

Access to Food Providers and Recreational Facilities in South Delta, Mississippi and its Relationship to Health

TECHNICAL REPORT
Center on Human Needs
Virginia Commonwealth University
Richmond, Virginia

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**VCU Center on
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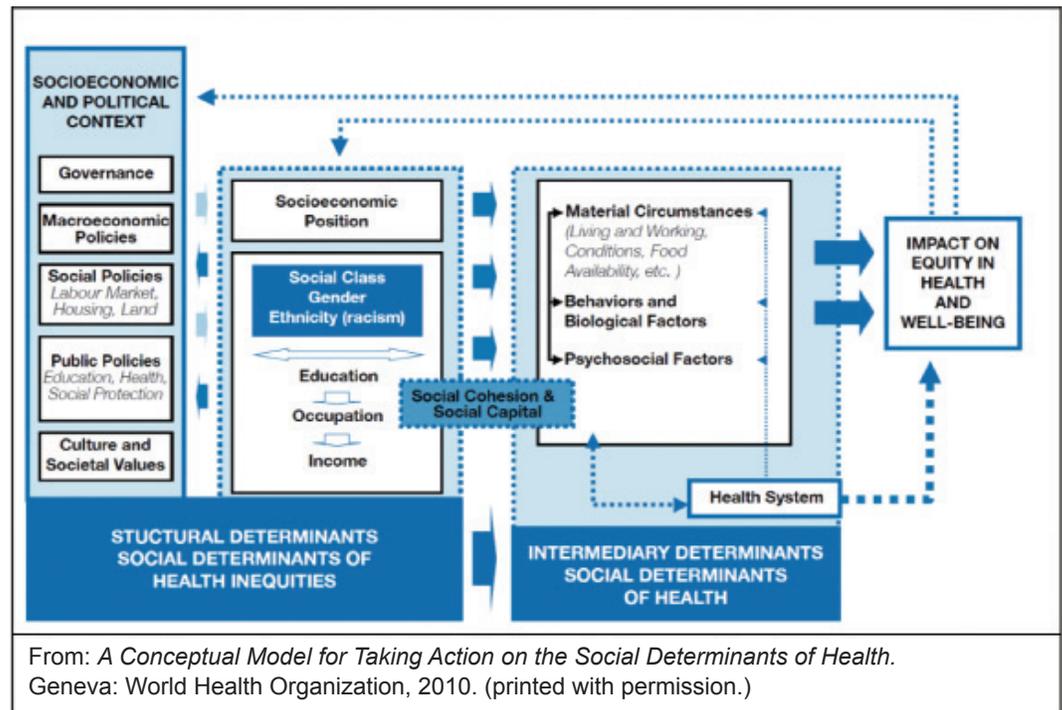
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Preface

Health is influenced by more than health care, and the same is true for health disparities.¹ Inequities in health exist for reasons that transcend access to health care or adequate health insurance coverage. Health is also heavily influenced by health behaviors (e.g., tobacco use), modifiable risk factors (e.g., obesity), and environmental conditions. These conditions are only partly a matter of personal choice. Adopting a healthier diet requires access to supermarkets or farmers’ markets that sell fresh produce. Regular physical activity requires a conducive built environment and access to safe parks, pedestrian routes, and green space for residents to walk, bicycle, or play. Tobacco and alcohol use is influenced by enticing advertising and marketing practices. Exposure to environmental pollutants from unhealthy housing or from nearby factories and smokestacks are not choices made by residents but by society.

Figure 1:
World Health Organization
Conceptual Model for Social
Determinants of Health



In the language of social epidemiology, “downstream” determinants of health—ranging from unhealthy behaviors to living and working conditions—are the byproduct of “upstream” structural determinants (see Figure 1) such as socioeconomic position, race-ethnicity, occupation, and social cohesion. These socioeconomic circumstances are themselves the result of upstream policies that create opportunities for education and employment, income and savings, social equality, and environmental stewardship. Macroeconomic policies create commercial incentives for industries to either promote unhealthy products or more healthful alternatives.²

Health also varies sharply by geography—across communities and neighborhoods—because unhealthful downstream conditions are often concentrated in disadvantaged areas. Areas populated by the poor or communities of color typically experience greater exposure to unhealthy conditions and material deprivation, a vicious cycle that is itself shaped by upstream factors. These upstream influences include historical antecedents, such as racial or ethnic discrimination and recurring cycles of poverty that inhibit economic growth and social mobility over generations, but also modern-day decisions about where to position highways and supermarkets and how much resource to invest in public transportation, housing, local development, crime prevention, public schools, job training, and social services. The recognition that “place matters” to health and the need to understand how unwise social policies foment health inequity comes at the recommendation of prestigious commissions sponsored by the World Health Organization³, the John D. and Catherine T. MacArthur Foundation⁴, and the Robert Wood Johnson Foundation.⁵

About the Place Matters Project

The Place Matters technical reports were produced by the Virginia Commonwealth University (VCU) Center on Human Needs (CHN) in collaboration with the Joint Center for Political and Economic Studies/Health Policy Institute (HPI) and the Virginia Network for Geospatial Health Research (VANGHR). All maps and geospatial analyses were produced by VANGHR.

The production of the Place Matters technical reports was funded by HPI under a subaward from a parent grant from the National Institutes of Health (grant 5RC2MD004795-02). The goal of the project was to prepare and disseminate a series of locally tailored Community Health Equity reports (CHERs) to assess population health inequities and related social and economic conditions for the following eight communities:

- Alameda County, California
- Baltimore, Maryland
- Bernalillo County, New Mexico
- Orleans Parish, Louisiana
- Cook County, Illinois
- San Joaquin Valley, California
- Boston, Massachusetts
- South Delta, Mississippi

The VCU Center on Human Needs and VANGHR were contracted by HPI to develop technical reports on which the eight CHERs were based. What follows is the technical report for South Delta, Mississippi. The focus of the report and the research questions it addresses were guided by extensive input from the Place Matters team in South Delta. See the Methods Appendix on the CHN website for more details on analytic methods.

The project was approved by the VCU Institutional Review Board.

For more information about the Place Matters technical reports or collaborating organizations visit the websites listed below:

Center on Human Needs: www.humanneeds.vcu.edu

Health Policy Institute: www.jointcenter.org/institutes/health-policy

Place Matters Initiative: www.jointcenter.org/hpi/pages/place-matters

Virginia Network for Geospatial Health Research: vnghr.org/

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Introduction

The health of Sharkey and Issaquena County residents is related to many factors.⁶ As is true elsewhere, disease rates vary dramatically by age, gender, and race and ethnicity, as well as with the prevalence of risky health-related behaviors.^{3, 7-11} Place matters in health because characteristics of the areas in which people live affect health choices, behaviors, environmental risks, and access to medical care.¹²⁻¹⁷ Local conditions that may affect health include levels of stress and environmental toxins, the social and economic characteristics of individuals and families (such as education and income), and the characteristics of the communities in which people live.

Area-wide statistics oversimplify important geographic differences that exist between different neighborhoods and communities within the Mississippi Delta and that contribute to large differences in the health of residents. Geographic disparities in health status within Sharkey and Issaquena counties reflect, in part, geographic patterns in the population and living conditions. The health challenges faced by individuals and households are influenced by the neighborhood.^{18, 19} Regardless of one's education, income, or motivation to make healthy choices, risks may be introduced by crime, air pollution, the absence of nutritious food or places to exercise, poor schools, a scarcity of good jobs, and stress related to these community challenges.^{17, 20-28} Furthermore, historical patterns of residential segregation contribute to long-term trends of placing vulnerable populations in stressed areas. This in turn reinforces cycles of hardship that entrench patterns of socioeconomic disadvantage.²⁹⁻³³

This report specifically focuses on access to recreational facilities and food providers in Sharkey County and Issaquena County and how this is associated with health outcomes. According to the U.S. Department of Agriculture (USDA), in 2008 Issaquena County had no grocery stores^a and Sharkey County had only two.³⁴ Furthermore, in 2006 10.7%—more than 1 of every 10—of Sharkey County households had no car and lived more than one mile from the nearest grocery store. More than one in six Issaquena County residents was in the same situation.³⁴ In addition, recreation or fitness facilities^b in the South Delta were also limited to only a few options, according to the Mississippi Department of Health. Lack of access to recreational facilities and food providers has been shown to be associated with higher obesity rates and other adverse health outcomes.³⁵⁻³⁹

Part I of this report provides background information about the two counties of Sharkey and Issaquena and their three respective census tracts (also referred to as South Delta in this document), including population data, health outcomes, socioeconomic conditions, and community characteristics. Part II examines the relationship between access to food providers, recreational facilities, and health. Part III presents some conclusions about community-level factors related to food access and health outcomes in South Delta. Appendices A and B, available on the CHN website, present detail about the data and methods that were used in preparing this report.

^a Grocery stores are defined as establishments engaged in retailing a general line of food such as canned and frozen goods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry. Convenience stores and supercenters or warehouse club stores are excluded from this category.³⁴

^b Recreation or fitness facilities are defined as establishments primarily engaged in operating fitness and recreational sports facilities featuring exercise and other active physical fitness conditioning or recreational sports activities, such as swimming, skating, or racquet sports (North American Industry Classification Code of 713940).

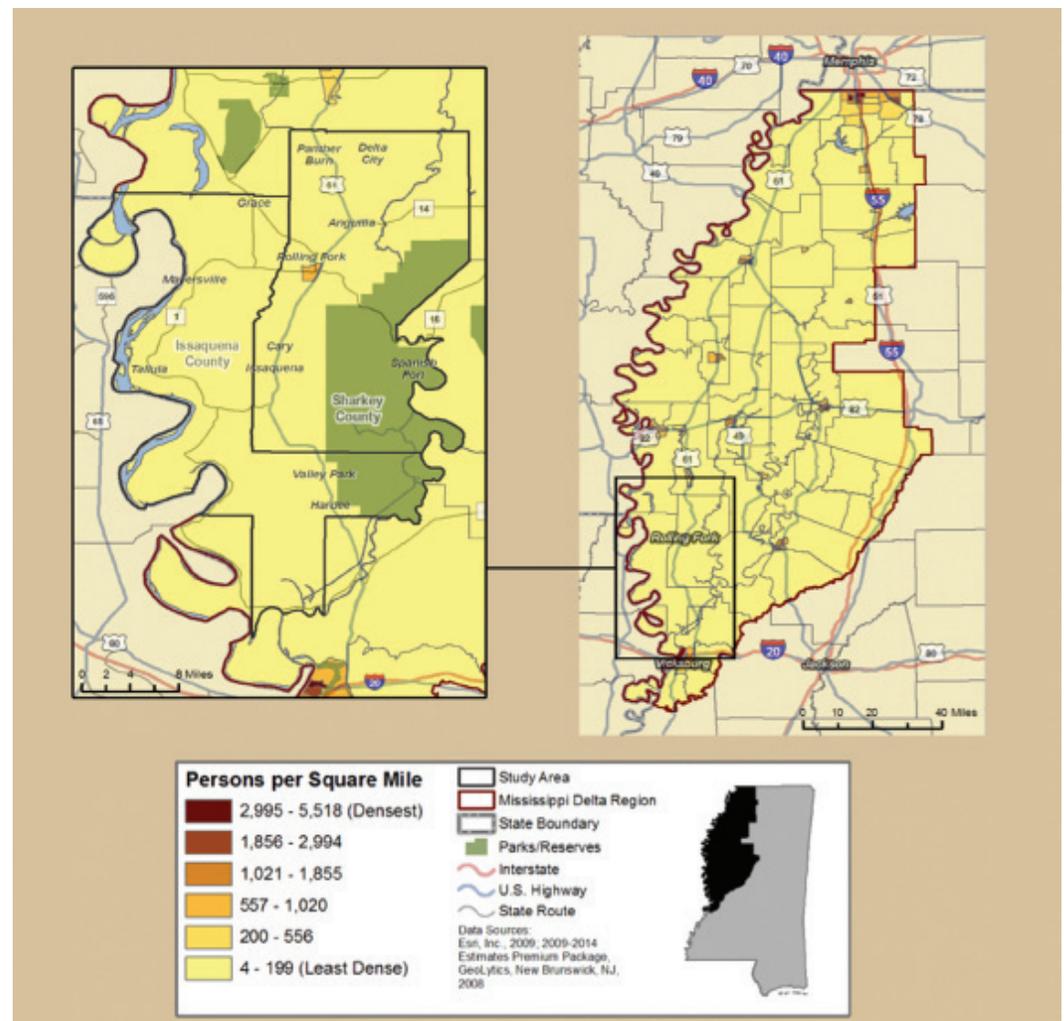


Part I. Background: Population, Community Characteristics, and Health in the South Delta

Population

The South Delta is located on the eastern border of Mississippi on the shore of the Mississippi River and includes Sharkey and Issaquena counties. Sharkey County had a population of 5,184 people in 2009 and contains the city of Rolling Fork.⁴⁰ Rolling Fork, with a population density of 935 persons per square mile, was home to more than a quarter (26.8%) of the population of Sharkey County; the rest of Sharkey County had a population density of 8.3 persons per square mile (Map 1).⁴¹ Issaquena County had 2,130

Map 1:
Population density by Census
Tract, South Delta and
Mississippi Delta (2009)



residents in 2009 and a population density of 3.9 persons per square mile.⁴¹ Although South Delta is the most rural part of the Mississippi Delta, the rest of the Mississippi Delta is also largely rural. The Mississippi Delta includes the counties of Bolivar, Carroll, Coahoma, DeSoto, Holmes, Humphreys, Issaquena, Leflore, Panola, Quitman, Sharkey, Sunflower, Tallahatchie, Tate, Tunica, Warren, Washington, and Yazoo.

