Burden of Diabetes in South Carolina

2009 Edition

Executive Summary

South Carolina ranks 10th in cases of diagnosed diabetes compared with other states. This *2009 Burden Report* attempts to quantify the impact of the diabetes epidemic on the State by outlining information on the number of people with diabetes, their characteristics, and the consequences of the disease.

The prevalence of diabetes in South Carolina is presently at 9.6%. Data sources revealed an estimate of 300,000- 350,000 people in South Carolina to be living with diabetes affecting more women than men; and higher in the non-white population (10.6%) than in the white population (7.3%).

Diabetes is a serious disease, which is often accompanied by complications, such as blindness, kidney failure, heart attacks, strokes, and amputations. High blood pressure and abnormal cholesterol levels are frequent. Medical costs rise with increased duration of the disease, and lifespan is shortened by 5-10 years in most patients. Approximately 3000 South Carolinians die from diabetes every year. Most diabetes deaths occur in persons over age 60. Minorities, predominantly blacks, experienced a substantially higher death rate and more years of potential life loss than whites. The racial disparity is narrowing in diabetes prevalence, primarily, because the prevalence in the white population is increasing.

The total number of hospital discharges with a primary diagnosis of diabetes is increasing. Total hospital charges for diabetes increased to $928 million in 2001. From 2001 to 2006 the average charges increased for patients of any age group. The increase in average charges ranged from 90% to 125%. Medicare claims were filed for over half of total charges in 2001. Length of hospital stay has changed very little in recent years. The number of patients on renal dialysis continues to increase. Currently, almost 3,000 patients with diabetes are on dialysis. Emergency room visits and costs have increased for diabetes visits over the past four years. The number of patients with Emergency Department (ED) visits increased by 46% between 1996 and 1999, and total charges for ED visits rose 115% between 1997 and 2001.

Hospitalization rates for renal failure are still more than double among blacks when compared with whites. In all cases, significant increases have been seen particularly in non-white when compared to white individuals. The prevalence of myocardial infarction and stroke are increased 5-fold among people with diabetes in South Carolina.

Presently, disquieting trends are seen in some risk factors for diabetes. Behavior Risk Factor Surveillance Survey (BRFSS) analyses show an alarming increase in diabetic individuals who are overweight or obese, and who have high blood cholesterol and hypertension. The prevalence of overweight or obesity in South Carolina adults increased by approximately 23% from a rate of 53% in 1997 to 65.3% in 2007. More than 70% of people with Type 2 diabetes are overweight, and this is a major contributor to the insulin resistance, which characterizes this disease.

There are encouraging trends however, such as; decrease in the rates of physical inactivity which should eventually be translated into a decreased prevalence of obesity; decrease in the prevalence of cigarette smoking among men with diabetes; decrease (45%) in lower-

extremity amputations in people with diabetes in the past five years; and short-term surrogate measures and actions such as frequency of hemoglobin A1c (HbA1c) tests, foot examinations, and eye examinations have improved in recent years.

Complications of diabetes may be prevented or delayed by specific actions. Improved blood glucose control will slow progression of eye, kidney, and nerve complications. Control of elevated blood pressure and high cholesterol, use of specific drugs for protein loss in the urine, improved nutrition, exercise, foot care, and low dose aspirin therapy have now all been shown to markedly reduce the risks of renal failure, blindness, stroke, heart attacks, and amputations in people with diabetes.

The Burden Report paints an alarming picture of the impact of diabetes on our state and we have a long way to go! Survey data show that 50% of people with diabetes in South Carolina check blood glucose less than one time a day. However, 70% have had two HbA1c tests, the gold standard marker of long-term blood glucose control, in the past year. This indicator has been stable at 70% or more since 2001, and is a marked improvement since 1994-97, when only five percent were checking HbA1C once a year or more.

Studies have conclusively shown that as little as a 10% reduction in the level of HbA1c will reduce the risks of eye, kidney, or nerve damage 25 to 50%! Over 68% of diabetic people have had their eyes checked in the past year, and close to 90% have had their feet examined. These steps are critical if one is to avoid the serious complications of blindness and amputations.

There are active efforts to train health care providers, to educate and encourage persons with diabetes to take control of their diabetes through self-management (dietary changes, exercises, smoking cessation, seeking regular medical care, and performing visual inspections of extremities), and to promote changes in the health care system and the community to improve diabetes outcomes.

SC DHEC has had a separately funded Diabetes Prevention and Control Program (DPCP) since 1994. Also, in July 1994, the South Carolina Legislature established the Diabetes Initiative of South Carolina (DSC), with a Diabetes Center of Excellence at the Medical University of South Carolina (MUSC) and a governing Board, and three active councils. DSC works closely with DPCP/DHEC via its widely representative Board of Directors and through its Surveillance and Outreach Councils, committees, and task forces. A 10 Year Strategic Plan was implemented by DSC in 1998, and results from successive Burden of Diabetes in South Carolina reports are used to monitor progress.

The DPCP and DSC have an impressive number of new educational and outreach programs for people affected by diabetes and its complications. Optimal management and treatment of diabetes and prevention of diabetes complications are a high priority of the continued efforts of the DPCP and the DSC. Increasing resources of diabetes control in South Carolina, particularly rural health settings, targeting high-risk populations are objectives of DSC and DPCP.

The challenge is to make health professionals and people with diabetes fully aware of these guidelines and take immediate medical action.

The DSC Strategic Plan calls for a ten-year program directed at these issues. Results of these programs will be regularly monitored by the DSC Board and by DPCP. Objective data on costs, complications, morbidity and

mortality will be reported in periodic issues of this Burden Report. We can be optimistic that this multi-faceted statewide program will gradually make a real impact upon the consequences of diabetes and its complications in South Carolina.

Acknowledgements

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Acronyms

ACSC	Ambulatory Care-Sensitive Conditions
BF	Black Female
BM	Black Male
BMI	Body Mass Index
BRFSS	Behavioral Risk Factor Surveillance System
CCME	Carolina Center for Medical Excellence
CDC	Center for Disease Control and Prevention
CDE	Certified Diabetes Educator
DHEC	Department of Health and Environmental Control
DSC	Diabetes Initiative of South Carolina
ED	Emergency Department
HbA1C	Hemoglobin A1C
HPSA	Health Professional Shortage Areas
MUA	Medically Underserved Areas
MUSC	Medical University of South Carolina
OCDE	Office of Chronic Disease Epidemiology
ORS	Office of Research and Statistics
PHSIS	Public Health Statistics and Information Services
SCDPCP	South Carolina Diabetes Prevention and Control Program
SCPHCA	South Carolina Primary Health Care Association
VA	Veteransô Affairs
WF	White Female
WM	White Male
YPLL	Years of Potential Life Lost

Introduction

Diabetes, the seventh leading cause of death in South Carolina, has an immense impact on public health and medical care. This disease claims more than 1,089 lives each year and approximately 400,000-510,000 South Carolinians are affected, including 100,000-160,000 who were still undiagnosed in 2007. People with diabetes are at increased risk for blindness, lower extremity amputation, kidney failure, nerve disease, hypertension, ischemic heart disease, and stroke. One of every seven patients in a South Carolina hospital has diabetes. The total direct and indirect costs of hospitalizations and emergency room visits were over $2.7 billion in 2006. The burden of diabetes is more significant in minority and elderly groups.

This report is a description of the impact of diabetes, including trends, disparities, morbidity, mortality, and costs. The wide range of information presented here is intended to:

- Assist health care professionals and family members of persons with diabetes to understand more fully the scope of the disease in South Carolina;
- Describe progress made in recent years with patient, physician, and other health provider education, and attempts to improve access to high quality self-management training for persons with diabetes; and
- Identify continuing needs and opportunities for diabetes control in South Carolina.

METHODS

The data presented in this report were compiled from a variety of sources including census data, vital records, hospital discharge data, emergency room records, the South Carolina Statistical Abstract and the Behavior Risk Factor Surveillance System (BRFSS). The former data sets are complete representations of events in South Carolina; however, the BRFSS is based upon a randomly selected, interview sample of South Carolinians over age 18 years.

There are limitations to the BRFSS data in terms of the representation of all regions of the state and all population groups. Rural and African-American residents are under-represented by the telephone interview system. The frequency of responses by a particular population group (e.g., 65 years and older African- American women) may be rather small, so in several instances multiple years of data were pooled, or regions of the state were combined to achieve reliable frequencies for this report. In that regard, the racial composition of the data is divided into two groups, based on the designation of the census [population-level] data as white and nonwhite. The nonwhite component of South Carolinians, which is about 30% of the state population, is about 96% African-American.

The data on hospitalizations and Emergency Room visits comes from the Inpatient and Emergency Room Discharge datasets collected and maintained by the Office of Research and Statistics of the South Carolina Budget and Control Board. These datasets are compiled from billing data supplied by all civilian instate hospitals. Within the datasets are information on admissions to hospitals and Emergency

Rooms, including diagnoses, procedures performed, length of stay, and charges. However there are limitations to the dataset. Hospital discharge data includes only hospital discharges from civilian hospitals within the state; therefore, patients seeking healthcare in the hospitals outside the state or in the Veterans Administration system are not included in the data.

Chapter One: Demographics and Access to Health Care

South Carolina has experienced several dramatic changes in population in the past 10 years. These changes have a huge impact on the interpretation and evaluation of health statistics. Changes over the past 10-20 years in demographics, urban and rural environments, access to health care, and health professional coverage are presented in this chapter, setting the stage for and giving context to the data presented in the next three chapters.

Chapter Two: Risk Factors

Diabetes is a slowly developing, metabolic disease. The risk of diabetes increases with age and in persons who have a family history of the disease or ones who belong to high-risk ethnic groups, such as, African Americans and Hispanics. Many behavioral factors contribute to the development of diabetes and its complications. The BRFSS collects information about a variety of modifiable behavioral risk factors for diabetes, and information about patterns of care seeking and utilization of care by persons with diabetes. These data are reviewed in the opening chapter with representations of trends over recent years, and across age, race, and gender groups among all South Carolinians.

Chapter Three: Morbidity

Diabetes imposes a major impact on health care utilization and costs in South Carolina. This chapter describes the prevalence rate of diabetes across selected age, race and gender groups in South Carolina, with information about trends over time. Data on the burden of diabetes on the medical care system including hospitalizations, costs, and lengths of stay are presented. In addition, this chapter highlights data on a variety of diabetes-related complications, and conditions associated with higher risk in persons with diabetes, information about the patterns observed for persons with diabetes related to emergency room visits, and diabetes among pregnant women and its impact on the outcomes of pregnancy.

Chapter Four: Mortality

Deaths from diabetes and diabetes-related conditions are described in this chapter, over time, and by population groups (race, gender). Topics such as years of potential life lost, and impact for infant mortality from maternal diabetes are also presented.

Chapter Five: Diabetes Data Resources

The DSC and SCDPCP have made extensive efforts to identify groups and agencies working with persons with diabetes, whether in terms of patient education or clinical care, all across the state. The statewide resources for data and research are presented in this section, as well as information about how to contact these groups, and a list of state and national websites for diabetes data, education, care, and research.

Chapter One
Demographics and Access to Health Care

Demographics

As of July 1 2007, South Carolinaõs population was estimated to be 4,407,7093. The estimated population is the calculated number of people living in an area as of July 1st. The estimated population is calculated from a components of change model that incorporates information on natural change (births, deaths) and net migration (net internal migration, net international migration) that has occurred in an area since a Census 2000 reference date.

