

2011 South Carolina Obesity Burden Report

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Executive Summary

Over the last 30 years, there have been rapid increases in the number of persons who are overweight or obese. This is alarming especially because overweight and obese persons are at risk for many serious health conditions, including but not limited to high blood pressure, high cholesterol and type 2 diabetes. Obesity is impacting individual lives as well as health. For the first time in two centuries, the current generation of children in America may have shorter life expectancies than their parents (American Heart Association).

Adults

- In 2010, three of every five (67.4 percent) adults were either overweight or obese.
- In 2010, 27.8 percent of S.C. adults engaged in no leisure-time physical activity.
- According to a CDC 2009 State Indicator Report, 90.7 percent of adults did not meet the fruit and vegetable recommendation of consuming both two or more fruits per day and three or more vegetables per day.

High School Students

- In 2011, 29.6 percent of S.C. high school students were overweight or obese.
- In 2011, 56.6 percent of S.C. high school students were not physically active at least 60 minutes per day on five or more days.
- According to the 2011 Youth Risk Behavior Survey (YRBS), 92.2 percent of high school students did not meet the fruit and vegetable recommendation of consuming both two or more fruits per day and three or more vegetables per day.

Middle School Students

- In 2011, 48.6 percent of S.C. middle school students were not physically active at least 60 minutes per day on five or more days.

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Pre-pregnancy weight and Breastfeeding

- In 2009, S.C. ranked 43rd in the nation for rates of breastfeeding.
- In 2009, 54.8 percent of S.C. pregnant women were overweight.
- According to the 2009 Pediatric Nutrition Surveillance System (PedNSS), 43.4 percent of new mothers ever breastfed, 13.8 percent of mothers breastfed at least 6 months, and 3.9 percent of mothers breastfed at least 12 months.

Economic Burden

- Individuals with BMIs greater than or equal to 30 accrued costs approximately 30 percent higher than their peers with BMIs less than 25 (Withrow, et al., 2001).
- In South Carolina, the obesity-attributable medical expenditures were estimated at \$1.06 billion in 2003. More than half of these expenses were paid by taxpayer dollars through Medicaid and Medicare programs (Finkelstein, 2004).
- In 2009, it is estimated that \$1.2 billion dollars was spent due to obesity in South Carolina, with the projected increase to \$5.3 billion dollars in 2018 or about \$1,505 dollars per adult in South Carolina.
- If South Carolina were to halt the increase in the prevalence of obesity at today's levels, we could save \$858 per adult in 2018, a total of \$3 billion.

Health Disparity

The burden of obesity and the severity of related health conditions vary among different populations groups. Obesity is of national health concern in the general population; however research has shown that persons within certain sub-populations are more vulnerable than others to this health problem:

- ethnic and racial minorities (Baker, et al., 2006)
- mentally and physically disabled person (Rimmer, et al., 2010)
- residents of rural areas (Paterson, et al., 2004)
- low socioeconomic status (Baker, et al., 2006).

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This report documents the trends, risk factors, and health consequences related to overweight and obesity. This report also discusses barriers to healthy living, the impact of weight on other chronic diseases, the economic costs of obesity and health disparity among populations affected by overweight and obesity.

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Background

Obesity poses a major health challenge. With the enormous increases in rates of overweight and obesity and the ensuing effects on society, obesity is now recognized as a critical health problem. Obese adults are at risk for many serious health conditions, including high blood pressure, high cholesterol, type 2 diabetes and its complications, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, and respiratory problems, as well as certain cancers (DHHS, Surgeon General's Report, 2010; CDC). In the United States and in South Carolina, obesity is impacting individual lives as well as health economics.

Overweight and obesity are associated with many factors. For each individual, body weight is determined by a combination of genetic, metabolic, behavioral, environmental, cultural, and socioeconomic influences. Behavioral and environmental factors are large contributors to overweight and obesity and provide the greatest opportunity for actions and interventions designed for prevention and treatment. For the vast majority of individuals, overweight and obesity result from excess calorie consumption and/or inadequate physical activity. Unhealthy dietary habits and sedentary behavior together account for approximately 300,000 deaths every year (Kiehl, et al., 2001).

Children with a high body mass index (BMI), one indicator of excess body weight, are more likely than those with a normal or recommended BMI to have insulin resistance, high blood pressure, asthma, depression, and poor self-esteem (Koletzko, et al., 2009). In addition to these risk factors, overweight or obesity in childhood may negatively affect health in adulthood, due in part because obese children are likely to become obese adults (Serdula, et al., 1993).

The burden of obesity and related health conditions vary among different populations. It is more prevalent among minority groups (Kumanyika, 1993), persons of lower socioeconomic status (McLaren, 2007), residents of rural areas (Paterson, et al., 2004), and among persons with mental illness and physical disability (Rimmer, et al., 2006).

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Measuring Overweight and Obesity

Obesity is defined as excess body fat and there are various ways that fat can be estimated; underwater weighing, electrical impedance, and skin fold calipers. The most commonly used screening tool is the calculation of body mass index (BMI) from the weight and height of an individual.

$$\text{BMI} = 703 \times (\text{weight (lbs.)}/\text{height}^2 (\text{in}^2)) \text{ or}$$

$$\text{BMI} = (\text{weight (Kgm)}/\text{height}^2 (\text{cm}^2))$$

For adults, overweight is defined as a BMI of at least 25.0, but less than 30.0. Adults with a BMI of 30.0 or greater are considered obese.

Figure 1. Classification of Weight for Adults by BMI

Classification	Body Mass Index (kg/m ²)
Underweight	less than 18.5
Normal/Recommended	18.5 - 24.9
Overweight	25.0 - 29.9
Obese	30.0 or greater

For children and youth, defining overweight or obesity based on BMI is more difficult because height and weight are age dependent and change throughout development. For children age 2 to 20 years old, the Centers for Disease Control and Prevention (CDC) has developed a definition based on the 2000 CDC growth charts for age and sex (Kuczmarski, et al., 2002). The BMI categories used for this report are:

Figure 2. Classification of Weight for by BMI-for-age for Children and Youth (ages 2-20)

Classification	Body Mass Index (kg/m ²)
Underweight	Below the 5 th percentile ranking
Normal/Recommended	≥ 5 th and < 85 th percentile ranking
Overweight	≥ 85 th and < 95 th percentile ranking
Obese	Above the 95 th percentile ranking

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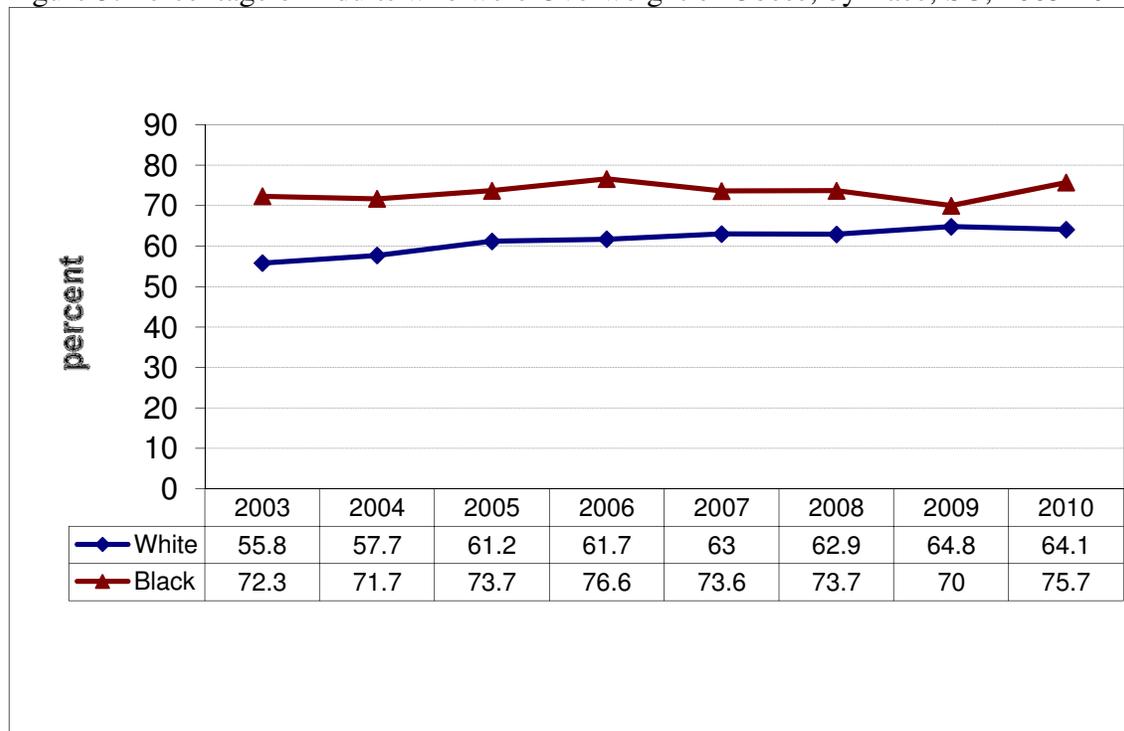
Overweight and Obesity South Carolina Adults

State-level

In 2010, 67.4 percent of all adults in South Carolina were either overweight or obese, with 35.4 percent considered overweight and 32 percent considered obese.

In 2000, 55.8 percent of White adults in South Carolina were overweight or obese compared to 72.3 percent of Black adults in South Carolina, a disparity of 16.5 percent. By 2010, the disparity between White and Black adults was reduced to 11.6 percent; the percentage of White adults who were overweight or obese was 64.1 percent and the percentage of Black adults who were overweight or obese was 75.7 percent.

Figure 3: Percentage of Adults who were Overweight or Obese, by Race, SC, 2003-2010



Source: BRFSS

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County-level

In 2010, 67.4 percent of all SC adults were overweight or obese. As shown in the figure below, there are great disparities between counties. The county with the highest percent of adult overweight or obese was Allendale (88.5 percent), while the county with the lowest percent of adult overweight or obese was Berkeley (52.8 percent).

Figure 4. Percentage of Adults who were Overweight or Obese, by County, SC, 2010

County	%	95% C.I.	Ranking	County	%	95% C.I.	Ranking
STATE	67.4	65.5 - 69.3					
ABBEVILLE	77.7	63.2 - 92.2	39	GREENWOOD	67.9	58.5 - 77.3	25
AIKEN	66.9	59.2 - 74.6	19	HAMPTON	77.8	65.7 - 89.8	40
ALLENDALE	88.5	77.7 - 99.3	46	HORRY	65.9	59.1 - 72.7	14
ANDERSON	64.5	55.5 - 73.5	9	JASPER	73.0	62.1 - 83.8	31
BAMBERG	78.1	62.8 - 93.4	41	KERSHAW	66.2	54.7 - 77.7	15
BARNWELL	67.2	51.8 - 82.7	23	LANCASTER	71.9	63.2 - 80.5	30
BEAUFORT	56.9	49.7 - 64	3	LAURENS	65.1	49.6 - 80.7	12.5
BERKELEY	52.8	36.7 - 68.9	1	LEE	73.5	58.3 - 88.8	33
CALHOUN	64.9	58.6 - 71.1	11	LEXINGTON	67.0	55.4 - 78.5	21
CHARLESTON	56.5	47.5 - 65.4	2	MARION	63.4	50.7 - 76.1	7
CHEROKEE	67.1	59.1 - 75.1	22	MARLBORO	73.9	58.9 - 89	35
CHESTER	73.7	64.6 - 82.8	34	MCCORMICK	70.4	55.3 - 85.5	28
CHESTERFIELD	75.0	61.6 - 88.5	37	NEWBERRY	65.1	58.2 - 72.1	12.5
CLARENDON	80.7	70.5 - 90.9	45	OCONEE	71.0	59.6 - 82.4	29
COLLETON	66.6	55 - 78.2	17	ORANGEBURG	73.4	65.2 - 81.5	32
DARLINGTON	78.3	65.9 - 90.7	42	PICKENS	57.4	37.5 - 77.4	4
DILLON	66.4	61.1 - 71.7	16	RICHLAND	64.4	49.9 - 78.9	8
DORCHESTER	79.8	70.6 - 89	43.5	SALUDA	68.0	48.8 - 87.2	26
EDGEFIELD	75.2	62.5 - 87.9	38	SPARTANBURG	57.7	44.1 - 71.4	5
FAIRFIELD	79.8	63.9 - 95.7	43.5	SUMTER	74.0	65.9 - 82.1	36
FLORENCE	67.6	53.5 - 81.6	24	UNION	60.0	34.4 - 85.6	6
GEORGETOWN	66.9	58 - 75.8	19	WILLIAMSBURG	66.9	53.2 - 80.7	19
GREENVILLE	64.8	55.6 - 74	10	YORK	70.1	52.9 - 87.3	27

