

# An Analysis of Disparities in Health Status and Access to Health Care in the Appalachian Region

---

## **Executive Summary** **September 2004**

Prepared for  
The Appalachian Regional Commission  
Washington, D.C.

by  
Joel A. Halverson  
Lin Ma  
E. James Harner  
West Virginia University



**Executive Summary**  
**An Analysis of Disparities in Health Status and Access to Health Care**  
**in the Appalachian Region**

A Report by Joel Halverson, West Virginia University,  
for the Appalachian Regional Commission  
September 2004

**Introduction**

This study was commissioned by the Appalachian Regional Commission in order to compile standardized, baseline information regarding health disparities in the region. Health disparities result from differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups. This study provides baseline information needed to assess health disparities in the region, to investigate causes of regional and local disparities, and to aid in developing targeted interventions aimed at reducing disparities and improve the overall health of the region.

The data and analyses presented in this report identify significant disparities in health status between the Appalachian region and non-Appalachian U.S., with the Appalachian region generally experiencing more adverse health outcomes. However, not all areas or population subgroups within the Appalachian region experience the same level of adverse health status. The reasons for geographic and demographic variability in health status are not clear; however a number of factors may contribute to geographic and demographic disparities in health status, including socioeconomic condition, access to medical care resources, and variability in the prevalence of high-risk behaviors. Significant diversity within the region with regards to these factors may help to explain observed disparities in health status.

In order to develop effective programs and policies to reduce and eliminate health disparities, it is necessary to understand the extent of disparities in health status as well as potential contributing factors. This report provides critical data and analyses documenting health disparities in the Appalachian region (as well as the non-Appalachian U.S.) and aids efforts to develop interventions that can be targeted to areas with the greatest need. In addition, this report provides a basis for understanding factors that contribute to geographic and demographic variability in health status in the Appalachian region.

**Health Disparities**

Significant improvements in the overall health of the population in the United States have been realized over the last four decades. In general, improvements in health may be attributable to a combined effect of improved living standards, advancements in medical treatment, improved access to medical care and resources, and increased awareness about health risks in the general population. However improvements in health outcomes have not been realized by all segments of the population and have resulted in significant disparities along a number of dimensions including gender, ethnicity, socioeconomic status, and geographic location.

The National Institutes of Health (NIH) health disparities definition is:

***"Health disparities are differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions that exist among specific population groups in the United States." (<http://healthdisparities.nih.gov/whatare.html>)***

Disparities in health exert an enormous burden on the health care community and on society. Variations in social, cultural, behavioral, biologic, genetic, and environmental factors contribute to differences in health among population subgroups and geographic locations. Among factors that are likely to contribute to disparities in health, access to medical care and quality of medical care are critical.

Reducing health disparities was a goal of the Healthy People 2000 objectives. Healthy People 2010 objectives have been substantially expanded to include eliminating health disparities, and this represents one of the most significant challenges for the nation. One of the key elements to the successful reduction of disparities along all socio-demographic and geographic dimensions is developing an understanding of the nature and extent of disparities.

The Appalachian region has endured significant excesses in adverse health outcomes. In general, the Appalachian region has lagged economically behind other parts of the U.S. Relatively high levels of unemployment, low regional incomes, and educational deficits continue to contribute to a lower standard of living than enjoyed in many areas of the U.S. However, Appalachia also represents significant levels of socioeconomic diversity. For example, metropolitan areas in the region have more diversified economies, higher per capita incomes, and greater access to medical care than non-metropolitan areas (Barnett, et al). Local socioeconomic differences within the Appalachian region are likely to be key contributors to disparities in health outcomes with those areas having diminished access to social, economic, and medical care resources experiencing more adverse outcomes. However, detailed data which describe the extent and nature of these disparities has been lacking.

### **The Appalachian region and the A.R.C.**

The Appalachian Regional Commission (ARC) is a federal-state partnership established in 1965 by the Appalachian Regional Development Act to promote economic and social development of the Appalachian Region. With a total population of 22.8 million, the Appalachian Region includes, as amended in 2002, 410 counties (when this study was commissioned in October of 2001, the ARC designated region consisted of 406 counties). The ARC designated region includes all of West Virginia and parts of 12 other states and extends more than a thousand miles from the southern tier of New York to northeast Mississippi.

Appalachia's population is geographically distributed across the urban-rural spectrum, from large urban areas in metropolitan counties to small, very remote counties lacking even small urban concentrations. Sixty percent of the population live in metropolitan counties, twenty-five percent live in counties adjacent to metropolitan counties, while the balance of the population live in more remote, rural locations.

For 38 years, the Commission has funded a wide range of programs in the Region, including highway corridors; community water and sewer facilities and other physical

infrastructure; health, education, and human resource development; economic development programs; and local capacity building and leadership development. In FY 2003, the Commission's definitions of economic development levels designates 121 counties as distressed because of high rates of poverty and unemployment and low rates of per capita market income compared to national averages; 259 counties were designated transitional (42 of these transitional counties may be characterized as "at-risk"), with higher than average rates of poverty and unemployment and lower per capita market income; 21 counties have nearly achieved parity with national socioeconomic norms and are now designated as competitive and; 9 counties have reached or exceeded national norms and are now designated as attainment counties.

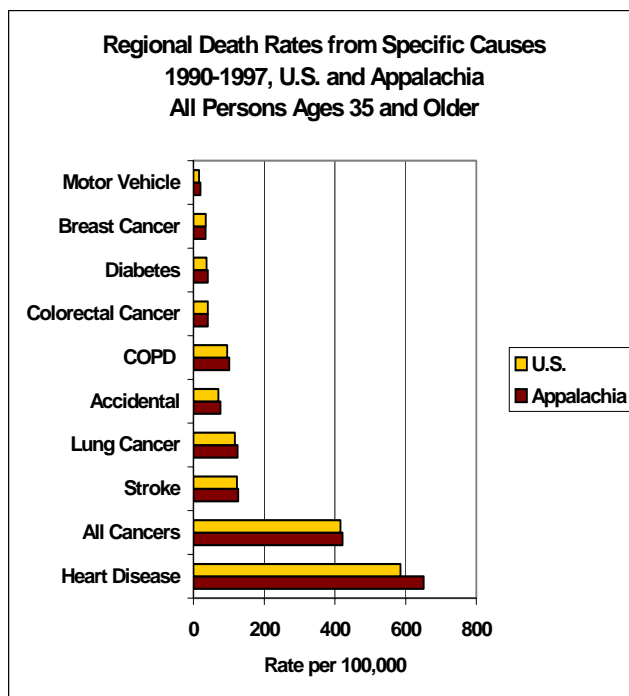
## **Organization of Report**

Section I of this report describes regional disparities in mortality from leading causes of death between the Appalachian region and the non-Appalachia United States. Regional death rates as well as county-level death rates were generated for eight population subgroups; white and black men and women ages 35 to 64 and 65 and older. County-level maps of death rates are presented for all counties in the coterminous U.S. and separately for the Appalachian region. This section highlights regional and county-level disparities in death rates. Section II examines county-level rates of hospitalizations from leading causes of illness for selected counties in the Appalachian region. Hospitalization rates are presented by county for six population subgroups: all persons ages 35 to 64 and 65 and older, and men and women ages 35 to 64 and 65 and older. Section III describes general socioeconomic conditions among Appalachian counties. Section IV examines leading health indicators among behavioral risks. Section V documents medical care resources in the Appalachian region. Section VI provides an overview of the study results and suggests several avenues for further research.