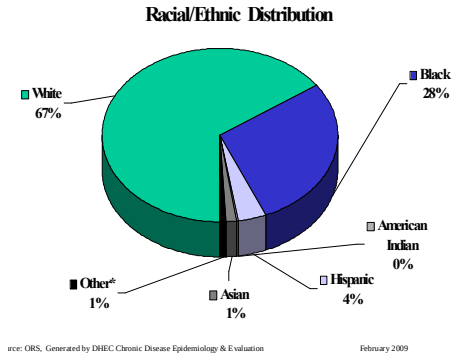
Table 1.1. Estimated Population Distribution as of July 1, 2007

Total Population	4,407,709	100.0%
Men	2,147,146	48.7%
Women	2,260,563	51.3%
Under 18 years	1,059,917	24.0%
18 to 44	1,619,960	36.8%
45 to 64 years	1,156,945	26.2%
65 years and over	573,098	13.0%
White, not Hispanic	2,877,557	65.3%
Black, not Hispanic	1,252,611	28.4%
Hispanic or Latino	168,920	3.8%
American Indian and Alaska Native	15,369	0.3%
Asian	51,650	1.2%
Other*	41,602	0.9%

Source: U.S. Census Bureau, Census 2000.
http://www.census.gov/popest/states/asrh/SC-EST2007-03.html
*Other Includes Native Hawaiian or Pacific Islander, Two or More Races, or Some Other Race

The population for South Carolina is about 65.3% white, 28.4% black, and 6.3% ñOtherò. The ñOtherò category includes Asian, American Indian, Pacific Islander, and other race groups, as reported by the Census Bureau. Table 1.1 shows the estimated population as of July 1, 2005 for South Carolina. Figures 1.1 through 1.3 show the breakdown of the population by race/ethnicity and age.

Figure 1.1. South Carolina Estimated Population Racial / Ethnic Distribution as of July 1, 2007



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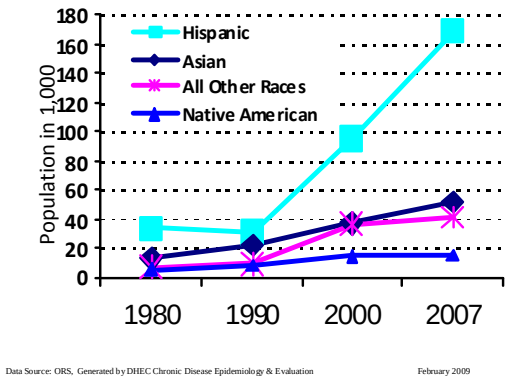
The population of South Carolina is becoming much more diverse. Since 1980, the numbers of Hispanic citizens of all races has quadrupled. American Indians, Asians, Pacific Islanders, and other races other than white or black have shown a three-to five-fold increase, while the number of whites and blacks has changed very little. Figure 1.2 shows the change in the ethnic makeup of the South Carolina population in the past 37 years.

Figure 1.2. Race/Ethnic Population Trends 1980-2007 (other than White and African American)



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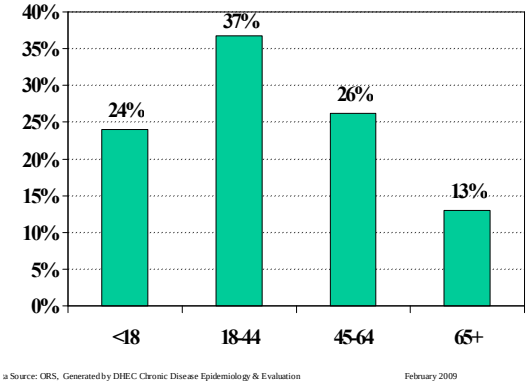
The majority of South Carolinaôs population falls into the 18-44-age category, but one quarter (26%) falls into the 45-64 age group where most diabetes is diagnosed (Figure 1.3).

Figure 1.3. Age Distribution of Estimated Population as of July 1, 2008



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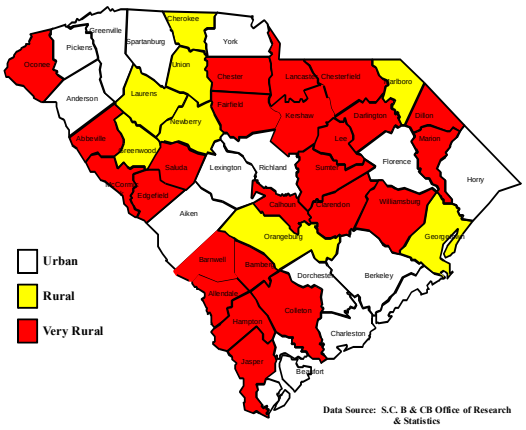
Urban VS Rural

The Office of Research and Statistics (ORS) of the South Carolina has researched a variety of health indicators by urban vs. rural counties. The location of these counties is found in figure 1.4. Urban counties have been defined as those with the largest town having a population of 25,000 or greater. The counties defined as urban by the ORS are Aiken, Anderson, Beaufort, Berkeley, Charleston, Dorchester, Florence, Greenville, Horry, Lexington, Pickens, Richland, Spartanburg, Sumter, and York. Lexington and Pickens counties are considered urban since they are bedroom communities to major metropolitan areas.

Figure 1.4. Urban, Rural and Very Rural Counties (Based on Size of Largest Town)



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Rural counties, which comprise 9.9% of South Carolinaôs population, are those whose largest town has a population less than 25,000 but greater than 10,000. Rural counties are Cherokee, Georgetown, Greenwood, Laurens, Marlboro, Newberry, Orangeburg, and Union.

Very Rural counties, which comprise 16.9% of South Carolinaôs population, are those with its largest town less than 10,000 population. Very rural counties are designated as Abbeville, Allendale, Bamberg, Barnwell, Calhoun, Chester, Chesterfield, Clarendon, Colleton, Darlington, Dillon, Edgefield, Fairfield, Hampton, Jasper, Kershaw, Lancaster, Lee, Marion, McCormick, Oconee, Saluda, and Williamsburg.

For the rural counties in South Carolina, the ORS reported that:

- 10% of South Carolinaôs population lives in rural counties.

- 38% of South Carolinaôs rural population is black.

For the very rural counties in South Carolina, the ORS reported that:

- 17% of South Carolinaôs population lives in very rural counties.
- 40% of South Carolinaôs very rural population is black.

For urban counties the ORS reported that:

- 73% of South Carolinaôs lives in urban counties.
- 72% of South Carolinaôs urban population is white.
- 26% of South Carolinaôs urban population is black.
- 2% of South Carolinaôs urban population is Hispanic.

The Uninsured in South Carolina

The rural areas are commonly known to have higher rates of uninsured citizens as well as higher proportions of citizens who receive Medicaid or Medicare. Lack of insurance decreases significantly the likelihood of receiving timely and appropriate care. High proportions of Medicaid and Medicare clients affect the reimbursement levels of hospitals and physician practices as well as having implications on individualôs likelihood of receiving specialty care. Almost one in five (16.4%) South Carolinians have no health insurance. South Carolina has the fifteenth highest percentage of uninsured population in the nation, as of 2007 Census Bureau Estimates.

Health Professional Shortages

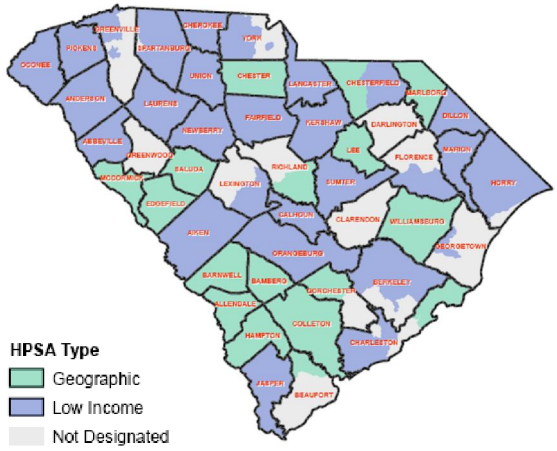
One of the first priorities is to have sufficient numbers of health professionals that are distributed according to need, to provide ongoing, quality diabetes care and self-management education and support for persons with diabetes. Most counties in South Carolina have a shortage of health professionals as defined by the Office of Primary Care of the Department of Health and Environmental Control (DHEC). A Health Professional Shortage Area (HPSA) can be established for primary medical care, which includes family and general practitioners, pediatricians, obstetricians/gynecologists, geriatrics and general internists in medical or osteopathic practice.

There are three major types of HPSA designations:

- Geographic HPSAs (a shortage for the total population)
- Low-Income Population (a shortage serving the population below 200 percent of the federal poverty level)
- Facility designations (Community Health Centers, Rural Health Clinics, federal correctional facilities)

Figure 1.5 depicts the distribution of current medical professional shortage area in South Carolina.

Figure 1.5. South Carolina Primary Care Health Professional Shortage Assessment by Type, as of June 2009



Source:

http://www.scdhec.gov/health/opc/docs/HPSA_Primary09.pdf

For full view of graph, please see page 45

Thiry counties were defined medical professional shortage areas, and 13 counties had areas within the county that were defined as medical professional shortage areas.

As of June 2007, 45 of the 46 counties of South Carolina were designated MEDICALLY UNDERSERVED AREAS by the U.S. Public Health Service for either the total county or certain areas of the county. Only Laurens was reported as adequately served. This designation takes into account physician-to-population ratio, infant mortality rate, and poverty level, and percent of population age 65 years and older. In health professional shortage areas, there are 19 federally funded community health centers distributed throughout the state. These health centers provide services based on a ñsliding fee scaleò that can assist those with limited incomes who may need assistance with financing health care, self-management education, medications, and monitoring supplies. (A listing of South Carolinaôs Community Health Centers may be obtained at:

http://www.scphca.org/findcenter.htm

Physicians

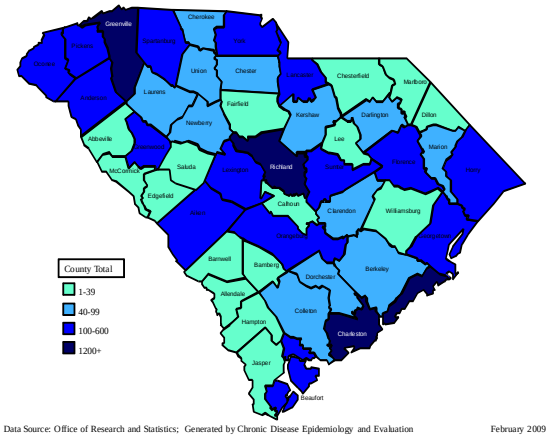
Table 1.2 lists the number of Physicians (based on data from SC Statistical Abstract) in those specialties most involved with diabetes care. The table also lists ratios of patients to physician (i.e. number of people with diabetes served, on average, by one physician of that specialty). Using the figure of 325,000 persons with diabetes in South Carolina gives one a sense of the relative scarcity of physician care available to patients with diabetes.

Table 1.2. Physician Specialties most involved in Diabetes Care in South Carolina

Specialty	1995 # of MDs in the state	2005 # of MDs in the state	Diabetes Patients Per Physician (2005)
Internal Medicine	394	1,056	307.8
Cardiology	119	269	1208.2
Endocrinology	11	53	6132.1
Nephrology	43	101	3217.8
Neurology	54	128	2539.1
Ophthalmology	177	248	1310.5
Family/General Practice	747	1536	211.6
Data source: SC Statistical Abstract 2007			

In addition to the number of physicians available being far less than the number needed, the geographic distribution of physicians imposes another problem for people with diabetes. Most of South Carolinaôs physicians are located in three major city areas; very few of them practice in the counties that have higher prevalence rates for diabetes. As shown in Figure 1.6, physician-to-population ratio is as low as two per 1,000 population in 12 of 15 counties that have a high prevalence of diabetes (previously greater than state average).

