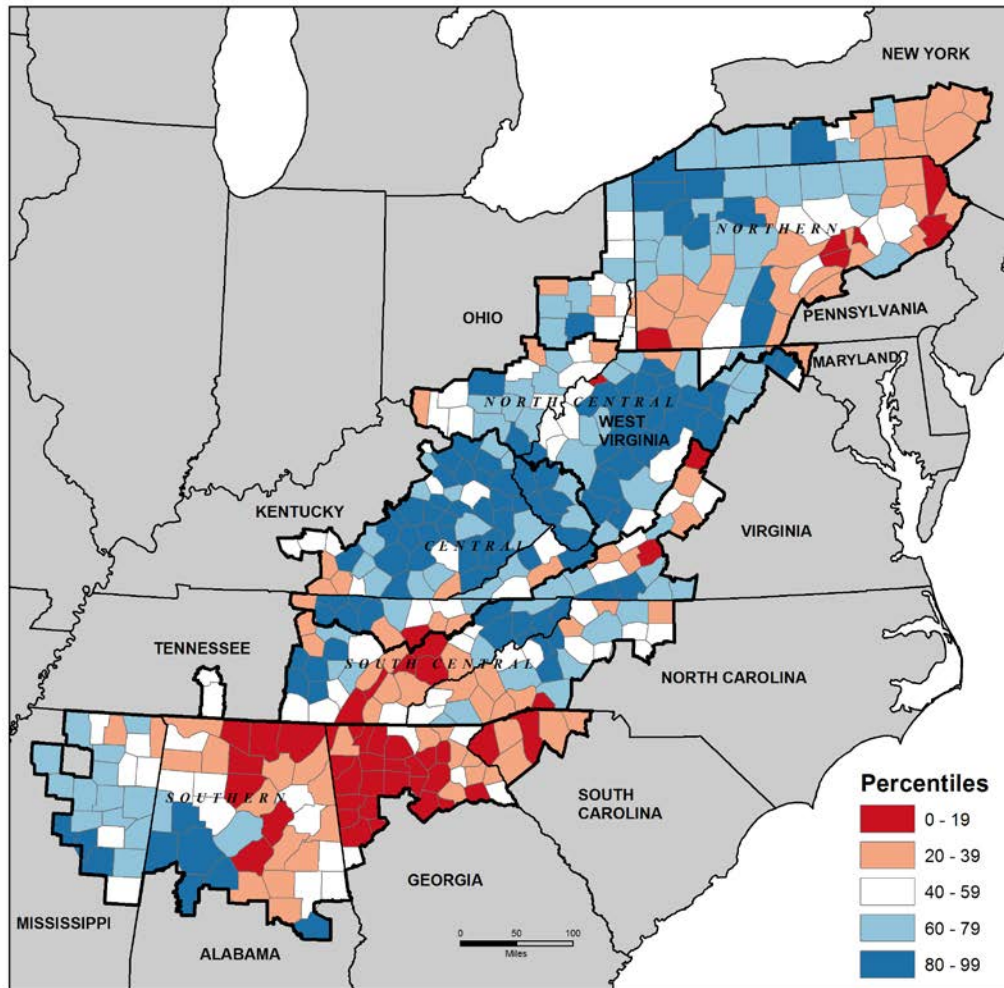
County Veteran Use of Veterans Health Administration Services in the United States, 2009



Source: VHA HERC database of unique veteran users divided by veteran eligibles arrayed by national percentile.

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FIGURE 37 – COUNTY VETERAN USE OF VETERANS HEALTH ADMINISTRATION (VHA) SERVICES IN APPALACHIA, 2009



Source: Percent National Percentile of Veterans Affairs (VA) Number of unique Veterans who used VA services as percent of Veterans living in county. Geographic Distribution of VA Expenditures 2009. Department of Veterans Affairs, 2010.

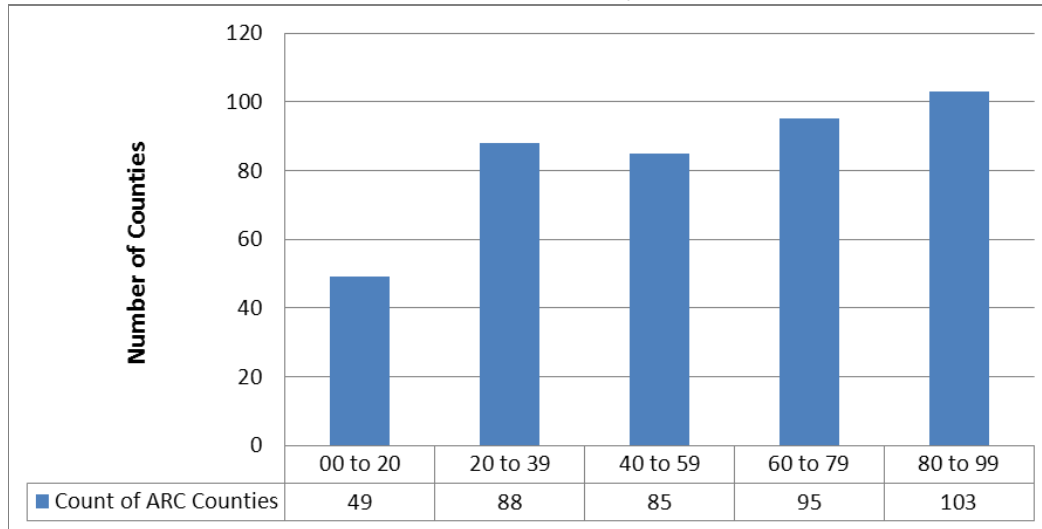
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In 2009, VHA users, as a proportion of eligible Veterans, were very high relative to the nation in central and northern Appalachia. Access in northeastern and southwestern Pennsylvania and the western counties of Appalachian New York is more like that in Alabama, Georgia, South Carolina and very west Tennessee. However, VHA use by veterans was relatively low.

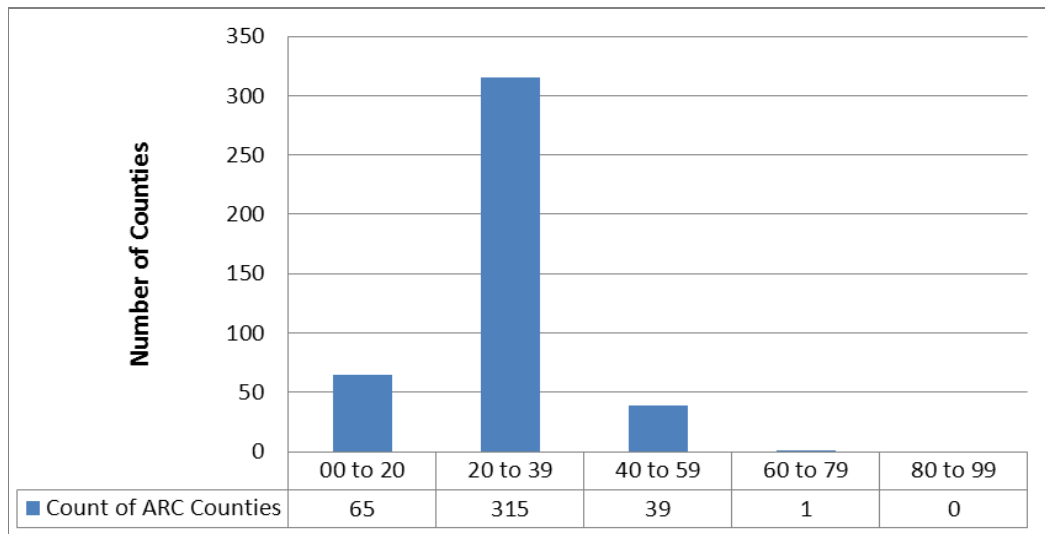
Nationally, 26.6 percent of eligible veterans used VHA services, in 2009. At the county level, VHA services were used by as few as 0.6 percent and as much as 95.7 percent of veterans. In the Appalachian Region, veteran use of VHA services, calculated as unique users per eligible veteran in 2009, was 28.2 percent, with a county high of 65.2 percent and a county low of 8.6 percent.

FIGURE 38 – PERCENTILE DISTRIBUTION OF UNIQUE USERS AS A PERCENTAGE OF VA ELIGIBLES, APPALACHIAN COUNTIES, 2009



Source data: VA Health Economics Resource Center Second Q, 2010

FIGURE 39 – UNIQUE USERS AS A PERCENTAGE OF VA ELIGIBLES, APPALACHIAN COUNTIES, 2009



Source data: VA Health Economics Resource Center Second Q, 2010

Appendix L contains state summaries for the Appalachian Region.

CHAPTER 4 CORRELATION OF HEALTHCARE COST, COVERAGE, AND ACCESS (HCCA) INDEX with HEALTH STATUS, ECONOMY AND PERSISTENT POVERTY

4.1 APPALACHIA

This chapter explores the relationship of economic disparity to the HCCA, and the relationship of both to the outcome measure, Years of Productive Life Lost under age 75 per 100,000 population. It also looks at the variation in HCCA when data are filtered for persistent poverty. As noted in Chapter 3, one or more of the health access components register low for counties in every Appalachian state. Although both Appalachian South Carolina and Appalachian Maryland rank average to above average on the HCCA, some Appalachian counties in both states rank below average on health insurance coverage (HIC). ARC counties that rank lowest on the HCCA concentrate in rural areas:

- Northern West Virginia
- Western Appalachian Kentucky
- Western-most Appalachian North Carolina
- Western Appalachian Tennessee
- Northern Georgia
- Appalachian Mississippi
- Appalachian Alabama outside the Birmingham metro area

In nine states, Appalachian counties fall below average on healthcare cost (HCC); and in four states, Maryland, North and South Carolina and Ohio, Appalachian counties fall in the average or higher percentiles on the HCC. This component describes the most dramatic of the disparities, and one that becomes self-perpetuating. Low payment limits provider capacity to pay wages, and low wages cause low payment rates.

Figure 14 in Chapter 3 shows the pervasive low wage rates from the CMS Geographic Wage Index in most of the Appalachian Region.

4.2 RURAL AND ECONOMICALLY DISTRESSED AREAS

Other parts of the U.S. have patterns similar to the Appalachian Region, or worse. Low health insurance coverage (HIC) in Texas, Louisiana and Florida are consistent with high concentrations of undocumented migrants in those states. Non-citizens rarely qualify for federal assistance programs. Lower HCC scores are primarily in the rural south.

The HCRA component indicates that basic health resources are distributed in a consistent pattern across the country. The HCRA component does not measure intensity of the resources. So, a small rural hospital in a small population county could score a percentile ranking as high as a tertiary medical center in a high population metropolitan county.

4.3 RELATIONSHIPS BETWEEN HEALTHCARE COST, COVERAGE, AND ACCESS (HCCA) INDEX AND COUNTY SOCIOECONOMICS

4.3.1. ANALYTIC APPROACH

In a first test of the extent to which the HCCA variance is explained by a county's economic and/ or health status, we examined the characteristics of the proposed HCCA Index by comparing its performance to three external characteristics that served as validating concepts:

1. Years of Potential Life Lost before age 75 due to preventable causes per 100,000 population (YPLL_75).
2. The ARC Economic Distress Index (ARC EDI), which served as a generalized proxy for the overall socio-economic status of a community.
3. Enrollment in Medicare Disability, because it is so pervasive in the Appalachian Region.

To accomplish this objective, we calculated correlation coefficients that describe the statistical relationships between the YPLL_75 rate, the ARC EDI, and our new composite index, HCCA. The logic we employed to assess the sturdiness of the HCCA Index is as follows.

- First, YPLL_75 rate represents a reasonable summary health measure that could be used to assess overall health status of a community.
- Second, we expect to observe a significant positive relationship between YPLL_75 rates and the ARC EDI. Such a finding would be consistent with the well-established positive relationship among community level socioeconomic factors, general health status, and lower premature mortality of populations. Such relationships have been observed consistently and repeatedly with county-level data in the United States.
- Third, we expect to see a positive relationship between the ARC EDI and the HCCA Index, as well as a positive relationship between the HCCA Index and the YPLL_75 rate.
- Because of the pervasive nature of disability in the Appalachian Region, we included in the correlation analysis a measure of the relationship of cost and access disability at the county level.
- Finally, we filtered the HCCA, the ARC EDI and the YPLL_75 rate for persistent poverty to determine the extent to which that factor explained variations.

Details of the construction and mathematical transformations of these indices are described in Appendix M and summarized below. We employed multivariate linear regression to describe the combined effects on community health status of ARC EDI, persistent poverty, the HCCA Index, and designation as an Appalachian county.

4.3.2 CORRELATIONS OF HEALTHCARE COST, COVERAGE, AND ACCESS (HCCA) INDEX AND ITS COMPONENTS WITH YPLL_75, THE ARC ECONOMIC DISTRESS INDEX, AND PREVALENCE OF DISABILITY

Tables 19 through Table 21 display the key variables in this analysis. Means and standard deviations are displayed in the first column, while the pattern of relationships between the variables is displayed in the form of correlation coefficients in subsequent columns. These three tables have the same format, but describe different sets of counties. Table 19 describes all counties in the United States; Table 20 describes all 1,070 counties in the 13 Appalachian states; and Table 21 describes the 420 counties within the ARC region.

In these tables, Years of Preventable Life Lost under age 75 per 100,000 population, as a result of preventable causes, ratio of Medicare Disabled in the population and the ARC Economic Development Index, are tested for correlation with one another and with the new HCCA Index and its three components. All data are centered on the year 2007. All variables have been scaled so that higher values whether numerical, percentiles or ranks represent less desirable situations. Most of the correlations are significant. For ease of reading, we have used blue shading to highlight correlation values above 0.25.

The health insurance coverage (HIC) component is the least correlated in all three geographies. The healthcare cost (HCC) component also behaves independently of health insurance coverage (HIC) in these geographies.

We chose YPLL_75, which was obtained from Wisconsin's County Health Rankings, to represent a reasonable summary global health measure that could be used to assess overall health status and preventable premature mortality of a community. The first two measures of community health transformed the YPLL_75 in two distinct ways. First, the quantity was ranked and converted to a percentile in such a way that a lower percentile would reflect less premature mortality. This transformation enables the reader to understand where a given county would rank in terms of its premature mortality experience when compared with all the other counties in the nation. However, in order to statistically examine the relationships between health status and the ARC Economic Distress Index (ARC EDI), as well as our proposed index and its components, we also performed another mathematical transformation on the YPLL_75 rate. Because values of these data were highly skewed, we transformed the variable by taking the natural logarithm. Further, we rescaled this value by multiplying it by 100,000, so that the regression coefficients would be more easily interpreted. Details of these transformations are in Appendix M.

A third measure of health status, disability, is included in the tables for comparative purposes. This measure consists of the ratio of the number of disabled persons on Medicare to the estimated population for the same year (2007). The next column contains the correlation to the individually ranked ARC EDI, in which higher values represented better status. The remaining four columns contain the correlations for the summary HCCA index and its three components. All four health index measures are treated as percentiles. For purposes of making values in this regression analysis consistent, HCCA and component percentiles were re-ordered, such that lower values reflect more favorable conditions and higher values reflect less desirable situations.

In Table 19, the national county average and standard deviations of the counties ranked on the ARC EDI are consistent with what would be expected in a national ranking, in the range of 1500. Similarly, the average YPLL_75 rate percentile, the HCCA, and its three component indices typically average around 50, with a standard deviation around 29. These values are consistent with expectations, given the mathematical transformations performed on the data. Not surprisingly, comparative examination of the values for the ARC states (Table 20) and ARC counties (Table 21) suggest that these counties have poorer health status and more distressed economic conditions than U.S. counties as a whole. The percentile of YPLL_75 rate in ARC

counties is 63.9, well above the national mean ranking. Similarly, the disability index in Appalachian counties (76.2) reflects the fact that the typical Appalachian county has a relatively high proportion of its population on Medicare Disability. The composite HCCA Index in Appalachian counties also suggests that ARC counties face a somewhat more challenging healthcare access situation than U.S. counties as a whole.

In the aggregate, healthcare resource availability (HCRA) in ARC states and counties is comparable to U.S. counties, at 51.3, and health insurance coverage is also comparable (48.1 percentile), due in part to extensive Medicaid coverage. However, ARC counties experience a widespread pattern of lower insurance reimbursement, the healthcare cost (HCC) component. At the value 69.1, the HCC is markedly below the average of all U.S. counties.

An examination of the relationships between these various indices reveals the expected positive inter-relationship between the community health status variables (YPLL_75), the ARC_EDI, and our proposed HCCA Index and its components. However, the individual components of the HCCA, especially measures of health insurance coverage (HIC) and levels of reimbursement HCC, do not always exhibit consistent patterns of correlation with each other or with measures of community health status.

Key to abbreviations in Tables 19 to 21

- YPLL_75: Years of Potential Life Lost under age 75 per 100,000 Population, averaged over 2005-2007 and expressed as a percentile
- Disabled: Ratio of Disabled (on Medicare SMI and HI) to Total Population in 2007, expressed as a percentile
- ARC_EDI: ARC Economic Distress Index Value Rank (1 = Best; 3,110 = Worst)
- HCCA: Healthcare Cost, Coverage and Access Index, expressed as a percentile (1 = Best; 100 = Worst)
- HCRA: Health Care Resource Availability, component expressed as a percentile (1 = Best; 100 = Worst)
- HIC: Health Insurance Coverage, component expressed as a percentile (1 = Best; 100 = Worst)
- HCC: Health Care Cost, component expressed as a percentile (1 = Best; 100 = worst)

TABLE 19 - CORRELATIONS BETWEEN MEASURES OF HEALTH STATUS, ECONOMIC DISTRESS, AND PROPOSED HCCA AND ITS COMPONENTS, FOR ALL COUNTIES IN THE U.S. (N=3110 COUNTIES)*

Variable	Mean (std. dev.)	Community Health Status		Economic Distress	Proposed Index and components			
		YPLL_75	Disabled	EDI	HCCA	HCRA	HIC	HCC
YPLL_75	49.5 (28.9)	1.000	.669	.669	.490	.288	.284	.465
Disabled	50.5 (28.9)		1.000	.672	.275	.183	-.031 ^{NS}	.426
EDI	1552.0 (895.9)			1.000	.487	.360	.257	.424
HCCA	50.5 (28.9)				1.000	.710	.702	.703
HCRA	50.5 (28.9)					1.000	.264	.254
HIC	50.5 (28.9)						1.000	.244
HCC	50.5 (28.9)							1.000

*Numbers of counties employed in above correlations range from 3008 to 3110, depending on availability of YPLL_75 estimates for the counties. Estimates for YPLL_75 were missing in 95 cases, and judged to be unreliable in an additional 196 cases. All correlations are significant at the $p < .01$ level, except for those marked "NS"

TABLE 20 - CORRELATIONS BETWEEN MEASURES OF HEALTH STATUS, ECONOMIC DISTRESS, AND PROPOSED HCCA INDEX AND ITS COMPONENTS, FOR ALL COUNTIES IN THE 13 APPALACHIAN STATES (N=1070 COUNTIES)*

Variable	Mean (std. dev.)	Community Health Status		Economic Distress	Proposed Index and components			
		YPLL_75	Disabled	EDI	HCCA	HCRA	HIC	HCC
YPLL_75	60.74 (26.8)	1.000	.755	.735	.487	.301	.188	.492
Disabled	65.9 (26.4)		1.000	.785	.515	.308	.088	.619
EDI	1842.7 (880.1)			1.000	.611	.394	.223	.612
HCCA	53.9 26.9				1.000	.731	.635	.688
HCRA	51.3 (29.5)					1.000	.262	.193
HIC	48.1 (23.1)						1.000	.190
HCC	59.5 (28.8)							1.000

*Number of counties employed in above correlations is 1070. Only 10 counties in ARC states were judged to have unreliable estimates of YPLL_75. All correlations are significant at the $p < .01$ level.

TABLE 21 - CORRELATIONS BETWEEN MEASURES OF HEALTH STATUS, ECONOMIC DISTRESS, AND PROPOSED HCCA INDEX AND ITS COMPONENTS, FOR ALL COUNTIES IN THE APPALACHIAN REGION (N=420COUNTIES)*

Variable	Mean (std. dev.)	Community Health Status		Economic Distress	Proposed Index and components			
		YPLL_75	Disabled	EDI	HCCA	HCRA	HIC	HCC
YPLL_75	63.9 (21.0)	1.000	.728	.560	.301	-.209	-.040 _{NS}	.368
Disabled	76.2 (21.0)		1.000	.688	.337	.203	-.140	-0.548
EDI	2035 (730.3)			1.000	.503	.359	-.032 ^{NS}	.534
HCCA	57.1 (28.7)				1.000	.713	.598	.564
HCRA	51.9 (23.4)					1.000	.172	.072 ^{NS}
HIC	44.9 (23.4)						1.000	.036 ^{NS}
HCC	69.1 (24.3)							1.000

*Number of counties employed in above correlations is 420. Only 3 counties within the ARC region were judged to have unreliable estimates of YPLL_75. All correlations are significant at the $p < .01$ level, except for those marked "NS"

4.3.3 CONTROLLING FOR THE ECONOMIC DISTRESS INDEX

We tested the hypothesis that the HCCA and its components have a direct, independent relationship to the rate of premature mortality (YPLL_75). Multiple regression models were employed to examine the joint relationships of YPLL_75 rates with the socio-economic variable (ARC_EDI), as well as health system variables reflected by the new HCCA index. In addition, at the national level, we included a variable reflecting whether or not a county was in the ARC region. Appendix M contains these results for all counties in the nation, the 13 Appalachian states and the Appalachian Region. In all three analyses, the socioeconomic status of counties, as reflected in the ARC_EDI, seems to have a substantial relationship to premature mortality rates. However, at the national level, the HCCA Index exhibits an independent relationship to premature mortality rates, as well.

Relationships between the HCCA, ARC_EDI and the YPLL_75 rates are significant nationally, but not in Appalachian states or counties. This suggests that something other than economic distress could be affecting the Appalachian states' premature mortality rates. Further, Appalachian counties' rates of premature mortality (YPLL_75) were higher than would be predicted on the basis of their scores on ARC_EDI and HCCA alone, suggesting that there may also be an unmeasured factor at work in counties located in the Appalachian Region, over and beyond the combined impact of socioeconomic status and health system characteristics. All of these relationships were highly statistically significant ($p < .001$) at the national level. Please see Appendix M, Tables 45 through 47, for the complete statistical analysis and commentary.

4.3.4 TESTING THE RELATIONSHIPS OF COMPONENTS OF HEALTHCARE COST, COVERAGE, AND ACCESS (HCCA) INDEX TO HEALTH STATUS AND ECONOMIC DISTRESS

Tables 48 through 50 in Appendix M show linear regressions of the components of the HCCA and the ARC_EDDI against YPLL_75 rates for United States, Appalachian states and Appalachian counties. Blue shading shows highly significant relationships.

The county ARC_EDDI has the strongest relationship with premature mortality rates of any of the variables in the equations at all levels: United States, Appalachian states and Appalachian Region. Even though the healthcare resource component (HCRA) has a relatively high correlation with county health status (YPLL_75 rate), HCRA has little relationship to county YPLL_75 rates, once the ARC_EDDI has been statistically controlled. This is true at the national, Appalachian state and Appalachian Region levels. The other two components of the HCCA index have complex relationships with health status depending on the geographic focus of the analysis:

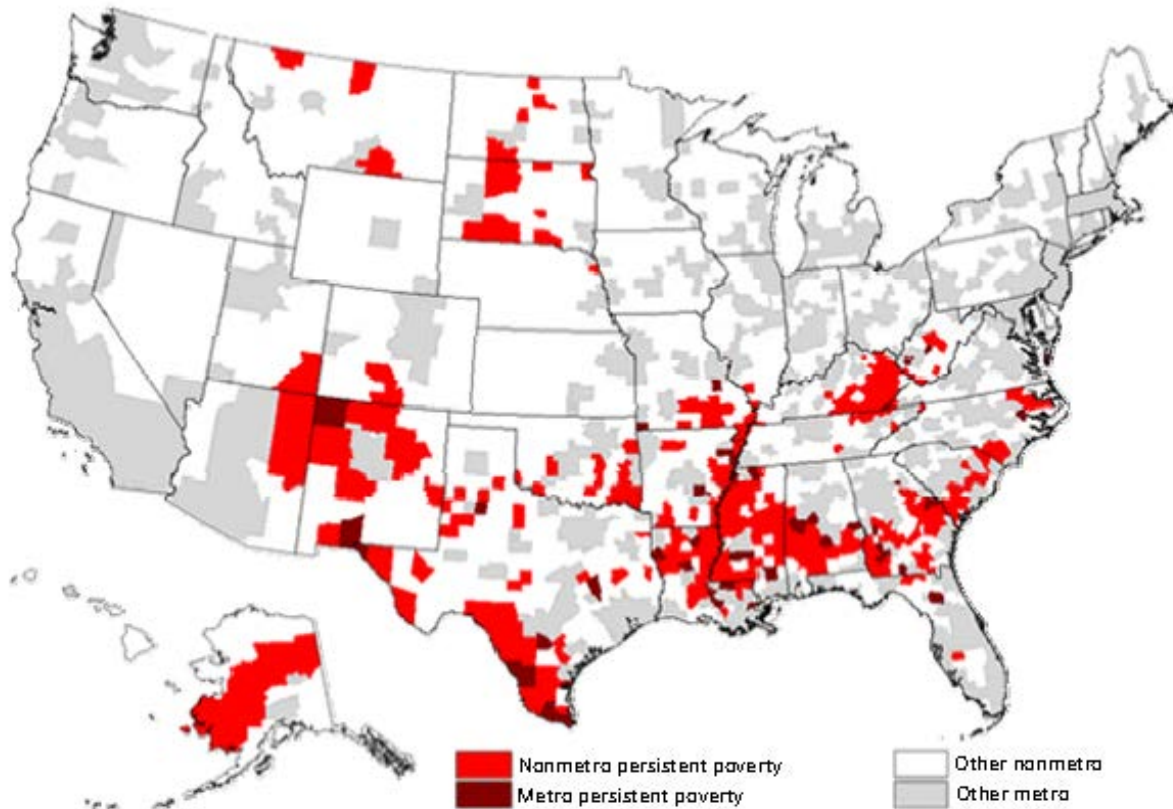
- At the national level, with ARC_EDDI controlled, less health insurance coverage and lower reimbursements continue to be significantly correlated with health status. Similarly, being an ARC county has a small, but still statistically significant, relationship with poorer YPLL_75 rate, the measure of health status ($p < .05$). Please see Table 48 in Appendix M.
- At the 13-state level, with ARC_EDDI controlled, less health insurance coverage is not related to health status, but lower reimbursements continue to be significantly correlated with poorer health status. Similarly, being an ARC county has a statistically significant relationship with health status ($p < .001$). Please see Table 49 in Appendix M.
- When examining only the Appalachian counties, with ARC_EDDI controlled, more health insurance coverage and lower payments for health services are associated with poorer health status, but these relationships do not achieve the same level of statistical significance (i.e., $p < .05$). This phenomenon may be related to intersection of a relatively high proportion of insurance coverage consisting of Medicaid and Medicare Disability, along with a relatively low level of reimbursement to providers by these programs in Appalachian counties. Please see Table 50 in Appendix M.

4.3.5 CONTROLLING FOR PERSISTENT POVERTY

The U.S. Department of Agriculture tracks persistent poverty in non-metropolitan counties. Among the list of 388 counties, those in the Appalachian Region are predominantly in Kentucky, West Virginia and Mississippi. A few are in Tennessee and Alabama. The pattern in Figure 40 shows some relationship between persistent poverty designation and a county's HCCA's, but the relationship is not consistent. In the Appalachian Region, eastern Kentucky and Mississippi counties that have high persistent poverty also rank low on the HCCA and high on YPLL_75 rates.

Tables 51 through 56, in Appendix M, explore the extent to which a filter for persistent poverty explains the variations in HCCA and YPLL_75 rates, nationally and in the Appalachian Region. A test of the hypothesis that persistent poverty is highly correlated with the HCCA showed less relationship between the HCCA and persistent poverty than between the ARC Economic Distress Index and HCCA.

FIGURE 40 – PERSISTENT POVERTY COUNTIES, 1970-2000



Persistent poverty counties - 20 percent or more residents were poor as measured by each of the last four censuses, 1970, 1980, 1990 and 2000.

Source: Economic Research Service, USDA. (<http://www.ers.usda.gov/briefing/rurality/typology/maps/poverty.htm>)

- In general, these six models do not explain as much variance in health status as do the corresponding models involving the ARC_EDI. Not surprisingly, persistent poverty is a consistent predictor of poor health status in all six models, whether using the combined HCCA index or the separate components of the combined index.
- The HCCA index is consistently statistically significantly related to health status at the national, 13-state and ARC region (Table 51, Table 52 and Table 53 in Appendix M).
- Further, when all three components of the HCCA index are put in the equation as individual variables, their relationships to health status are significant at the national level, as is designation as an ARC county (Table 54 in Appendix M).
- The situation is less clear at the 13-state level where resources (HCRA) and cost (HCC) are related to health status, but coverage (HIC) is not (Table 55 in Appendix M).
- Finally, at the Appalachian Region level, all three components of the HCCA index are significantly related to health status, with higher levels of health insurance coverage being associated with poorer health status (Table 56 in Appendix M), as was the case in the national comparison (Table 54 in Appendix M). Though counter intuitive, this may reflect national policy that provides coverage for poor, aged and disabled persons.

4.4 SUMMARY OF STATISTICAL CORRELATIONS: ACCESS AND HEALTH STATUS

In summary, the proposed Healthcare Cost, Coverage and Access Index (HCCA) performs reasonably well in explaining variation in a surrogate indicator of community health status, preventable premature mortality rates. Furthermore, the HCCA is associated with overall community economic status and with preventable premature mortality rates in the expected positive manner.

We tested the hypothesis that there would be a positive relationship between the HCCA and preventable mortality, after we controlled for the relationship of economic distress to premature mortality rates. A multivariate linear regression statistical model of the relationship between the HCCA and preventable premature mortality showed a positive statistical relationship between premature mortality rates and socioeconomic status of counties, as reflected in the ARC_EDI. However, our proposed HCCA index also exhibited an independent relationship to premature mortality rates. Further, rates of premature mortality in Appalachian counties exceeded what would be predicted on the basis of their combined predicted scores on ARC_EDI and HCCA alone ($p < .01$). This suggests that factors other than socioeconomic status and healthcare cost, coverage and access are related to premature mortality.

Although the HCCA did not perform as well as a predictor of YPLL_75 rates at the regional level, where sample sizes were smaller, we can conclude the proposed HCCA Index is a useful measure for comparing the performance of community healthcare systems in Appalachian counties in relation to national patterns of healthcare.

ARC Economic Distress (ARC_EDI) status and persistent poverty scores are so highly correlated that either one swamps the relationship with the other, a problem of multi-co linearity. However, a comparison of the scatter plots at the national level shows that the ARC_EDI status is a better predictor of poor health outcomes than is persistent poverty. Scatter plots and supporting statistics are contained in Appendix M of this report.

In the regression analysis, the insurance coverage component, HIC, had no significant relationship to preventable mortality rates and had a weak relationship to the resource component, HCRA. Contextually, this suggests that health reform initiatives to increase the number of people who have healthcare coverage may not result in improved health status. Without other complementary interventions, coverage costs may increase without an offsetting improvement in access or health outcomes.

CHAPTER 5 POLICY ISSUES FOR ARC

5.1 SUPPLY OF HEALTH CARE PROVIDERS

In the aggregate, supply of physicians and other healthcare providers in Appalachian counties resembles the national profile, skewing towards slightly fewer providers in Appalachian counties, but the skew is not statistically significant. Careful examination of the Health Care Resources Availability (HCRA) component maps in Figure 16 and Figure 17 show individual counties that are under-resourced in virtually every state. There are more central and southern Appalachian counties than northern Appalachian counties in the lower percentiles. Contributing factors are geographic and historical:

- Mountainous terrains impede physical access to existing health resources for routine care, and lack of year round passable roads in some areas make it difficult to sustain economic operations of healthcare facilities. Costs to maintain supplies are higher and patient use patterns vary significantly between seasons.⁴¹
- Dispersion of populations into numerous small isolated communities makes appropriate deployment of health personnel difficult. Some logical geographic service areas may be too small to sustain the presence of a practitioner.
- Historic location of hospitals and other facilities may not match current road networks, transportation patterns, and settlement patterns. Rural parts of the region and some urban communities are experiencing hospital closure and consolidation of healthcare providers as a result of this phenomenon and other delivery system nationwide changes. Change brings efficiency to the system, but often results in labor force reductions. Not infrequently, consolidations/closures are prompted when aging infrastructure requires more capital investment than the owners can afford.
- Healthcare providers increasingly rely on daily internet downloads; for example, pharmaceutical indicators and alerts, and evidence based medicine protocols for routine care delivery. Although the problem is gradually disappearing as the nation's wireless footprint expands, in rural and sparsely settled parts of the Appalachian Region, physical terrain or limited size of the market makes deployment of wireless technology and internet access difficult, spotty, and unreliable. Labor force will favor places with broadband access.

Healthcare professional and facility licensure is state regulated, and local barriers to entry still exist. License-related barriers are higher in dental than medical care, because national board certification makes physician, nurse, and mid-level and technologist licenses more portable. However, each state has different credentialing requirements. On top of that, individual facilities have entry limiting requirements. For example, more and more hospitals require board certification for membership on the medical staff.

Independent non-physician, non-dentist health practitioners can extend the reach of traditional professionals. Mid-level practitioners, like nurse midwives, nurse practitioners, physician assistants and dental hygienists are subject to state licensure jurisdiction and differ even between adjacent states. Scope of practice legislation defines what each practitioner can do. Restrictions apply to: capacity to work in a location where physicians are not present, extent to which they can work in a retail clinic, capacity to prescribe medications, ratio of

⁴¹ PDA unpublished data files.

practitioners to physicians or dentists, and other issues. Most of the independent practitioner clinics start out funded by grants and addressing care for underserved populations. An exception is the investor-funded retail clinic movement that is focused on a low-cost, limited scope service that is not covered by insurance. National pharmacy and food companies are encouraging growth of this model and working with states to remove barriers.

Generally, state-specific issues are not unique to the Appalachian Region. State-specific barriers include:

- Laws and/or traditional style of practice may unduly limit the scope of practice of physician extenders in primary care and specialty areas (e.g., physician assistants, nurse practitioners, certified nurse midwives, mental health practitioners, and dental hygienists). Some states limit these providers to working only in places where a licensed physician, psychiatrist or dentist is physically present.
- To control budgets, Medicaid and other insurance programs may discourage direct access to allied health professionals (e. g., physical therapy, occupational therapy), requiring physician visits for referral, thus lengthening treatment times, increasing cost of care and making it harder for patients to complete treatment regimens in the outpatient setting. Restricted access makes low population areas less attractive.

ARC led a national effort that produced Medicare and Medicaid and, eventually, private insurance payment for Rural Health Clinics. In 1977, the effort produced the Rural Health Clinics Act, PL 95-210. By 2011, there were 3,846 certified Rural Health Clinics.⁴² All are required to have a nurse practitioner, physician assistant, or certified nurse mid-wife at least 50 percent of the time the clinic is in operation. Moreover, new research is showing that primary care providers who follow the Rural Health Clinics model are reducing cost of healthcare while improving health of populations.

Unfortunately, other restrictions, like location in a “Health Professional Shortage Area “or “Medically Underserved Area,” as designated by HRSA regulations, has severely restricted development of new clinics. For example, a community that has a primary care provider may no longer qualify, even if the provider is located in a rural area with limited resources. This is contrary to ACA health reform directives that encourage an increase in primary care. In this context, with PL 95-210 in its fourth decade, ARC could serve the Appalachian Region and the country by encouraging HRSA to loosen geographic restraints on Rural Health Clinic designation.

5.2 HEALTH SYSTEM DESIGN

The HCRA component does not focus on design issues in the healthcare delivery system. The low correlation between the component and lost years of productive life suggests that system design flaws may exist. Some are national in scope, like the transaction-based payment system that rewards activity over outcomes. Some are regional, like the uneven distribution of vertically integrated, technologically connected healthcare delivery systems.

The latter is more opportunistic than geographic. For example, Geisinger Health System in rural Pennsylvania is nationally recognized for excellent, patient-focused integrated healthcare. Academic medical centers nationwide are struggling to make integration happen. Yet, Guthrie Clinic in Sayre, Pennsylvania, Appalachian Regional Hospital System in Kentucky and West Virginia, Cabin Creek Health Systems in West

⁴² Kaiser Family Foundation. www.statehealthfacts.org. Providers and Service Use. October 24, 2011.

Virginia, Carillion Health System in Virginia, Greenville Health System and Spartanburg Regional Medical Center in South Carolina, University of Alabama Birmingham and Baptist Medical Center, Birmingham, along with Northeast Mississippi Health System, Novant and Wake Forest Baptist University Health System in North Carolina and North Georgia Health District are some examples of highly developed excellent integrated healthcare delivery systems in the Appalachian Region.

The Appalachian Region has benefited from development of new medical schools, such as Marshall in West Virginia and Pikeville Osteopathic in Kentucky. The schools are attracting faculty and training local residents in the healthcare professions. Area Health Education Centers are also extending metropolitan medical schools into Appalachian counties in some states. Neither the HCCA nor its components measured technology, which is increasingly critical for integrated healthcare delivery system. Challenges for the healthcare professional supply and system design remain:

- The skill mix of health professionals in some communities may not match the emerging needs of the communities (e.g., migrant populations, aging population).
- Aging populations require increased volume of services and careful attention to an appropriate style of service delivery, e.g., geriatric specialists, interdisciplinary teams, education of and attention to the needs of family caregivers, and a focus on risks and opportunities occurring during transitions in site of care.
- Dispersed extended families make it difficult for kin to provide long term care services and supports to elders at home, thus increasing the cost of care for older residents who, in turn, endure otherwise preventable institutionalization.
- Quality of long term care facilities like skilled and domiciliary care varies from state to state and community to community.
- Some states may be having difficulty meeting their Olmsted obligations to care for disabled in least restrictive settings because of lack of well-designed community alternatives.
- Mental health services are a challenge in every state, because payment for services is restricted by public and private payers.