## **Summary of Findings**

*An Analysis of Disparities in Health Status and Access to Medical Care in the Appalachian Region* shows that significant health disparities persist in the Appalachian region. The region as a whole suffers considerable excess in mortality from leading causes of death when compared to the non-Appalachian U.S. Furthermore, there is a high degree of within-region variability in both the rates of mortality and hospitalization. Many Appalachian counties with the most adverse health outcomes correlate geographically with socioeconomic characteristics, behavioral risk profiles, and available medical care resources. However, there does not appear to be a consistent relationship between all factors combined for individual counties. It appears that reasons for disparities in health outcomes are highly variable and localized. Identifying the causes of inconsistencies may help in developing effective interventions and policy at the local level.

- Overall the Appalachian region experiences excesses in mortality from many of the major causes of death and illness relative to the non-Appalachian U.S.

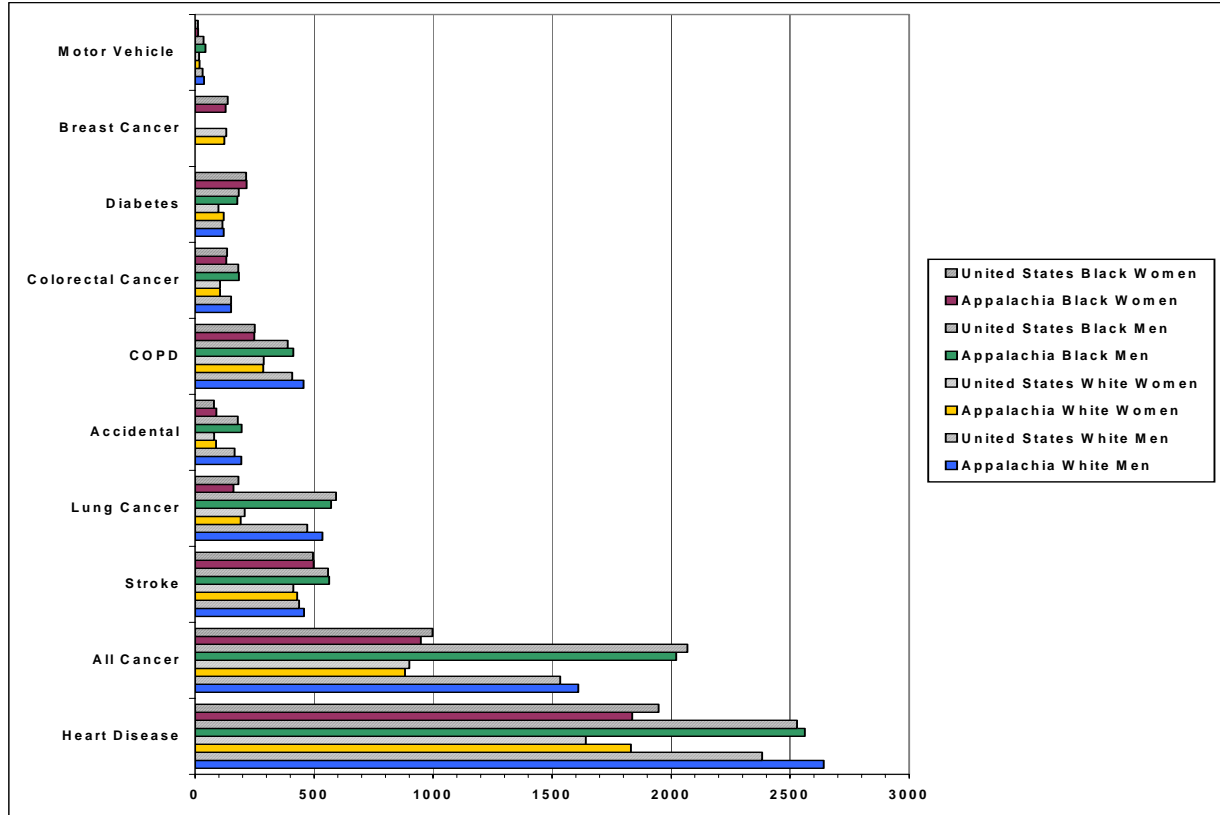


- To clarify the extent and nature of regional excesses, analyses have been conducted for eight demographic subgroups for leading causes of death and illness; white and black men and women ages 35 to 64 and 65 and older.
- County-level analyses have also been conducted in order to identify disparities within the Appalachian region and highlight clusters of counties that exhibit both favorable and adverse health outcomes in the region.
- Additional data is examined which may help to explain observed disparities including, socioeconomic conditions, behavioral risks, and available medical care resources.
- Together these data provide a detailed account of health status in the Appalachian region and provide evidence for targeted interventions as well as avenues for further research.
- These data suggest that variations in health status within Appalachian are, to a large extent, highly localized and therefore achieving Healthy People 2010 objectives will require intervention at the local level.

## I. Mortality

Mortality statistics provide the most comprehensive source of information available for examining public health outcomes among population subgroups and/or geographic areas. The analyses conducted in this study help to situate the mortality experience of the Appalachian region with the rest of the United States. The specific causes of death that were analyzed are heart disease, cancer(s), cerebrovascular disease (stroke), chronic obstructive pulmonary disease and allied conditions, diabetes, accidental deaths, deaths from motor vehicle accidents, suicide, and infant mortality. The study population consisted of black and white men and women who resided in the United States during the period 1990-1997. Each of these sub-groups was divided into two age categories; 35 to 64 and 65 and older. Deaths which occur in the 35 to 64 age-groups are considered premature and preventable.

Regional Death Rates from Specific Causes, U.S. and Appalachia, 1990-1997 – Persons Ages 65 and Older