Source: BRFSS

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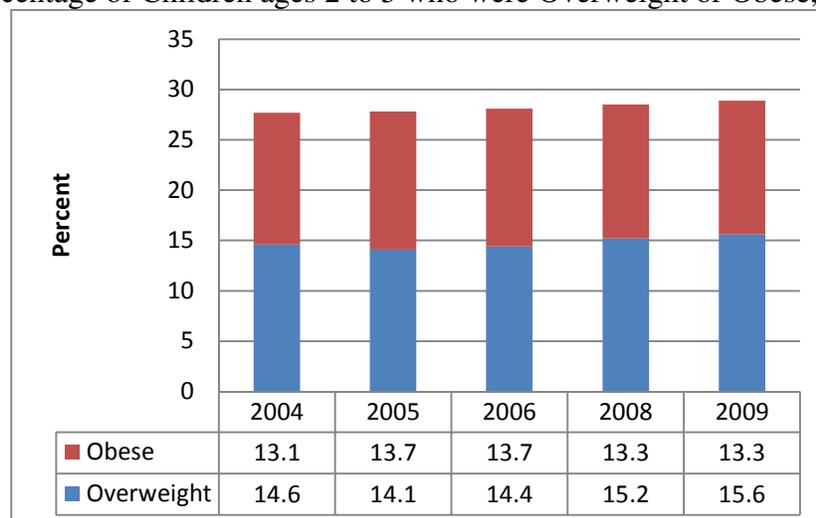
Overweight and Obesity

South Carolina Children younger than 5 years of age

South Carolina currently lacks comprehensive surveillance data for children younger than middle school ages. Data are available for children ages younger than 5 years old who are enrolled in the Special Supplemental Nutrition for Women, Infant and Children (WIC). WIC is a federally-funded program that helps pregnant women and families with young children by providing nutrition education, nutritious foods, and breastfeeding support. Data for these children are reported by states to the CDC through the Pediatric Nutrition Surveillance System* (PedNSS). A limitation of this data is that it is not representative of all children younger than 5 in South Carolina but only of those children five-years old and younger who meet the WIC eligibility requirements and are enrolled in the program.

According to the 2009 PedNSS report 28.9 percent of SC children between the ages of 2 and 5 years old were either overweight or obese. The percentage of overweight and obesity among Hispanic SC children between the ages of 2 and 5 was 37.3 percent in 2009. This percentage was the highest compared to Black SC children (27.3 percent) and White SC children (26.4 percent) of the same age group.

Figure 5: Percentage of Children ages 2 to 5 who were Overweight or Obese, SC, 2004-2009



Source: PedNSS

*PedNSS is a child-based public health surveillance system that provides prevalence reports which are produced by the CDC.

The CDC has decided to discontinue operation of the PedNSS in the Fall of 2012, after production of the 2011 reports.

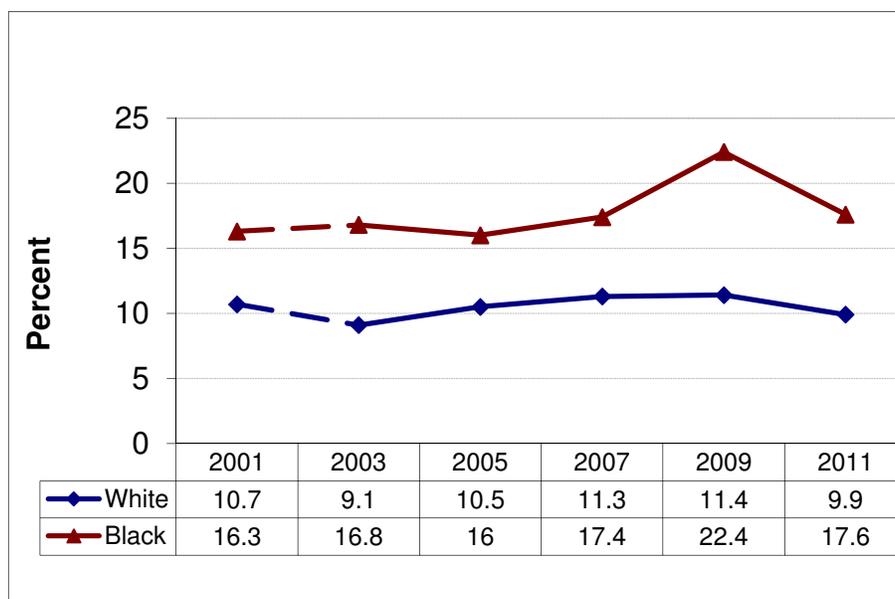
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State-level - South Carolina Youth in Grades 9 through 12

In 2011, 29.6 percent of all South Carolina high school students were either overweight or obese, with males (32.3 percent) more likely to be overweight or obese than females (26.8 percent). While 16.3 percent of all high school students were considered overweight, the percent of female students who were overweight (18.4 percent) was greater than the percent of male students who were overweight (14.3 percent). The percent of all high school students who were obese was 13.3 percent; the percent of male students who were obese (18 percent) was greater than the percent of female students (8.4 percent) who were obese.

There were differences by race/ethnicity for both overweight and obese. While 16.3 percent of all SC high school students were considered overweight, the percent of Black high school students who were overweight (23.4 percent) was greater than the percent of overweight among their White counterparts (12.6 percent). This disparity increases when considering high school students who are obese. While 13.3 percent of all high school students are considered obese, the percent of Black students who were obese (17.6 percent) was also greater than the percent of overweight among their White counterparts (9.9 percent).

Figure 6: Percentage of Youth in Grades 9-12 who were Obese, by Race, SC, 2001-2011



*The 2001 and 2003 data are not weighted.

Source: YRBS

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County-level – South Carolina Youth in Grades 1 through 8

While rates of obese and overweight are unavailable for SC middle school students (grades 6 through 8) and younger, the SC Department of Health and Environmental Control (SCDHEC) have participated in several local projects that have provided estimates for rates of obese and overweight in the following counties: Beaufort, Fairfield, and Jasper counties.

Figure 7. Percentage of SC Children who were Overweight or Obese in Beaufort, Fairfield, and Jasper Counties, by Grade

Counties	Grades Included	School Year	Overweight (percent)	Obese (percent)	Overweight or Obese (percent)
Beaufort	3rd	2007-2008	15.1	22.6	37.7
Beaufort	5th	2007-2008	17.2	22.6	39.8
Beaufort	8th	2007-2008	20.1	23.2	43.3
Beaufort	3rd	2008-2009	16.9	20.3	37.2
Beaufort	5th	2008-2009	17.6	21.9	39.5
Beaufort	8th	2008-2009	18.4	20.4	38.8
Fairfield	1st - 8th	2008 - 2009	19.2	30.0	49.2
Fairfield	1st - 8th	2009 - 2010	17.9	31.6	49.5
Fairfield	1st - 8th	2010 - 2011	19.0	30.9	49.9
Jasper	3rd	2007-2008	15.9	33.1	49.0
Jasper	5th	2007-2008	13.3	36.7	50.0
Jasper	8th	2007-2008	25.0	33.7	58.7
Jasper	3rd	2008-2009	18.7	29.5	48.2
Jasper	5th	2008-2009	17.4	34.3	51.7
Jasper	8th	2008-2009	15.1	21.8	36.9

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Physical Activity

South Carolina Adults

According to the U.S. Surgeon General, adults can obtain significant health benefits by including moderate physical activity on most days of the week. Engaging in regular physical activity is one of the most important steps to reduce risk for chronic disease, build physical and mental health and prevent overweight and obesity. All adults should avoid physical inactivity. Some physical activity is better than none, and adults who participate in some physical activity may also gain some health benefit. There are several activities that adults can participate in to avoid being sedentary: hiking, yard work, dancing, bicycling, walking, swimming, running or jogging, weight lifting.

According to guidelines set by the US Department of Health and Human Services (DHHS), adults should do at least 150 minutes (2 hours and 30 minutes) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) a week of vigorous-intensity aerobic physical activity or a combination of the moderate and vigorous-intensity physical activity. DHHS also recommends that adults should also do muscle-strengthening activities that are moderate or high-intensity and involve all major muscle groups on two or more days a week, as these activities provide additional health benefits.

Although physical activity provides benefits at even moderate levels of intensity that are within the capability of most individuals, in 2009 49.4 percent of U.S. adults did not meet recommendations for regular physical activity, putting them at a risk for a score of chronic diseases and conditions.

Major shifts in social and environmental conditions have triggered a rise in both inactivity and increased weight. Society has become increasingly suburbanized, and people are more inclined to drive than use active means of transportation. Work environments have shifted from a labor-based to service-based economy, which means that daily work has become more sedentary.

Although regular physical activity is important for all age groups, evidence suggests that physical activity and fitness have protective effects against major chronic disease affecting older

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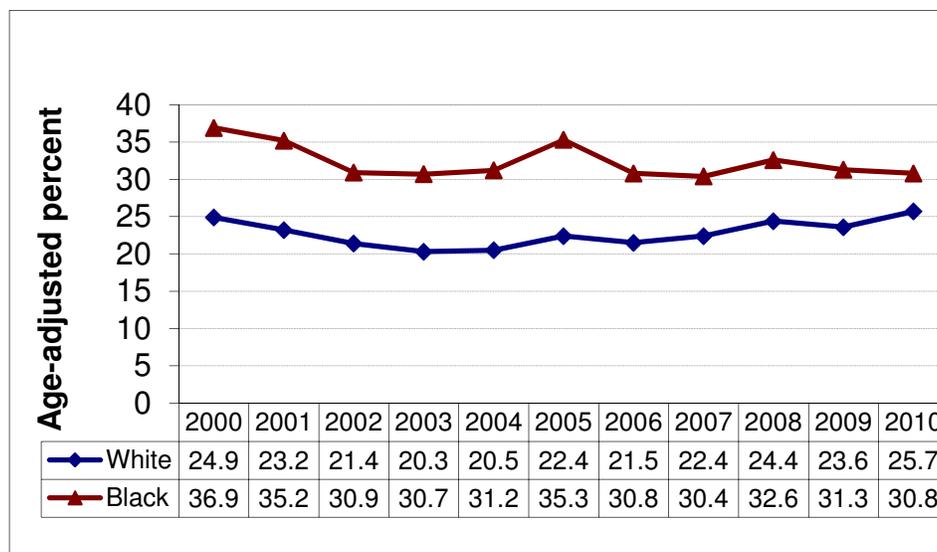
people, namely, coronary heart disease, breast cancer and type 2 diabetes (DiPietro, 2001). Studies have also shown that in the aged populations that physical activity may lower the risk of cognitive impairment, Alzheimer disease, and dementia (Laurin, Verreault, Lindsay, et al, 2001). In addition to these benefits, in all ages, physical activity aids in weight management and may reduce the likelihood of overweight and obese.