Figure 1.6. Physicians Employed in South Carolina, 2005



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Other Health Professionals

In addition to physicians, many other health professionals, including podiatrists, Certified Diabetes Educators (CDEs), dietitians, pharmacists and nurses play a vital role in diabetes care and education. Table 1.3 shows that the number of nurses and CDEs has increased since 1994. The Diabetes Initiative and its partners have offered training courses to help prepare eligible health professionals to become CDEs. As the choices of medications for management expands, the pharmacistôs role is increasingly vital in the control and management of diabetes. Great efforts have been made to provide diabetes disease management training programs for pharmacists in recent years. At least 94 pharmacists have completed an advanced diabetes disease management program. Some of these pharmacists have developed diabetes self-management education programs for their clients, and are working with other health providers to improve diabetes outcomes.

Table 1.3. Number of Other Health Professionals, SC

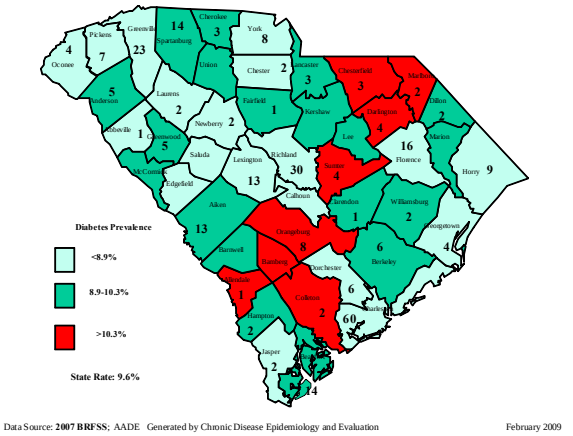
Specialty	Number in 1994*	Current Number	% Change
Certified Diabetes Educators	85	298	251%
Pharmacists	3098	3419	10%
Podiatrists	2	114	5600%
Physician Assistants	59	318	439%
Advance Practice Nurses	1271	1957	54%
Registered Dietitians	751	1100	46%
Registered Nurses (RNs)	23,435	32,319	38%
Licensed Practical Nurses	8,572	9,307	9%

* Abstracted from 1996 Burden of Diabetes Report

Certified Diabetes Educators

There are 298 Certified Diabetes Educators (CDE) in South Carolina as of 2008. On average, one CDE needs to serve 15,500 residents in South Carolina. Figure 1.7 shows the number of CDEs by county relative to diabetes prevalence for that county. Based on September 2008 data, 24 counties have a CDE/population ratio higher than 1/15,500. Anderson County has the highest ratio with one CDE /35,900. Nine counties have no CDE coverage. Only twelve counties have adequate CDE coverage according to this standard. Potential caseload (number of diabetes cases per each CDE, based on BRFSS Diabetes prevalence estimates) ranges from a high of 3707 cases/CDE in Anderson to a low of 411 cases/CDE in Charleston County, which has the highest concentration of CDEs. Of the ten counties with the highest prevalence three, Saluda, Marlboro, and Edgefield, have no CDEs and four more have inadequate CDE coverage.

Figure 1.7. Number of Certified Diabetes Educators in South Carolina, 2008



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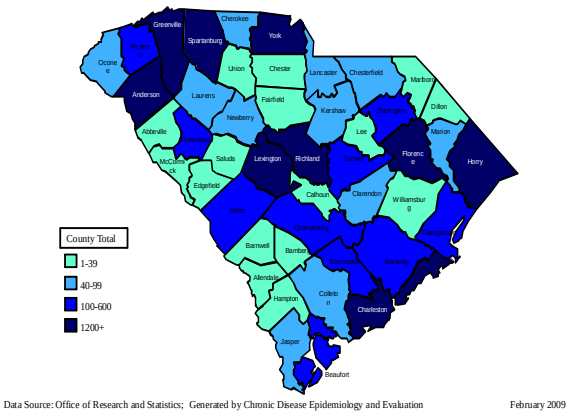
Pharmacists

Figure 1.8 shows number of pharmacists employed in each county in 2005. Several counties, mostly rural, with the highest diabetes prevalence have the lowest number of pharmacists employed.

Figure 1.8. Pharmacists Employed in South Carolina, 2005



Source: http://www.ors2.state.sc.us/manpower1.php

For full view of graph, please see page 48

Diabetes Programs
Primary Health Care Centers

Medically underserved areas throughout South Carolina are provided high-quality medical care from 19 Community Health Centers that see more than 250,000 people annually, mostly blacks. (In 2007, the Centers saw a total of 297,341 people). Patients who often have no other access to primary health care are treated by physician-led health care teams that handle everything from management of chronic illnesses and immunizations to episodic sick care. Expensive and frequent visits to the emergency room are lessened or entirely eliminated by providing the communities with access to primary care.

South Carolina Primary Care Association, the lead Primary Care Association for the Southeast, has 16 community health centers that participated in the Diabetes Collaborative and are currently using the Chronic Care Model as a tool to provide quality care to their patients. SC DPCP staff resources are focused within fifteen of the centers across the state to demonstrate effective interventions. The goal of these interventions is to improve diabetes health care in office-based practices in medically underserved areas of the state and increase diabetes self-management in patients who attend these primary care centers.

Local Diabetes Community Health Partners

In the fall of 1999, The South Carolina Department of Health and Environmental Control (SC DHEC) partnered with the Diabetes Initiative of South Carolina (DSC), and assisted several communities in developing local diabetes community health partners across the state. The community health partners were a forum for local

communities to plan, create, and implement diabetes-related awareness activities that are locally driven and controlled, to share resources, to improve communication, to collaborate with members from other communities and to solicit corporate support for community projects.

Today the total number of community health partners across South Carolina has grown to thirty-four. However, several of the community health partners are experiencing challenges and need guidance and leadership. Data analysis from focus groups show that these community health partners face barriers such as; lack of leadership, inability to focus, lack of cohesion among members, lack of commitment to coalition work, difficulty recruiting new members, and the lack of movement. Surveys will be administered to all the community health partners. Coalition leaders will be asked to evaluate their coalition using a six-subscale measure tool adapted from a needs assessment tool, Butterfoss (2008). Data collected will be analyzed and reported along with a descriptive summary of the community health partnersô strengths and challenges that will provide a prescription for action.

The SC DPCP continues to provide mini-grants to the local diabetes community health partners and examples of outcomes the community health partners have accomplished are:

Williamsburg County Diabetes Education and Control Coalition has partnered with the Black River Medical Center for over seven years to provide diabetes self-management education, host monthly Lunch & Learn Sessions, and community health screenings in Williamsburg County. They are currently seeking a seat on the Health School Advisory Council in an effort to improve school menus by including healthier food choices for the students.

For the past six years ***Low Country Diabetes Initiative*** has partnered with faith based health ministries to encourage healthy cooking and physical activity. Local physical activity consultants assist the churches with developing a physical activity component at their church. As a result of this partnership, 25 churches have reported over 350 pounds lost. In addition, members have seen significant drops in blood pressure and cholesterol levels.

The ***Georgetown County Diabetes CORE group*** discovered that people with diabetes had a hard time controlling their blood sugar levels, blood pressure, weight, etc., which they thought may be related to cooking high fat and high calorie meals as well as prohibitive costs for gym memberships and unsafe places to walk in rural Georgetown County. This prompted the CORE group to apply for a grant through the Frances P. Bunnelle Foundation and was awarded $22,150 to open a fitness center with a trained instructor and to go to churches within Georgetown County to do cooking demonstrations using tasty alternative recipes.

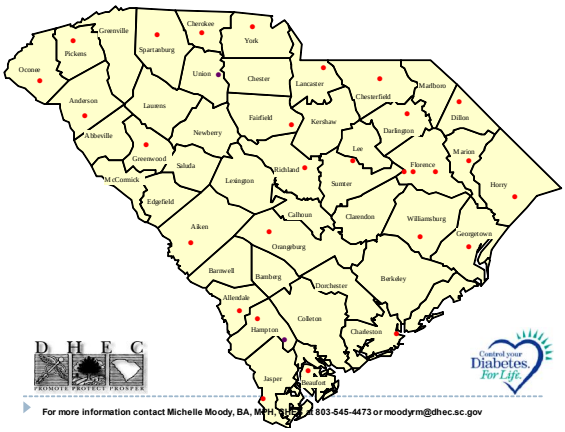
Since April of 2008, the CORE group has done cooking demonstrations in 13 churches and received reports that three of the churches have made major changes in how they prepare meals for their congregation. For example, preparing oven baked ñfriedò chicken instead of grease-fried chicken.

The fitness center was ready to start enrollment June 2008 and to date 93 people have signed up. An average of 20-24 people attend on a daily basis and the excellent participation has made them out grow their current space donated by the Georgetown

County Alcohol & Drug Abuse Commission.

Testimonies include a 38-year-old female that has lost 13 lbs; a 44-year-old male whoôs A1C has dropped from a 9 to 7; and several others whose blood pressure have dropped and/or lost weight. The Georgetown Diabetes CORE group is now busy searching for funding to support a larger facility.

Figure 1.9. South Carolina DPCP Diabetes Community health partners



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Summary

According to the 2007 census population estimates, South Carolinaôs population has increased by over four hundred thousand since 2000, and is becoming more diverse. The populations of races other than white or black have increased dramatically while the number of white and blacks has changed very little. The number of trained health care professionals has increased, but is still short of desirable goals.

The combination of a growing and increasingly diverse population, increasing uninsured, shortages of medical professionals, especially in rural areas, has serious implications with regard to access to health care in the near future. These issues impact the patients, the public health system, health care providers, the insurance industry, and the economy, as people in poor health are much less productive than healthy people.

Chapter Two
Risk Factors

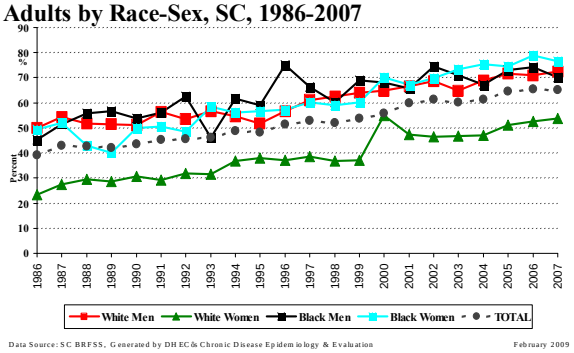
About 5% to 10% of all diabetics have Type 1 diabetes. Type 2 diabetes represents the majority of cases of this disorder, accounting for about 90-95% of all people with diabetes. A family history of diabetes is more common in Type 2 than in Type 1. Major behavioral risk factors, such as overweight, physical inactivity and unhealthy diet, are partially responsible for development of Type 2 diabetes. Inadequate access to health care and/or sub-optimal diabetes management contributes to uncontrolled diabetes and diabetes complications.

Risk Factors in the General Population
Overweight or Obese

Overweight (BMI $\geq$25 kg/m$^{2)}$ and obesity (BMI $\geq$30 kg/m$^{2)}$ are major risk factors of diabetes. More than 70% of people with Type 2 are overweight. Figure 2.1 presents the data from the BRFSS survey in 1997-2006. In South Carolina, nearly two-thirds adults are overweight. In 2006, the prevalence was higher among blacks than whites, and higher among men than women.

