

Section 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, 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. The rural nature of the Appalachian region may be reflected in excess prevalence of many of these behavioral risks to disease morbidity and mortality.

Data and Methods

In this study we examined behavioral risks using data from the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a telephone survey administered each year by state health departments across the country and is designed to “collect uniform, state-specific data on preventive health practices and risk behaviors that are linked to chronic disease, injuries, and preventable infectious disease” (DHHS, 1999). Although the BRFSS began in 1984, county identifiers were not universally provided until 1993. Therefore, sub-state areas cannot be analyzed using data prior to 1993. The target population for the BRFSS survey is the adult (aged 18 and

older) non-institutionalized population of each state. A two-stage random-digit telephone sampling protocol is used to contact households, and a third stage randomly selects a single eligible adult from within each sampled household. The median response rate for participating states was 70.4% in 1992. The format and content of specific questions in the BRFSS surveys replicate questions asked in the National Health Interview Survey and the National Health and Nutrition Examination Surveys whenever possible. For this study, the following risk factors were analyzed:

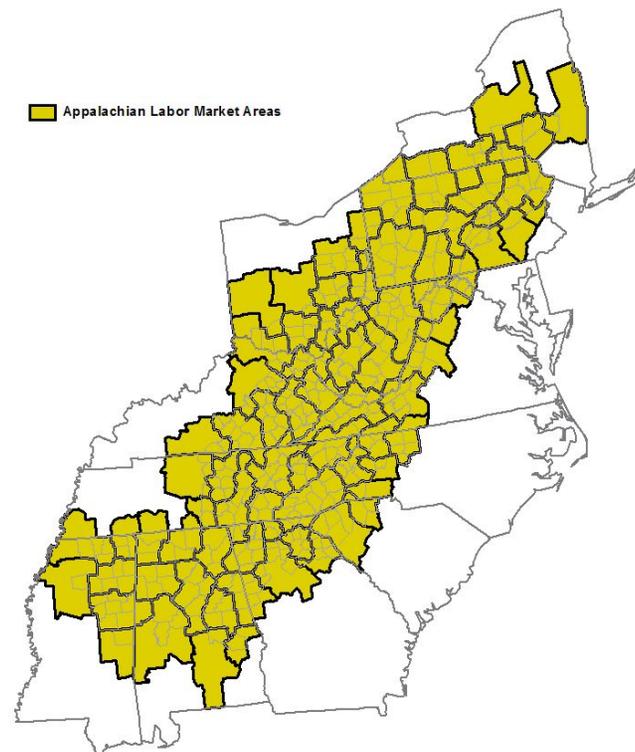
- Obesity (based on body mass index calculated from self-reported weight and height)
- Cigarette smoking and smoking quit rates
- Physical inactivity
- Cancer screening (Mammography and rectal exams)
- Access to medical care (Insurance Coverage)

Obesity, tobacco use, and physical activity are three leading health indicators identified in *Healthy People 2010*.

One of the greatest limitations of the BRFSS data is small numbers of responses, particularly at the county level. The Centers for Disease Control (CDC) recommends a minimum of 50 responses for any geographic unit of analysis in order to calculate a reliable rate. Five years of data were aggregated to maximize available sample sizes; however, few counties met the 50-response minimum after aggregating five years of data. For obesity, a smoothing algorithm was applied that is identical to the one used to generate death rates (see Section I), except that it does not use distance as a weighting factor. Distance was not applied as a weighting factor in this

instance in order to maximize the number of available responses for each county. This method enabled obesity prevalence estimates to be generated for all Appalachian counties for white populations. However, responses for other risk factors analyzed here were less consistently answered in the BRFSS questionnaires, and therefore had fewer responses with which to generate prevalence estimate at the county level. In order to obtain the greatest regional coverage of other risk factor prevalences, counties were aggregated to Labor Market Areas (LMAs). These consist of groups of counties and/or county equivalents, which define small regions in which participants in local labor markets both live and work (Tolbert and Sizer-Killian, 1987). The LMAs to be used in this analysis were developed by a team of rural sociologists at Louisiana State University, based on empirical journey-to-work and residence data for counties, county equivalents, and the District of Columbia, obtained from the U.S. Census of Population and Housing. There are 394 LMAs defined for the United States. LMAs cross state boundaries, which is appropriate given the true nature of local labor markets. Each LMA has been constrained to contain at least 100,000 inhabitants. Subsequently, LMAs tend to be much larger in more sparsely populated regions of the U.S. Individual LMAs are typically described using the name of the largest place (i.e. city or town) within the LMA. There are 79 LMAs that contain one or more Appalachian counties. Figure 1 shows the LMAs which encompass the 406 counties in the Appalachian region. For each risk factor, prevalence estimates were generated for all U.S. LMAs to allow comparison with those in the Appalachian region.

Figure 1. Appalachian Labor Market Areas



Behavioral risk factors were defined categorically, based on standard definitions used by the Centers for Disease Control and Prevention (DHHS, 1999). Where possible race/ethnic and gender specific behavioral risk factor prevalence estimates were calculated. Due to differences in response to specific questions on the BRFSS survey, some questions have insufficient responses to stratify by race/ethnicity and/or gender.

Obesity Prevalence

Obesity is a know risk factor for a number of chronic diseases including heart disease, cerebrovascular disease, hypertension, some cancers, and diabetes. The prevalence of obesity has been increasing in the U.S., and many areas within the Appalachian region are estimated to be among the highest rates of obesity in the country (Mokdad *et al*, 2001).

Obesity is defined by the Body Mass Index (BMI). The BMIs are calculated from self-reported height and weight by BRFSS respondents using the following formula:

$$BMI = \frac{\text{weight(kilograms)}}{\text{height(meters)}^2}$$

Persons with a BMI of 30.0 or greater are considered obese. Although obesity is a known risk factor for chronic disease and overall poor health, this measure alone is not an indication of poor health.

For this analysis, the prevalence of obesity is estimated for counties by calculating the proportion of respondents in each county with BMIs greater than or equal to 30.0. Obesity prevalences were generated for white and black men and

women. Obesity prevalences among counties outside of the Appalachian region were from 1.7% to 32.9% for white men, 8.3% to 36.8% for black men, 3.0% to 31.6% for white women, and 11.9% to 50.7% for black women. Obesity prevalences among counties within the Appalachian region were 9.0% to 27.7% for white men, 8.5% to 30.0% for black men, 6.9% to 25.2% for white women, and 11.3% to 47.1% for black women. Figures 2-5 show the distribution of obesity prevalences for counties both outside and inside the Appalachian region.

Figure 2.

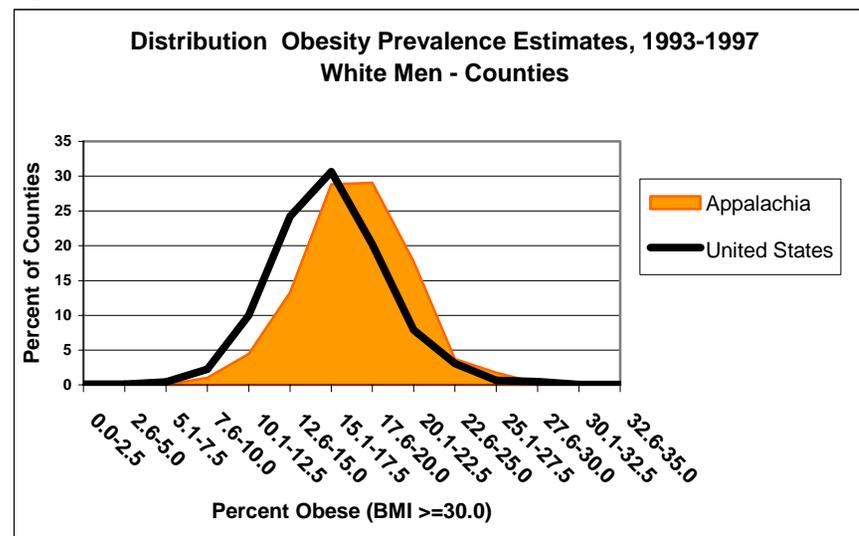


Figure 3.

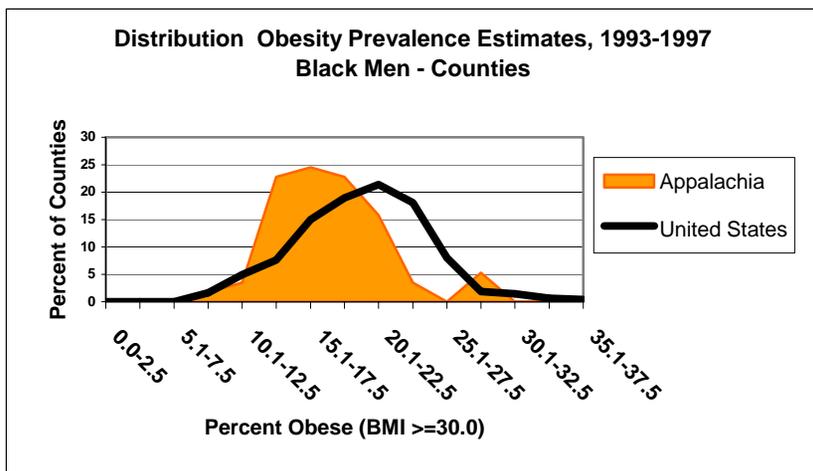


Figure 5.

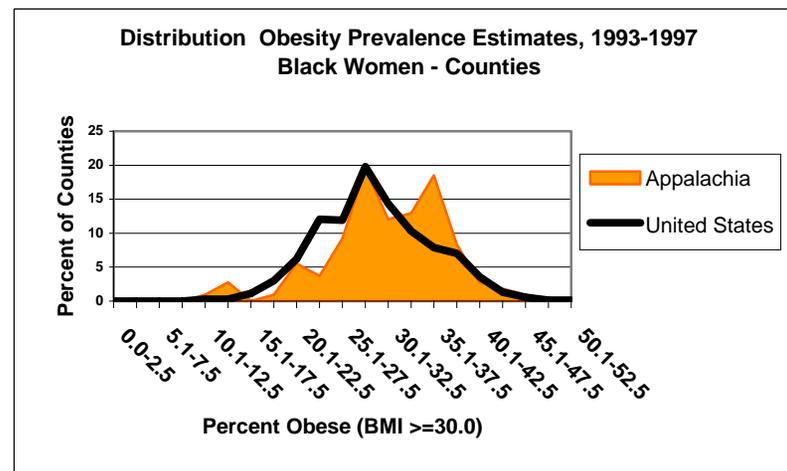
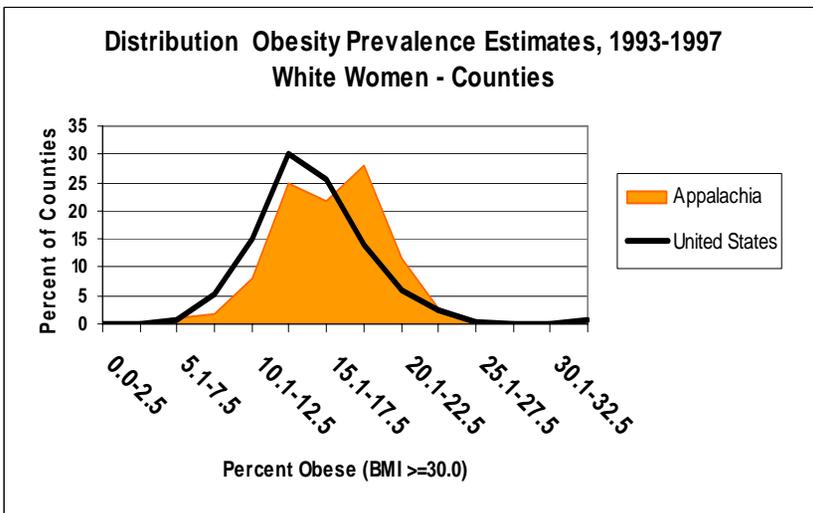


Figure 4.



Appalachian counties tend to be more represented among the higher obesity prevalences. The maps on pages 192 and 193 show the geographic distribution of obesity prevalence among these race/ethnic and gender groups for Appalachian counties. For white men and women, the higher obesity prevalences occur in counties in Northern Appalachia in Northern Pennsylvania and Southern New York, in Central Appalachia in Central West Virginia and Eastern Kentucky, and a few scattered counties in Southern Appalachia. While relatively few counties had sufficient data to estimate obesity prevalence for black men and women, high obesity counties are found in central West Virginia and the extreme southern Appalachian counties. For black women, high obesity counties occur along the margins of Appalachia primarily in Northeastern Kentucky and Northern Alabama.

Cigarette Smoking

More than 400,000 deaths are attributed to cigarette smoking each year, making it the leading preventable cause of death in the U.S. Smoking is known to increase the risk of heart disease, cancer, stroke, and chronic lung disease. For this analysis we have constructed two estimates regarding cigarette smoking: the percent of respondents who smoke and the percent of respondents who have quit. High quit rates may reflect successful campaigns to reduce the public health burden of cigarette smoking in some areas. Smoking rates in U.S. LMAs outside of the Appalachian region range from 9.2% to 45.5% for white men, 6.9% to 35.8% for white women, 14.1% to 42.1% for black men, and 7.8% to 35.5% for black women. In Appalachian LMAs, smoking rates ranged from 18.2% to 36.6% for white men, 15.8% to 33.2% for white women, 19.3% to 42.6% for black men, and 11.3% to 37.6% for black women. The distributions of smoking rates among LMAs for white population subgroups are shown in Figures 6 and 7. Due to the limited number of LMAs for which prevalence estimates could be generated for black populations, these distribution are not presented.

Appalachian LMAs are more represented in the higher ranges of smoking rates compared with LMAs outside the Appalachian region. The geographic distribution of smoking rates are shown on the maps on pages 194 and 195. 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.

Figure 6.