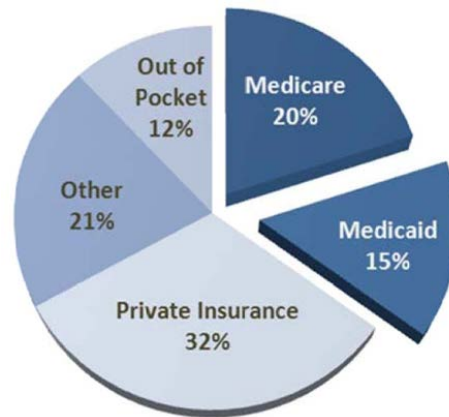
5.3 HEALTH CARE COST ISSUES

Cost to provide healthcare is often distantly related to what the consumer pays. The consumer cost, includes the cost of return on investment to providers and often an additional offset to cover unpaid mandates for free care and costs that are not reimbursed by insurers or government. Full charge can be significantly more than what an insurer “allows.” Third party purchasers, like insurance companies and government (Medicare, Medicaid, TriCare, VA, etc.) negotiate or set “allowable” payment rates for a unit of service. Uninsured consumers are often charged full price, unless they qualify for a discount, or live in a jurisdiction that limits charges to self-paid consumers to the maximum paid by insurers. Recent Congressional hearings, new IRS reporting requirements for tax-exempt providers and press coverage have resulted in more hospitals offering discount programs or matching self-paid with insurer rates. However, each provider can and does establish a unique charge structure and payment policy. The difference between full charge and paid charges was, at one time, reported on healthcare provider financial statements as “bad debt,” “charity,” or “contractual adjustment.” Increasingly they are appearing as “charity care.”

According to CMS 2009 National Health Care Expenditures report, consumers’ direct purchases represent only 12 percent of the amount spent on U.S. healthcare. Together, Medicare and Medicaid paid just slightly more than private insurance (35 versus 32 percent). Other sources, government and other grants for operations

and research made up the remaining 21 percent of expenditures. When these are reassembled, the CMS report highlights the role of the local economy in decisions about healthcare spending. Together, out-of-pocket and private insurance represented 44 percent of expenditures. In some states, the state part of Medicaid is shared between the state and local counties. In those states, with the Medicaid included, local economic capacity can affect up to 59 percent (44 plus 15) of health care expenditures.

FIGURE 41 – 2009 NATIONAL HEALTHCARE EXPENDITURES



Source: CMS.gov NHE Fact sheet 2009

In fact, when an out-of-pocket expenditure like a copayment or deductible is required first, tolerance for out-of-pocket payments can control expenditures by the Medicare and Private Insurance sectors. To limit expenditures, all third parties, including state Medicaid programs, are adding these consumer-driven controls. Hence, out-of-pocket cost will play an increasingly larger role in total healthcare expenditures.

Nationally, CMS reports that increases in expenditures for healthcare decelerated to 4.0 percent in 2009, but the amount still represented \$8,086 per person or 17.6 percent of the national Gross Domestic Product.⁴³ The recession was in full play at that time, but many unemployed were still covered by safety net programs, like COBRA and Unemployment Insurance. Data for 2010 and 2011, when available, may show further deceleration. COBRA is a provision in the 1985 Budget Reconciliation Act, that lets employees purchase health insurance benefits from prior employers at cost.

⁴³ National Health Expenditure Fact Sheet. CMS website https://www.cms.gov/NationalHealthExpendData/25_NHE_Fact_Sheet.asp#TopOfPage. Accessed October 13, 2011.

5.4. COST-ACCESS RELATIONSHIP

Health expenditures absorb approximately 20 percent of median personal income in the United States. Personal health expenditures were \$8,086 in 2009 and median personal income was \$40,584 in 2010⁴⁴. In the Appalachian states, the median income was closer to \$34,000, moving the health expenditures closer to one quarter of personal income. As costs escalate, consumers are forced to choose between healthcare and core needs for shelter and food; consequently, for those who choose healthcare, discretionary spending on education, culture and infrastructure fades.

The health policy journal, *Health Affairs*, dedicated its September 2011 issue to “The New Urgency to Lower Costs.” Writing in the issue, Auerbach and Kellerman note that, in the past decade, increases in healthcare costs have eliminated all of the gains in family income⁴⁵. They note that increased intensity of care during this time was associated with only a one-year increase in average life expectancy.

A recent Commonwealth Fund report on access to care for vulnerable populations⁴⁶, notes that insurance alone does not guarantee access to high-quality care. It further notes that healthcare delivery systems serving vulnerable populations are and will continue to be challenged to serve insured patients who cannot meet out-of-pocket costs. Presently, some hospitals can offset some of these costs with Medicare Disproportionate Share (DSH) payments. But these are not available to all hospitals and are restricted for rural hospitals. DSH payments are also scheduled to terminate under health reform. Health reform will use saved DSH funds to offset some of the federal share of reform cost increases. Some non-profit community health centers receive federal FQHC grants to cover charity care, but most clinics do not qualify for these funds.

The Commonwealth Fund report notes that low-income persons need more than the services traditionally covered by health insurance:

“Vulnerable patients may disproportionately benefit from greater clinical integration among providers and from a focus on team-based primary care and population-based strategies to improve health. The Affordable Care Act has several provisions to stimulate delivery system reform across the entire healthcare system, but further steps will likely be necessary.”

The health of low-income and minority populations is heavily dependent on resources outside the traditional healthcare system. These include not only services that enable them to fully access healthcare, such as transportation and language interpretation, but also environmental factors, such as access to healthy food, a safe home and workplace, and accessible places for exercise. In addition, traditional public health activities, such as infectious disease control and community vaccination programs, are often critical for the health of vulnerable populations.”

The wide differential in the CMS Geographic Wage Index, which is demonstrated by the HCC in Chapter 3, also makes certain geographies less attractive to healthcare providers. Without an incentive to compensate for the payment disparity, two graduates from the same health professional school with the same debt will rapidly separate with regard to lifetime earning potential, if one locates in a high HCC area and the other locates in an area with low HCC.

⁴⁴ US Census Bureau. The 2012 Statistical Abstract, Income, Expenditures, Poverty & Wealth, Table 681. Personal Income per Capita, http://www.census.gov/compendia/statab/cats/income_expenditures_poverty_wealth.html. Accessed October 14, 2011. Data were not estimated for 2009.

⁴⁵ Auerbach, David L. and Arthur L. Kellerman. “A Decade of Health Care Cost Growth has Wiped out Real Income Gains for an Average US Family”. *Health Affairs*, 30 (9) 2011, 1630-1636.

⁴⁶ Schorr, Edward L., M.D., Julia Berenson, M.Sc., Anthony Shih, M.D., M.P.H., Sara R. Collins, Ph.D., Cathy Schoen, M.S., Pamela Riley, M.D., M.P.H. and Cara Dermody. “Ensuring Equity: A Post-Reform Framework to Achieve High Performance Health Care for Vulnerable Populations” Commonwealth Fund Report, October 7, 2011.

Areas with high concentrations of poverty and low wage indices are particularly unattractive to providers for other reasons. In addition to being paid less by Medicare and Medicaid than their colleagues in more affluent areas, they will encounter patients who cannot afford private insurance copayments and deductibles. Moreover, providers in these areas will face bigger hurdles in achieving patient compliance with care regimens that depend on pharmaceuticals, nutrition, and even transportation, because these items are not covered fully by health insurance.

5.5 INDIRECT ECONOMIC IMPACT OF HEALTHCARE COST

5.5.1 LOSS OF DISPOSABLE INCOME

Healthcare expenditures are competing for an increasing share of personal and national income; and, as average per capita medical spending begins to reach \$10,000, it will be out of the reach of persons who are not insured, or whose insurance requires high deductibles and copayment. For them, the choice is to do without or incur debt. Recent care patterns indicate that most eventually do without⁴⁷.

Economists differ on whether healthcare spending is good or bad for the economic health of the country. Optimists like Uwe Reinhart and Lowell Catlett argue in favor of the service industry job creation and personal development associated with healthcare jobs. Pessimists argue that more spending on healthcare means less disposable income for consumption of value-added products on which the economy of the country was built. Both agree that middle income workers cannot afford to carry the burden without help and both agree that the best hopes for a more effective and broadly accessible system require changing the current transaction-based system of paying for healthcare services to a value/outcome system.

5.5.2 MEDICAL BANKRUPTCY

Medical bankruptcy is a critical issue in the debate on healthcare access, reflecting the results of multiple factors: health status, economics and insurance coverage. Consequently, we are treating it separately in this report. Data on medical bankruptcy are scarce and inconsistent. Two classic studies and one commentary^{48, 49 50} reviewed causes of bankruptcy as listed on U.S. Bankruptcy Court filings. Though one 2005 study by Himmelstein reported that as many as 62 percent of bankruptcies were medical related, the American Enterprise Institute challenged the study noting the relatively low level of medical debt reported in bankruptcy filings. The relationships are murky, because medical costs pile up over time, may be charged to credit cards and may be written off or forgiven by providers, as the individual's financial status declines.

A better measure of risk of medical bankruptcy may be the charity care and bad debt reported on the 990 Forms filed by tax-exempt hospitals with the IRS. Unfortunately, AHA reports that, in 2009, only 58 percent of U.S. community hospitals were non-profit. That means that charity reports for the other 42 percent of hospitals that are government and for profit will not be uniformly available.

⁴⁷ PDA Files.

⁴⁸ Himmelstein, David U., M.D., Deborah Thorne, Ph.D., Elizabeth Warren, J.D. and Steffie Woolandler, M.D., M.P.H. Medical Bankruptcy in the United States, 2007: Results of a National Study. *The American Journal of Medicine*. 2009.04.012.

⁴⁹ Skinner, Brett J. The Medical Bankruptcy Myth. *The American*. The Journal of the American Enterprise Institute. August 19, 2009.

⁵⁰ Jacoby, Melissa B. and Mira Holman. Managing Medical Bills on the Brink of Bankruptcy. *Yale Journal of Health Policy Law & Ethics*. Vol. 10. No. 2. p. 239 (2010).

A 2008 California study found that, in the prior year, 34 percent of adults ages 19 to 64 had medical bill problems, such as medical debt, inability to pay medical bills, or being contacted by a collection agency. Although the uninsured are most at risk of having medical bill problems and medical debt, the survey found that more than 25 percent of people continuously insured over the previous year had medical bill problems or medical debt.⁵¹

A 2007 nationwide sample survey found that 62 percent of all bankruptcies were medical; 92 percent of these medical debtors had medical debts over \$5,000, or 10 percent of pretax family income.⁵² The rest met criteria for medical bankruptcy because they had lost significant income due to illness, or mortgaged a home to pay medical bills. Most medical debtors were well educated, owned homes, and had middle-class occupations. Three-quarters had health insurance.

Using identical definitions in 2001 and 2007, the report suggests that share of bankruptcies attributable to medical problems rose by 49.6 percent. Regrettably, no one monitors this consistently. This report can only summarize one-time standards.

A recent careful study by Jacoby and Hollman⁵³ explored relationships of medical costs and bankruptcy. They note that court records of medical debt in bankruptcy cases do not reflect the history that preceded the bankruptcy. Yet the Himmelstein study⁵⁴ reported that 62 percent of bankruptcy was medical related. The Department of Justice challenged the Himmelstein report noting that data from bankruptcy courts did not support the claim. Jacoby and Holloman combined surveys with a review of court records and found that persons who reported medical bills as the cause of bankruptcy had mortgaged their homes to pay medical bills at a rate nearly four times that of other filers. They were also a third more likely to have used credit cards to pay medical bills. Jacoby also reported that many persons in bankruptcy did not identify their medical bills as debt, or may have been making payments in order to sustain care.

On the Jacoby and Holloman surveys, only three out of ten reported medical bills as a reason for bankruptcy. However, credit cards were a choice of bill management for medical as well as other bills among those filing for bankruptcy. In fact their study showed those most affected by medical debt are less likely to show up in a court records study.

Few medical providers require cash payment at the time of service, so patients can easily accumulate medical debt without being aware of the total amount until after the fact. Medical debt on credit cards is not formally reported, but providers increasingly accept that form of payment. Health Savings Account plans (HSA's) are now coupled with credit and debit cards that can increase debt beyond the amount in an individual's account. Together, these factors and high medical costs coupled with the capacity to strain employment in the face of a chronic or acute healthcare problem to sustain personal and family budgets.

Clearly, the consumer cost of medical care is a factor in some bankruptcy cases.

⁵¹ Carol Pryor, J. Prottas, B. Lottero and M. Rukavina. The Access Project. Issue Brief No 1. May 2008. www.accessproject.org/adobe/ca_brief_no_1.pdf.

⁵² Himmelstein, op. cit.

⁵³ Jacoby, Melissa B. and Mirya Holman. Managing Medical Bills on the Brink of Bankruptcy. *Yale Journal of Health Policy Law & Ethics*, p. 239 (2010).

⁵⁴ David Himmelstein, et al., *Illness and Injury as Contributors to Bankruptcy*, *Health Affairs*. W5-67 (Web Exclusive February 2, 2005).

5.5.3 PER CAPITA SPENDING

Recent geographic studies of healthcare expenditure patterns, including those done by the Dartmouth Atlas research team, show patterns of sustained high resource use by residents of certain areas of the country. The Dartmouth studies show high rates of age-adjusted hospital readmission rates among Medicare beneficiaries in parts of Appalachian Ohio, western Pennsylvania, eastern Kentucky, northern West Virginia and northeast Mississippi.⁵⁵ Data for these studies were age and sex adjusted, allocated to hospital service areas, and include only the 20 percent of 2008 Medicare claims sample that CMS made available to researchers.

Dartmouth researchers found the highest rates of Appalachian Medicare expenditures in three hospital market areas:

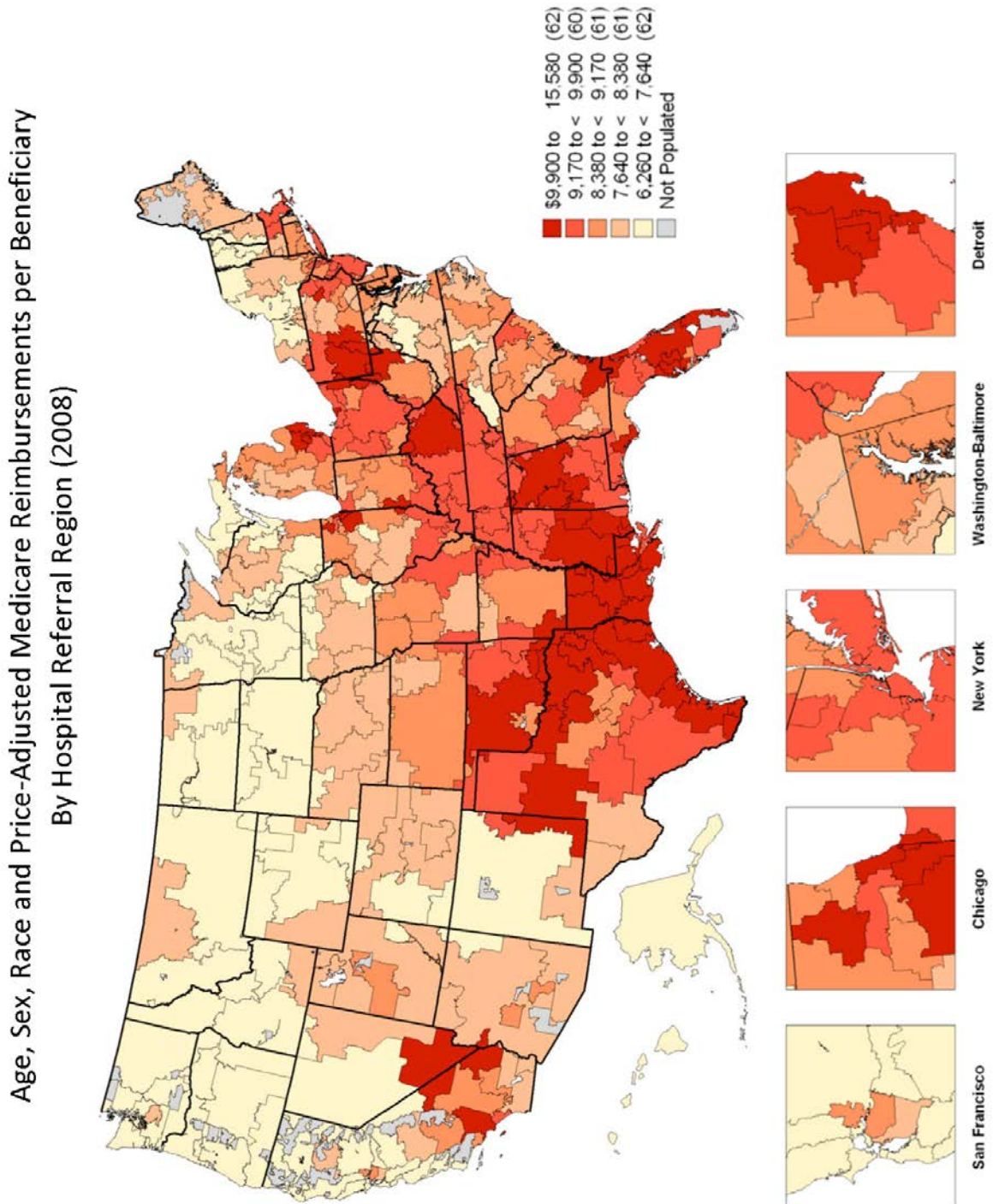
- Western Pennsylvania and adjacent counties in Ohio, West Virginia and Maryland;
- Eastern Kentucky; and
- North central Alabama.⁵⁶

In the Dartmouth Atlas study, few Appalachian market areas showed low total Medicare payments per beneficiary. In fact, as illustrated in Figure 42, outside Appalachian New York, most Appalachian markets had high per beneficiary expenditures.

⁵⁵ Percent of patients readmitted within 30 days following discharge, on line map www.dartmouthatlas.org/ Accessed October 21, 2011.

⁵⁶ Skinner, JS, DJ Gottlieb, D Carmichael, KK Bronner. A New Series of Medicare Expenditure Measures by Hospital Referral Region: 2003-2008, Dartmouth Atlas on line. http://www.dartmouthatlas.org/downloads/reports/PA_Spending_Report_0611.pdf. Accessed October 24, 2011.

FIGURE 42 - PRICE-ADJUSTED MEDICARE EXPENDITURES PER BENEFICIARY BY HOSPITAL, 2008



Source: Dartmouth Atlas Project, The Dartmouth Institute for Health Policy & Clinical Practice, JS Skinner, et al, June 21, 2011

5.6 CMS GEOGRAPHIC WAGE INDEX

The Medicare Hospital Geographic Wage Index has traditionally been based on 441 areas (365 metropolitan statistical areas (MSAs) and 76 non-MSAs)⁵⁷. These are meant to reflect labor market areas on the assumption that healthcare employers within these areas are drawing upon a pool of potential workers from these communities. The structure disregards the fact that healthcare workers travel across MSA, county, and even state boundaries to go to work. Further, the Geographic Index generally applies distinct rates to each of a state's metro areas, but only one, same rate to all other non-metropolitan areas of a state. The non-metropolitan areas may be quite distant from one another and the single uniform non-metro rate may be applied to multiple labor markets.

Medicare uses a separate wage index for physician payment. Geographic areas for the physician payment wage index vary by state; some states have a single uniform statewide physician wage index and other states have multiple indices that apply to combinations of metropolitan and non-metropolitan areas.

As noted in Chapter 3, many parts of central and southern Appalachia have very low Medicare Hospital Geographic Wage Indices; and local providers have been unsuccessful in attempts to increase them. By contrast, rural hospitals in Frontier states (North Dakota, South Dakota, Montana, Wyoming and Nevada) argued that their wages are depressed because their Geographic Wage index is too low. As a result, the health reform statute, ACA, accords all facilities in Frontier states a minimum index of 1.0 or their actual index. Many areas of Appalachia face similar wage depression. However, they have not benefited from the consistent and sustained advocacy for change.

⁵⁷ See Appendix A for Hospital Wage Index by Wage Area, FY 2011, as presented by the Institute of Medicine in Report on Geographic Wage Index. June 1, 2011, pps. 1-10 uncorrected proofs.

FIGURE 43 – COUNTY CMS HOSPITAL GEOGRAPHIC WAGE INDEX ADJUSTED FOR GAF IN THE U.S., 2011

County Percentile Rank of County CMS Hospital Geographic Wage Index Adjusted For Geographic Adjustment Factor in the United States, 2011

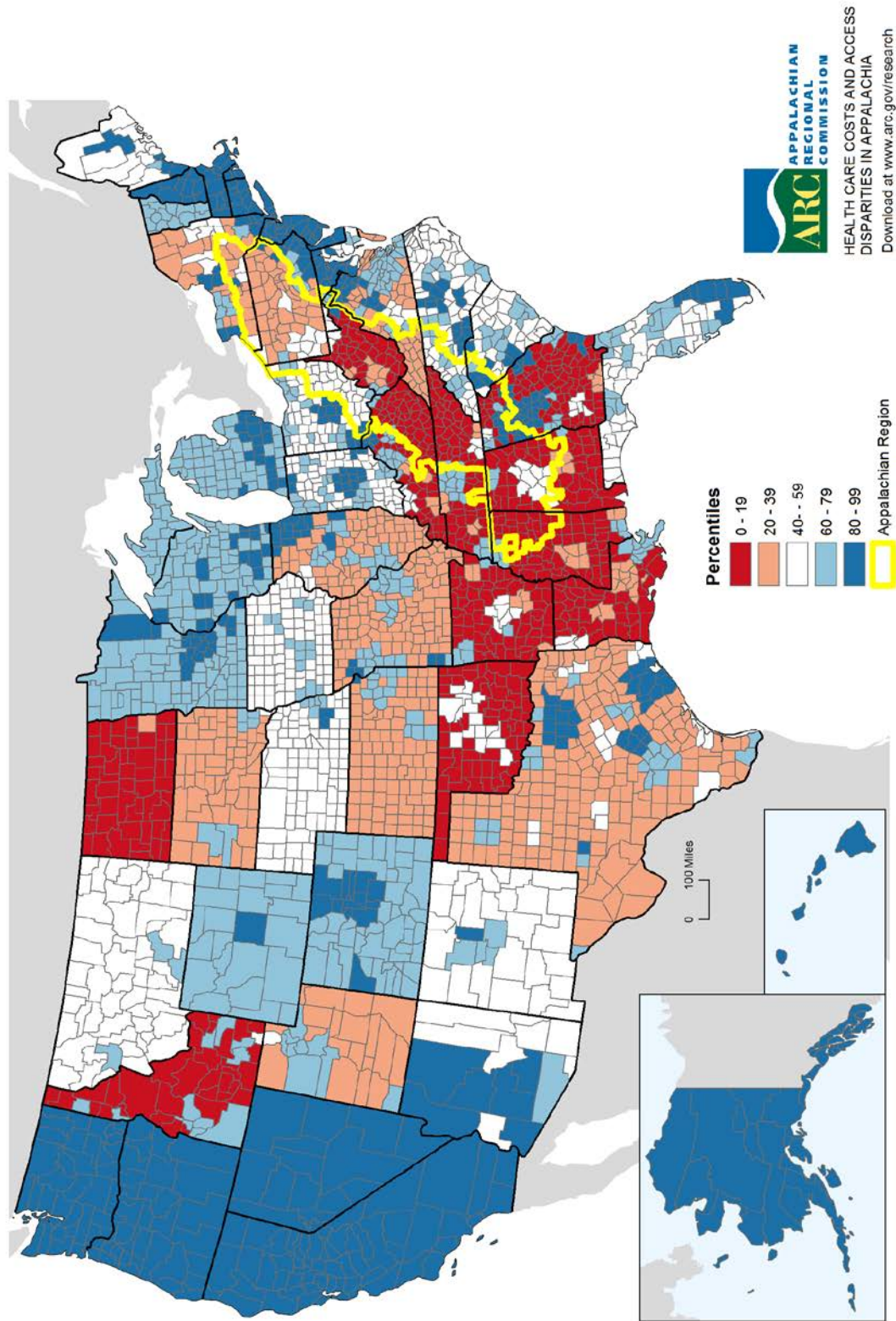
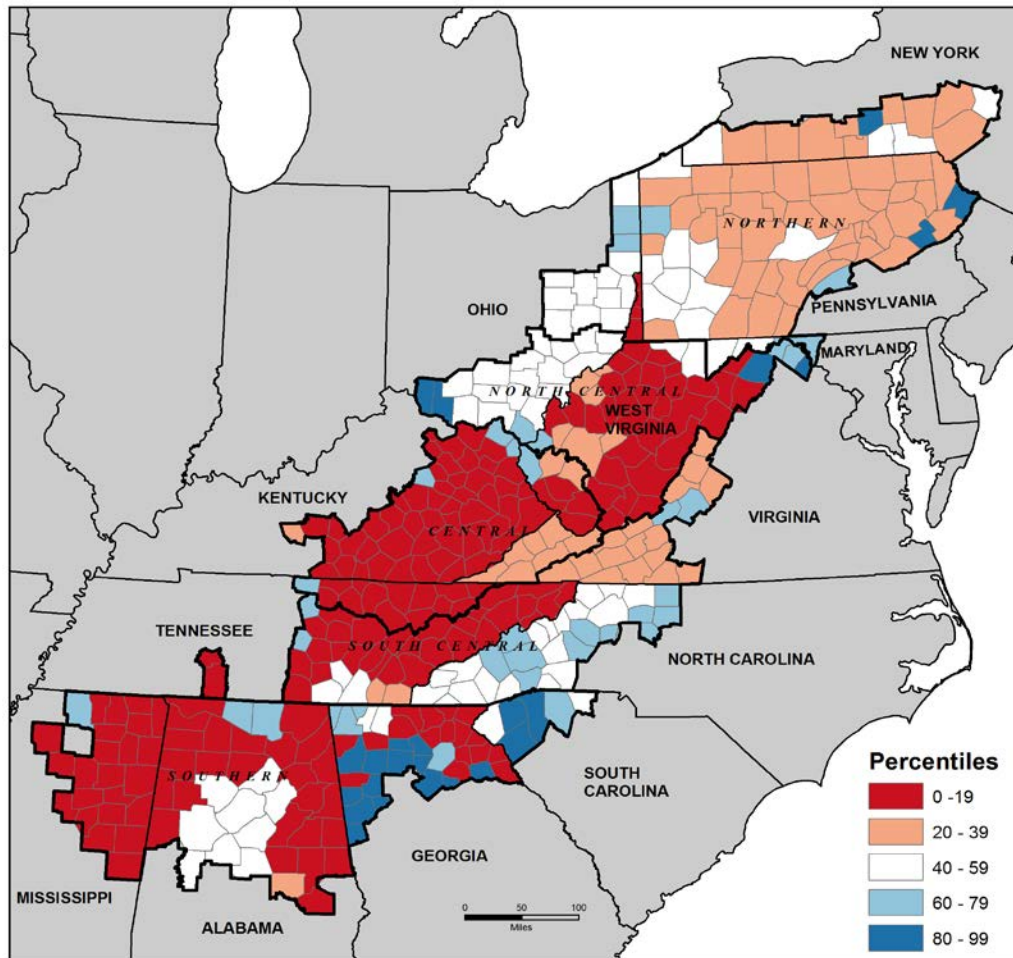


FIGURE 44 – COUNTY PERCENTILE RANK OF CMS HOSPITAL GEOGRAPHIC WAGE INDEX FOR GEOGRAPHIC ADJUSTMENT FACTOR (GAF) IN APPALACHIA, 2011



Source: Percentile of CMS Wage Index Modified by Geographic Adjustment Factor: 2009 CMS Hospital Wage Index and Geographic Adjustment Factor (calculated by CMS from year 2005 Wage Data). Department of Health and Human Services. Centers for Medicare & Medicaid Services 2010. Wage Index and Capital Geographic Adjustment Factor by CBSA 2009.

Prepared by Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill in cooperation with PDA, Inc, Raleigh, North Carolina, 2011



The CMS hospital Geographic Wage Index, the basis for cost component (HCC) in the HCCA Index, reflects the labor variation in care delivery cost. Medicare and others assume that the other 40 percent of care delivery costs, supplies, facilities, equipment, for example, are relatively uniform across the nation. This assumption alone overlooks extra transportation costs associated with supplying rural mountainous areas.

A Geographic Adjustment Factor (GAF), which CMS added to smooth variations in adjacent markets, does little to change regional disparities. Most of the Appalachian Region remains below the 40th percentile, even after the GAF is applied. As a result, payments for a comparable unit of healthcare in central and southern Appalachia, for the most part, are much lower than for the same service in the northeast and west. The spread between the highest and lowest is a 215 percent difference, 1.5766 to 0.7336. The median is 0.866.

Congress mandated a report on the Geographic Wage Index and the Institute of Medicine (IOM) convened a Task Force to review it. The IOM's June 2011 Draft Report presents several policy opportunities for ARC.

- ARC could consider advocating with the Institute of Medicine and CMS for applying the Frontier Index to facilities located more than one hour from a Metropolitan Statistical Area.
- ARC could advocate for adoption of the IOM recommendation to use BLS wage data. This would reflect the actual price of attracting labor to healthcare facilities in the region. However, presently, BLS does not collect a robust set of healthcare wage data.
- ARC should carefully watch changes in the physician wage index. Most of the Appalachian states, have maintained a single statewide physician index that prevents disparities in physicians' payments between rural and urban locations.
- ARC should watch carefully any border smoothing initiatives associated with the Geographic Wage Index. The formulas could continue the disparities in rural payments.

5.7 SOCIAL COST OF HEALTHCARE ACCESS BARRIERS

As healthcare costs, including the costs for health insurance increase, more persons are forced outside the care system. For those in need of services, incentives to seek publicly funded alternatives, like Medicare Disability and Medicaid Aid for Dependent Children (AFDC) or Old Age (OA) increase.

Healthcare coverage for low-income and disabled persons provides an essential safety net. However, it has become expensive and unsustainable. In 2008, disability payments to working age people alone accounted for 12 percent of federal expenditures. The healthcare component represented 6.6 percent of combined state and federal expenditures; and inflation-adjusted health cost components of disability increased 35 percent between 2002 and 2008. Average spending per working age disabled person was \$22,561.⁵⁸

In June 2011, the IOM issued its Draft Report on improvements to the Medicare Geographic Wage Index, noting:

Because Medicare is a national program, policy makers and researchers working to develop and implement its payment systems have long recognized the need to adjust payment amounts to reflect input price differences across geographic areas of the United States. The geographic adjustments to Medicare fee-for-service payments are the hospital wage index (HWI) and the three geographic practice cost indexes (GPCIs)².

Although there is widespread agreement about the importance of providing accurate payments to providers, there is considerable and long-standing disagreement in the provider community and among policy makers about how best to adjust payments based on geographic location. In two public sessions, the committee heard testimony from critics of the existing geographic adjusters who identified a number of questions and concerns and who believe that the current adjusters are not treating them fairly. Among their stated concerns are problems and inconsistencies with the definitions of payment areas and labor markets, concerns about the relevance and accuracy of the source data for determining area wages and other input prices, questions about the occupational mix used to create the hospital wage and physician practice expense adjustments, and criticisms about the lack of transparency of index construction.

From Geographic Adjustment in Medicare Payment Phase I: Improving Accuracy, Institute of Medicine, Washington, DC, and Prepublication Copy June 2011

⁵⁸ Livermore, G.L., D.C. Stapleton, M. O'Toole. Health Care Costs are a Key Driver of Growth in Federal and State Assistance to Working-age People with Disabilities.

The Accountable Care Act will shift many who are currently supported by Medicare Disability to state-supported Medicaid, increasing the state burden. The social impact of healthcare coverage and cost also shows up in many areas; including the current national pregnancy statistics. In 2009, according to the CDC National Vital Statistics reports, 41 percent of births involved unmarried women, up from 40.6 the year before.⁵⁹ Until very recently, low income single women who were pregnant or with children could obtain Medicaid coverage for themselves and their children; no coverage was available for married women at the same income level. No coverage is available for fathers. ACA expanded Medicaid to cover all members of homes below 133 percent poverty, after 2014.

Among elderly persons facing need for nursing home care, the practice of spending down and transferring assets to others in order to qualify for Medicaid is common. Once the assets are transferred, individuals want to stay in the nursing homes, because they have no other alternatives.

Together, the safety net has become an entrapment, keeping many people who might be on the margin from gradually moving towards independence. There is no safety net program for low-middle income working adults and their families.

With these adverse incentives, people who become dependent on these safety nets because of their health conditions are discouraged from advancing their income to levels that would make them ineligible for Medicaid or Medicare Disability. The gap between temporary safety net and long term multi-generational dependence on safety nets is a small one.

Multiple studies have demonstrated an association between low income, poor health and low healthcare access.⁶⁰ As reported in Section 4.3.2, the high correlation between HCCA and ARC_EDDI and the significant relationship between HCRA and ARC_EDDI ($p < .01$), affirm such a relationship. However, studies reported here are insufficient to determine causative impact of one on the other. At best, the evidence shows contributory influence. Regardless of cause, the evidence illustrates some of the high hurdles faced by health professionals and organizations who choose to offer services in high poverty counties.

The studies also highlight the economic disincentives that persons and families whose incomes qualify them for disability or Medicaid coverage face when they consider seeking better incomes. They may lose more than they gain by earning more or diversifying their skill set to compensate for their disability. This may explain some of the low participation in the Appalachia labor force.

5.8 HEALTH REFORM AND STATE MEDICAID BURDENS

As part of healthcare reform, ACA expands the group of mandated persons eligible for Medicaid coverage beginning in 2014.⁶¹ Medicaid is state administered, though funded by both state and federal governments. Free to offer the basic minimum or the full possible range of services and to cover only the minimum required group or an expanded one, each state sets its own guidelines regarding eligibility and services. Because their programs are different, Appalachian states' experience with ACA will be very different.

Nonetheless, data from Kaiser Family Foundation show that by 2019, Medicaid enrollment and spending in Appalachian states will increase dramatically under ACA.

⁵⁹ Hamilton, B.E., J.A. Martin, S.J. Ventura. Births: Preliminary Data for 2009. National Vital Statistics Reports, (59)3, December 21, 2010.

⁶⁰ Halverson, et al, 2004 op. cit, and Halverson et al, 2008, op.cit.

⁶¹ Green, Cheri D. "Medicaid Expansion Under PPACA". Brunni Update. June 4, 2010. Accessed October 24, 2011. <http://www.brunini.com/newsletter-17.html>

The “newly eligible” Medicaid recipient is an individual 19 years or older, but under the age of 65, not entitled to, or enrolled for, benefits under Medicare Part A or Part B, and otherwise not eligible for Medicaid under any other category. The eligible income is raised from 100 to 133 percent of the Federal Poverty Level (FPL). Income will be measured using a modified adjusted gross income calculation and asset testing as a means of determining eligibility is prohibited. In 2011, 133 percent of FPL for a single person is \$14,403.90 and for a family of four is \$29,326.50.

TABLE 22 – ACA IMPACT ON APPALACHIAN STATE MEDICAID ENROLLMENT AND SPENDING

State	% Increase in Medicaid Enrollment by 2019	% Increase in Medicaid Spending by 2019
New York	6.0%	1.7%
Pennsylvania	21.7%	10.5%
Ohio	31.9%	12.8%
Maryland	32.4%	15.6%
West Virginia	29.5%	15.6%
Virginia	41.8%	18.4%
Kentucky	37.3%	24.0%
Tennessee	20.9%	14.3%
North Carolina	38.2%	19.7%
South Carolina	38.4%	26.3%
Georgia	40.4%	19.8%
Alabama	36.9%	25.7%
Mississippi	41.2%	28.9%
United States	27.4%	13.2%

Source: Kaiser Commission on Medicaid and the Uninsured

Ten Appalachian states could see Medicaid enrollment increase more than the United States average of 27.4 percent. They are: Ohio, Maryland, West Virginia, Virginia, Kentucky, North Carolina, South Carolina, Georgia, Alabama, and Mississippi.

Ten Appalachian states could experience a larger percent increase in Medicaid spending than the United States average of 13.2 percent: Maryland, West Virginia, Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, and Mississippi.

Factors driving these cost increases are not consistent. Although in 2009 Appalachian states had 33 percent of both the U.S. population and the Medicaid population, as demonstrated in Table 23 below, only Kentucky and South Carolina have an equal percentage of both United States population and Medicaid population. Five Appalachian states have a disproportionate share of the nation’s Medicaid population. These include New York, West Virginia, Tennessee, Alabama, and Mississippi.

Six Appalachian states have a smaller percentage of the national Medicaid population than of the total United States population. These include Pennsylvania, Ohio, Maryland, Virginia, North Carolina, and Georgia.

TABLE 23 – APPALACHIAN STATES SHARE OF U.S. POPULATION AND U.S. MEDICAID ENROLLMENT

State	2010 Population	% of U.S. Population	2009 Medicaid Enrollment	% of U.S. Medicaid Enrollment
New York	19,378,102	6.3%	4,954,600	8.5%
Pennsylvania	12,702,379	4.1%	2,090,200	3.6%
Ohio	11,536,504	3.7%	2,067,300	3.6%
Maryland	5,773,552	1.9%	753,100	1.3%
West Virginia	1,852,994	0.6%	392,300	0.7%
Virginia	8,001,024	2.6%	863,300	1.5%
Kentucky	4,339,367	1.4%	833,900	1.4%
Tennessee	6,346,105	2.1%	1,447,100	2.5%
North Carolina	9,535,483	3.1%	1,645,900	2.8%
South Carolina	4,625,364	1.5%	891,600	1.5%
Georgia	9,687,653	3.1%	1,685,000	2.9%
Alabama	4,779,736	1.5%	918,800	1.6%
Mississippi	2,967,297	1.0%	750,400	1.3%
United States	308,745,538		58,106,000	

Source: U.S. Census-Population, Kaiser-Medicaid Enrollment

The Federal Medical Assistance Percentage (FMAP) is the percentage of total Medicaid spending in each state that is funded by the federal government. FMAP's in Appalachian states range from some of the highest to some of the lowest in the United States. A low FMAP and a high share of the nation's Medicaid population, places a higher burden on the individual taxpayers in a state. The 2009 federal Stimulus Act, ARRA, boosted the FMAP for every state temporarily.

TABLE 24 – FEDERAL MATCHING PERCENTAGE (FMAP) FOR MEDICAID IN APPALACHIAN STATES

State	2011 Standard FMAP	2011 Enhanced FMAP
New York	50.00	61.6%
Pennsylvania	55.64	66.6%
Ohio	63.69	73.7%
Maryland	50.00	61.6%
West Virginia	73.24	83.1%
Virginia	50.00	61.6%
Kentucky	71.49	80.6%
Tennessee	65.85	75.6%
North Carolina	64.71	75.0%
South Carolina	70.04	79.6%
Georgia	65.33	75.2%
Alabama	68.54	78.0%
Mississippi	74.73	84.9%
United States Average	59.03	70.9%

Source: Federal Register: November 27, 2009 (Volume 74, Number 227) [Page 62315-62317]
From the Federal Register Online via GPO Access [wais.access.gpo.gov] [DOCID: E9-28438]

As shown in Table 24, nine Appalachian states are benefiting from 2011 Enhanced FMAP's above the national average of 70.9 percent: Ohio, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, and Mississippi. At 84.9 percent, Mississippi has the highest FMAP in the United States.