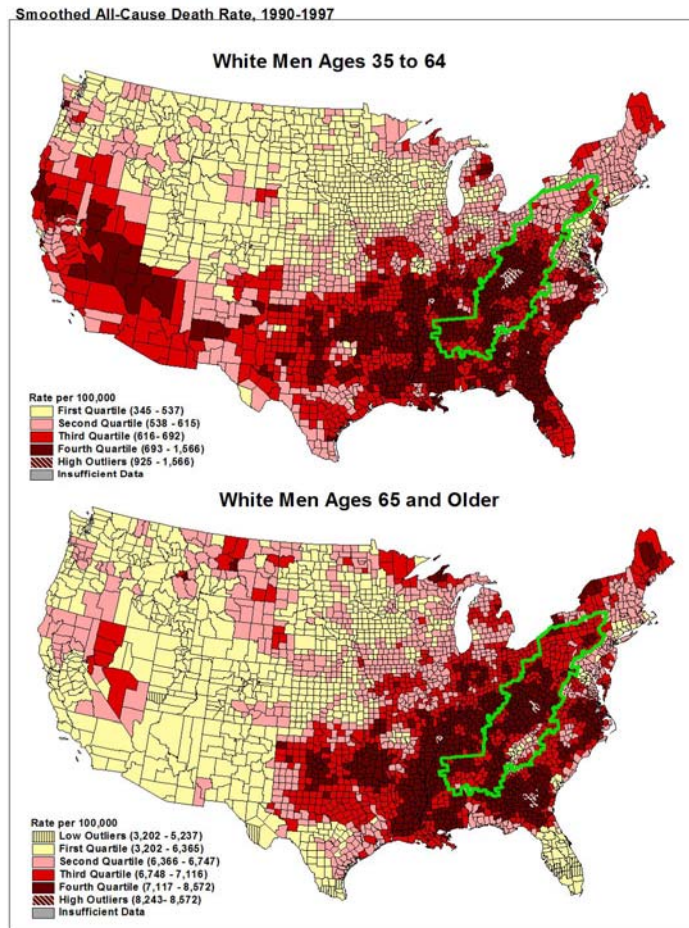


The Appalachian region as a whole experiences excess mortality compared to the non-Appalachian U.S. Among the causes of death examined in this study, Appalachian populations suffer the most significant excesses in heart disease mortality, the leading cause of death in the U.S. There are, however, considerable differences in the burden of mortality among age/gender/ethnic groups. In addition, the Appalachian region suffers an excess in premature deaths (among persons ages 35 to 64) from heart disease, all cancers combined, lung cancer, colorectal cancer, chronic obstructive pulmonary disease, diabetes, and motor vehicle accidents, relative to comparable non-Appalachian U.S.

population. All Cause death rates are consistently higher among Appalachian population subgroups compared with U.S. rates, with the exception of black men ages 35 to 64 and black women ages 65 and older.

### ***County-level Mortality Rates***

The analyses of county-level mortality rates are intended to identify geographic disparities in mortality in the Appalachian region, highlight specific areas in the region that experience the most adverse health outcomes, and aid in the development of tailored intervention strategies for reducing adverse health outcomes and disparities in Appalachia. County-level mortality analyses for the coterminous U.S. allow comparisons between counties in the Appalachian region and non-Appalachian U.S.

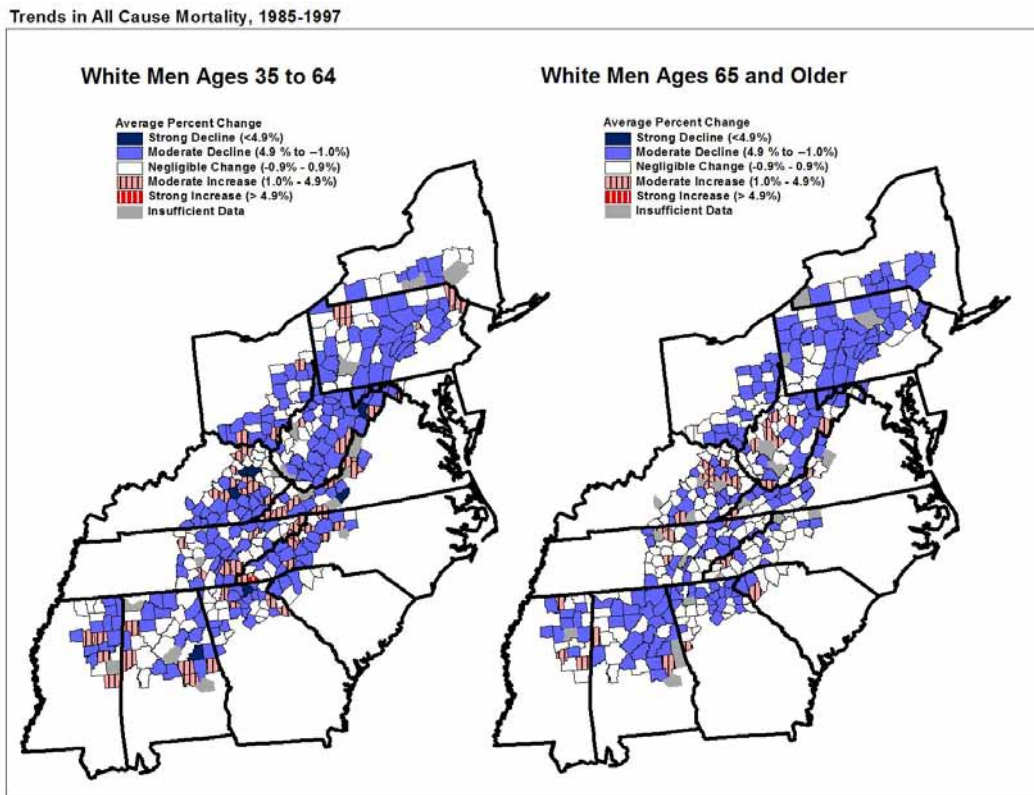


***Mortality from all causes*** exhibits some clear geographic patterns that are fairly consistent among the demographic subgroups. The geographic patterns are nearly identical for white men and women in both age categories with high rate areas concentrated in the Central Appalachian counties in portions of Eastern Kentucky, Southern Ohio, Southern West Virginia, and Western Virginia. Additional high-rate

counties appear in the Southern portion of the region. The geographic patterns for black men and women are less consistent although there are similarities with the distribution for white men and women.

**County-level trends in all-cause mortality** have been estimated over the period 1985-1997. There are substantial differences in the trends among race/ethnic, gender, and age groups. For white men in both age groups the trends of all-cause mortality are overwhelmingly positive with the greatest number of counties experiencing moderate declines over the study period. However, many counties have experienced negligible change (arguably a negative outcome).

The majority of counties experiencing moderate increases among white men occur in the counties of Central and Southern Appalachia. Mortality trends for white women are less positive, particularly among elderly white women where the majority of counties experienced either negligible change or moderate increases. The majority of counties for which trends can be estimated for black men and women have experienced moderate declines in disparities, with some counties in the south experiencing adverse trends.





### ***Heart Disease Mortality in Appalachia***

Both in the Appalachian region and the non-Appalachian U.S., death rates from heart disease rank first among causes of death, with a marked disparity in Appalachia. In general, high death rates from heart disease are predominant in the central and southern portions of the Appalachian region among all demographic subgroups.

The dominant trends since 1985 for all population subgroups suggest moderate to strong declines in heart disease mortality over the study period. However, in each state several counties have experienced moderate increases and a few have experienced strong increases.

### ***Cancer Mortality in Appalachia***

Both in the Appalachian region and the non-Appalachian U.S., death rates from all cancers rank first among death rates used in this analysis for white and black women ages 35 to 64. For white and black men ages 35 to 64 cancer death rates rank second. Among the elderly, Appalachian death rates from all cancers rank second for all demographic groups in both the Appalachian region and the non-Appalachian U.S. In general, high death rates from all cancers are predominant in the central portion of the Appalachian region among all demographic subgroups. However, there is considerable variation among demographic groups. For example, for elderly white women, high cancer death rates occur in Eastern Kentucky, Southern West Virginia, and Southeastern Ohio in addition to Southwestern Pennsylvania and Southern New York.

The county-level trends for cancer mortality since 1985 indicate significant variability in the mortality trends among counties in the Appalachian region. Perhaps the most striking trend is the number of counties that have experienced moderate to strong increases in mortality from all cancers.