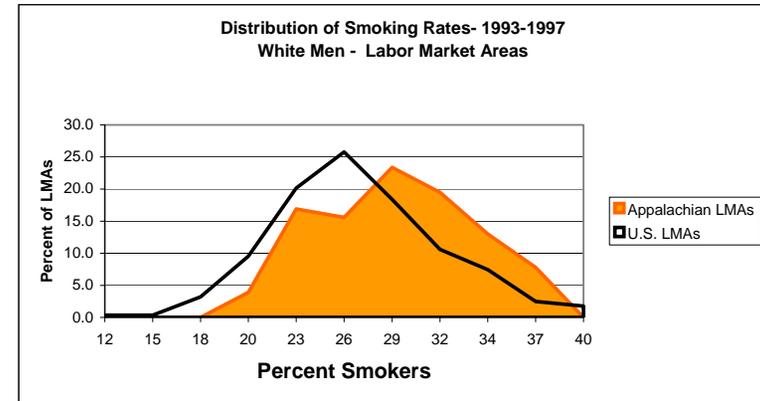
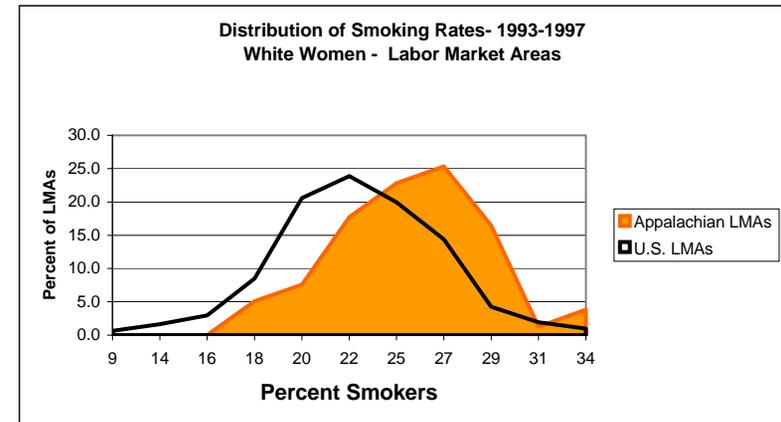


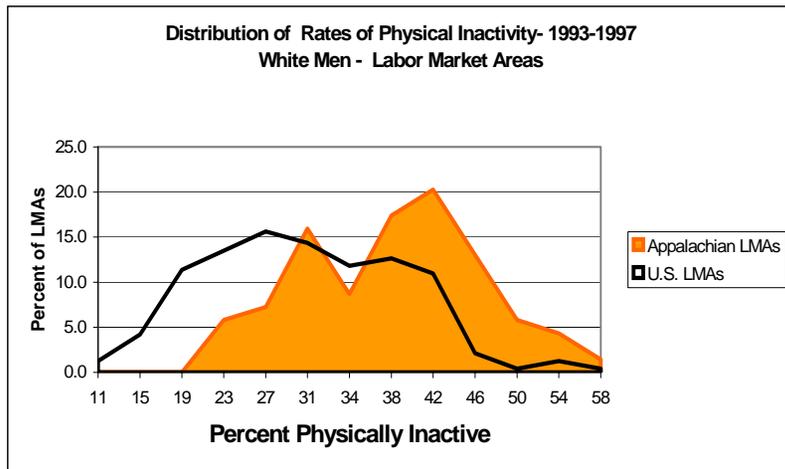
Figure 7.



Physical Inactivity

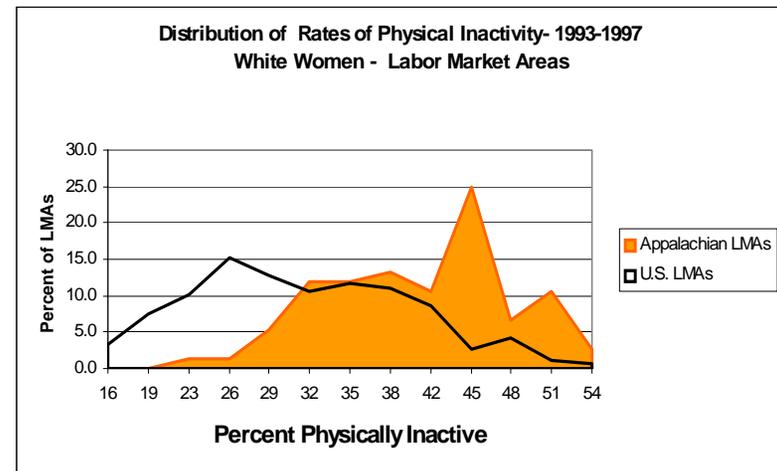
Physical inactivity, in conjunction with other risk factors, is an important factor in a number of adverse public health outcomes. Approximately 35% of mortality from coronary heart disease is attributable to physical inactivity (DHHS, 1999). Physical inactivity increases the risk for heart disease, colon cancer, stroke, diabetes as well as obesity. We assess physical inactivity based on the number of respondents to the BRFSS who reported no leisure-time physical activity within the past month. Rates of physical inactivity in LMAs outside of the Appalachian region ranged from 6.7% to 58.3% for white men, 12.9% to 54.4% for white women, 17.5% to 49.5% for black men, and 25.4% to 58.1% for black women. For LMAs within the Appalachian region, rates of physical inactivity ranged from 18.6% to 59.4% for white men, 19.6%

Figure 8.



to 58.8% for white women, 31.4% to 52.9% for black men, and 35.8% to 67.2% for black women. Figures 8 and 9 show the distributions of rates of physical inactivity for LMAs outside the Appalachian region and those in the Appalachian region. Appalachian LMAs consistently are more represented by the higher rates of physical inactivity compared with LMAs outside of the region. The maps on pages 198 and 199 show the geographic distribution of rates of physical activity among LMAs in the Appalachian region. High rates of physical inactivity appear to cluster in the Central Appalachian region for white men and women. For black men and women, high rates of physical inactivity occur in LMAs along the western fringes of the Appalachian region.

Figure 9.



Cancer Screening

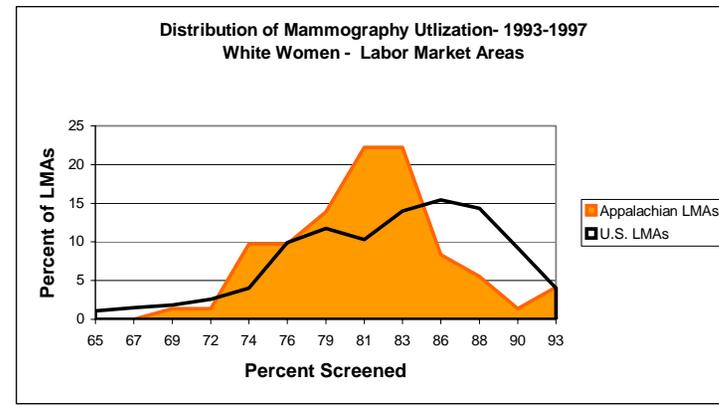
Early detection of cancer is the most effective way to treat the disease before it has a chance to metastasize or spread through the body. Screening for breast cancer (through mammography and/or self-examination) and colorectal cancer, (through digital rectal exams or proctosopies) are effective in detecting cancers early, when treatment will be most effective.

The American Cancer Society recommends that women aged 40 years and older have an annual mammogram and monthly breast self-examination (DHHS, 1999). Colorectal cancer screening is recommended every 5 years for persons 50 years old and older. A number of factors may influence the utilization of cancer screening services including their availability and accessibility. In addition, screening for some cancers (particularly colorectal cancer) can be more invasive and unpleasant than screening for other cancers and may therefore be more underutilized.

We assess screening for two cancers in this analysis: breast cancer and colorectal cancer. Use of these services has been estimated for LMAs in the Appalachian region using respondent data from the BRFSS. Use of mammography screening was estimated for white and black women aged 50 and older who reported ever having a mammogram. Use of colorectal cancer screening has been estimated for white and black men and women aged 50 and older who reported ever having a digital rectal exam or proctoscopy. Rates of mammography utilization in LMAs outside of the Appalachian region ranged from 64.5% to 92.7% for white women and 61.6% to 93.3% for black women. For LMAs within the Appalachian region, rates of mammography utilization ranged

67.2% to 92.7% for white women, and 69.5% to 88.0% for black women. Figure 10 shows the distributions of rates of

Figure 10.



mammography utilization among white women for LMAs the Appalachian region and those in the non-Appalachian U.S.

Appalachian LMAs generally are more represented by the lower rates of mammography screening compared with LMAs outside of the region. The maps on page 200 show the geographic distribution of rates of mammography screening among LMAs in the Appalachian region. Low rates of mammography screening appear in a swath through the Central Appalachian region for white women, although the lowest rates of utilization occur in Northeastern Mississippi.

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 (Figures 11-12).

The maps on pages 201 and 202 show the geographic distribution of rates of colorectal cancer screening among LMAs in the Appalachian region. The lowest rates of colorectal cancer screening occur in South-Central Kentucky and Eastern Tennessee for white men. For white women, the lowest rates of colorectal cancer screening occur in LMAs in South-Central Ohio, Eastern Tennessee, and Northern and Southern Alabama. Rates for black men and women are sparse, however there appear to be low rates of utilization primarily in Southern Alabama among black women.

Figure 11.

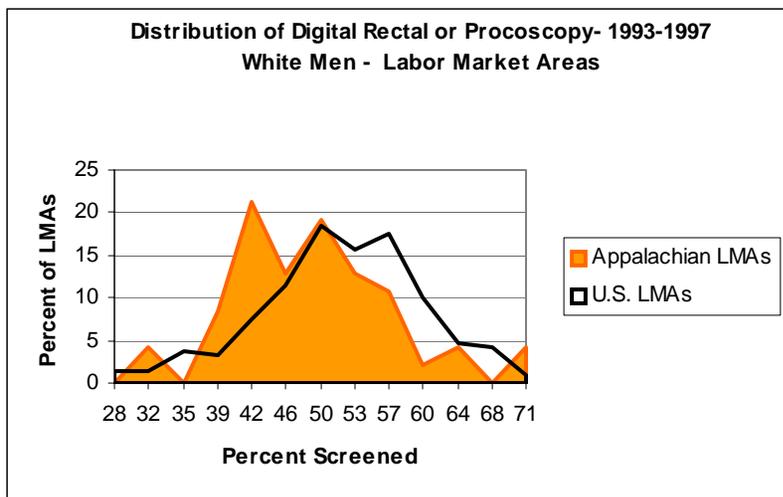
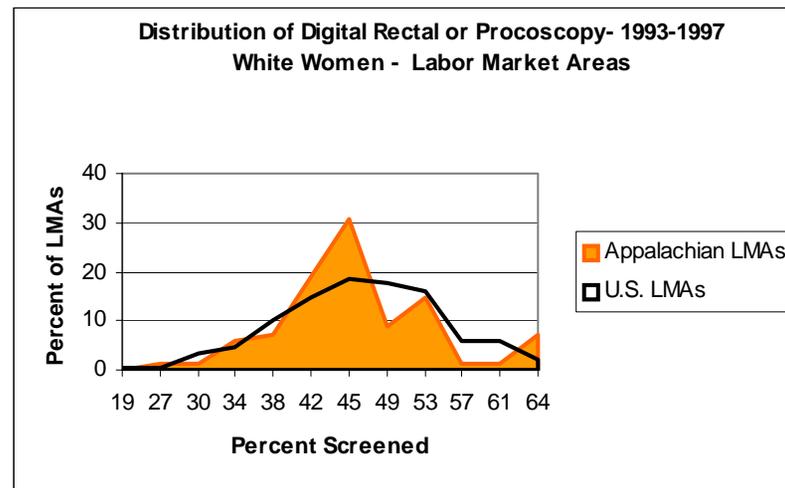


Figure 12.



Health Insurance

In the contemporary climate of medical care, health insurance is increasingly important due to rising health care costs. For those individuals without health care coverage, regular doctor visits and preventative care may occur less often due to the expense. This results in increased risk that medical conditions will not be diagnosed and treated (Pickle and Su, 2002). Therefore, populations with high percentages of people without health insurance may be more susceptible to both morbidity and mortality from injury and disease.

The percentage of people 18 years and older that have health care insurance coverage was estimated based on BRFSS responses to the question “Do you have any kind of health care

plan?” The distribution of rates of health care coverage for LMAs both outside and within the Appalachian region are shown in Figures 13-14 for white men and women. 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 maps on pages 203 and 204 show the geographic distribution of health care coverage for LMAs among white and black men and women. There is a great deal of geographic variability in rates of health care coverage in the region; however, the lowest rates of coverage occur consistently among white men and women in eastern Kentucky.

Figure 14.

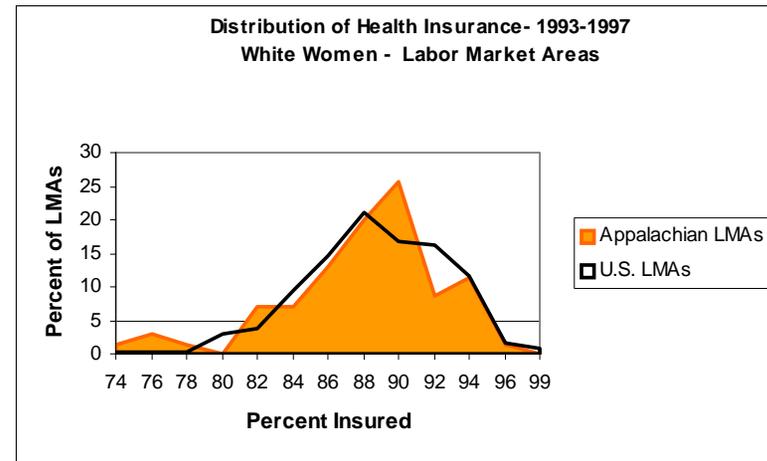
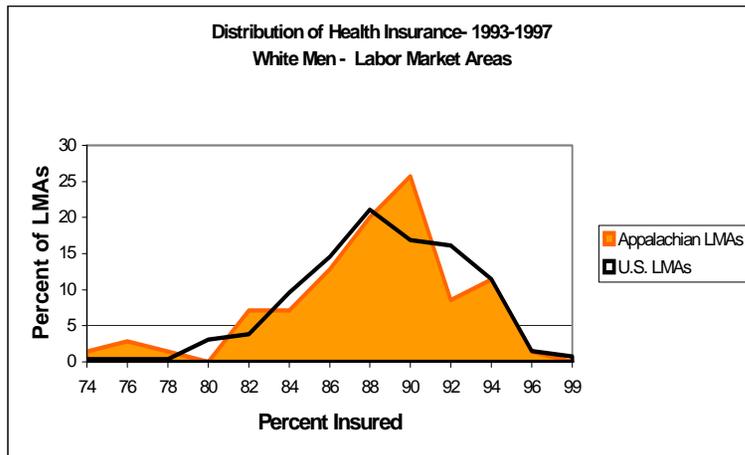


Figure 13.