The remaining four Appalachian states have FMAP's below the national average. These include New York, Pennsylvania, Maryland, and Virginia. At 61.6, New York, Maryland, and Virginia are tied with seven other non-Appalachian states for the lowest Enhanced FMAP in the United States. Enhanced rates may expire when ARRA stimulus funds end in 2012, then states will face program restrictions or increased budget demands to sustain their Medicaid programs. In 2009, New York spent the most per Medicaid enrollee and Georgia spent the least.

TABLE 25 – MEDICAID ENROLLMENT AND SPENDING IN APPALACHIAN STATES, 2009

State	2009 Medicaid Enrollment	% of U.S. Population of Medicaid Enrolled	2009 Total Medicaid Spending	% of U.S. Medicaid Spending	Medicaid Spending per Enrollee
West Virginia	392,300	0.70%	\$2,434,058,051	0.70%	\$6,205
Mississippi	750,400	1.30%	\$3,947,805,053	1.10%	\$5,261
Alabama	918,800	1.60%	\$4,415,810,844	1.20%	\$4,806
South Carolina	891,600	1.50%	\$5,098,527,910	1.40%	\$5,718
Kentucky	833,900	1.40%	\$5,400,899,512	1.50%	\$6,477
Virginia	863,300	1.50%	\$5,774,994,043	1.60%	\$6,689
Maryland	753,100	1.30%	\$6,523,939,093	1.80%	\$8,663
Tennessee	1,447,100	2.50%	\$7,290,231,215	2.00%	\$5,038
Georgia	1,685,000	2.90%	\$7,693,345,212	2.10%	\$4,566
North Carolina	1,645,900	2.80%	\$11,506,119,180	3.10%	\$6,991
Ohio	2,067,300	3.60%	\$14,056,788,223	3.80%	\$6,800
Pennsylvania	2,090,200	3.60%	\$17,231,560,151	4.70%	\$8,244
New York	4,954,600	8.50%	\$49,368,510,253	13.50%	\$9,964
United States	58,106,000		\$366,471,017,061		\$6,307

Source: Kaiser Commission on Medicaid and the Uninsured

Table 25 shows that seven Appalachian states absorb a larger percentage of the U.S. Medicaid spending budget than their share of the total U.S. Medicaid population: New York, Pennsylvania, Ohio, Maryland, Virginia, Kentucky, and North Carolina. These states spend more than the U.S. average on each Medicaid beneficiary, and offer more services, have higher unit costs, or use more services per beneficiary than the other states.

Six Appalachian states have a smaller percentage of the total Medicaid spending budget than the total Medicaid population: West Virginia, Tennessee, South Carolina, Georgia, Alabama, and Mississippi; and they spend less than the U.S. average on each beneficiary

Such differences will limit ARC's Medicaid policy response. The only clear policy that will benefit all states is advocating for an extension of the expiration date for Enhanced FMAP.

CHAPTER 6 BEST PRACTICES IN PROVIDING BETTER HEALTH INSURANCE

6.1 RURAL RESIDENTS

Appalachian counties rank high on health insurance coverage when compared to the U.S. However, having coverage does not assure protection from medical costs. Benefits vary from policy to policy and state to state. Moreover, insurers set prices and organize benefits packages on the basis of their expected payouts. This is described as their “medical loss ratio.” To price their policies competitively, insurers need a large group of healthy people who have low medical loss ratios. Low population and older ages in rural areas reduce the number of available healthy people. To serve rural residents, insurers must aggregate groups large enough to balance high with low users. Presently, all health insurance plans are state regulated; and insurance companies cannot market across state lines. To some extent, large companies and large membership organizations can aggregate rural areas within a state, thus attaining some purchasing leverage with insurance companies, but state boundary hurdles remain.

Professional groups, Farm Bureaus and Rural Electric Cooperatives have historically formed membership groups and brokered private health insurance plans. Tennessee Rural Health (TRH), a Farm Bureau membership organization, for example, covers 95 Tennessee counties and offers a variety of plans.⁶² Many large employers bypass insurance companies and self-insure, working across state lines to meet local requirements. Small companies cannot form good risk pools alone. For them, membership organizations, large insurer sponsored small group plans and state risk pools are common solutions. Individuals traditionally turn to membership groups and large insurer’s individual plans. Individual plans are age- and location-risk rated and may price out of the reach of many. Health reform will not change this. A report by United Health observes that rural adults and particularly those in the rural south are more likely than urban ones to have a range of chronic conditions. This makes their geographic risk higher and their healthcare more expensive.

The last option for small companies and individuals is state high-risk pools. These pools focus on persons who have pre-existing, often chronic conditions that make them ineligible for individual or group plans. Chronic disease tends to associate with pre-existing conditions that preclude qualification from private insurance programs. For these people, government programs, employment by a large company or access to risk pools are the only options. Many state-wide high risk pools require subsidies.⁶³ Even then, many rural and urban residents find them unaffordable. The difference between rural and urban levels of uninsurance is only two percent.⁶⁴ Federal health insurance programs provide uniform accessibility to rural and urban residents and a higher proportion of rural than urban residents are covered by CHIP, Medicare and/or Medicaid (31 compared to 25 percent).

⁶² TRH Health Coverage, <http://www.trh.com>. Accessed October 27, 2011.

⁶³ S. Khimm. Why are High-risk Pools Having So Much Trouble? Health Insurance Resource Center, Health Insurance Risk Pool News, 06/01/2011 http://www.washingtonpost.com/blogs/ezra-klein/post/why-are-high-risk-pools-having-so-much-trouble/2011/06/01/AGbBVZGH_blog.html. Accessed October 25, 2011.

⁶⁴ Modernizing Rural Health Care: Coverage, Quality and Innovation. Working Paper 6. July 2011. http://www.unitedhealthgroup.com/hrm/UNH_WorkingPaper6.pdf. Accessed October 25, 2011.

As noted in Chapter 4 of this report, health insurance coverage is not necessarily associated with good health outcomes. By contrast, a recent survey of literature and statistics by United Health Center for Health Reform & Modernization (United Health) and data from the Patient Centered Primary Care Collaborative consistently indicate that integrated healthcare delivery systems built around a primary care medical home, customer engagement and multidisciplinary teams that use independent practitioners to the full scope of their practices and not subject to older licensing constraints do produce good clinical outcomes and use fewer health resources in both urban and rural settings.

United Health reports that a majority of rural primary care doctors agree with this approach.⁶⁵ On the positive side, United Health authors note that a higher proportion of rural than urban primary care providers accept new Medicaid patients.

Three-quarters of rural residents live in the south and the west, and 60 percent of people living in rural counties live close to an urban area.⁶⁶ Nonetheless, data from a United Health/ Harris Interactive survey note that more than half of rural patients travel an average of 60 miles for specialty care. Primary access and health insurance coverage are not the only barriers to full care. What the insurer pays the provider is also important; and some private and government insurers have traditionally paid less than cost for services. Medicare is the benchmark payer, and tends to pay below cost in most markets. TRICARE, the program for military retirees and families pays significantly less than Medicare. Medicaid may pay as little as 55 percent of Medicare. However, Medicaid payments in rural areas are closer to Medicare payments, averaging 82 percent of Medicare.⁶⁷ As demonstrated by the HCC component of the HCCA, Medicare payments in the Appalachian Region are, for the most part, substantially lower than in the rest of the country.

Medicaid is the primary coverage for institutional long term care; and spending on the 30 percent elderly Medicaid beneficiaries who also have Medicare coverage uses 77 percent of Medicare and Medicaid funds spent. This group of “dual eligibles” represents an opportunity and a challenge for the Appalachian Region, where a significant portion of the population is older, lower income and has chronic disease. Efforts to control costs and outcomes for this group are just emerging and represent significant opportunity for regional information sharing. Judy Feder argues that Medicare must take the lead because the federal share of spending exceeds the state share.⁶⁸ Others argue that the smaller state unit can innovate faster. Still others argue for privatized contracts with national managed care companies.

6.2 POTENTIAL FOR APPALACHIAN REGION

As noted in Chapter 3, poor health insurance coverage is concentrated in four states in the Appalachian Region. Most Appalachian counties in Mississippi, Georgia, North Carolina and eastern West Virginia, rank below the HIC 39th percentile. Please see Figure 15 of this report. These low coverage statistics reflect state Medicaid eligibility limits, absence of major employers, limited individual purchasing capacity, and other barriers not explored in this report.

⁶⁵ Ibid.

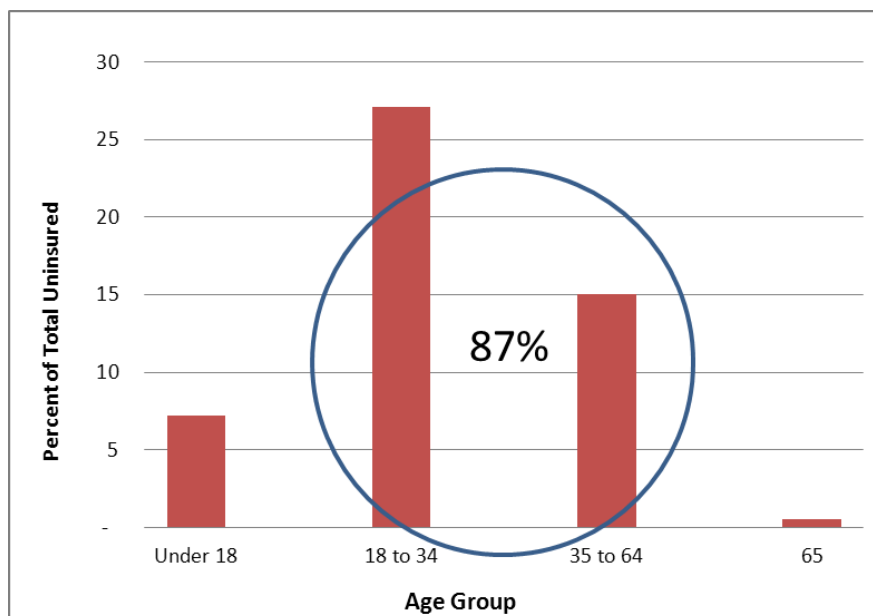
⁶⁶ Ibid.

⁶⁷ Ibid.

⁶⁸ Feder, J. Refocusing Responsibility for Dual Eligibles: Why Medicare Should Take the Lead. Georgetown University Urban Institute for Alliance for Health Reform Briefing. Washington, D.C., October 28, 2011.

Nationwide, and in the Appalachian Region, most of the people who have no health insurance are between the ages of 18 and 64. In 2009, they represented 87 percent of the uninsured, but only 63 percent of the total population of the Appalachian Region. About twice as many 18 to 34 year olds as 34 to 64 year olds were uninsured. Ineligible for public programs, this group depends on private health insurance. Individual plans, pools and insurance exchanges are the options available to them.⁶⁹

FIGURE 45 – APPALACHIAN REGION UNINSURED BY AGE GROUP, 2009



Source: American Community Survey Data Set 2009 prepared for the Appalachian Regional Commission 9/1/2011

Membership cooperatives have historically played a major role in health insurance improvement in the Appalachian Region. They face new challenges as health reform's health exchanges permit marketing across state lines. Strong ones may become a valuable resource. It is too early to tell.

6.3 IMPACT OF HEALTH REFORM LEGISLATION

6.3.1 INSURANCE EXCHANGES

Health insurance exchanges are mandated by health reform, but some already exist. They sell direct to the consumer. Early reports indicate that their premium price will be critical to attract enrollment. Pennsylvania, a state that ranks high on the HIC index of health insurance coverage, posts insurance plan rates on a website⁷⁰, and supports a low cost state health insurance plan for people with pre-existing conditions. The Pennsylvania health risk exchange pool appears to have done the best job of making care affordable.

⁶⁹ Data from B27010. Types of Health Insurance Coverage By Age - Universe: Civilian Non-institutionalized Population Data Set: 2009 American Community Survey 1-Year Estimates, Survey: American Community Survey, Puerto Rico Community Survey Table compiled by ARC 9/1/2011.

⁷⁰ www.Pahealthinsurancecoverage.com.

Its low price has attracted a significant subscriber base. Monthly premiums for PA Fair Care are only \$283 and enrollment is strong.⁷¹ Unknown is whether the pool size and subsequent organization of delivery system response to management of care for this high-risk group can offset the higher cost of their care. A pilot North Carolina high-risk plan priced closer to market rates experienced slow enrollment.⁷²

Health reform's mandates for expanded Medicaid eligibility and health insurance exchanges will require creative cost management to keep costs under control. Newly eligible people, after 2014, will have incomes below 133 percent poverty, a group at high risk of poor health and related high healthcare costs.

6.3.2 INNOVATION OPPORTUNITIES

Health reform launched CMS Center for Medicare and Medicaid Innovations (CMMI) with \$10 billion in funding for the 10-years ending in 2021. Projects and programs are emerging in three- to five-year rapid cycle improvements intended to test and implement delivery system changes that will: improve health, reduce cost and improve customer satisfaction. First funding will begin in January 2012. ARC is uniquely positioned to facilitate an understanding of the region's needs and opportunities among the highly motivated staff at CMMI. Understanding regional variations is important to the work of CMMI, and they are continually soliciting new ideas in advance of releasing innovation cycles. Recent patterns indicate that each cycle will produce limited awards involving five to 40 participants nationwide. Cycle announcements generally precede letters of intent due by only 45 days. Hence, advance planning is critical to success.

Authorization for the CMMI permits CMS to use rapid cycle improvement approaches to bring success from pilots to mainstream quickly. This break-through program is led by Richard Gilfillan, MD. Prior to taking the position, Dr. Gilfillan was a member of the Danville, Pennsylvania leadership team at Geisinger Health System that piloted some of the early health reform programs.

One improvement project that will be funded in 2012, involves multi-year grants of \$1.0 million to \$30 million to "a broad set of innovation partners to identify and test new care delivery and payment models that originate in the field and that produce better care, better health, and reduced cost through improvement for identified target populations."

This project is ideally suited to the Appalachian Region; it requires state and healthcare provider participation and would put ARC and participating states front and center with some of the program's strategic goals. In announcing this initiative, CMS emphasized the project's potential to develop and sustain employment for extended practice providers and entry-level workers like community health workers. Although applications for that batch of innovation projects were due in January 2012, the nature of the CMMI projects and its focus on population health offers a good platform for ARC to encourage similar projects that could specifically benefit the Appalachian Region.

6.3.3 DELIVERY SYSTEM

Most health insurers, federal and private, are starting to design their coverage around integrated care delivery systems. In these, patient information is shared among providers who agree to common goals and common use of evidence based medicine. As these take hold, formal connections between healthcare specialty centers and remote communities should improve.

⁷¹ Bracken, D. State's uninsured about to get new options, News and Observer, Raleigh, NC June 30, 2010. http://www.portal.state.pa.us/portal/server.pt/community/health_insurance/9189/pa_fair_care/666211.

⁷² <http://www.newsobserver.com/2010/06/30/558114/health-options-about-to-expand.html#storylink=misearch>.

A few pilots aimed at controlling costs for people with chronic disease are underway and more are expected in 2012 as part of CMS Chronic Care Innovations.⁷³ In North Carolina, Blue Cross teamed with the University of North Carolina with plans to offer a clinic dedicated to subscribers who are high risk. Incentives for that program are still under development. Maryland Blue Cross is incentivizing primary care providers to become medical homes. Georgia Department of Community Health has organized quality programs to focus on rewarding outcomes, particularly in long term care.

Most ACA health reform payment changes are scheduled to occur in 2014. Communities that fail to form integrated healthcare delivery systems before 2014 will get behind in the rapid cycle of healthcare delivery reform, and may lack the resources to ever catch up. Early reports from reform initiatives indicate that the massive change effort involved in health reform requires collective work, either by group association, health system membership or insurance/ practice cooperation. Lack of capital or tendency to accept relationships as they are may work against particularly the most remote communities. On the other hand, the Appalachian Region has demonstrated time and again that its independent inventiveness can, of necessity, design solutions faster than more cosmopolitan large centers.

Rural Health Clinics, which are in every Appalachian state, except Maryland,⁷⁴ have the organized approach and the improved primary care payment required to support coordinated care, but they still consist largely of two to four providers, and are not quite large enough to support the care coordinators and behavioral health specialists that are associated with outcome changes. As the originator of that legislation, ARC can help focus CMS attention on changes needed in Medicare and Medicaid to make the Rural Health Clinic form of primary care more accessible in the region. Today, once a location attains the Medically Underserved Area (MUA) benchmark level of primary health manpower, practices lose the opportunity to become designated as Rural Health Clinics. This was not the original intent of the legislation. In 2011, a committee formed to study the criteria for qualifying an area to have Rural Health Clinics was asked by one Governor to provide for “Exceptional Medically Underserved Areas.” This designation is defined in legislation and adding it to the eligibility qualifications would permit a practice to keep Rural Health Clinic status if its area loses its official designation as an MUA. See Appendix J.

An insightful United Health report⁷⁵ lists core strategies that will modernize rural delivery systems:

- Provide incentives to expand the availability of rural primary care physicians.
- Encourage greater teamwork in rural primary care, including making full use of the skills of advanced nurse practitioners and other health professionals.
- Increase clinical collaboration across rural regions and with urban providers.
- Support greater integration and coordination of rural care with health information technology.
- Use mobile infrastructure to bring care to rural areas.
- Adopt new approaches to improving consumer health and wellness, including new alliances with third sector/non-traditional partners.
- Improve payments for primary care physicians.

⁷³ CMS press release Health Care Reform Law Demonstration To Improve Care, Lower Costs For Seniors And People With Disabilities, Dec 20, 2011.

⁷⁴ CMS Listing of Certified Rural Health Clinics. July 2011.

⁷⁵ Modernizing Rural Health Care, op. cit.

Emergence of telemedicine for reaching remote areas will be constrained by the speed with which all remote regions have access to broadband coverage. The National Broadband Plan, released in 2010, recommends as a national broadband availability target that every household in America have access to affordable broadband service offering actual download (i.e., to the customer) speeds of at least 4 Mbps and actual upload (i.e., from the customer) speeds of at least 1 Mbps. It notes that 14 to 24 million still lack access.⁷⁶

The U.S. Food and Drug Administration (FDA) also plays a role in access to telemedicine. Before a tool can be used for healthcare purposes, it must be submitted to the FDA for approval. The time to market delays in FDA approval now represent barriers to widespread adoption and product development.

6.3.4 ESTIMATED CHANGES IN MEDICAID STATE SPENDING

ACA requires that, starting in 2013, states must pay primary care physicians Medicare rates for Medicaid beneficiaries. For the years 2013 and 2014, the federal government will pay the differential in full. After 2014, the burden will shift to the states. Thus, a good thing may come at high cost to states, if cost management associated with health reform does not occur.

Health reform is intended to create savings that will offset the costs. Kaiser Commission on Medicaid and the Uninsured notes that states have a major role on the implementation side of health reform, including Medicaid expansion, health insurance exchange design, private insurance regulation, and developing coordinated eligibility and enrollment processes.⁷⁷

Looking at five states including Maryland and New York, as examples, the Kaiser Report notes:

- The federal program will pay all costs associated with covering new Medicaid enrollees between 2014 and 2020, and phase down to 90 percent of the new eligibles' costs after that.
- Program design changes in Medicaid are intended to increase coordination of care for Medicare/Medicaid dual eligibles and reduce cost of their care. As noted earlier, this group is among the most expensive to serve.
- States can set up a health insurance exchange, or the federal government will do it for them.

As noted in Chapters 1 and 5, increases in Medicaid enrollment may put severe pressures on state Medicaid budgets, particularly after 2014. Though state costs for new eligibles will be offset by federal payments at first, the costs of expanded benefits for existing eligibles will be entirely born by states. States struggling with Medicaid budget deficits of \$100 million and more as a result of the current recession may not have funds to meet the health reform mandates.

⁷⁶ Federal Communications Commission News Release July 20, 2010, Washington, DC. <http://www.fcc.gov/measuring-broadband-america> National Broadband Plan at 135 (recommending that the national broadband availability target also include "acceptable quality of service for the most common interactive applications").

⁷⁷ R.R. Bovbjerg, B.A. Ormond and V. Chen. State Budgets under Federal Health Reform: The Extent and Causes of Variations in Estimated Impacts. Kaiser Commission on Medicaid and the Uninsured. February 2011.

There is no consensus on what health reform will cost individual states. One Kaiser report notes that incremental costs for states could range from a five-year \$164 million in West Virginia to \$1.1 billion in Pennsylvania. For all states together, estimates range from \$20 billion reported by the Congressional Budget Office to a savings of \$33 billion estimated by CMS. Variations reflect the difficulty estimating the size of the uninsured gap and how individuals will respond to the opportunities. CMS estimates presume a dramatic reduction in physician Medicare payments that will not occur. An automatic adjustment in a formula known as the Sustainable Growth Rate (SGR) would reduce physician payments 35 percent. However, Congress has reversed this formula every time it reaches double digits.

The United Health report forecasts that under health reform, rural areas could see coverage increase by eight million new Medicaid or health insurance exchange beneficiaries, of whom about five million will be newly insured. All but three Appalachian states, West Virginia, Pennsylvania and New York, will increase their Medicaid enrollment by 30 to 44.9 percent.⁷⁸

Whether rural primary care providers will have capacity or willingness to absorb the Medicaid increase is a matter of concern. In the Appalachian Region, United Health reports that Alabama, Georgia, Mississippi, northern West Virginia and North Carolina will have the substantial primary care challenges. The Kaiser Commission on Medicaid and the Uninsured added Kentucky to the primary care shortage list.⁷⁹ Without coverage, budgets may not increase as much.

States will retain their role in determining Medicaid payment amounts. Low payments will likely result in sustained patterns of healthcare provider access problems in areas with high concentrations of Medicaid beneficiaries.

As noted earlier, the big ACA impact will occur in 2014, when Medicaid eligibility must expand to cover non-elderly adults who have incomes up to 133 percent of the federal poverty level (FPL). The federal government will cover 100 percent of all costs for these newly eligible from 2014 through 2016. After that, the federal share will begin to shift to states. In 2017, the portion of newly eligible covered by the federal government will decrease to 95 percent and will gradually decrease to 94 percent in 2018, 93 percent in 2019, and 90 percent in 2020 onward. States will receive the same Medicaid matching rate (FMAP) for the classes of people eligible for Medicaid before healthcare reform.

Costs of state health insurance exchange pools are included in estimates of new Medicaid costs.

Several briefs have argued the state burden from healthcare reform will be minimal because the federal government will cover most of the Medicaid expansion costs. They argue that expansion of Medicaid services and coverage will also allow states to shift or eliminate health costs that will be newly covered under ACA. Table 26 describes a range of early estimates – ranked in ascending order of state Medicaid spending change due to health reform.

⁷⁸ Amednews.com. Interactive map, a major expansion, data from HRSA Area Resource File, 2008. <http://www.ama-assn.org/amednews/site/media/braceforit.htm>. Accessed October 27, 2011.

⁷⁹ Ibid.

TABLE 26 - SUMMARY OF MEDICAID EXPANSION EFFECT ON STATE BUDGETS

Study	% Change from Baseline (2014-2019)	New Medicaid Enrollees (2019)	Total State Spending (2014-2019)
Angeles and Broaddus	1.25%	N/A	\$20.0 billion
Holahan and Headen (standard)	1.4%	15.9 million	\$21.1 billion
Holahan and Headen (enhanced)	2.9%	22.8 million	\$43.2 billion
Milliman (Mississippi)**	10.4%	N/A	N/A
Milliman (Nebraska)**	10.7%	N/A	N/A
Milliman (Indiana)**	15.4%	N/A	N/A

* Baseline assumes no passage of healthcare reform

** Milliman estimates are for individual states only

Angeles and Broaddus from the Center on Budget and Policy Priorities have addressed the question of federal and state costs for Medicaid as health reform rolls out. These authors project that the federal government will shift most of the cost burden away from states. From 2014 through 2019, the first five years of healthcare reform, states will see a 1.25 percent increase in Medicaid spending as a result of ACA.⁸⁰ Taking the CBO baseline estimates from March 2010, Angeles and Broaddus estimate that the additional \$20 billion in Medicaid expansion cost from 2014 through 2019 is a small percentage of the projected \$1.6 trillion that states will already spend on existing Medicaid expenditures. The increased cost from healthcare reform over the pre-reform spending represents a 1.25 percent increase through 2019.

John Holahan and Irene Headen conducted an analysis for the Kaiser Commission on Medicaid and the Uninsured. This study used a Medicaid participation model to create state-by-state results of the spending impact of Medicaid expansion. Using different multiple participation scenarios, the authors argue that “the federal government will pay a high portion of new Medicaid costs in all states and the increases in state spending are small compared to increases in coverage and federal revenues and relative to what states would have spent if reform had not been enacted.”⁸¹ See details in Appendices F and G.

The standard participation scenario assumes newly eligible Medicaid enrollment is at the same rate as current Medicaid enrollment and minimal enrollment for currently eligible participants. Under the standard participation scenario, federal spending for Medicaid expansion, which does not include CHIP, will total \$443.5 billion for the federal government and \$21.1 billion for state governments through 2019.⁸² This is slightly higher than the CBO estimate of \$20 billion, which includes both Medicaid and CHIP expansion costs.

In the model, enrollment in Medicaid will expand by 15.9 million by 2019 and will lead to a reduction of 11.2 million uninsured individuals. Enrollment was expected to increase 27.4 percent from a baseline model with no reform legislation passed.

⁸⁰ January Angeles and Matthew Broaddus. “Federal Government Will Pick up Nearly All Costs of Health Reform’s Medicaid Expansion”. Center on Budget and Policy Priorities. Revised June 18, 2010. <http://www.cbpp.org/files/4-20-10health2.pdf>. Accessed January 3, 2011.

⁸¹ John Holahan and Irene Headen. “Medicaid Coverage and Spending in Health Reform: National and State-by-State Results for Adults at or Below 133% FPL”. The Kaiser Commission on Medicaid and the Uninsured. May 2010. <http://www.kff.org/healthreform/upload/Medicaid-Coverage-and-Spending-in-Health-Reform-National-and-State-By-State-Results-for-Adults-at-or-Below-133-FPL.pdf>. Accessed January 3, 2011.

⁸² Ibid. p. 23.

Because of federal match increases, state spending is projected to increase only 1.4 percent. In comparison, federal spending will increase 22.1 percent above the baseline model. A state-by-state breakout of the changes in Medicaid expansion enrollment and spending is seen in Appendix F for the standard scenario.

Under the enhanced participation scenario, the model uses a higher Medicaid participation level which would increase Medicaid enrollment and correspondingly it assumes a lower level of uninsured population. Enrollment in Medicaid would expand by 22.8 million by 2019 and would lead to a reduction of 17.5 million uninsured individuals. Under the enhanced scenario, 5.3 million would have had other health coverage before the passage of health reform.⁸³ Enrollment was expected to increase 39.3 percent from a baseline model with no reform legislation passed. Under this scenario, state spending is projected to increase 2.9 percent. Federal spending will increase 26.5 percent above the baseline model.⁸⁴ A state-by-state breakout of the changes in Medicaid expansion enrollment and spending is seen in Appendix G for the enhanced scenario.

Holahan and Headen argue that the increased enrollment for states will far exceed the new state costs. However, the authors caution the magnitude of enrollment and costs will vary by state and by existing Medicaid coverage. States that currently have fewer Medicaid benefits and high uninsured rates will see the largest increases in federal spending.⁸⁵

A different approach to cost estimates on an individual state basis have been created by Milliman, a consulting firm with a long history of involvement in healthcare actuarial estimates. Milliman's estimates of the state impact of healthcare reform are higher than other reports that have been released.

The states of Indiana, Mississippi, and Nebraska have commissioned individual reports estimating the additional Medicaid state costs from healthcare reform.⁸⁶ With a full participation scenario, the analysis assumes a full 100 percent participation rate at the beginning of Medicaid expansion in 2014. Under this scenario, the increase in Medicaid expansion costs from 2014 through 2019 would be 15.4, 10.4, and 10.7 percent for the states of Indiana, Mississippi, and Nebraska, respectively.

When compared to the Kaiser analysis at the enhanced scenario, which does not include CHIP and is at a lower participation rate, Milliman has increased Medicaid state costs for Indiana, Mississippi, and Nebraska at 4.8, 6.4, and 2.2 percent, respectively.

John Holahan and Stan Dorn argue that although states will spend slightly more of their own budgets on Medicaid through 2019 as a result of healthcare reform, there are potential areas for state savings. Citing CBO estimates, the authors say increases in Medicaid coverage will come from newly eligible and not from currently eligible individuals. Costs from newly eligible individuals would be mostly covered by the federal government and states most affected by reform are those that already have high number of currently eligible individuals as a result of high income eligibility levels. These states include New York, Massachusetts, and California.⁸⁷

⁸³ Ibid. p. 30.

⁸⁴ Ibid. p. 21.

⁸⁵ Holahan and Headen. p. 7.

⁸⁶ Robert Damler. "Letter to Anne Murphy, Secretary of the Indiana Family and Social Services Administration, on the Patient Protection and Affordable Care Act With House Reconciliation – Financial Analysis". Milliman, Inc. May 6, 2010; John Meerschaert. "Financial Impact Review of the Patient Protection and Affordable Care Act as Amended by H.R. 4782, The Reconciliation Act of 2010 on the Mississippi Medicaid Budget". Milliman, Inc. October 1, 2010; and Robert Damler, "Letter to Vivianne Chaumont, Director of the Nebraska Division of Medicaid and Long-Term Care, Department of Health and Human Services, on the Patient Protection and Affordable Care Act with House Reconciliation – Financial Analysis". Milliman, Inc. August 10, 2010.

⁸⁷ John Holahan and Stan Dorn. "What Is the Impact of the Patient Protection and Affordable Care Act (ACA) on the States?" Timely Analysis of Immediate Health Policy Issues, June 2010. <http://www.urban.org/UploadedPDF/412117-impact-patient-protection.pdf>.

The authors believe that ACA can provide savings for states in six areas that can vary from one state to another. First, states can reduce spending on their own existing, state-related health funding for the poor because federal Medicaid spending will replace those state services. A projected \$70 to \$80 billion in savings from 2014 through 2019 can be shifted from state to federal Medicaid services.⁸⁸ Second, significant savings could come from moving Medicaid patients above 133 percent of FPL out of Medicaid and into health insurance exchanges. Patients who are in the exchanges would qualify for a federal tax credit without state matching funds. Third, the authors believe states have smaller financial burdens on CHIP if Congress ends funding for the program in 2015 and young patients move from CHIP to expanded Medicaid coverage. Fourth, savings can be generated through greater integration and funding of dual eligibles. Fifth, states may reduce coverage for their employees and retirees. ACA provided an allowance of \$5 billion for its role in reducing chronic care costs through subsidized reinsurance for early retirees. Sixth, states that are currently providing coverage for patients whose income is between 133 and 200 percent of FPL can move the patients into the “basic health program” option. This option allows states to “convert ACA’s tax credits to funding for contracts with health plans serving adults in this income range.”⁸⁹

In addition to savings, Holahan and Dorn say ACA will increase effective federal matching rates in states that did not have broader eligibilities. States that might see greater matching rates would typically be in the south and the west.

ACA eliminates a major hospital funding program for low-income persons, the Disproportionate Share Program (DSH). CBO estimates that Medicaid DSH payments will fall as a result of the increasing number of insured patients. The CBO estimates a decrease in DSH payments of \$0.5 billion in 2014, \$0.6 billion in 2015, \$0.6 billion in 2016, \$1.8 billion in 2017, \$5 billion in 2018, \$5.6 billion in 2019 and \$4 billion in 2020.⁹⁰ Hospital providers in urban areas will be most affected by this change.

There is no doubt that implementation of all the provisions of ACA will change the mix of state, local and federal payments for Medicaid at the state level. Further, estimates of the extent of these changes in state and local expenditures for Medicaid are highly dependent on a number of assumptions about the uptake rates of various kinds of public and private insurance as exemplified by the significant contrast between the estimates made by Milliman and those made by the Kaiser Commission. All of these estimates are related in turn to the actual design and implementation of the insurance exchanges, the pace at which these new structures are put in place, and the array of choices available to participants.

As important as these sector-specific factors may be, their impact may be dwarfed by variation in overall performance of the U.S. economy, particularly national and local unemployment levels, which may likely affect the burden on state and local governments, particularly as economic stimulus funds disappear. As described in Figure 6, private spending will continue to be the largest single source of healthcare revenue, thus a major determinant of access.

⁸⁸ Ibid. p. 2.

⁸⁹ Ibid. p. 2.

⁹⁰ Ibid. p. 3.

CHAPTER 7 SUMMARY FINDINGS AND RECOMMENDATIONS

7.1 CONCLUSIONS AND FINDINGS FROM THE HEALTHCARE COST, COVERAGE AND ACCESS INDEX (HCCA)

This report describes how the research team generated a county-level index of healthcare cost, coverage, and access, (HCCA) that can be replicated from data collected uniformly and annually by federal agencies. It shows that parts of the Appalachian Region, particularly in central and southern Appalachia, rank in the lowest percentiles nationally.

When applied to all counties in the nation, the HCCA showed that nearly half of Appalachian counties ranked below the 40th percentile. Appalachia also ranked low on the healthcare resource (HCRA) and healthcare cost components (HCC). It ranked high on health insurance coverage (HIC). Even on that measure, certain states have significant numbers of counties that ranked in the lowest quintile. The region's biggest disparity challenge lies in healthcare reimbursement (HCC). Half of Appalachian counties ranked in the lowest national quintile. Healthcare resource access (HCRA) is less a problem in the Appalachian Region on average, but the region has more than 176 counties that ranked below the 40th percentile. Thus, barriers associated with travel for care are still a reality in the Appalachian Region.

With the exception of the insurance coverage component, HIC, the HCCA measures correlate significantly with the health outcomes measure, years of potential life lost from preventable causes under age 75 per 100,000 population (YPLL_75). Healthcare cost was inversely related to YPLL_75, with low cost areas having high premature mortality.

When the research team controlled for either socioeconomic status (ARC Economic Distress Index), or for persistent poverty, the HCCA could account for variation in the YPLL_75 from one county to another. The ARC Economic Distress Index alone is a good predictor of YPLL_75 nationwide and in Appalachian states, but less so in Appalachian counties; whereas the HCCA Index was a good predictor in all geographies. This suggests a relationship between healthcare cost, coverage and access that is independent of socioeconomic status.

The proposed HCCA and its component indices can be a useful tool for measuring progress in development of healthcare access in the Appalachian Region. Including an additional measure of health outcomes, the YPLL_75, in future measures could show the extent to which advances in cost, coverage and access have been accompanied by improvements in health status.

7.2 IMPLICATIONS OF HEALTH REFORM

Federal healthcare reform, the Accountable Care Act (ACA), will change healthcare delivery systems and payment structures. Health reform will bring significant increases in Medicaid coverage in the Appalachian Region, adding at least 30 percent to most state eligible pools. Low reimbursement and the additional strain of increased coverage on state budgets raise the question of whether improved health coverage will change true accessibility for residents. Moreover, data in this study show limited correlation between health insurance coverage and good health outcomes in areas with high poverty.

Health reform legislation launched several national initiatives involving billions of dollars in federal expenditures to improve healthcare access and provide cost savings. Some are grant funds, involving short term subsidies for service delivery changes with hopes that successful programs will find funding sources. Others involve structural change in reimbursement formulas. Though grant programs direct significant funds to universities and some to healthcare providers, the major healthcare funds flow is in the reimbursement associated with Medicare and Medicaid entitlement programs. These funds follow the user, hence should spread funding across a broad geography.

The largest initiative involving entitlement programs resides at CMS in the Center for Medicare and Medicaid Demonstration Programs and Center for Medicare and Medicaid Innovation (CMMI) pilots. CMMI is charged to “research, develop, test and expand innovative payment and service delivery models that will improve the quality and reduce the costs of care” for patients covered by CMS-related programs.

CMS demonstration sites are receiving significant funding to invest in infrastructure and programmatic changes that will improve communication among health providers and improve funding for primary care. Early reports indicate that such communication and primary care investment can reduce healthcare spending as much as 30 percent. If so, success of this program could reverse or, at best, confuse any conclusions about total health expenditures.

Health reform statutes also required the U.S. Department of Health and Human Services/ Health Resource and Service Administration (HRSA) to re-examine the way it defines underserved areas. A negotiated rulemaking committee to review criteria for the designation of medically underserved areas and health professional shortage areas is charged with this responsibility.

7.3 RECOMMENDATIONS

7.3.1 POLICY ISSUES

Healthcare policy issues that merit ARC attention must affect multiple states and have achievable solutions. Even with limited resources, ARC could do much for the region by working with HRSA and CMS to ensure access to Rural Health Clinics throughout the region and by advocating for regional adjustments to the geographic eligibility criteria in central and southern Appalachia.

If proposed changes to the CMS hospital Geographic Wage Index do not include special provisions for communities in rural central and southern Appalachia, access provisions in the ACA reform statute may not reach reality there, because providers will not be able to afford the tools required to optimize health reform programs.

In fact, several federal agencies are key players. One, CMS, directly affects sustained payment for services. Health reform research studies show improvements in health outcomes most likely to occur among persons using care provided in integrated healthcare delivery systems aligned with primary care medical homes.

With its policy position, ARC has opportunities to represent a regional voice in several areas of healthcare reform:

- Advocating for Geographic Wage Index change, through CMS, MedPac, or Institute of Medicine;
- Advocating for Rural Health Clinic expansion through CMS Center for Medicare and Medicaid Innovation and HRSA;
- Communicator of successful efforts to address care management for Medicare/ Medicaid dual eligibles;
- Champion of expanded FTC broadband access, which is so essential for remote area healthcare delivery;
- Communicator of local success with information technology and community-based initiatives that extend the reach of specialists into remote areas;
- Continued support for initiatives to develop the healthcare labor force, including entry-level positions inside the region;
- Participant in HRSA definition of underserved areas; and
- Advisor on CMMI Innovation, particularly programs that will pay for extended practice providers like community health workers and dental hygienists.

7.3.2 PARTICIPATE WITH INSTITUTE OF MEDICINE COMMITTEE TO MODIFY CMS GEOGRAPHIC WAGE INDEX

The HCCA Index cost component is the unmodified CMS hospital Geographic Wage Index. Data for the Geographic Wage Index are collected from cost reports filed by hospitals. However, Medicare applies it to adjust payments and, by reference to Medicare, other payers use it for their payment baseline. At least four national committees are reviewing the Geographic Wage Index, including the Institute of Medicine, the Centers for Medicare and Medicaid, the Research Triangle Institute and MedPac. Many are calling for changes in the way this controversial measure is calculated and applied. High indices boost local payments and low indices pull them down.