State-level

According to the 2010 BRFSS, 27.8 percent of SC adults engaged in no leisure-time physical activity, with males being less likely (24.4 percent) to engage in no leisure-time physical activity than females (31 percent).

There are differences by race/ethnicity in the percentage of adults who engage in no leisure-time activity. In 2000, the percentage of White adults in South Carolina who engaged in no leisure-time activity was 24.9 percent. By 2010 this percentage increased slightly to 25.7 percent. The percentage of Black adults in South Carolina who engaged in no leisure-time activity decreased from 36.9 percent in 2000 to 30.8 percent in 2010.

Figure 8: Percentage of Adults who Engage in No Leisure-time Physical Activity, by Race, SC, 2000-2010

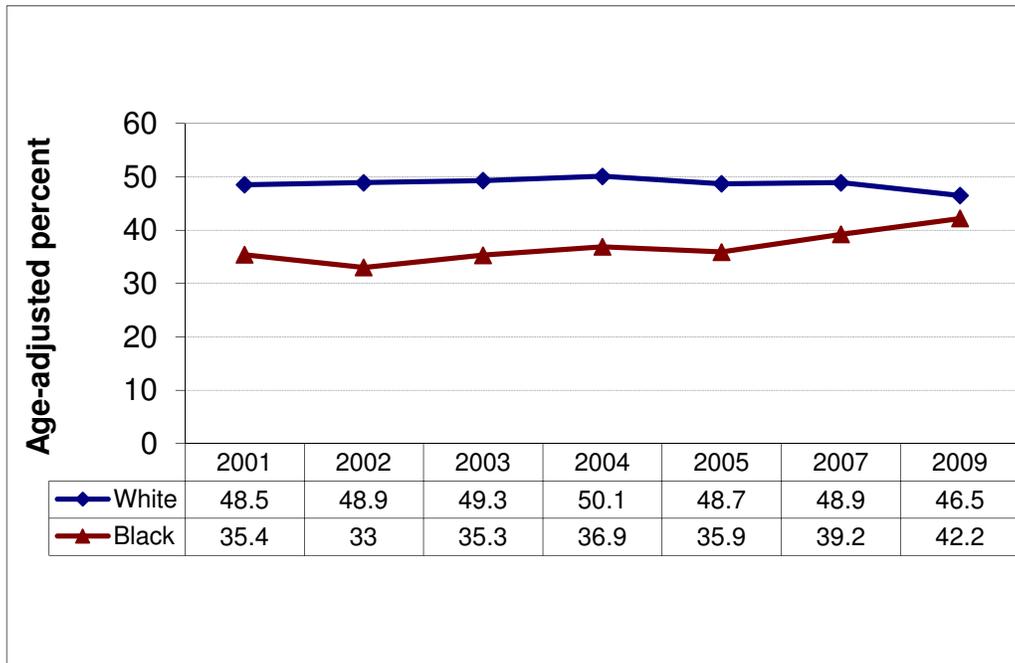


Source: BRFSS

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The disparity between White and Black also decreased over the same time period. In 2000, the percentage disparity was 12.0 percent and in 2010 the disparity was 5.1 percent.

Figure 9: Percentage of Adults who Engage in Moderate or Vigorous Physical Activity Per Recommendation, by Race, SC, 2001-2009



Source: BRFSS

The figure above shows the percentage of South Carolina adults who engage in moderate or vigorous physical activity per recommendation. While overall, White adults had greater percentages of engaging in physical activity, the percentage of Black adults who engaged in physical activity per recommendation increased from 35.4 percent in 2001 to 42.2 percent in 2009. The racial disparity decreased from 13.1 percent in 2001 to 4.3 percent in 2009.

County-level

In 2010, 27.8 percent of all SC adults were physically inactive or engaged in no leisure-time physical activity. There are great disparities between counties. The county with the highest percent of physically inactive adult was Greenwood County (38.4 percent), while the county with the lowest percent of physically inactive adults was Beaufort (15.4 percent).

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Figure 10. Percentage of Adults Engage in No Leisure-time Physical Activity,
by County, SC, 2010

County	%	95% C.I.	Ranking	County	%	95% C.I.	Ranking
STATE	27.8	26.1 - 29.5					
ABBEVILLE	24.1	20 - 28.2	13	GREENWOOD	38.4	27.8 - 49	46
AIKEN	25.4	19.2 - 31.6	20	HAMPTON	23.0	19.3 - 26.8	8
ALLENDALE	32.0	25.2 - 38.8	37	HORRY	23.9	17.6 - 30.2	11
ANDERSON	23.8	17.6 - 30	10	JASPER	27.9	16.2 - 39.5	26
BAMBERG	25.0	20.5 - 29.4	16	KERSHAW	30.2	25 - 35.4	32
BARNWELL	21.8	15.3 - 28.3	5.5	LANCASTER	27.4	20.4 - 34.4	23
BEAUFORT	15.4	11.8 - 19	1	LAURENS	29.8	17.6 - 42	31
BERKELEY	27.8	16.7 - 38.9	24.5	LEE	30.6	25.6 - 35.5	33
CALHOUN	25.3	21 - 29.6	19	LEXINGTON	22.2	12.9 - 31.6	7
CHARLESTON	24.0	16.1 - 31.9	12	MARION	38.3	26.8 - 49.8	45
CHEROKEE	27.8	21.5 - 34.1	24.5	MARLBORO	33.4	19.7 - 47	40
CHESTER	28.5	19.2 - 37.7	28	MCCORMICK	27.3	20.3 - 34.4	22
CHESTERFIELD	33.7	26.4 - 41.1	42	NEWBERRY	24.5	19.7 - 29.2	15
CLARENDON	31.9	27 - 36.7	36	OCONEE	24.3	14.4 - 34.2	14
COLLETON	37.1	26.8 - 47.5	43	ORANGEBURG	29.0	21.8 - 36.2	29
DARLINGTON	32.3	26.4 - 38.2	38	PICKENS	21.3	17.1 - 25.5	4
DILLON	29.3	24.7 - 33.9	30	RICHLAND	23.3	14.7 - 31.9	9
DORCHESTER	18.4	10.8 - 26.1	3	SALUDA	25.2	20.1 - 30.4	18
EDGEFIELD	18.1	10.7 - 25.5	2	SPARTANBURG	30.7	21.2 - 40.2	34
FAIRFIELD	25.6	19.4 - 31.8	21	SUMTER	32.7	23.3 - 42.1	39
FLORENCE	37.6	24.5 - 50.7	44	UNION	28.2	22.9 - 33.5	27
GEORGETOWN	25.1	18.3 - 32	17	WILLIAMSBURG	33.6	21.9 - 45.3	41
GREENVILLE	21.8	15.1 - 28.5	5.5	YORK	30.9	14.5 - 47.2	35

Source: BRFSS

Physical Activity – South Carolina Youth in Grades 6-12

According to guidelines set by the US Department of Health and Human Services (DHHS), youth aged 6 to 17 years old should engage in 60 minutes or more of physical activity each day. The Centers for Disease Control (CDC) suggests that the 60 minutes of physical activity encompass not only aerobic activity such as running or walking, but that youth should also include muscle strengthening and bone strengthening exercises.

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Figure 11. Physical Activity Behaviors of Youth in Middle School and High School, SC, 2011.

	South Carolina	
	Middle School (6th to 8th grade)	High School (9th to 12th grade)
	%	%
Physically active at least 60 minutes per day on less than 5 days		
Total	51.4	43.4
Male	59.0	55.6
Female	43.7	31.4
Did not attend physical education classes in an average week		
Total	63.8	75.8
Male	64.4	69.2
Female	62.9	82.3
Watched television 3 or more hours per day (on an average school day)		
Total	42.9	39.2
Male	41.9	36.8
Female	44.1	41.6
Used computers 3 or more hours per day (not school work)		
Total	32.2	28.9
Male	34.5	29.5
Female	29.7	28.7

Source: YRBS

One lifestyle factor that influences both physical activity levels and nutritional behaviors is screen time. Children who are watching television or playing computer games are not being physically active and several studies confirm a direct association between sedentary time and fitness in adolescents (Must, et al., 2007). In the 1970s, a child watched about 20,000 commercials per year. This amount has increased dramatically; a child now watches more than 40,000 television commercials each year. Since exposure to television advertising can influence food and beverage choices, these unhealthy dietary choices along with sedentary time while watching television can lead to energy imbalance and weight gain (Must, et al., 2007).

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It is recommended that youth engage in two hours or less of entertainment from television.

According to the 2011 YRBS, 39.2 percent of high school students reported three or more hours of sedentary time per school day from television alone. By race, more than half (56.1 percent) of Black high school students in South Carolina reported three or more hours of sedentary time per school day from television alone, compared to 29 percent of White high school students. Among high school students there is a gender disparity of 4.8 percent with 36.8 percent of high school males reporting three or more hours of sedentary time per school day from television alone compared to 41.6 percent of high school females.

Of middle school 2011 YRBS respondents, 42.9 percent reported three or more hours of sedentary time per school day from television alone. By race, twice as many Black middle school students (62.4 percent) reported three or more hours of sedentary time per school day from television alone as White middle school students (30.6 percent). Among middle school students there is a gender disparity of only 2.4 percent with 41.9 percent of middle school males reporting three or more hours of sedentary time per school day from television alone compared to 44.1 percent of middle school females.

In regard to using computers, HHS also recommends that youth engage in two hours or less of entertainment from computers and video games per day. According to the 2011 YRBS, 28.9 percent of high school students in South Carolina reportedly used computers or video games three or more hours per day and 32.2 percent of middle school students in South Carolina reported the same.

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Nutrition

Along with adequate physical activity, good nutrition is another cornerstone of healthy living. In recent years, the availability and accessibility to high calorie foods has increased significantly. Americans are eating food prepared away from home more than ever. Food eaten outside of the home tends to be less healthy, providing more calories, sugar, sodium, and fat than food prepared in the home. In 1970, households spent 26 percent of their total food spending on food-away-from-home; by 2002, this percentage had increased to 46 percent (USDA, Economic Research Report 4, 2005).

During this same time period, portion sizes have increased dramatically. The most glaring example is the notorious "super-sizing." According to CDC, portion sizes began to rise in the 1970s, increased in the 1980s, and have grown ever since. For example, in 1957, the typical serving of soda was 8 fluid ounces. A typical serving size of soda is now 32 to 64 fluid ounces. During this time period, there has also been a steady rise in the prevalence of obesity.

Eating breakfast is an important lifestyle habit for healthy weight maintenance; skipping breakfast can lead to snacking and overeating later in the day. A recent study of young adults found that obesity and insulin resistance syndrome rates were 35 percent to 50 percent lower among people who ate breakfast every day compared to those who usually skipped breakfast. The report suggested that eating breakfast might have beneficial effects on appetite, insulin resistance and energy metabolism (American Heart Association, 2003).

State Level

According to guidelines set by DHHS, adults should consume two or more servings of fruits and three or more servings of vegetables daily. According to a CDC 2009 State Indicator Report on Fruits and Vegetables, 23.8 percent of adults in South Carolina reported consuming two or more fruits per day, 25.5 percent reported consuming three or more vegetables per day, and 9.3 percent reported consuming both two or more fruits per day and three or more vegetables per day.

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County Level

In 2009, 82.6 percent of all SC adults consumed less than five fruits and vegetables daily. As shown in figure 12, there are great disparities between counties. The county with the highest percent of adults who consumed less than five fruits and vegetables daily was McCormick County (87.8 percent), while the county with the lowest percent of adults who consumed less than 5 fruits and vegetables daily was Laurens (74.2 percent).