Overweight and obesity prevalence in South Carolina adults increased by approximately 23% from 53% in 1997 to 65.3 in 2007. The increase in prevalence of overweight varied among race-sex groups, from 16% among white men to 37% among white women during 1997-2007 (Figure 2.1).

Figure 2.1. Prevalence of Overweight or Obese among Adults by Race-Sex, SC, 1986-2007



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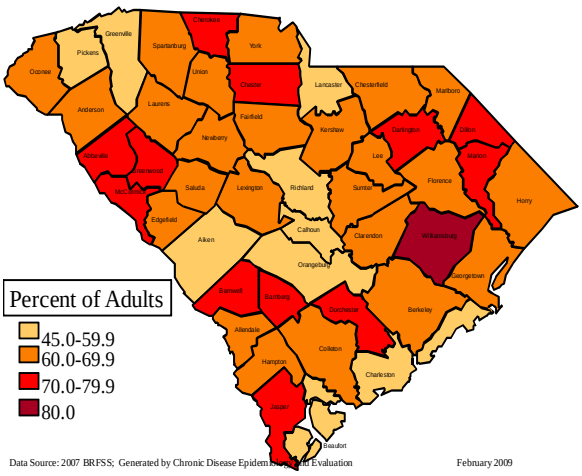
According to the BRFSS survey, the statewide prevalence of overweight or obese was 65.3% in 2007. Sixteen counties had a prevalence rate higher than the State average and 13 counties had a prevalence rate lower than the State average. (Figure 2.2)

Figure 2.2. Prevalence of Overweight or Obese among Adults, 2007



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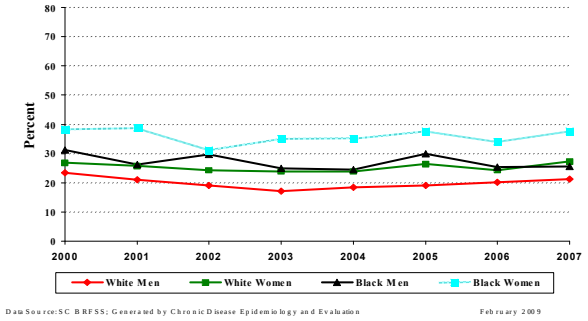
Physical Inactivity

Regular physical activity reduces the risk of being overweight and promotes the bodyôs expenditure of energy. Physical activity also reduces the risk of cardiovascular diseases, which are associated with diabetes. Physical inactivity is defined as no leisure time physical activity or exercise during the past 30 days other than the respondentôs regular job. Approximately 25% of South Carolina adults were physically inactive in 2007. Twenty-two percent of whites and 30% of blacks were physically inactive. Black women had the highest prevalence of physical inactivity (34%) among four race-sex groups. Figure 2.3 shows that during 2000-2006, the prevalence of physical inactivity decreased among all groups.

Figure 2.3. Prevalence of Physical Inactivity among Adults by Race-Sex, SC, 2000-2007



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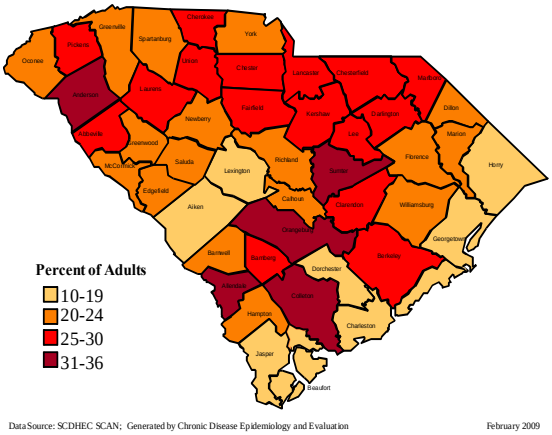
Many of the counties (25) in South Carolina had a prevalence of physical inactivity less than the State average. Sixteen counties had a prevalence ranging between 25% and 30%. Five counties had a prevalence rate higher than 30% (Figure 2.4).

Figure 2.4. Prevalence of Physical Inactivity among Adult South Carolinians, 2007



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Unhealthy Diet

The American Dietetic Association, the American Health Association, and the National Cancer Institute all recommend the consumption of at least five servings of fruits and vegetables a day (5-A-Day). Consuming fewer fruits and vegetables than recommended indicates an unhealthy diet that may lead to overweight.

In 2007, four out of five adult South Carolinians did not consume the recommended 5-A-Day. Men had a higher prevalence than women, and black men had the highest prevalence (84.2%) of not consuming 5-A-Day among the four race-sex groups in 2007. Black females showed the only increase in fruit and vegetable consumption in the past 10 years. During 1996-2007, the prevalence rates increased over 10 years by 7% (Figure 2.5).

Figure 2.5. Prevalence of Consuming Fruits and Vegetables Fewer Than 5-A-Day among Adults by Race-Sex, SC, 1990-2007.

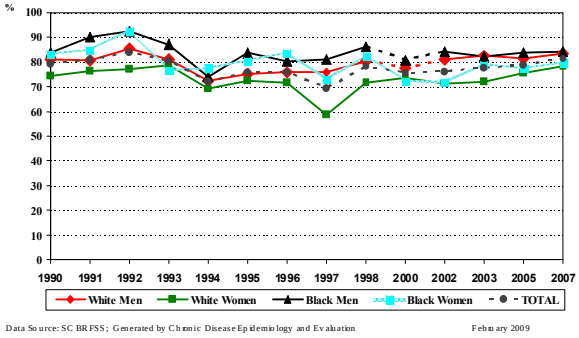

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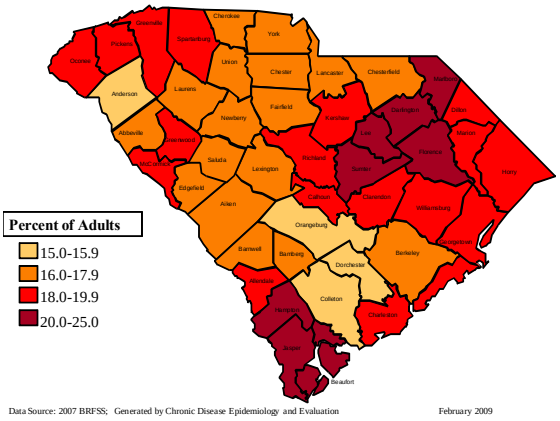
Figure 2.6 shows the prevalence of consuming 5-A-Day by county in South Carolina. No special pattern of prevalence of consuming fruits and vegetables less than 5-A-Day appears to occur by geographic distribution. Approximately one-half of the stateôs counties had a higher prevalence of consuming fruits and vegetables less than 5ï A-Day than the State average.

Figure 2.6. Prevalence of Consuming Fruits and Vegetables Less than 5-A-Day among Adults, SC, 2007



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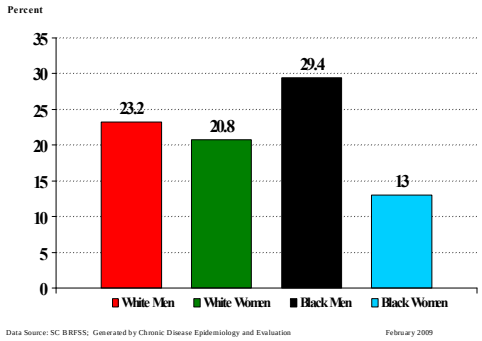
Cigarette Smoking

Although cigarette smoking is not a risk factor for diabetes, it increases the risk of diabetes related complications, especially for cardiovascular disease amputations, kidney disease, and respiratory disease among people with diabetes.

Among people with diabetes, black men had the highest prevalence (23.2%) of cigarette smoking, while black women had the lowest prevalence (11.2%) among four race-sex groups (Figure 2.7). The prevalence of cigarette smoking among people with diabetes increased by 46% among white men, decreased 33% among white women, decreased 12% among black women, and decreased 2% among black men during 2002-2006.

Figure 2.7. Prevalence of Current Cigarette Smoking among Adults with Diabetes by Race-Sex, SC, 2007



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The overall prevalence of cigarette smoking in South Carolina was 21.8% in 2007. Figure 2.8 presents smoking prevalence by county. There were 17 counties with the prevalence of cigarette smoking greater than the state rate of 21.8%.

Figure 2.8. Prevalence of Current Cigarette Smoking among Adults, SC, 2007

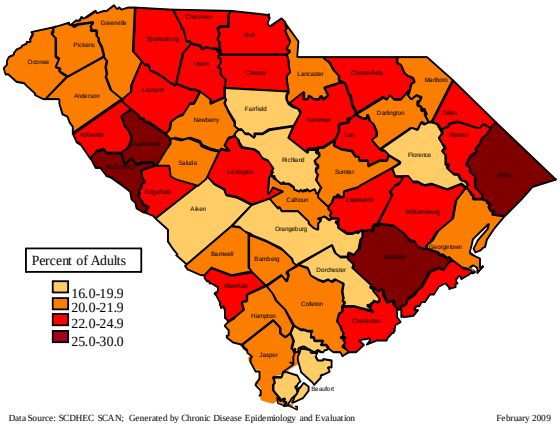

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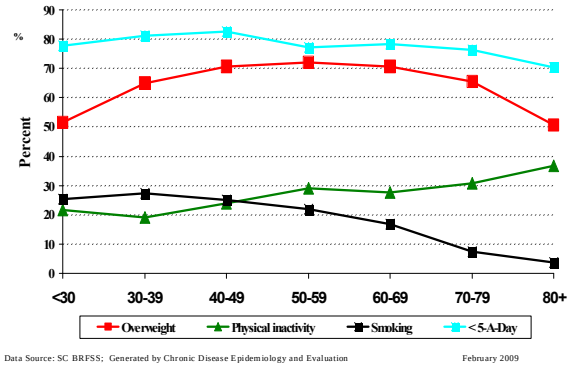
Figure 2.9. Age-Specific Prevalence of Major Behavioral Risk Factors among Adults, SC BRFSS, 2007



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Age-Specific Prevalence of Major Behavioral Risk Factors among Adults

Figure 2.9 presents age-specific prevalence of four risk behavioral risk factors: overweight, physical inactivity, consuming less than 5-A-Day fruits and vegetables, and cigarette smoking. Young adults (under 30 years of age) have the highest prevalence of smoking, and the lowest prevalence of physical inactivity among all age groups. Middle age adults (between age 30 and 70) have an increasing prevalence of overweight and physical inactivity by age, but a decreasing prevalence of consuming fruits and vegetables (less than 5-A-Day) and cigarette smoking by age. Older adults (age 70+) have the lowest prevalence of smoking and the lowest prevalence of consuming fruits and vegetables (less than 5-a-Day), but have the highest prevalence of physical inactivity among all age groups.

Hypertension and High Cholesterol

Control of hypertension and high cholesterol are important ways to prevent diabetes related complications. People with diabetes are more likely to have hypertension and high cholesterol than people without diabetes. In 2007, approximately 70% of people with diabetes had hypertension, while only one-fourth of people without diabetes had hypertension. Almost three-quarters (72.3%) of black women with diabetes had hypertension, a prevalence that was the highest among race-gender groups. (Table 2.1)

Table 2.1. Prevalence of Hypertension in South Carolina, 2007, BRFSS

	People with Diabetes	People without Diabetes
	2007	
White Men	64.1	27.5
White Women	70.9	24.4
Black Men	67.2	29.5
Black Women	72.3	30.2

Over half the number of diabetics have high cholesterol. Table 2.2 shows that the prevalence of high cholesterol among people with diabetes in 207. The prevalence of high cholesterol is twice as high among those respondents to the BRFSS with diabetes than those without diabetes. White women with diabetes had the highest prevalence (67.4%) of high cholesterol among all race-sex groups in 2007.