### ***Breast Cancer Mortality in Appalachia***

With the exception of white women ages 35 to 64, breast cancer death rates used in this analysis suggest an excess of breast cancer mortality among Appalachian women compared with the Non-Appalachian U.S. While the magnitude of the death rates is larger for black women of both age-groups, there appears to be greater disparity in the county-level rates among white women of both age groups.

### ***Colorectal Cancer Mortality in Appalachia***

There appears to be a north to south gradient of disparities in colorectal cancer death rates for both white men and women of both age groups. The data for black men and women are very limited for both age groups, although there do appear to be a few clusters, particularly in western Pennsylvania and eastern Tennessee, and for elderly black women in southern West Virginia.

### ***Lung Cancer Mortality in Appalachia***

In general the region has slightly higher lung cancer death rates for all demographic groups when compared to the rest of the nation, although there is considerable variation in the geographic distribution of rates among the different

demographic subgroups. Central Appalachia exhibits a strong clustering of higher rates for white men ages 35-64 and elderly men, with clusters of higher rates in northeast Mississippi, northwest Alabama, and northwest Georgia. White women exhibit higher rates in central Appalachia, as well a clustering among elderly women in northern Pennsylvania and the southern tier of New York. Black men and women of both age groups show clustering in counties around Pittsburgh, southern West Virginia, eastern Tennessee, particularly surrounding Chattanooga, concentrations in northeast Mississippi and northern Georgia and several counties in western North and South Carolina. Elevated rates are also found in Black women of both age groups in the two western-most counties of New York.

### ***Stroke Mortality in Appalachia***

Both in the Appalachian region and the non-Appalachian U.S., death rates from stroke rank fourth among death rates used in this analysis for white and black men of both age groups and third among white and black women of both age groups. In general, high death rates from stroke are predominant in the southern portion of the Appalachian region among all demographic subgroups. This pattern is consistent with the history of the 'Stroke Belt'. For the most part, county level trends show that most counties have continued the historic trend of decline. There are a number of counties, throughout the Region, however, where rates are increasing, but Northern Pennsylvania seems to exhibit a disproportionate number of increases for elderly white men.

### ***Chronic Obstructive Pulmonary Disease (COPD) Mortality in Appalachia***

Both in the Appalachian region and the non-Appalachian U.S., death rates from all COPD rank fifth among death rates used in this analysis for white and black men of both age groups. For white and black women of both age groups COPD death rates rank fourth. In general, high death rates from COPD are predominant in the central portion of the Appalachian Region among white population groups. There appear to be consistently high rates of COPD mortality among counties in the Western Carolinas and in Alabama among all black population groups. Perhaps the most striking feature of the trend is the number of counties that have experienced moderate to strong increases in mortality from COPD.

### ***Accidental Mortality in Appalachia***

Both in the Appalachian region and the non-Appalachian U.S., death rates from accidental causes rank third among death rates used in this analysis for white and black men ages 35 to 64. In general, high death rates from accidental causes are predominant in the southern portion of the Appalachian region among all demographic subgroups. The majority of counties have experienced either moderate declines or negligible change for all demographic subgroups over the study period.

### ***Motor Vehicle Accident Mortality in Appalachia***

Both in the Appalachian region and the non-Appalachian U.S., death rates attributable to motor vehicle accidents rank fifth among white men ages 35 to 64 and ninth among white women ages 35 to 64. In Appalachia and the motor vehicle death rate is seventh among black men ages 35 to 64 and eighth among younger black men in the

non-Appalachian U.S. Motor vehicle death rates rank last among black women ages 35 to 64 in both the Appalachian and non-Appalachian regions as well as among all elderly demographic groups. In general, there appears to be a south-north gradient with higher death rates occurring primarily in the southern portions of the region.

### ***Diabetes Mortality in Appalachia***

Both in the Appalachian region and the non-Appalachian U.S., death rates attributable to diabetes rank ninth among white men and women ages 35 to 64 in Appalachia and eighth among elderly white men and women. For black men of both age groups diabetes death rates rank eighth. For black women diabetes death rates rank seventh among ages 35 to 64 and fifth among elderly black women. In general, high death rates from diabetes are predominant in the central to northern portions of the Appalachian region among all demographic subgroups.

### ***Suicide Mortality in Appalachia***

The relatively small numbers of suicides at the county-level is evident in both the small value of the suicide rates as well the narrow range of the values in each distribution. Several high rate counties are coincident for ages 35 to 64 and 65 and older. These counties generally appear in Eastern Virginia and along the West Virginia border. Two high-outlier (unusually high value) counties are apparent among persons ages 65 and older. These counties occur in Eastern Virginia and Northeastern Alabama and generally seem to mark the ends of a swath of high rate counties that occur in the central to southern portions of the region.

### ***Infant Mortality in Appalachia***

A clear disparity in the level of infant mortality rates between white and non-white populations is made clear by examining the two distributions. Infant mortality rates for the white population range from 1.6 to 17.1 deaths per 1,000 live births. In contrast, infant mortality rates for non-white populations range from 2.3 to 500.0 deaths per 1,000 live births.

## II. Morbidity

Hospitalization data provide the best available information on morbidity for most health conditions. Inpatient hospitalizations were obtained from the Health Care Cost and Utilization Project (HCUP) database and the State Inpatient Databases (SIDs) for the year 2000. Appalachian states that are not participating are Ohio, Mississippi, and Alabama. Where the primary diagnosis for hospitalizations was identified, these diagnoses included heart disease, cancer(s), cerebrovascular disease (stroke), and chronic obstructive pulmonary disease and allied conditions (COPD), and diabetes.

**Table 1. Number of hospitalizations by diagnosis**

<b>Diagnosis</b>	<b>Number of Hospitalizations</b>
Heart Disease	338,012
COPD	87,458
All Cancers	85,083
Stroke	75,835
Diabetes	31,368
Other	1,671,791
Total	2,289,547

### *All-Cause Hospitalizations in Appalachia*

High rates of hospitalization are concentrated primarily in the Central Appalachian counties in portions of Eastern Kentucky, Southern West Virginia, and Western Virginia for persons ages 35 to 64. High rates of hospitalization are a bit more wide-spread for the elderly.