Figure 12. Percentage of Adults Consuming less than Five Fruits and Vegetables daily, by County, SC, 2009

County	%	95% C.I.	Rank	County	%	95% C.I.	Rank
STATE	82.6	81.3 - 83.8					
ABBEVILLE	84.8	81.4 - 88.1	26	GREENWOOD	83.9	78.8 - 89.0	24
AIKEN	80.7	74.6 - 86.8	5	HAMPTON	83.1	80.2 - 86.0	18
ALLENDALE	84.5	79.5 - 89.5	25	HORRY	87.3	83.9 - 90.6	44
ANDERSON	87.2	82.7 - 91.7	43	JASPER	82.1	78.8 - 85.4	10
BAMBERG	82.5	78.5 - 86.6	13	KERSHAW	83.6	80.2 - 87.0	21.5
BARNWELL	82.4	77.0 - 87.9	12	LANCASTER	85.3	81.0 - 89.6	29.5
BEAUFORT	80.3	75.7 - 84.9	3	LAURENS	74.2	61.0 - 87.5	1
BERKELEY	81.6	70.2 - 93.0	8	LEE	83.0	79.6 - 86.4	16.5
CALHOUN	81.1	76.7 - 85.5	6	LEXINGTON	81.8	77.9 - 85.7	9
CHARLESTON	80.6	73.3 - 87.9	4	MARION	85.5	82.3 - 88.7	31
CHEROKEE	85.1	80.7 - 89.5	28	MARLBORO	86.1	81.7 - 90.5	36
CHESTER	86.1	81.7 - 90.5	36	MCCORMICK	87.8	83.8 - 91.9	46
CHESTERFIELD	87.7	84.0 - 91.3	45	NEWBERRY	81.2	76.7 - 85.6	7
CLARENDON	83.8	80.3 - 87.2	23	OCONEE	82.8	75.0 - 90.7	15
COLLETON	86.2	80.4 - 92.0	38.5	ORANGEBURG	83.3	77.9 - 88.6	19
DARLINGTON	85.8	81.8 - 89.9	32.5	PICKENS	84.9	81.4 - 88.5	27
DILLON	85.3	81.6 - 88.9	29.5	RICHLAND	82.7	75.2 - 90.2	14
DORCHESTER	82.3	78.8 - 85.8	11	SALUDA	83.0	78.8 - 87.3	16.5
EDGEFIELD	83.6	79.8 - 87.3	21.5	SPARTANBURG	86.8	80.4 - 93.3	42
FAIRFIELD	85.8	81.1 - 90.6	32.5	SUMTER	79.5	71.7 - 87.3	2
FLORENCE	86.0	79.5 - 92.5	34	UNION	83.4	79.3 - 87.6	20
GEORGETOWN	86.3	81.8 - 90.8	40	WILLIAMSBURG	86.1	77.2 - 95.0	36
GREENVILLE	86.2	81.8 - 90.5	38.5	YORK	86.4	82.0 - 90.8	41

Source: BRFSS

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State Level – Youth in Grades 9 through 12

Similar to the recommendation for adults, DHHS recommends that youth of all ages consume two or more fruits and three or more vegetables a day. According to a CDC 2009 State Indicator Report on Fruits and Vegetables 26.5 percent of youth in South Carolina reported consuming two or more fruits per day, 10.4 percent reported consuming three or more vegetables per day, and 6.3 percent reported consuming both two or more fruits per day and three or more vegetables per day.

According to the 2011 YRBS, 92.2 percent of high school youth ate fruits and vegetables less than five times a day, 73.9 percent of high school students drank 100% fruit juices one or more times in the most recent 7 days, and 33 percent drank a can, bottle, or glass of soda or pop at least once a day.

Figure 13. High School Students' Nutritional Behaviors, SC, 2011

	Total	Males	Females	White	Black
	%	%	%	%	%
Ate fruits and vegetables less than five times a day					
Total	92.2	92.3	92.5	93.6	90.9
Drank a can, bottle, or glass of soda or pop at least one time per day					
Total	33.0	35.0	30.9	35.8	29.9
Did not drink 100% fruit juices					
Total	26.1	23.2	29.1	31.0	19.7

Source: YRBS

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Competitive foods are those foods sold or served at schools that fall outside of the meals and snacks served through the federally reimbursed school lunch, breakfast, and after-school snack programs. Competitive foods include food and beverage items sold through a la carte lines, snack bars, student stores, vending machines, and school fundraisers.

According to the 2008 School Health Profiles, a survey of principals conducted by the South Carolina Department of Education, 70 percent of middle schools and 95 percent of high schools in SC allow students to purchase snack foods or beverage from vending machines at the school or at a school store, canteen, or snack bar.

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Lifecycle: Pre-pregnancy weight and Breastfeeding

A lifecycle perspective is one that is focused on prevention of obesity in women of child-bearing age, excessive weight gain during pregnancy, and the role of breast-feeding in reducing later obesity in children and adults (Deckelbaum, et al., 2001).

Pre-pregnancy weight is a determinant of infant birth weight. Overweight and obesity in women are predictors of gestational diabetes, preeclampsia, eclampsia, and newborns with excessive birth weight, which is a predictor of overweight and obesity in adulthood (Baeten, et al., 2001; Bodnar, et al., 2005; Jensen, et al., 2003). According to the 2008 Pregnancy Nutrition Surveillance Survey * (PNSS), the overall percentage of women who were overweight or obese pre-pregnancy was 45.5 percent. In 2009, 54.8 percent of South Carolina pregnant women were overweight or obese.

There are nutritional, immunologic and economic benefits to breastfeeding (Gartner, et al., 2005). In addition to these benefits, a growing body of evidence suggests that breastfeeding may also reduce the risk of childhood overweight and obesity (Shields, et al., 2006). Studies suggest that children who were exclusively or mostly breastfed are less likely to be overweight than children who were exclusively or mostly formula fed (Gartner, et al., 2005; Hediger, et al., 2001; Gillman, et al., 2001). Although the exact mechanisms are still under investigation, theories regarding this protective link between breastfeeding and lower rates of obesity include:

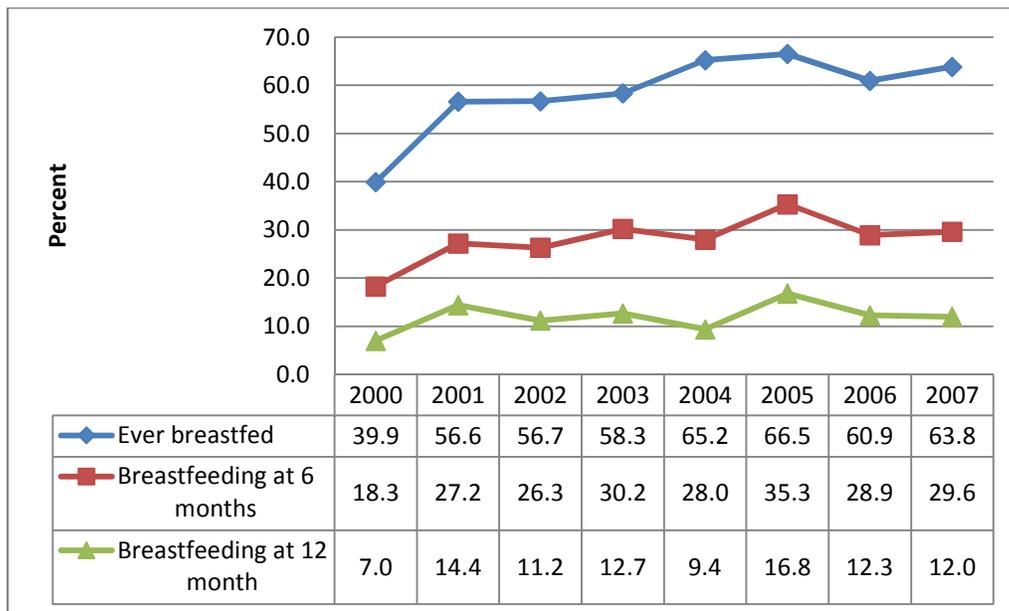
- Breast-fed infants have more self-control over when and how much they eat; this early regulation of food intake may be important for establishing long-term appetite regulation patterns (Bartok, et al., 2009; Dewey, 2003).
- Breastfeeding babies experience a variety of tastes through breast milk (Nicklaus, 2009), which may help in acceptance of a greater variety of foods when solids are started; this greater variety in the diet may help in establishing long-term healthier eating patterns (Menella, 1995).
- Breast-fed babies' biological adaptations during breastfeeding may help defend against later energy imbalance (Bartok, et al., 2009; Dewey, 2003).

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- Breastfeeding has different effects than formula feeding on infant’s metabolism and hormones such as insulin. (Dewey, 2003)

Despite the documented benefits of breastfeeding for babies and mothers, breastfeeding duration and rates remain low. According to the 2009 PedNSS* national data show that 61.7 percent of mothers had ever breastfed their babies, 27.0 percent breastfed at least for 6 months and 18.5 percent breastfed for at least 12 months. In South Carolina, 43.4 percent of new mothers ever breastfed (43rd in the nation), 13.8 percent of mothers breastfed at least 6 months, and 3.9 percent of mothers breastfed at least 12 months.

Figure 14: Breastfeeding Rates among SC Residents, 2000-2007



Source: National Immunization Survey, CDC

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Breastfeeding data are available for women who are enrolled in the Special Supplemental Nutrition for Women, Infant and Children (WIC).

Figure 15: Breastfeeding Rates among WIC participants, by Race, SC, 2010

County	White	Black	Total	County	White	Black	Total
State	71.4%	44.4%	62.8%				
ABBEVILLE	63.7%	33.3%	52.8%	GREENWOOD	58.1%	36.8%	50.4%
AIKEN	67.1%	40.0%	58.2%	HAMPTON	59.7%	41.7%	51.6%
ALLENDALE	36.4%	31.7%	32.5%	HORRY	72.1%	46.8%	68.0%
ANDERSON	65.5%	41.5%	60.9%	JASPER	82.7%	46.3%	66.7%
BAMBERG	68.8%	35.5%	44.8%	KERSHAW	66.7%	40.8%	59.5%
BARNWELL	52.0%	25.0%	36.7%	LANCASTER	54.6%	32.5%	46.4%
BEAUFORT	85.4%	55.0%	77.9%	LAURENS	50.5%	29.5%	44.0%
BERKELEY	78.2%	63.5%	74.9%	LEE	53.3%	27.1%	33.9%
CALHOUN	63.5%	27.8%	47.3%	LEXINGTON	70.4%	52.6%	67.7%
CHARLESTON	87.7%	56.1%	76.7%	MCCORMICK	60.0%	27.8%	37.3%
CHEROKEE	52.8%	28.3%	47.1%	MARION	51.9%	26.1%	34.7%
CHESTER	48.8%	25.4%	37.5%	MARLBORO	41.3%	26.7%	31.3%
CHESTERFIELD	47.3%	27.4%	40.1%	NEWBERRY	66.8%	25.7%	50.9%
CLARENDON	54.3%	29.4%	39.6%	OCONEE	60.5%	35.0%	58.9%
COLLETON	60.2%	35.7%	49.4%	ORANGEBURG	55.5%	37.9%	43.9%
DARLINGTON	55.9%	31.9%	44.2%	PICKENS	66.7%	47.7%	65.9%
DILLON	42.5%	29.4%	34.6%	RICHLAND	80.2%	53.4%	65.8%
DORCHESTER	77.0%	58.2%	72.8%	SALUDA	67.6%	32.2%	58.3%
EDGEFIELD	58.3%	28.3%	38.0%	SPARTANBURG	70.3%	48.5%	65.5%
FAIRFIELD	63.1%	50.9%	54.5%	SUMTER	69.5%	45.5%	57.5%
FLORENCE	63.2%	37.8%	50.6%	UNION	44.7%	35.3%	41.4%
GEORGETOWN	71.3%	40.4%	57.7%	WILLIAMSBURG	57.4%	29.2%	38.1%
GREENVILLE	78.0%	48.6%	71.8%	YORK	65.1%	31.9%	55.0%

Source: SC DHEC Division of Biostatistics/PHSIS

*PedNSS is a child-based public health surveillance system that provides prevalence reports which are produced by the CDC. The CDC has decided to discontinue operation of the PedNSS in the Fall of 2012, after production of the 2011 reports.