South Delta’s population is composed almost entirely (99.9%) of either non-Hispanic Whites or Blacks.⁴⁰ In both South Delta and the Mississippi Delta, the majority population is Black (Figure 2). The Mississippi Delta has a higher percentage of Hispanics and Asians than in South Delta, but these percentages are still less than in Mississippi and far less than national averages (Table 1). The vast majority of the population in the Delta is native born.⁴⁰

Figure 2:
Race/Ethnicity in
South Delta, MS

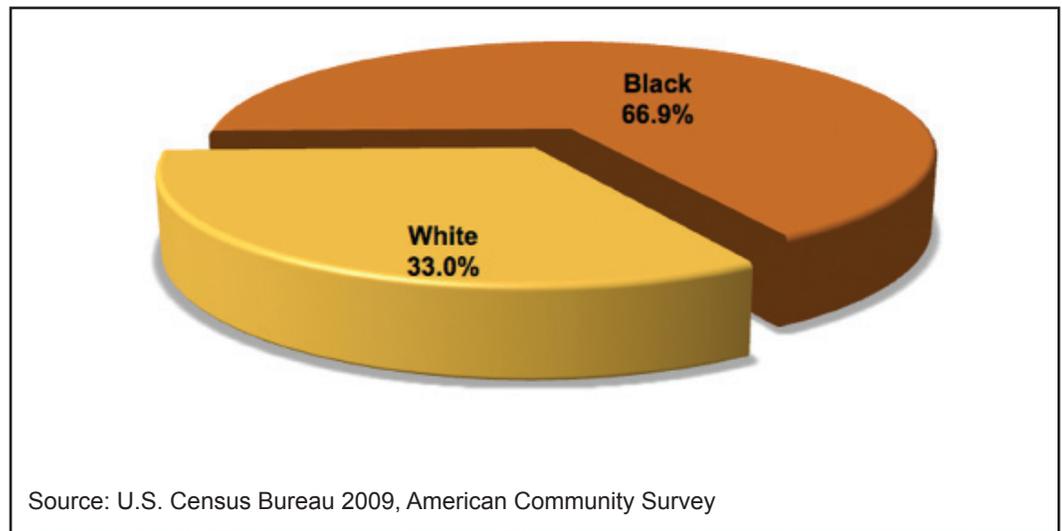


Table 1:
Demographic Characteristics
of South Delta, Mississippi
Delta, Mississippi, and the
United States (2009)

	South Delta	Mississippi Delta	Mississippi	United States
Population _(a)	7,314	341,582	2,922,240	307,006,556
Population Density _(b)	8.3	52.6	62.5	86.7
Race/Ethnicity _(a)				
White	33.0%	37.3%	58.8%	64.9%
Black	66.9%	59.8%	36.9%	12.1%
Hispanic	0.1%	1.6%	2.1%	15.8%
Asian	0.0%	0.5%	0.8%	4.4%
Other	0.0%	0.9%	1.3%	2.8%
Foreign Born _(a)	0.0%	1.7%	1.9%	12.5%

(a) Source: U.S. Census Bureau 2005–2009, American Community Survey.

(b) Source: Persons per square mile. 2009 Geolytics Projection.

Note: “Other” includes American Indian and Alaska Native, Native Hawaiian and Other Pacific Islander, and those who identified themselves as some other race or two or more races. Racial groups include the non-Latino population only; Latino can include any racial group.

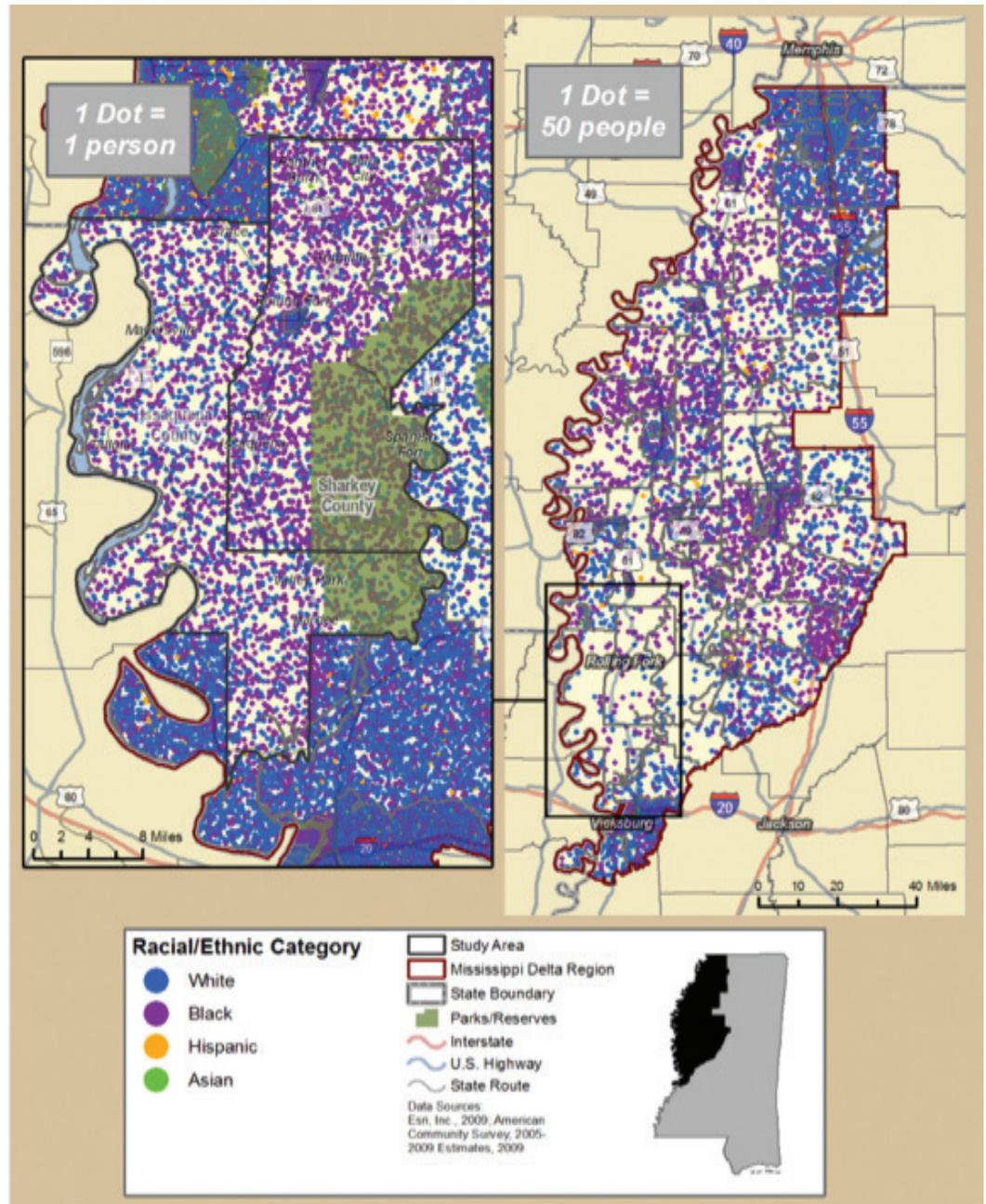
In many cities and towns, people of color and disadvantaged populations have historically been relegated to isolated and segregated communities that perpetuate cycles of hardship by means of limited housing and employment opportunities and lack of access to financial capital. The diversity index is a useful tool for measuring racial segregation. It is a measure of the likelihood that two people randomly chosen from an area will be of a different race or ethnicity. The higher the value, the less segregated the area. The diversity index for South Delta is 85.7%, whereas the index for the Mississippi Delta is 88.7%. The value ranges by census tract in the Mississippi Delta from a low of 75.7% in Greenville to a high of 91.5% in Vicksburg.

Although the residential area of South Delta is diverse, enrollment in public and private schools in the region does exhibit notable differences in racial composition of students. The South Delta School District contains one private school, Sharkey-Issaquena Academy, located in Rolling Fork. A full year of tuition at the school is \$3,950,⁴² potentially pricing out residents with less wealth. This disproportionately affects Black residents more than White. Of the 201 students in the academy, 188 were White (93.5%). The racial composition of students enrolled in the South Delta School District (the public school system) was 96.9% Black, 2.3% White, and 0.8% other racial or ethnic group. This racial separation is similar in surrounding counties as well. Washington and Yazoo counties are home to four private schools: Deer Creek, Benton Academy, Covenant Christian, and Manchester Academy. The proportion of Black students in the private schools of the region ranged from 0% in Benton to 4.8% in Covenant Christian as of the 2007–2008 school year.^{43, 44}

A difference in racial concentrations at public and private schools in areas of residential diversity is not unique to the South Delta.⁴⁵ One national, longitudinal study suggests that as the percentage of minority students increases in an area, the likelihood that White students will enroll in private schools also increases.^{45,46} The literature suggests that there tend to be disparities in academic opportunities and outcomes between private and public schools.⁴⁷⁻⁴⁹ Opportunity and excellence in a student's academic career have been associated with better social and economic outcomes later in life. For example, higher educational attainment is linked to higher earnings.⁴⁰ In comparison, poor student performance is linked to a higher risk of dropping out of high school, risky health behaviors, delinquent or criminal behavior, and limited economic success.⁵⁰ Separated racial concentrations, through selection of public or private sector education, may influence the distribution of favorable or problematic environments available to students.

The racial and ethnic distribution throughout both South Delta and the Mississippi Delta as a whole is illustrated in Map 2. The census tracts with the highest White population were predominantly in DeSoto County, whereas the areas with the highest Black population were predominantly in Washington County.