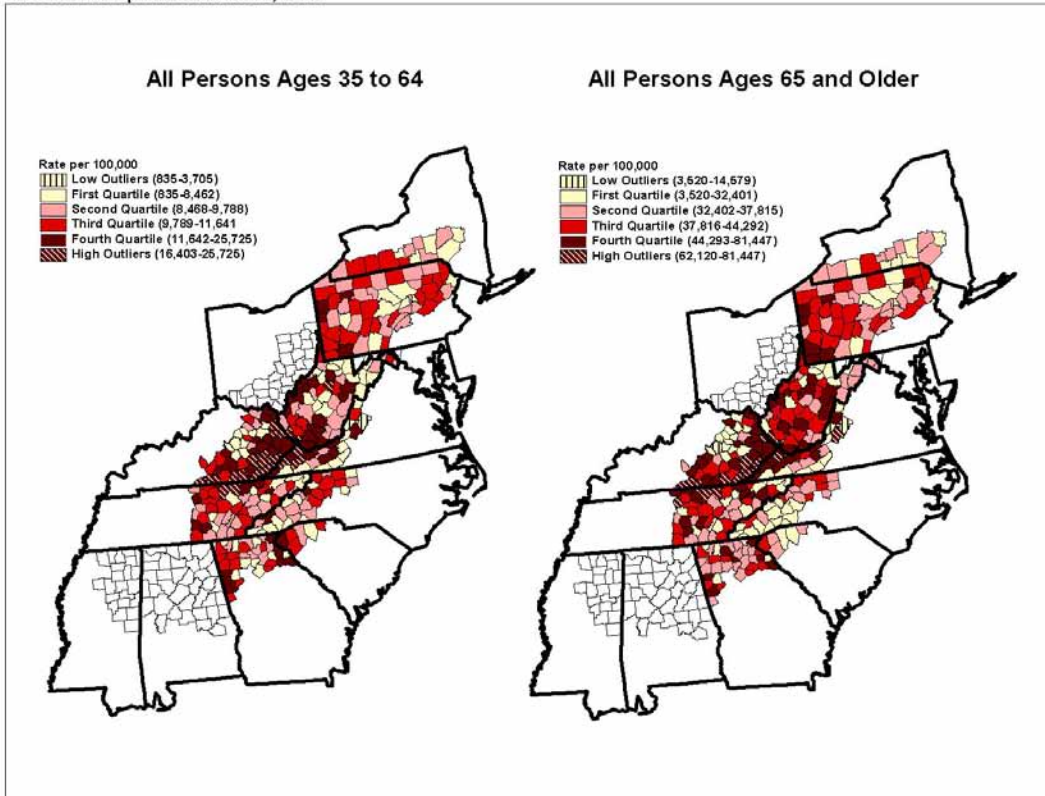
### *Heart Disease Hospitalizations in Appalachia*

Heart disease related hospitalizations are responsible for approximately 15 percent of all hospitalizations in the year 2000 for the counties used in this analysis. High rates of hospitalization are concentrated primarily in the Central Appalachian counties in portions of Eastern Kentucky, Southern West Virginia, and Western Virginia for all population subgroups, although there are concentrations in parts of Pennsylvania and the southern tier of New York, particularly for the elderly populations.

### *Cancer Hospitalizations in Appalachia*

For this analysis, hospitalizations with a primary diagnoses related to any malignant neoplasms, cancers of various organs, and leukemia were combined. High rates of cancer hospitalization are fairly sporadic throughout the region, however some general clusters of high rate counties occur in Western Pennsylvania and in the Central Appalachian counties in portions of Eastern Kentucky, Southern West Virginia, and Western Virginia for all population subgroups.

All Cause Hospitalization Rates, 2000



### ***COPD Hospitalizations in Appalachia***

Hospitalizations with primary diagnoses related to chronic obstructive pulmonary disease (COPD) include those resulting from bronchitis, emphysema, and chronic airway obstruction and does not include asthma. COPD related hospitalizations are responsible for approximately 3.8 percent of all hospitalizations in the year 2000 for the counties used in this analysis. Major clustering occurring in central Appalachia includes counties in Eastern Kentucky, Southern West Virginia, and Western Virginia. These clusters appear fairly consistently among all population subgroups and most counties designated as high outliers also appear in these regions.

### ***Diabetes Hospitalizations in Appalachia***

Hospitalizations with primary diagnoses related to diabetes include those resulting from diabetes mellitus both Type I and Type II. Diabetes related hospitalizations are responsible for the fewest hospitalizations among illnesses used in this analysis accounting for approximately 1.4 percent of all hospitalizations in the year 2000. Major clustering occurring in central Appalachia including counties in Eastern Kentucky, Southern West Virginia, and Western Virginia. There is also a small group of counties in Eastern Georgia with high diabetes hospitalization rates. These clusters appear fairly consistently among all population subgroups and most counties designated as high outliers also appear in these regions.

### III. Socioeconomic Condition

There is a growing awareness in the public health community that a person's health (both physical and mental) is linked to contextual circumstances and events in addition to the influence of individual risks. Contextual approaches examine the social and economic conditions that affect all individuals who share a particular environment: the *social environment*. The variation in social landscapes in the U.S. and Appalachian region reflects underlying differences in the contexts in which regions and local areas have developed and adapted to changes over time. Distinct geographic variability in health outcomes suggests that contextual differences across geographic space may influence the overall health of regional and local populations.

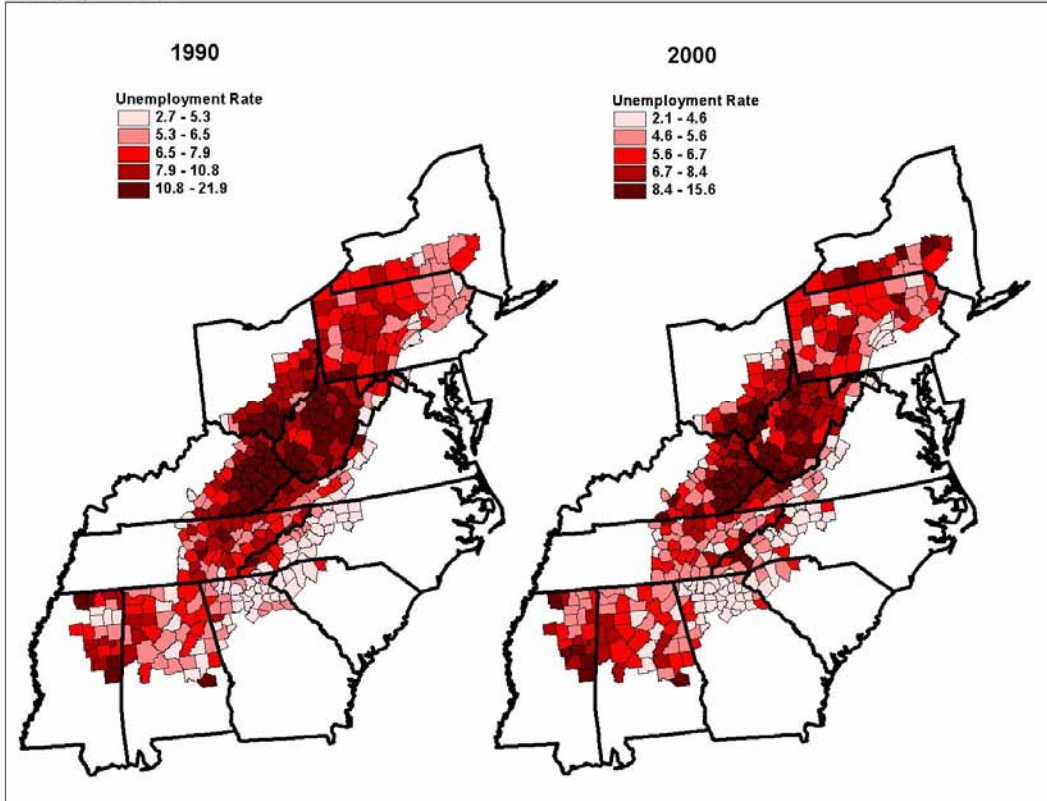
In general, the Appalachian region has lagged economically from other parts of the U.S. Relatively high levels of unemployment, low regional incomes, and educational deficits continue to contribute to a lower standard of living than enjoyed in many areas of the U.S. However, there are significant levels of socioeconomic diversity within Appalachia. For example, metropolitan areas in the region have more diversified economies, higher per capita incomes, and greater access to medical care than non-metropolitan areas. Local socioeconomic differences within the Appalachian region are likely to be key contributors to disparities in health outcomes with those areas having diminished access to social, economic, and medical care resources experiencing more adverse outcomes. However, direct associations are also likely to vary throughout the region.