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Environmental and Policy Barriers to Healthy Living

The ability to be physically active and eat healthy is partly dependent on how the community environment is designed and supported. The “environment” not only encompasses the physical structure and layout of neighborhoods, sidewalks, walking or biking trails, and safety from traffic and crime, but also the political “environment” to ensure and support access to nutritious food and establishments supportive of physical activity.

Food deserts

Communities without convenient access to affordable and healthy foods are called “food deserts.” A decline of traditional retail and closure of supermarkets means that people in certain neighborhoods have inadequate access to stores selling food. Studies have shown that people living in poor and/or Black neighborhoods have less access to supermarkets compared with wealthier, White neighborhoods (Moore, et al., 2006; Baker, et al., 2006).

The dietary implications of food deserts are that people living in them don’t eat as healthy as others, consuming fewer fruits and vegetables and less low-fat milk. People who live near an abundance of fast-food restaurants and convenience stores compared with supermarkets and fresh produce vendors have a significantly higher prevalence of obesity and diabetes (Baker, et al., 2006).

While there is no quantitative measure to determine what area are considered food deserts, the California Center for Public Health Advocacy has developed the Retail Food Environment Index (RFEI). The RFEI is a ratio describing the relative abundance of different types of retail food outlets in a given area. It is an indicator of the density of food outlets that are less likely to stock fresh fruits and vegetables and other healthy food relative to food outlets that are more likely to stock such healthy food. The higher the RFEI, the greater the number of fast food outlets and convenience stores in relationship to grocery stores and produce vendors.

The RFEI is constructed by dividing the total number of fast-food restaurants and convenience stores by the total number of supermarkets and produce vendors (produce stores and farmer’s markets) in the area.

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$$\text{RFEI} = \frac{(\# \text{fast food restaurants} + \# \text{convenience stores})}{(\# \text{supermarkets} + \# \text{produce stores} + \# \text{farmer's markets})}$$

By county, an RFEI was calculated based on data found in the Food Environment Atlas (FEA), an atlas hosted by the US Department of Agriculture that assembles statistics on food environment indicators in the domains of food choices, health and well-being and community characteristics and provides a spatial overview of a community's ability to access healthy food (www.ers.usda.gov). The formula used to calculate the RFEI using FEA data is

$$\text{RFEI} = \frac{(\# \text{fast food restaurants} + \# \text{convenience stores})}{(\# \text{grocery stores} + \# \text{supercenter/club stores} + \# \text{farmer's markets})}$$

As shown in Figure 16, the overall SC RFEI is reported to be 5.9. The RFEI of 5.9 means that on average for every grocery store within the state of SC, there are almost 6 fast food outlets or convenience stores. There is great disparity between the counties. The county with the highest RFEI is Horry with an estimated 10 fast food outlets or convenience stores for every grocery store. The county with the lowest RFEI is Allendale with an estimated 1.4 fast food outlet or convenience store for every grocery store. The literature demonstrates that higher RFEIs are correlated with higher prevalence of obesity and associated health problems (California Center for Public Health Advocacy, Policy Link, & UCLA Center for Health Policy Research).

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Figure 16: Retail Food Environment Index (RFEI) by SC County

	# fast food restaurants	# of convenience stores	# of grocery stores	# of supercenter /club stores	# farmer's markets	RFEI
State	3500	2628	864	77	94	5.9
Abbeville	8	16	2	0	2	6.0
Aiken	84	87	28	3	1	5.3
Allendale	0	7	4	0	1	1.4
Anderson	118	130	26	3	3	7.8
Bamberg	4	11	3	0	0	5.0
Barnwell	12	16	4	1	1	4.7
Beaufort	242	61	37	2	5	6.9
Berkeley	71	65	17	3	2	6.2
Calhoun	3	11	1	0	1	7.0
Charleston	407	151	92	7	7	5.3
Cherokee	39	44	9	1	1	7.5
Chester	15	31	10	0	0	4.6
Chesterfield	31	28	11	1	3	3.9
Clarendon	17	32	6	1	1	6.1
Colleton	24	37	11	1	2	4.4
Darlington	31	52	15	1	0	5.2
Dillon	18	26	9	0	1	4.4
Dorchester	50	46	17	1	1	5.1
Edgefield	10	12	3	0	0	7.3
Fairfield	7	19	2	1	0	8.7
Florence	80	111	41	2	3	4.2
Georgetown	89	40	14	1	2	7.6
Greenville	385	203	86	9	3	6.0
Greenwood	56	47	16	1	1	5.7
Hampton	11	21	7	0	1	4.0
Horry	479	177	55	7	3	10.1
Jasper	17	27	3	1	1	8.8
Kershaw	34	38	9	1	1	6.5
Lancaster	33	47	16	1	1	4.4
Laurens	26	48	11	0	1	6.2
Lee	6	11	3	0	0	5.7
Lexington	188	132	42	8	5	5.8
Marion	16	27	12	1	1	3.1
Marlboro	10	23	9	0	1	3.3
McCormick	2	9	2	0	0	5.5
Newberry	33	34	7	1	1	7.4
Oconee	45	43	14	1	2	5.2
Orangeburg	58	80	22	1	2	5.5
Pickens	82	61	13	1	2	8.9
Richland	254	164	59	5	21	4.9
Saluda	10	12	3	0	1	5.5
Spartanburg	194	165	45	6	2	6.8
Sumter	47	72	17	1	2	6.0
Union	16	24	8	0	1	4.4
Williamsburg	13	23	8	0	1	4.0
York	125	107	35	3	3	5.7

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Availability of sidewalks, parks, recreational facilities, etc.

The increasing prevalence of obesity in youth and adults has been attributed to environmental changes that encourage sedentary behaviors and reduced physical activity. Environments that include streets, parks, trails, recreation facilities, and school properties, can impede or encourage activity depending on their accessibility and design. In 2009, 68.0 percent of SC residents report no sidewalks in their neighborhood .

Neighborhoods with greater accessibility to reinforcing physical activities such as those provided at parks and recreational facilities could increase young children's physical activity by increasing children's motivation to be active outside. Studies have shown that greater accessibility to environments that support physical activity was been associated with lower risks of being overweight in both youth and adults (Craig, et al., 2002).

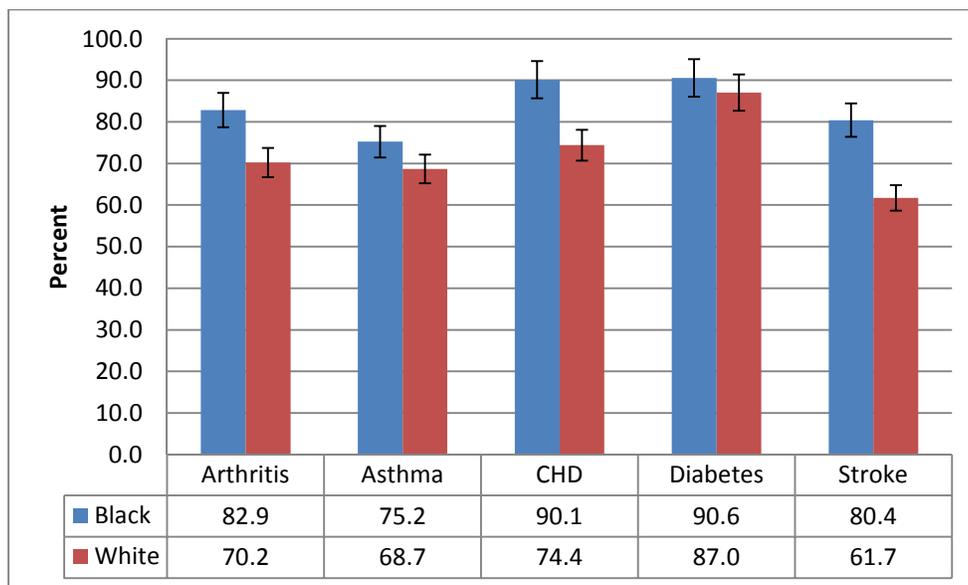
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Impact of Overweight and Obesity on Chronic Diseases and Conditions

Individuals who are overweight or obese have increased odds of developing a chronic disease. Those who are obese are at the greatest risk. Obesity is associated with more than 30 major diseases, including diabetes, high blood pressure, coronary heart disease, stroke, and certain types of cancer (such as endometrial, breast, prostate, and colon) (DHHS, Surgeon General’s Report, 2010; CDC).

Obesity is a greater trigger for problems and increased health spending than smoking or drinking. Individuals who are obese have 30 percent to 50 percent more chronic medical problems than those who smoke or drink heavily. (Health Affairs, 2002).

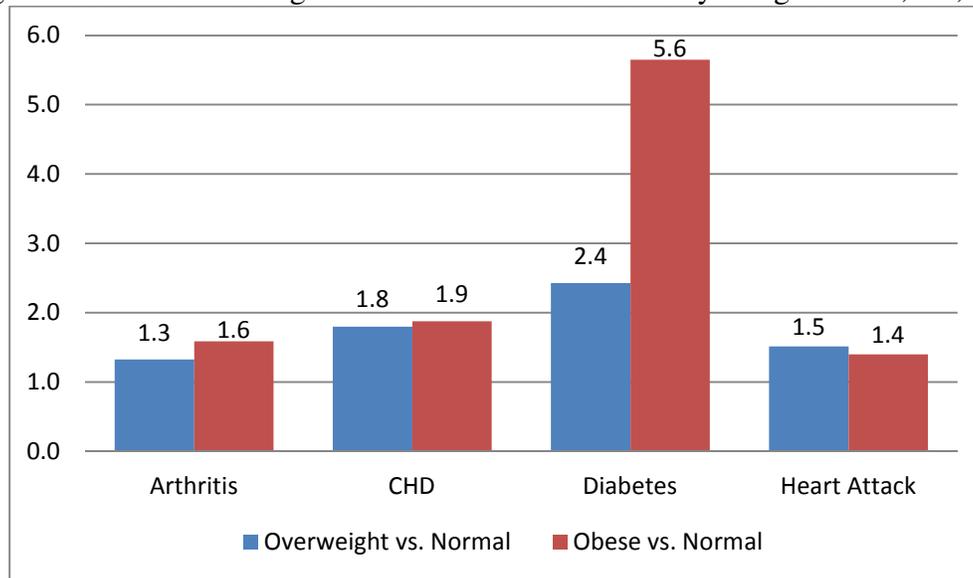
Figure 17: Percent of Residents with Chronic Disease who are Overweight or Obese, by Race, SC, 2010



Source: BRFSS

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Figure 18: Odds of Having Various Chronic Conditions by Weight Status, SC, 2010



Source: BRFSS

According to the 2010 SC BRFSS, overweight and obese individuals had increased odds of having arthritis, coronary heart disease (CHD), diabetes, or heart attack.

Compared to normal/recommended weight status, overweight individuals had

- 30 percent higher odds of having arthritis
- 80 percent higher odds of having CHD
- odds of having diabetes that are more than twice (2.4 times) the odds of individuals of recommended weight status
- 50 percent higher odds of having a heart attack

Compared to normal or recommended weight status, obese individuals had

- 60 percent higher odds of having arthritis
- 90 percent higher odds of having CHD
- odds of having diabetes that are 5.6 times the odds of individuals of recommended weight status
- 40 percent higher odds of having a heart attack

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Impact of Overweight and Obesity: Economic Costs

Obesity has been found to decrease health-related quality of life and overall life expectancy (Peeters, et al, 2003). This largely preventable condition and its associated comorbidities place an undue stress on the healthcare system and use resources which are already scarce. In recent years, researchers have documented the impact that obesity has on health care and related costs. These estimates of the costs of obesity to the healthcare system are of great importance as they may justify preventative and intervention programs and policies. According to several studies, individuals with BMIs greater than or equal to 30 accrued costs approximately 30 percent higher than their peers with BMIs of less than 25 (Withrow, et al., 2001).