Map 2:
 Distribution of Racial and
 Ethnic Groups, South Delta
 and Mississippi Delta (2005-
 2009)

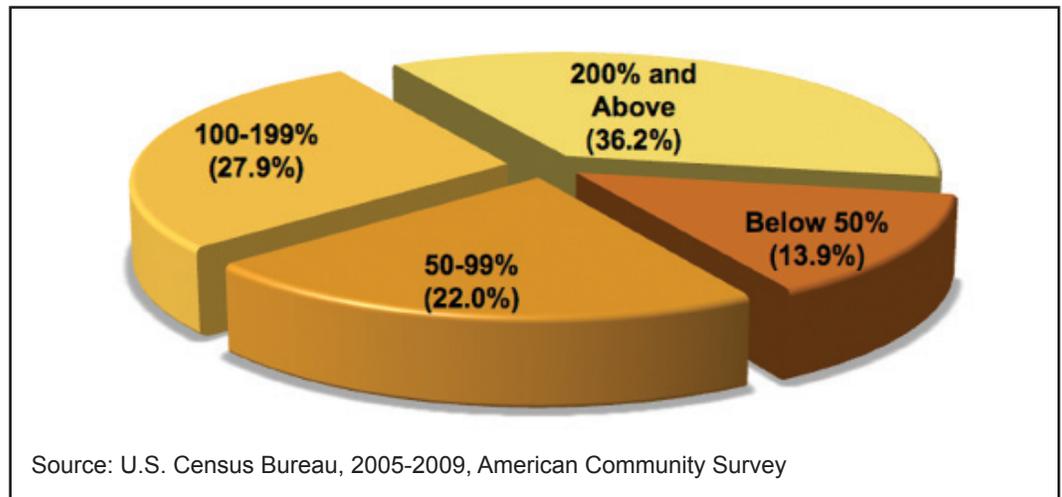


Socioeconomic Characteristics

As is true of other communities, socioeconomic conditions in South Delta and the Mississippi Delta exert an important, and often unrecognized, influence on health status. Nationally, families with incomes below the federal poverty level (FPL) are 3.6 times more likely to report fair or poor health than are those with incomes of at least twice the poverty level.⁵¹

Poverty rates are high in South Delta. Household income in relation to the FPL is known as the income-to-poverty ratio. A ratio of 200% or more means that the income is at least twice the FPL, or approximately \$44,100 for a family of four in 2009. Figure 3 shows that between 2005 and 2009, approximately two of every three South Delta households had incomes below 200% of the FPL. More than one out of three South Delta households had incomes below the FPL (less than 100% FPL)—meeting federal criteria for poverty—and one in seven households lived in severe poverty (less than 50% FPL) (Figure 3). The poverty rate in South Delta (35.9%) was greater than the average for the state of Mississippi (21.4%) and much higher than the national average (14.4%) (Table 2).⁵²

Figure 3:
Ratio of Income to Poverty,
South Delta (2005-2009)



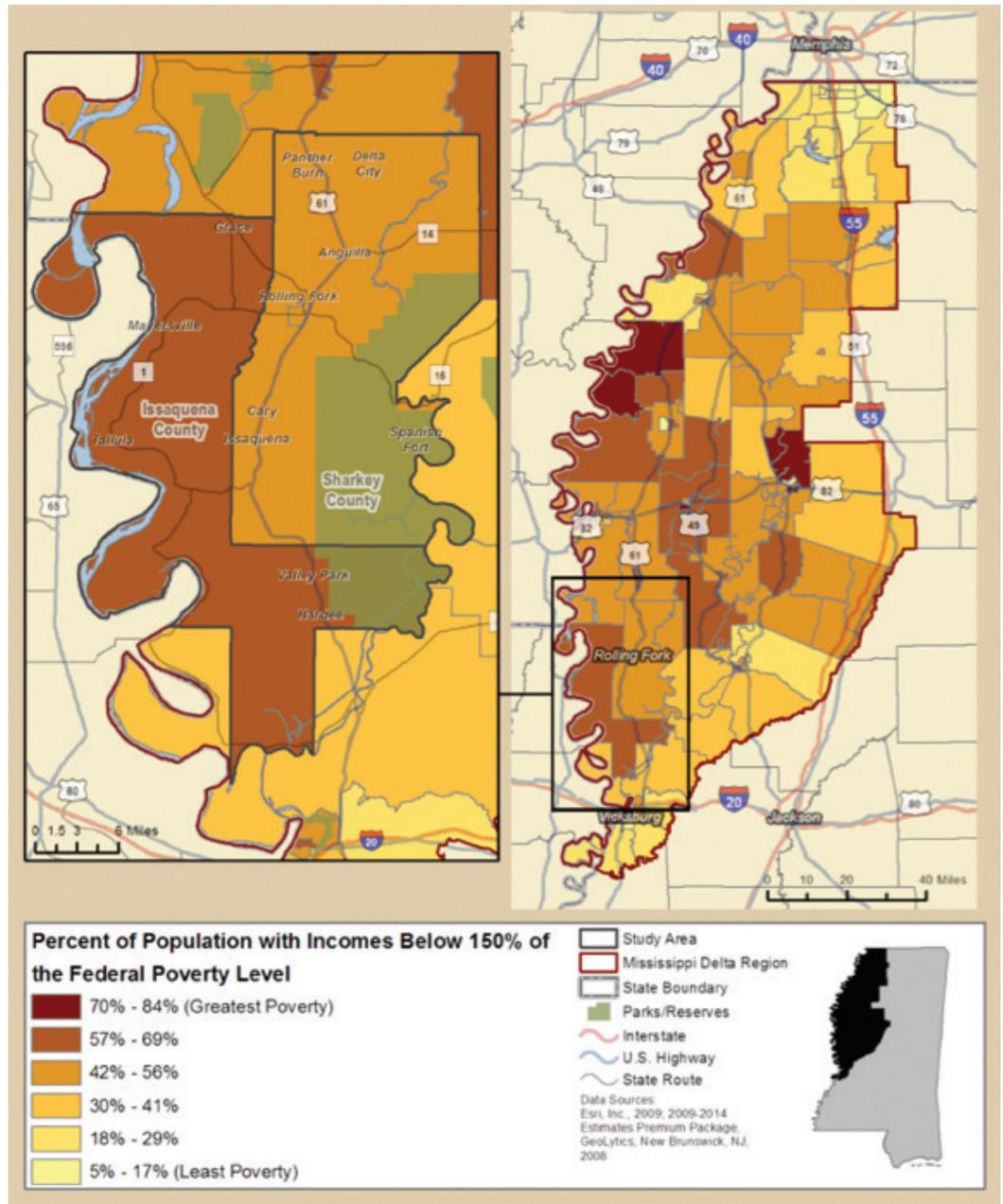
In 2009, the U.S. Census Bureau estimated that nationally, 23.6% of households were below 150% of the FPL.⁴⁰ In South Delta, the percentage was 55.7%,⁴¹ more than twice the rate of the United States. Fully 38.8% of Mississippi Delta households had incomes below 150% of the FPL. The highest percentage was in Greenwood County, where in one census tract, 83.8% of households reported incomes below 150% of the FPL (Map 3).

Table 2:
Socioeconomic Characteristics
of South Delta, Mississippi
Delta, Mississippi, and the
United States

	South Delta (%)	Mississippi Delta (%)	Mississippi (%)	United States (%)
Educational attainment				
Less than high school	32.7	23.8	21.1	14.7
High school only	34.3	31.1	31.2	28.5
Some college	19.6	28.0	28.6	28.9
Bachelor's degree or higher	13.4	17.1	19.1	27.9
Poverty rate				
Below 50%	13.9	10.6	9.1	6.3
50-99%	22.0	15.1	12.3	8.1
100-199%	27.9	23.5	22.9	18.4
200% and above	36.2	50.9	55.7	67.3

(a) Source: U.S. Census Bureau 2005-2009, American Community Survey.

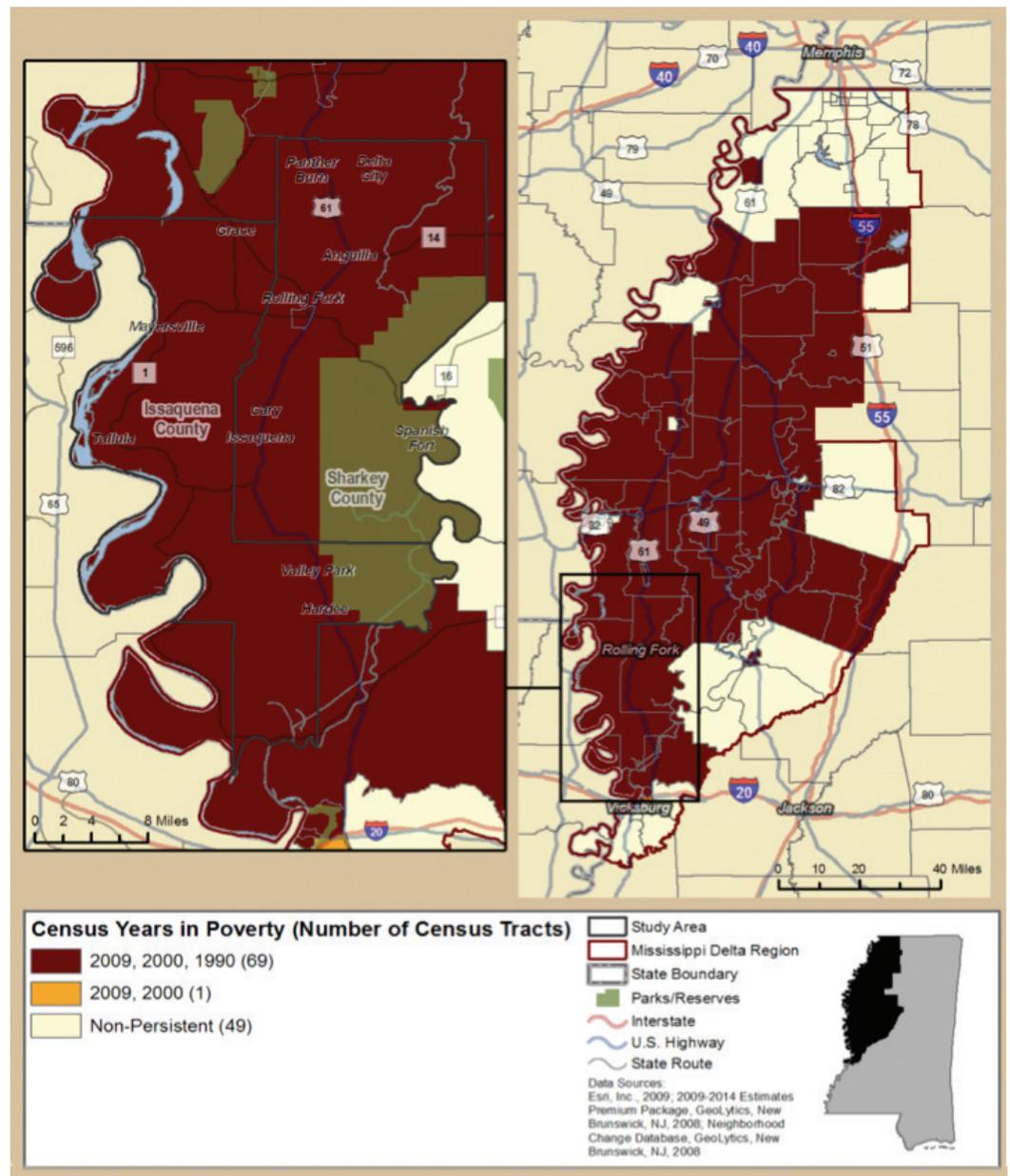
Map 3:
Poverty by Census Tract,
South Delta and Mississippi
Delta, (2009)



Race is strongly associated with poverty and wealth—both nationally and in the Mississippi Delta region. In 2009, the median income for households in Sharkey County and Issaquena County was \$29,495 and \$20,250, respectively.⁵² In both Sharkey County and Issaquena County, median income was more than twice as high in White households (\$45,833 and \$33,622, respectively) than in Black households (\$18,778 and \$15,927, respectively).⁵² The county with the highest median income in the Mississippi Delta was DeSoto County (\$57,995).⁵² Even in the county with the smallest racial disparity—DeSoto County—White households reported an income of \$61,801, and Black households reported \$45,354.⁵²

Persistence of concentrated poverty across several decades may have additional health and social consequences, particularly for the children living in those areas. A persistent lack of economic resources during childhood has consequences on cognitive, emotional, behavioral, and physical development.^{53,54} It may also diminish the likelihood of high school completion, thus perpetuating disadvantage and the multigenerational cycle of living in conditions that adversely affect health.⁵³ *Persistent poverty* is defined as occurring in areas in which at least 20% of the population was poor (incomes below 100% of the FPL) for at least two census periods. Persistent poverty has been a pervasive influence throughout the Mississippi Delta region. According to the Census definition, of the 119 census tracts in the Mississippi Delta region, 69 (58.0%) experienced persistent poverty since at least 1990. All three census tracts in South Delta meet this definition (Map 4).