In June 2011, the National Institutes of Medicine (IOM) published its first report on the Geographic Wage Index⁹¹. The report explored the structure of two indices used by CMS to adjust Medicare payments to allow for geographic variations in cost. The first is the hospital Geographic Wage Index. A second index is applied to physician service payment. Both hospital and physician wage indices are applied within state boundaries. Both address the labor component of healthcare costs. The physician index is the most simple, for in many states, it is uniform statewide. In some states, specific metro areas have a different index. The hospital Geographic Wage Index is much more complex, varies significantly within and across state lines, and has been politically modified with carve out exceptions since its introduction in 1965. The IOM June report observed some structural problems with the hospital Geographic Wage Index.

- Some counties have no hospital, so they are represented by the nearest hospital
- Areas within states are aggregated to two groups, individual CBSA's and "Rest of State"

⁹¹ Edmunds, Margaret and Frank A. Sloan, Editors, Geographic Adjustment in Medicare Payment Phase I: Improving Accuracy. Committee on Geographic Adjustment Factors in Medicare Payment. Board on Health Care Services. Institute of Medicine of the National Academies. Washington, D.C. June 1, 2011

- Communities on the boundaries of CBSA's are often relegated to a lower cost area when they are, in fact, paying CBSA wages
- Some labor costs are becoming uniform nationally; the index should be tailored to reflect the costs that actually vary locally
- Variation in the index is too broad. With 1.0 as the national average, the lowest index is 0.7 and the highest is 1.65. The actual differential should probably be 0.8 to 1.2⁹²
- Reclassifications are common, made possible by special exceptions for:
 - Sole Community Hospital
 - Rural floors
 - Frontier Index
 - Special petitions based on proof of labor migration patterns
- Reclassifications more often reflect political considerations, than uniformly reflect national labor cost differences.
- Boundaries do not truly reflect labor market boundaries
- Data on the cost reports are self-reported, thus have limited transparency

The IOM Committee agreed that labor costs differ between metropolitan and non-metropolitan areas, with higher wages prevailing in metropolitan areas. However, it recommends more focus on the price of labor in each market that is beyond the control of the hospital. It notes that the cost reports are prone to reflect a hospital's own decisions about wages.

The IOM has recommended a number of changes:

- Use one index. Do not separate physicians from other providers.
- Use Bureau of Labor Statistics wage data for a fixed, defined set of occupations
- Standardize all geographic areas to metropolitan and non-metropolitan
- Use data from all healthcare employers, not just hospitals
- Develop a weighting system for all types of healthcare workers to reflect the actual mix of different healthcare professionals in the labor force. The IOM recommends that the weights be derived from the hours each profession works in the specific type of healthcare facility: hospital, hospice, home health agency, etc.
- Adjust the index nationwide to account for commuting patterns. This would smooth the differences at the boundaries of metropolitan statistical areas. It would likely boost payments for some rural areas.
- Maintain MSA and statewide non-MSA boundaries.

These are recommendations, and will likely take years to translate to national policy. However, Congress did mandate that a report on the Geographic Wage index be produced in 2011. No doubt, many of these recommendations will be seriously considered, and built into new amendments to the Medicare and Medicaid statute.

⁹² Interview with RTP staff to the IOM Committee. Kathleen Dalton, Ph.D. June 1, 2011.

7.3.3. SUPPORT REGIONAL AND LOCAL HEALTHCARE LABOR FORCE REFORMS AND TECHNOLOGY

ARC has the structure to integrate health resource planning into overall comprehensive planning. As a member of the White House Rural Council, ARC can advocate for policy change.

ARC has several opportunities in workforce development, and in technology evolution.

- Successful health workforce/ health resource developments that take place in one state or within the ARC states can be diffused more effectively across regional and state boundaries when sponsored by the ARC. Similarly, failures may not spread if ARC helps tell the story or the “lessons learned”.
- Demonstrations in one state or community can be shared quickly among local decision makers and may not have to wait for dissemination through the peer review literature. CMS is encouraging this approach as a part of its “Rapid Cycle Improvement Initiative”, which requires extensive documentation and quick feedback facilitated by a developed electronic contact system.
- Sound evaluation and good documentation of successes and failures in one area can be of use to health program planners in another area within the region and nationally, as ARC participates in critical work sessions with other federal health agencies.
- ARC’s long history with the J-1 visa program to bring physicians to underserved areas should be documented and evaluated to determine its possible utility in addressing shortages expected as health reform emerges. In several parts of Appalachia, where communities worked with ARC to set high standards and emphasize retention strategies, it has been an excellent source of highly qualified physicians, many of whom stayed.

“ARC’s primary care development program in the 1970’s was one of the best things that happened in northeast Mississippi. People from different communities got together and shared what they were learning and trying. Political party and racial lines disappeared”.

-Reece Dixon, State Legislator Noxubee County Mississippi, 2011.

Labor departments and workforce intermediaries are increasingly recognizing that healthcare is one of the few current growth industries. Even with efforts to reduce total costs, innovative and expanded roles for front line, entry health workers will exist across the care delivery spectrum in areas like emergency medicine technicians, health behavior community workers. Opportunities for entry include:

- Basic education with a health focus in secondary and community college education (numeracy, literacy, computer skills);
- Career ladder development to permit entry level workers and returning military to convert skills acquired to credits in academic professional programs, eventually reaching licensed professional levels; and
- State loan repayment programs.

ARC should also systematically assess how its general economic development programs may have affected health and health systems, for example, by increasing physician recruitment/ retention, reducing emergency and routine travel time, increasing health literacy, etc.

A wide array of mandates and opportunities are associated with the rapid innovations occurring in health information technology, payment initiatives and healthcare labor force; many of which are enjoying support from federal agencies. Using its cross-agency relationships, ARC can facilitate access to these by providers in the region, and, act as an intermediary to assure that regional providers are not unduly hampered by the mandates.

Expanded requirements for information technology are exceeding the healthcare industry's capacity to absorb it. Capital costs associated with electronic medical records, evidence based medicine, pharmaceutical protocols, and other evidence based medicine documentation, and electronic review of community health data, are almost as costly as the hospitals and clinics that house the providers. This represents an enormous hurdle in both capital infrastructure and labor force training for providers who are already facing economic challenges.

7.3.4 ADVOCATE FOR LOW RESOURCE AREAS

All 13 states have loan repayment programs for diverse health professionals in the medical, dental, nursing and allied health areas. Most are cooperatives with the National Health Service Corps, and funded through the Health Resources and Services Administration (HRSA). The definition of Medically Underserved Areas by HRSA excludes many communities from access to these benefits. Many ARC counties can benefit from these programs, and ARC could play a role in creating an Appalachian exception to include counties that have high YPLL_75 scores and/or low Health Care Resource Availability scores but may not meet HRSA criteria. Better collaboration and information sharing between programs across state line might lead to improvements, especially in boundary communities.

There are many federal loan repayment programs, e.g., National Health Service Corps loan repayment program, nursing loan repayment programs, geriatric career incentive rewards, pediatric specialist loan repayment program, public health workforce loan repayment program.

Funding associated with the 2010 stimulus legislation, American Recovery and Reinvestment Act (ARRA), dramatically expanded the number of National Health Service Corps (NHSC) clinicians deployed throughout the country. Documenting how much ARC counties were affected by these federal resources and what impact they are likely to have on long term retention is important. An assessment of the extent to which ARC states and communities have made use of opportunities for the health workforce and health resource programs initiated or expanded through health reform, via the Affordable Care Act, would tell how well and quickly the region responds to short-notice funding opportunities.

Continuing the ARC role of informing the region's communities about new opportunities (and challenges) in Federal funds availability helps the region to compete with better resourced companies and providers outside the region.

Private philanthropies have been catalytic in drawing attention to the special needs of the region. Because they are closer geographically, the regional foundations like Benedum, Kate B. Reynolds and the Foundation for Healthy Kentucky offer the strongest promise for start-up initiatives. Funding by these foundations often provides a platform from which regional providers can advance to larger scale funding from foundations like the Robert Wood Johnson Foundation, which regularly launches initiatives aimed at healthcare delivery improvement. ARC working with these foundations has helped many in the region and could be expanded as some of these foundations begin to work collaboratively.

Continued advocacy by ARC for expansion of opportunities to qualify for Rural Health Clinic designation would make low-cost primary care access even more available in the Appalachian Region. One Appalachian state, Maryland, has no Rural Health Clinics in 2011; New York and Ohio have few.

Telemedicine offers significant advantages to remote regions, and funding programs cover both infrastructure and service development; payment for services is still in developmental stages. ARCs experience in economic development makes it uniquely positioned to encourage novel health workforce development programs. Ideally, such programs should have multiple goals:

- Enhance population health and improve community health outcomes;
- Contribute to “bending the cost curve” of healthcare by shifting some healthcare tasks “downward” from more expensive providers (e.g., physicians, RNs) to lower cost frontline workers (e.g., patient care technicians and community health workers) to intervene before problems become expensive to solve; and
- Create stable jobs and career ladders for those frontline workers who can be recruited from unemployed, or underemployed local workers, or youth who might otherwise leave the region, or returning veterans whose skills are not formally recognized by credential boards.

7.3.5 ACTIVELY ENGAGE WITH CMS CENTER FOR MEDICARE AND MEDICAID INNOVATIONS

The Appalachian Regional Commission has an opportunity to represent Appalachia’s interests in an advocacy role with CMMI. CMMI has significant authority and funds to try innovative approaches to care delivery and extract lessons learned directly to new payment methods. Its mandates to increase access and reduce total healthcare costs fit well with the ARC mission. CMMI began announcing programs in 2011 and will solicit ideas and organize funding initiatives from 2012 through 2020. The program is ideally suited to the Appalachian Region; it requires state and healthcare provider participation and would put ARC and participating states front and center with some of the program’s strategic goals. In one of the first initiatives, CMS will subsidize programs that develop and sustain employment for extended practice providers and entry-level workers like community health workers.

Listed among its intended targets are programs that reflect the ARC Health Demonstration legacy:

- Multi-Payer Advanced Primary Care Practice Demonstration
- Comprehensive Primary Care Initiative
- Partnership for Patients
- State Demonstrations to Integrate Care for Dual Eligible Individuals
- Demonstration to Improve Quality of Care for Nursing Facility Residents
- Financial Models to Support State Efforts to Coordinate Care for Medicare-Medicaid Enrollees

One of the key reasons for the project is described as the “Need to identify and test new ways to create the workforce of the future that will deliver and support new care models”, for example:

- New roles and skills for existing health professionals,
- New types of workers to support care transformation, and
- Team-based models to better utilize a mix of health providers.

7.4 AREAS FOR FURTHER STUDY

The region can benefit from pushing the boundaries in most dimensions of this report. Although most Appalachian residents have health insurance, what is covered may be limited. And, nationwide, the amount of care covered by insurance is declining. In some areas, a person eligible for Medicaid has better coverage than a person with high deductible private insurance. A new measure that better reflects the depth of coverage will be needed to truly understand distinctions in the value of health insurance coverage from one geographic area to another. Standardization of coverage is a national issue that will require participation of both the measurement agencies at CDC, AHRQ and HRSA, and the payers at CMS and private insurance. It should get substantial attention as CMS, the states and the insurance industry work out the terms of the ACA-mandated health insurance exchanges.

Beyond changes to the Geographic Wage Index, healthcare payment system reform will profoundly affect the Appalachian Region. Initial attempts to curb high use may actually hurt areas of the region that benefit from the economic impact of healthcare spending. It will be important for the region's healthcare industry to keep pace with rapid cycle innovations emerging from health reform initiatives; and to participate in evaluations of both beneficial and adverse impacts on the region.

The region's rich history of effectively using alternative health professionals is ready for career path development and inclusion in payment programs. A baseline report describing the many programs that are working effectively under grant subsidy would accelerate their inclusion in national health reform payment programs.

The cost of dual eligibles in Appalachian counties was not explored in this report, nor was the state burden of long term healthcare services. Both represent a large part of the state budget burden for healthcare and a review of successful efforts at reducing these costs while increasing health status would also be useful to Appalachian states.

Block grants for Medicaid, which are under consideration as a way to give states more flexibility and put defined limits on federal contributions, may or may not help Appalachian states. A review of proposals against current federal payments to states would be helpful.

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APPENDICES

APPENDIX A: CMS WAGE INDEX

**TABLE 27- CMS WAGE INDEX APPROVED FOR USE IN 2010 MEDICARE PAYMENTS
(EXCERPTS FROM RECLASSIFIED INDEX)**

CBSAGEO	cbsa unadjusted ahw	unadjusted wage index	cbsa occmix adjusted wages	cbsa occmix adjusted ahw	occ mix adjusted wage index
a	b	c	d	e	f
01	24.5828	0.7327	537,171,016.88	24.81461	0.7401
02	39.1490	1.1669	55,870,291.81	39.07405	1.1655
03	29.4898	0.879	115,413,433.82	29.55665	0.8816
04	24.5993	0.7332	405,796,338.06	25.27959	0.754
05	40.2613	1.2001	282,058,410.30	39.60987	1.1814
06	33.3101	0.9929	266,785,865.61	32.51602	0.9699
07	37.2154	1.1093	199,174,413.45	37.74876	1.1259
08	33.2470	0.991	181,828,359.29	33.57681	1.0015
10	28.7395	0.8566	414,629,181.48	28.88329	0.8615
11	25.5738	0.7623	796,499,027.93	26.25911	0.7832
12	37.2838	1.1113	229,761,783.16	37.88722	1.1301
13	25.9421	0.7733	86,108,799.32	25.66652	0.7656
14	27.8874	0.8312	767,721,224.45	27.94876	0.8336
15	28.6157	0.8529	475,590,501.29	28.5959	0.8529
16	28.9343	0.8624	413,214,145.70	28.77978	0.8584
17	27.3979	0.8167	382,851,414.05	27.34289	0.8156
18	26.2109	0.7813	998,040,430.76	26.54652	0.7918
19	25.5337	0.7611	524,643,658.07	26.27411	0.7837
20	28.7816	0.8579	348,349,981.79	28.72936	0.8569
21	30.6333	0.9131	202,587,754.07	30.99966	0.9246
23	29.4509	0.8778	1,008,509,665.22	29.54314	0.8812
24	30.7321	0.916	434,719,304.17	30.74302	0.917
25	25.6260	0.7638	936,884,454.57	25.91737	0.773
26	25.7365	0.7671	581,873,857.91	26.25918	0.7832
27	28.1781	0.8399	177,787,208.61	27.85996	0.831
28	29.2055	0.8705	318,361,097.12	29.08873	0.8676
29	32.4571	0.9674	43,705,967.27	32.49179	0.9691
30	33.4037	0.9957	453,167,298.66	33.53765	1.0003
32	29.9848	0.8938	316,882,007.34	30.18106	0.9002
33	27.7410	0.8269	993,168,365.41	28.15631	0.8398
34	28.6542	0.8541	1,430,081,871.85	28.85795	0.8607
35	26.2109	0.7813	72,696,021.57	26.80444	0.7995
36	28.5362	0.8506	1,095,384,224.15	28.61054	0.8534
37	25.6773	0.7654	570,564,918.08	26.21748	0.782
38	34.3414	1.0236	312,301,998.80	34.22945	1.021
39	27.8664	0.8306	1,348,642,320.53	28.04196	0.8364

CBSAGEO	cbsa unadjusted ahw	unadjusted wage index	cbsa occmix adjusted wages	cbsa occmix adjusted ahw	occ mix adjusted wage index
42	28.1621	0.8394	586,312,111.57	28.18972	0.8408
43	28.5519	0.851	144,197,091.29	28.07504	0.8374
44	26.1942	0.7808	679,934,388.12	26.53199	0.7914
45	26.0298	0.7759	1,073,441,785.43	26.67742	0.7957
46	28.0567	0.8363	82,653,766.16	28.34997	0.8456
47	32.7529	0.9763	150,892,853.86	32.20597	0.9606
49	26.4005	0.7869	475,395,964.87	27.08658	0.8079
50	34.2998	1.0224	198,657,517.99	33.99501	1.014
51	24.8124	0.7396	456,190,357.94	25.11384	0.7491
52	30.8842	0.9206	602,552,912.35	30.98923	0.9243
53	31.9893	0.9535	153,392,368.63	31.53379	0.9406
10180	26.6569	0.7946	134,608,459.40	27.99435	0.835
10380	11.6131	0.3462	22,914,237.30	11.29923	0.337
10420	29.6921	0.885	549,839,345.38	29.69807	0.8858
10500	29.8542	0.8899	177,531,492.74	29.99301	0.8946
10580	29.4455	0.8777	765,992,510.29	29.56859	0.8819
10740	31.5326	0.9399	657,191,563.81	32.16856	0.9595
10780	26.8807	0.8012	192,221,458.48	27.37408	0.8165
10900	32.2446	0.9611	820,887,225.88	32.95485	0.9829
11020	29.7350	0.8863	145,459,054.64	29.6321	0.8838
11100	29.1493	0.8689	210,048,961.59	28.86153	0.8608
11180	31.8496	0.9493	55,052,646.44	32.03333	0.9555
11260	40.3019	1.2013	287,947,371.32	39.78169	1.1866
11300	30.3672	0.9052	108,338,849.87	30.61859	0.9133
11340	30.2705	0.9023	139,776,634.52	30.67785	0.915
11460	34.5306	1.0293	1,078,630,885.62	34.39726	1.026
11500	25.6425	0.7643	90,615,578.11	25.53313	0.7616
11540	31.1643	0.9289	131,100,162.27	31.05119	0.9262
11700	30.3850	0.9057	396,215,526.24	30.49976	0.9097
12020	31.8446	0.9492	196,954,955.58	30.91235	0.922
12060	32.1786	0.9591	3,077,772,100.35	32.17651	0.9597
12100	38.7640	1.1554	335,910,444.36	38.32462	1.1431
12220	27.3031	0.8138	79,374,938.97	28.3184	0.8446
12260	31.5672	0.9409	527,200,313.81	31.71917	0.9461
12420	31.9321	0.9518	798,759,163.07	31.95571	0.9531
12540	37.6822	1.1232	477,861,580.53	38.11265	1.1368
12580	34.2662	1.0214	3,209,722,482.84	34.0219	1.0148
12620	34.0646	1.0154	227,651,974.54	33.66637	1.0042
12700	42.3315	1.2618	217,831,436.91	42.24554	1.2601
12940	27.4430	0.818	516,025,094.36	27.67032	0.8253
12980	33.5494	1	120,775,692.16	33.83193	1.0091
13020	31.0916	0.9267	91,647,418.75	31.72294	0.9462
13140	28.1248	0.8383	319,036,661.78	27.95648	0.8339
13380	38.2307	1.1395	124,352,444.75	37.89383	1.1303
13460	38.4005	1.1446	144,606,968.98	37.88804	1.1301
13644	34.5474	1.0298	599,447,050.91	34.10797	1.0173
13740	29.4611	0.8781	210,552,772.31	30.29329	0.9036
13780	29.4553	0.878	244,828,103.59	30.10871	0.898

CBSAGEO	cbsa unadjusted ahw	unadjusted wage index	cbsa occmix adjusted wages	cbsa occmix adjusted ahw	occ mix adjusted wage index
13820	28.6977	0.8554	980,843,975.64	28.5866	0.8526
13900	25.6205	0.7637	131,947,842.97	26.57642	0.7927
13980	28.1620	0.8394	86,482,280.18	28.0388	0.8363
14020	30.3396	0.9043	110,045,795.57	31.27462	0.9328
14060	31.4638	0.9378	113,212,495.16	31.81891	0.9491
14260	31.2610	0.9318	429,030,222.18	31.31018	0.9339
14484	40.8844	1.2186	3,316,113,219.64	41.28132	1.2313
14500	34.4432	1.0266	279,016,172.14	34.54688	1.0304

Key by column:

- a. Geographic Code for CBSA from Bureau of Labor Statistics
- b. Unadjusted average hourly wage (AHW) by CBSA from cost reports of providers in or assigned to this CBSA
- c. Unadjusted wage mix index by CBSA, with 1.0 as national average
- d. Total occupational mix adjusted wages by CBSA
- e. Occupational mix adjusted AHW by CBSA
- f. Occupational mix adjusted wage index before reclassification, with 1.0 as national average of all CBSA's

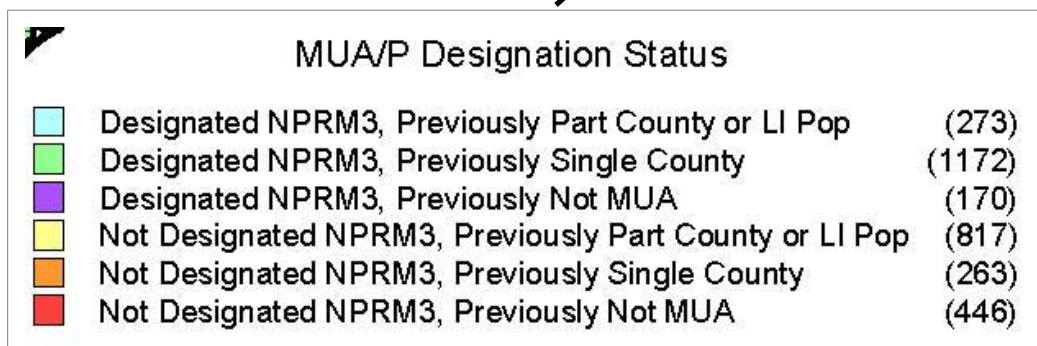
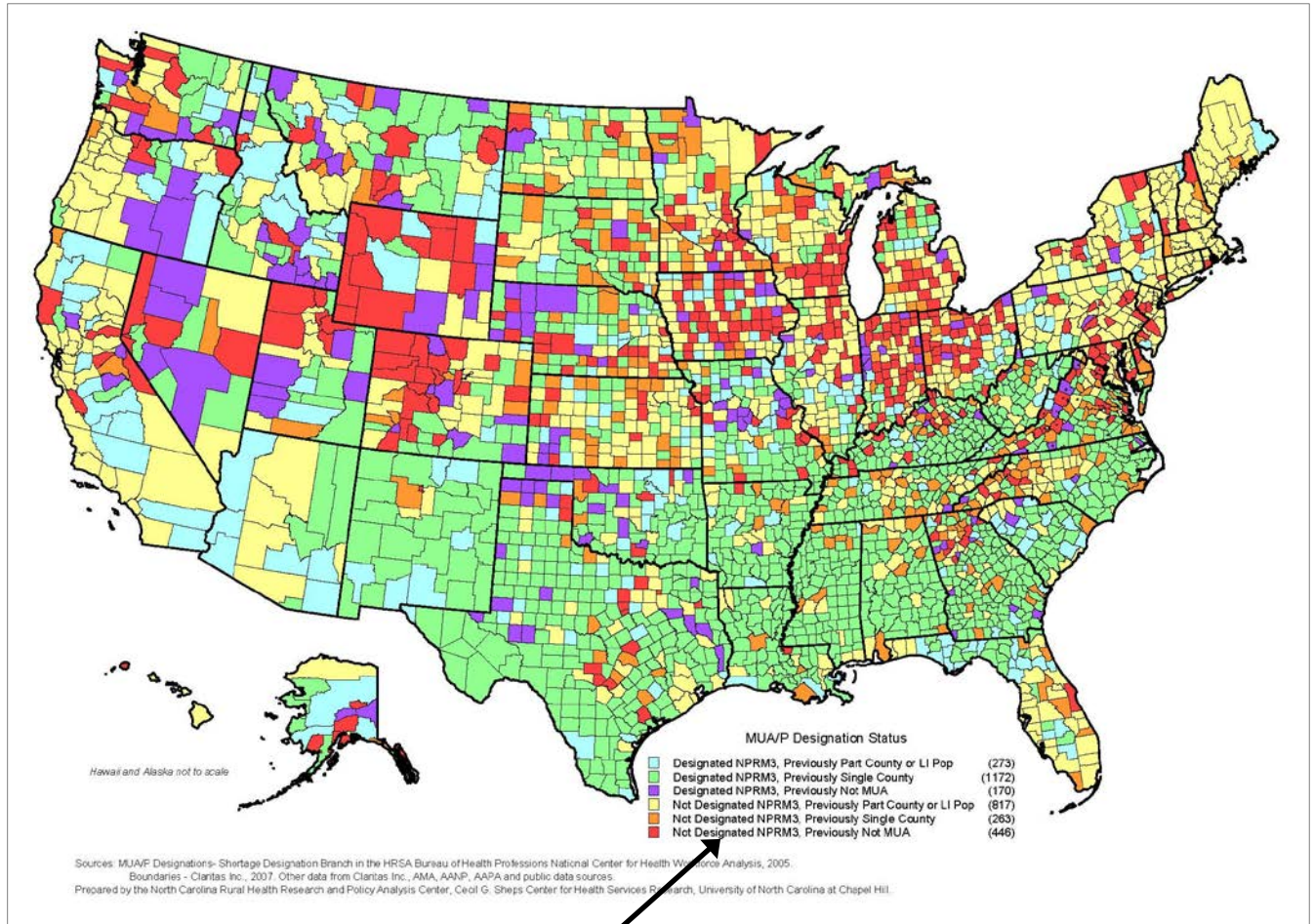
These data are before reclassification for any special adjustment for providers or areas.

Source: CMS FY 2010 Final Rule Home Page, Details for Final Occupational Mix Adjusted & Unadjusted AHWs & Pre-Reclass Wage Indexes by CBSA.

<https://www.cms.gov/AcuteInpatientPPS/10FR/itemdetail.asp?filterType=none&filterByDID=-99&sortByDID=1&sortOrder=ascending&itemID=CMS1227467&intNumPerPage=10>

APPENDIX B: SHEPS CENTER MEDICALLY UNDERSERVED MAP

FIGURE 46 - MEDICALLY UNDERSERVED AREAS & POPULATIONS IN THE UNITED STATES
 NPRM3 DESIGNATION CHANGE CATEGORIES: MUA/PS



APPENDIX C: FEDERAL MEDICAL ASSISTANCE PERCENTAGE RATES BY STATE 2011

**TABLE 28 - FEDERAL ASSISTANCE PERCENTAGES AND ENHANCED FEDERAL MEDICAL ASSISTANCE PERCENTAGES
EFFECTIVE OCTOBER 1, 2010- SEPTEMBER 30, 2011 (FISCAL YEAR 2011)**

State	Federal Medical assistance percentages	Enhanced Federal medical assistance percentages
Alabama.	68.54	77.98
Alaska.	50.00	65.00
American Samoa *	50.00	65.00
Arizona	65.85	76.10
Arkansas	71.37	79.96
California	50.00	65.00
Colorado	50.00	65.00
Connecticut	50.00	65.00
Delaware	53.15	67.21
District of Columbia **	70.00	79.00
Florida	55.45	68.82
Georgia	65.33	75.73
Guam *	50.00	65.00
Hawaii	51.79	66.25
Idaho	68.85	78.20
Illinois	50.20	65.14
Indiana	66.52	76.56
Iowa	62.63	73.84
Kansas	59.05	71.34
Kentucky	71.49	80.04
Louisiana	63.61	74.53
Maine	63.80	74.66
Maryland	50.00	65.00
Massachusetts	50.00	65.00
Michigan	65.79	76.05
Minnesota	50.00	65.00
Mississippi	74.73	82.31
Missouri	63.29	74.30
Montana	66.81	76.77
Nebraska	58.44	70.91
Nevada	51.61	66.13
New Hampshire	50.00	65.00
New Jersey	50.00	65.00
New Mexico	69.78	78.85
New York	50.00	65.00
North Carolina	64.71	75.30
North Dakota	60.35	72.25

State	Federal Medical assistance percentages	Enhanced Federal medical assistance percentages
Northern Mariana Islands *	50.00	65.00
Ohio	63.69	74.58
Oklahoma	64.94	75.46
Oregon	62.85	74.00
Pennsylvania	55.64	68.95
Puerto Rico *	50.00	65.00
Rhode Island	52.97	67.08
South Carolina	70.04	79.03
South Dakota	61.25	72.88
Tennessee	65.85	76.10
Texas	60.56	72.39
Utah	71.13	79.79
Vermont	58.71	71.10
Virgin Islands *	50.00	65.00
Virginia	50.00	65.00
Washington	50.00	65.00
West Virginia	73.24	81.27
Wisconsin	60.16	72.11
Wyoming	50.00	65.00

Source: "Federal Financial Participation in State Assistance Expenditures; Federal Matching Shares for Medicaid, the Children's Health Insurance Program, and Aid to Needy Aged, Blind, or Disabled Persons for October 1, 2010 through September 30, 2011," Office of the Secretary, DHHS. ACTION: Notice, Federal Register: November 27, 2009 (Volume 74, Number 227) [Page 62315-62317], <http://aspe.hhs.gov/health/fmap11.htm>

APPENDIX D: NATIONAL HEALTH SPENDING PROJECTIONS THROUGH 2020

TABLE 29- PROJECTED NATIONAL HEALTH EXPENDITURES: THE ESTIMATED IMPACT OF REFORM - AGGREGATE AMOUNTS

Item	Projected															
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
National Health Expenditures (billions)	\$2,021.0	\$2,152.1	\$2,283.5	\$2,391.4	\$2,486.3	\$2,584.2	\$2,708.4	\$2,823.9	\$2,980.4	\$3,227.4	\$3,417.9	\$3,632.0	\$3,849.5	\$4,080.0	\$4,348.5	\$4,638.4
National Health Expenditures as a Percent of Gross Domestic Product	16.0%	16.1%	16.2%	16.6%	17.6%	17.6%	17.7%	17.8%	17.6%	18.1%	18.3%	18.6%	18.8%	19.1%	19.4%	19.8%
National Health Expenditures Per Capita	\$6,826.7	\$7,197.6	\$7,560.7	\$7,845.0	\$8,086.5	\$8,327.3	\$8,648.5	\$8,936.8	\$9,348.8	\$10,035.2	\$10,535.3	\$11,099.3	\$11,664.3	\$12,259.1	\$12,951.7	\$13,708.8
Gross Domestic Product (billions)	\$12,638.4	\$13,398.9	\$14,061.8	\$14,389.1	\$14,119.0	\$14,659.6	\$15,334.4	\$16,071.0	\$16,891.1	\$17,803.8	\$18,712.3	\$19,573.5	\$20,464.8	\$21,396.1	\$22,360.8	\$23,368.4
Gross Domestic Product (billions of 2005 \$)	\$12,638.4	\$12,976.2	\$13,228.9	\$13,228.8	\$12,880.6	\$13,254.1	\$13,678.3	\$14,128.7	\$14,638.3	\$15,194.8	\$15,726.4	\$16,198.2	\$16,635.5	\$17,054.8	\$17,409.5	\$17,775.1
Gross Domestic Product Implicit Price Deflator (chain weighted 2005 base year)	1.000	1.033	1.063	1.086	1.096	1.107	1.123	1.139	1.157	1.175	1.194	1.213	1.235	1.262	1.292	1.323
Consumer Price Index (CPIW) - 1982-1984 base	1.953	2.016	2.073	2.153	2.145	2.182	2.232	2.292	2.363	2.437	2.505	2.575	2.647	2.721	2.797	2.876
U.S. Population ²	296.1	299.0	302.0	304.8	307.5	310.3	313.2	316.0	318.8	321.6	324.4	327.2	330.0	332.8	335.6	338.4
Population age less than 65 years	259.7	262.1	264.4	266.2	268.0	270.2	272.1	273.6	275.0	276.5	277.9	279.3	280.7	281.9	283.0	284.1
Population age 65 years and older	36.3	36.9	37.7	38.6	39.4	40.2	41.1	42.4	43.8	45.1	46.5	47.9	49.4	50.9	52.6	54.2
Private Health Insurance - NHE (billions)	\$697.2	\$733.6	\$763.8	\$790.6	\$801.2	\$822.3	\$850.3	\$864.4	\$926.9	\$1,013.7	\$1,076.7	\$1,141.0	\$1,200.3	\$1,251.0	\$1,324.7	\$1,402.0
Private Health Insurance - PHC (billions)	603.8	636.4	663.8	692.7	712.2	725.5	748.7	775.4	810.5	879.9	932.2	989.7	1,041.4	1,089.1	1,153.4	1,219.2
National Health Expenditures (billions)	—	6.5%	6.1%	4.7%	4.0%	3.9%	4.8%	4.3%	5.5%	8.3%	5.9%	6.3%	6.0%	6.0%	6.5%	6.7%
National Health Expenditures as a Percent of Gross Domestic Product (Change)	—	0.4	1.1	2.5	5.8	0.1	0.2	-0.5	0.4	2.7	0.8	1.6	1.4	1.3	1.8	2.1
National Health Expenditures Per Capita	—	5.4	5.0	3.8	3.1	3.0	3.9	3.3	4.6	7.3	5.0	5.4	5.1	5.1	5.6	5.8
Gross Domestic Product (billions)	—	6.0	4.9	2.2	-1.7	3.8	4.6	4.8	5.1	5.4	5.1	4.6	4.5	4.6	4.6	4.5
Gross Domestic Product (billions of 2005 \$)	—	2.7	1.9	0.0	-2.6	2.9	3.2	3.3	3.6	3.8	3.5	3.0	2.7	2.4	2.2	2.1
Gross Domestic Product Implicit Price Deflator (chain weighted 2005 base year)	—	3.3	2.9	2.2	0.9	1.0	1.4	1.5	1.5	1.6	1.6	1.6	1.8	2.2	2.4	2.4
Consumer Price Index (CPIW) - 1982-1984 base	—	3.2	2.8	3.8	-0.4	1.7	2.3	2.7	3.1	3.1	2.8	2.8	2.8	2.8	2.8	2.8
U.S. Population ³	—	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8
Population age less than 65 years	—	0.9	0.9	0.7	0.7	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4
Population age 65 years and older	—	1.7	2.0	2.6	2.0	1.9	2.3	3.2	3.3	3.1	3.0	3.0	3.1	3.2	3.2	3.2
Private Health Insurance - NHE	—	5.2	4.1	3.5	1.3	2.6	3.4	4.0	4.8	9.4	6.2	6.0	5.2	4.2	5.9	5.8
Private Health Insurance - PHC	—	5.4	4.3	4.4	2.8	1.9	3.2	3.6	4.5	6.6	5.9	6.2	5.2	4.6	5.9	5.7

¹The health spending projections were based on the National Health Expenditures released in January 2011. The projections include impacts of the Affordable Care Act.

²July 1 Census resident based population estimates.

NOTE: Numbers and percent's may not add to totals because of rounding.
Source: Centers for Medicare & Medicaid Services, Office of the Actuary.