The total cost of obesity in the United States was \$117 billion in 2000. Obesity-attributable medical expenditures were estimated at \$75 billion in 2003. In South Carolina, the 2010 obesity-attributable medical expenditures were estimated at \$1.06 billion in 2003. More than half of these expenses were paid by taxpayer dollars through Medicaid and Medicare programs (Finkelstein, 2004). Today, it is estimated that \$1.2 billion dollars is spent due to obesity in South Carolina, with the projected increase to \$5.3 billion dollars in 2018 or about \$1,505 dollars per adult in South Carolina. If South Carolina were to halt the increase in the prevalence of obesity at today's levels, we could save \$858 per adult in 2018, a total of \$3 billion (<http://www.americashealthrankings.org/Obesity.aspx?st=SC>).

Along with the impact of obesity to health care costs, employers feel the impact of this burden. The cost of obesity-related health problems to U.S. businesses in 1994 were almost \$13 billion (with approximately \$8 billion of this for health insurance expenditures, \$2.4 billion for sick leave, \$1.8 billion for life insurance, and close to \$1 billion for disability insurance) (DHHS, 2003).

It should be noted that in addition to these direct costs of obesity there are also indirect costs associated with obesity such as productivity loss, psychological and social costs and decreased quality of life which are harder to calculate its economic impact.

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Health Disparities

The National Institute of Health (NIH) defines health disparities as: “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.” Eliminating health disparities is part of the nation’s health agenda and has been included as a goal of Healthy People 2020 (HP 2020). This stated goal in HP 2020 is to eliminate health disparities among subgroups of the population who are vulnerable to higher levels of chronic conditions. The burden of obesity and the severity of related health conditions vary among different populations groups. Obesity is of national health concern in the general population, however research has shown that persons within certain sub-populations are more vulnerable than others to this health problem: ethnic and racial minorities (Baker, et al., 2006), mentally and physically disabled person (Rimmer, et al., 2010), residents of rural areas (Paterson, et al., 2004), and persons with low socioeconomic status (Baker, et al., 2006).

Race

South Carolina’s population continues to increase. The majority of this growth is in racial and ethnic minority population groups. In the last decade, the number of people belonging to racial and ethnic minorities in the state has increased by over 18%. Over 81% of these individuals are Black (1.3 million South Carolinians). However, the greatest increase in population occurred among Hispanics or Latinos which doubled in numbers (SC DHEC, Office of Minority Health). Racial and ethnic minorities are one of the subgroups of the populations who are vulnerable to higher levels of overweight, obesity, and other chronic disease.

According to the 2010 Behavioral Risk Factor Surveillance System (BRFSS), obesity prevalence is higher among African Americans (41 percent) and Hispanics (54.8 percent) than among their White counterparts (28.3). In South Carolina in 2010, there existed a disparity of 12.7 percent. This disparity has decreased from a 17.7 difference in 2000 where 18.3 percent of Whites were obese compared to 36 percent of African Americans being obese.

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Disability

In 2008 the Kaiser Family Foundation estimated that 13.9 percent of SC adults 21-64 years old reported a disability compared to 12.1 percent reporting disability nationally. Among adults several studies have also reported a higher prevalence of obesity among persons with intellectual disability compared to non-intellectually disabled persons. Among disabled persons, women, older individuals, and those with less severe disabilities and certain genetic causes of obesity (i.e. Down syndrome) were more likely to be obese compared to their counterparts (Rimmer, et al., 2006).

In South Carolina, according to the 2009 BRFSS, 71.4 percent of disabled adult persons were overweight or obese compared with 63.9 percent of adult persons reporting no disability.

Obesity is as much of a health problem among persons with disabilities as it is in the general population. According to the Department of Education, youth with disabilities comprised 9.2 percent or 6 million school-age children in the United States in 2007. Secondary analyses from 2002 National Health and Nutrition Examination Survey (NHANES) data suggest that overweight is more prevalent among adolescents with physical disabilities. Analysis of national high school survey data, for example, found that one-third of 9th to 12th grade students who reported having “any physical disabilities or long term health problems” were obese or overweight (Rimmer, et al., 2007). This increased prevalence of overweight and obesity has also been identified in school aged children reporting intellectual and developmental disabilities.

Rural vs. Non-rural

According to the 2000 US Census Population Statistics, one in every five (20.8 percent) of the US population lives in a rural area. Several studies have reported that rural residents experience higher rates of obesity and overweight than people living in urban areas (Liu, 2008; Patterson, 2004). It is possible that rural demographics may play some role in the disparity between rural and urban overweight and obesity rates. Rural residents tend to be older, less educated and have lower income than urban residents, all factors being related to higher obesity (Rural Assistance Center, 2009). Even with all other factors held equal, rural residents of every racial/ethnic group are at higher risk for obesity (Patterson, et al, 2004).

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Unhealthy diet is one reason to explain the rural obesity disparity. Rural residents in some areas eat a higher fat and calorie diet than the average American. People in rural areas may face limited selection and higher cost for fresh fruit and vegetables than consumers in more urban areas. Some challenges include distance and limited transportation options. Those living in areas not served by a major grocery chain may find it difficult to shop for healthy foods.

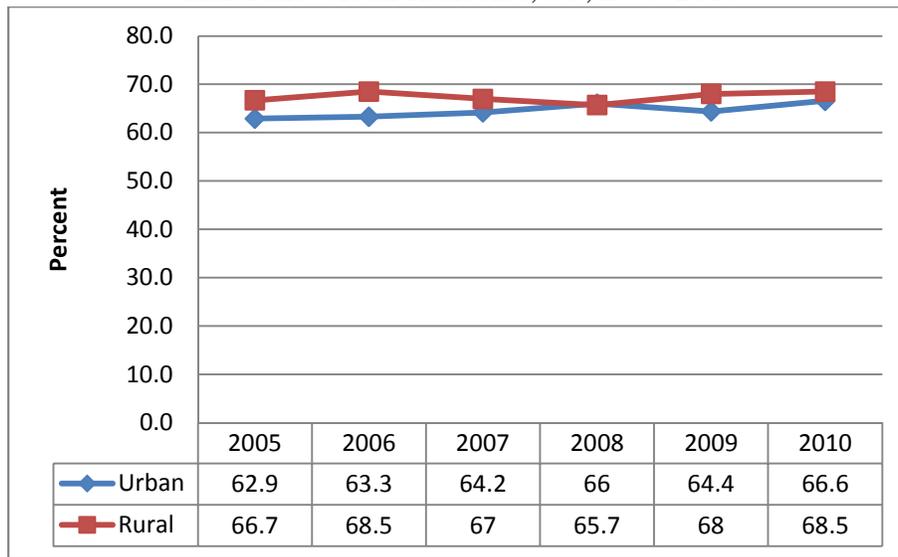
Besides differences in access healthy foods, another risk factor, lack of exercise also contributes to rural obesity. Rural residents tend to be less physically active than urban residents (Rural Assistance Center, 2009). Some causes may include limited access to exercise facilities, sidewalks, parks and other challenges due to the built environment. People living in areas without sidewalks and public transportation may find exercise as a part of daily activity and outdoor exercise much more difficult.

According to the South Carolina Rural Health Research Center (SCRHRC), rural children are both more likely to be overweight or obese. Using data from the 1999-2006 NHANES, the SCRHRC reported that 36 percent of rural children were overweight compared with 30 percent of urban children and that 19 percent of rural children were obese compared with 15 percent of urban children. Overweight and obesity were more common among minority children with rural black children having the highest prevalence than the other races.

According to the 2010 SC BRFSS, the rates of overweight and obesity among rural residents was 68.5 percent compared to the rates among urban residents of 66.6 percent. This amounts to a 1.9 percent disparity. Figure 19 shows the rates of overweight and obesity among rural and urban residents for the years 2005 to 2010.

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Figure 19: Percentage of Adult who are Overweight and Obesity Among Rural and Urban Residents, SC, 2005-2010



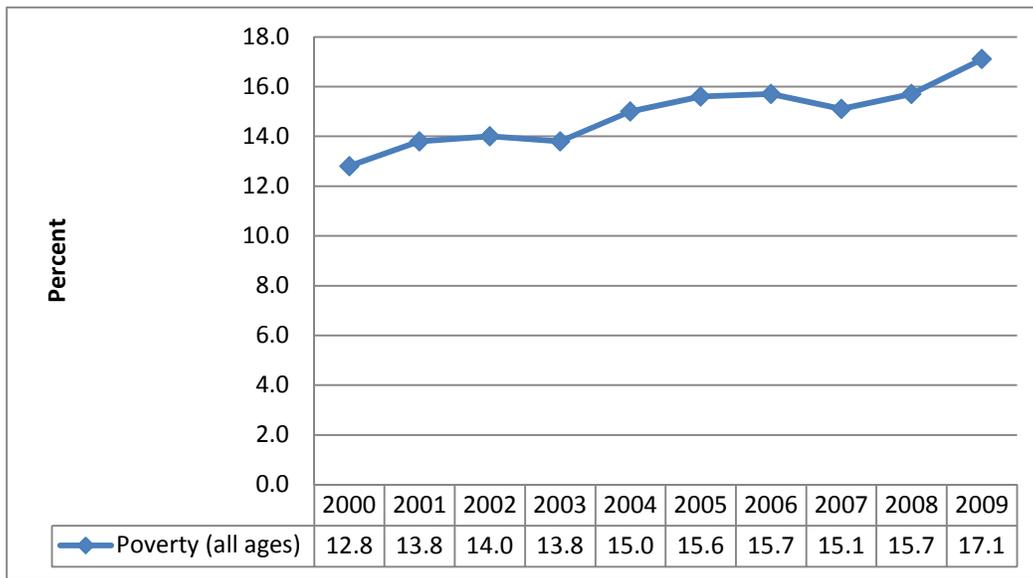
Source: BRFSS

Poverty Level

Many health disparities in the US are linked to inequalities in education and income. Therefore it should not come as a surprise that another area where notable disparities exist in the percentage of overweight and obesity is by socioeconomics. Some of the highest rates of obesity occur among population groups with the highest poverty rates and the least education (Drewnowski, et al. 2004).

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Figure 20: Percent of Residents in Poverty, SC, 2000-2009



Source: US Census

The reasons that people of low socioeconomic status (SES) tend to have poorer diets (James, et al., 2001), lower levels of physical activity (Giles-Corti, et al., 2002), and thus higher rates of overweight and obesity (Drewnowski, et al., 2004; McLauren, 2007) are not completely understood. Research suggests that this could be caused by a number of factors. Some factors can be attributed to characteristics of the individual, such as knowledge or skill, while other causes are due to challenges in the social environment, such as family support, or the physical built environment. It is most probable that the high risk of obesity in low socioeconomic populations is caused by a combination of these different factors.

Summary

With 67.4 percent of all adults in South Carolina either overweight or obese and 29.6 percent of all high school students in S.C. overweight or obese, this is of serious concern in South Carolina. Since overweight or obese persons are at greater risk of chronic diseases such as type 2 diabetes, high cholesterol, coronary heart disease, and stroke, if obesity remains unaddressed this epidemic of South Carolina can lead to increasing rates of these chronic diseases. If South Carolina were to halt the increase in the prevalence of obesity at today's levels, we could save a total of \$3 billion dollars (<http://www.americashealthrankings.org/Obesity.aspx?st=SC>).