Map 4:
 Persistent Poverty by Census
 Tract, South Delta and
 Mississippi Delta (1990-2009)



Insufficient income to meet basic needs intensifies material hardship. People of limited means often spend a large portion of their income on housing. Nationally, in 2009 the risk of housing cost burden (paying more than 30% of income towards housing cost) was almost seven times larger for those earning less than \$20,000 per year as compared with those earning \$75,000 or more.⁴⁰ In 2009, housing cost burden was high in both the South Delta and the Mississippi Delta. In South Delta, 21.8% of households had moderate to severe (between 30 and 49.9% of income) housing cost burden, and another 10.4% experienced severe housing cost burden (more than 50% of income).⁵² In the Mississippi Delta, 16.8% of households experienced moderate housing cost burden, and another 12.2% experienced severe housing cost burden. In the State of Mississippi, a smaller percentage of households reported housing cost burden: 14.7 and 6.3%, respectively.⁵²

Low income also increases the likelihood of living in undesirable housing conditions.⁵⁵ In 2009, the percentage of South Delta households lacking plumbing was 1.13%, a higher rate than in the Mississippi Delta (0.48%), the state of Mississippi (0.42%), or the United States (0.36%).⁴¹ Even basic needs such as food become more tenuous in the presence of poverty. Nationally, in 2009 those living below 100% of the FPL were 5.7 times more likely to report food insecurity than were households making at least 185% of the FPL.⁵⁶ The USDA reports that households in Mississippi experienced the third highest prevalence of food insecurity of all states and the District of Columbia between 2007 and 2009 (17.4%).⁵⁶

Because of a lack of access to financial capital, impoverished families are more likely to rent than own property and are more likely to live in less desirable areas. In 2009, 12.1% of housing units in South Delta were vacant, compared with 8.1% in the Mississippi Delta, 9.8% in Mississippi, and 9.1% in the United States.⁴¹ That same year, 58.1% of South Delta housing units were occupied by owners rather than renters, compared with 63.9% in the Mississippi Delta, 65.6% in Mississippi, and 60.7% in the United States.⁴¹

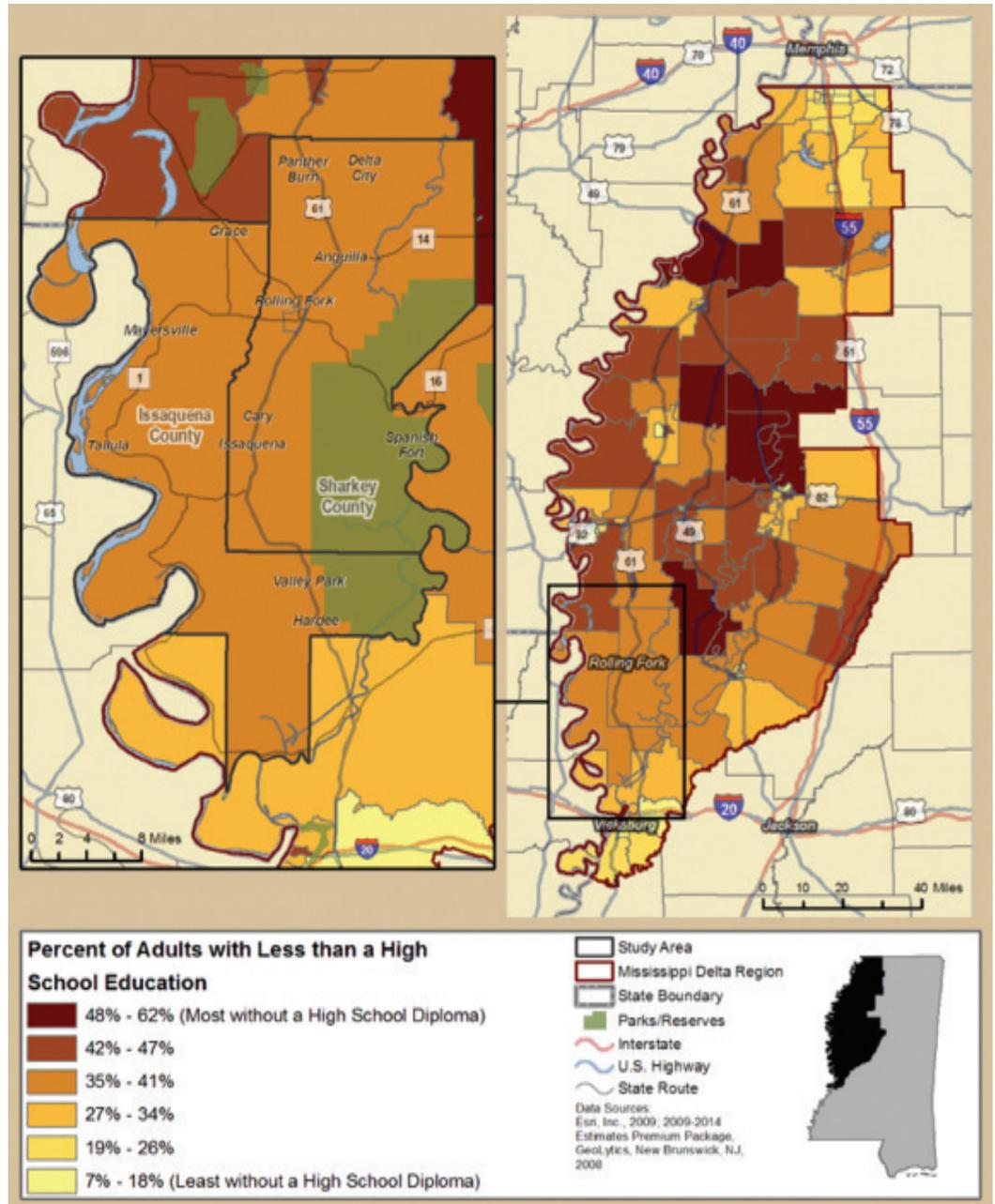
Education

Education is a pathway to higher income and net worth, which also have strong influences on health status and access to health care. In 2009, American adults with less than a high school diploma as their highest educational attainment had less than half the earnings (\$18,432 versus \$47,510)⁴⁰ and were three times more likely to die before age 65 as were those with a college education.⁵⁷ They are also more likely to engage in unhealthy behaviors such as cigarette smoking.⁵⁸

In 2009, nearly one third (32.7%) of adults (age 25 and older) in South Delta had not completed high school, a percentage greater than that of the Mississippi Delta area as a whole,

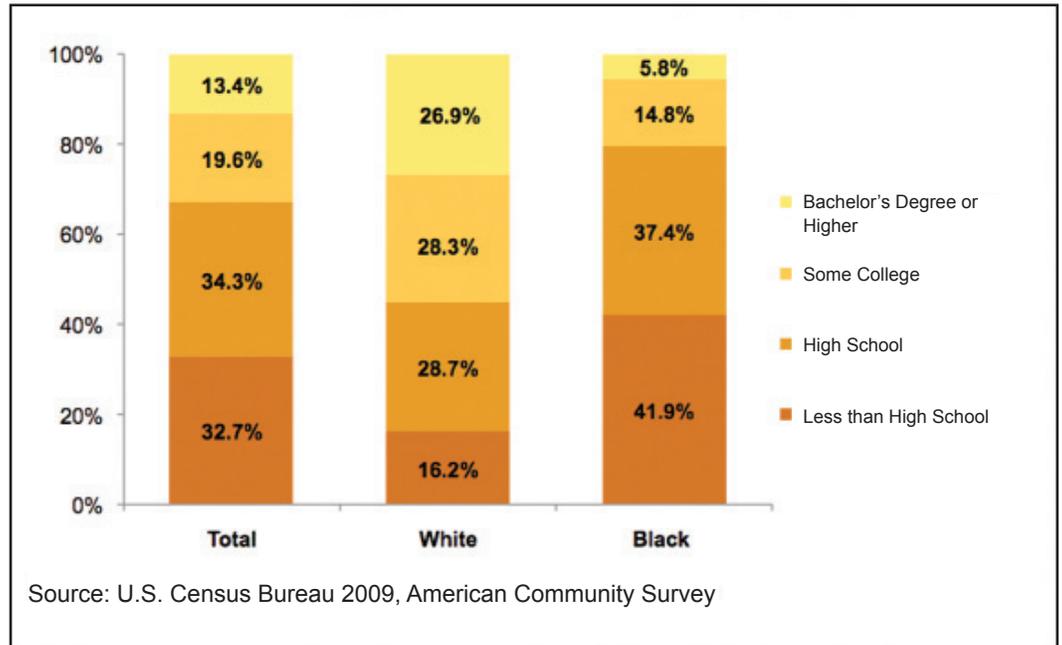
Mississippi, or the United States (Table 2). In fact, South Delta adults were more than twice as likely to lack a high school diploma than were U.S. adults generally. The geographic distribution of educational attainment across South Delta was largely uniform: The percentage of adults without a high school education was 39.9% in Rolling Fork, 40.5% in Issaquena County, and 39.4% in Sharkey County.⁴¹ The Mississippi Delta population had a higher rate of high school completion than that of the South Delta, with wide geographic disparities, from a low of 20.9% in a tract in the city of Southaven in DeSoto County to a high of 62.0% in a tract in the city of Clarksdale in Coahoma (Map 5).⁴¹

Map 5:
Adults without a High School
Education by Census Tract,
South Delta and Mississippi
Delta (2009)



Race and ethnicity are also strongly associated with educational attainment. Nationally, in 2009 Black adults age 25 and over were almost twice as likely to lack a high school diploma as were White adults.⁴⁰ In South Delta, Black adults were more than twice as likely to lack a high school diploma as compared with White adults.⁵² In addition, in South Delta White adults were four times more likely to have a Bachelor's degree or higher as compared with Black adults.⁵²

Figure 4:
Educational Attainment by
Race in South Delta,
2005-2009



Health Outcomes

Disparities in health outcomes based on demographic factors are well established. In 2007, life expectancy at birth for the United States was 77.9 years; it was 73.6 years for Blacks, compared with 78.4 years for Whites.⁵⁹ Life expectancy in South Delta was 72.6 years.

Between 1999 and 2007, the premature death rate (death before the age of 65) disparity between White and Black populations was higher in the Mississippi Delta region than in Mississippi but less than that of the United States (Table 3). Although the racial disparity was lower in South Delta in comparison with the United States, it was not due to a lower mortality rate in the Black population but rather a mortality rate in the White population of South Delta that is higher than the U.S. average. The overall premature mortality rate in South Delta (regardless of race) was 133.6 deaths per 100,000 more than that of the United States.

Table 3:
Life Expectancy and
Premature Mortality Rate
in South Delta, Mississippi
Delta, Mississippi, and the
United States

	South Delta	Mississippi Delta	Mississippi	United States
Life expectancy at birth	72.6 ^(a)	72.8 ^(a)	74.8 ^(b)	77.9 ^(c)
Premature mortality rate per 100,000 persons under age 65^(d)				
White	294.2	302.3	299.5	225.9
Black	432.7	516.5	472.6	414.4

Note: All racial categories are non-Hispanic only

(a) Calculated by VCU Center on Human Needs from 1990–2008 data provided by the Mississippi Department of Health, Vital Records/Public Health Statistics and population estimates from 2001–2008 Geolytics Premium Estimates and 2009 Geolytics Premium Estimates.

(b) Calculated by VCU Center on Human needs from 2007 data provided by Centers for Disease Control and Prevention National Center on Health Statistics and population estimates from 2001–2008 Geolytics Premium Estimates.

(c) Health, United States 2010: With Special Features on Death and Dying; the Centers for Disease Control and Prevention: 2007.

(d) 1999–2007 Centers for Disease Control and Prevention, CDC WONDER Online Tool.