APPENDIX E: OVERVIEW OF MEDICAID ECONOMIC IMPACT

TABLE 30 – MEDICAID ECONOMIC IMPACT FOR ARC STATES

State	State Study	Findings
Georgia	A. Essig, Governor's FY 2004 and FY 2005 Medicaid Budget Proposals (Georgia Budget Notes, no. 16), February 2004, Fiscal Research Center, Andrew Young School of Policy Studies, Georgia State University	<p>The state funded portion of the Medicaid budget in FY 2001 was \$2.15 billion. Spending for FY 2001 resulted in :</p> <ul style="list-style-type: none"> • \$3.225 billion federal match. • Employment impact: 75,000 jobs. • Business activity impact: \$7.2 billion. <p>Medicaid cuts proposed in the FY2004 and FY2005 budget of \$73.7 million will result in:</p> <ul style="list-style-type: none"> • \$114.5 million lost federal match. • 2,360 jobs lost
Maryland	Medicaid: Good Medicine for MD's Economy, 2003, Advocates for Children and Youth	<p>Effect of \$1 million in Medicaid cuts would result in:</p> <ul style="list-style-type: none"> • \$2.27 million in lost business activity • \$800,000 in lost wages • 22 lost jobs
Mississippi	B. Blair and M. Millea, Economic Impacts of Federal Medicaid Expenditures on the State of Mississippi in 2002, August 2003, Mississippi Health Policy Research Center, Mississippi State University	<p>Mississippi's 2002 Medicaid expenditure of approximately \$620 million resulted in:</p> <ul style="list-style-type: none"> • \$1.98 billion federal match • \$2.69 billion in additional economic output • \$1.39 billion of the state's GSP was attributable to federal Medicaid funding • 39,059 jobs supported by Medicaid inflow • \$1.05 billion in personal income • Increase in personal income generated \$60.7 million in tax revenue
North Carolina	K. Kilpatrick, et al, The Economic Impact of Proposed Reductions in Medicaid Spending in North Carolina, April 11, 2002, Institute for Public Health, School of Public Health, University of North Carolina, Chapel Hill.	<p>High reduction (-\$408,309,631 federal + state)</p> <ul style="list-style-type: none"> • Employment impact: 9,700 lost jobs • Economic output loss: \$706,257,420 <p>Federal reduction only under the high scenario (-\$278,593,774)</p> <ul style="list-style-type: none"> • Employment impact: 6,590 lost jobs • Economic output loss: \$479,846,829 <p>Low reduction (-\$399,292,466 federal + state)</p> <ul style="list-style-type: none"> • Employment impact: 9,500 lost jobs • Economic output loss: \$690,432,383

State	State Study	Findings
North Carolina	<p>C. Dumas, W. Hall and P Garrett .The Economic Impacts of Medicaid in North Carolina, March/April 2008 North Carolina ,Journal of Medicine 69,(2)</p>	<p>Federal reduction only under the low scenario (-\$272,467,295)</p> <ul style="list-style-type: none"> • Employment impact: 6,454 lost jobs • Economic output loss: \$469,094,951 <p>North Carolina state Medicaid expenditures of \$2.36 billion resulted in:</p> <ul style="list-style-type: none"> • \$3.941 billion in federal dollars • 182,000 jobs (including full and part time positions) • \$6.11 billion in wages, salaries and sole proprietorship/partnership profits • \$1.892 billion in rents, interest and corporate dividend payments to NC citizens • \$2.2 billion in government tax revenues
Ohio	<p>R. Greenbaum and A. Desai, Uneven Burden: Economic Analysis of Medicaid Expenditure Changes in Ohio ,April 2003 , School of Public Policy and Management, The Ohio State University</p> <p>A. Desai, Y. Kim, and R. Greenbaum Estimating Local Effects of Medicaid Expenditure Changes ,June 2005, Health Policy Institute of Ohio and The Health Foundation of Greater Cincinnati</p>	<p>Ohio’s FY 2001 state expenditure of \$3.6 billion for Medicaid expenditures resulted in the following:</p> <ul style="list-style-type: none"> • Employment impact: 132,028 jobs • Income impact: \$4.1 billion • New business activity: \$11.5 billion A reduction of \$491 million in state <p>Medicaid expenditures would result in :</p> <ul style="list-style-type: none"> • Reduced economic activity: \$1.5 billion over a two-year period • Employment impact: 16,500 jobs • Fiscal impact: \$22 million in tax revenue (tax revenue figure includes only state income taxes and does not estimate the effect on sales and other taxes) <p>Cuts proposed in state spending in SFY2006 (\$3.26 million) and SFY2007 (\$5.98 million) budget include:</p> <ul style="list-style-type: none"> • A \$3 billion reduction in economic activity over the two year period • 30,000 jobs lost over the two year period
South Carolina	<p>Division of Research Moore School of Business University of South Carolina Economic ,Impact of Medicaid on South Carolina, January 2002, Fiscal Analytics, Ltd.</p>	<p>South Carolina’s 2001 state expenditure for Medicaid resulted in:</p> <ul style="list-style-type: none"> • \$2.1 billion federal matching funds • Support of more than 61,000 jobs • Generation of \$1.5 billion in income for state citizens

State	State Study	Findings
Virginia	The Impact of Additional Medicaid Spending in Virginia ,June 2003	<p>A \$250 million increase in state Medicaid spending would result in support of 10,000 to 15,000 jobs</p> <p>RIMS II calculations (using Virginia-specific multiplier of 2.5 from Medicaid; Good Medicine for State Economies, Families U.S.A.):</p> <ul style="list-style-type: none"> • \$250 million federal match • \$626 million in new business activity <p>IMPLAN calculations (using multiplier of 1.7):</p> <ul style="list-style-type: none"> • \$250 million federal match • \$426 million in new business activity
West Virginia	Christiadi and T. Witt, Economic Impact of Medicaid Federal-Match on the West Virginia Economy FY 2002 ,January 2003 ,Bureau of Business and Economic Research, College of Business and Economics, West Virginia University	<p>West Virginia's FY 2002 state expenditure of \$371 million for Medicaid generated:</p> <ul style="list-style-type: none"> • \$1.133 billion federal match • Total employment of: 32,685 jobs • Total income of \$667.3 in employee compensation • Total business volume of \$1.881.0 billion • \$955.2 million of value added

APPENDIX F: MEDICAID COVERAGE AND SPENDING: HEALTH REFORM

TABLE 31 - NATIONAL AND STATE-BY-STATE RESULTS FOR ADULTS AT OR BELOW 133 PERCENT FPL (STANDARD PARTICIPATION SCENARIO)

	Coverage in 2019			Spending in 2014-2019 (in millions)				Change From Baseline 2014-2019			
	Total New Medicaid Enrollees*	Previously Uninsured Newly Enrolled	% Reduction in Uninsured Adults < 133% FPL	State Spending	Federal Spending	Total Spending	% Federal Spending	Enrollment in 2019	State Spending	Federal Spending	Total Spending
Northeast											
Connecticut	114,083	75,864	48.0%	\$263	\$4,686	\$4,949	94.7%	20.1%	1.2%	21.0%	11.1%
Maine	43,468	27,877	47.4%	-\$118	\$1,857	\$1,738	100%*	11.8%	-1.5%	12.9%	7.7%
Massachusetts**	29,921	10,401	10.2%	-\$1,274	\$2,137	\$864	100%*	2.0%	-2.1%	3.5%	0.7%
New Hampshire	55,918	34,625	48.7%	\$63	\$1,204	\$1,267	95.0%	38.8%	1.1%	21.3%	11.2%
New Jersey	390,490	292,489	45.3%	\$533	\$9,030	\$9,563	94.4%	38.1%	1.2%	20.9%	11.1%
New York	305,945	223,175	14.8%	\$50	\$8,049	\$8,099	99.4%	6.0%	0.0%	3.3%	1.7%
Pennsylvania	482,366	282,014	41.4%	\$1,054	\$17,086	\$18,140	94.2%	21.7%	1.4%	17.7%	10.5%
Rhode Island	41,185	29,147	50.6%	\$70	\$1,559	\$1,629	95.7%	20.0%	0.7%	14.6%	8.1%
Vermont	4,484	3,214	10.2%	-\$26	\$112	\$86	100%*	2.8%	-0.6%	1.9%	0.9%
Midwest											
Illinois	631,024	429,258	42.5%	\$1,202	\$19,259	\$20,461	94.1%	25.8%	1.6%	25.9%	13.8%
Indiana	297,737	215,803	44.2%	\$478	\$8,535	\$9,013	94.7%	29.4%	2.5%	22.9%	16.1%
Iowa	114,691	74,498	44.1%	\$147	\$2,800	\$2,947	95.0%	25.3%	1.4%	15.7%	10.3%
Kansas	143,445	89,265	50.9%	\$166	\$3,477	\$3,643	95.4%	42.0%	1.7%	24.0%	14.8%
Michigan	589,965	430,744	50.6%	\$686	\$14,252	\$14,938	95.4%	30.2%	2.0%	21.5%	14.8%
Minnesota	251,783	132,511	44.2%	\$421	\$7,836	\$8,257	94.9%	32.9%	1.2%	22.0%	11.6%
Missouri	307,872	207,678	45.5%	\$431	\$8,395	\$8,826	95.1%	29.8%	1.7%	19.5%	13.0%
Nebraska	83,898	50,364	53.9%	\$106	\$2,345	\$2,451	95.7%	36.2%	1.5%	23.5%	14.4%
North Dakota	28,864	17,198	45.1%	\$32	\$595	\$627	94.9%	44.0%	1.4%	16.9%	10.8%
Ohio	667,376	462,024	50.0%	\$830	\$17,130	\$17,960	95.4%	31.9%	1.6%	19.2%	12.8%
South Dakota	31,317	18,594	51.9%	\$32	\$717	\$748	95.8%	25.9%	1.1%	16.4%	10.5%
Wisconsin	205,987	127,862	50.6%	\$205	\$4,252	\$4,457	95.4%	20.8%	0.9%	12.7%	8.0%
South											
Alabama	351,567	244,804	53.2%	\$470	\$10,305	\$10,776	95.6%	36.9%	3.6%	35.9%	25.7%
Arkansas	200,690	154,836	47.6%	\$455	\$9,401	\$9,856	95.4%	27.9%	4.7%	38.9%	29.1%
Delaware	12,081	7,916	15.9%	\$3	\$387	\$390	99.2%	6.7%	0.1%	6.2%	3.3%
District of Columbia	28,900	15,308	49.1%	\$42	\$902	\$944	95.6%	16.1%	0.9%	8.3%	6.1%
Florida	951,622	683,477	44.4%	\$1,233	\$20,050	\$21,283	94.2%	34.7%	1.9%	24.3%	14.3%
Georgia	646,557	479,138	49.4%	\$714	\$14,551	\$15,265	95.3%	40.4%	2.7%	28.9%	19.8%
Kentucky	329,000	250,704	57.1%	\$515	\$11,878	\$12,393	95.8%	37.3%	3.5%	32.2%	24.0%
Louisiana	366,318	277,746	50.7%	\$337	\$7,273	\$7,610	95.6%	32.4%	1.7%	21.6%	14.4%
Maryland	245,996	174,484	46.2%	\$533	\$9,112	\$9,645	94.5%	32.4%	1.7%	29.6%	15.6%
Mississippi	320,748	256,920	54.9%	\$429	\$9,865	\$10,294	95.8%	41.2%	4.8%	37.0%	28.9%
North Carolina	633,485	429,272	46.6%	\$1,029	\$20,712	\$21,741	95.3%	38.2%	2.6%	29.0%	19.7%
Oklahoma	357,150	261,157	53.1%	\$549	\$12,179	\$12,728	95.7%	51.2%	4.0%	48.2%	32.7%
South Carolina	344,109	247,478	56.4%	\$470	\$10,919	\$11,389	95.9%	38.4%	3.6%	36.0%	26.3%
Tennessee	330,932	245,691	43.3%	\$716	\$11,072	\$11,788	93.9%	20.9%	2.5%	20.4%	14.3%
Texas	1,798,314	1,379,713	49.4%	\$2,619	\$52,537	\$55,156	95.3%	45.5%	3.0%	38.9%	24.7%
Virginia	372,470	245,840	50.6%	\$498	\$9,629	\$10,127	95.1%	41.8%	1.8%	35.1%	18.4%
West Virginia	121,635	95,675	56.7%	\$164	\$3,781	\$3,945	95.9%	29.5%	2.4%	20.4%	15.6%
West											
Alaska	42,794	33,106	48.4%	\$117	\$2,046	\$2,163	94.6%	38.5%	2.1%	36.9%	19.5%
Arizona	105,428	81,095	13.6%	\$56	\$2,091	\$2,147	97.4%	7.7%	0.2%	4.2%	2.9%
California	2,008,796	1,406,101	41.5%	\$2,982	\$44,694	\$47,676	93.7%	20.1%	1.5%	23.0%	12.3%
Colorado	245,730	166,471	50.0%	\$286	\$5,917	\$6,203	95.4%	47.7%	1.8%	37.1%	19.4%
Hawaii	84,130	42,381	50.0%	-\$28	\$2,999	\$2,971	100%*	38.0%	-0.5%	46.8%	24.0%
Idaho	85,883	59,078	53.9%	\$101	\$2,402	\$2,502	96.0%	39.4%	2.5%	27.1%	19.4%
Montana	57,356	37,978	49.6%	\$100	\$2,178	\$2,278	95.6%	54.5%	3.7%	40.0%	27.9%
Nevada	136,563	100,813	47.0%	\$188	\$3,445	\$3,633	94.8%	61.7%	2.9%	49.8%	27.1%
New Mexico	145,024	111,279	52.6%	\$194	\$4,510	\$4,704	95.9%	28.3%	2.1%	21.3%	15.5%
Oregon	294,600	211,542	56.7%	\$438	\$10,302	\$10,739	95.9%	60.6%	3.6%	50.6%	33.1%
Utah	138,918	78,284	52.5%	\$174	\$4,129	\$4,304	96.0%	56.1%	3.7%	35.3%	26.2%
Washington	295,662	189,463	52.2%	\$380	\$8,271	\$8,651	95.6%	25.2%	1.2%	26.0%	13.6%
Wyoming	29,899	19,099	53.0%	\$32	\$683	\$715	95.6%	40.0%	1.2%	26.8%	14.0%
Total	15,904,173	11,221,455	44.5%	\$21,148	\$443,530	\$464,678	95.4%	27.4%	1.4%	22.1%	13.2%

*Includes newly enrolled 1115 waiver eligible population.

** Massachusetts has a low share of uninsured within the newly enrolled due to low levels of uninsurance in the baseline.

Note: These estimates relate solely to the Medicaid expansion and do not account for other changes in health reform such as access to subsidized coverage in the exchanges or state or federal savings from reduced uncompensated care or the transition of individuals from state-funded programs to Medicaid in 2014.

Source: Medicaid Coverage and Spending in Health Reform. Kaiser Commission on Medicaid and the Uninsured. www.kff.org/healthreform/upload/Medicaid-Coverage-and-Spending-in-Health-Reform-National-and-State-By-State-Results-for-Adults-at-or-Below-133-FPL.pdf.

APPENDIX G: MEDICAID COVERAGE AND SPENDING: HEALTH REFORM

**TABLE 32 - NATIONAL AND STATE-BY-STATE RESULTS FOR ADULTS AT OR BELOW 133 PERCENT FPL
(ENHANCED PARTICIPATION SCENARIO)**

	Coverage in 2019			Spending in 2014-2019 (in millions)				Change From Baseline 2014-2019			
	Total New Medicaid Enrollees*	Previously Uninsured Newly Enrolled	% Reduction in Uninsured Adults < 133% FPL	State Spending	Federal Spending	Total Spending	% Federal Spending	Enrollment in 2019	State Spending	Federal Spending	Total Spending
Northeast											
Connecticut	154,664	113,876	72.1%	\$440	\$5,048	\$5,488	92.0%	27.3%	2.0%	22.6%	12.3%
Maine	59,502	41,858	71.1%	-\$65	\$2,105	\$2,040	100%*	16.2%	-0.8%	14.7%	9.1%
Massachusetts**	75,569	43,508	42.9%	-\$628	\$2,783	\$2,155	100%*	5.2%	-1.0%	4.5%	1.8%
New Hampshire	76,744	52,146	73.4%	\$117	\$1,470	\$1,586	92.6%	53.3%	2.1%	26.0%	14.0%
New Jersey	567,852	455,627	70.6%	\$1,078	\$11,129	\$12,207	91.2%	55.4%	2.5%	25.7%	14.1%
New York	820,623	706,575	46.7%	\$2,859	\$17,170	\$20,030	85.7%	16.0%	1.2%	7.1%	4.1%
Pennsylvania	682,880	458,200	67.2%	\$2,041	\$19,489	\$21,530	90.5%	30.8%	2.7%	20.2%	12.4%
Rhode Island	53,841	40,850	70.9%	\$100	\$1,768	\$1,868	94.6%	26.2%	1.1%	16.5%	9.2%
Vermont	15,509	13,443	42.9%	\$8	\$283	\$291	97.4%	9.7%	0.2%	4.9%	2.9%
Midwest											
Illinois	911,830	694,012	68.8%	\$2,468	\$22,109	\$24,577	90.0%	37.2%	3.3%	29.7%	16.6%
Indiana	427,311	337,987	69.1%	\$899	\$10,112	\$11,010	91.8%	42.2%	4.8%	27.1%	19.6%
Iowa	163,264	117,621	69.6%	\$257	\$3,298	\$3,555	92.8%	36.1%	2.4%	18.4%	12.4%
Kansas	192,006	131,528	75.1%	\$260	\$4,033	\$4,293	93.9%	56.2%	2.6%	27.8%	17.5%
Michigan	812,818	635,231	74.6%	\$1,096	\$16,944	\$18,040	93.9%	41.6%	3.2%	25.6%	17.9%
Minnesota	348,684	211,781	70.7%	\$745	\$9,116	\$9,861	92.4%	45.6%	2.1%	25.6%	13.9%
Missouri	437,735	324,276	71.0%	\$773	\$10,228	\$11,001	93.0%	42.4%	3.1%	23.8%	16.2%
Nebraska	110,820	71,053	76.0%	\$155	\$2,732	\$2,886	94.6%	47.8%	2.2%	27.4%	16.9%
North Dakota	40,017	26,457	69.4%	\$57	\$709	\$766	92.5%	61.0%	2.5%	20.2%	13.2%
Ohio	901,023	670,992	72.6%	\$1,335	\$19,578	\$20,913	93.6%	43.1%	2.6%	22.0%	14.9%
South Dakota	41,847	27,160	75.8%	\$46	\$844	\$890	94.9%	34.6%	1.6%	19.3%	12.5%
Wisconsin	277,116	188,043	74.3%	\$314	\$4,912	\$5,226	94.0%	28.0%	1.4%	14.7%	9.4%
South											
Alabama	455,952	335,547	72.9%	\$693	\$11,404	\$12,097	94.3%	47.9%	5.3%	39.7%	28.9%
Arkansas	286,347	234,695	72.1%	\$761	\$11,523	\$12,284	93.8%	39.9%	7.9%	47.7%	36.3%
Delaware	28,839	23,317	46.9%	\$90	\$686	\$776	88.4%	15.9%	1.6%	11.0%	6.6%
District of Columbia	38,763	22,891	73.4%	\$62	\$1,068	\$1,129	94.5%	21.5%	1.3%	9.9%	7.3%
Florida	1,376,753	1,073,391	69.7%	\$2,537	\$24,260	\$26,797	90.5%	50.2%	3.8%	29.4%	18.0%
Georgia	907,203	721,558	74.4%	\$1,233	\$17,916	\$19,149	93.6%	56.7%	4.6%	35.6%	24.9%
Kentucky	423,757	337,987	77.0%	\$695	\$13,220	\$13,915	95.0%	48.1%	4.7%	35.8%	26.9%
Louisiana	507,952	409,869	74.8%	\$536	\$8,937	\$9,472	94.3%	44.9%	2.8%	26.5%	17.9%
Maryland	348,140	267,555	70.8%	\$1,060	\$10,881	\$11,941	91.1%	45.9%	3.4%	35.3%	19.4%
Mississippi	419,571	350,091	74.8%	\$581	\$10,959	\$11,539	95.0%	53.9%	6.4%	41.1%	32.4%
North Carolina	887,560	661,292	71.8%	\$1,791	\$24,720	\$26,511	93.2%	53.5%	4.6%	34.6%	24.0%
Oklahoma	470,358	367,541	74.8%	\$789	\$13,436	\$14,225	94.5%	67.4%	5.8%	53.2%	36.6%
South Carolina	443,020	334,296	76.2%	\$615	\$12,109	\$12,724	95.2%	49.4%	4.7%	39.9%	29.4%
Tennessee	474,240	372,894	65.7%	\$1,523	\$13,128	\$14,651	89.6%	29.9%	5.4%	24.2%	17.8%
Texas	2,513,355	2,055,888	73.6%	\$4,514	\$62,056	\$66,570	93.2%	63.5%	5.1%	45.9%	29.8%
Virginia	504,466	365,514	75.2%	\$863	\$11,129	\$11,992	92.8%	56.7%	3.1%	40.5%	21.8%
West Virginia	156,582	129,185	76.5%	\$217	\$4,182	\$4,399	95.1%	37.9%	3.2%	22.6%	17.4%
West											
Alaska	59,914	49,061	71.7%	\$219	\$2,379	\$2,598	91.6%	53.9%	3.9%	42.9%	23.4%
Arizona	305,634	273,008	45.6%	\$739	\$4,861	\$5,600	86.8%	22.4%	2.9%	9.9%	7.5%
California	2,986,362	2,291,221	67.6%	\$6,544	\$54,936	\$61,481	89.4%	29.9%	3.4%	28.3%	15.8%
Colorado	337,706	249,208	74.8%	\$470	\$6,925	\$7,395	93.6%	65.6%	2.9%	43.4%	23.2%
Hawaii	110,203	64,167	75.7%	\$30	\$3,414	\$3,444	99.1%	49.7%	0.5%	53.3%	27.8%
Idaho	115,730	85,523	78.1%	\$133	\$2,896	\$3,028	95.6%	53.1%	3.3%	32.7%	23.5%
Montana	78,840	56,889	74.3%	\$155	\$2,558	\$2,713	94.3%	75.0%	5.7%	47.0%	33.3%
Nevada	196,168	156,025	72.7%	\$338	\$4,100	\$4,438	92.4%	88.6%	5.2%	59.3%	33.1%
New Mexico	201,855	163,105	77.1%	\$278	\$5,608	\$5,885	95.3%	39.4%	3.0%	26.5%	19.4%
Oregon	386,845	292,651	78.4%	\$555	\$11,723	\$12,279	95.5%	79.6%	4.6%	57.6%	37.9%
Utah	180,478	113,872	76.3%	\$227	\$4,695	\$4,921	95.4%	72.8%	4.8%	40.2%	30.0%
Washington	395,577	276,096	76.1%	\$567	\$9,573	\$10,139	94.4%	33.6%	1.8%	30.1%	15.9%
Wyoming	40,041	27,488	76.2%	\$49	\$818	\$867	94.3%	53.6%	1.9%	32.0%	17.0%
Total	22,809,862	17,524,046	69.5%	\$43,218	\$531,958	\$575,176	92.5%	39.3%	2.9%	26.5%	16.4%

*Includes newly enrolled 1115 waiver eligible population.

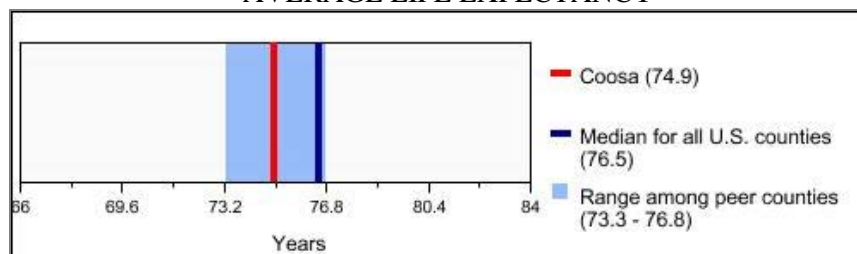
** Massachusetts has a low share of uninsured within the newly enrolled due to low levels of uninsurance in the baseline.

Note: These estimates relate solely to the Medicaid expansion and do not account for other changes in health reform such as access to subsidized coverage in the exchanges or state or federal savings from reduced uncompensated care or the transition of individuals from state-funded programs to Medicaid in 2014.

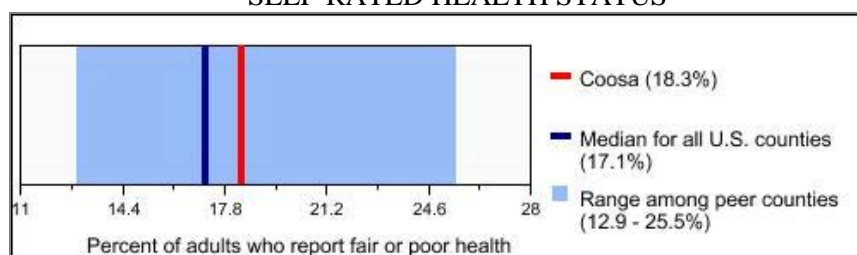
Source: Medicaid Coverage and Spending in Health Reform. Kaiser Commission on Medicaid and the Uninsured. www.kff.org/healthreform/upload/Medicaid-Coverage-and-Spending-in-Health-Reform-National-and-State-By-State-Results-for-Adults-at-or-Below-133-FPL.pdf.

APPENDIX H: CDC COMMUNITY HEALTH STATUS INDICATORS SAMPLE: COOSA COUNTY, ALABAMA

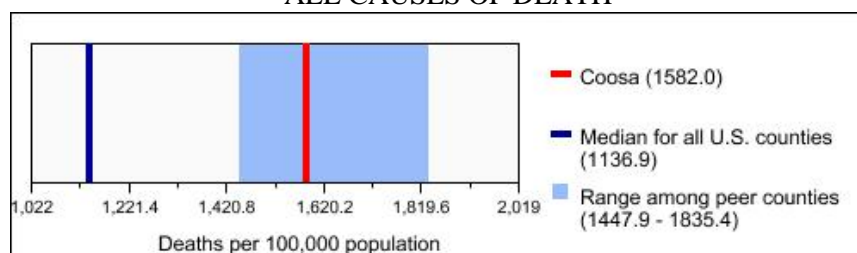
¹ AVERAGE LIFE EXPECTANCY



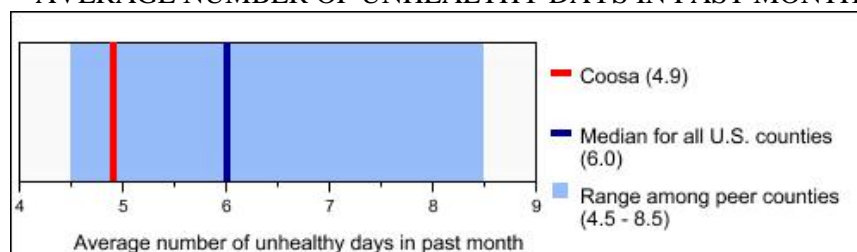
^{2,3} SELF-RATED HEALTH STATUS



² ALL CAUSES OF DEATH



³ AVERAGE NUMBER OF UNHEALTHY DAYS IN PAST MONTH



nda: No data available; nrf: No report, survey sample size fewer than 50

Notes:

1. Murray et al., PLoS Medicine 2006 Vol. 3, No. 9, e260 doi:10.1371/journal.pmed.0030260.
2. NCHS. Vital Statistics Reporting System, 1996-2005.
3. CDC. Behavioral Risk Factor Surveillance System, 2000-2006.

APPENDIX I: DEFINITION OF ELIGIBLE LOCATION FOR RURAL HEALTH CLINIC

§ 491.2 Definition of shortage area for Rural Health Clinic (RHC) purposes. Shortage area means a geographic area that meets one of the following criteria. It is— (a) Designated by the Secretary as an area with shortage of personal health services under section 330(b)(3) of the Public Health Service Act; (b) Designated by the Secretary as a health professional shortage area under section 332(a)(1)(A) of the public Health Service Act because of its shortage of primary medical care professionals; (c) Determined by the Secretary to contain a population group that has a health professional shortage under section 332(a)(1)(B) of that Act; or (d) Designated by the chief executive officer of the State and certified by the Secretary as an area with a shortage of personal health services. [68 FR 74816, Dec. 24, 2003]

Source: 42CFR491.2 as referenced on CMS.gov website November 3, 2011.

APPENDIX J: NEGOTIATED RULEMAKING COMMITTEE: DRAFT EXCEPTIONAL MEDICALLY UNDERSERVED POPULATION (EMUP), OCTOBER 12, 2011

DEFINITION Exceptional Medically Underserved Population (EMUP)

The original Exceptional Medically Underserved Population designation authority was established in Public Law 99-280 (1986) and remains in force at Section 330_____ of the PHS Act. This provision is intended to allow designation of a population group that does not meet the established MUA and/ or MUP criteria but has an “unusual local conditions which are a barrier to access to or the availability of personal health services” for the population. The EMUP designation would be used only if a community could not be designated under the general MUA and/ or MUP criteria, normally because the access barrier or other unusual local condition involved is not covered by the standard MUA/P criteria. The EMUP must allow for detailing unusual local conditions, access barriers, and availability indicators that would indicate a need for an exceptional designation.

The request for EMUP needs to include a written recommendation for the designation from the Governor or other CEO of the State, and may include recommendations of other local officials. This process also allows for experts to weigh in with opinions on the proposed exceptional designation of an appropriately needy population in a locality.

DEFINITION EMUP SERVICE AREA

The EMUP service area does not need to be an existing RSA or PCSA as defined for geographic designations. The EMUP may have its own unique service area boundaries, if the unusual local conditions which are a barrier to access to or the availability of personal health services cross or the boundaries of or are a subset within an existing RSA or PCSA. The EMUP’s service area boundaries must be an area in which the population can both reasonably access the services provided and support the state and or federal resources assigned or allocated to serve that population.

GUIDANCE FOR EMUP DESIGNATIONS

Designation requested by Governor; should address all factors:

- An area or population group that does not meet the regular MUP and/ or MUA criteria
- Unusual local conditions which show:
- A barrier to accessing primary medical care or indication of medical under-service not covered by the regular
- MUA/P criteria is present;
- documented data showing high disease or mortality rates for the requested population group; and/or
- Significant negative changes in a community profile; such as but not limited to high unemployment, high increase in school lunch program enrollment, high increase in WIC program, major employer closings or other community distress.
- Compare to national or state norms; include data and source of data; should be a minimum of two examples of unique high morbidity/mortality and or significant changes in community profile.
- Focus on why this area or population group is “exceptional”; what makes it stand out from other similar areas, the surrounding areas, the county, and the state. provide a comparison of the local, regional, state, and/or national data for whatever factors are involved to show they are worse than the rest of the state and/or nation.

UPDATES TO EMUP

No designation will be held in perpetuity. Updates to the EMUPs will occur at least one to two years post availability of the decennial census data. The first EMUP re-designation or update will be upon availability of the complete 2010 decennial census; another shall be made following the 2020 census. (There was not consensus on this...a compromise could be every 5 years). Governor's Designation Secretary Certified (GDSC) (added at the pleasure of a Committee member who wanted to make sure we were not making changes to this...)

A GDSC was created in the Omnibus Budget Reconciliation Act of 1989 under section 6213(c). "areas designated by the Governor of a State and certified by the Secretary as having a shortage of personal health services." The Negotiated Rule Making Committee will not make any regulatory or guidance recommendations on said Act.

Source: www.HRSA.gov/advisorycommittees.../draftexceptionalmup.pdf

APPENDIX K: METHODOLOGY FOR ARC HEALTH CARE COST AND ACCESS INDEX

1 DIMENSIONS OF COST AND ACCESS

Following the logic and procedure of the ARC's "County Economic Status Classification System," (ARC Economic Status Index), the proposed Health Care Cost and Access Index should include a relatively small number of core indicators and compare these indicators with national values. The ARC's Economic Status Index is quite simple and straightforward in its composition and generally intuitive in interpretation. Further, it makes use of data sources that are reliable, publicly available, and constructed and validated by federal government sources using nationally uniform data collection strategies. Further the index makes use of sources that are transparent and rely upon justifiable validated small area analysis techniques for making county level estimates. Thus, the official sources for the data used in the Economic Status Index include: the U.S. Department of Labor, Bureau of Labor Statistics (unemployment levels), U.S. Department of Commerce, Bureau of Economic Analysis (per capita market income), and the U.S. Department of Commerce, Census Bureau (poverty level). It is evident that for the component indicators of the index, consistency and reliability are preferred over currency of information in choosing indicators. In other words, the index seeks to tap into stable structural trends in the Appalachian Region, the component states, and the United States as a whole, and to assess these trends relative to the national situation.

For example, a three-year average unemployment statistic is chosen over a single year's unemployment rate. This approach serves to control year to year volatility within counties in these rates due to local circumstances (e.g., plant closings and openings), as well as to reflect the fact that variations in employment levels can have an enduring effect on the community. As a result, for any given year, the unemployment rates used in the index will lag by an interval of two to four years. Similarly, there is likely to be a two-year lag in the per capita market income level. Finally the poverty level, another component of the index, was historically measured in decennial census years. Hence, the range of lag time range from one to ten years depending on the year for which the estimate is made. (It should be noted that the Census Bureau does construct and disseminate small area estimates of the poverty rate, and income distribution relative to the poverty rate, on a regular basis, and that it would be helpful to use these estimates as data in health related access measures (e.g., small area health insurance estimates). In the future, the poverty level will be measured annually in the American Community Survey (ACS).

To build the index on the foundation, we explored both the literature on healthcare access and published national databases.

2 CRITERIA FOR CONSTRUCTING HEALTH CARE COST AND ACCESS INDICES

2.1 CONCEPT

An index that could be used by the Appalachian Regional Commission to measure disparities associated with healthcare access, cost and coverage at the county level requires consistent, available data that reliably reflect the issues.

Composite measures combining several items may represent distinct but inter-related aspects of a single underlying concept. Indices used to assess healthcare cost and access disparities should be relatively transparent, simple to understand, comparable across the entire U.S., and easily replicable.

Whenever possible the subcomponents of the index should be drawn from publically available, periodically updated official sources of data. Despite the fact that there may be a time lag between data collection and reporting, it is preferable to use uniformly collected and reported data that have been well validated rather than more recent, but not so well validated data.

However, locally available estimates may be used for comparisons to better understand the limitations of the national data. Healthcare data are not always collected and compiled with the same frequency as economic data, nor is there as much consensus about the way in which various kinds of health related phenomena should be measured, or who has the best measurement strategy or the best raw data that can be used. There are three dimensions upon which healthcare cost and access disparities will be assessed: access, cost and status/outcomes; we will discuss these in some detail below.

2.2 HEALTHCARE ACCESS

Healthcare access is measured in terms of two primary sub-dimensions: resource availability and financial access. Resource availability refers to the physical presence of resources within a local community (i.e. presence of short term general hospital beds, presence of physicians of various types and specialties). Financial access means having of the economic means to access these resources (chiefly through the presence of health insurance). The presence of certain dedicated resources for underserved and uninsured population within a county reflects both of these dimensions (e.g., Rural Health Clinics, Community Health Centers, and Federally Qualified Health Centers).

2.3 HEALTH CARE COSTS

2.3.1 DEFINITIONS

Costs to those who pay for healthcare (payers) are measured by the expenditures of public and private insurance in per capita terms. Generally this means aggregate expenditures over an annual period divided by the number of “participants” (users and nonusers who were eligible to use the service over the time period observed). In some cases, particularly where relatively few eligibles actually make use of the service, the appropriate denominator might be the number of actual users, rather than merely the eligibles. This means that coverage of the population must be specified (e.g., Private Insurance, “Uninsurance,” Medicaid, Medicare, and Veterans Administration). This has to be carefully done to assure that denominators are available and consistently applied for the same years as the numerator data.

Actual costs to deliver care are more difficult to measure. The most uniform of existing measurements is the wage index used by CMS to adjust payments to account for labor cost differences. The wage index is expressed as a ratio of the local to the national wage average.

CMS and the Congressional Budget Office also track healthcare expenditures by state, for federal budgeting purposes. In 2011, CMS reported National Health Expenditures online for the year 2004 at www.cms.gov/NathionalHealth/ExpendData.

2.3.2 CMS EXPENDITURE REPORTS

2.3.2.1 NATIONAL HEALTH EXPENDITURES

- Historical annual health spending in the U.S. by type of service delivered (hospital care, physician services, nursing home care, etc.) and source of funding for those services (private health insurance, Medicare, Medicaid, out-of-pocket spending, etc.), by year through 2009.
- Projections based on the National Health Expenditures. These estimates spending for healthcare in the U.S. through 2020. Projections are presented by type of service delivered (hospital care, physician services, nursing home care, etc.) and by source of funding for those services (private health insurance, Medicare, Medicaid, out-of-pocket spending, etc.). The projections include a simulation of personal healthcare and Medicare per-enrollee spending using the age-mix of future selected years and include adjustments for health reform from the Office of the Actuary Health Reform Model (OHRM).

2.3.2.2 STATE HEALTH EXPENDITURES

- Personal healthcare (PHC) expenditures by State of Provider are estimates of health spending by the location of healthcare providers in the 50 States and in the District of Columbia. These estimates are presented by the type of establishment delivering care (hospitals, physicians, nursing homes, etc.) and by source of funding (Medicare and Medicaid).
- PHC expenditures by State of Residence are based on State of Provider estimates adjusted for the flow of residents between states in order to consume healthcare services. These estimates present health spending on behalf of residents in the 50 States and in the District of Columbia. Included are estimates of aggregate and per capita health spending by type of establishment delivering care (hospital, physicians, nursing home, etc.). Per enrollee spending for Medicare and Medicaid are also presented by type of establishment.
- PHC estimates by type of service and source of funding are customarily separated into seven age groups: 0-18, 19-44, 45-54, 55-64, 65-74, 75-84, and 85 and over. Some databases consolidate the information in three main age groups: Children (ages 0-18), Working-age Adults (ages 19-64), and Elderly (ages 65 and over).

2.3.2.3 SPONSORS: BUSINESS, HOUSEHOLD AND GOVERNMENT HEALTHCARE SPENDING

- Estimates of healthcare spending by sponsor: Businesses, Households and Governments. These estimates provide context for discussion of who ultimately pays for healthcare, the underlying pressures and the burden that affect these sponsors and their decisions to finance healthcare in the United States. The estimates are derived from a subset of the National Health Expenditure Accounts by the Office of the Actuary. State level data are assembled periodically. The most recent published in July 2011 are for the year 2009.
- In 2004, healthcare spending by state of residence continued to vary significantly, ranging from an average of \$6,683 per resident in Massachusetts to \$3,972 in Utah. The national average spent for personal healthcare services in the United States was \$5,283 per resident.

On this report, Appalachian states divided almost evenly above and below the national average.

TABLE 33 - APPALACHIAN STATE HEALTH CARE SPENDING BY STATE OF RESIDENCE RANK ORDERED*

State	Total All Payers Per Capita Personal Health Care Expenditures (PHCE) 2009
Georgia	\$4,600
Virginia	\$4,822
Mississippi	\$5,059
South Carolina	\$5,114
Alabama	\$5,135
North Carolina	\$5,191
Tennessee	\$5,464
Kentucky	\$5,473
Maryland	\$5,590
Ohio	\$5,725
Pennsylvania	\$5,933
West Virginia	\$5,954
New York	\$6,535
U.S. Average	\$5,283

Source: Centers for Medicare & Medicaid Services, Office of the Actuary, National Health Statistics Group (<https://www.cms.gov/NationalHealthExpendData/downloads/res-states.pdf>).

*Note the table above is includes the most recent data available.

Nationwide, Medicare expenditures per beneficiary were highest in Louisiana (\$8,659) and lowest in South Dakota (\$5,640) in 2004; for Medicaid, expenditures per enrollee were highest in Alaska (\$10,417) and lowest in California (\$3,664).

Residents cross state borders for healthcare for reasons such as ease of travel, proximity to state borders, and the availability of facilities and services that cannot be found in one's home state.

In 2004, states where spending by state-of-residence was significantly greater than spending by state-of-provider included Wyoming, Idaho, West Virginia, New Mexico, and Vermont. This indicates that residents of these states travel outside of their state for healthcare in greater proportions than others travel into that state for care. On the other hand, spending by state-of-residence was less than spending by state-of-provider for North Dakota, Tennessee, South Dakota, Minnesota, and the District of Columbia. Use controls, age and travel barriers account for their differences.

2 3.2.4 NATIONAL HEALTH EXPENDITURE SURVEY

The Center for Disease Control, National Center for Health Statistics also tracks personal health expenditures through the National Health Expenditure Survey, which is conducted by sampling individuals and providers. These data are not available at the county level.

The Agency for Healthcare Research and Quality (AHRQ) conducts a bi-annual Medical Expenditure Panel Survey (MEPS) in which it samples families, providers and insurance companies for data on healthcare charges and employer contributions. Geographically, these are aggregated only for the four quadrants of the country. Reported expenditures tend to be lower than those reported by the CMS Office of the Actuary.

2.3.2.5 AMERICAN COMMUNITY SURVEY – U.S. CENSUS

Through the American Community Survey, the U.S. Census staff samples type of health insurance coverage and extends the sample to the Congressional District level. This can be approximately contoured to the Appalachian Region. However, the data set has only consumer expenditure survey information and is dependent on recall over a full year.

2.3.3 GEOGRAPHIC WAGE INDEX

2.3.3.1 DESCRIPTION

To reflect the difference in cost of healthcare from one area to another, CMS maintains several geographic healthcare wage indices. Initially, focused only on hospitals, the indices now include one for hospitals, one for physicians, one for skilled nursing and facilities, one for end stage renal disease and a separate one for home health. With the exception of home health and physicians, the wage indices are based in some way on the hospital index. Some have a rural floor factor. Annually, CMS sets the wage index to one as the national norm. Indices are calculated for three Core Based Statistical Areas (CBSA) in each state: based on Metropolitan, Micropolitan and Other. For the most part, Census definitions set the boundaries. In some cases, Congressional action may assign a provider or a geographic area to a higher paying CBSA. Every provider certified to bill Medicare is then assigned a wage index on the basis of its address.