The risk factors of poor nutrition and physical inactivity are influenced by a complex and interrelated set of individual and community factors. Long-term gains in obesity and related chronic disease prevention will be maximized through a comprehensive, collaborative, and long-term approach involving a wide range of partners and stakeholders. Reducing the burden of poor quality of life, chronic illness, disability, increasing healthcare expenditures, illness, and even premature death in South Carolina will require sustained commitment at all levels to create places in which the healthy choice is the easy choice.

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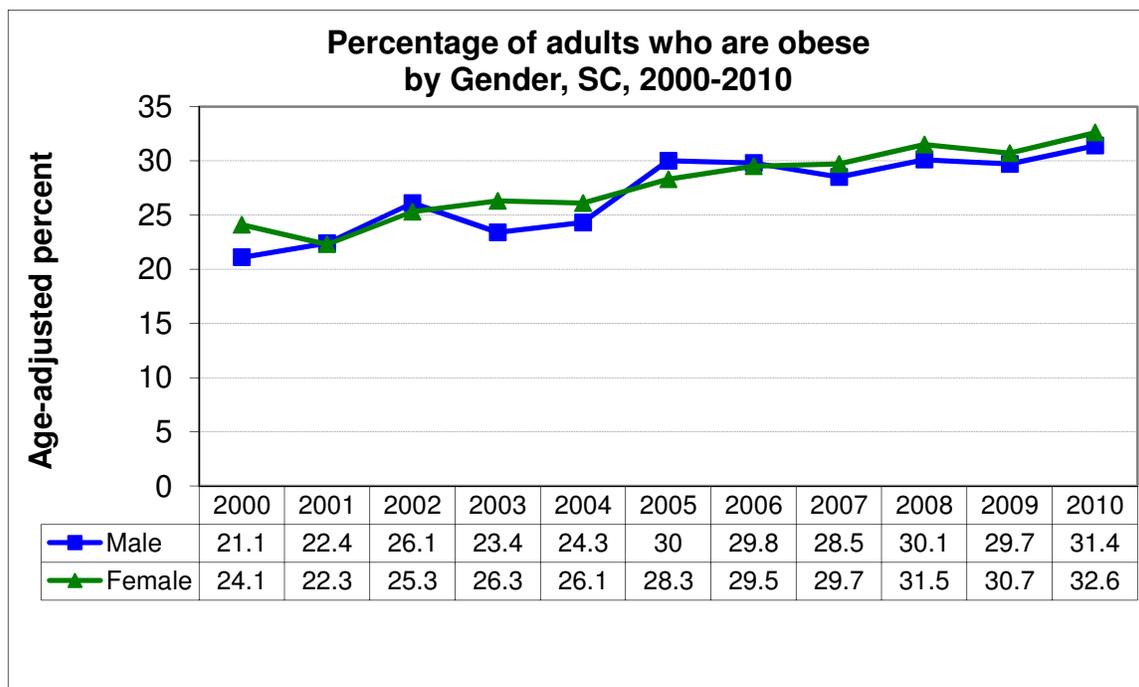
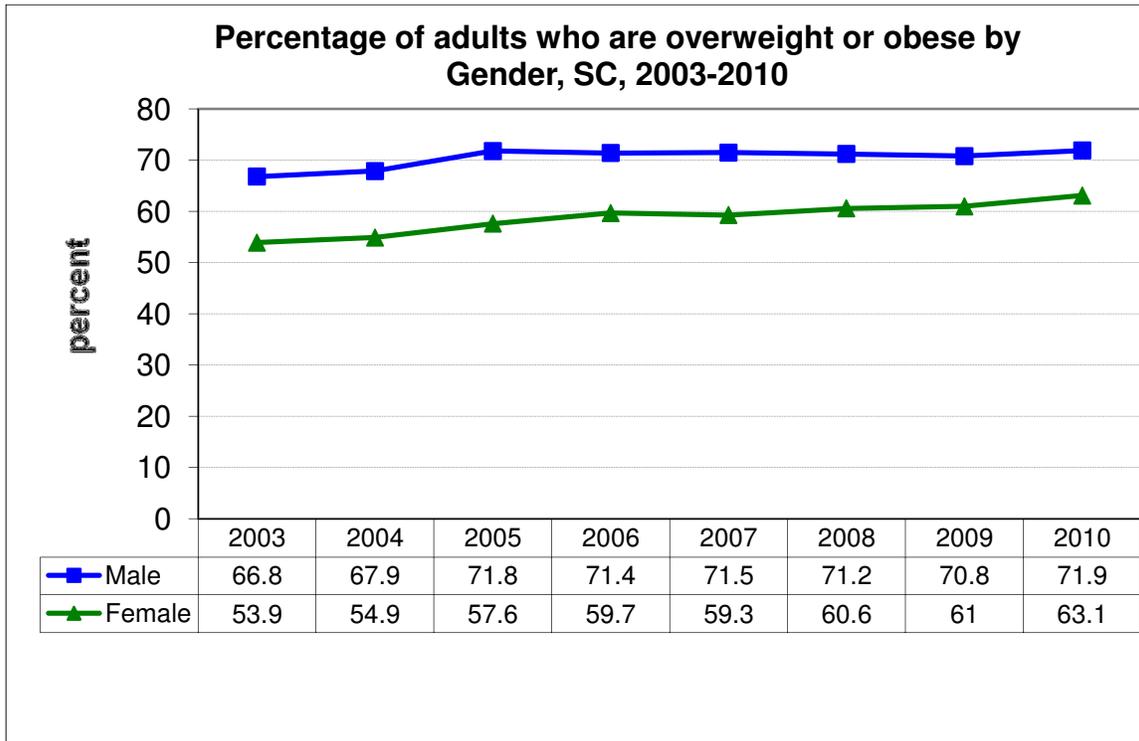
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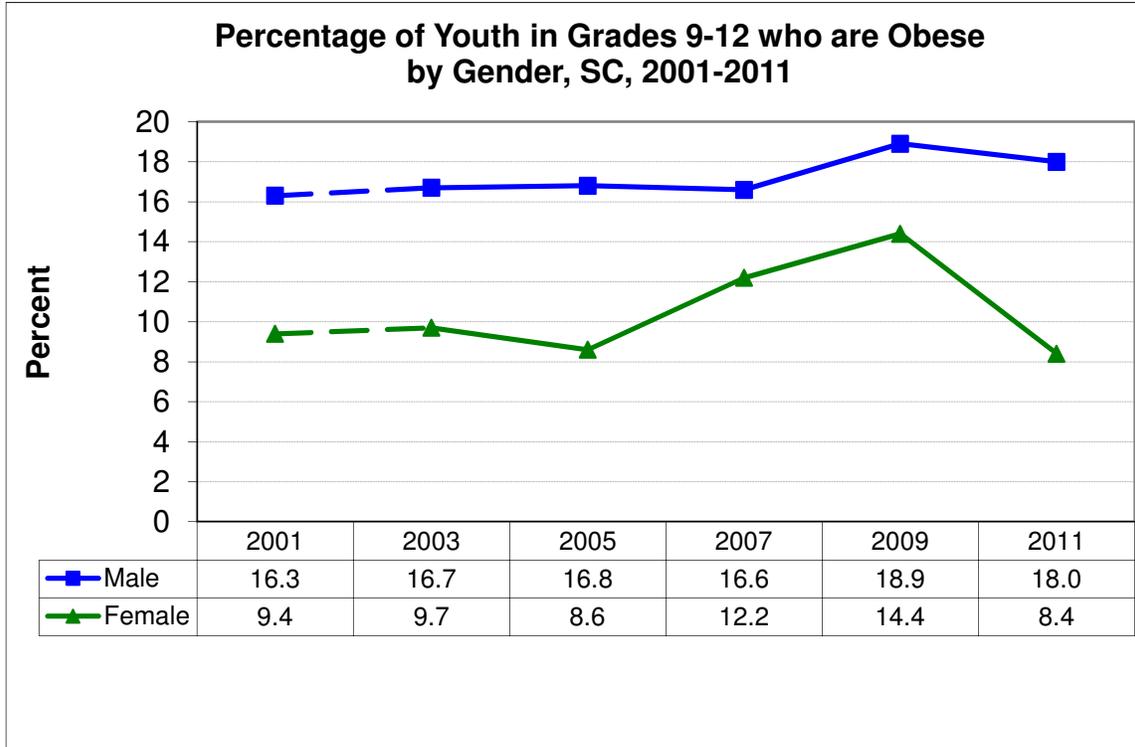
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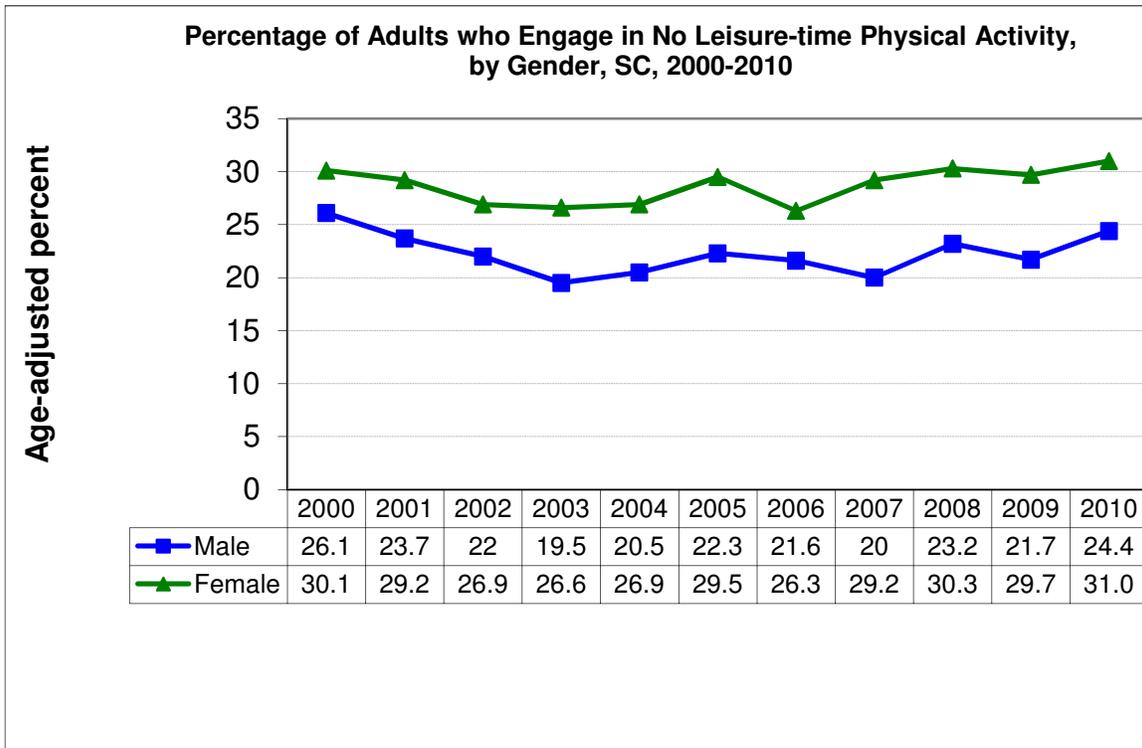
Appendix