Table 2.2. Prevalence of High Cholesterol in South Carolina, 2007, BRFSS

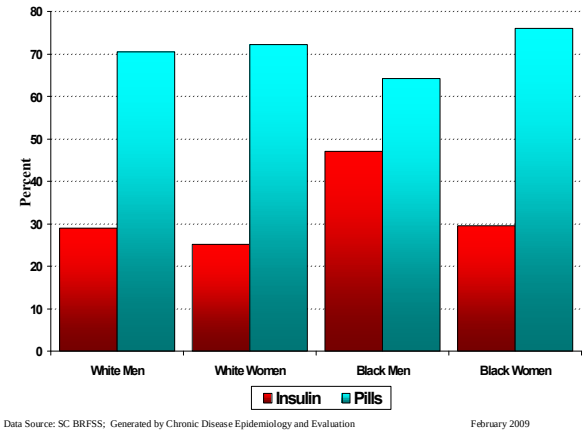
	People with Diabetes	People without Diabetes
	2007	
White Men	66.4	40.3
White Women	67.4	35.4
Black Men	55.6	32.4
Black Women	60.2	31.9

Diabetes Management and Control

Control of Diabetes with Insulin or Diabetes Pills

BRFSS surveyed the means of control of diabetes, using either insulin or diabetes pills, among people with diabetes. Diabetes pills are used more often than insulin among people with diabetes. Approximately 71% of people with diabetes take diabetes pills. The prevalence of using insulin to control glucose level is approximately the same across all race-sex groups (Figure 2.10). The statewide prevalence of using insulin to control diabetes among diabetes was 28.3% in 2005-2006.

Figure 2.10. Prevalence of Taking Insulin or Diabetes Pills Among People with Diabetes, SC, 2007.



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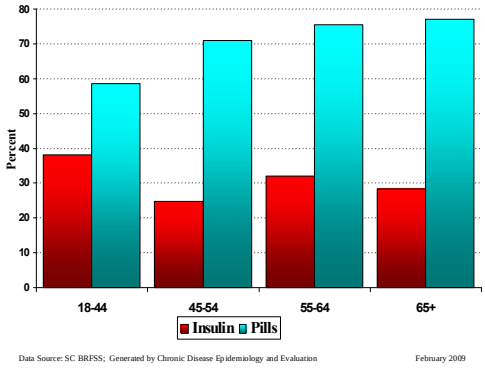
Insulin was almost equally used among all age groups. However in 2005-2006 the prevalence of using diabetes pills increased with patientôs age with a significant difference existing between those who were 18-44 (61.4%) and those age 55-64 (74.6%). Figure 2.11 illustrates the prevalence of using insulin or diabetes pill by age groups.

Figure 2.11. Prevalence of Taking Insulin and Diabetes Pills by Age among People with Diabetes, SC, 2007



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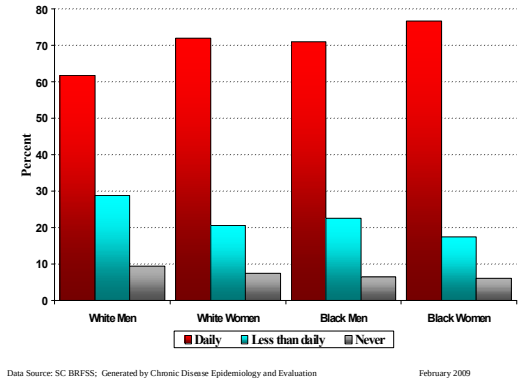
Regularly Checking Blood Glucose

Regularly monitoring blood glucose level is the foundation of appropriate management of diabetes. Figure 2.12 show that 91% of people with diabetes checked their blood

glucose level; approximately 60% did so daily. Black men had the lowest prevalence (54.3%) of checking glucose on daily basis among race-sex groups.

Many people with diabetes who had their glucose checked, monitored their glucose level less than once a day. The prevalence of having glucose checked less than once a day ranged from the highest rate of 34.9% among black men to the lowest rate of 22.6% among white women. It is worthwhile to notice that many women, especially white women (8.7%) reported they never had their glucose checked. While there is room for further improvement in these measures, frequency of blood glucose monitoring has improved significantly since 2000-2001 (previous Burden Report).

Figure 2.12. Prevalence of Having Blood Glucose Checked among People with Diabetes by Race, Sex, SC, 2007.



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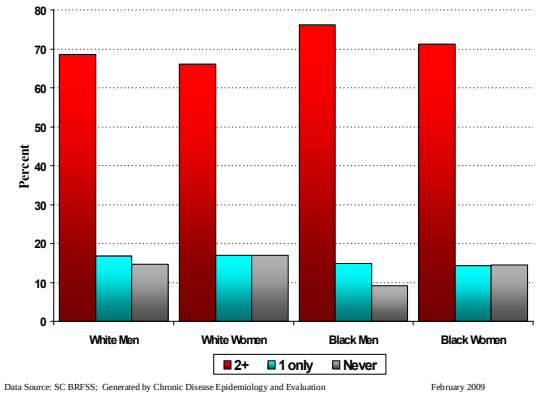
Checking HbA1C

Hemoglobin A1c (HbA1c) or glycosylated hemoglobin is a recommended measure of average blood glucose level in the past 2-3 months. The American Diabetes Association recommends that people with diabetes should have their HbA1c checked every three months for monitoring long-term glucose control. In 2005-2006, more than 80% of people with diabetes had at least two HbA1c tests in the past year (Figure 2.13). This is a marked improvement since 1994-97, when only 25% had ever heard of A1C. White women had the lowest prevalence (68.5%) of having at least two HbA1c among race-gender groups. Another 14%-17% of people with diabetes reported having only one HbA1c test in the past year. Nearly 9.1% of black men, 14.5% of black women, 14.7% of white men and 17% of white women, reported having no HbA1c test in the past year or reported having never heard of the test.

Figure 2.13. Prevalence of Having HbA1c Checked by Number Tests among People with Diabetes, SC, 2007



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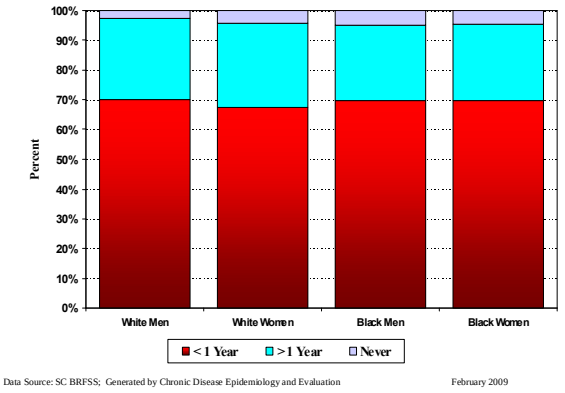
Eye Examination

The diabetes standard of care guideline issued by the American Diabetes Association recommends an annual dilated eye exam by an eye care specialist to detect early signs of retinopathy and start appropriate treatment. Figure 2.14 shows that approximately more than two-thirds (65%) of people with diabetes reported having their eyes examined in the past year. The prevalence of having eyes examined in the past year was the highest among white women (70.1%) among four race-sex groups. Twenty-seven percent of people with diabetes reported having their eyes examined a year ago. Approximately 4.1% of people with diabetes reported never having their eyes examined. Black men had the highest prevalence (5.0%) in all race-sex groups of never having had their eyes examined.

Figure 2.14. Prevalence of Having Eyes Examined among People with Diabetes by Race-Sex, SC, 2007



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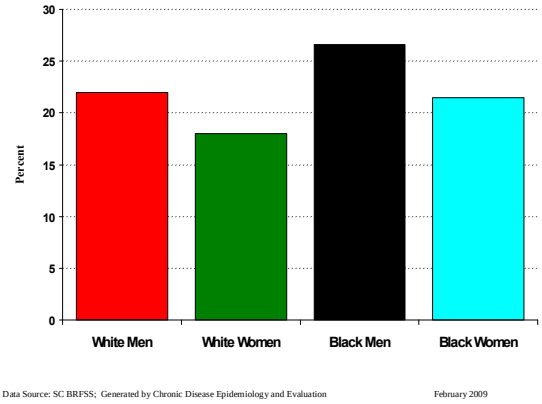
According to the BRFSS survey in 2007, approximately 22% of people with diabetes reported that their eyes were affected by diabetes. Among people with diabetes, black men had the highest prevalence (26.6%) of eyes being affected by diabetes, while white women had the lowest prevalence (18%) among race-sex groups. These data on eye examinations are comparable to the last Burden Report results (Figure 2.15).

Figure 2.15. Prevalence of Eyes Being Affected by Diabetes, SC, 2007



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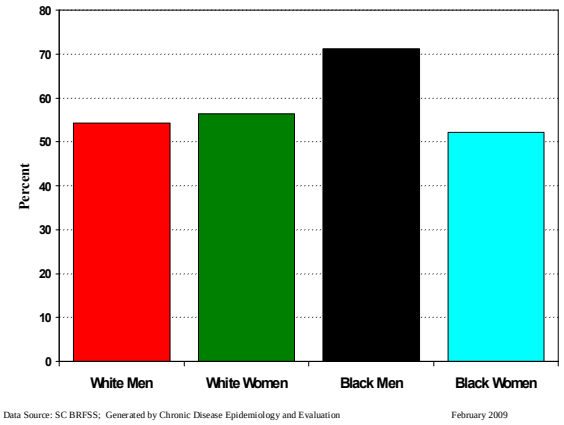
Diabetes Patient Education

Diabetes patient education for self-management of diabetes is an integral component of diabetes care and management. The goal of diabetes self-management education is to enable people with diabetes to become active participants in their diabetes care and treatment. Among people with diabetes, approximately half had taken a course for diabetes management in 2007. The prevalence of having taken a course was highest among black males (71.2%).

Figure 2.16. Prevalence of Having Taken a Course for Managing Diabetes among People with Diabetes, SC, 2007.



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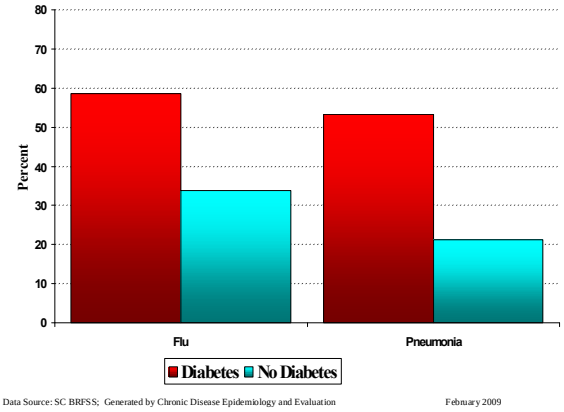
Flu and Pneumonia Vaccinations

Flu and pneumonia vaccinations are recommended for people with diabetes to prevent respiratory infections. According to the 2007 BRFSS survey, the prevalence of receiving flu and pneumonia vaccinations were significantly higher among people with diabetes than among people without diabetes. However, there was still a great deal of people with diabetes who did not receive a flu (58.6%) or pneumonia vaccination (53.3%) in 2007 (Figure 2.17).