Summary

A considerable proportion of the burden of chronic disease may be attributable to modifiable risk factors such as obesity, smoking, and physical activity. We examined the geographic distribution of prevalence estimates for several leading health indicators.

Relative to the non-Appalachian U.S., the Appalachian region experiences generally higher prevalence of obesity, smoking, physical inactivity, and also experiences less utilization of cancer screening. Within the Appalachian region there is a great deal of variation in the prevalence of these behavioral risk factors. In general, the more adverse levels of prevalence occur in the central portion of the region including areas within eastern Kentucky, Southeastern Ohio, Southern and Central West Virginia, and Western Virginia.

References

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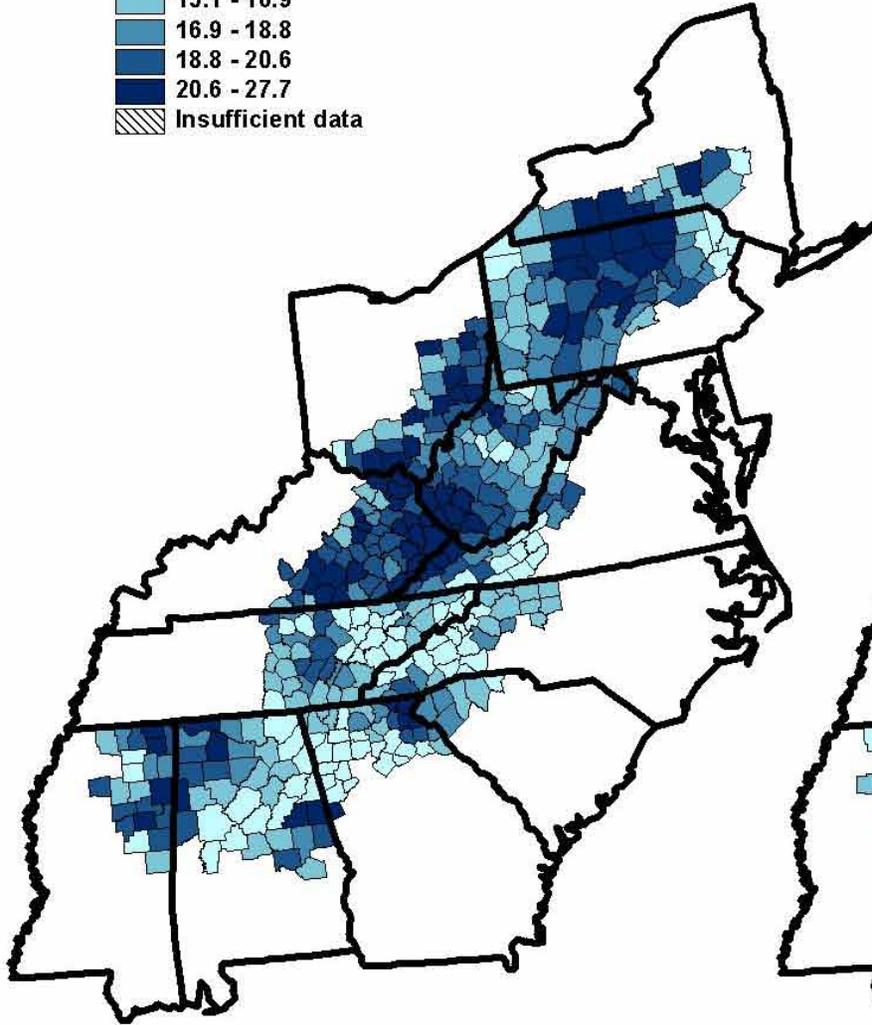
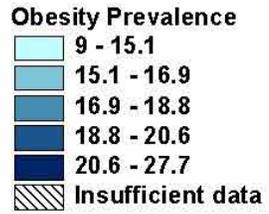
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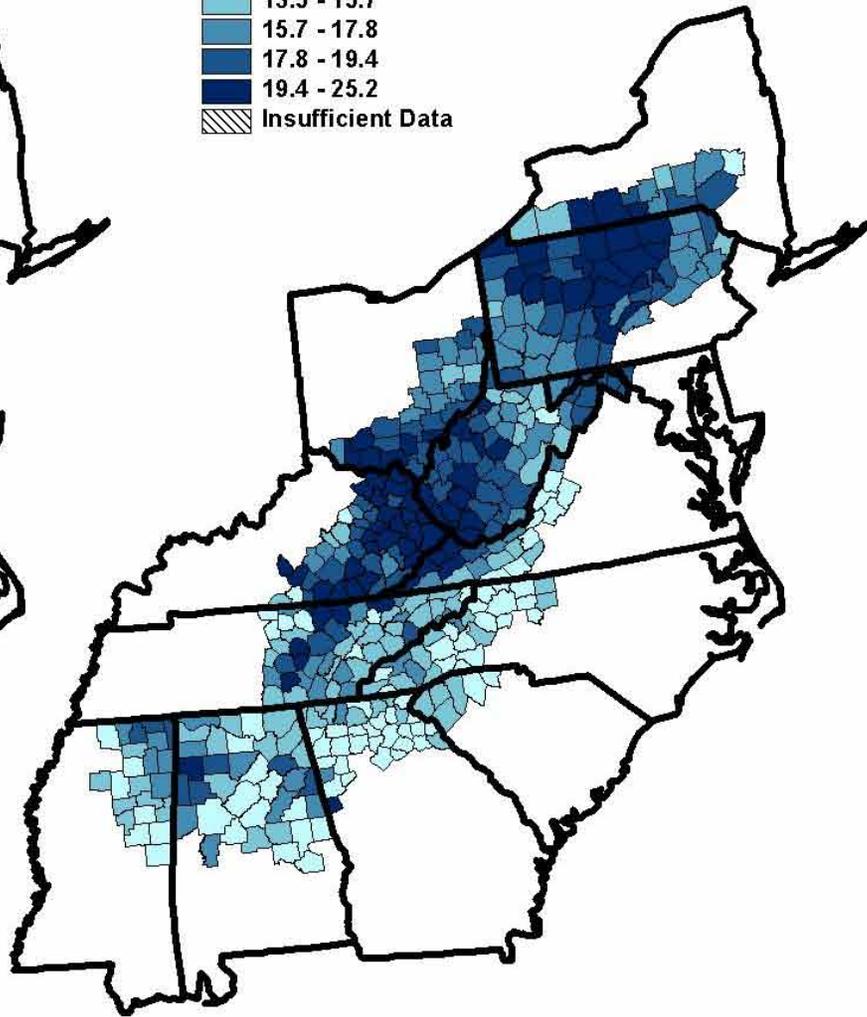
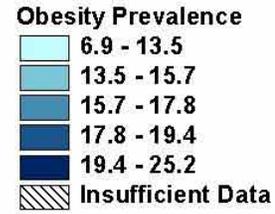
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Obesity Prevalence, 1993-1997

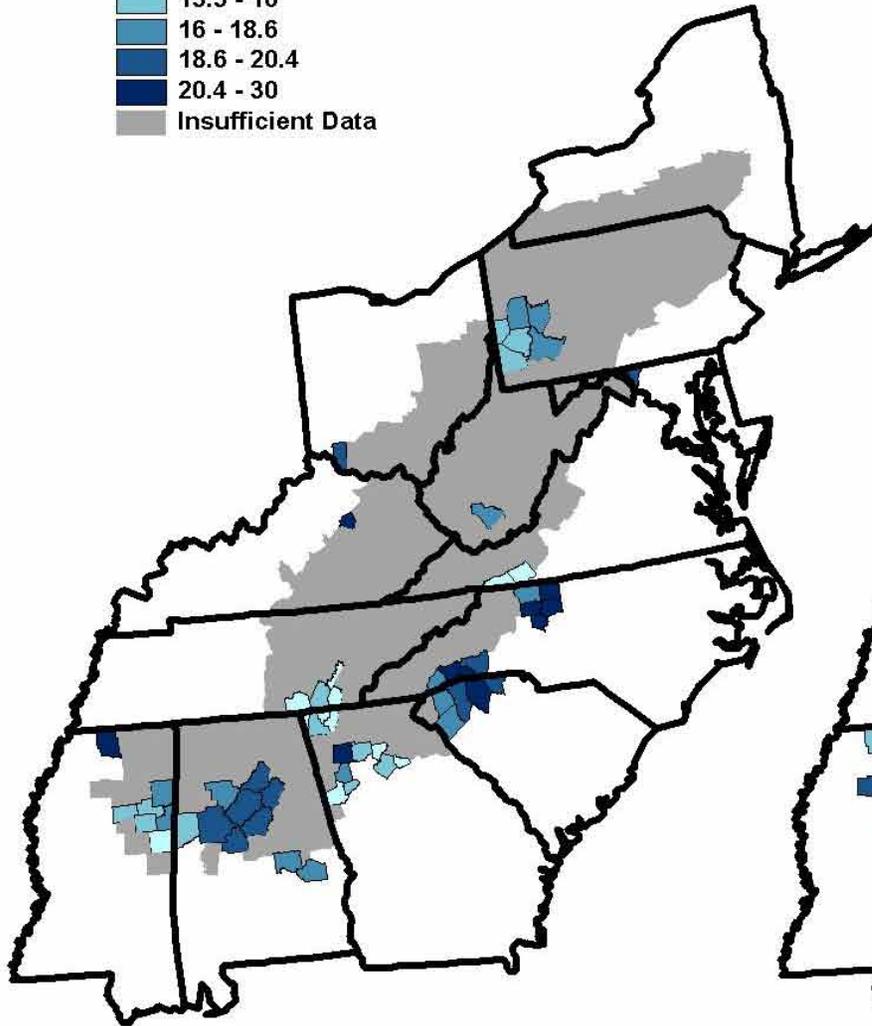
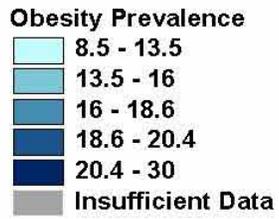
White Men Ages 18 and Older



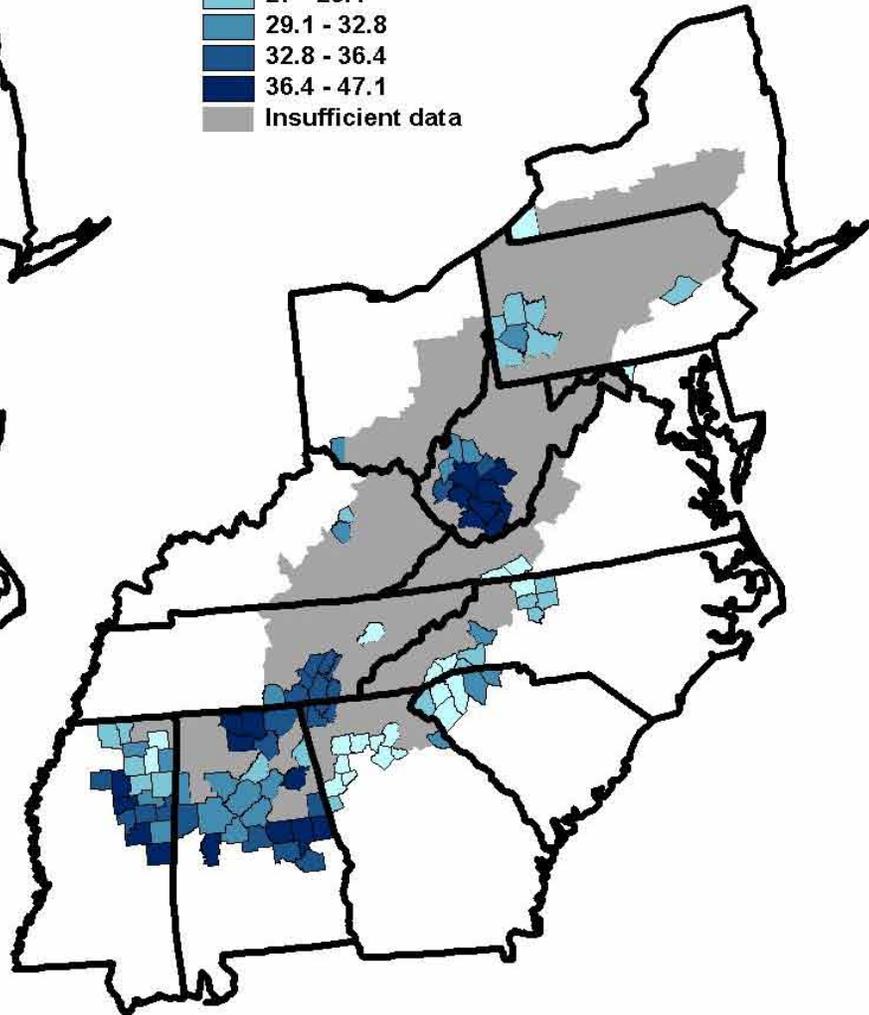
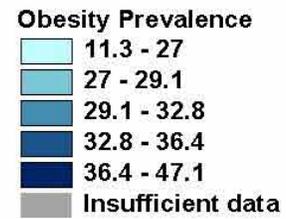
White Women Ages 18 and Older