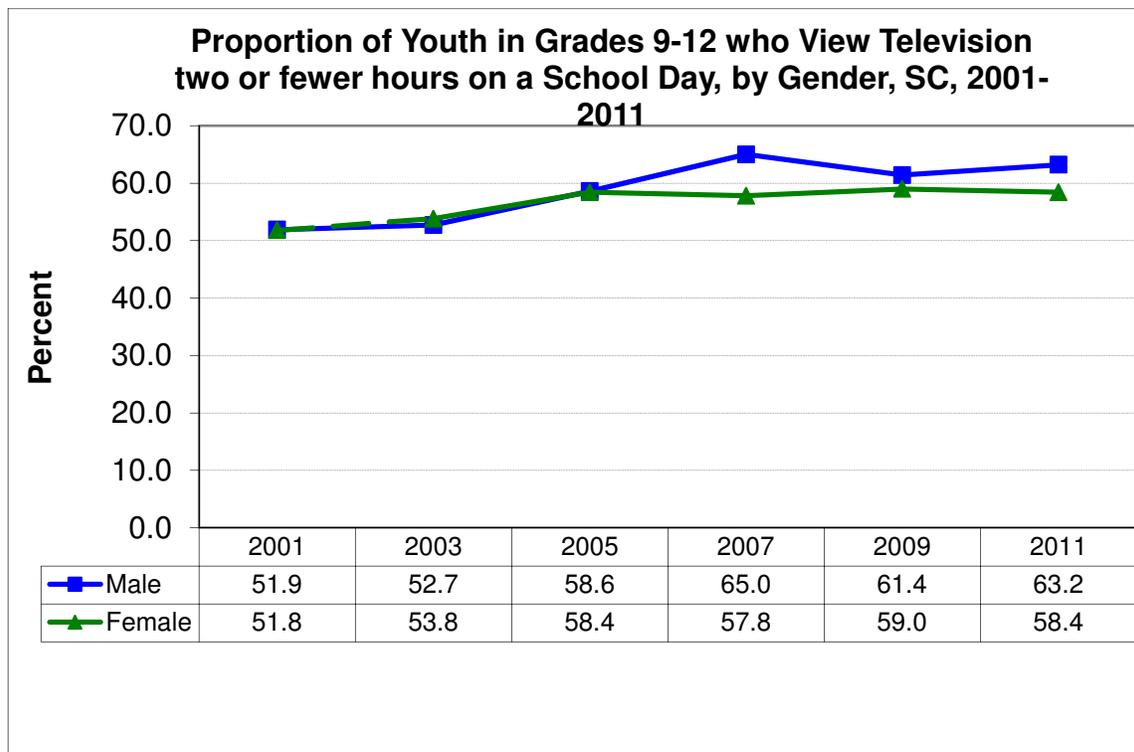
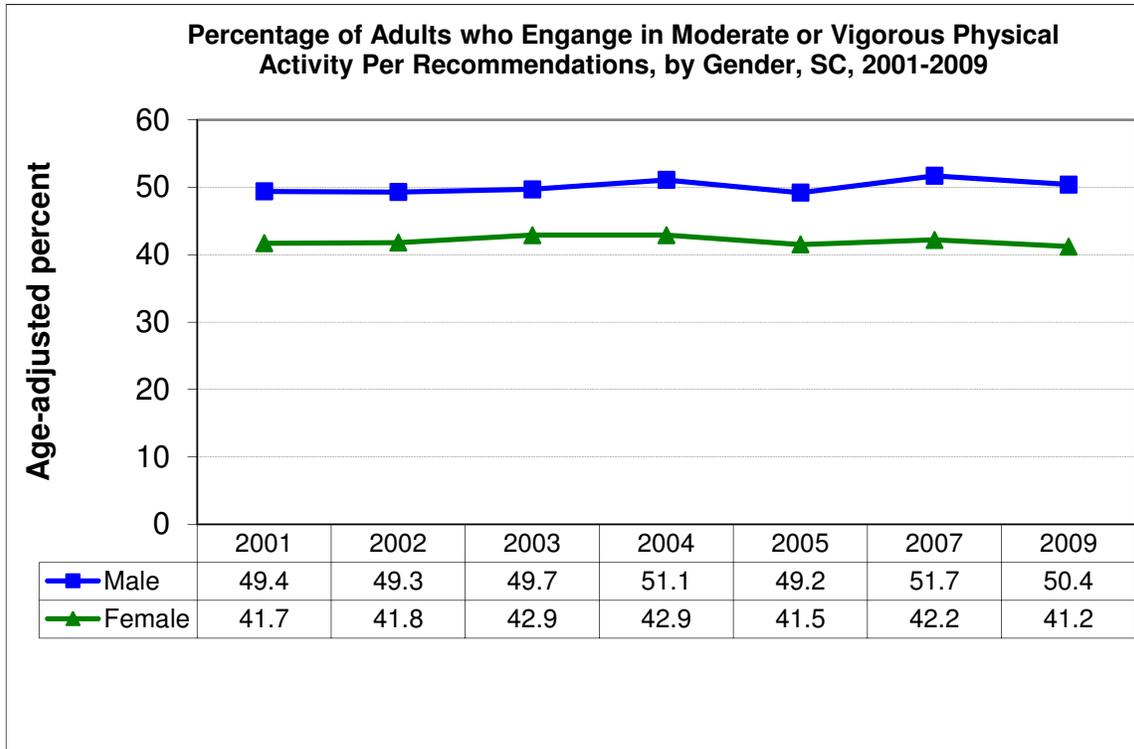
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*The 2001 and 2003 data are not weighted.



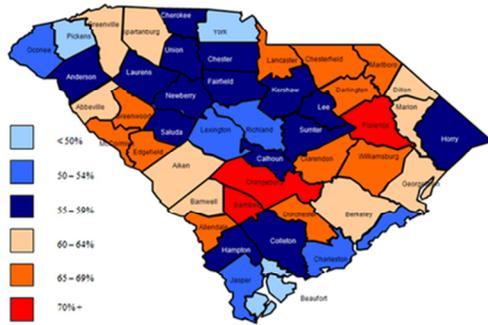
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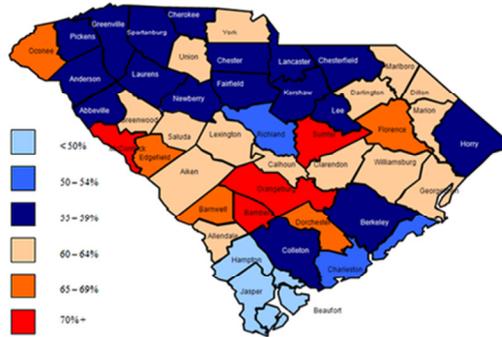
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SC Overweight and Obesity Maps 2000-2005

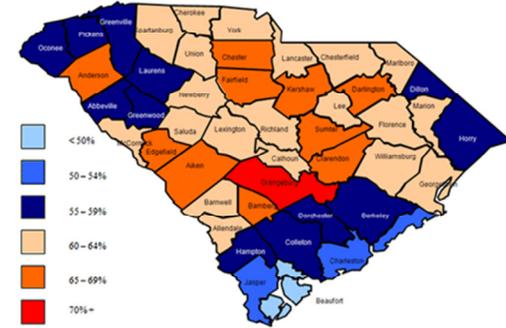
Percent of Overweight and Obese (BMI ≥ 25) in S.C. Adults
2000



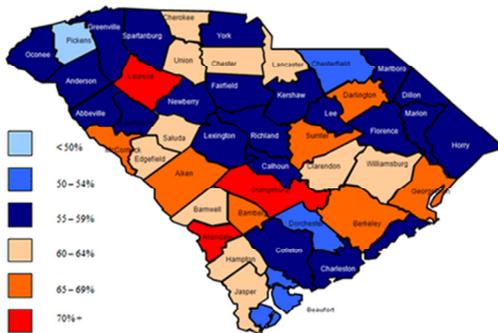
Percent of Overweight and Obese (BMI ≥ 25) in S.C. Adults
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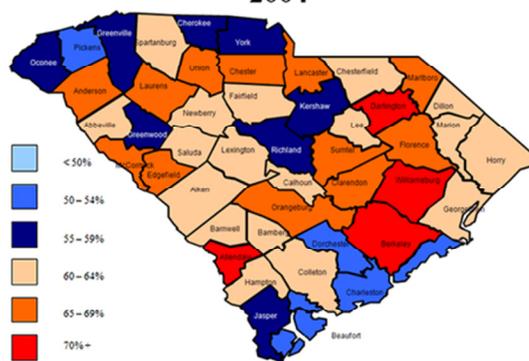
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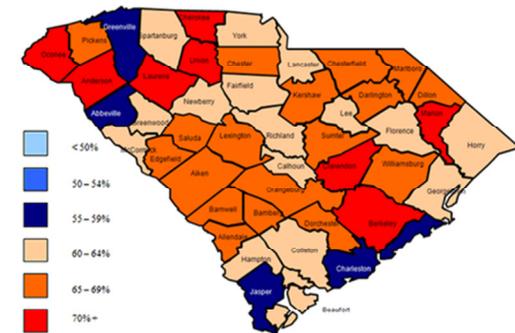
Percent of Overweight and Obese (BMI ≥ 25) in S.C. Adults
2003



Percent of Overweight and Obese (BMI ≥ 25) in S.C. Adults
2004



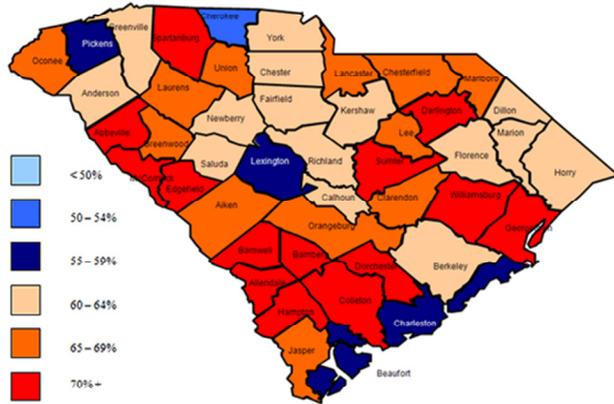
Percent of Overweight and Obese (BMI ≥ 25) in S.C. Adults
2005



SC Overweight and Obesity Maps 2006-2009

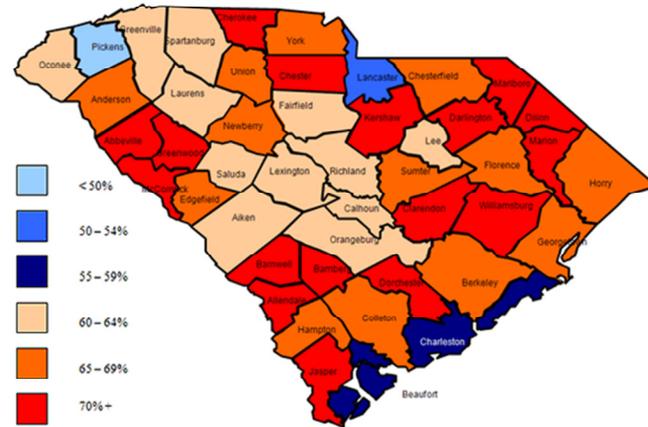
Percent of Overweight and Obese (BMI ≥ 25) in S.C. Adults

2006



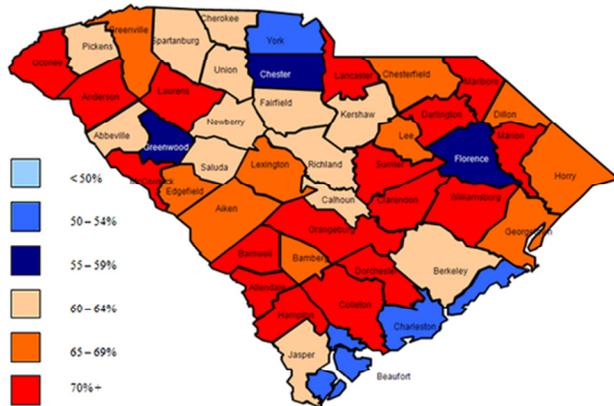
Percent of Overweight and Obese (BMI ≥ 25) in S.C. Adults

2007



Percent of Overweight and Obese (BMI ≥ 25) in S.C. Adults

2008



Percent of Overweight and Obese (BMI ≥ 25) in S.C. Adults

2009