FIGURE 47 - CORE BASED STATISTICAL AREAS PER OMB

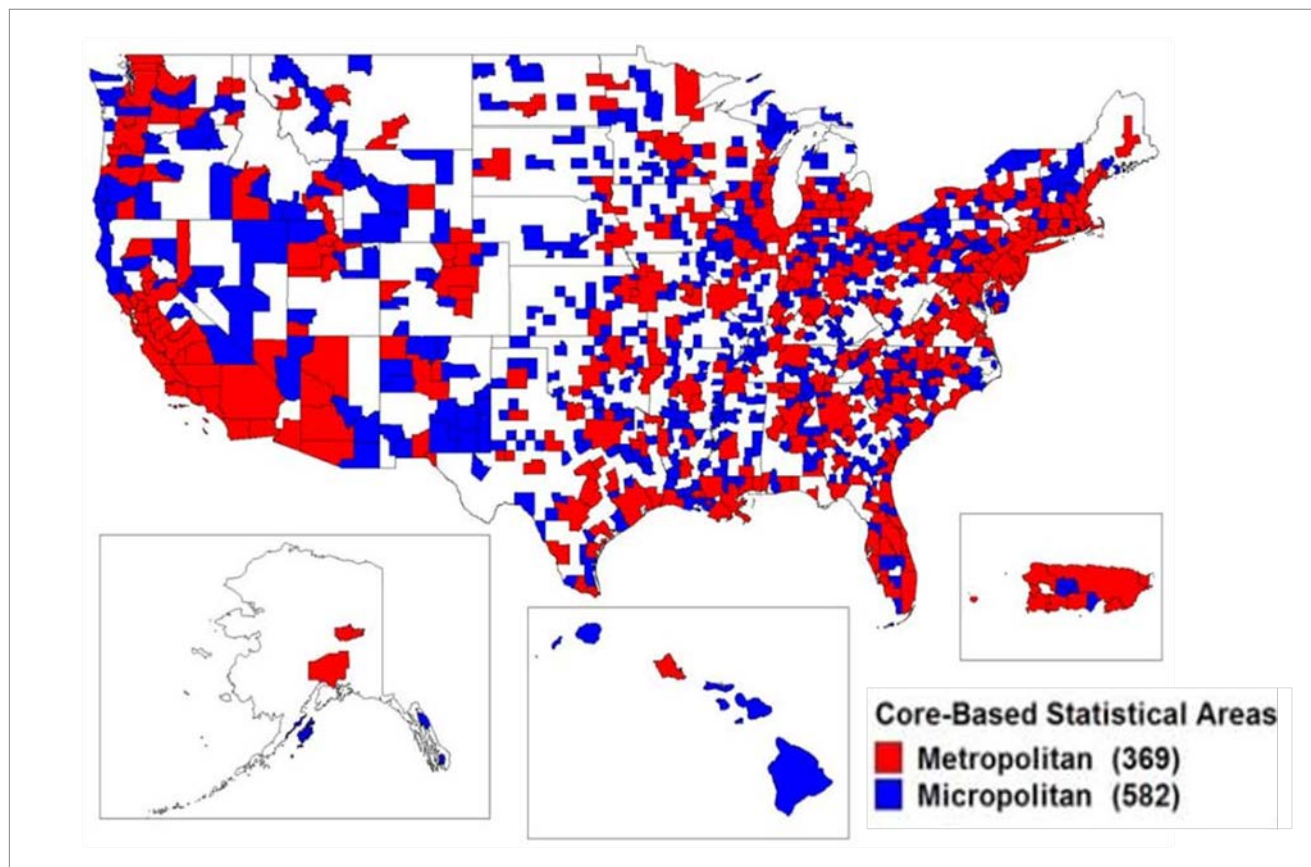


Figure 47 illustrates the distribution of the CBSA's nationwide. A close look shows much of West Virginia and Appalachian Kentucky fit in the "Other" or non-core classification.

The Geographic Wage Index itself is a three-year average, with the most recent year as much as five years behind. The 2011 index includes data from years: 2003, 2004 and 2005. By statute, the Wage Index is used to adjust Medicare payments. In practice, Medicaid and private insurers set their payment schedules as a multiple of Medicare. The Index tends to reflect higher wages than the BLS wage index.⁹³ Many Appalachian counties are classed as non-core or rural under this grouping and these tend to get the lower indices.

2.3.3.2 ORIGIN

Section 1886(d) (3) (E) of the Social Security Act requires that, as part of the methodology for determining prospective payments to hospitals, the Secretary must adjust the standardized amounts "for area differences in hospital wage levels by a factor (established by the Secretary) reflecting the relative hospital wage level in the geographic area of the hospital compared to the national average hospital wage level." This adjustment factor is the wage index.

CMS currently defines hospital geographic areas (labor market areas) based on the definitions of Core-Based Statistical Areas (CBSAs) established by the Office of Management and Budget and announced in December 2003. The wage index also reflects the geographic reclassification of hospitals to another labor market area in accordance with sections 1886(d) (8) (B) and 1886(d) (10) of the Act.

The Act further requires that CMS update the wage index annually, based on a survey of wages and wage-related costs of short-term, acute care hospitals. Data included in the wage index derive from the Medicare Cost Report, the Hospital Wage Index Occupational Mix Survey, hospitals' payroll records, contracts, and other wage-related documentation. In computing the wage index, CMS derives an average hourly wage (AHW) for each labor market area (total wage costs divided by total hours for all hospitals in the geographic area) and a national AHW (total wage costs divided by total hours for all hospitals in the nation). A labor market area's wage index value is the ratio of the area's AHW to the national AHW. The wage index adjustment factor is applied only to the labor portion of the standardized amounts.⁹⁴

2.3.3.3 MODIFICATIONS

The index has been a source of significant political debate; and work-around amendments often occur. For example, to protect hospitals in sparsely populated Frontier states, the ACA requires CMS to adopt a hospital wage index that is not less than 1.0000 for hospitals located in frontier states, beginning in FY 2011. Frontier states are defined in the law as states where at least 50 percent of the counties have a population density of less than six people per square mile. In the final rule, CMS is basing the frontier county and state determinations on the most recently available Annual Population Estimates from the U.S. Census. As a result, 51 IPPS hospitals in five states - Montana, Nevada, North Dakota, South Dakota, and Wyoming - will benefit from this provision in FY 2011.

⁹³ MaCurdy, Thomas, Thomas Deleire, Karla Lopez de Nava, Paulette Kamenecka, Yang Tan, Sean McClellan. Revision of Medicare Wage Index Final Report, Part 1. April 2009. Accumen, LLC. Burlingame, CA.
https://www.cms.gov/AcuteInpatientPPS/03_wageindex.asp#TopOfPage. Accessed January 3, 2011.

⁹⁴ Centers for Medicare & Medicaid Services (CMS). "Wage Index". http://www.cms.gov/AcuteInpatientPPS/03_wageindex.asp.

An amendment to the Medicare statute added a Geographic Adjustment Factor (GAF) to the index. Its intended purpose was to correct for higher costs that particularly rural communities may pay to compete for staff from nearby urban or metropolitan counties.

2.4 HEALTH STATUS / HEALTH OUTCOMES

We have chosen three-year average YPLL_75-75 as the key measure of health outcomes. This is a mortality based measure rather than a health status measure, but it disproportionately weights mortality that occurs in younger ages, because more years of life are lost by the death of a younger person over time.

It would be helpful to have another measure that deals with illness severity or long term disability over the life course or risks such as estimates of morbidity. However, most such estimates are secondary to the use of health resources (e.g., hospital discharge data) or based on statistical models that lack sufficient precision at the local level (e.g., model based BFRSS surveys or health risks or health behavior).

2.5 DATA REDUCTION STRATEGIES.

2.5.1 SELECTION OF CANDIDATE SOURCES

The selection process involved three key drivers.

- The criterion: uniform data available at the county level quickly narrowed the selection process for data. Even then, more items are available than needed to construct a valid index.
- Where multiple items are indicative of a single concept, we used multivariate data reduction techniques to assess the contribution of each discrete item to the underlying hypothetical construct representing the underlying concept.
- Factor analysis was used for data reduction. This locates Items which “load” on factors help guide selection of final items for inclusion in the indices. As core indicators of access, we selected two to five items that are both substantively meaningful and statistically indicative of health access.

2.5.2 SMALL AREA ANALYSIS

When population based data are not available for a small geographic area such as a county, estimates are made. These estimates can involve a variety of methods, but typically use one of three basic approaches: direct estimates; synthetic estimates; or estimates based on geographic “smoothing”.

- Direct estimates are generally made from samples of individuals residing within the boundaries of the small area. However, in order to generate valid and reliable estimates, there must be a sufficient number of cases to generate a stable estimate. Generally this would be in excess of 100 cases. Further, the method of selection should be known, and if possible, random. Direct estimates are thought to be preferred to other methods, when there are sufficient data points in a small area and simple random sampling is used.
- Synthetic estimates (model-based estimates) use data from large national, regional, or statewide samples to make estimates for small geographic areas like counties, but do not use direct methods from the data points actually within that geographic area. Instead, a statistical model relating the characteristic of interest (e.g., “uninsurance”) to a set of demographic predictors, e.g., age, sex, race, educational level, job type, etc. If these population characteristics can be reconstructed from

local areas, then the statistical model can be applied and a local area estimate can be made using the population characteristics of the local area.

- The validity of these estimates depends on how well the statistical model predicts the characteristic of interest. If important characteristics are left out of the statistical model, the validity decreases. Characteristics can be missing because they are not available in the original dataset (e.g., unionization status of individual), or the predictors have a more complex relationship than the statistical model will support.
- The Small Area Health Insurance Estimates are model-based or synthetic estimates of numbers and percentages in communities based on information from large national surveys reporting the insurance status of individuals and households. These are combined with locally applied estimates of the population characteristics of a given county and re-aggregated up to the county level to yield estimates of the numerators and denominators needed to measure the insured and uninsured populations.
- **Geographic smoothing** is a variation of direct estimation in which the deficiencies of having a small number of actual data points is compensated for by extending out the radius of the “small area” to include data points from adjacent areas and using these points (with some down-weighting factors for remote areas) to increase the sample size. The focal and peripheral counties are then combined into an estimate.

When empirical tests of these three methods are applied against population-based data, results have revealed that direct estimation is the least reliable, and that model-based estimates of health characteristics are generally much more reliable, assuming the model is reasonably robust. SAHIE and YPLL_75 are both validated model-based estimates.

2.6 SUMMARY OF ITEMS RELEVANT TO HEALTH DISPARITIES INDEX CONSTRUCTION

2.6.1 DATA ELEMENTS

Data elements and related sources that the study team reviewed for possible inclusion in an index of health cost and access measurement of health disparities, separated into five categories. The following sections describe each element in order of the particular dimension of access or cost measured or examined.

- Items 1 through 12 are potential access indicators which are also arrayed by sub-domain: items 1 through 2 reflect resource availability indicators; 3 through 4 reflect access indicators involving use of services. Items 5 through 10 represent financial aspects of Access to Care; items 11 and 12 represent more of a policy dimension, i.e., dedicated facilities or resources designed to promote access;
- Items 13 through 16 represent a healthy physical and social environment; items 17 through 19 represent socioeconomic status; Item 20 represents health status or health outcomes; and
- Finally the cost of care is represented by the remaining items 21 through 26. For each of the 26 items profiled, the source, most recent year, and smallest level of geographic data availability is provided along with a brief definition, the actual database source and a website where available.

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2.6.3 MEASURES OF FINANCE

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2.6.5 MEASURES OF SOCIOECONOMIC STATUS

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2.6.6 MEASURES OF HEALTH STATUS AND OUTCOMES

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2.6.7 MEASURES OF COST OF CARE

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3 CONSTRUCTION OF THE ARC HEALTH COST AND ACCESS INDEX

3.1 SELECTION OF DATA ELEMENTS

In this section we explain how the health access index was constructed. We will first explain how three distinct subcomponent indices were constructed and then how the three were combined into a single index.

3.2 HEALTH RESOURCE ACCESS INDEX CONSTRUCTION

Our intent in examining health resources indices was to start with the distribution of primary care physicians, which have frequently been used as an overarching measure of healthcare access and to compare this distribution with more specialized physicians.

TABLE 34 - NUMBER AND PERCENT OF COUNTIES WITHOUT PHYSICIANS, 2008 (U.S. AND ARC COUNTIES)

Counties without:	All U.S. Counties (N=3141)		Appalachian Counties (N=420)	
	Number	Percent	Number	Percent
Primary Care MDs or Dos	157	5.0%	3	0.7%
General Surgeons	1196	38.1%	134	31.9%
General OBGYNs	1486	47.3%	170	40.5%
Medical Subspecialists	1442	45.9%	140	33.3%
Surgical Subspecialists	1410	44.9%	187	44.5%
Hospital Specialties	1313	41.8%	150	35.7%
Mental Health Specialists	1669	53.1%	197	46.9%
Emergency Medicine	1480	47.1%	159	37.9%
Any of the above non primary care specialties	633	20.2%	44	10.5%
Number of Counties	3141	100.0%	420	100.0%

Source: ARF 2010.

Table 34 compares physician shortages in Appalachian counties to all U.S. counties and county surrogates. Appalachian counties are less inclined to lack any physicians than are counties elsewhere in the U.S. Only three Appalachian counties (less than one percent) had no primary care physicians in 2008. This stands in contrast to 5 percent of all U.S. counties that lack primary care physicians. Clearly, this difference may be evidence of the success of the long-standing efforts to build a primary care workforce in the Appalachian Region through a variety of federal and state programs.

Similarly, only 44 Appalachian counties (less than 11 percent) had none of the physician specialists we identified in our analysis, while nationally 633 counties (over 20 percent of the counties in the nation) lacked any of these non-primary care specialties.

However, as Table 35 reveals, when Appalachian and non-Appalachian counties are compared by population, there is very little difference between the mean values in physician to population ratios.

**TABLE 35 - MEAN VALUES OF PHYSICIANS TO POPULATION RATIOS OF VARIOUS TYPES
(APPALACHIAN AND NON-APPALACHIAN COUNTIES, 2008)**

Physicians Per 100,000 population	Non Appalachian Counties N=2721			Appalachian Counties N=420		
	Mean	Std. Dev.	Skew	Mean	Std. Dev.	Skew
Primary Care (MD or DO)	66.18	47.29	3.055	66.34	69.10	10.951
General Surgeons	6.27	8.60	4.549	6.77	11.65	9.562
General Obstetrics Gynecology	5.20	7.01	2.104	5.11	6.88	4.445
Medical Sub Specialists	11.95	23.78	6.346	12.98	39.19	15.175
Surgical Sub Specialists	11.08	18.12	4.705	10.79	20.96	8.761
Hospital Specialists	12.19	21.47	6.731	11.15	24.62	10.984
Mental Health Specialists	4.95	9.73	4.914	4.24	6.53	2.986
Emergency Medicine Specialists	4.96	7.92	4.114	4.78	7.54	6.995
Combined non-primary Care	162.63	628.14	16.73	139.39	534.47	18.38

Source: ARF 2010.

No statistically significant differences between the Appalachian counties and the non-Appalachian counties were found, either in the percentage of counties lacking a specific specialty or in the mean physician to population ratios for each of the different types of physicians counted separately or combined. In some cases the mean Appalachian county appeared to have a slightly higher physician to population ratio (primary care, general surgery, medical subspecialists, obstetrician-gynecologists), while in other cases it appeared slightly lower (e.g., mental health, emergency medicine, obstetrics gynecology, surgical subspecialists, hospital specialists). Yet, when all the non-primary care specialties are combined, the difference appears to favor the non-Appalachian counties. This is largely attributable to the highly concentrated geographic clustering of many U.S. subspecialists in very large metropolitan areas outside of Appalachia.

However, given the high degree of skewness of the distribution of county level physician-to-population ratios, it is important to examine other properties of the physician-population ratios to determine if such measures can be useful in discriminating physicians at the lower levels of physician to population ratios.

When the information about physician population ratios is displayed in percentile form, it becomes evident that there are a number of challenges to meaningful discrimination between counties in terms of physician availability especially at the low end of the distribution and among non-primary care physician specialties.

TABLE 36 - PHYSICIANS PER 100,000 POPULATION, APPALACHIAN AND NON-APPALACHIAN COUNTIES, ARRAYED BY PERCENTILE

Type of Physician	Type of County	Percentile Level						
		5 th	10 th	25 th	50 th	75 th	90 th	95 th
Primary Care (MD or DO)	Non Appalachian	00	17.91	37.83	59.06	86.91	118.48	142.99
	Appalachian	14.72	22.65	37.28	56.91	78.90	109.69	140.01
General Surgeons	Non Appalachian	0	0	0	4.69	9.40	14.94	19.61
	Appalachian	0	0	0	5.12	9.25	13.75	17.89
Gen OBGYN	Non Appalachian	0	0	0	2.25	8.75	14.29	18.27
	Appalachian	0	0	0	3.96	7.78	12.50	18.02
Medical Sub-Specialists	Non Appalachian	0	0	0	2.46	15.42	34.58	51.85
	Appalachian	0	0	0	5.85	14.70	28.30	40.91
Surgical Sub-Specialists	Non Appalachian	0	0	0	3.89	16.80	31.11	41.76
	Appalachian	0	0	0	4.91	14.73	26.31	37.51
Hospital Specialists	Non Appalachian	0	0	0	4.74	16.90	33.61	46.09
	Appalachian	0	0	0	5.41	14.42	27.57	41.50
Mental Health Specialists	Non Appalachian	0	0	0	.00	6.50	14.57	20.74
	Appalachian	0	0	0	1.90	6.50	10.58	17.51
Emergency Medicine Physicians	Non Appalachian	0	0	0	1.82	7.79	13.77	18.25
	Appalachian	0	0	0	3.38	6.68	11.79	15.82
Combined Non Primary Care Physician Groups	Non Appalachian	0	0	16.05	65.19	149.58	312.34	490.69
	Appalachian	0	0	38.33	76.38	149.43	250.14	341.42

In Table 36, at least 25 percent of the counties in the U.S., and a comparable percentage of counties in the Appalachian Region, lack most of the physician specialty groups that we have identified. Note zeros in columns representing 25th percentile and below. For many of these specialist groups, the typical (50th percentile) Appalachian county has a higher physician to population ratio than does the typical (50th percentile) U.S. County.

On the other hand, relatively fewer Appalachian counties are in the top quartile (i.e. at the 75th percentile) in terms of physician to population ratios for almost any of the identified physician groups.

Because of the uneven distribution of specialist physicians in particular, it is quite difficult to make comparisons at the lower end of any of the physician availability measures except for primary care. Hence comparing Appalachian and non-Appalachian counties may prove to be relatively difficult because so many counties are “tied” at “zero” for the various types of physician specialties. Even when all the non-primary care physician groups are combined as in the last row of the table, at least 10 percent of counties have none of the non-primary care physician groups we have examined.

We remedied this situation of a “lumpy” distribution by adopting two approaches: (1) extending the physician availability measures from a single point in time to include physicians present in a county over a three-year period; and (2) arraying the counties which have no physicians of a given type for a given year in order of their population for purposes of establishing a percentile rank. Each of these two strategies can be justified as a measurement strategy.

First of all, single point in time estimates of physician-to-population ratios can be quite inaccurate especially for counties with small populations and small numbers of physicians, because the retirement, in-migration or out-migration of a single physician can dramatically change that ratio from one year to another. Further, the health impact of a physician is likely to endure beyond a single year meaning that a county that loses its sole physician can plausibly be characterized as having had better healthcare access in the subsequent year, than would a county that did not have a physician in either year. In fact, migration of physicians in and out of rural counties and states is quite substantial and has been well documented for both primary care physicians and specialists.⁹⁵ Such a pattern of migration can make counties with small population change from being without a doctor in one year, to having a quite favorable physician to population ratio in another year.

Our second approach is arraying counties with a persistent experience of zero physicians in order of their overall population. This is based on the logic that a more populated county without a physician experiences a greater population health burden in terms of access than would a smaller county without a physician. Further, doctor-less counties are often counties where populations are not only small but in decline, rather than growing, making acquisition of a new physician even more difficult.

By using these two techniques together—yearly averaging and selective ordering of counties without physicians, and by assessing these parameters separately for primary care physicians and non-primary care physicians, we can effectively discriminate counties with a various degrees of physician availability from one another in a more meaningful way—especially among those counties that lack a variety of different kinds of health resources—and thereby produced a more valid and stable index.

3.3 SELECTION OF RESOURCE ITEMS

Given the complexity of the distributions of different non-primary care specialties, we selected the following four items as indicators of healthcare resource access:

- Primary care physicians per 100,000 population (average of three consecutive years: 2006-2008),
- Non-primary care physicians per 100,000 population (average of three consecutive years: 2006-2008),
- Dentists per 100,000 population for 2007, most recent year available,
- Hospital beds per 10,000 population for 2008 or most recent year available.

Each of the four variables was sorted for all counties in the U.S. and a rank value assigned on that basis. In cases where counties were tied, with zero practitioners or no hospital beds, counties with larger populations were assumed to have less favorable access scores and were ranked accordingly. A county's combined raw score on the healthcare resource access component is the average of the ranks on the four items. Raw scores were then converted to percentiles and this is the final component score for each county.

⁹⁵ Ricketts, T.R., S.E. Tropman, R. Slifkin, T.R. Konrad. Migration of Obstetricians-Gynecologists In to and Out of Rural Areas. *Medical Care*. May 1996. 34(5)428-438. Also T.R. Konrad, Li Hong. Migrating Docs: Studying Physician Practice Location. *JAMA*. December 27, 1995. 274(24):1914

3.4 HEALTH INSURANCE ACCESS COMPONENT CONSTRUCTION

The Health Insurance Access component consists of a combination of those health insurance variables that are available at the county level. All four SAHIE based measures, which are available from the Census for every U.S. County, are very highly inter-correlated, but each reflects different age and income groups. The four were selected from the database in the following table.

TABLE 37 - HEALTH INSURANCE ACCESS COMPONENT CONSTRUCTION

Age Group (Census Est.)	Relevant Subgroup	Insurance Variable	Source	Most Recent Year	Interpretation
0-19	All income group	Percent Insured*	SAHIE	2007	Extent of coverage of all children by public or private health insurance
0-19	Below 200% of Poverty	Percent Insured*	SAHIE	2007	Extent of coverage of poor children by public or private health insurance
18-64	All income group	Percent Insured*	SAHIE	2007	Extent of coverage of all working age adults by public or private health insurance
40-64	All income group	Percent Insured*	SAHIE	2007	Extent of coverage of middle aged adults by public or private health insurance
65+	Medicare Part A	Ratio of HI (Pt. A) to est. pop 65+	CMS	2007	Extent of coverage of older adults by Medicare hospital insurance
65+	Medicare Part B	Ratio of SMI (Pt. B) to est. pop 65+	CMS	2007	Extent of coverage of older adults by Medicare supplementary medical (physician) insurance
65+ & Medicare beneficiaries <65	Medicare Part C	Medicare Advantage Penetration. 2008	CMS	2007	Extent to which eligible Medicare beneficiaries have Medicare advantage coverage (Part C)
65+ & Medicare beneficiaries <65	Medicare Part D	Medicare Part D Penetration. 2008	CMS	2007	Extent to which eligible Medicare beneficiaries have drug coverage through Medicare Part D.
18-64	All income group	Medicare Disabled beneficiaries	CMS	2008	Percent of working age population with Medicare coverage by reason of a disability
18-64	All income group	SSA / SSI Recipients	SSA	2008	Percent of working age population with a dependency that enables them to receive Supplemental Security Income
Age 18+	Veterans	Unique VA Users	VA	2009	Percent of Veterans who have used the VA healthcare system in the last year.

*Estimates of the Percent Uninsured, exactly equal to 100-Pct Insured, have been calculated for SAHIE, but yield no additional information

For children, the lack of available health insurance is more closely associated with poverty, while for middle-aged adults the need for health insurance is greater with the onset of chronic disease. The use of all four SAHIE based indicators in effect gives us information about the entire population of children and working age adults as well as up-weighting for the presence of health insurance among two especially vulnerable groups: poor children and middle aged adults.

Similarly, the percent of working age population with both Supplemental Security Income (SSI) payments and Medicare are two different measures of insurance coverage for a disabled adult population. These two variables are moderately correlated, have a high degree of variability across counties, and both are markedly and statistically significantly higher in Appalachian counties.

In fact, when we combined the two indicators, we found an estimated 6.3 percent of the working age population is on one of these two sources of disability payments in non-Appalachian counties, whereas and estimated 10.3 percent of the working age population in Appalachian counties has one of the two sources of income or insurance.

We considered and discarded the idea constructing the Health Insurance Access index by ranking each of the 11 health insurance access items across all counties in the U.S. and then taking the average rank. This rank was rescaled to percentiles to represent the final health insurance access rank for that county. That approach was both complex and unnecessary.

3.5 LABOR COST INDEX CONSTRUCTION

3.5.1 GEOGRAPHIC WAGE INDEX

The Geographic Wage Index was used in its raw form. Each county has an index based on the hospital providers located in the county. The index uses 1.0 as the national average. Counties with no hospital are aggregated with the nearest hospital inside the state. Limitation of granularity to three clusters in each state: metropolitan, micropolitan, and other non-core does limit distinctions and some argue misrepresents the actual cost of care. Alone, this component has equal weight with the other access items.

3.5.2 HEALTH CARE UTILIZATION MEASURES - DARTMOUTH ATLAS

Healthcare utilization measured in dollars spent is often cited in discussion of healthcare costs. This is difficult to measure uniformly, because there is no national database of healthcare expenditures. CMS estimates expenditures at the state and regional level using data from sample surveys, but there is no national source for private insurance payments at the county level. Most public studies of healthcare expenditures rely on Medicare claims files. These are available in a five percent sample without restriction, and the claims file is very expensive to manipulate.

An enterprising group of researchers, led by John E. Wennberg, PhD, began mining Medicare claims files in the mid 1990's. Year over year, they noticed significant variations in per capita Medicare payments that could not be explained easily. They published their findings in a series of maps under the title Dartmouth Atlas of Health Care Expenditures.⁹⁶

⁹⁶ Wennberg, John E. "Dartmouth Atlas of Health Care Expenditures". The Dartmouth Atlas of Health Care: Atlases & Reports". <http://www.dartmouthatlas.org/publications/reports.aspx>.

Certain areas like McAllen, Texas drew national attention when the New Yorker Magazine drew data from the atlas and ran a feature article on the correlation between physician owned hospitals and the high expenditures in this community.⁹⁷

The atlas measures only expenditures for hospital care and only expenditures for Medicare. Medicare beneficiaries are persons over 65, persons certified as disabled by the Social Security Administration, persons with end stage renal disease, and blind persons.

Recently, the atlas has drawn criticism from researchers who can find explanations for some of the variations. For these reasons we did not include utilization data in the index.

3.6 COMBINED INDEX MEASUREMENT

The overall Healthcare Cost, Coverage, and Access (HCCA) Index is an average of three components: the healthcare cost (HCC), the insurance access (HIC), and the resource access (HCRA). Following the logic of the Appalachian Regional Commission’s (ARC) Economic Status Index, the combined HCCA Index was converted to percentiles and a percentile value assigned to each county in the U.S.

TABLE 38 - SUMMARY OF SUBCOMPONENT INDICES

Element	Source	Measure	Units
Coverage per Capita	ARF – 2006	Insurance Coverage - Under 65 (Insured and Uninsured)	Coverage
	CMS – 2007	Medicare B –	Participation
	ARF – 2009	Medicare C –	Participation
	ARF – 2005	Medicaid – Over 65 –	Dual Eligibility
	ARF – 2005 VA File	Medicaid – Under 65 VA - Users	Participation
Resource Availability per Capita	ARF -2008	Primary Care	Primary Specialty
	ARF -2008	Surgeons + OB	Primary Specialty
	ARF -2008	Surgical Specialties	Primary Specialty
	ARF -2008	Hospital Specialties	Primary Specialty
	ARF -2007	DDS - Dentists	Primary Specialty
	ARF -2008	Behavioral Health	Primary Specialty
Cost	CMS 2010	Geographic Wage Index	Normalized to 1=national average

The rationale for choosing these elements is that they measure three dimensions of access:

- Purchasing capacity of the individual,
- Availability of resources to serve the individual, and
- The labor cost of serving the individual.

⁹⁷ Gawande, Atul. The Cost Conundrum. The New Yorker. June 1, 2009. http://www.newyorker.com/reporting/2009/06/01/090601fa_fact_gawande

Labor is the most variable of healthcare costs and makes up 60 percent of the healthcare expense and 35 percent of all hospital costs.⁹⁸ All of the data elements meet the test of availability, scalability and uniformity. All are collected by federal agencies.

We similarly excluded the VHA per capita spending measure. VHA spending is a resource consumption measure. It does show disparities, which are discussed in Chapter 3.

3.7 CALCULATION OF INDEX

The HCCA is calculated by standardizing each of the components to a per capita measure and summing the per capita measures for each county. These were then normalized to multiples of a national average and grouped in percentiles.

The resource availability component is calculated by summing the per capita counts for each of the professional groups and normalizing to national by percentile. To get a county Geographic Wage Index, we started with the CMS Medicare Hospital Geographic Wage index for the county. The geographic wage index is already set to 1.0 as the national average, so it requires no further normalization.

3.8 FORMULA

The formula from the Healthcare Cost, Coverage, and Access (HCCA) Index is:

$$\text{Geographic Wage Index} + \text{Health Insurance Coverage per capita component} + \text{Health Resource per capita component} / 3.$$

$$(HCC + HIC + HCRA) / 3$$

The following tables show how the normalized data were combined with the wage index to provide the HCCA.

TABLE 39 – HCC COMPONENT CONSTRUCTION AND FOR CONSTRUCTING THE FINAL HCCA INDEX INDICATOR

Component Item	Component Item Definition	Time Periods	Basic Scaling Method	Component Item	Component Item Definition
Health Care Cost	HCC= CMS Hospital Geographic Wage Index Rescaled	2005	Percentile Value	The CMS Hospital Geographic Wage Index was Rank ordered then converted to a percentile. Tied counties were given tied ranks for percentile ranking	HCC_R
Combined Health Access Index	$CHAI = (HCRA_R + HIC_R + HCC_R) / 3$		Percentile Value	Rank ordered then converted to a percentile	CHAI_R

⁹⁸ American Hospital Association. "The Cost of Caring". March 2010. <http://www.fiercehealthcare.com/story/labor-costs-are-key-driver-hospital-cost-growth/2010-03-15>. Accessed December 2010.

TABLE 40 - STEPS IN HIC COMPONENT CONSTRUCTION

Component Item	Component Item Definition	Time Periods	Basic Scaling Method	Computation Refinements	Component Item Definition
HI_KIDS	Pct. of children 0-19 insured by public or private sources	2007 (latest available data)	Percentile Value	Rank ordered then converted to a percentile	HI_KIDS_R
HI_POORKIDS	Pct. of children age 0-19 in families with incomes less than 200% poverty insured by public or private sources	2007 (latest available data)	Percentile Value	Rank ordered then converted to a percentile	HI_POORKIDS_R
HI_ADULTS	Percent of all adults 19-64 insured by public or private sources	2007 (latest available data)	Percentile Value	Rank ordered then converted to a percentile	HI_ADULTS_R
HI_45-64	Percent of adults aged 45-64 insured by public or private sources	2007 (latest available data)	Percentile Value	Rank ordered then converted to a percentile	HI_45-64_R
MC_A	Ratio of HI (Pt. A) to est. pop 65+	2007	Percentile Value	Rank ordered then converted to a percentile	MC_A_R
MC_B	Ratio of SMI (Pt. B) to est. pop 65+	2007	Percentile Value	Rank ordered then converted to a percentile	MC_B_R
MC_C	Medicare Advantage Penetration. 2008	2007	Percentile Value	Rank ordered then converted to a percentile	MC_C_R
MCF_D	Medicare Part D Penetration. 2008	2007	Percentile Value	Rank ordered then converted to a percentile	MCF_D_R
MC_Disab	Medicare Disabled beneficiaries as a percent of population of working age	2008	Percentile Value	Rank ordered then converted to a percentile	MC_Disab_R
SSA	SSA Recipients as a percent of population of working age.	2008	Percentile Value	Rank ordered then converted to a percentile	SSA_R
VETS	Number of unique veterans using VA services as a percentage of VA estimates of Veteran Users	2009	Percentile Value	Rank ordered then converted to a percentile	VETS_R
Health Insurance Coverage	HIC= Avg. of the 11 rescaled percentile items above (HI_KIDS_R... VETS_R)		Percentile Value	Rank ordered then converted to a percentile	HIC_R

TABLE 41 - STEPS IN HCRA COMPONENT CONSTRUCTION

Component Item	Component Item Definition	Time Periods	Basic Scaling Method	Computation Refinements	Final Rescaled Variable Name
PCP	Primary Care Physicians per 100K pop	Averaged across the 3 most recent years	Percentile value	Those 5-10%% of U.S. counties without physicians (tied at zero) were arrayed so most populated counties have a greatest degree of physician shortage	PCP_R
NPCP	Non-primary care Physicians per 100K pop	Averaged across the 3 most recent years	Percentile Value	Those 10-20% of U.S. counties without physicians (tied at zero) were arrayed so most populated counties have a greatest degree of physician shortage	NPCP_R
DDS	Dentists per 100K pop	2007 (latest available data)	Percentile Value	Those 5-10%% of U.S. counties without dentists (tied at zero) were arrayed so most populated counties have a greatest degree of physician shortage	DDS_R
HOSPBEDS	Short term general hospital beds per 10K population	Averaged across the 3 most recent years	Percentile value	For those counties without hospitals (tied at zero) were arrayed so most populated counties have a greatest degree of physician shortage.	HOSPBEDS_R
Health Care Resource Availability Index.	HCRA= (PCP_R + NPCP_R + DDS_R + HOSPBEDS_R)/4		Average of the 4 percentile values or PCP	The average or the 4-item summed percentile scores is then again rank ordered and converted to a percentile across all U.S. counties	HCRA_R

3.9 RATIONALE FOR SELECTION OF MEASURES

The measurements were selected by first isolating measures that were reliably collected and maintained, such that they could be updated annually at the county level. This screen narrowed the access and resource list to elements available on the ARF or OSCAR files. The team seriously considered using the UNC Sheps Center Disparity Index, which relies on socioeconomic data and count of primary care providers. Though well tested and respected by many, the index requires a complex mathematical analysis of expected utilization by a normative age, race, sex and income mix of the population. Dramatic changes in healthcare utilization that are expected as a result of health reform would make it difficult to choose, much less predict, behavior of this normative population.

Moreover, recent studies suggest that many of the problems in rural healthcare access are associated with the lack of surgical specialties in rural hospitals.⁹⁹ These issues caused the team to use the basic elements available through the Sheps Center modeling efforts, but to use them in a more elemental format, reflective of the raw resource.

Classic work by Ricketts has documented significant differences in health insurance coverage.¹⁰⁰ Though we did run a regression analysis to determine correlation or lack thereof, between total insurance coverage and resources, this element was a major focus of the ACA and should change dramatically after 2014. Timeliness of data at present is a major concern. In some cases, the most current available data are five years old. However, with several top-level commissions and task forces focused on the issue of timeliness and consistency of coverage data, we expect currency to improve before the year 2014, when most of the health reform measures become effective.

The final measure, the CMS Geographic Wage Index is the best available national index of healthcare labor cost. The hospital index is one of several geographic wage indices employed by CMS. Data are collected annually, on cost reports filed by providers who are certified to participate in Medicare reimbursement. The index is published annually and used to calculate Medicare reimbursement for most Medicare facilities.

CMS and actuarial groups routinely engage in cost accounting for individual services, and report total dollars spent. However, those calculations include both utilization and cost. The Geographic Wage Index alone measures raw cost. It is indexed to an average wage and normalized to a national average wage. It can be traced to the county level by matching metropolitan and urban designations within the state. All other areas are designated "Other." It can also be traced to the county level using the geographic address for each hospital provider in the state. We combined and rejected a more complex model for counties without hospitals; the index can adopt nursing home, then rural health clinic, then home health agency. A county without any of these providers would have no healthcare labor cost. We chose instead to group counties in the way that CMS groups them from the hospital wage index.

We also rejected a more current index, the Health Care and Social Assistance Index, which is assembled as part of the Employment Cost Index (ECI) by the Bureau of Labor Statistics, because it is not granular enough. These data are published quarterly from information collected as part of the National Compensation Survey and assembled to produce the ECI.¹⁰¹ However, these survey data represent only 150 local areas nationwide. We considered this and the measure of Health Insurance Cost also collected by BLS. Although the ECI is attractive because it provides 12-month percent changes in employer costs for health as reference tests, ECI data are too sparse to be used in county-based comparisons.

⁹⁹ Poley, Stephanie, Thomas Ricketts, Ph.D., Daniel Belsky and Katie Gold. Pediatric Surgeons: Subspecialists Increase Faster than Generalists. ACS/HPR Institute. July 2009.

¹⁰⁰ Ricketts, Thomas C., et al. Designating Places and Populations as Medically Underserved, a Proposal for a New Approach. *JL for Poor and Underserved*. (2007). 567-589.

¹⁰¹ Bureau of Labor Statistics, Chapter 8, National Compensation Measures. <http://www.bls.gov/opub/hom/pdf/homch8.pdf>. Downloaded December 2010.

4 DATA SOURCES

4.1 ACCESS MEASURES

All access measures selected for use in the proposed index are drawn from the Area Resource File (ARF) file. ARF is compiled from multiple national databases by the Health Resource and Service Administration (HRSA) of the U.S. Department of Health and Human Services (DHHS). The Cecil B. Sheps Center of the University of North Carolina Chapel Hill (Sheps Center) has worked with these files and understands and has documented statistical variation in each measure. The Sheps Center and other have used ARF data in multiple analytic studies.

Cost measures for the index are reduced to one, the hospital Geographic Wage Index used by CMS. Data are 100 percent samples drawn from the cost reports prepared by Medicare certified facilities. All locations are coded to FIPS codes. Some of the 420 counties have no facility. However, the Wage Index has a default for “Other” counties. This default permits assignment of an index to all counties. Nationwide, counties are assigned to the “Other” default and within the state boundaries. These are typically rural counties, and have been the source of significant policy decisions to create additional indices. For example, the Frontier Index was developed to offset the otherwise low “Other” value for counties with fewer than six persons per square mile. Overlays like Frontier status and rural minima are used to make adjustments to the Geographic Wage Index. To avoid distortions we used the unadjusted Geographic Wage Index.

4.2 INSURANCE RELATED ACCESS

Small Area Health Insurance Estimates (SAHIE) is the name given to insurance survey data compiled by the U.S. Census Bureau. Table 42 represents the SAHIE data that were extracted from the ARF. The latest year available is 2007.

TABLE 42 – SAHIE EXTRACTED DATA FROM ARF

Age	Group	Insurance	Income Level
0-19	Children	Insured/Uninsured	All income levels
0-19	Children	Insured/Uninsured	Up to 200% of poverty level
0-64	Children / Adults	Insured/Uninsured	All income levels
0-64	Children / Adults	Insured/Uninsured	Up to 200% of poverty level

These measures have been calculated as percentages of the relevant denominators in the ARF. They were verified and items used where the fields are populated. They are available at the county level and can be described in per capita terms.

The measures in Table 42 exclude the over 65 population. According to Census data for the American Community Survey, in 2009, approximately 99 percent of people are covered. See discussion in Chapter 4. All persons over 65 who are legal citizens qualify for Medicare Part A, facility coverage. This is minimum coverage. Unfortunately, there are no uniform measures of Part B, C, D and E coverage. Insurance policies are not uniform and “coverage” definitions vary from one area to another.

Separating insurance coverage by working and not working people is also not possible at the county level. Experts at Kaiser and Research Data Assistance Center (ResDAC) agree.