The data and analyses presented in this section are intended to reveal *potential* associations between county-level health outcomes and prevailing socioeconomic conditions. We did not measure comprehensive associations, but provide a basis from which to chart further work relating socioeconomic conditions to health outcomes in the region.

#### *Unemployment*

In 1990, the U.S. average unemployment was 6.3%. In Appalachia the average unemployment was 6.8%. County-level unemployment rates ranged from 2.0% to 25.5% among non-Appalachian U.S. counties and from 2.7% to 21.9% among counties within the Appalachian region. Although the disparities in unemployment rates among non-Appalachian counties in the U.S. had increased between 1990 and 2000, the disparities in unemployment among Appalachian counties appear to have decreased. However in both years, Appalachia had a higher proportion of counties represented by higher rates of unemployment than non-Appalachian U.S. counties. In 1990 clusters of counties with high rates of unemployment, relative to other counties in the region, are evident primarily in Central West Virginia, Southeastern Ohio, and Eastern Kentucky. Despite an apparent decrease in unemployment rates, as indicated by the distribution of values for the year 2000, there appears to be a persistence of relatively high unemployment among counties in Central West Virginia, Southeastern Ohio, and Eastern Kentucky.

## Unemployment Rate



### *Per Capita Income*

Between 1990 and 2000 the distributions of per capita incomes among Appalachian counties have become slightly more commensurate with counties outside of Appalachia. However, Appalachian counties continue to be more represented in the lower income categories than non-Appalachian U.S. counties. Concentrations of low per capita income counties, relative to other Appalachian counties, have persisted primarily in Eastern Kentucky and Central and Southern West Virginia.

### *Median Family Income*

In 1990, the median family income for non-Appalachian U.S. counties ranged from \$10,903 to \$65,201. For Appalachian counties, median family income range from \$11,110 to \$48,000 in 1990. In 2000 the median family income for non-Appalachian U.S. counties ranged from \$14,167 to \$97,225. For Appalachian counties, median family income ranged from \$18,034 to \$74,003 in 2000.

Appalachian counties tend to be represented more in the lower income ranges than in the higher ranges compared with U.S. counties outside of Appalachia. The geographic distribution of median family incomes is very similar to the distribution of per capita income, with lower incomes being represented by Central Appalachian counties in Eastern Kentucky, and Central and Southern West Virginia.

### ***Percent Living Below Poverty Level***

Poverty rates in non-Appalachian U.S. counties ranged from 0.0% to 63.1% in 1990. For Appalachian counties, poverty rates ranged from 3.2% to 52.1% in 1990. In 2000, the range of poverty rates decreased in both non-Appalachian counties and Appalachian counties, ranging from 0.0% to 56.9% and 5.2% to 45.4% respectively. Appalachian counties tend to be more represented in the higher poverty rate categories. The geographic distribution of poverty rates is very similar to the distribution of per capita income and median family income with higher poverty rates being represented by Central Appalachian counties in Eastern Kentucky, and Central and Southern West Virginia. In general, it appears that high rates of poverty are associated with highly rural areas.

### ***Educational Attainment***

Dramatic differences in educational attainment are evident among counties in the U.S. and Appalachia. In 1990, the percent of persons with at least a high school diploma in non-Appalachian U.S. counties ranged from 31.6% to 95.5% and from 35.5% to 87.2% for Appalachian counties. In the same year the percentage of persons with a college degree ranged from 3.7% to 53.4% among non-Appalachian counties and from 3.7% to 41.7% among Appalachian counties. By the year 2000, the ranges of values for both indicators show significant improvement. In 2000, the percentage of persons with at least a high school diploma in non-Appalachian U.S. counties ranged from 34.7% to 97.0% and from 49.2% to 91.4% for Appalachian counties. The percentage of persons with a college degree ranged from 4.9% to 60.5% among non-Appalachian counties and from 5.6% to 47.6% among Appalachian counties.

Deficiencies in educational attainment are evident in the Appalachian region when compared to the non-Appalachian U.S. In 1990, Appalachian counties were more represented in lower percentages with both high school diplomas and college degrees when compared to non-Appalachian U.S. counties. Despite improvements in educational attainment for all U.S. counties by the year 2000, the Appalachian region has, in general, continued to lag behind much of the country. Low educational attainment is prevalent in Central Appalachian counties in Eastern Kentucky, Southern West Virginia, Eastern Tennessee, and Western Virginia. These areas correspond quite well to areas which are very rural, have high levels of unemployment and low income levels.



#### IV. Behavioral Risks

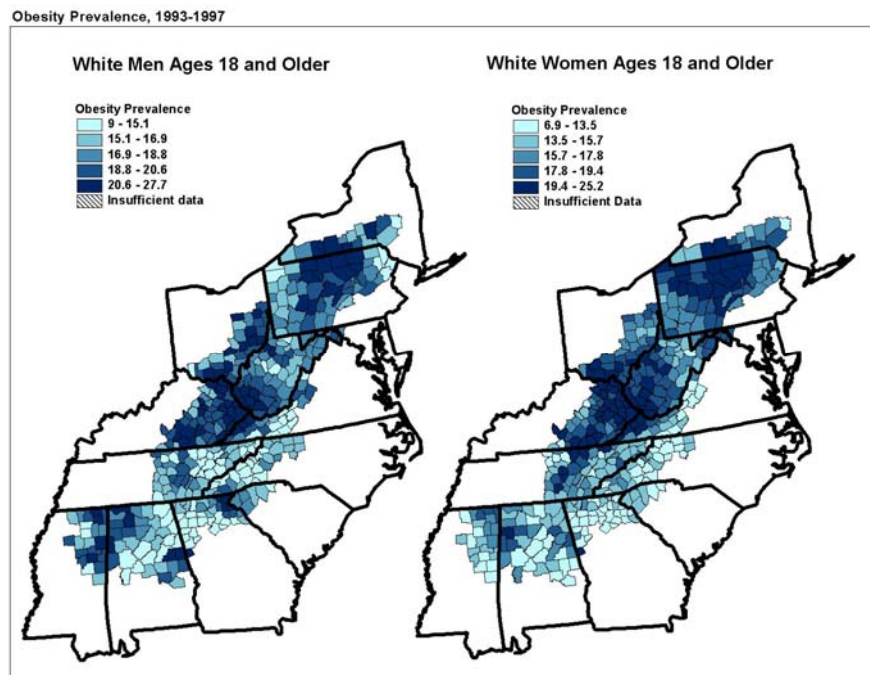
A number of specific risk behaviors such as smoking, poor nutrition, and lack of physical exercise are known to contribute to the prevalence of a number of chronic diseases, including cardiovascular and cerebrovascular disease and cancer. It is believed that much of the burden of chronic disease is preventable with modifications of these risk behaviors. The prevalence of specific risk behaviors may be influenced by socioeconomic conditions of particular areas. Rural, underdeveloped regions, for example, may have a poor public health infrastructure, poor availability of healthy foods, inadequate facilities for leisure-time physical activity, and inadequate availability of medical care and public health education resources.