Black Men Ages 18 and Older



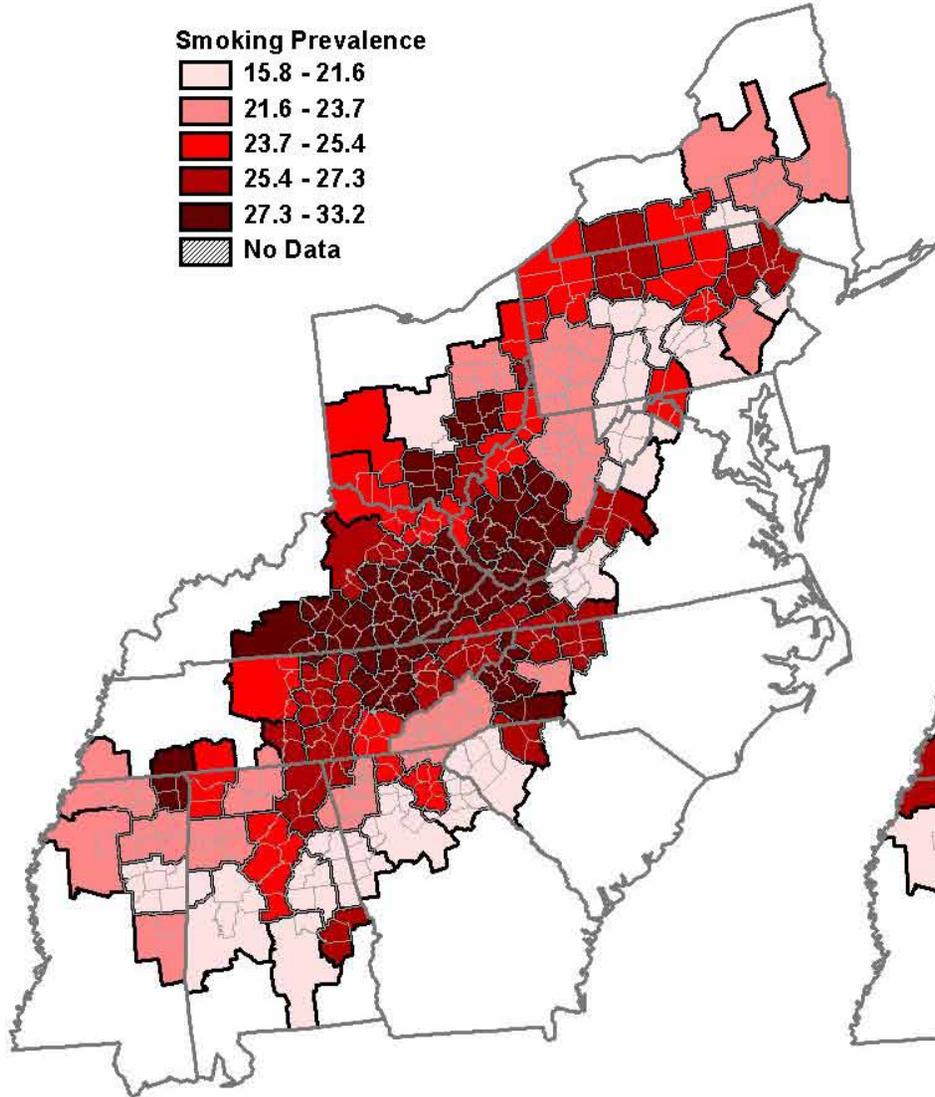
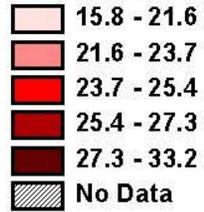
Black Women Ages 18 and Older



Cigarette Smoking Prevalence

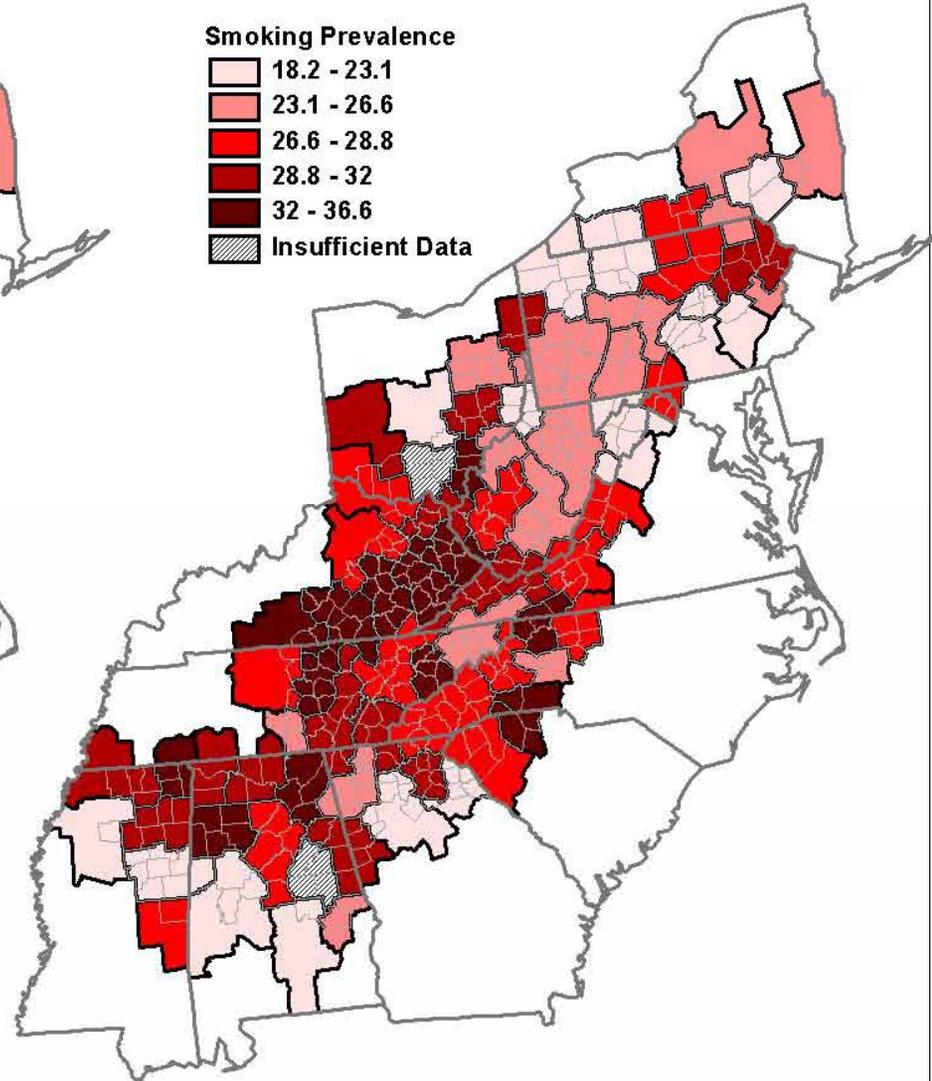
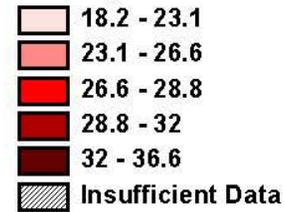
**White Men Ages 18 and Older
BRFSS, 1993-1997
U.S. Labor Market Areas**

Smoking Prevalence



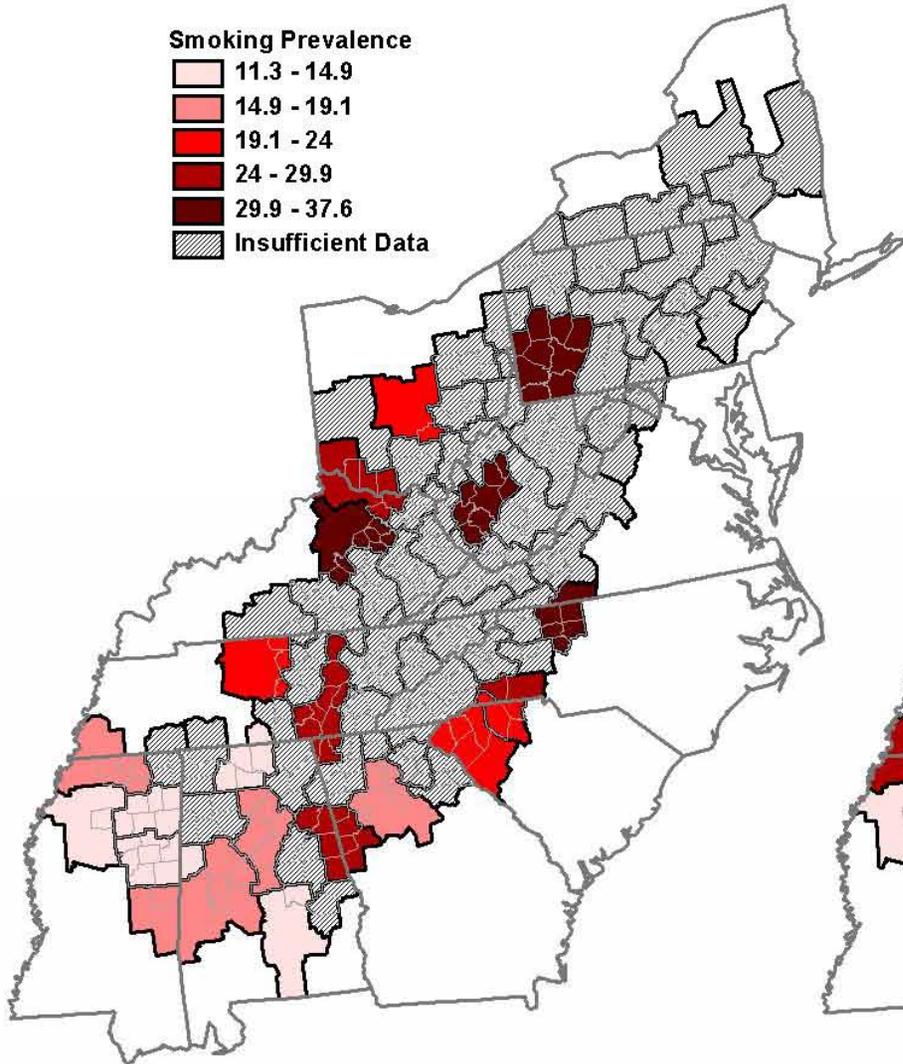
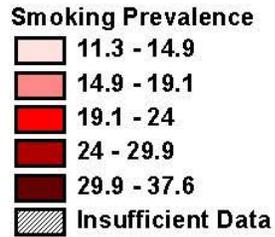
**White Women Ages 18 and Older
BRFSS, 1993-1997
U.S. Labor Market Areas**

Smoking Prevalence

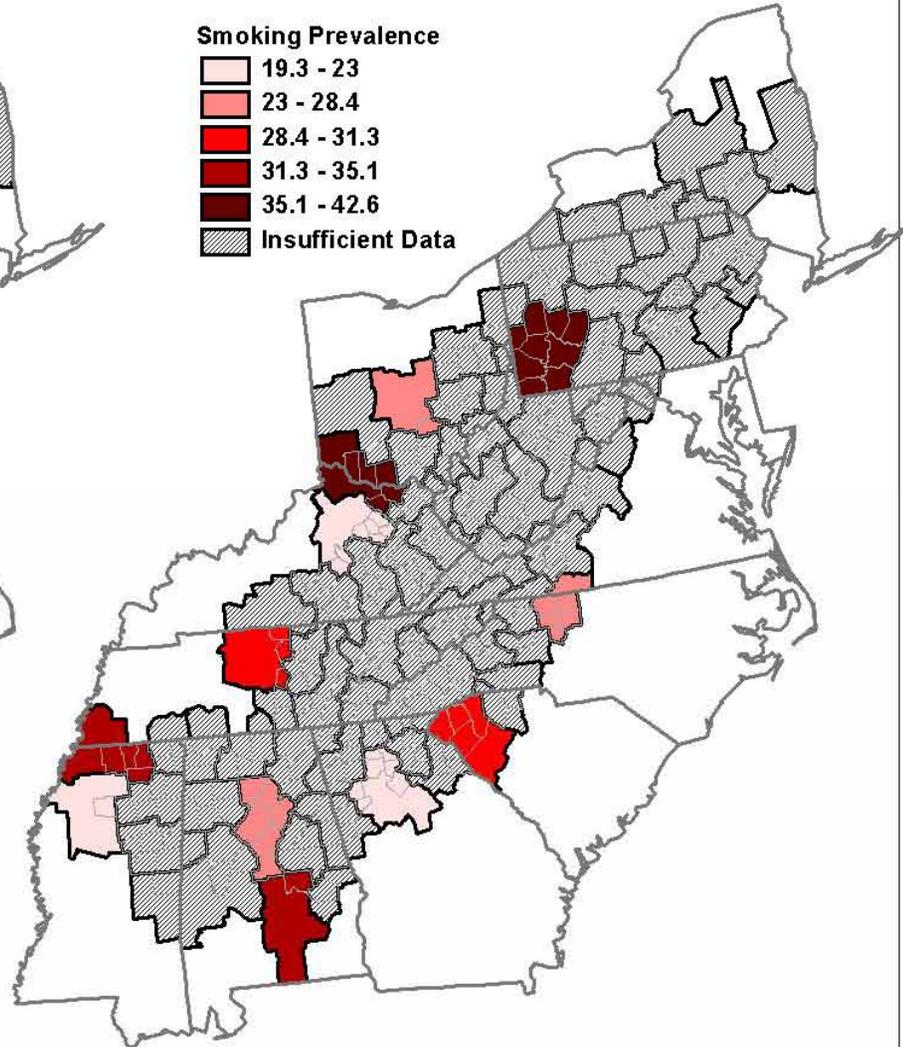
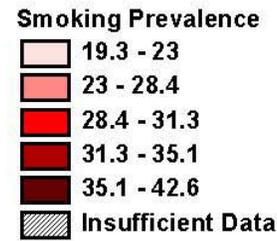