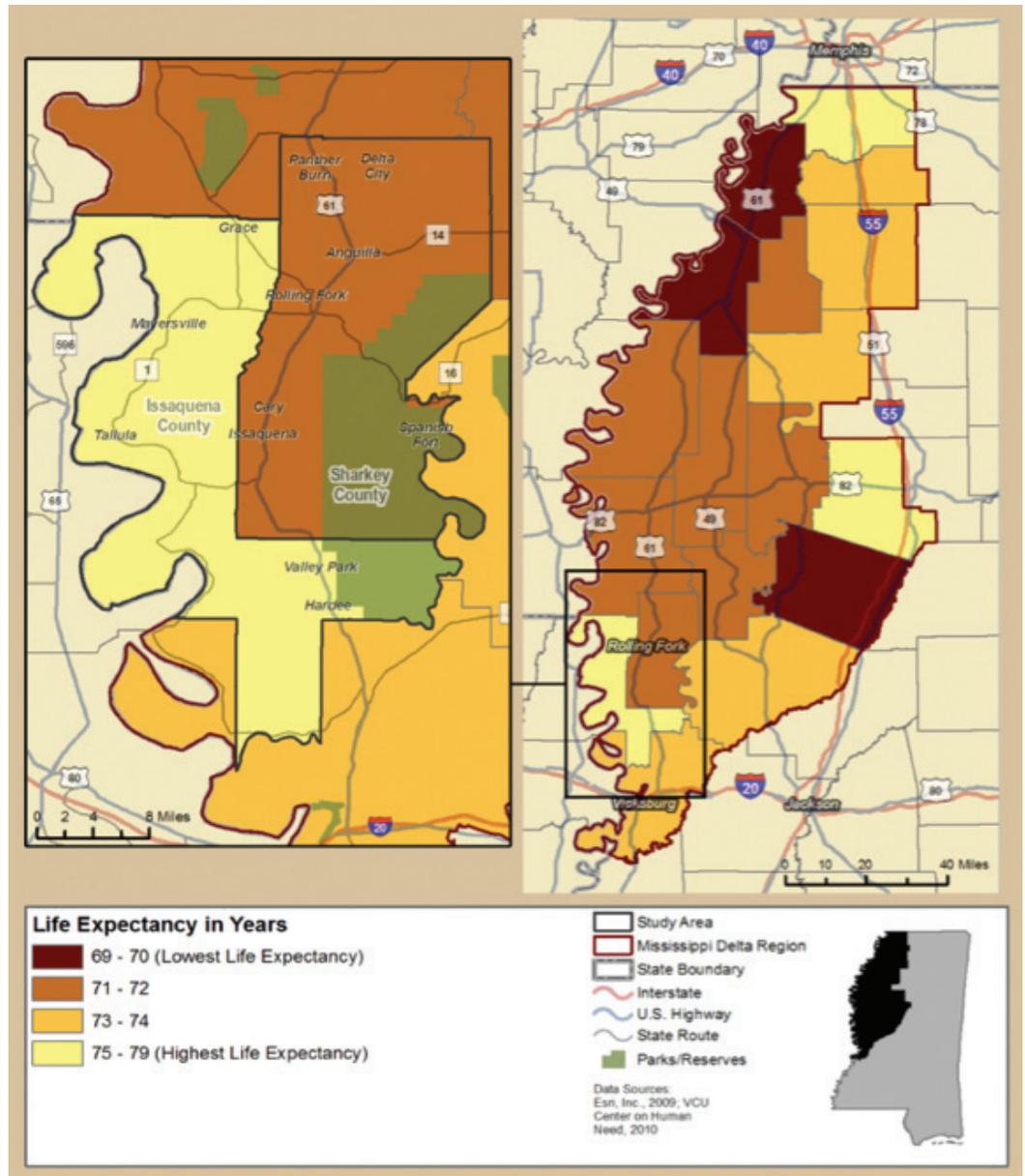
Nationally, non-Hispanic Blacks had the highest age-adjusted mortality rate between 1999 and 2007 among racial or ethnic groups. In South Delta, during the same time period there was a ratio of 1.3 Black deaths per 100,000 residents for every one White death per 100,000 residents.⁶⁰ Non-Hispanic Blacks also had the highest age-adjusted mortality rate from cardiovascular diseases.⁶⁰ Between 1999 and 2007, the all-cause mortality rate in the Mississippi Delta region was 1.3 times higher than that of the United States, and circulatory disease mortality was 1.4 times higher. In South Delta, both all-cause and circulatory disease mortality was lower than in the Mississippi Delta during the same time period but higher than the rate for the United States. The racial disparity between the White and Black populations for all-cause and circulatory disease mortality was higher in the Mississippi Delta than in Mississippi. In the South Delta between 1999 and 2007, per 100,000 residents there were 1.3 Black deaths for every White death, and 1.4 Black deaths from cardiovascular disease for every one White death from cardiovascular disease.

Table 4:
Mortality Rates per 100,000
Persons in South Delta,
Mississippi Delta, Mississippi
and the United States in
1999–2007

	South Delta	Mississippi Delta	Mississippi	United States
All-cause mortality rate^(a)	956.8	1060.8	1003.9	821.7
White	828.4	957.5	942.5	815.9
Black	1,082.8	1,232.2	1,170.7	1,068.5
Circulatory disease mortality rate^(a)	332.3	424.9	393.6	301.2
White	273.3	373.7	364.8	298.0
Black	387.9	512.2	477.6	402.6
Note: All racial categories are non-Hispanic only				
Source: 1997–2007 Centers for Disease Control and Prevention, CDC Wonder Tool.				

Given the geographic variation in socioeconomic and environmental factors that affect health in the Mississippi Delta region, it follows that health outcomes—including life expectancy—vary sharply by county as well (Map 6). Between 1990 and 2008, life expectancy at birth varied by 10 years between counties within the Mississippi Delta. Issaquena County had the highest life expectancy at 79.5 years. At 69.0 years, Tunica County had the lowest life expectancy of all the Mississippi Delta counties. This life expectancy is lower than that of the Dominican Republic, Estonia, or Sri Lanka.⁶¹

Map 6:
Life Expectancy by Census
Tract, South Delta and
Mississippi Delta (1990–2008)

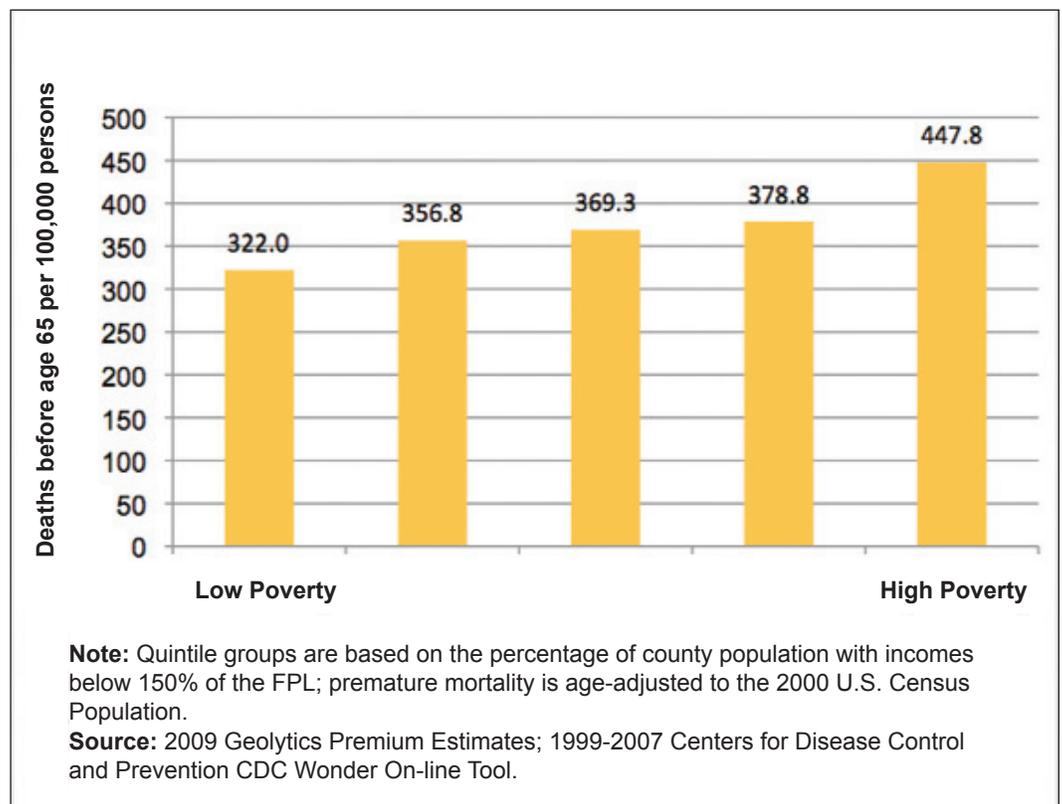


Other health measures—including premature mortality and obesity—vary sharply by county as well. In 2007, DeSoto County had the lowest age-adjusted premature mortality rate of the 18 Mississippi Delta counties (264.6 deaths per 100,000 persons under the age of 65).⁶⁰ That same year, the rate in Quitman County (654.4) was close to two and a half times higher than in DeSoto County.⁶⁰ In 2007, adult obesity prevalence was highest in Holmes County, where 42.3% of those over age 18 had a body mass index greater than 30 kg/m².⁶² The lowest prevalence was in Panola County (34.0%).⁶²

Socioeconomic Characteristics and Health

Socioeconomic factors affect the way people live and may affect the risk of illness and premature death.^{3, 12} In 2007, members of families living in poverty nationwide were nearly twice as likely to have diabetes, 5.3 times more likely to report serious psychological distress, and 1.6 times as likely to have been hospitalized during the previous year as compared with families with incomes of at least 200% of the FPL.⁶³ In Figure 5, Mississippi counties are grouped into quintiles (five equal groups) based on the percentage of the population with incomes below 150% of the FPL. The premature mortality rate in counties in the highest poverty quintile (which includes Sharkey County and Issaquena County) was 39% higher than in counties in the lowest quintile (including counties such as DeSoto, Madison, and Rankin).

Figure 5:
Average Premature Death
Rate of Mississippi Counties
by Poverty Levels



In addition to suffering worse health outcomes, those with low income have diminished access to health care services. In 2009, in the United States impoverished families were more than three times more likely to lack health insurance, more than twice as likely to lack a usual source of care, more than twice as likely to defer or delay care because of cost, and almost three times more likely to defer prescription medication because of cost as compared with families that had incomes of at least 200% of the federal poverty level.⁶⁴

Disparities in access to care measures are compounded in rural areas. In addition to higher average poverty rates in comparison with urban areas, a dispersed population and lack of a community health care source make attaining timely, quality, and sustained health care more difficult.⁶⁵ In 2009, nearly one in five residents outside of a metropolitan statistical area (MSA) deferred or delayed medical care because of cost, compared with 14.8% of residents within MSAs.⁶⁶ The length of time between visits with a physician or other health professional can greatly affect prevention efforts and potentially exacerbate conditions left unattended. One in 10 residents living outside of MSAs had not seen a health care professional in at least two years as of 2009. This is compared with 8.2% of residents in large MSAs.⁶⁴ One in five rural residents had not seen a dentist in more than five years.⁶⁴

Rurality and Health

The U.S. Census Bureau designates a census tract as rural if it has a population density of less than 1,000 people per square mile.⁶⁷ Of the 119 census tracts within the Mississippi Delta, more than half (68 tracts) met the density requirement for rural status.⁵² These areas tend to have community assets dispersed over a wide geographic area. The South Delta region is the most rural portion of Mississippi (as determined by population density), and its counties are among the most rural in the country.⁴¹

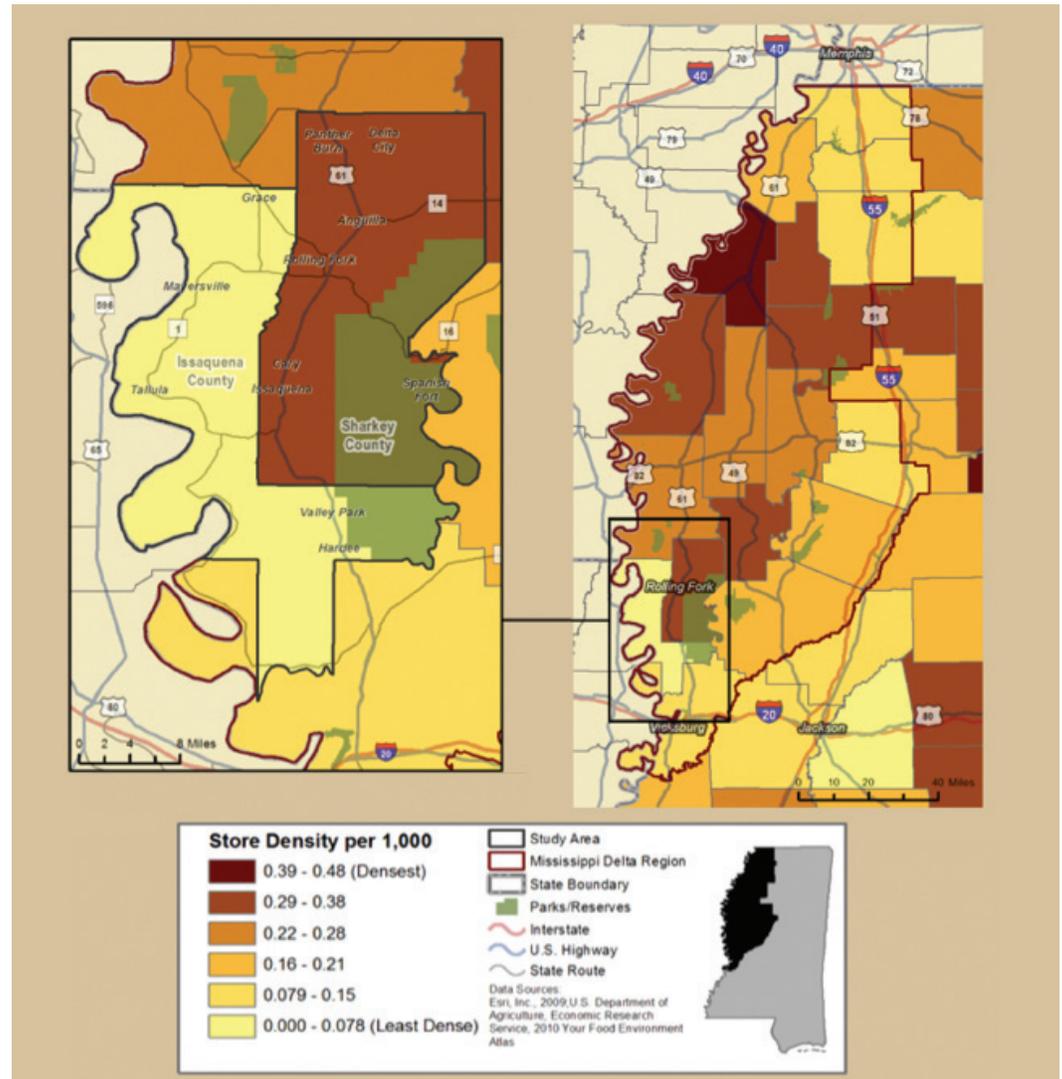
Rural areas have unique community features that present obstacles to good health. Both in the United States and in the South, rural areas had a higher age-adjusted death rate between 2005 and 2007 than did more urban areas.⁵⁹ This is true even when mortality data are stratified by race.⁵⁹ Other reports also indicate that rural areas have higher deaths rates among children and young adults (less than 24 years of age) and seniors (65 years and older) and higher heart disease mortality.⁶⁸ Avoidable hospitalization rates are higher among rural residents than their urban counterparts, as is the prevalence of chronic diseases such as cancer, diabetes, and heart disease.^{66, 69} Rurality also has been associated with higher rates of smoking, obesity, and physical inactivity.⁶⁸

Part II. Food Access, Recreational Facilities, and Health in South Delta

Food Access in the South Delta

In the Mississippi Delta region, the average density of grocery stores was 0.22 per 1,000 persons, the same density as the state of Mississippi but lower than the national average of 0.28 per 1,000 persons. Coahoma County had the highest density (0.44 per 1,000 persons), whereas the lowest was Issaquena County, which has no grocery store within its boundaries. The geographic variation in grocery store density is displayed in Map 7, with lighter colors indicating the lowest levels of access.