Behavioral risk data are drawn from the Behavioral Risk Factor Surveillance System (BRFSS), which is based on a telephone survey administered each year by state health departments across the country. For this study, the following risk factors were analyzed:

- Obesity (based on body mass index calculated from self-reported weight and height)
- Cigarette smoking and smoking quit rates
- Physical inactivity
- Cancer screening (Mammography and rectal exams)
- Access to medical care (Insurance Coverage).

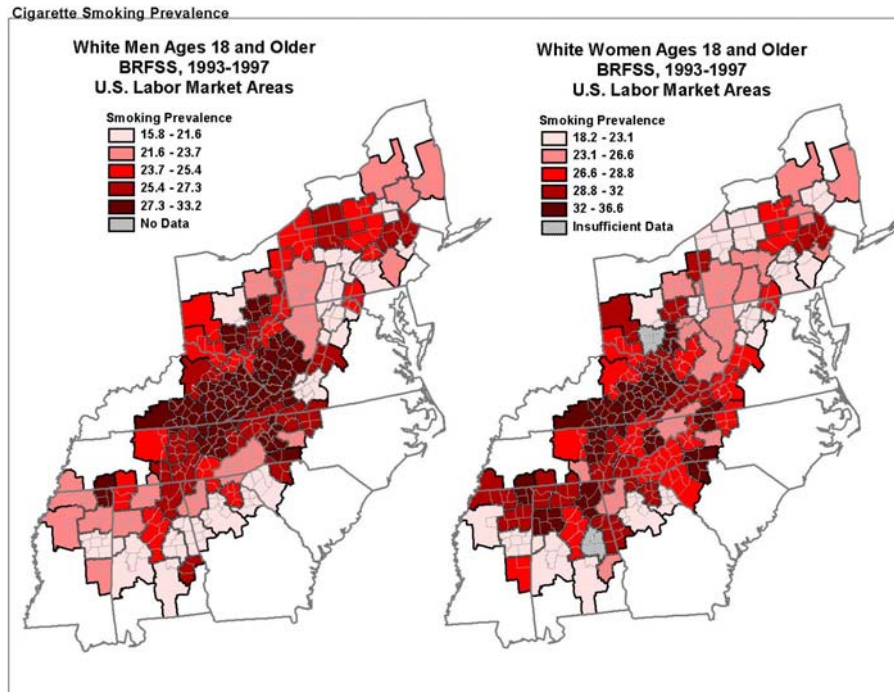
##### *Obesity*

With the exception of black men, Appalachian counties tend to be more represented among the higher obesity prevalence.



### ***Cigarette smoking***

Appalachian Labor Market Areas (LMAs) are more represented in the higher ranges of smoking rates compared with LMAs outside the Appalachian region. LMAs with high rates of smoking appear to cluster in the central Appalachian region for white men and women, primarily in eastern Kentucky and central and southern West Virginia. For black men and women, there appears to be a north-south gradient in smoking rates with higher rates occurring in the more northern LMAs and lower rates in the southern LMAs.



### ***Physical Inactivity***

Appalachian LMAs consistently are more represented by the higher rates of physical inactivity compared with LMAs outside of the region.

### ***Cancer Screening***

Appalachian LMAs generally are more represented by the lower rates of mammography screening compared with LMAs outside of the region. Appalachian LMAs are also, for the most part, more represented by the lower rates of colorectal cancer screening compared with LMAs outside of the region

### ***Health Insurance***

In general it appears that LMAs within Appalachia fair reasonably well when compared to LMAs outside the region. However there also appear to be groups of LMAs that are more represented among the lowest rates of health care coverage. The lowest rates of coverage occur consistently among white men and women in eastern Kentucky. Low rates areas appear in Western South Carolina for black men and primarily in Southern Alabama and Eastern Mississippi for black women.

## **V. Medical Care Resources**

Accessibility to adequate medical care is a critical element of secondary preventive efforts to reduce disease morbidity and mortality. In much of rural Appalachia, there are significant barriers to adequate medical care including physical distance, terrain, lack of public or private means of transportation to providers, lack of health insurance, and inability to pay for prescription drugs. In this report we examine the geographic distribution of medical care resources in order to help identify counties and regions which have deficiencies in resources.

### ***Health Professional Shortage Areas***

Of the 406 Appalachian counties used in this analysis, 108 counties have health professional shortages throughout the county, 189 counties have shortages in part of the county, and 109 counties have no shortages. Fairly large regions, identified by clusters of counties that have shortages for the whole county, are located in Central West Virginia, Eastern Kentucky, Northeastern Mississippi, and Central Alabama.

### ***Hospitals***

There were 81 counties in the region that had no hospitals and 203 had a single hospital. Appalachian counties with large metropolitan areas, such as Pittsburgh and Birmingham have medical schools, teaching hospitals, and are represented by large numbers of hospitals, relative to other Appalachian counties.

### ***Population Ratio per Hospital Bed***

Population-to-hospital bed ratios provide an indication of the overall medical care resources available in a local area. More favorable population-to-hospital bed ratios are found in counties with metropolitan areas, but are also found in non-metropolitan counties throughout the region. No clear clustering of unfavorable population-to-hospital bed ratios is apparent within the region.

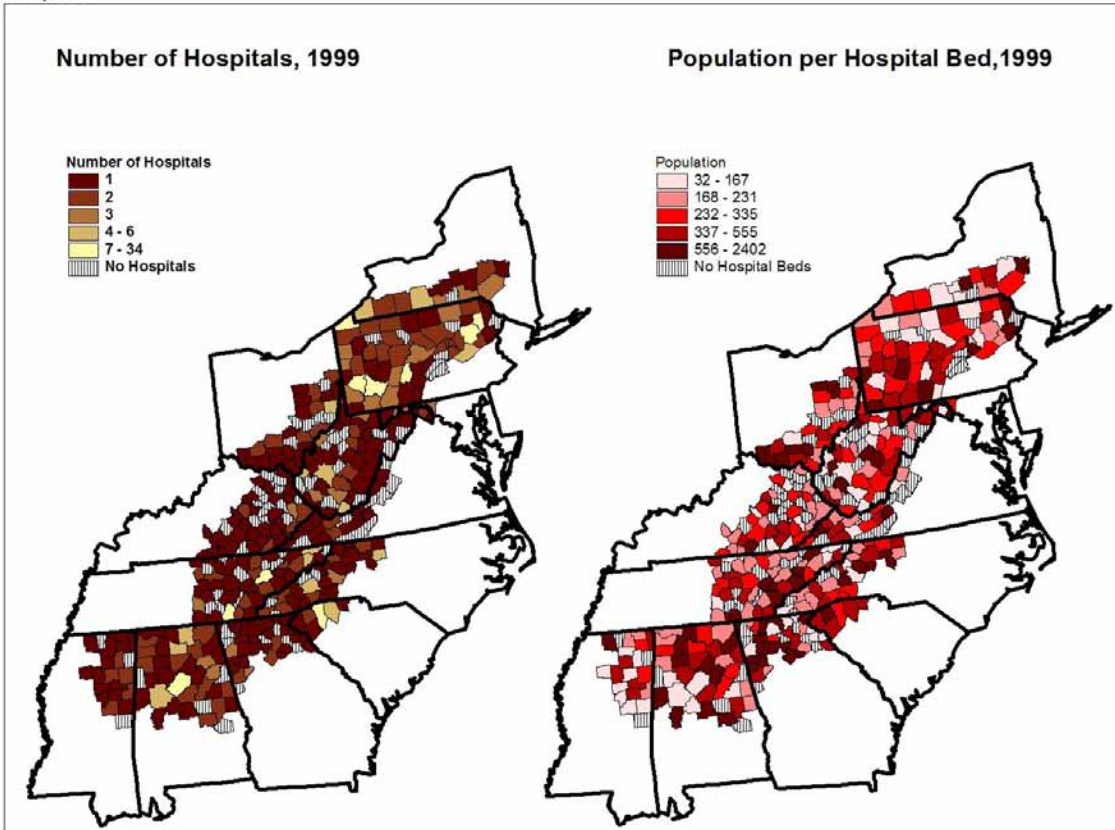
### ***Hospitals with Cardiac Intensive Care Units (CICUs)***