Cigarette Smoking Prevalence

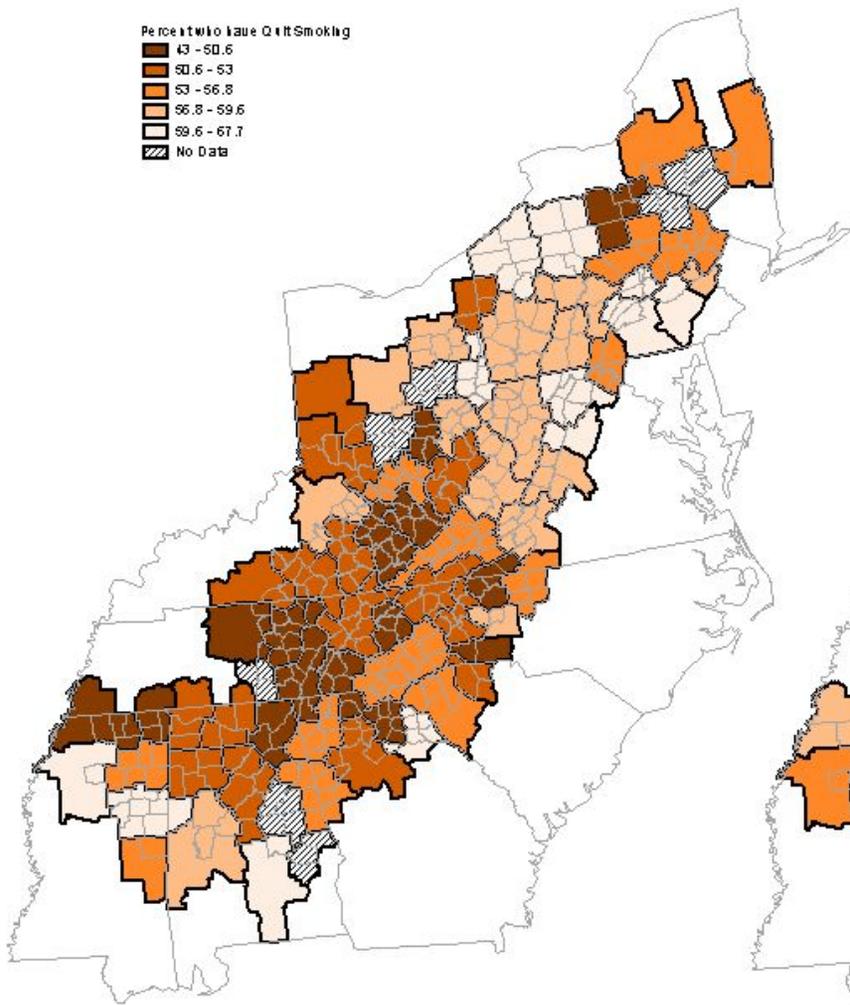
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BRFSS, 1993-1997
U.S. Labor Market Areas**



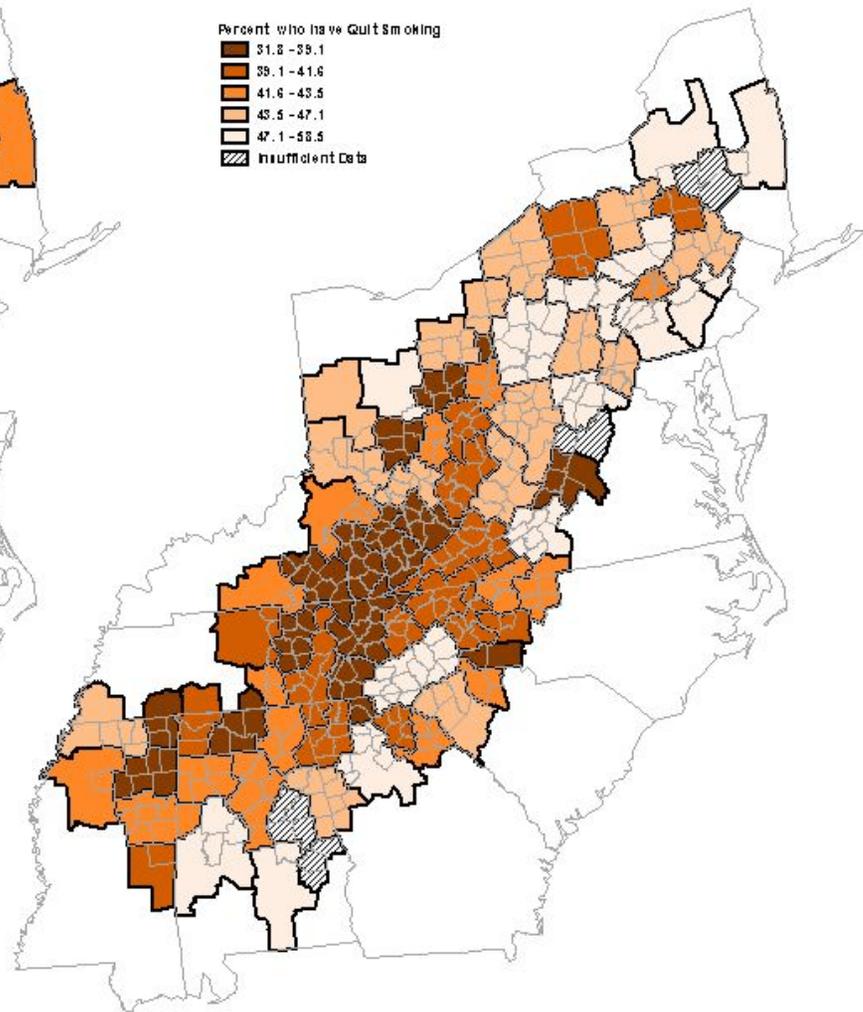
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BRFSS, 1993-1997
U.S. Labor Market Areas**



Percent of Respondents who Have Quit Smoking
 White Men Ages 18 and Older
 BRFSS 1993-1997
 U.S. Labor Market Areas

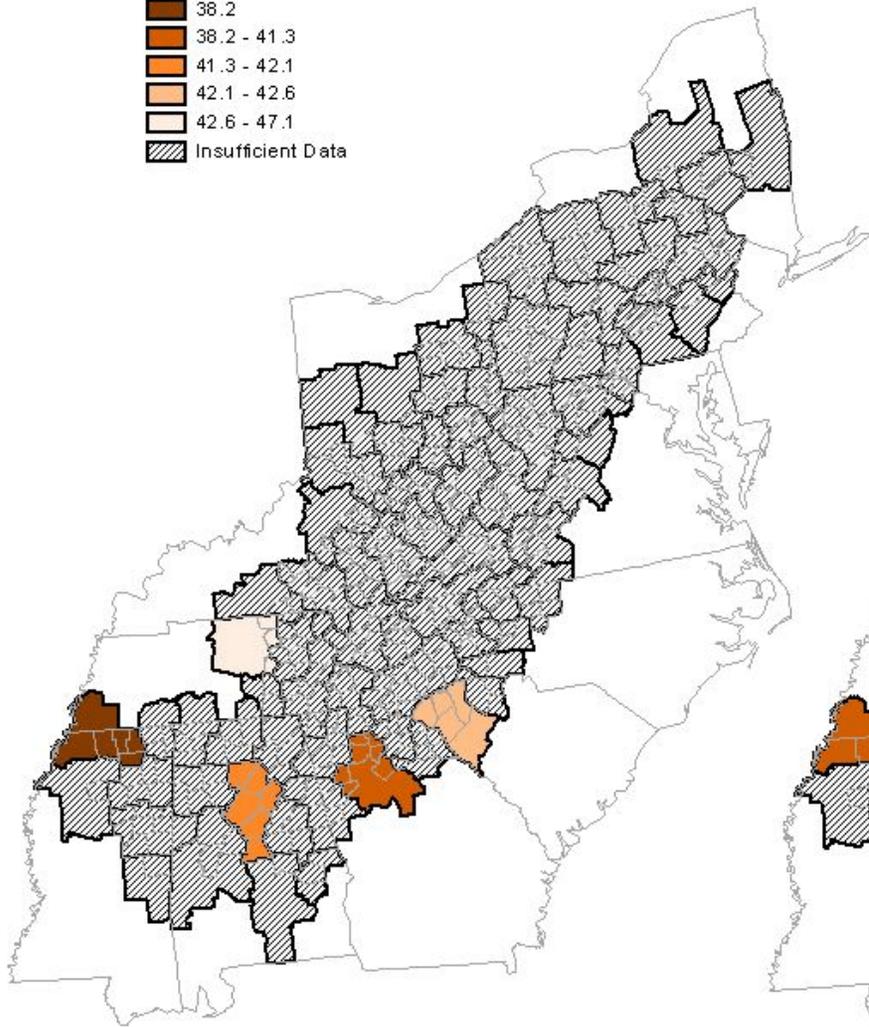
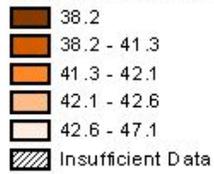


Percent of Respondents who have Quit Smoking
 White Women Ages 18 and Older
 BRFSS 1993-1997
 U.S. Labor Market Areas



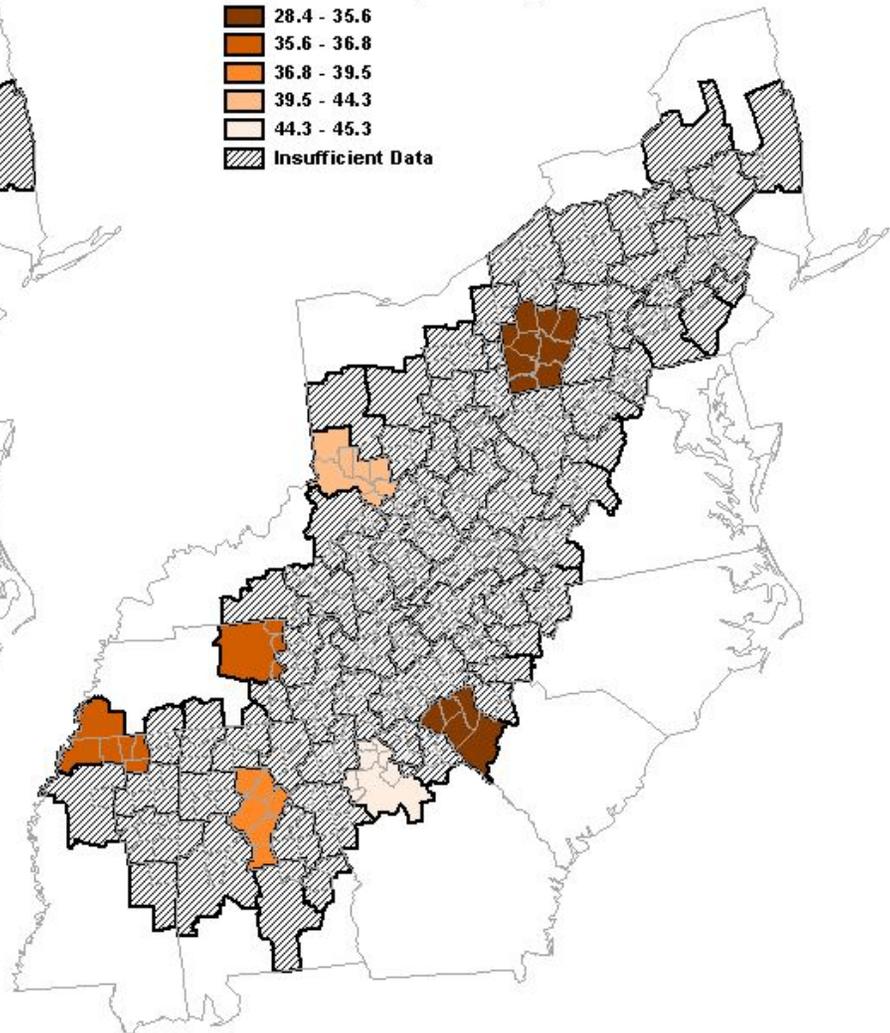
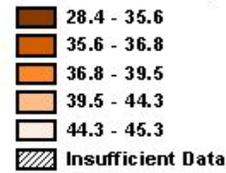
**Percent of Respondents who Have Quit Smoking
Black Men Ages 18 and Older
BRFSS 1993-1997
U.S. Labor Market Areas**