Map 7:
Density of Grocery Stores
per 1,000 by County,
South Delta and
Mississippi Delta
(2008)



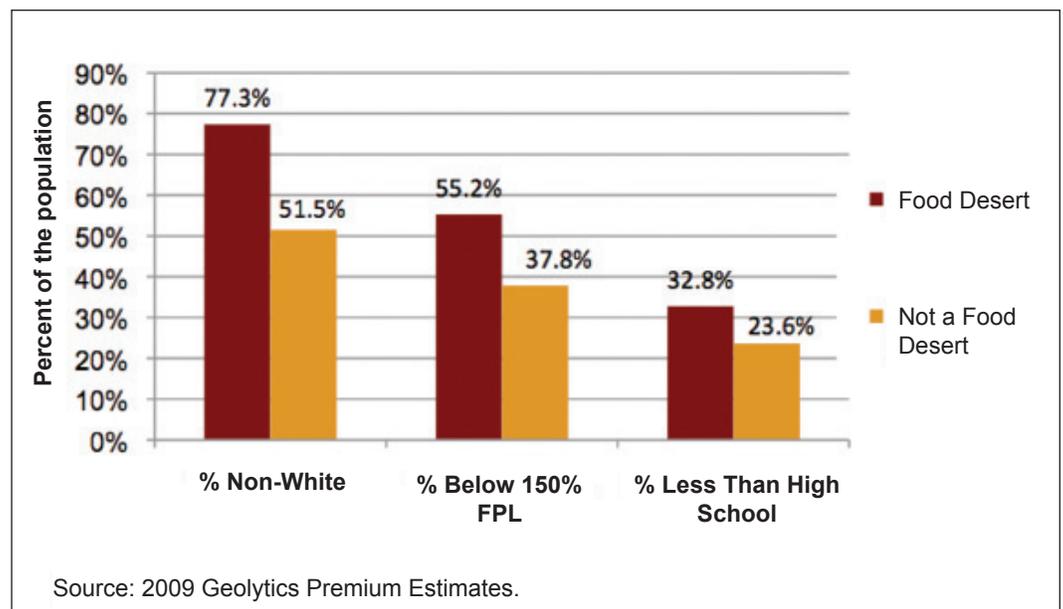
According to the USDA, in 2008 there were only two grocery stores located within the approximately 840-square-mile⁷⁰ area that encompasses Sharkey and Issaquena counties.³⁴ By comparison, there were 18 grocery stores located in the 478 square miles⁷⁰ of DeSoto County (one of the more urban areas in the Delta region).³⁴ Because of the small sizes of the populations of Sharkey and Issaquena counties, however, the per capita measure of grocery store density results in a higher rate in South Delta than in DeSoto (0.273 per thousand persons and 0.116 per thousand persons, respectively).³⁴ Nonetheless, the large degree of population dispersion in South Delta means that many residents must travel relatively long distances to reach the nearest grocery store. Furthermore, both of the grocery stores in South Delta are located in Rolling Fork, relatively close to each other. In addition to the distance to grocery stores, access is further compounded in South Delta by the low rate of vehicle ownership among households. In South Delta, 17.0% of households lacked a vehicle, compared with 2.5% of DeSoto County households.⁴¹

In 2010, the USDA identified 34 census tracts as “food deserts” in the Mississippi Delta. The food deserts included the one census tract that comprises Issaquena County and one of the two census tracts that comprise Sharkey County. USDA defines food deserts as low-income tracts (poverty rate at least 20%) where at least 33% of the population is more than one mile away from a supermarket or a large grocery store in an urban area (10 miles away in a rural area).⁷¹

Other options for obtaining fresh fruits and vegetables available to South Delta residents include seven convenience stores and three full-service restaurants. As of 2008, the USDA had not documented any supercenters, farmers markets, or fast food restaurants in Sharkey County or Issaquena County.³⁴

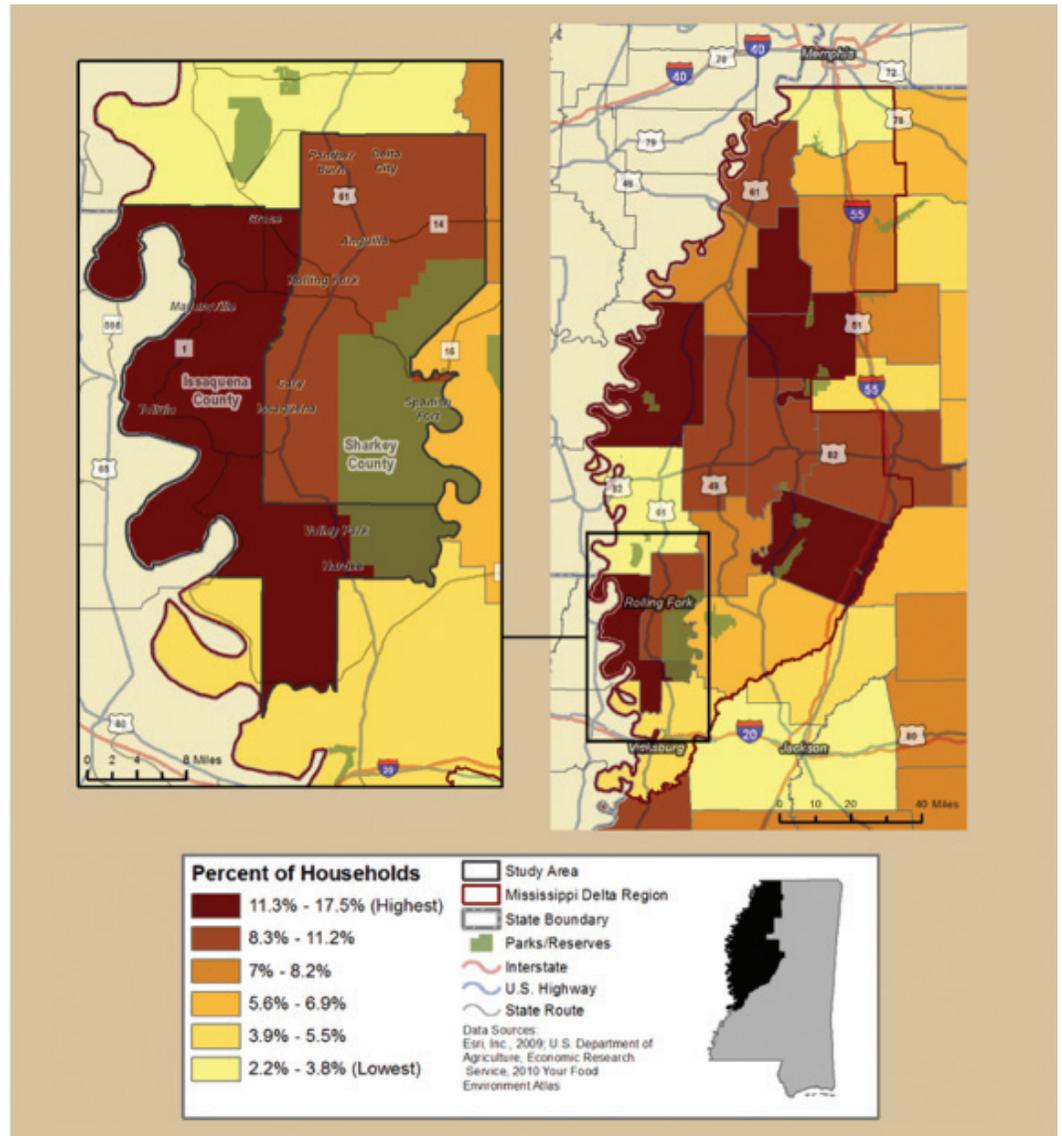
The distribution of food providers in a community is related to numerous factors, including the demographic and socioeconomic characteristics of the community. In comparison with areas with high poverty rates and large racial and ethnic minority populations, studies have found that White and more affluent communities tend to have higher densities

Figure 6:
Characteristics of Food
Deserts and Non-Food
Deserts in Mississippi Delta



of supermarkets.⁷² How the social, economic, and demographic characteristics of food desert census tracts in the Mississippi Delta differ from non-food desert census tracts is illustrated in Figure 6. Whereas the population in non-food desert census tracts was just over half non-White (51.5%), three of every four (77.3%) residents of food deserts were non-White. The percentages of the population below 150% of the FPL and with less than a high school diploma were higher in food deserts as well.

Map 8:
Households without a Vehicle
Located More than One Mile
from the Nearest Grocery
Store, South Delta and
Mississippi Delta (2010)



The percentage of the population that does not own a vehicle and lives more than one mile away from the nearest grocery store is displayed in Map 8. The highest percentage is in Issaquena County, where greater than one in every six households (17.5%) meets this definition, and the lowest is in DeSoto County (2.2%).³⁴ More than one of every ten households (10.7%) in Sharkey County meet these criteria.³⁴ By comparison, the national average for U.S. counties is 4.0%.³⁴

The prevalence of other distressed populations in South Delta is displayed in Table 6. Almost two thirds of Issaquena households are both low-income (an income below 200% of the FPL) and live more than a mile from the nearest grocery store. In Sharkey County, almost half of households face these conditions. A small percentage of South Delta households are more than 10 miles from a grocery store and lack a vehicle to get there. There is no public transit system in place for South Delta, other than a regional Greyhound bus stop in Rolling Fork. The nearest taxi service is in Vicksburg, a 30 to 45 minute drive away for most residents.

Table 6:
Prevalence of Distressed
Populations in Sharkey,
Issaquena, the Mississippi
Delta and the U.S.

	Issaquena (%)	Sharkey (%)	Average Mississippi Delta County (%)	Average U.S. County (%)
Percent of households with no vehicle that live >1 mile from a grocery store	17.5	10.7	9.0	4.0
Percent of households with no vehicle that live >10 miles from a grocery store	3.1	1.3	2.0	0.8
Percent of total population that is low income and that lives >1 mile from a grocery store	64.6	43.9	37.1	23.6
Percent of total population that is low income and that lives >10 miles from a grocery store	15.7	6.7	8.3	5.6

Source: USDA: 2006 Food Environment Atlas.