There were 296 counties in the region with no CICU, and fairly large areas for which there are large distances to the nearest CICU. More metropolitan areas within the region, such as Pittsburgh, Knoxville, and Birmingham have comparatively large numbers of CICU hospitals.

### ***Hospitals with Cardiac Catheterization Labs and Rehabilitation Care***

There were 318 counties that did not have hospitals with at least one cardiac catheterization lab and 326 counties that did not have at least one county with a cardiac rehabilitation unit. Large areas within the region do not have ready access to these critical services. Counties with metropolitan areas have a greater number of hospitals that offer these specialized services.

## Hospitals



### *Specialty Physicians*

Favorable population-to-physician ratios were found throughout the region. Counties with less favorable ratios are found primarily in Southeastern Ohio, Southern and Central West Virginia, Eastern Kentucky, and North-Central Mississippi. There were 6 Appalachian counties with no physicians active in patient care in 1999. More common physician specialties, such as cardiovascular disease, emergency medicine, diagnostic radiology, and pathology, are widely dispersed throughout the region. However large areas within the region are lacking these specialty medical services. There appear to be a regional concentration, in Western Pennsylvania, of physicians specializing in pulmonary disease and physical rehabilitation. Physician specialties that occur very sparsely among Appalachian counties are colon and rectal surgery, general preventive medicine, and public health.

## **Key Findings and Challenges**

This report represents the first such analysis found in the literature involving a regional review of mortality, morbidity and risk and represents a new, fruitful approach in disparities research. The central finding of this report of pervasive disparities in premature mortality in the region, as compared to the rest of the nation, provides evidence for identifying Appalachia as a geographic health disparity population.

The findings of this report indicate that the Appalachian Region as a whole suffers considerable excess in mortality from leading causes of death when compared to the non-Appalachian U.S. Among the causes of death examined in this study, Appalachian populations suffer the most significant excesses in heart disease mortality, the leading cause of death in the U.S. In addition, the Appalachian region suffers an excess in premature deaths (among persons ages 35 to 64) from heart disease, all cancers combined, lung cancer, colorectal cancer, chronic obstructive pulmonary disease, diabetes, and motor vehicle accidents, relative to comparable non-Appalachian U.S. populations. As this report has shown, there are considerable differences in the burden of mortality among age/gender/ethnic groups. The geographic patterns in national mortality rates for different causes of death are often mirrored in the Appalachian region, particularly by the apparent north-south gradients for breast, colorectal and lung cancer mortality, strokes, accidental deaths, and diabetes.

There is a discernable pattern of large clusters of high death rate counties in Central Appalachia for multiple causes of death. In many cases these concentrations represent the largest such clusters in the country. Among specific causes of death, which exhibit large clusters of high death rate counties in the Appalachian region, some of the most notable exist for heart disease, all cancers, lung cancer, COPD, and diabetes.

Analysis of hospitalization for different illnesses reveal similarities to the geographic distribution to mortality rates, however there is a high degree of within-region variability in both the rates of mortality and hospitalization. The lack of morbidity data hinders more extensive analysis. Key morbidity data is lacking for individual states in the nation and the region.

This report finds higher percentages of obesity, smoking and lack of physical activity in Appalachian labor market areas compared with the U.S. These behaviors are all considered risk factors to leading causes of mortality. There appear to be some associations among counties and clusters of counties with high mortality/hospitalization rates and high prevalence of behavioral risk factors.

Appalachia continues to suffer adverse socio-economic conditions (higher unemployment, lower educational achievement, lower per capita income), and there does appear to be some association between areas with more adverse socioeconomic conditions and adverse health outcomes. However, the direct role of socioeconomic conditions in influencing health disparities is not clear. There are places with adverse socioeconomic conditions that do not endure the burden of adverse health outcomes relative to other areas in the region.

Measures of health service availability are generally crude and limited in terms of measures of actual utilization rates, access barriers, quality issues and cross-county and

cross-state utilization patterns. The available data indicate an apparent centralization of specialty health services in the region's metropolitan areas.

### **Policy Implications**

The distributions of excess mortality rates found in this report may indicate a need for regional approaches to address such health disparities, especially in the case of excess premature deaths. In some cases, clusters of counties with high death rates correspond to clusters of counties with high risk factor prevalence. In such cases, regional health prevention approaches may make sense as an intervention strategy. The clusters cross state boundaries and suggest that interventions should be considered on a multi-state, regional basis.

Deficiencies in key morbidity data for every state suggest that additional incentives ought to be considered to encourage participation by all of the states in the HCUP program and that a standardized data base that guarantees both confidentiality and a robust national research capability be developed for use by public health researchers.

The effects of the apparent centralization of specialized health services in metropolitan areas on mortality and morbidity rates in non-metro areas are not yet clear. An alternative approach to measuring access to specialized health services might be to identify services required for a typical course of care by disease and to measure relative access at multiple local levels.

It appears that the reasons for disparities in health outcomes are highly variable and localized. Additional research is necessary to identify specific combinations of factors that contribute to the health experience of places within Appalachia. The detailed findings of county-level health status suggest that many health disparities are highly localized in the region and result from a combination of factors that are unique to each local area. Developing targeted interventions, and local policies, to reduce and eliminate health disparities in the region requires an understanding of local conditions that influence health outcomes.

In conjunction with developing regional health policies, one of the most significant challenges that is posed by this type of study is addressing the key disparities with local knowledge of conditions that exist in these geographic areas. Although analysis of secondary data sources is a critical part of developing an understanding of the health conditions in Appalachia, understanding the causes of disparities at the local level often requires specific and detailed local knowledge regarding events and conditions that influence local health outcomes. Preliminary analyses suggest a highly variable landscape of associations between various health disparities and socioeconomic condition, prevalence of behavioral risks, and access to available medical care resources. Local responses and more extensive analysis is required to identify how these factors combine and intersect at the local level to influence local health outcomes.

These findings will be communicated to each of the states included in the Appalachian Regional Commission's area. The Commission should consider promoting regional collaborations among states and partnerships with other Federal agencies to address the disparities identified in this report.