Figure 2.17. Prevalence of Receiving Flu Shot in Past 12 Months and Ever Received Pneumonia Vaccine among People with Diabetes, SC, 2007.



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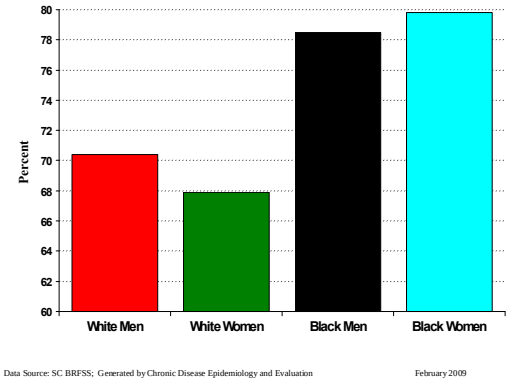
Foot Examination by a Health Professional

Standard diabetes care recommended by the American Diabetes Association also includes foot examination at each medical visit. Figure 2.18 show that approximately 74% of people with diabetes had their feet checked by a health professional. The prevalence of having their feet checked was 78% for black men and 80% for black women. The prevalence of having their feet checked for white men was 70% and 67.9% for white women (Figure 2.18).

Figure 2.18. Prevalence of Having Feet Checked by a Health Professional in the Last Year among People with Diabetes, SC, 2007



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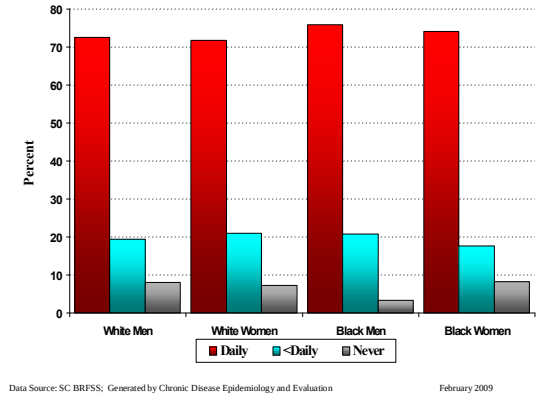
Self-Checking Feet for Sores or Irritations

Approximately 89% of people with diabetes reported self-checking feet for sores and irritations in 2007. More than 73% of people with diabetes checked their feet daily for sores and irritations. However, approximately 7% of people with diabetes had never checked their feet for sores and irritations by themselves (Figure 2.19).

Figure 2.19. Prevalence of Self-Checking Feet for Sores or Irritations among People with Diabetes, by Race, Sex, SC, 2007.



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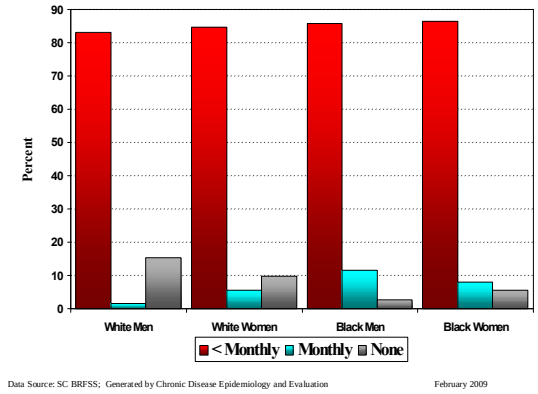
Seeing a Health Professional for Diabetes in the Past Year

Approximately 90% of diabetics reported having seen a health professional for diabetes in the past year, according to the BRFSS survey in 2007. There were, however, approximately 15% of white men with diabetes and 10% of white women with diabetes who did not see a health professional in the past year, but only 3% of black women and 5% of black men who did not see a health professional in the past year.

Figure 2.20. Prevalence of Seeing a Health Professional for Diabetes in Past Year, SC, 2007.



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Summary

The major findings in the serial BRFSS analyses have been an alarming increase in diabetic individuals who are overweight or obese, and who have high blood cholesterol and hypertension. These are clearly areas to target in future programs directed toward improving cardiovascular morbidity and mortality in people with diabetes, and improving primary prevention efforts.

Overall, there has been improvement in areas of knowledge of diabetes and access to prevention and intervention services. Short-term surrogate measures and actions such as HbA1c tests, foot examinations, and eye examinations have been improved in recent years. Continued efforts should emphasize major behavioral risk factor modification, racial and gender disparities in self-blood glucose monitoring, standards of care, accessibility, and affordability of care. Optimal management and treatment of diabetes and prevention of diabetes complications are a high priority of the continued efforts of the SCDHEC DPCP and the DSC.

Chapter Three
Morbidity

Introduction

Diabetes frequently leads to complications and co-morbidities. Major complications include diabetic ketoacidosis, blindness, kidney failure, and lower extremity amputation. The most common co-morbidities include coronary heart disease, stroke, hypertension, and peripheral vascular disease. Significant high risk of complications and co-morbidities in diabetes leads to more emergency room visits, hospitalizations, increased mortality, decreased quality of life, and increased costs.

Prevalence

The statewide prevalence of diabetes was 9.6% in 2007. Studies have indicated that this figure might account for only two thirds of people with diabetes, and another one third of people with diabetes are unaware of their status. It is estimated that there were 300,000 to 350,000 South Carolinians who have diabetes; this number increased by 17,000 to 42,000 from the estimate in 1998. The prevalence of diabetes was higher among blacks (13.8%) than among whites (8.2%). The prevalence among black men (13.2%) was 67% higher than that among white men (7.9%). The overall prevalence of diabetes increased in the past ten years, from 4.9% in 1997 to 9.6% in 2006. In addition to increase in overall prevalence, all race-sex specific prevalence increased in the last decade (Figure 3.1).

Figure 3.1. Prevalence of Self-Reported Diabetes by Race-Sex, SC, 1988-2007.

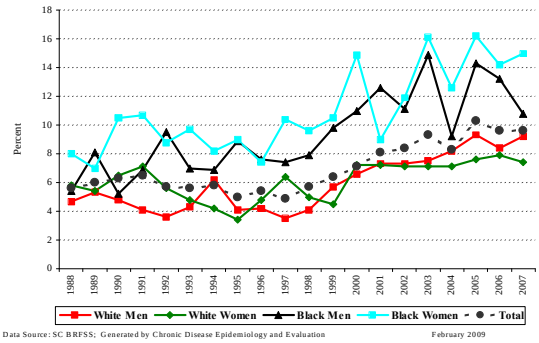

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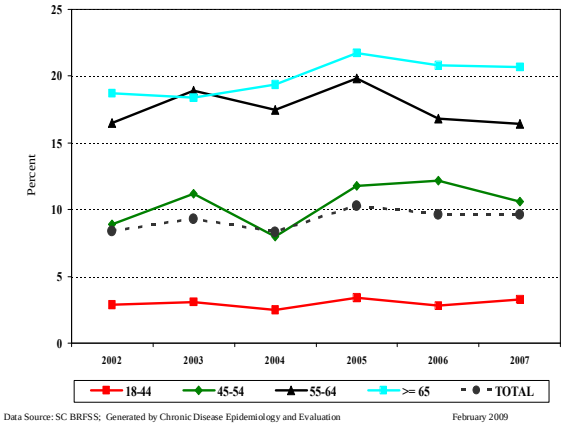
Figure 3.2 presents the prevalence of diabetes by age groups in 2002 to 2007. The prevalence of diabetes was higher among older people than among younger people. The prevalence of diabetes among people 65 years and older was seven times that of people under age 45. The prevalence tended to increase in the 45-54 age groups and in those who are over 65 during the past 5 years.

Figure 3.2. Prevalence of Self-Reported Diabetes among Adults by Age, SC, 2002-2007.



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The BRFSS survey asked respondents how old they were when they were diagnosed with diabetes. The vast majority of diabetes is adult-onset diabetes. Nearly half of people with diabetes were diagnosed at age between 45 and 64 years. Another one-third reported that they were diagnosed between 18 and 44 years. Only 4% of people with diabetes reported that they were diagnosed when they were under age 18.

Figure 3.3. Age of Diagnosis of Diabetes among People with Diabetes, SC, 2007.

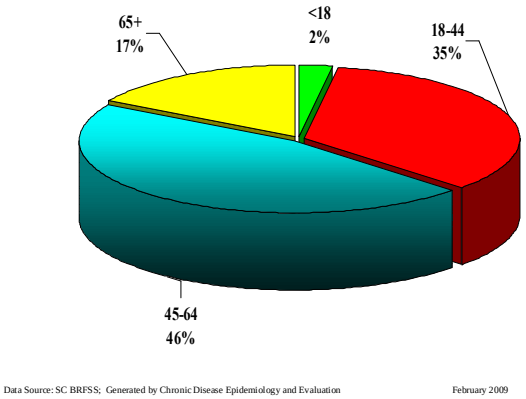

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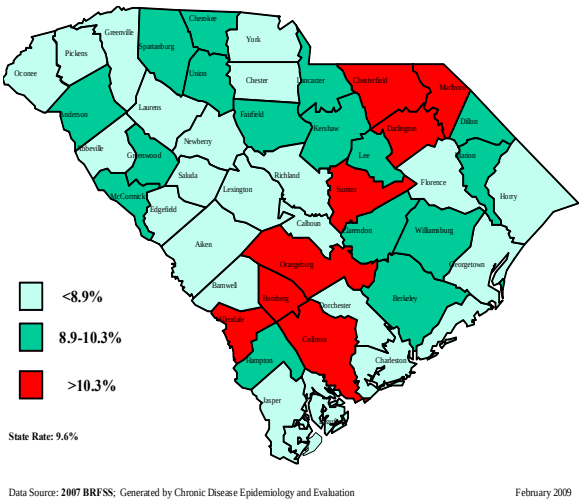
Figure 3.4 presents geographic distribution of the prevalence of diabetes in South Carolina in 2006. Sixteen counties had a prevalence of diabetes similar to the state average (9.6%), while eight counties had a higher prevalence than the state average in 2007.

Figure 3.4. Prevalence of Diabetes among Adults, SC, 2007



For full view of graph, please see page 73

Hospital Discharges for Diabetes Number of Discharges

Diabetes poses a significant burden on South Carolina health care systems. In 2006, 9,055 hospital discharges had diabetes as the primary diagnosis (the main reason of hospitalization), and 92,582 discharges had diabetes as a secondary diagnosis (a co-morbidity). The number of annual diabetes discharges decreased for the first time in ten years. Nearly one out of five black inpatients and one out of six white inpatients in South Carolina hospitals had diabetes in 2006.

Patients hospitalized with diabetes accounted for a significant portion of all who were hospitalized in South Carolina hospitals. Figure 3.5 show that the proportion of patients with diabetes to all inpatients was higher among blacks than among whites. The proportion increased by age, from less than 2% among patients under age 20, to more than 40% among patients age between 60 and 69.