Percent who have Quit Smoking

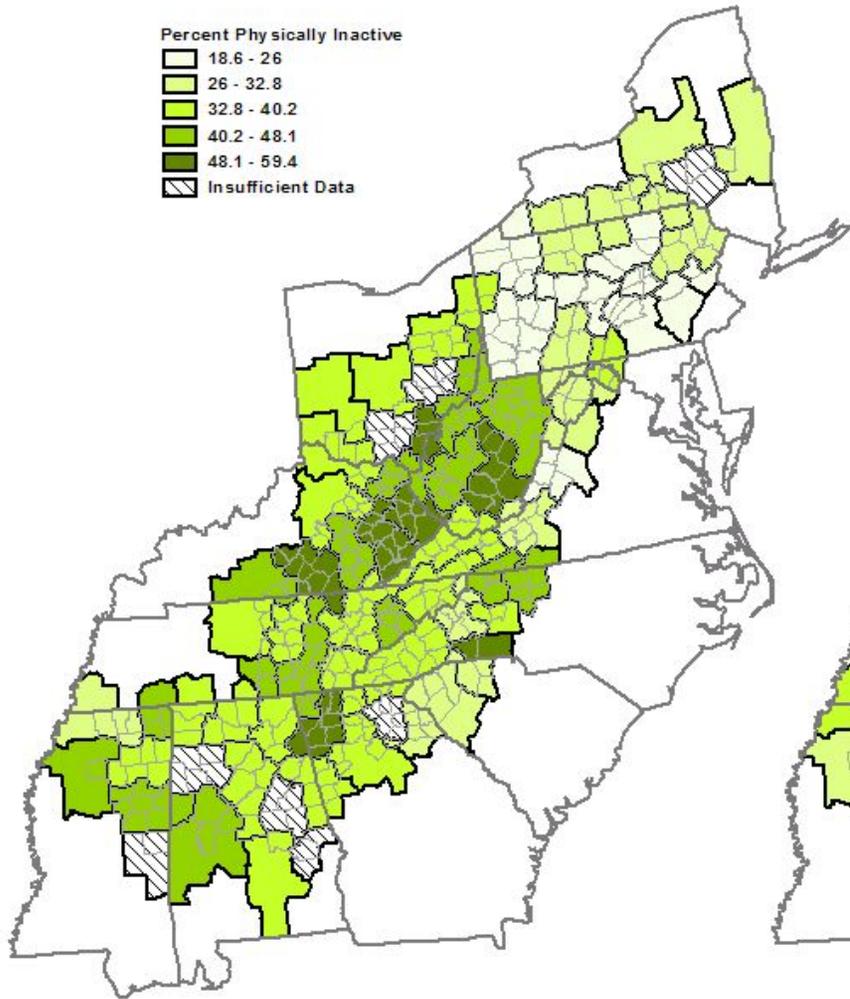


**Percent of Respondents who have Quit Smoking
Black Women Ages 18 and Older
BRFSS 1993-1997
U.S. Labor Market Areas**

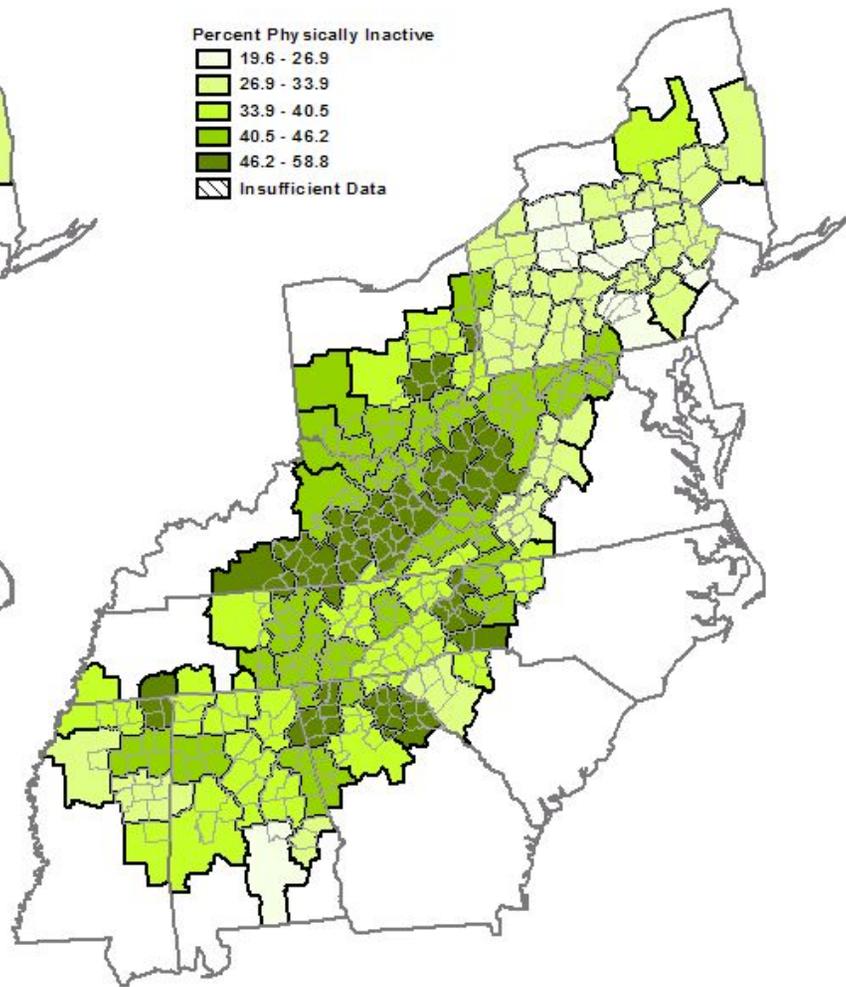
Percent who have Quit Smoking



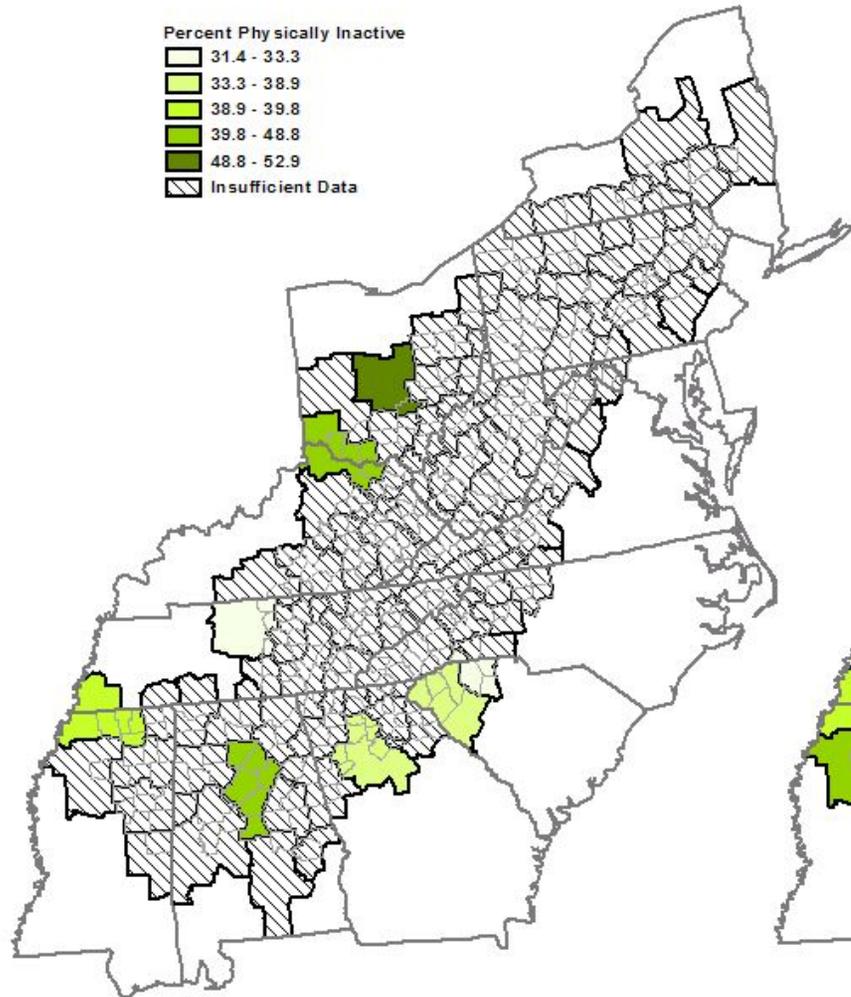
**Percent of Respondents Reporting Physical Inactivity
White Males Ages 18 and Older
BRFSS, 1993-1997
U.S. Labor Market Areas**



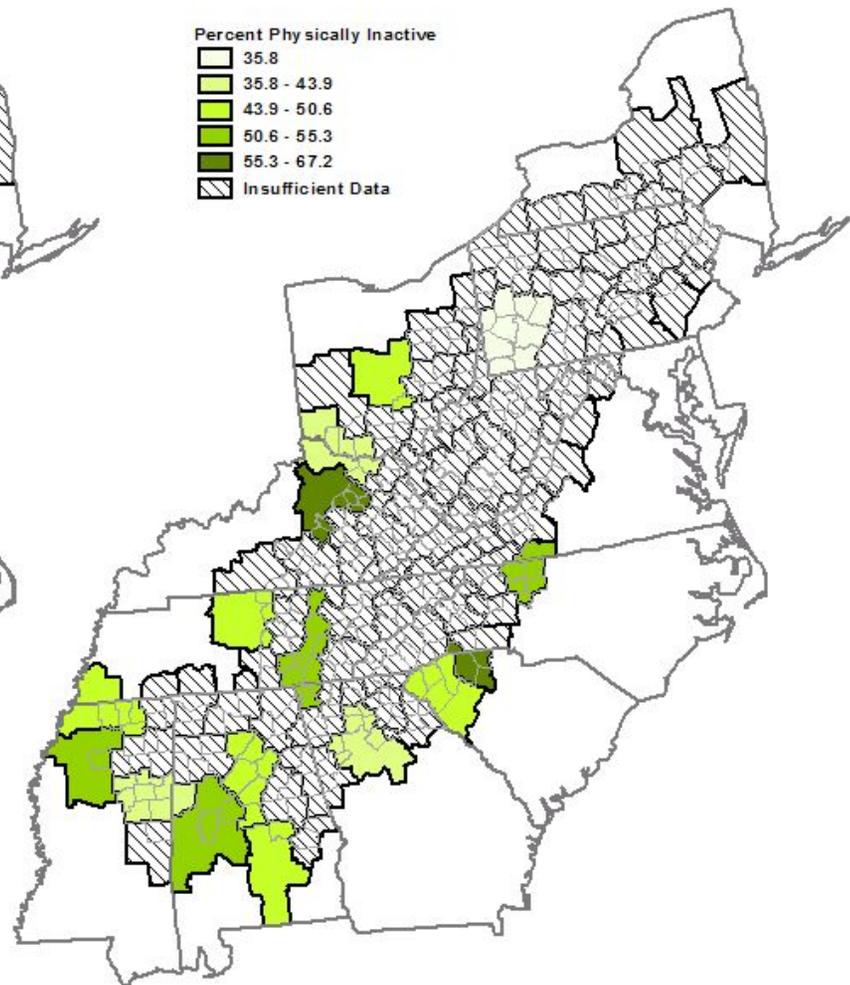
**Percent of Respondents Reporting Physical Inactivity
White Females Ages 18 and Older
BRFSS, 1993-1997
U.S. Labor Market Areas**



**Percent of Respondents Reporting Physical Inactivity
Black Men Ages 18 and Older
BRFSS, 1993-1997
U.S. Labor Market Areas**

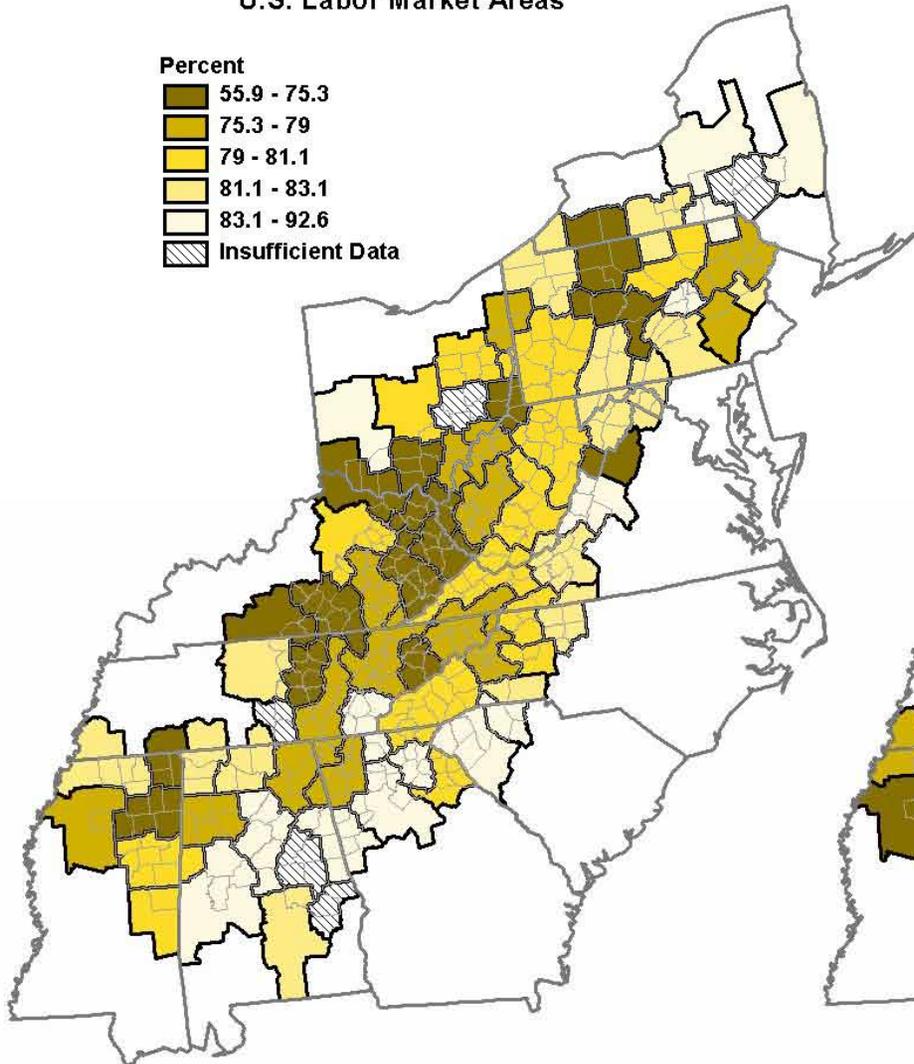
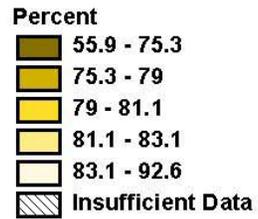