Food Access and Health

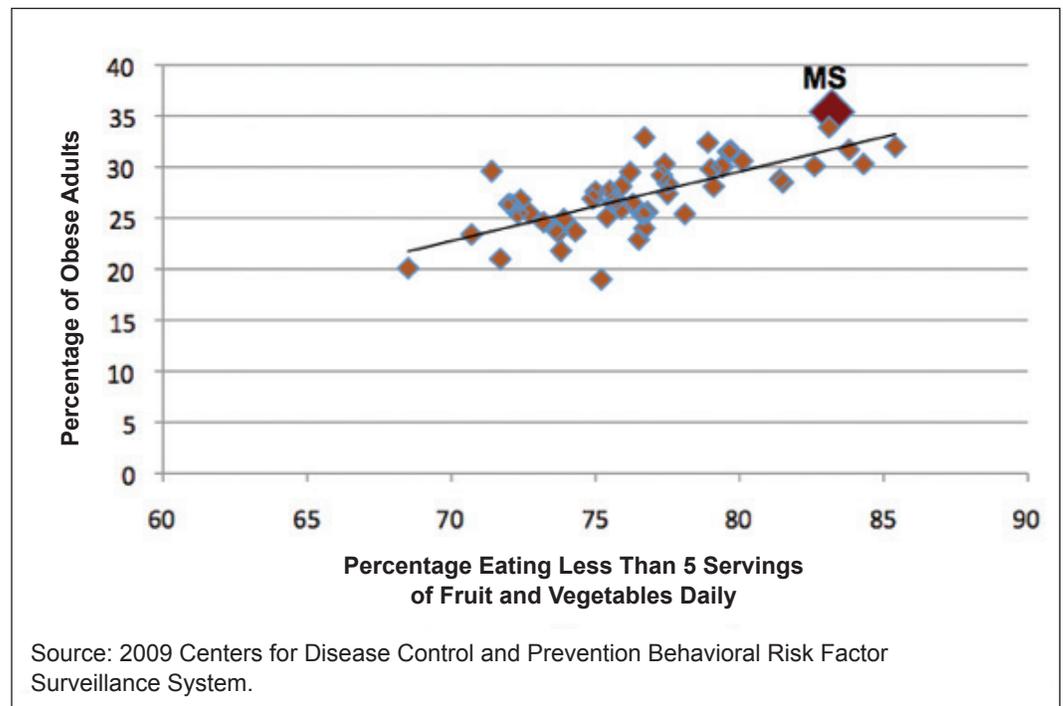
Inadequate diets are not uncommon among rural residents, who may be limited in their ability to acquire adequate food—in terms of both access and variety.⁷³ The Lower Mississippi Delta Nutrition Research Initiative found that in 2000, the average diet of Mississippi Delta residents was markedly low in recommended vitamins and minerals and high in sugars and fats.⁷⁴⁻⁷⁶ In 2009, 83.2% of Mississippi adults did not consume the recommended daily intake of five servings of fruit or vegetables.⁷⁷ This percentage of inadequate fruit and vegetable intake was greater than the national rate for adults (76.5%) and the fourth highest rate of all states.⁷⁷ In the Mississippi Delta, households in food desert census tracts spend an average of \$51 dollars less per year on fruits and vegetables than do households in non-food desert tracts.⁷¹

Access to healthy, nutritious food is important to health. A diet deficient in fruits and vegetables and high in excess calories, sodium, and fat is linked to numerous acute and chronic health problems such as diabetes, hypertension, obesity, heart disease, and stroke.⁷⁸ Inadequate diets that result in poor nutrition are also linked to improper child development and growth.⁷⁹ The consequences of food insecurity can include anxiety over food supply and quality, decreased health-related quality of life, impaired physical and psychosocial functioning, and academic problems in childhood.^{80, 81}

Nationwide, Blacks face a higher risk of diet-related conditions such as hypertension and stroke. Black Delta residents are at particular risk for inadequate diet and related chronic conditions.⁷⁴ Poor diet is associated with educational attainment, socioeconomic status, age, sex, cultural preference,⁸¹ and access to supermarkets.^{75, 81} Educational attainment and income in South Delta vary significantly by race. As seen in Figure 4, 5.8% of Black residents of Sharkey and Issaquena counties had a bachelor's degree or higher education, compared with 26.9% of White residents.⁵² Additionally, 47.0% of Black residents of South Delta had incomes below the poverty level between 2005 and 2009, as opposed to 11.6% of the non-Hispanic White population.⁵²

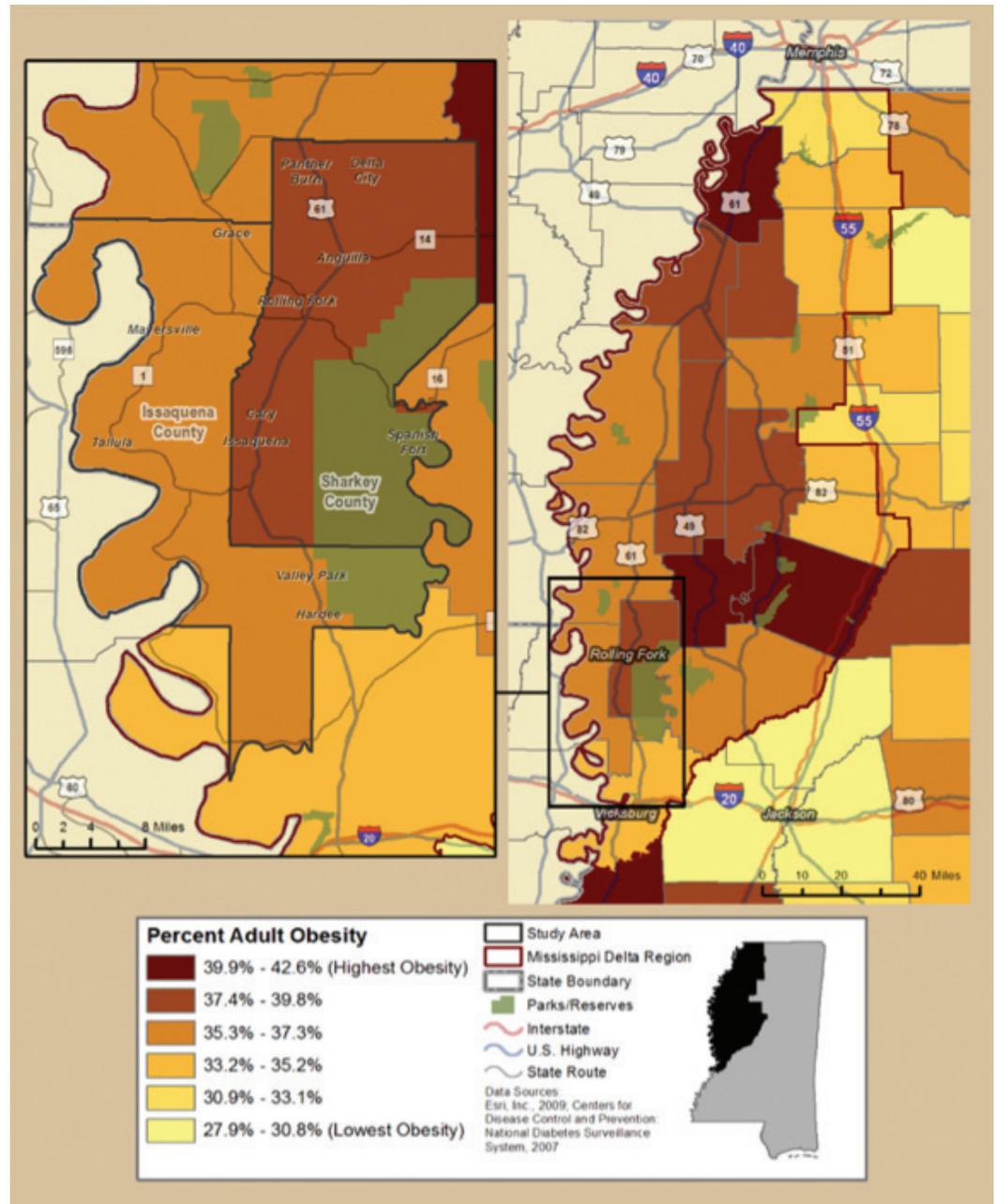
In 2009, Mississippi had the highest adult obesity rate (35.4%) of all states. The relationship between consumption of fruits and vegetables and obesity prevalence by state is illustrated in Figure 7.

Figure 7.
Obesity Rate by Fruit/
Vegetable Consumption for
States (2009)



The spatial distribution of obesity prevalence in the Mississippi Delta region in 2007 is displayed in Map 9. The highest obesity rate among Mississippi Delta counties was in Holmes County (42.3%), and the lowest rate was in Leflore County (38.6%). In both Sharkey and Issaquena counties, more than one of every three adults was obese. Diabetes—a condition strongly associated with obesity—is also more prevalent in the Mississippi Delta. The average age-adjusted diabetes prevalence in Mississippi Delta counties among adults in 2008 was 13.0%, compared with 8.9% for all counties in the United States and 12.0% among all Mississippi counties. Similarly, the prevalence of diabetes in Sharkey and Issaquena counties was 12.9 and 13.0%, respectively.⁷⁷

Map 9:
Obesity Rate by County,
South Delta and Mississippi
Delta (2007)

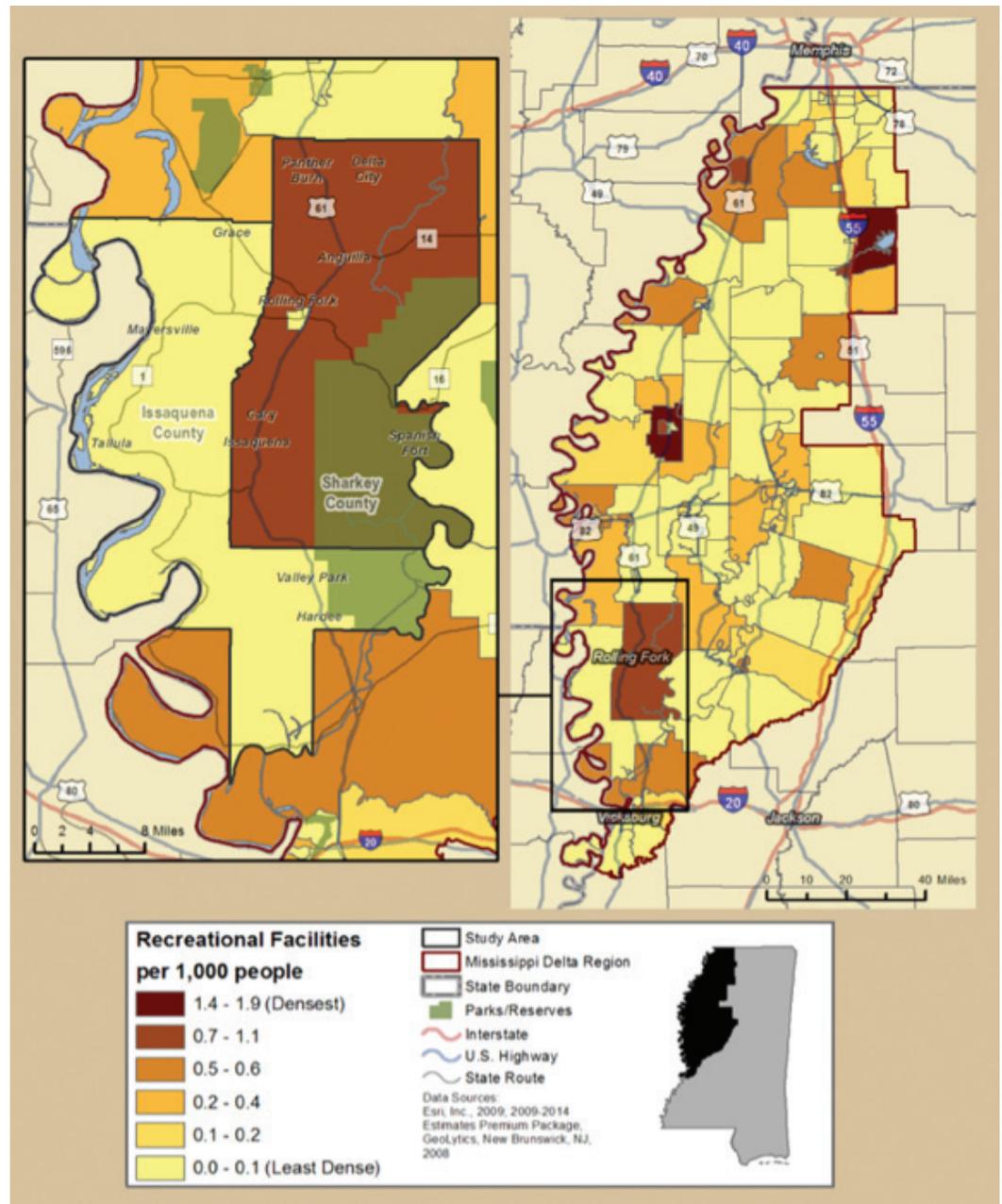


This cross-sectional analysis describes how food access and diet are correlated with poor health outcomes in South Delta, but such associations cannot disentangle the many causes of poor health outcomes or quantify the relative contribution of food access. However, the scarcity of food providers, combined with large distances and lack of access to a vehicle for many residents, are factors that may limit access to healthy food options for many low-income households in South Delta. The co-occurrence of poor diets, high obesity rates, and other chronic diseases only underscore the importance of these community characteristics.