5 STATISTICAL ISSUES WITH DATA

5.1 LIMITED DATA AT THE COUNTY LEVEL

The data sources ARF, SAHIE, and CMS were chosen because they were available at the county level without manipulation, easily replicable, publically acceptable, and transparent.

5.2 RECENT DATA / DATA FOR A CONSTANT YEAR

The proposed Healthcare Cost, Coverage, and Access (HCCA) Index is based on ARF, SAHIE, and CMS data. The ARF data used is from 2006-2008; the SAHIE data is from 2007; and the CMS data are from 2005. These data were the most recent available from the three sources. We chose to use data from different years, as opposed to consistently using 2005 data, noting that CMS used 2005 data for 2011 rate setting.

5.3 DOUBLE COUNTING OF INSURANCE COVERAGE

The Health Insurance Coverage (HIC) component describes health insurance coverage and includes eleven inputs. After consideration, seven of the inputs and three of the remaining four inputs were combined. Inputs were eliminated after discovering that some Medicaid enrollees and children below 200 percent poverty were being double counted.

APPENDIX L: USE OF VETERANS HEALTH ADMINISTRATION SERVICES IN APPALACHIAN COUNTIES, 2009

TABLE 43 – UNIQUE USERS AS A PERCENTAGE OF VA ELIGIBLES BY NATIONAL PERCENTILE GROUP

State Name	Number of Counties by Percentile Group					Grand Total
	00 to 20	20 to 39	40 to 59	60 to 79	80 to 99	
Alabama	7	13	9	2	6	37
Georgia	24	8	5	0	0	37
Kentucky	0	4	8	12	30	54
Maryland	0	1	1	1	0	3
Mississippi	0	2	6	13	3	24
New York	0	7	1	5	1	14
North Carolina	1	8	10	7	3	29
Ohio	0	5	12	12	3	32
Pennsylvania	6	17	6	15	8	52
South Carolina	2	4	0	0	0	6
Tennessee	6	12	11	7	16	52
Virginia	2	5	6	8	4	25
West Virginia	1	2	10	13	29	55
Grand Total	49	88	85	95	103	420

Source: Data from United States Department of Veterans Affairs, Health Economics Resource Center Second Quarter 2010, VA National Patient Care Database, analysis by UNC Sheps Center and PDA, Inc, 2011.

TABLE 44 – UNIQUE USERS AS A PERCENTAGE OF VA ELIGIBLES

State Name	Number of Counties by Percentage Group					Grand Total
	00 to 20	20 to 39	40 to 59	60 to 79	80 to 99	
Alabama	9	26	2	0	0	37
Georgia	27	10	0	0	0	37
Kentucky	0	39	14	1	0	54
Maryland	0	3	0	0	0	3
Mississippi	0	23	1	0	0	24
New York	1	12	1	0	0	14
North Carolina	1	28	0	0	0	29
Ohio	1	31	0	0	0	32
Pennsylvania	9	42	1	0	0	52
South Carolina	3	3	0	0	0	6
Tennessee	9	39	4	0	0	52
Virginia	3	22	0	0	0	25
West Virginia	2	37	16	0	0	55
Grand Total	65	315	39	1	0	420

Source: Data from United States Department of Veterans Affairs, Health Economics Resource Center Second Quarter 2010, VA National Patient Care Database, analysis by UNC Sheps Center and PDA, Inc, 2011.

APPENDIX M: MULTIVARIATE REGRESSION ANALYSIS OF HCCA INDEX

CONTROLLING FOR THE ECONOMIC DISTRESS INDEX

We tested the hypothesis that the HCCA and its components have a direct, independent relationship to the rate of premature mortality (YPLL_75) which we took to reflect a global measure of health status at the county level. Multiple regression models were employed to examine the joint relationships with the socio-economic variable, (the ARC_EDI) as well as health system variables reflected by the new HCCA index. In addition, at the national level, we included a variable reflecting whether or not a county was in the ARC region. These results are reported for all counties at the national level in Table 45 in Appendix M, again for all counties in the 13 Appalachian states in Table 46 in Appendix M, and for the ARC counties in Table 47 in Appendix M. In all three analyses, the socioeconomic status of counties, as reflected in the ARC_EDI, seems to have a substantial relationship to premature mortality. However, at the national level, our proposed HCCA Index exhibits an independent relationship to premature mortality as well.

Relationships between the HCCA, the ARC_EDI and the YPLL_75 are significant nationally, but not in Appalachian states or counties. This suggests that something other than economic distress could be affecting premature mortality rates in the Appalachian states. Further, Appalachian counties experienced higher rates of premature mortality (YPLL_75) than would be predicted on the basis of their scores on ARC_EDI and HCCA alone, suggesting that there may be an unmeasured factor at work in counties located in the Appalachian Region over and beyond the combined impact of socioeconomic status (ARC_EDI) and health system characteristics (HCCA). All of these relationships were highly statistically significant ($p < .001$) when measured at the national level. The same statistical models were applied to a smaller number of counties in the 13 ARC states (Table 47 in Appendix M), and to the Appalachian counties alone (Table 48 in Appendix M). The relationships observed at the national level were repeated to some extent at the level of the 13 states and the ARC counties alone, although the HCCA did not relate as well on the smaller samples of counties in the Appalachian Region. Please see Appendix M for the complete statistical analysis and commentary.

In the flowing tables, blue shading shows stronger relationships. Each table is followed by a scatter plot showing how closely the actual data distributed in the regression matches the predicted values.

TABLE 45 - REGRESSION MODEL: PREDICTIVE VALUE OF YEARS OF POTENTIAL LIFE LOST_75¹ BY ARC ECONOMIC DISTRESS INDEX AND HCCA, FOR ALL COUNTIES IN THE U.S. (N=3007 COUNTIES)

All Predictor U.S. Counties N=3007 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8612.301	8.748		984.533	.000
ARC Economic Distress Index Rank (1 = Best; 3,110 = Worst)	.182	.005	.558	35.181	.000
Combined Healthcare Cost, Coverage and Access Index - percentile	1.823	.159	.178	11.453	.000
Flag for ARC County (0/1)	43.682	11.599	.052	3.766	.000

¹ Predictors of YPLL_75 per 100,000 population (logged), for U.S. Counties, 2005-2007.

² N=3007 because some counties have a missing value for the some variables.

$$\text{LnYPLL}_75 \times 100K = 8612.301 + 0.182 * \text{ARC_EDI} + 1.823 * \text{HCCA_Index} + 3.682 * \text{ARC County}$$

- Economic Distress is more important than either the HCCA or presence in the Appalachian Region as a predictor of variance. Log of YPLL_75 times 100,000 equals a consistent multiple of these three variables.
- Adjusted R square means equation explains 46.2 percent of the variation; above 40 percent is good. Significance level less than .001 is good; t value tells how significant; a 1.96 value is 95% chance of correct. Above 1.96 is good. Betas are standardized; value above 0.05 is good.

R	R Square	Adjusted R Square	Std. Error of the Estimate
.680^a	.462	.462	215.34130

FIGURE 48 - SCATTER PLOT REGRESSION MODEL: PREDICTIVE VALUE OF YPLL_75^{BY} ARC_EDI AND HCCA INDEX FOR ALL COUNTIES IN THE U.S. (N=3007 COUNTIES)

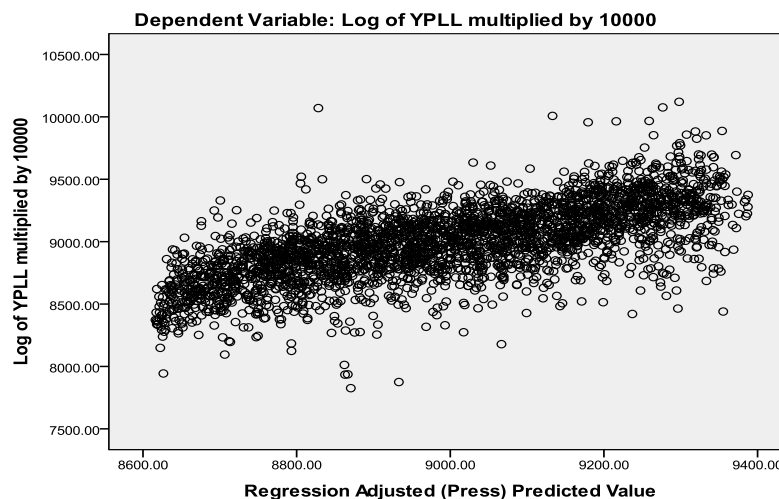


TABLE 46 - REGRESSION MODEL: PREDICTIVE VALUE OF YPLL_75¹ BY ARC_EDI AND HCCA INDEX FOR ALL COUNTIES IN THE 13 APPALACHIAN STATES (N=1069 COUNTIES)

All Predictor Counties in the 13 Appalachian States, N=1069 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8698.380	13.806		630.025	.000
ARC Economic Distress Index Rank (1 = Best; 3,110 = Worst)	.210	.008	.708	26.591	.000
Combined Healthcare Cost, Coverage and Access Index - percentile	.480	.255	.049	1.879	.061
Flag for ARC County (0/1)	-22.301	11.330	-.042	-1.968	.049

¹ Predictors of YPLL_75 per 100,000 Population (logged), for U.S. Counties, 2005-2007.

² N=1069 because some counties have a missing value for the dependent variable.

$$\text{LnYPLL}_75 \times 100K = 8698.38 + .021 * \text{ARC_EDI} + 0.48 * \text{HCCA_Index} - 22.30 * \text{ARC County}$$

Within the Appalachian States, the Economic Distress Index is the better predictor of variance

R	R Square	Adjusted R Square	Std. Error of the Estimate
.733^a	.537	.536	178.13009

FIGURE 49 - SCATTERPLOT OF REGRESSION MODEL: PREDICTIVE VALUE OF YPLL_75^{BY} ARC_EDI AND HCCA INDEX, FOR ALL COUNTIES IN THE 13 APPALACHIAN STATES (N=1069 COUNTIES)

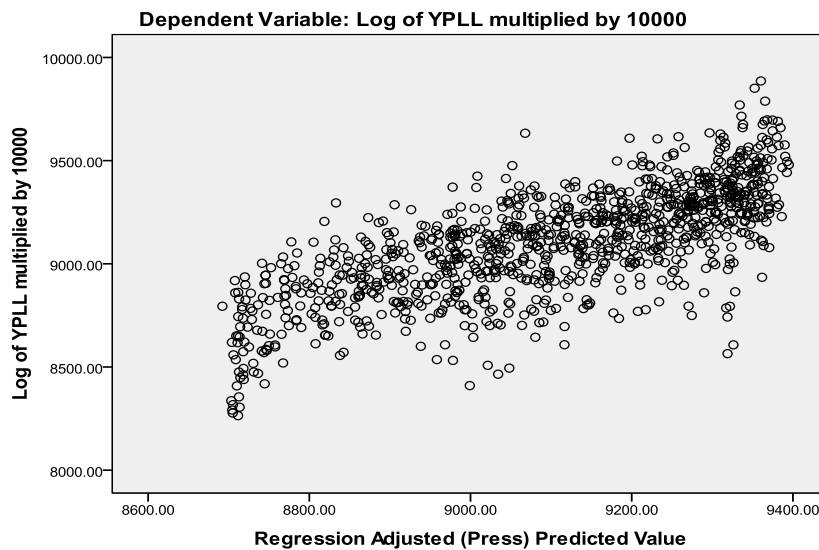


TABLE 47 - REGRESSION MODEL: PREDICTIVE VALUE OF YPLL_75¹ BY ARC_EDI AND HCCA INDEX FOR ALL COUNTIES IN THE APPALACHIAN REGION (N=419 COUNTIES)

All Predictor Appalachian Counties N=419 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8772.504	28.727		305.379	.000
ARC Economic Distress Index Rank (1 = Best; 3,110 = Worst)	.174	.014	.565	12.123	.000
Combined Healthcare Cost, Coverage and Access Index - percentile	.076	.435	.008	.174	.862
ARC County (1/0)	NA	NA	NA	NA	NA

¹ Predictors of YPLL_75 per 100,000 Population (logged) and multiplied by 100,000, for U.S. Counties, 2005-2007.

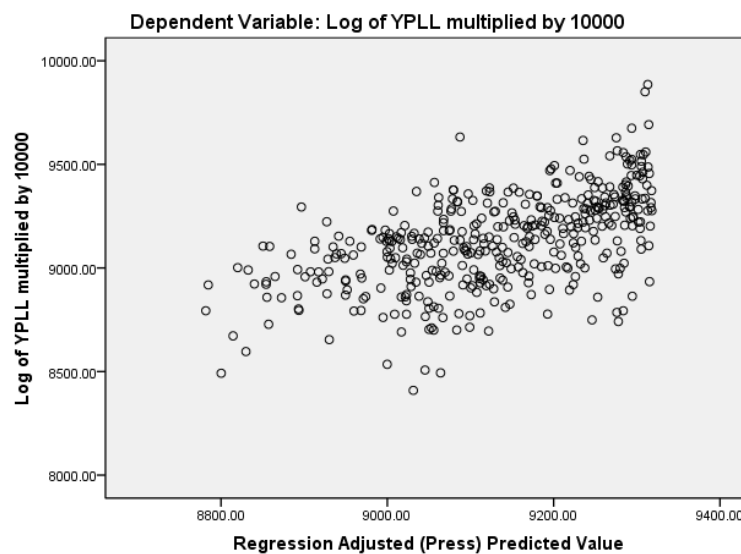
² N=419 because one county has missing values for the dependent variable.

$$\text{LnYPLL}_75 \times 100K = 8772.504 + 0.174 * \text{ARC_EDI} + 0.076 * \text{HCCA_Index}$$

The ARC Economic Distress Index is a better predictor of YPLL_75 variance in the Appalachian Region.

R	R Square	Adjusted R Square	Std. Error of the Estimate
.569 ^a	.324	.320	185.75601

FIGURE 50 - REGRESSION MODEL: PREDICTIVE VALUE OF YPLL_75^{BY} ARC_EDI AND HCCA INDEX FOR ALL COUNTIES IN THE APPALACHIAN REGION (N=419 COUNTIES)



Note: The ceiling and floor effect are caused by ranking the counties.

TESTING THE RELATIONSHIPS TO HEALTH STATUS AND ECONOMIC DISTRESS

Tables 48 through 50 in Appendix M show linear regressions of the components of the HCCA and the ARC_EDJ against YPLL_75 rates for United States, Appalachian states and Appalachian counties. Blue shading shows highly significant relationships.

The county ARC_EDJ has the strongest relationship with county health status of any of the variables in the equations at all levels: United States, Appalachian states, and Appalachian counties. Even though the healthcare resource component (HCRA) has a relatively high correlation with county health status (YPLL_75), HCRA has little relationship to county health status, once the ARC_EDJ has been statistically controlled. This is true at the national, Appalachian state and Appalachian county levels. The other two components of the HCCA index have complex relationships with health status depending on the geographic focus of the analysis:

- At the national level, once ARC_EDJ is controlled for, less health insurance coverage and lower reimbursements continue to be significantly correlated with health status. Similarly, being an ARC county has a small, but still statistically significant, relationship with poorer YPLL_75, the measure of health status ($p < .05$). Please see Table 48.
- At the 13-state level, once ARC_EDJ is controlled for, less health insurance coverage is not related to health status, but lower reimbursements continue to be significantly correlated with poorer health status. Similarly, being an ARC county has a statistically significant relationship with health status ($p < .001$). Please see Table 49.
- When examining only the Appalachian counties, once ARC_EDJ is controlled for, more health insurance coverage and lower payments for health services are associated with poorer health status, but these relationships do not achieve the same level of statistical significance (i.e., $p < .001$). This phenomenon may be related to intersection of a relatively high proportion of insurance coverage consisting of Medicaid and Medicare Disability, along with a relatively low level of reimbursement to providers by these programs in Appalachian counties. Please see Table 50.

TABLE 48 - REGRESSION MODEL: YPLL_75¹ BY ARC_ED I AND COMPONENTS OF HCCA INDEX FOR ALL COUNTIES IN THE UNITED STATES (N=3007 COUNTIES)

All U.S. Counties N=3007 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8576.849	10.547		813.238	.000
ARC_ED I Value Rank (1 = Best; 3,110 = Worst)	.181	.005	.552	34.802	.000
HCRA (1=best;100=worst)	.181	.150	.018	1.204	.229
Health Insurance Coverage Component (1=best;100=worst)	.679	.146	.066	4.637	.000
Health Care Cost Component (1=best;100=worst)	1.759	.156	.174	11.290	.000
Flag for ARC County (0/1)	25.640	11.900	.030	2.155	.031

¹ Predictors of YPLL_75 per 100,000 Population (logged), for all U.S. Counties, 2005-2007.

² N=3007 because some counties have a missing value for the some variables.

$$\text{LnYPLL}_75 \times 100K = 8576.849 + .181 * \text{ARC_EDI} + .181 * \text{Access_Comp} + .679 * \text{Coverage_Comp} + 1.759 * \text{Cost_Comp} + 25.64 * \text{ARC County}$$

R	R Square	Adjusted R Square	Std. Error of the Estimate
.686	.471	.470	213.68456

TABLE 49 - REGRESSION MODEL: YPLL_75¹ BY ARC_ED I AND COMPONENTS OF HCCA INDEX FOR ALL COUNTIES IN THE 13 APPALACHIAN STATES (N=1069 COUNTIES)

All Counties in the 13 Appalachian States N=1069 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8692.132	16.996		511.427	.000
ARC Economic Distress: Index Rank (1 = Best; 3,110 = Worst)	.203	.008	.682	24.175	.000
Health Care Resource Availability Component (1=best;100=worst)	.211	.205	.024	1.030	.303
Health Insurance Coverage Component (1=best;100=worst)	-.162	.251	-.014	-.647	.518
Health Care Cost Component (1=best;100=worst)	.784	.246	.086	3.188	.001
Flag for ARC County (0/1)	-30.717	11.726	-.057	-2.619	.009

¹ Predictors of YPLL_75 per 100,000 Population (logged), for U.S. Counties, 2005-2007.

² N=1069 because some counties have a missing value for the dependent variable.

$$\text{LnYPLL}_75 \times 100K = 8692.132 + .203 * \text{ARC_EDI} + .211 * \text{Access_Comp} - .162 * \text{Coverage_Comp} + .784 * \text{Cost_Comp} + -30.717 * \text{ARC County}$$

R	R Square	Adjusted R Square	Std. Error of the Estimate
.735	.540	.538	177.69279

TABLE 50 - REGRESSION MODEL: YPLL_75¹ BY ARC_ED I AND COMPONENTS OF HCCA INDEX FOR ALL COUNTIES IN THE APPALACHIAN REGION (N=419 COUNTIES)

Appalachian Counties N=419 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8774.442	35.032		250.470	.000
ARC Economic Distress: Index Rank (1 = Best; 3,110 = Worst)	.153	.016	.496	9.725	.000
Health Care Resource Availability Component (1=best;100=worst)	.387	.344	.049	1.125	.261
Health Insurance Coverage Component (1=best;100=worst)	-.995	.390	-.103	-2.548	.011
Health Care Cost Component (1=best;100=worst)	1.017	.442	.110	2.302	.022

¹ Predictors of YPLL_75 per 100,000 Population (logged) and multiplied by 100,000, for U.S. Counties, 2005-2007.

² N=419 because one county have a missing value for the dependent variable.

$$\text{LnYPLL}_75 \times 100K = 8774.442. + .153 * \text{ARC_EDI} + .387 * \text{Access_Comp} - .995 * \text{Coverage_Comp} + 1.017 * \text{Cost_Comp}$$

R	R Square	Adjusted R Square	Std. Error of the Estimate
.735	.540	.538	177.69279

CONTROLLING FOR PERSISTENT POVERTY

Tables 51 through Table 56 repeat the analyses in Table 51 through Table 53. The exception is that a dichotomous variable indicating a persistent poverty county is substituted for the ARC_ED I as a measure of socioeconomic status. Blue shading indicates high significance and scatter plots follow the tables to show the distribution of data.

The scatter plots show how well the values of the predicted YPLL_75 variable from the multiple regression equations (on the X-axis) fit to the observed distribution (on the Y-axis). Consistent with the larger multiple regression coefficients in the equations involving the ARC_ED I, those statistical models show a more consistent relationship between the predicted and observed values, than do the equations involving the persistent poverty index.

TABLE 51 - REGRESSION MODEL: YPLL_75¹ BY PERSISTENT POVERTY OF THE COUNTY AND HCCA INDEX, FOR ALL COUNTIES IN THE U.S. (N=3007 COUNTIES)

All U.S. Counties N=3007 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8765.919	8.965		977.828	.000
Persistent Poverty (1=yes;0=no)	255.170	14.200	.290	17.970	.000
Combined Healthcare Cost, Coverage and Access Index - percentile	3.623	.165	.354	21.918	.000
Flag for ARC County (0/1)	111.852	12.881	.132	8.684	.000

¹ Predictors of YPLL_75 per 100,000 Population (logged), for U.S. Counties, 2005-2007.

² N=3007 because some counties have a missing value for the some variables.

$$\text{LnYPLL}_75 \times 100K = 8765.919 + 255.170 * \text{Pers_Pov} + 3.623 * \text{HCCA_Index} + 111.852 * \text{ARC County}$$

Explained variance is not as good because socioeconomic status (persistent poverty) is only a “yes” or “no” variable.

R	R Square	Adjusted R Square	Std. Error of the Estimate
.560	.313	.312	243.38126

FIGURE 51 - REGRESSION MODEL: YPLL_75 BY PERSISTENT POVERTY OF THE COUNTY AND HCCA INDEX, FOR ALL COUNTIES IN THE U.S. (N=3007 COUNTIES)

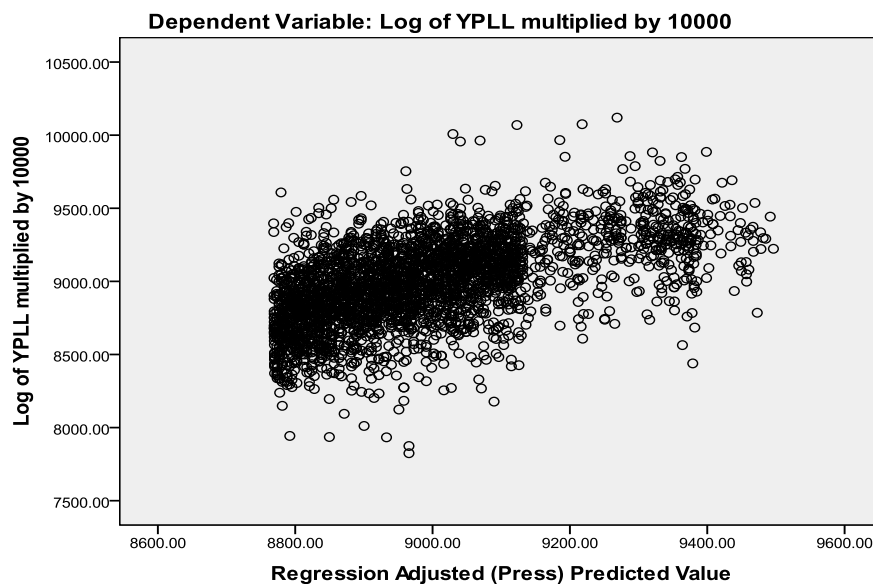


TABLE 52 - REGRESSION MODEL: YPLL_75¹ PERSISTENT POVERTY OF THE COUNTY AND HCCA INDEX FOR ALL COUNTIES IN THE 13 APPALACHIAN STATES (N=1069 COUNTIES)

All Counties in the 13 Appalachian Counties N=1069 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8866.800	15.145		585.448	.000
Persistent Poverty (1=yes;0=no)	238.733	17.713	.361	13.478	.000
Combined Healthcare Cost, Coverage and Access Index - percentile	3.273	.261	.337	12.520	.000
Flag for ARC County (0/1)	34.015	13.383	.064	2.542	.011

¹ Predictors of YPLL_75 per 100,000 Population (logged), for U.S. Counties, 2005-2007.

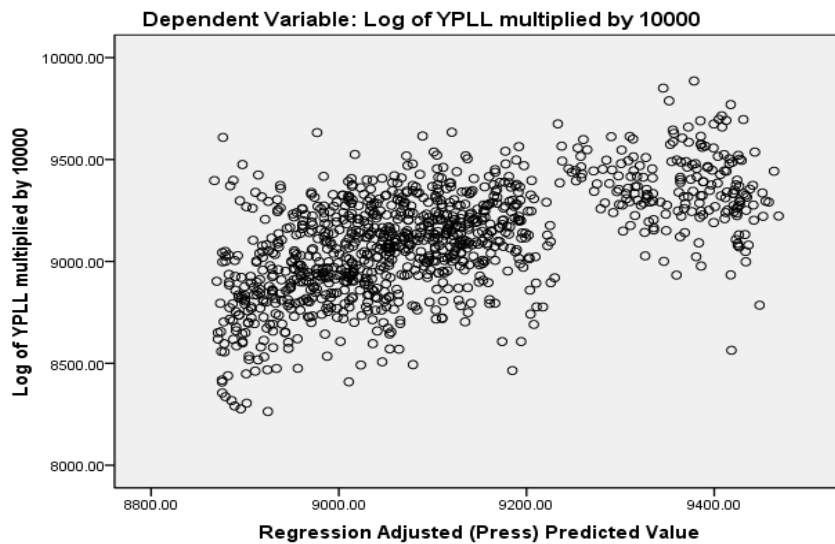
² N=1069 because some counties have a missing value for the dependent variable.

$$\text{LnYPLL_75x100K} = 8866.800 + 238.733*\text{Pers_Pov} + 3.273* \text{HCCA_Index} + -34.015* \text{ARC County}$$

By controlling for poverty, we remove pieces that were not controlled in the ARC Economic Distress Index

R	R Square	Adjusted R Square	Std. Error of the Estimate
.585	.342	.341	212.35163

FIGURE 52 - REGRESSION MODEL: YPLL_75 BY PERSISTENT POVERTY OF THE COUNTY AND HCCA INDEX FOR ALL COUNTIES IN THE 13 APPALACHIAN STATES (N=1069 COUNTIES)



Note: Dense areas on the left are counties with the higher income, less dense areas on the right are persistent poverty counties.

TABLE 53 - REGRESSION MODEL: YPLL_75¹ BY PERSISTENT POVERTY OF THE COUNTY AND HCCA FOR ALL COUNTIES IN THE APPALACHIAN REGION (N=419 COUNTIES)

Appalachian Counties N=419 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	9002.378	25.199		357.254	.000
Persistent Poverty (1=yes;0=no)	228.794	26.563	.393	8.613	.000
Combined Healthcare Cost, Coverage and Access Index - percentile	1.527	.427	.163	3.579	.000
ARC County (1/0)	NA	NA	NA	NA	NA

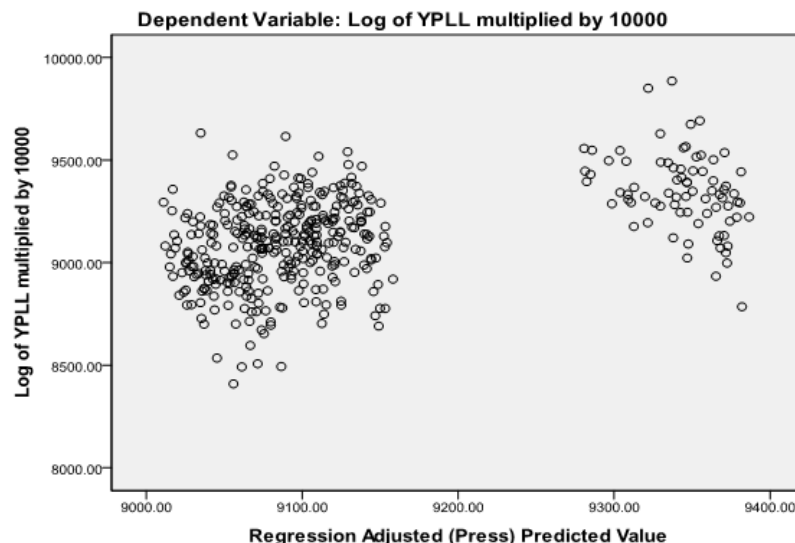
¹ Predictors of YPLL_75 per 100,000 Population (logged) and multiplied by 100,000, for U.S. Counties, 2005-2007.

² N=419 because one county has missing values for the dependent variable.

$$\text{LnYPLL}_75 \times 100K = 9002.378 + 228.794 * \text{Pers_Pov} + 1.527 * \text{HCCA_Index}$$

R	R Square	Adjusted R Square	Std. Error of the Estimate
.473	.224	.220	199.04304

FIGURE 53 - REGRESSION MODEL: YPLL_75 BY PERSISTENT POVERTY OF THE COUNTY AND HCCA, FOR ALL COUNTIES IN THE APPALACHIAN REGION (N=419 COUNTIES)



Note: Points on the right are persistent poverty counties, on left are not persistent poverty counties.

The regression shows significant correlation between the HCCA and premature mortality in counties, even when the equation is controlled for designation as a Persistent Poverty county. With few exceptions Appalachian counties with high persistent poverty had higher premature mortality and, with a few exceptions, the level of premature mortality was close to what would be predicted by the county's HCCA score. The discontinuity on the regression scatter plot reflects the yes/no nature of the Persistent Poverty classification. The scatter plot in Figure 53 also shows that a few Persistent Poverty counties have much lower than expected premature mortality, as represented by the few low mortality scores in the right hand cluster.

TABLE 54 - REGRESSION MODEL: YPLL_75¹ BY PERSISTENT POVERTY OF THE COUNTY AND COMPONENTS OF HCCA INDEX FOR ALL COUNTIES IN THE UNITED STATES (N=3007 COUNTIES)

All U.S. Counties N=3007 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8688.943	11.870		732.018	.000
ARC Economic Distress: Index Rank (1 = Best; 3,110 = Worst)	246.108	14.171	.279	17.368	.000
Health Care Resource Availability Component (1=best;100=worst)	1.256	.164	.122	7.668	.000
Health Insurance Coverage Component (1=best;100=worst)	1.277	.164	.125	7.802	.000
Health Care Cost Component (1=best;100=worst)	2.685	.173	.265	15.552	.000
Flag for ARC County (0/1)	89.330	13.295	.105	6.719	.000

¹ Predictors of YPLL_75 per 100,000 Population (logged), for all U.S. Counties, 2005-2007.

² N=3007 because some counties have a missing value for the some variables.

$$\ln YPLL_{75} \times 100K = 8688.943 + 246.108 * Pers_Pov + 1.256 * Access_Comp + 1.277 * Coverage_Comp + 2.685 * Cost_Comp + 89.330 * ARC$$

R	R Square	Adjusted R Square	Std. Error of the Estimate
.569	.324	.322	241.60900

TABLE 55 - REGRESSION MODEL: YPLL_75¹ BY PERSISTENT POVERTY OF THE COUNTY AND COMPONENTS OF HCCA INDEX FOR ALL COUNTIES IN THE 13 APPALACHIAN STATES (N=1069 COUNTIES)

All Counties in the 133 Appalachian States N=1069 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8797.858	19.914		441.782	.000
ARC Economic Distress: Index Rank (1 = Best; 3,110 = Worst)	212.092	17.741	.321	11.955	.000
Health Care Resource Availability Component (1=best;100=worst)	1.479	.228	.167	6.485	.000
Health Insurance Coverage Component (1=best;100=worst)	.159	.293	.014	.542	.588
Health Care Cost Component (1=best;100=worst)	3.012	.255	.332	11.798	.000
Flag for ARC County (0/1)	2.736	13.809	.005	.198	.843

¹ Predictors of YPLL_75 per 100,000 Population (logged), for U.S. Counties, 2005-2007.

² N=1069 because some counties have a missing value for the dependent variable.

$$\ln YPLL_{75} \times 100K = 8797.858 + 212.092 * Pers_Pov + 1.479 * Access_Comp + .159 * Coverage_Comp + 3.012 * Cost_Comp + 2.736 * ARC$$

R	R Square	Adjusted R Square	Std. Error of the Estimate
.610	.372	.369	207.66614

TABLE 56 - REGRESSION MODEL: YPLL_75¹ BY PERSISTENT POVERTY OF THE COUNTY AND COMPONENTS OF HCCA INDEX, FOR ALL COUNTIES IN THE APPALACHIAN REGION (N=419 COUNTIES)

Appalachian Counties N=419 ²	Unstandardized Coefficients		Std. Coeff	t	Sig. Level
	B	Std. Error	Beta		
(Constant)	8926.903	36.199		246.604	.000
Persistent Poverty (1=yes;0=no)	191.767	26.417	.330	7.259	.000
Health Care Resource Availability Component (1=best;100=worst)	1.140	.340	.145	3.353	.001
Health Insurance Coverage Component (1=best;100=worst)	-1.155	.407	-.120	-2.839	.005
Health Care Cost Component (1=best;100=worst)	2.348	.411	.253	5.715	.000

¹ Predictors of YPLL_75 per 100,000 Population (logged) and multiplied by 100,000, for U.S. Counties, 2005-2007.

² N=419 because one county have a missing value for the dependent variable.

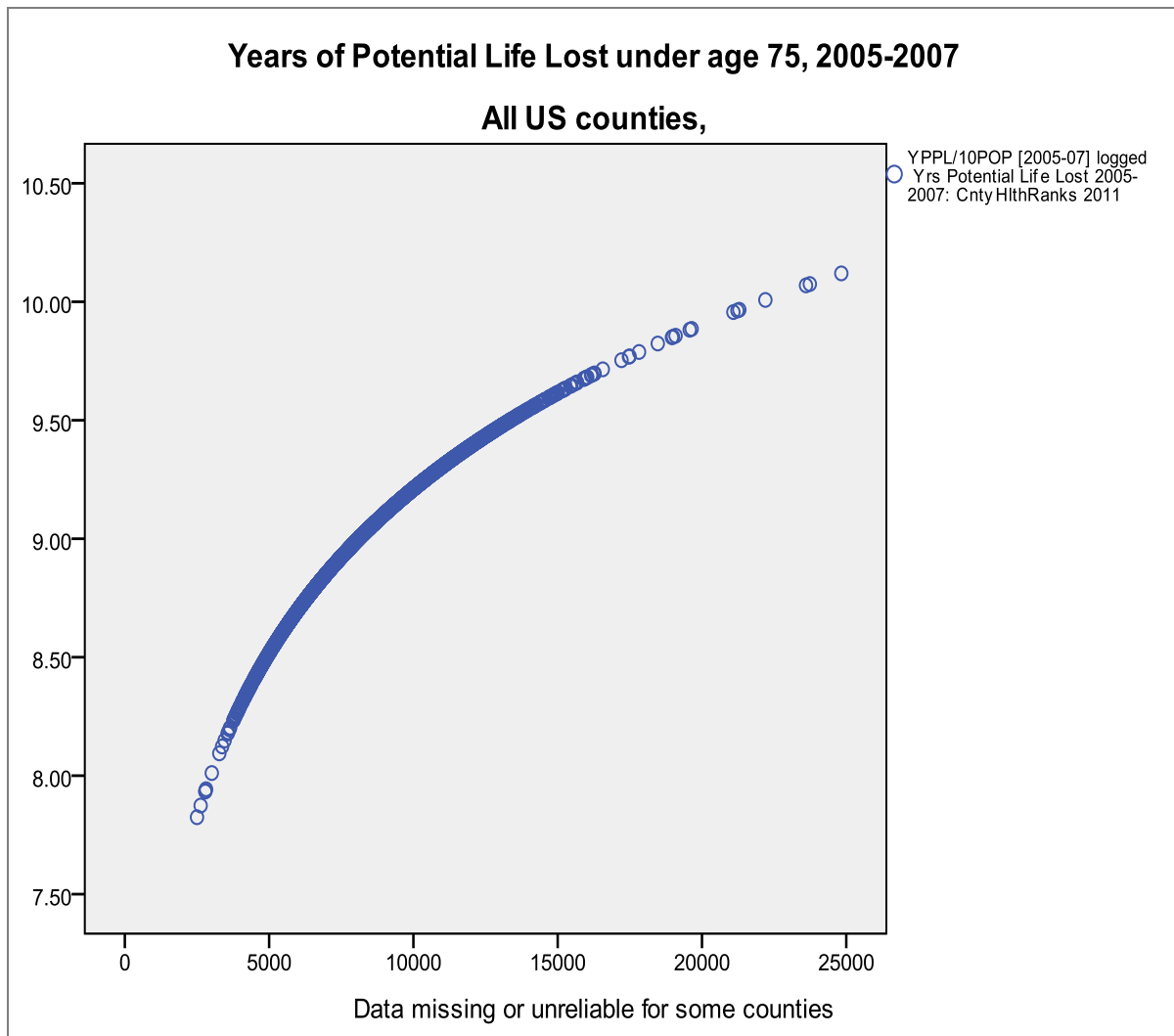
$$\text{LnYPLL}_75 \times 100K = 8926.903 + 191.767 * \text{Pers_Pov} + 1.140 * \text{Access_Comp} - 1.155 * \text{Coverage_Comp} + 2.348 * \text{Cost_Comp}$$

R	R Square	Adjusted R Square	Std. Error of the Estimate
.532	.283	.276	191.75721

ADDITIONAL MATERIAL

The additional material provides supporting documentation for the YPLL_75 analyses including the flag for presence of county in Appalachia.

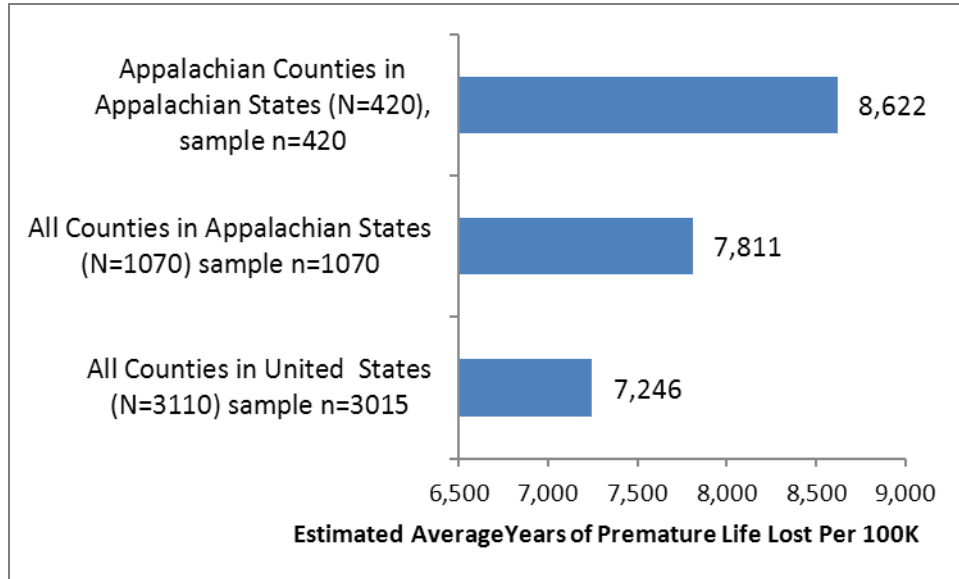
FIGURE 54 - LOGRITHMIC TRANSFORMATION OF YEARS OF POTENTIAL LIFE LOST PER 10,000 POPULATION UNDER AGE 75



The absolute level of years of preventable life lost estimated for each county has been standardized by the population of the county. This quantity is measured along the horizontal axis. This quantity is rescaled using a natural logarithmic transformation. That result is displayed along the vertical axis. This, mathematically, makes the subsequent statistical manipulations more statistically stable and interpretable and less affected by extreme values.