**Percent of Respondents Reporting Physical Inactivity
Black Women Ages 18 and Older
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U.S. Labor Market Areas**

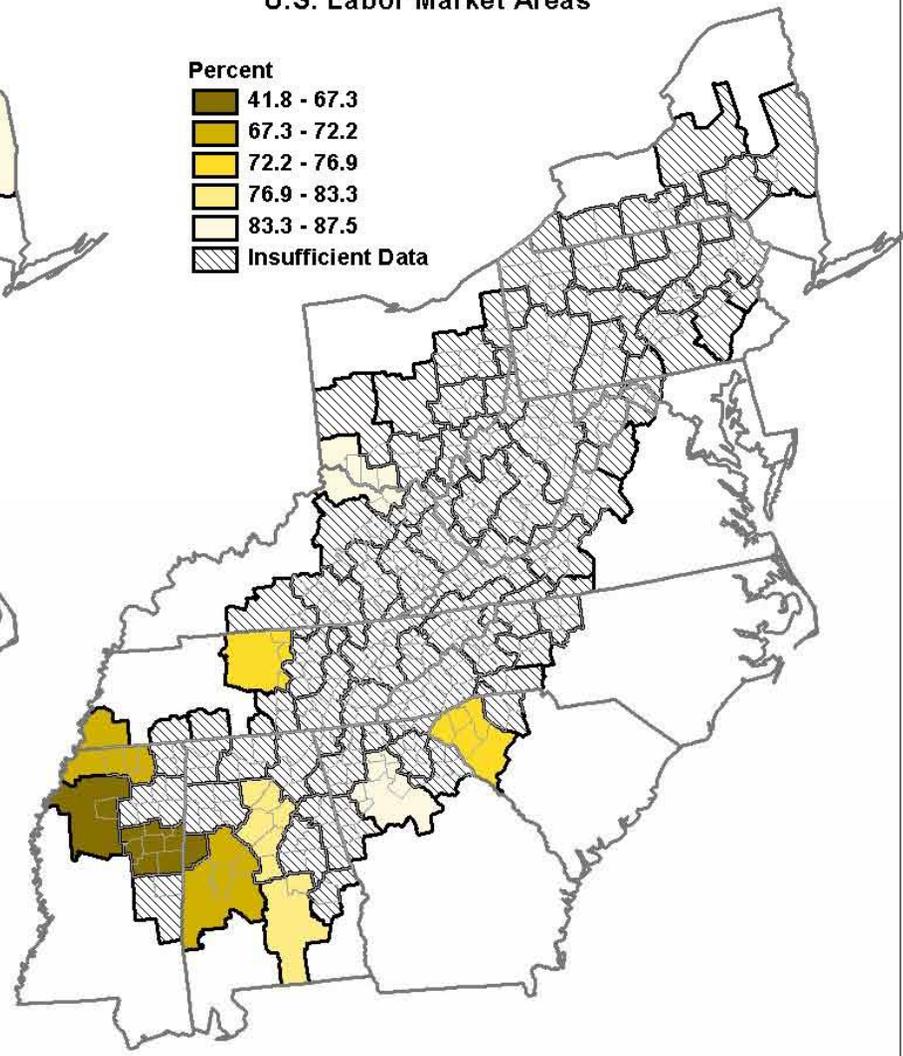
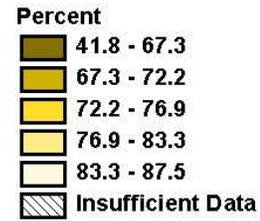


Cancer Screening

Percent of White Women Ages 50 and Older
Who Have Ever Had a Mammogram
BRFSS, 1993-1997
U.S. Labor Market Areas

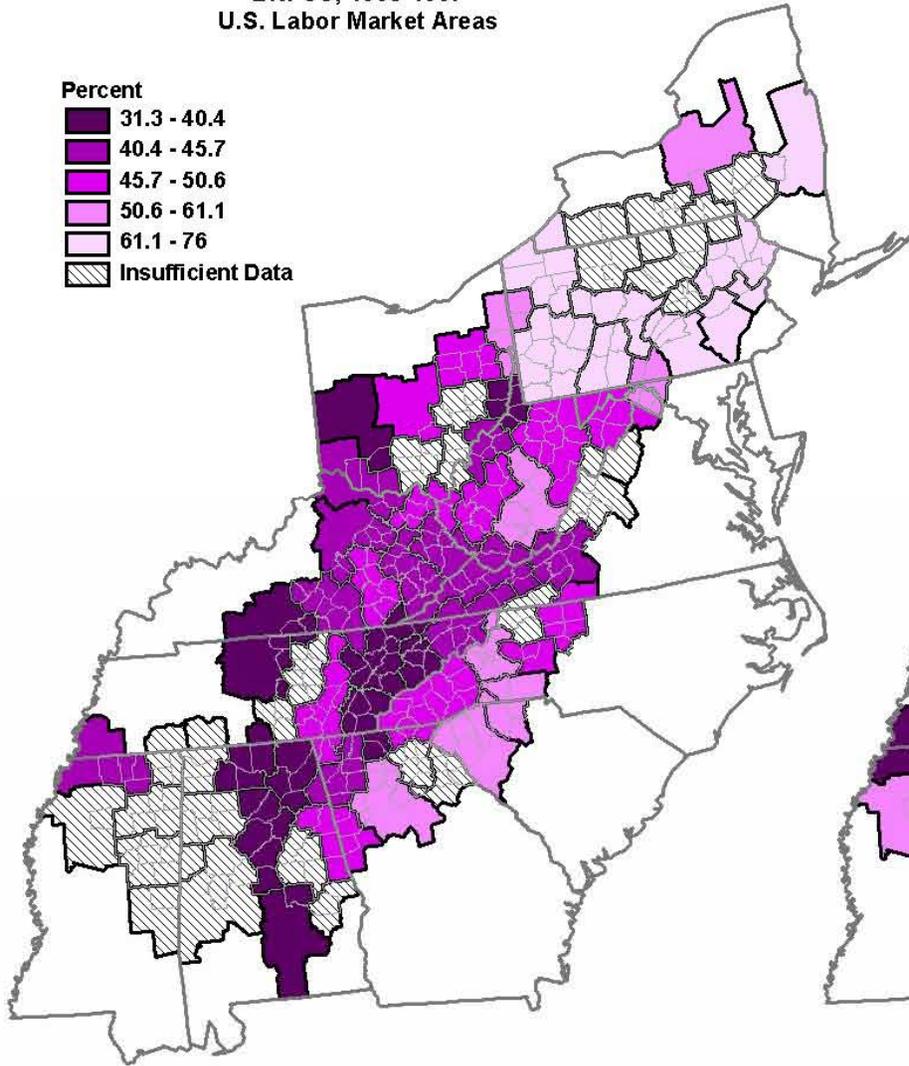
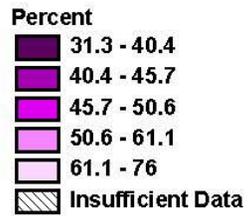


Percent of Black Women Ages 50 and Older
Who Have Ever Had a Mammogram
BRFSS, 1993-1997
U.S. Labor Market Areas

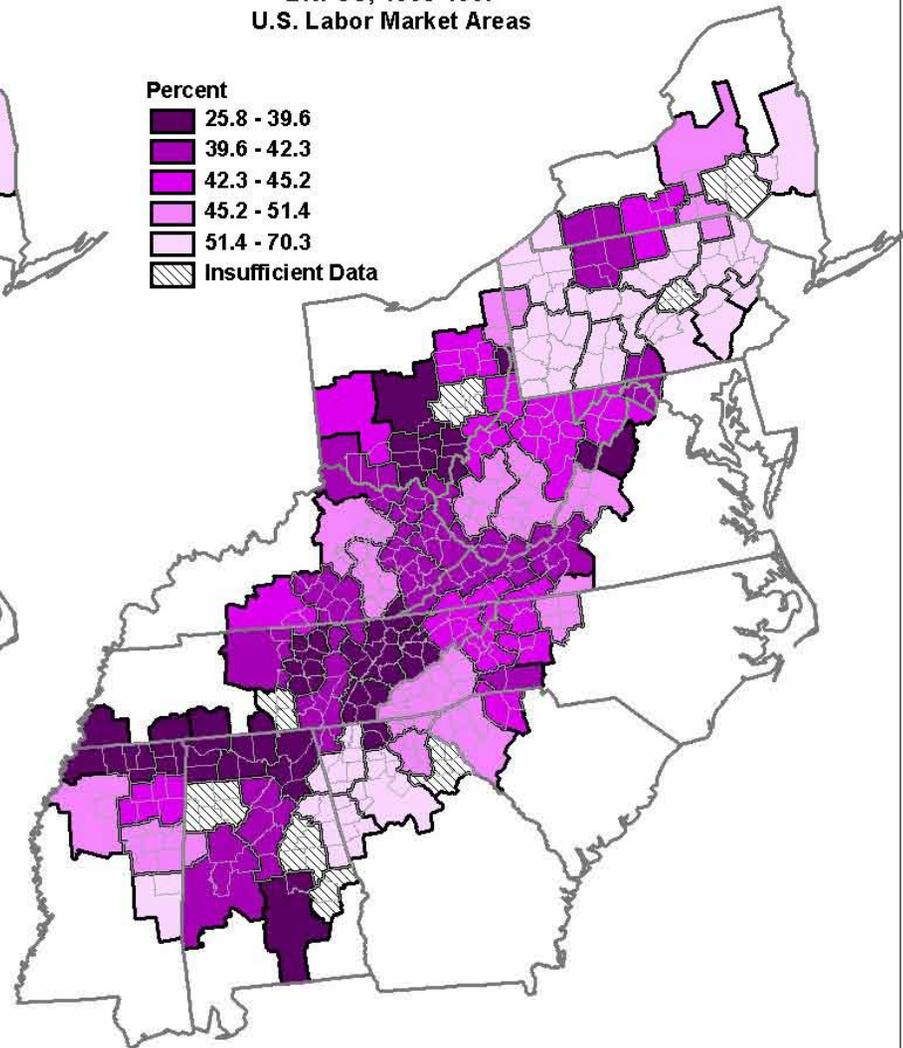
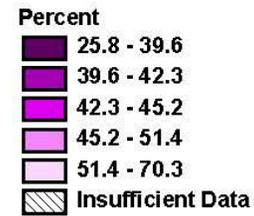


Cancer Screening

**Percent of White Men Ages 50 and Older
Who Have Ever Had a Digital Rectal Exam or Proctoscopy
BRFSS, 1993-1997
U.S. Labor Market Areas**

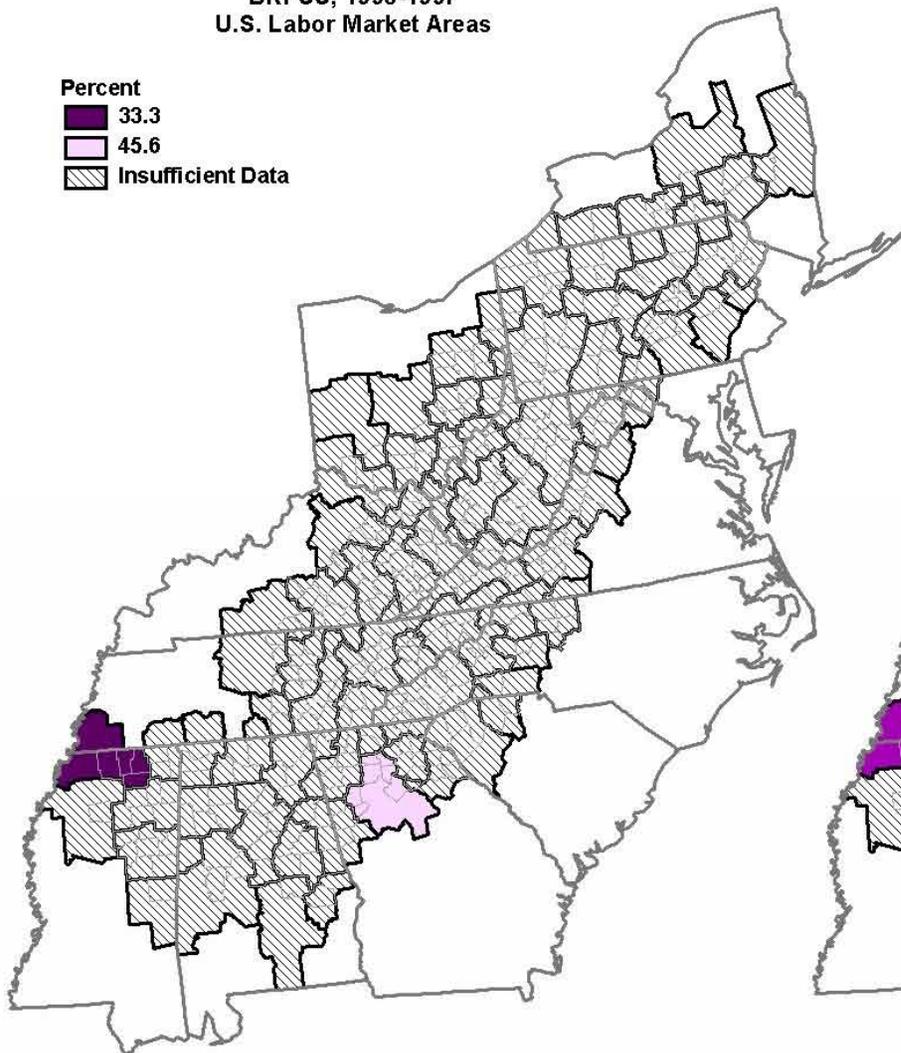


**Percent of White Women Ages 50 and Older
Who Have Ever Had a Digital Rectal Exam or Proctoscopy
BRFSS, 1993-1997
U.S. Labor Market Areas**