Recreational Facilities in South Delta

Previous qualitative research suggests that use of recreational facilities is dependent on many factors, with availability being paramount.⁸² Lack of nearby access to a recreational facility, particularly for children, significantly increases the likelihood that residents will be physically inactive.⁸²⁻⁸⁴ But other factors—including low-cost, well-maintained facilities, safety, variety of exercise equipment, and the availability of preferred activities—can influence levels of physical activity as well.^{82,85, 86}

Map 10:
Density of Recreational
Facilities per 1,000 People by
Census Tract, South Delta and
Mississippi Delta (2009)



The variability among South Delta and Mississippi Delta census tracts in the density of recreational facilities (number of facilities per 1,000 people) is highlighted in Map 10. In 2009, the areas with the highest densities were located in Panola and Bolivar counties. Issaquena County lacked any recreational facilities in the USDA data set analyzed for this project. However, there is a park in Mayersville that offers a basketball court and baseball field. Sharkey County has a few recreational and physical activity options identified by the health department, but these are limited. They include a camping and picnic area in Rolling Fork. A country club in Sharkey was included in the rate calculation, but access is limited to club members. Not included in the rate calculation are two walking trails in Rolling Fork and the Delta National Forest, which provides recreational opportunities such as hiking, fishing, camping, and hunting for those with transportation, but may not be sufficiently accessible to residents to provide an outlet for regular physical activity.

On the basis of previous research findings,⁸⁷⁻⁸⁹ it would be expected that access to recreational facilities would be related to the geographic distribution of income, poverty, and race in the Mississippi Delta region. However, given the limited data (for example, a majority of census tracts in Mississippi Delta have no recreational facilities within their boundaries) we could not demonstrate a statistically significant correlation between those variables.

Apart from the park in Mayersville and the country club in Sharkey, most of the public venues for exercise in South Delta allow for only unstructured activities such as walking and hiking. Furthermore, some types of physical activities require additional equipment and, in the case of children, adult supervision. Activities offered by the school system can be a good alternative for children, but opportunities at the public schools are limited. According to the website of the South Delta School District, the elementary school does not offer team sports, the middle school offers a choice of two sports (football and basketball) for boys and one (basketball) for girls, and the high school also provides track, baseball, and softball teams.

Recreational Facilities and Health

A large amount of literature documents the association between regular physical activity and positive health outcomes. In addition to lower all-cause mortality, other health benefits include reduced risk of cardiovascular disease, type 2 diabetes, stroke, depression, and weight management.^{90,91} Despite its benefits, a sizable proportion of the general population is sedentary, failing to meet recommended levels of physical activity.^c

The Centers for Disease Control and Prevention estimate that in 2009, only 37.5% of Mississippi adults regularly participated in a healthy amount of physical activity.⁹² This was a significantly lower percentage than the national average (49.4%) and the fourth lowest level of physical activity of all states and territories.⁹² In South Delta, the rates are even lower (Table 7). Issaquena County had a higher rate of physically inactive adults than 94% of U.S. counties, and Sharkey County had a higher rate than 98% of counties.

Table 7:
Age-Adjusted Prevalence
of Physical Inactivity in
Issaquena, Sharkey, the
Mississippi Delta and the
United States (2008)

	Issaquena	Sharkey	Average MS Delta County	Average U.S. County
Percent of adults who were physically inactive	34.0	36.7	34.9	26.2

Notes: “Adult” refers to persons over the age of 20.
 “Physical Inactive” refers to anyone who answered “no” to the question “During the past month, other than your regular job, did you participate in any physical activity or exercises such as running, calisthenics, golf, gardening, or walking for exercise?”
 Rates are age-adjusted to 2000 U.S. Census population.
Source: 2008 Centers for Disease Control and Prevention; Behavioral Risk Factor Surveillance System.

Data from Mississippi counties in 2008 on physical activity among adults and socio-economic status indicate that these variables are significantly related. Correlation coefficients—which estimate the strength of the relationship between two variables without controlling for the influence of any other factors—indicate that the prevalence of physical inactivity was significantly correlated with both median income ($r = -0.65$, $P < 0.0001$) and the percentage of the population with incomes below 150% of the FPL ($r = 0.53$, $P < 0.0001$) in 2008–2009. The direction of the correlations indicates that higher median income is associated with higher levels of physical activity and that residents of counties with high poverty rates tend to have higher levels of physical inactivity. The relationship between recreational facility density and inactivity, however, was not statistically significant.

States with smaller proportions of the population reporting that they meet minimum recommended levels of physical activity tend to have a higher prevalence of diabetes, obesity, and hypertension among adults.⁷⁷ As shown in Figure 8, in 2009 Mississippi had one of the highest percentages (62.5%) of adults who failed to meet minimum suggested levels of physical activity. The state also had one of the highest prevalence rates for adult diabetes (11.6%).⁷⁷

^cRecommended levels of physical activity are moderate physical activity for 30 minutes, five times a week, or 20 minutes of vigorous physical activity, two days a week.¹⁰¹

Measures of mortality are also related to physical activity. Illustrated in Figure 9 is how premature mortality in Mississippi counties correlates with the level of physical inactivity (no physical activity outside of work). Counties with the most inactive population (an average of 37.2% of adults reporting no physical activity outside of work) have a premature mortality rate of 436.6 per 100,000, which is 33.7% higher than the premature mortality rate (326.5 per 100,000) in counties with the least inactive population (in which an average of 29.4% of adults report no physical activity outside of work).

Figure 8.
Diabetes Prevalence by
Activity Levels in
U.S. States (2009)

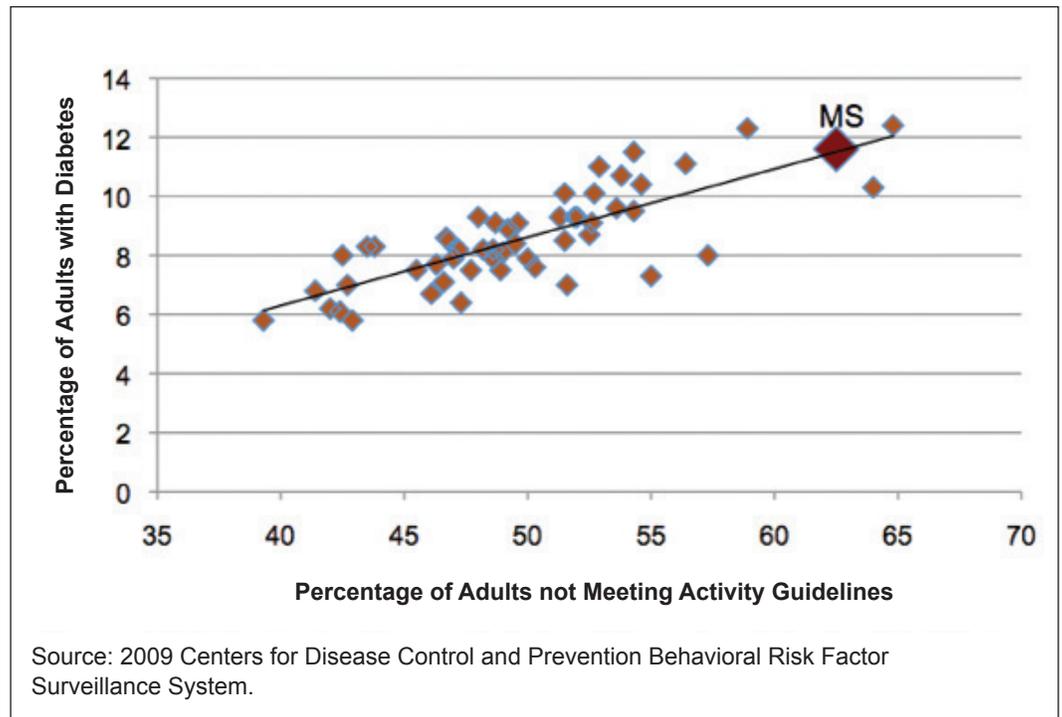
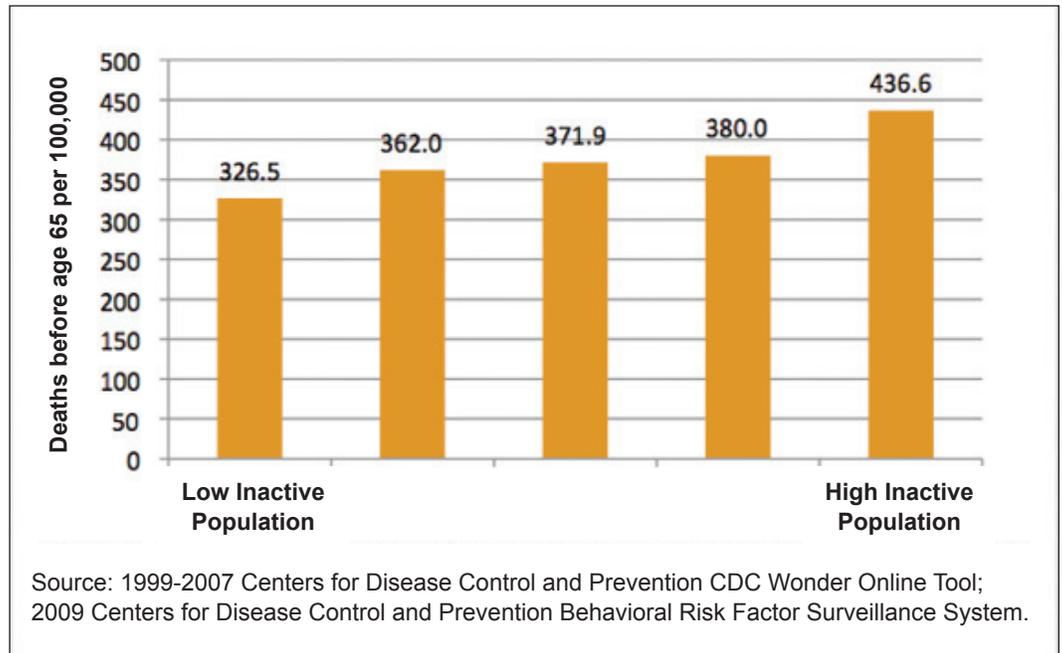


Figure 9.
Average Premature Death
Rate by Activity Level in
Mississippi Counties
(1999-2008)



We did not find a statistically significant relationship between access to recreational facilities in Mississippi counties (as measured by density) and morbidity, mortality, or physical inactivity. This may reflect limitations related to using density rather than proximity to measure access to recreational facilities. In rural areas, density measures may mask important distinctions in access when facilities may be numerous yet clustered in a particular region of the county, especially when residents lack adequate transportation.

Community-based interventions that focus on the quality, safety, and variety of recreational activities offered within facilities are one way that an area can promote the physical activity of its residents. Some examples of interventions that have promoted physical activity have included walking trails, bike lanes, and sidewalks and providing access to exercise equipment in community centers.^{90, 91, 93} Other possible interventions include increasing time allotment in schools for physical activity, worksite health promotion, or improving public transportation so that there are other options besides using a personal vehicle. These types of efforts have been shown to help decrease chronic disease risk factors within a population.^{90, 93}

Part III. Conclusions

There are many unique characteristics of rural populations that influence health outcomes. In denser, urban environments, access to community assets such as hospitals, reliable employment, and safe and well-maintained public parks are more efficiently shared among the population. The challenge of strategically distributing these assets among a more dispersed population often challenges rural residents with limited access.

Although establishing more physical activity options for residents may be beneficial, we identified other factors in Sharkey County and Issaquena County—such as lack of a vehicle—that inhibit the use of existing resources. Research also shows that physical activity options must not only be convenient but also affordable and safe. Parks or walking trails that are poorly maintained or deemed unsafe by the residents are less likely to be used.⁹⁴⁻⁹⁹ Diversity of physical activities is also a factor that the population considers when determining their level of involvement.¹⁰⁰

Similarly, access to quality food providers in South Delta is affected by factors that are not necessarily captured by crude density measures. With two grocery stores located within the two counties and a small population size, the density measure masks the relative lack of access to food providers. There are no grocery stores outside of Rolling Fork; half of the population of South Delta lives outside of Rolling Fork and 19% of those households lack a vehicle.⁴¹ In order for these households to make important dietary changes, increased access to grocery stores or improved selection of nearby alternative providers is necessary.

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