Figure 3.5. Proportion of Hospitalizations with Diabetes of All Hospitalizations by Race-Age 2006

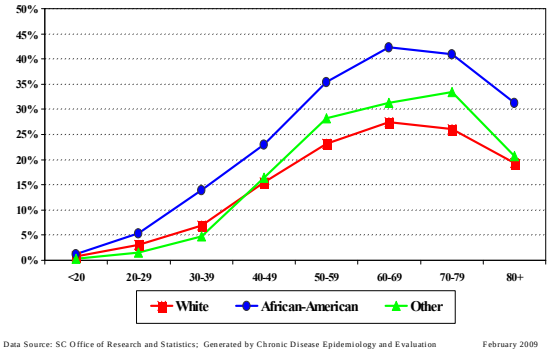


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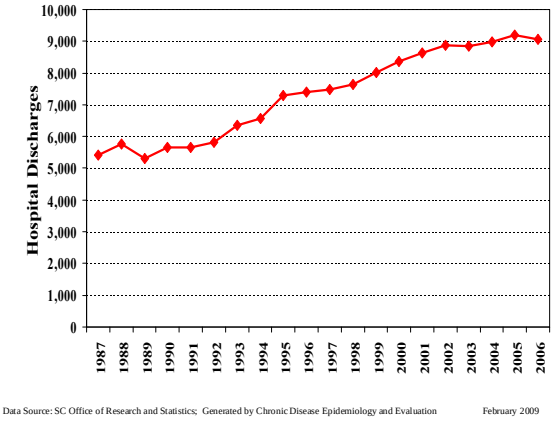
Figure 3.6 presents the total number of hospitalizations for diabetes as the primary diagnosis during 1996 to 2006. The number of hospitalizations for diabetes increased by 22.5% during the last ten years- a pace far faster than the increase in South Carolina population.

Figure 3.6. Total Number of Hospitalizations for Diabetes as the Primary Diagnosis, SC, 1987-2006



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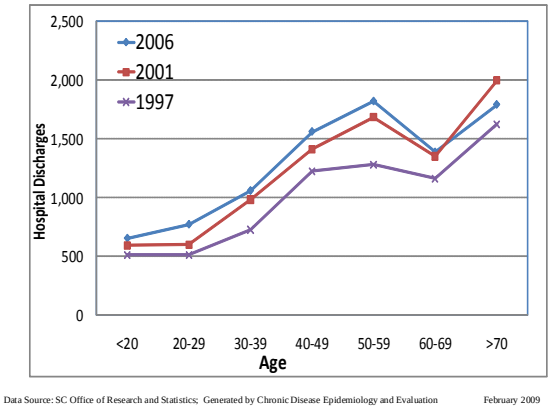
The number of hospitalizations for diabetes increases dramatically with the patientôs age. In 2006, the number of discharges with diabetes as the primary diagnosis among older patients (70 years and older) was 4 times that among young patients (under age 20). As diabetes becomes more prevalent among older people, the number of hospitalizations for diabetes as a secondary diagnosis among older patients becomes 88 times the number for young patients. Compared to the data in 1997 and 2001, the number of hospitalizations for diabetes as the primary diagnosis increased for all age groups in 2006, (Figure 3.7).

Figure 3.7. Number of Hospital Discharges with Diabetes as Primary Diagnosis by Age, SC, 1997, 2001 and 2006



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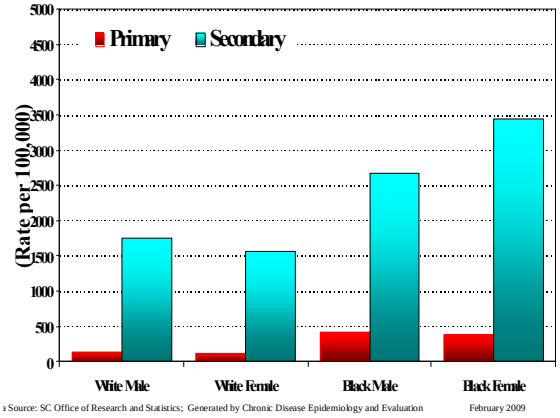
Blacks had a much higher hospitalization rate for diabetes than whites. The rate of hospitalizations with diabetes as the primary diagnosis among blacks was more than 384/100,000; three times the rates among whites. Moreover, the hospitalization rate for diabetes as a secondary diagnosis was disproportionately higher among black women than among whites (Figure 3.8).

Figure 3.8. Rate of Hospitalizations with Diabetes as Primary or Secondary Diagnosis, 2006 (Rate per 100,000)



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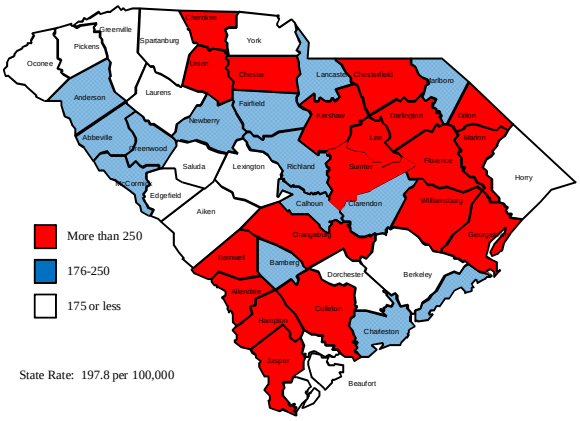
Counties that had a high rate of hospitalization for diabetes among their residents are primarily those that are located in the northeastern and southwestern regions of the state, especially in the Pee Dee districts (Figure 3.9). The data on the counties at the border with North Carolina or with Georgia might underestimate the rates of hospitalization for diabetes, since these counties are close to cities in other states with major medical centers such as Charlotte, NC (such as York, Cherokee, and Lancaster), and Augusta, GA (such as Aiken and Edgefield).

Figure 3.9. Age-Standardized Rate of Hospitalizations for Diabetes, (Primary Diagnosis), SC, 2006



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Hospital Charges

In concordance with the increased number of hospitalizations for diabetes, the total hospital charges for hospitalization for diabetes as the primary diagnosis increased to $199.5 million in 2006. The total charges for diabetes hospitalization increased an average of $13.5 million every year, during 1996 to 2006 (Figure 3.10).

Figure 3.10. Total Hospital Charges for Hospitalizations for Diabetes as the Primary Diagnosis, SC, 1987-2006

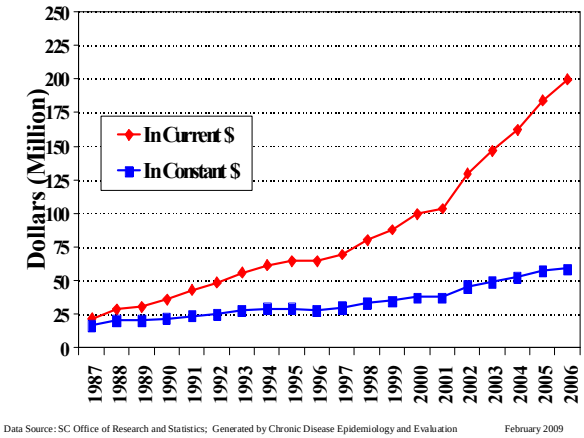

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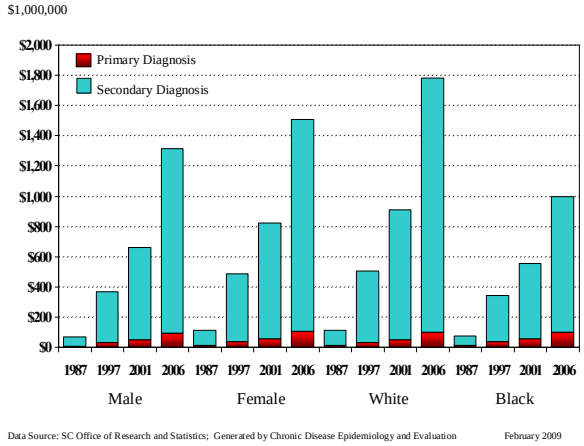
Figure 3.11 presents the total hospital charge for hospitalizations with diabetes as either the primary diagnosis or a secondary diagnosis in 1987, 1997, 2001, and 2006. Charges for diabetes as the primary diagnosis increased almost tenfold between 1987 and 2006, and charges for diabetes as secondary diagnosis increased sixteen fold in ten years.

Figure 3.11. Total Charges for Hospitalization among Patients with Diabetes by Race-Sex, 1987, 1997, 2001, and 2006



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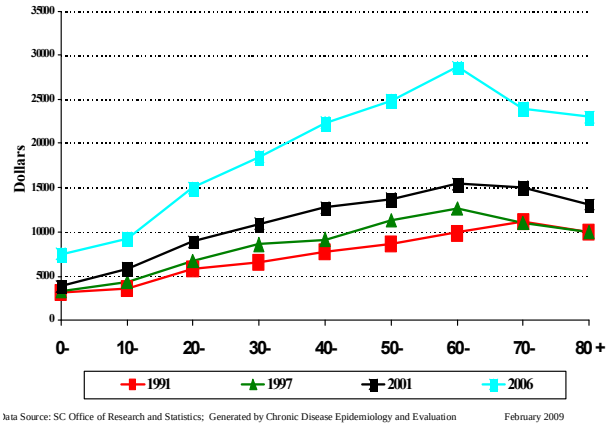
The total charges for diabetes (as either the primary diagnosis or a secondary diagnosis) were $2.8 billion in 2006, more than fifteen times the total charges in 1987 ($183 million).

The increase in total charges for hospitalizations that is presented in Figure 3.12 was not only attributable to the increase in the number of hospitalizations in the past 14 years as shown in Figure 3.12, but also to the increase in average charges per hospitalization. Figure 3.12 compares the average charges in 1987, 1991, 1997, 2001 and 2006. In 2001 to 2006 the average charges increased for patients of any age group. The increase in average charges ranged from 90% to 125%. Figure 41 also illustrates that the average charges increased with patientôs age, from $7,000 for patients under age 10, to more than $27,000 for patients aged 60 to 69 in 2006.

Figure 3.12. Change in Average Hospital Charge for Diabetes as Primary Diagnosis by Age, SC, 1991-2006

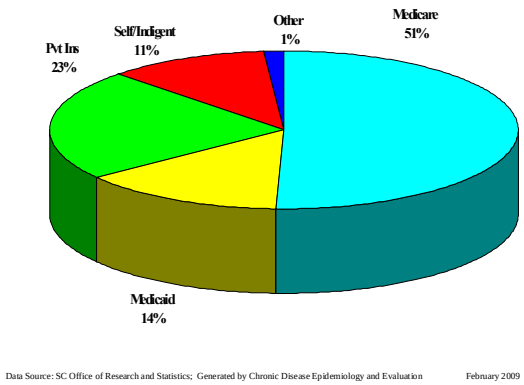


*2001 Hospital data did not include all secondary diagnoses; therefore, charge data may be incomplete.

For full view of graph, please see page 81

Who pays for the hospitalizations for diabetes as the primary diagnosis? Taxpayers paid approximately three quarters of the hospital charges through governmental programs. Medicare alone paid for more than half of the total charges in 2005 (Figure 3.13).

Figure 3.13. Sources of Payment for Hospitalization among Patients with Diabetes as the Primary Diagnosis, SC, 2006



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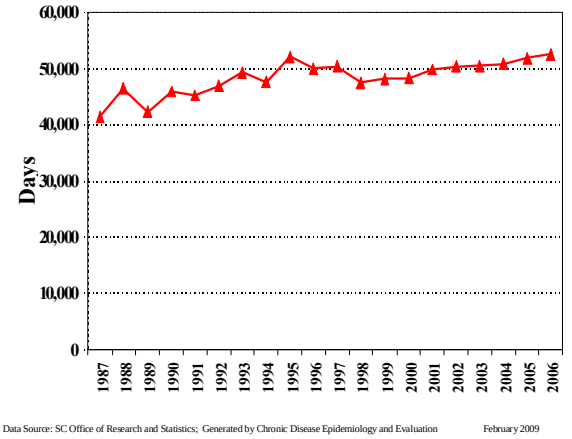
Length of Hospital Stay

Patients with diabetes as the primary diagnosis stayed in hospitals for a total of 52,445 days (Figure 3.14). In contrast to a 24% increase in the number of total hospitalizations for diabetes as a primary diagnosis between 1996 and 2006 (Figure 36), the total length of hospital stay for patients with diabetes only increased by 5%.