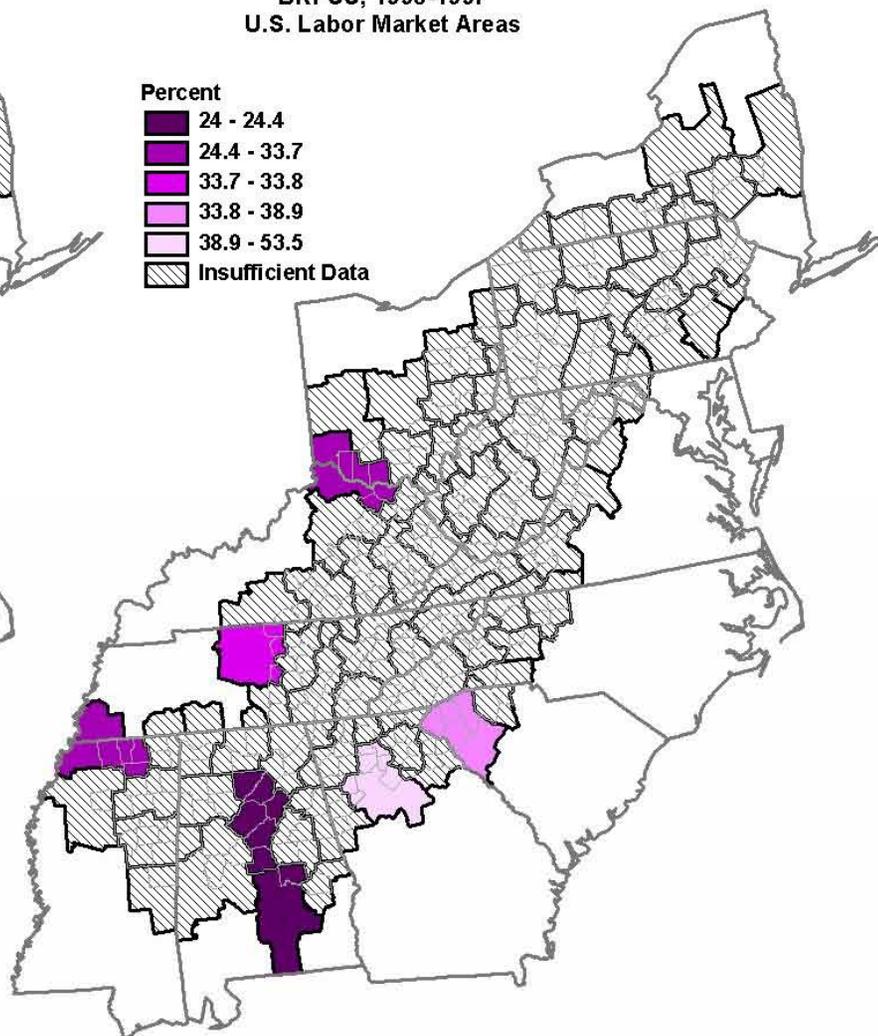
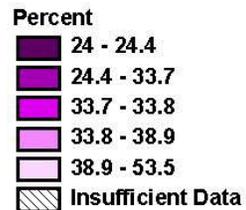


Cancer Screening

**Percent of Black Men Ages 50 and Older
Who Have Ever Had a Digital Rectal Exam or Proctoscopy
BRFSS, 1993-1997
U.S. Labor Market Areas**

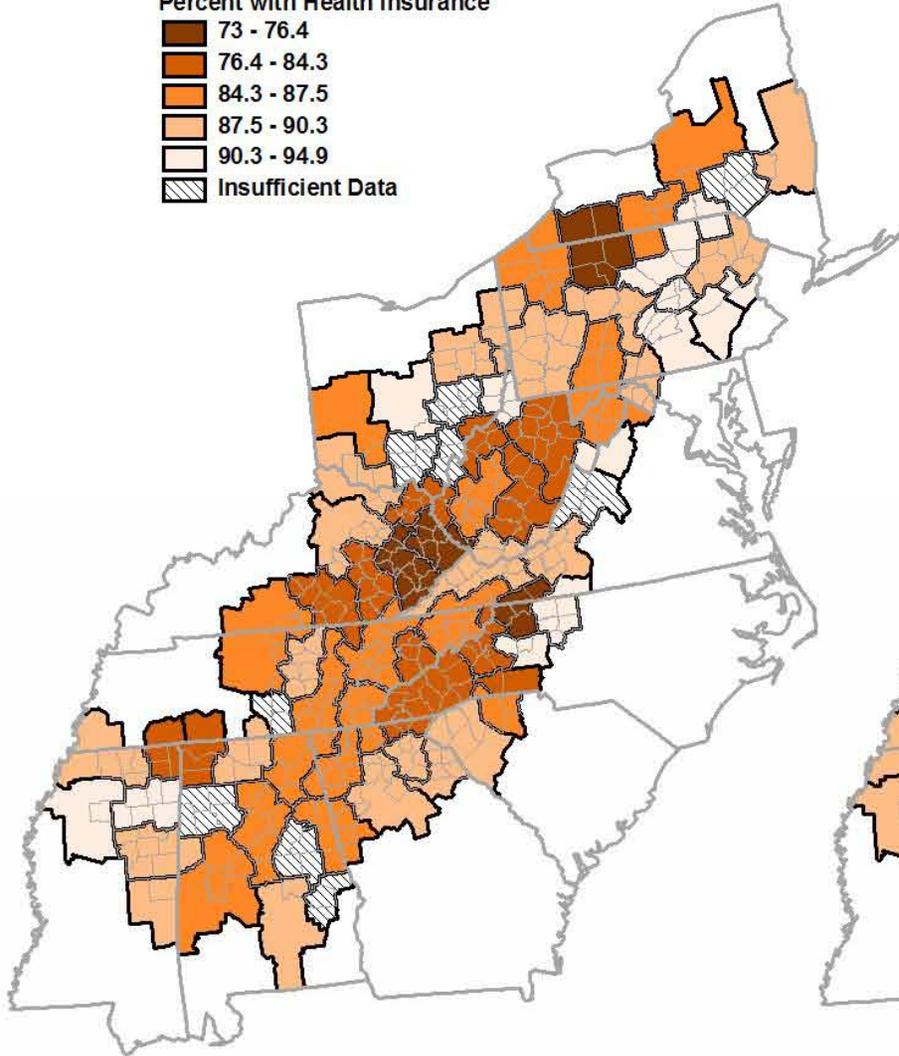
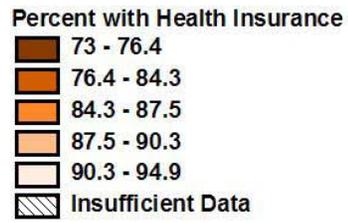


**Percent of Black Women Ages 50 and Older
Who Have Ever Had a Digital Rectal Exam or Proctoscopy
BRFSS, 1993-1997
U.S. Labor Market Areas**

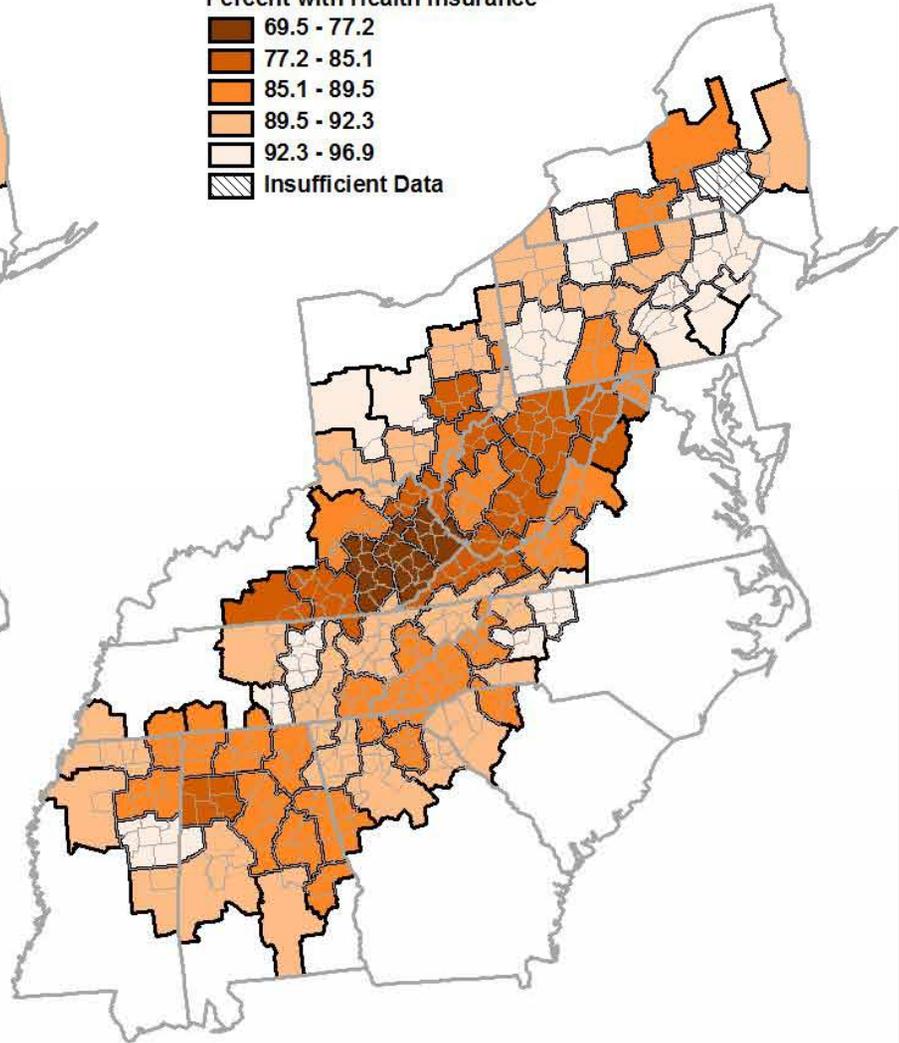
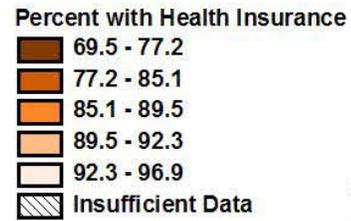


Health Insurance

White Men Ages 18 and Older
BRFSS, 1993-1997
U.S. Labor Market Areas



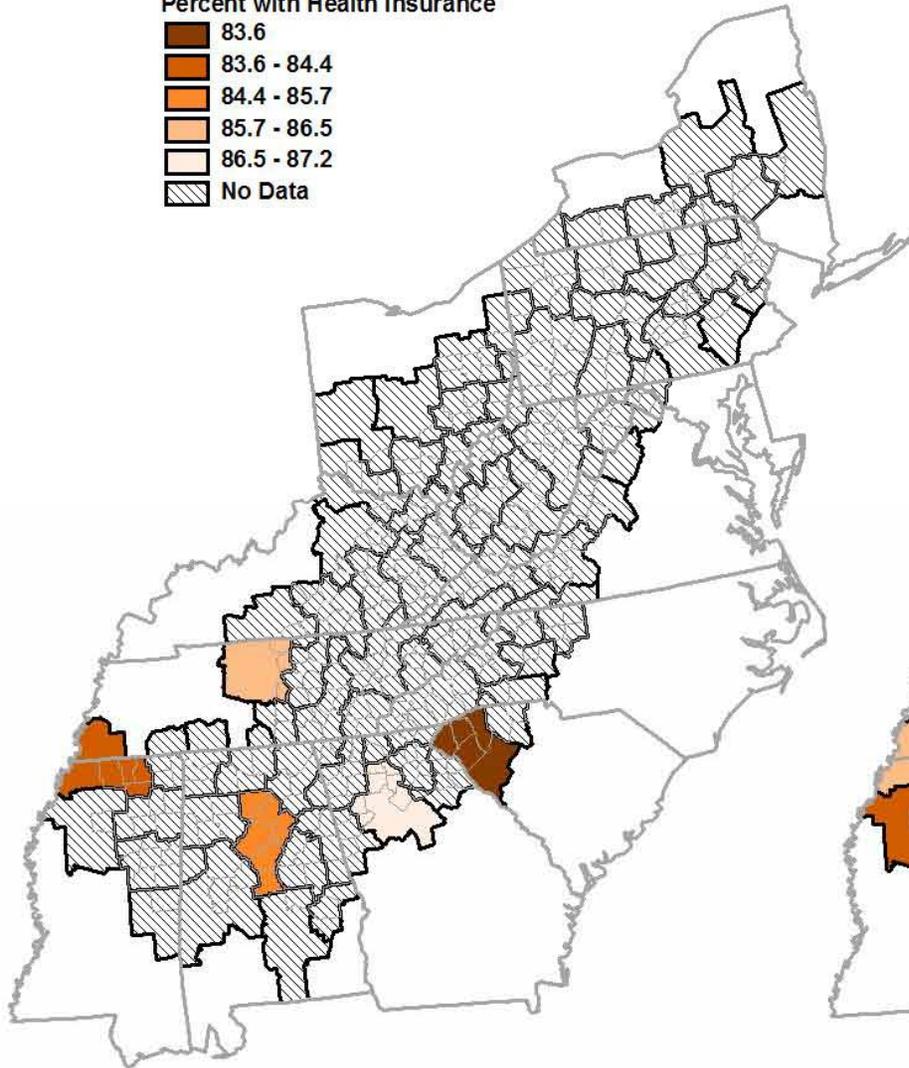
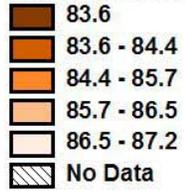
White Women Ages 18 and Older
BRFSS, 1993-1997
U.S. Labor Market Areas



Health Insurance

Black Men Ages 18 and Older
BRFSS, 1993-1997
U.S. Labor Market Areas

Percent with Health Insurance



Black Women Ages 18 and Older
BRFSS, 1993-1997
U.S. Labor Market Areas

Percent with Health Insurance