YPLL_75 per 100,000 population from the Wisconsin 2005-2007 County Population Health Ranking files were used in the regression; the regression creates a “mean” for the values used. This is a mean of the premature mortality rates. Differences in these means are more apparent when expressed in terms of their natural logarithms.

**FIGURE 55 - COMPARISON OF ESTIMATED PREVENTABLE MORTALITY RATES IN 2005-2007
AVERAGE OF YEARS OF POTENTIAL LIFE LOST UNDER AGE 75 PER 100,000 POPULATION**

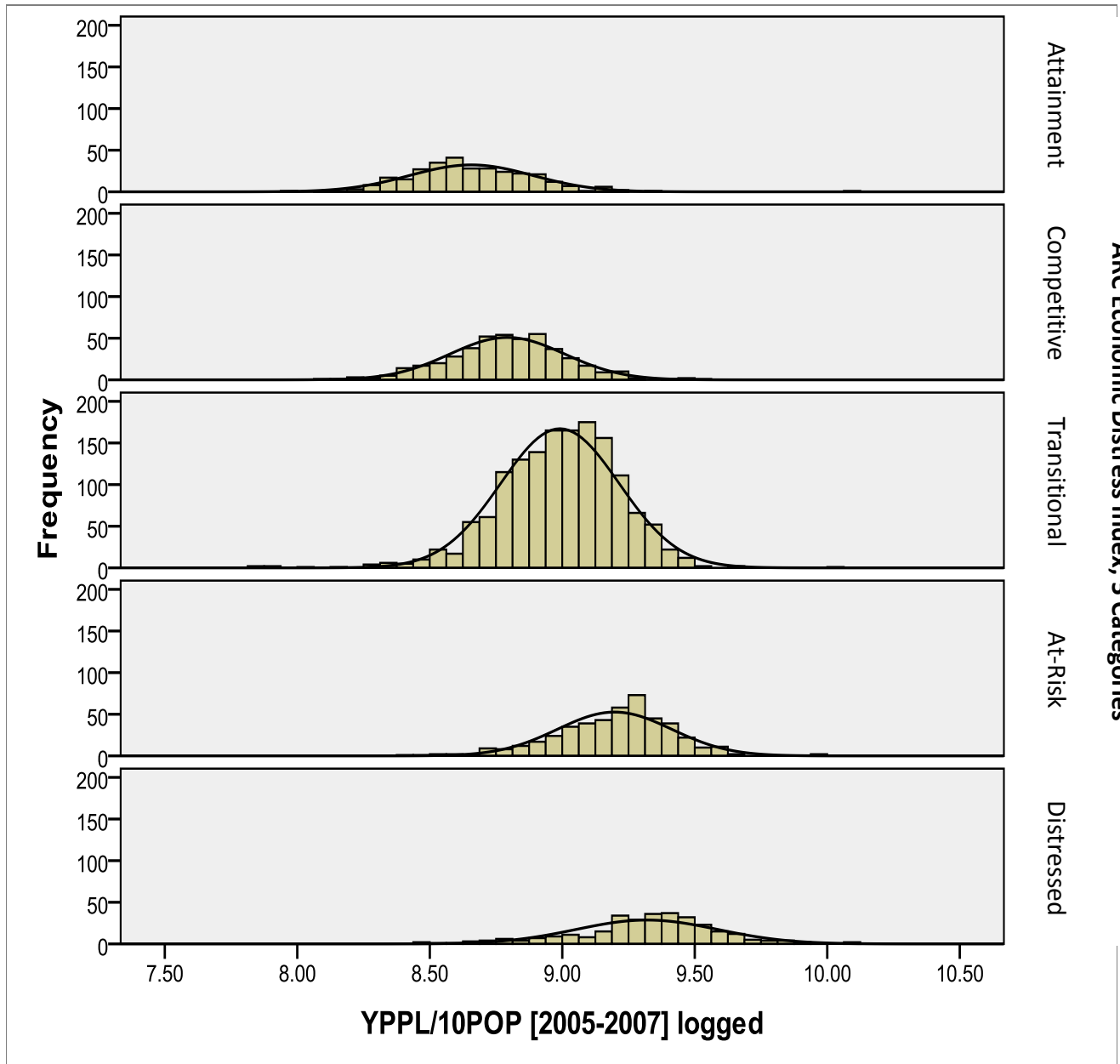


Source: University of Wisconsin County Health Rankings, Premature mortality was estimated with the equation: County YPLL_75 / 100K x county population 2008 / 100,000. Mortality was summed for all counties and divided by the total population times 100,000

YPLL_75 is a rate. To demonstrate its meaning, Figure 55 illustrates the number of people under 75 who would have died prematurely in the years 2005 through 2007, if 100,000 people were randomly selected from three different populations: Appalachia, Appalachian states and the United States. During that period, 18 percent more Appalachians than U.S. residents would have died prematurely.

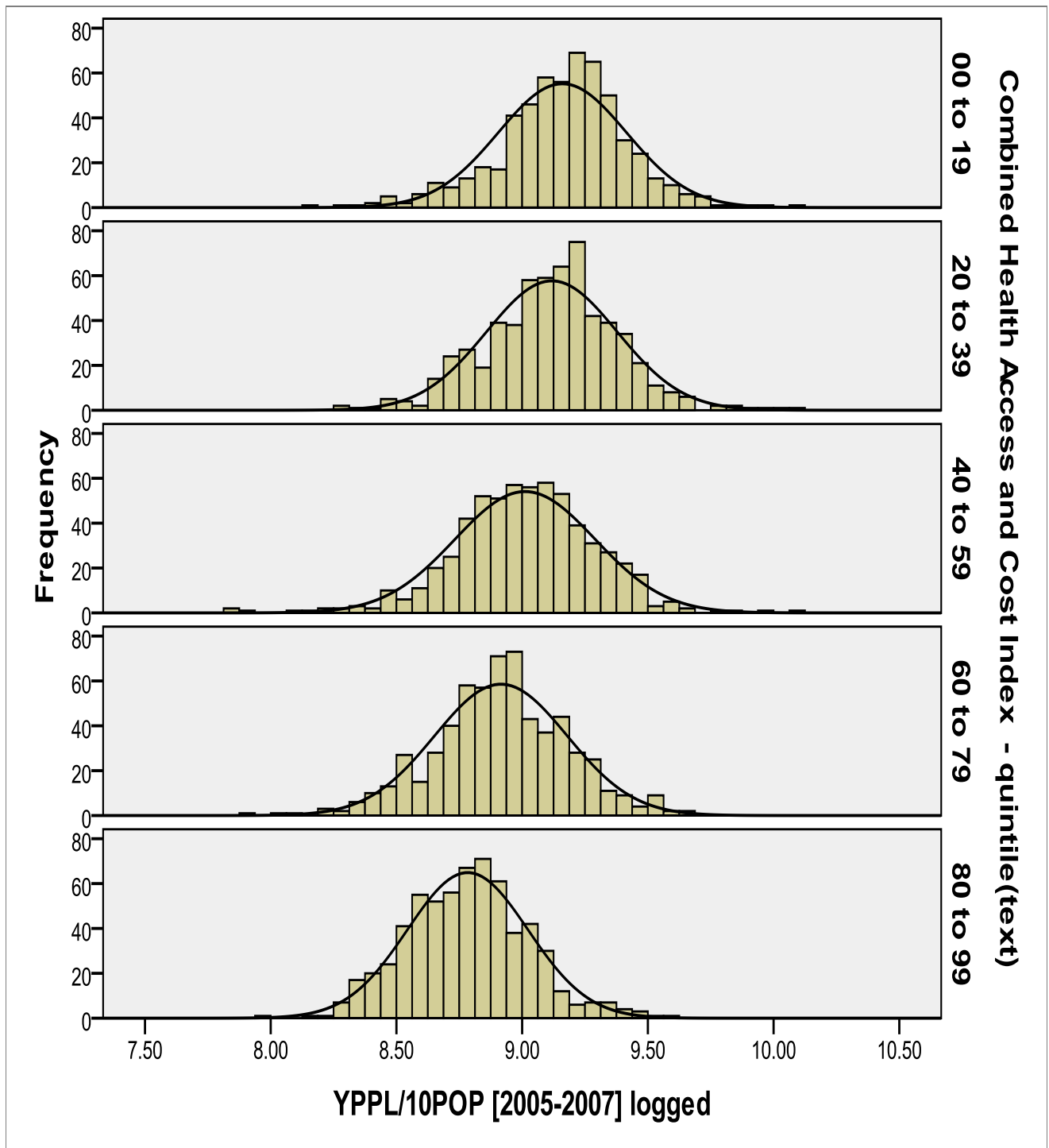
$$(8,622 / 7,246 - 1) / 100 = 18\%$$

FIGURE 56 - CORRESPONDENCE BETWEEN ARC_EDI AND YPLL_75 PER 10,000 POPULATION IN ALL U.S. COUNTIES, 2005-2007



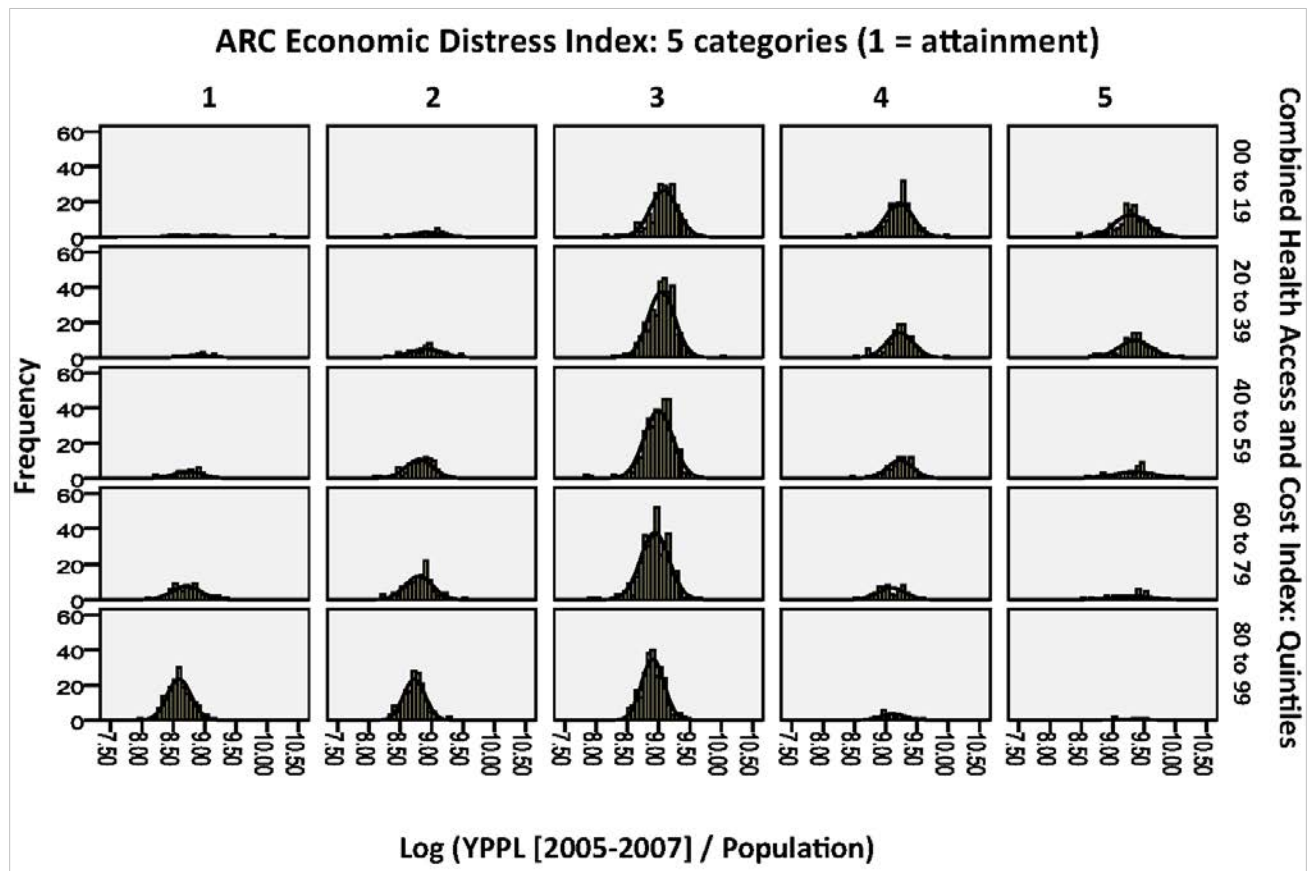
People who live in more economically distressed communities tend to die younger of potentially preventable causes.

FIGURE 57 - CORRESPONDENCE BETWEEN HCCA INDEX AND YPLL_75, ALL U.S. COUNTIES, 2005-2007



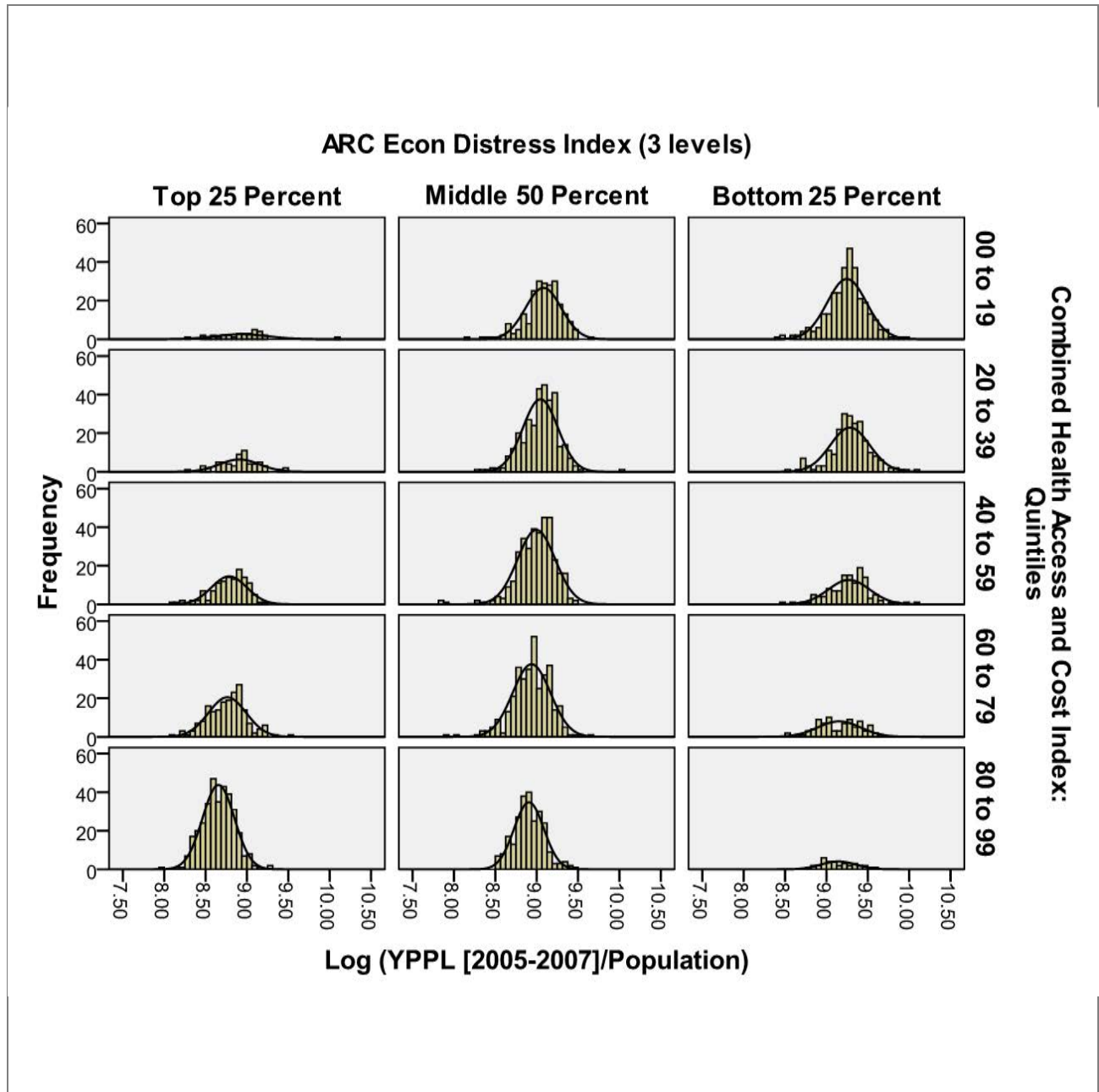
People who live in counties with a less favorable Health Access and Cost profile tend to die younger of potentially preventable causes.

FIGURE 58 – YPLL_75, ALL U.S. COUNTIES, 2005-2007 – ARRAYED BY ARC_EDI (5LEVELS) AND HCCA INDEX



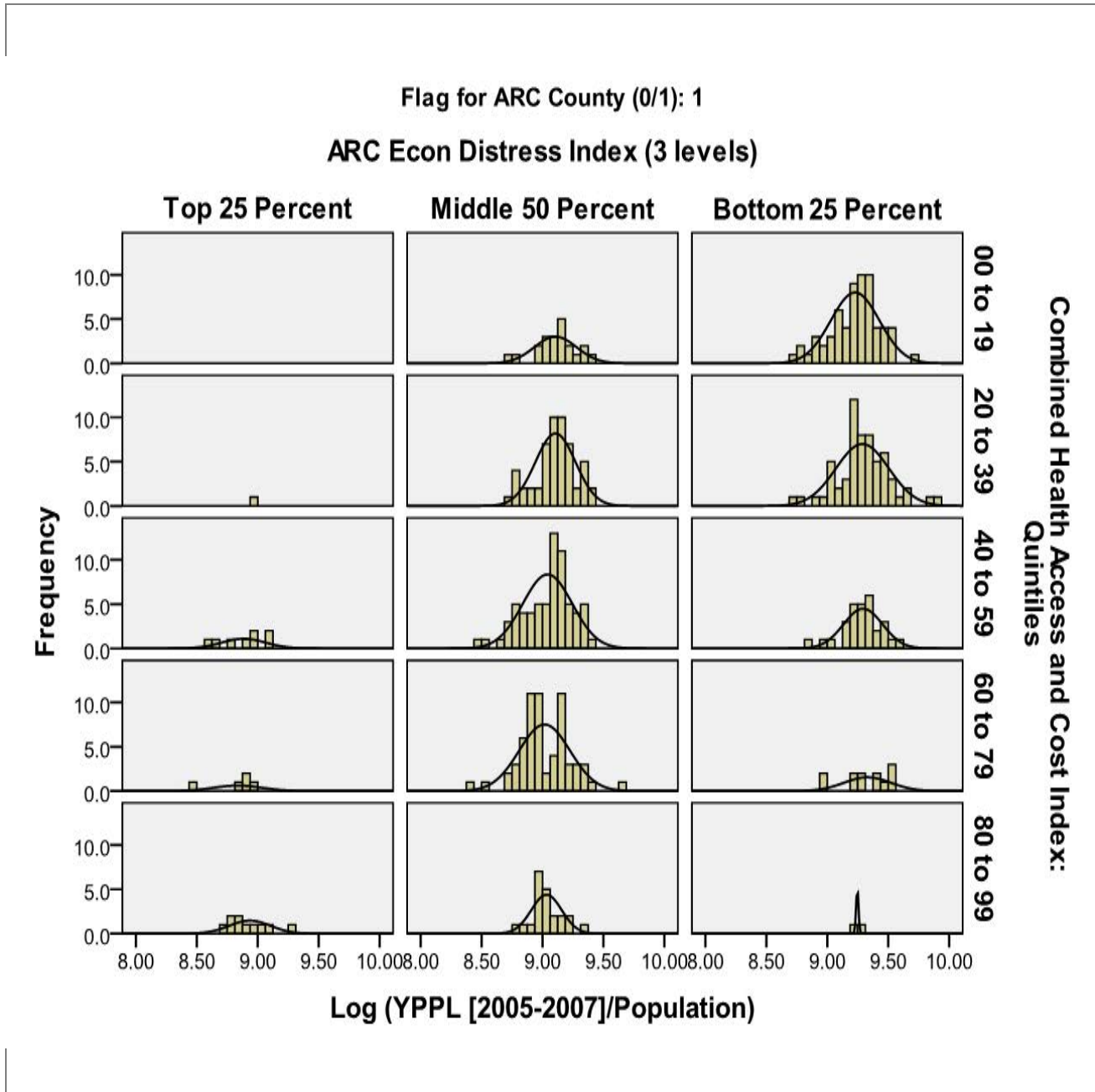
Both economic distress and healthcare access problems tend to occur in the same counties. However both factors seem to be associated with years of potential life lost. This pattern is observed when the ARC EDI is arrayed into 5 categories.

FIGURE 59 – YPLL_75, ALL U.S. COUNTIES, 2005-2007 – ARRAYED BY ARC_ED1 (3LEVELS) AND HCCA INDEX



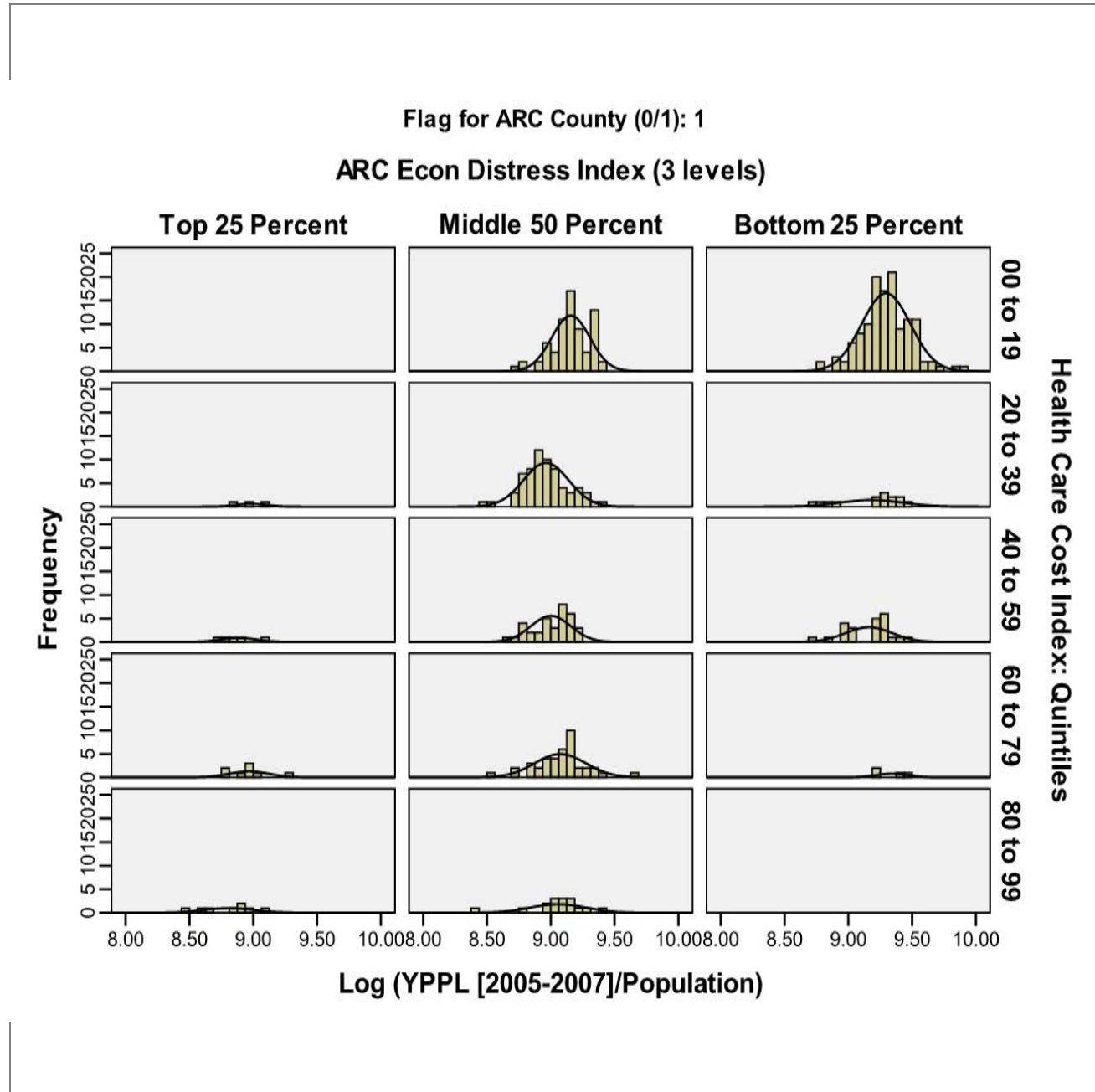
Both economic distress and healthcare access problems tend to occur in the same counties. However both factors are associated with years of potential life lost. A similar pattern is seen when the ARC EDI is arrayed into 3 categories.

FIGURE 60 – YPLL_75, APPALACHIAN COUNTIES, 2005-2007 – ARRAYED BY ARC_EDI (3LEVELS) AND HCCA INDEX



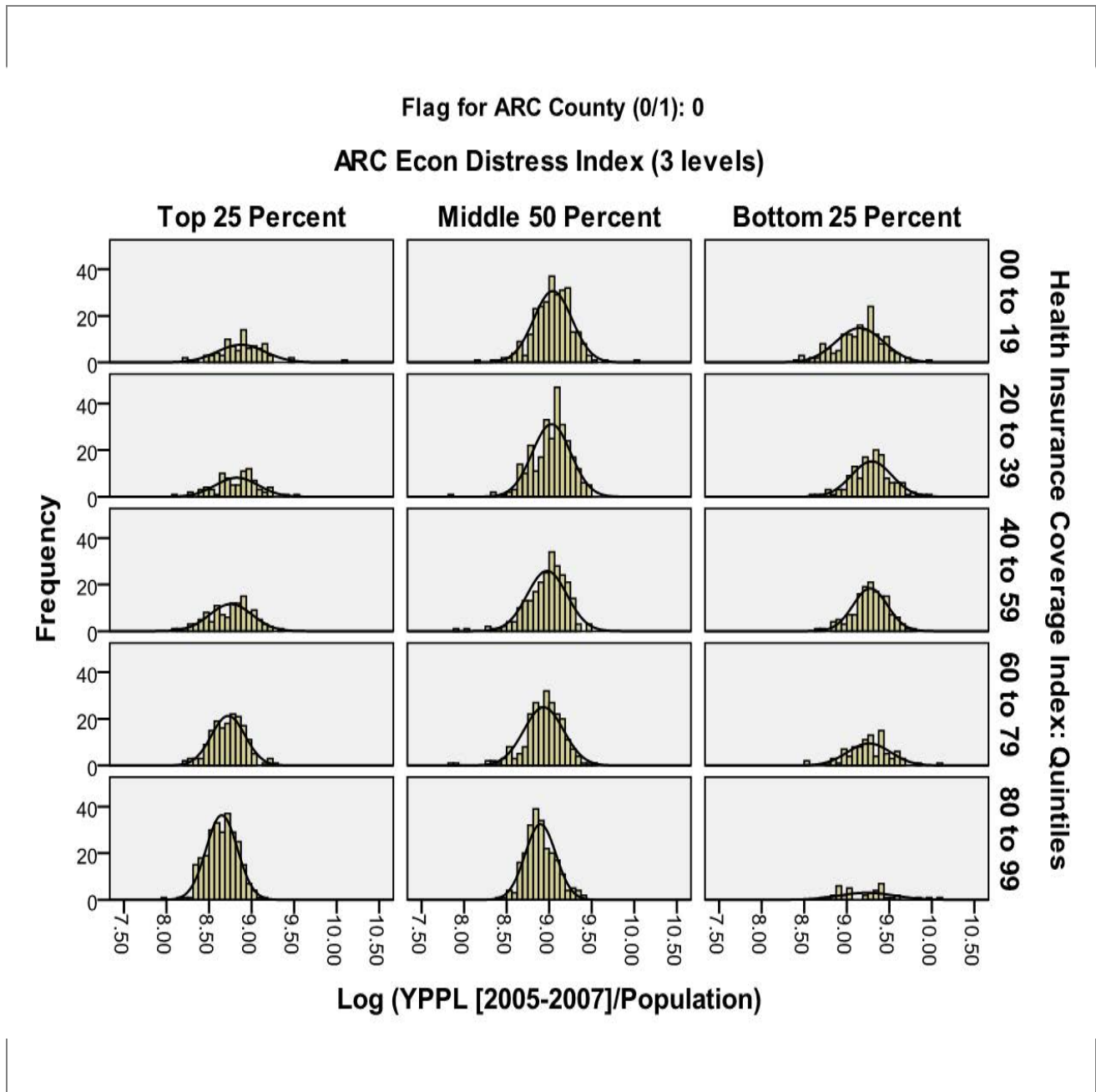
A similar pattern of economic distress and healthcare access problems occurring in the same counties is found in Appalachia. There are a high number of counties in the bottom 25% of counties nationally in terms of economic distress, and also in the bottom two quintiles in terms of health access and cost. (Two cells in the upper right corner of the graph above). Conversely, almost no counties in Appalachia are both in the top 25 percent in terms of their economic distress index and in the top two quintiles in terms of their health access and cost profile.

FIGURE 61 –YPLL_75, APPALACHIAN COUNTIES, 2005-2007ARRAYED BY ARC_ED I (3 LEVELS) AND HCC COMPONENT



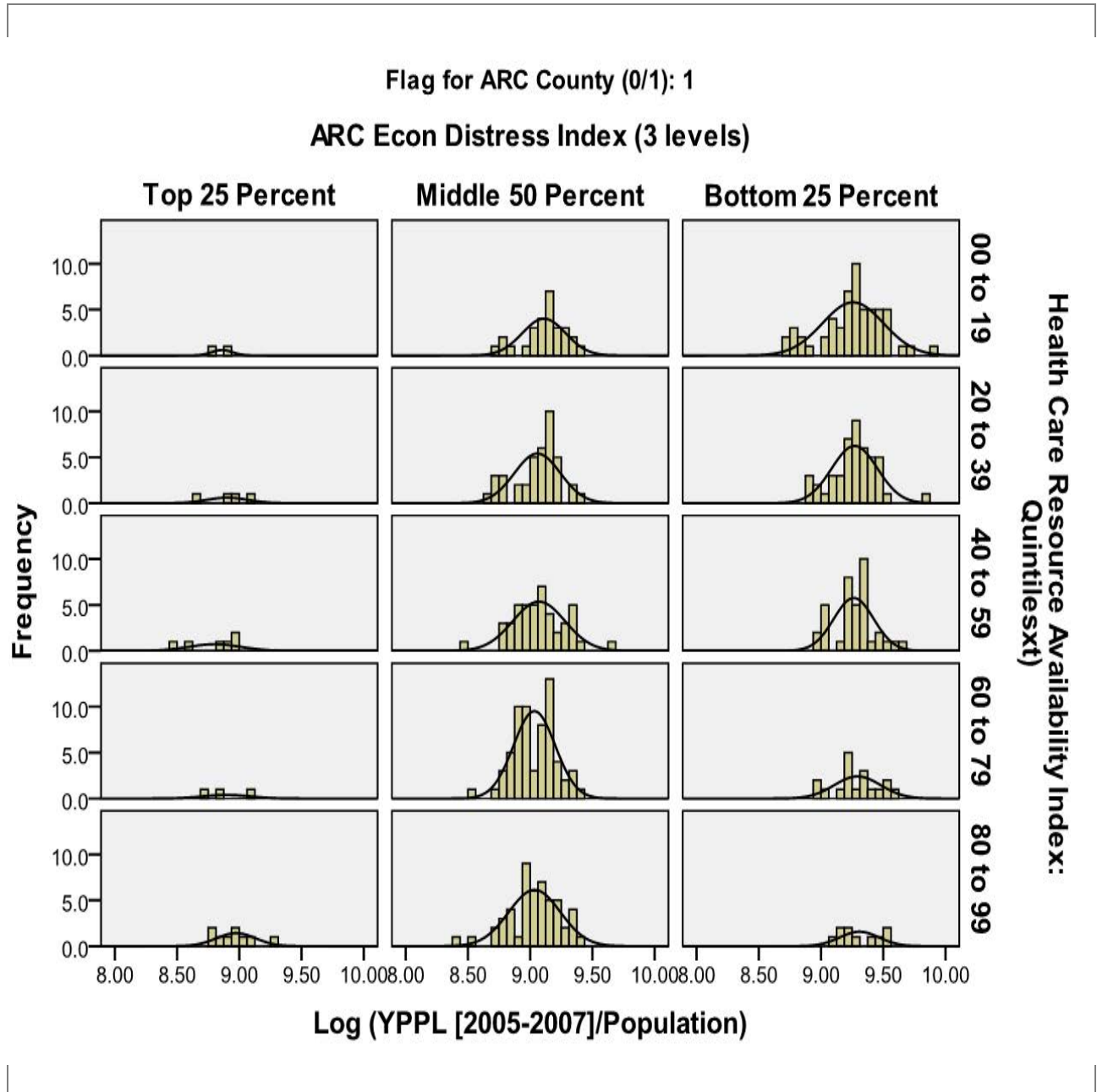
A very high proportion of Appalachian counties are both economically distressed and providers in those counties are reimbursed at relatively low levels. Residents of these counties have disproportionately high levels of mortality in terms of years of potential life lost (see the upper right hand cell of table above).

FIGURE 62– YPLL_75, APPALACHIAN COUNTIES, 2005-2007 ARRAYED BY ARC_ED1 (3 LEVELS) AND HIC COMPONENT



Higher insurance coverage is more closely associated with decreases in mortality in Appalachian counties that have a more advantaged profile.

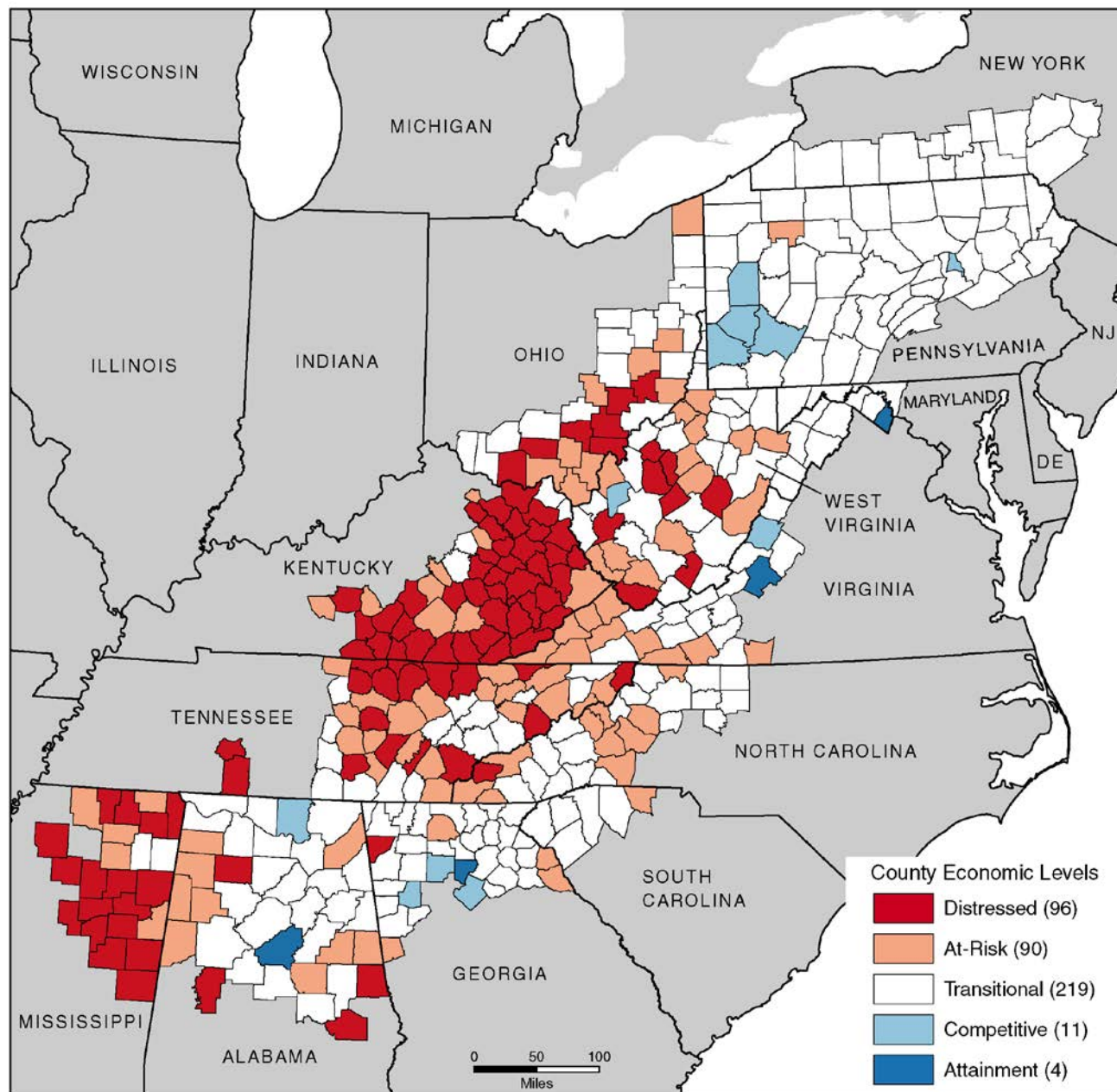
FIGURE 63 – YPLL_75, APPALACHIAN COUNTIES, 2005-2007 ARRAYED BY ARC_ED I (3 LEVELS) AND HCRA COMPONENT



More extensive health resources seem to have a more consistent and pronounced effect on lengthening life in the most economically distressed Appalachian counties, i. e. those in the bottom 25 percent.

APPENDIX N: COUNTY ECONOMIC STATUS IN APPALACHIA, FY 2012

FIGURE 64 – COUNTY ECONOMIC STATUS IN APPALACHIA, FY 2012



Created by the Appalachian Regional Commission, March 2011

Data Sources:

Unemployment data: U.S. Bureau of Labor Statistics, LAUS, 2007–2009

Income data: U.S. Bureau of Economic Analysis, REIS, 2008

Poverty data: U.S. Census Bureau, American Community Survey, 2005–2009

Effective October 1, 2011
through September 30, 2012