Figure 3.14 Total Length of Hospital Stay for Patients with Diabetes as the Primary Diagnosis, 1987-2006



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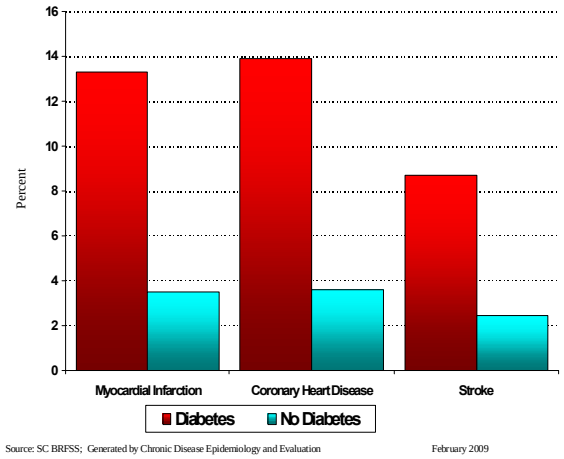
Complications

Diabetes significantly increases the risk of coronary heart disease, especially myocardial infarction, and stroke. The SC BRFSS surveyed South Carolina adults for the prevalence of coronary heart disease, myocardial infarction and stroke in 2006. The data shows that the prevalence of coronary heart disease, myocardial infarction and stroke among diabetics was triple that of nondiabetics (Figure 3.15). These data underscore the significance of diabetes control and management of cardiovascular risk factors, which will not only lower the diabetes morbidity and mortality, but also contribute to prevention of cardiovascular diseases, the leading cause of death in South Carolina.

Figure 3.15 Prevalence of CVD and Stroke by Diabetes Status, SC, 2006



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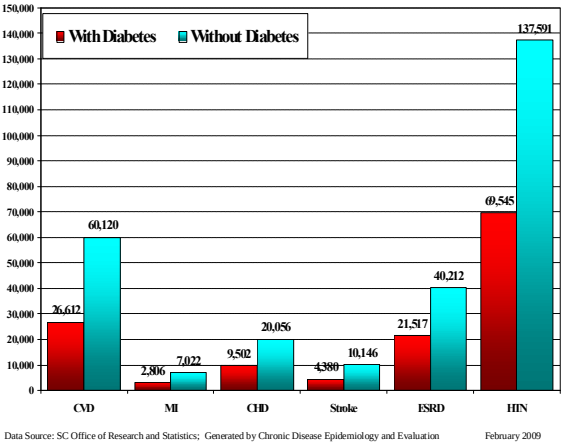
Hospital discharge data show that diabetes is a major cause of cardiovascular disease, including myocardial infarction, coronary heart disease and stroke. Figure 3.16 shows that among all patients hospitalized for cardiovascular disease and stroke, approximately 30% of patients had diabetes, a proportion that is significantly higher than the proportion of people with diabetes in general population. In addition to cardiovascular disease and stroke, patients with diabetes accounted for 36% of patients with renal failure and 34% of patients with hypertension. Patients with diabetes comprised the majority of patients hospitalized for lower extremity amputation(s) in 2005. Sixty-three percent of patients with lower extremity amputations were patients with diabetes, more than five times the frequency of people with diabetes in the general population.

Figure 3.16. Number of Hospitalizations for Major Diseases & Procedures by Diabetes Status, SC, 2006



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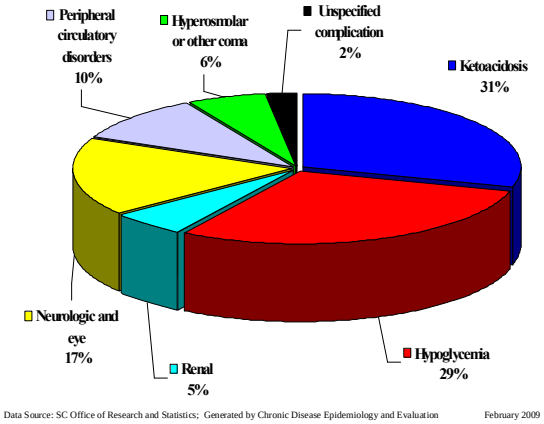
More than four out of five (86%) patients hospitalized for diabetes had diabetes complications in 2005. Hypoglycemia or hypoglycemic shock was the most common complication (25%), with ketoacidosis (24%), resulting from failure of glycemic control, was the second most common complication and was the diagnosis for 24% of patients with diabetes. Other major complications include: 5% with renal manifestation, 5% with hyperosmolar coma or other coma. The following set of figures present specific patterns for the most common complications of diabetes (Figure 3.17).

Figure 3.17. Distribution of Complications among Inpatients with Diabetes as Primary Diagnosis, SC, 2006



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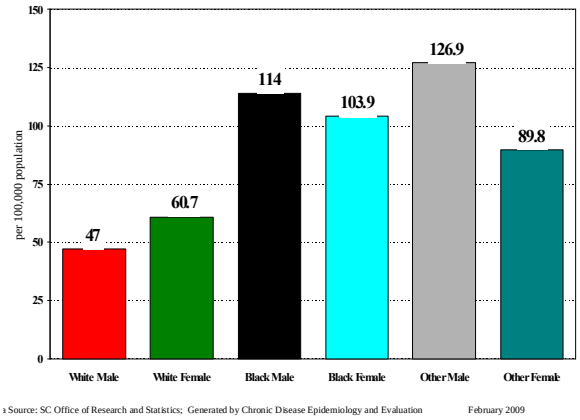
Diabetic Ketoacidosis

Ketoacidosis is a serious crisis for persons with diabetes, with high blood glucose, ketonemia and metabolic acidosis. Ketoacidosis is one of the most common acute complications seen among diabetes patients. Figure 3.18 shows the race-sex specific age-adjusted rate of hospitalization with Ketoacidosis. Blacks had a rate of hospitalization more than twice that of whites. Among four race-sex groups, black men had the highest rate (113.8/100,000) in 2005.

Figure 3.18 Age-Adjusted Hospitalization of Diabetic Ketoacidosis by Race-Sex, SC, 2006



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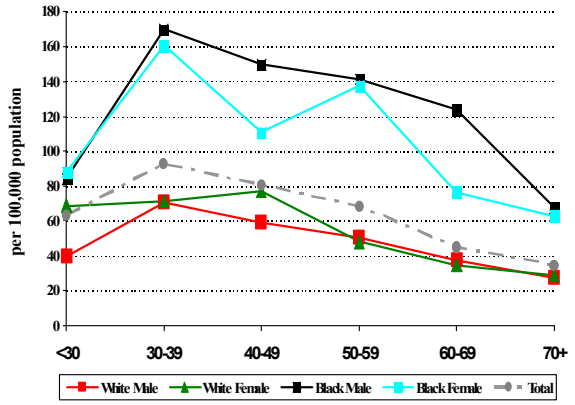
The rate of hospitalization with ketoacidosis varies by patientôs age. Figure 3.19 shows the age-specific rate of hospitalization with ketoacidosis by race and sex. Blacks had a higher rate than whites for all age groups. Black men had the highest rates among patients under age 55 years. The age-specific rate was high among patients age between 30 and 39, and declined by patientôs age for white men, white women and black men. Rates among black female patients appeared to peak between ages 60 and 69.

Figure 3.19. Age-specific Hospitalization Rates of Diabetic Ketoacidosis by Race-Sex, SC, 2006



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Diabetic Renal Failure and Dialysis

Renal failure (end-stage renal disease) is another very common manifestation of diabetes. After years of hyperglycemia accompanied with hypertension, diabetic nephropathy may lead to renal failure that requires lifelong dialysis or kidney transplantation. The rate of hospitalization for renal failure was disproportionately higher among blacks with diabetes than the rate among whites with diabetes. Figure 50 shows that black women with diabetes had the highest rate of hospitalization for diabetic renal failure in race-sex groups, more than three times the rate among white women with diabetes.

Figure 3.20. Age-Adjusted Hospitalization Rate of Diabetic Renal Failure by Race-Sex, SC, 2006

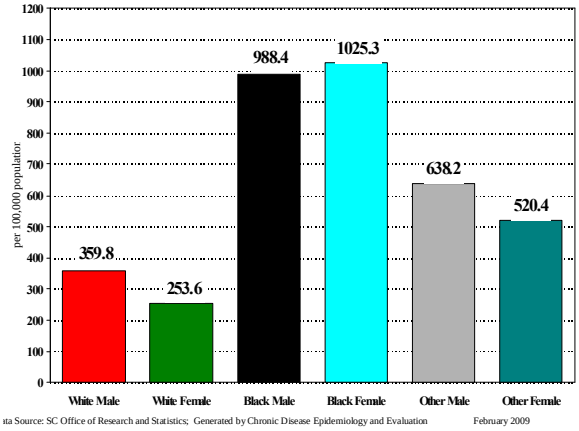

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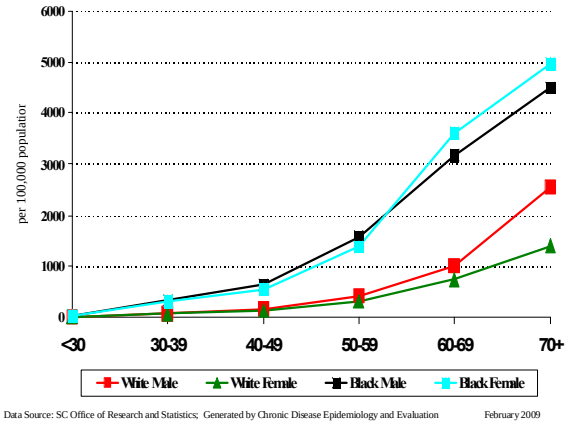
Figure 3.21 illustrates the pattern of the rate of hospitalizations for diabetic renal failure by age. The rate increased with patientôs age in 2006. Almost two-thirds (63%) of hospitalizations were for patients age 60 years and older. A dramatic increase in the rate of hospitalization was observed among patients age 40 years and older. Blacks had a higher age-specific rate than that of whites. There was little gender difference in the age-specific rates, except among older patients (age 70 years and older).

Figure 3.21. Age-Specific Hospitalization Rate of Diabetic Renal Failure by Race-Sex, SC, 2006



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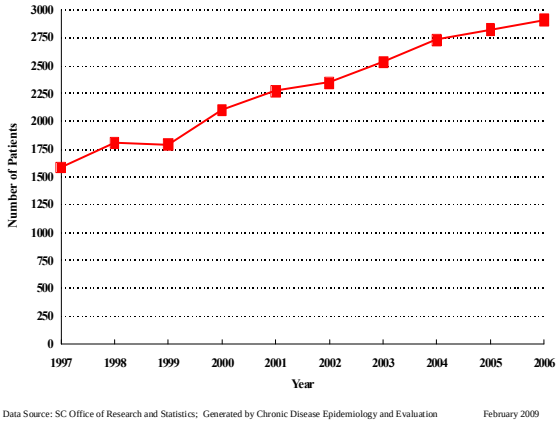
Diabetes is the largest single source of kidney disease and represents about 40% dialysis patients in SC a number that has almost doubled since 1997. Currently, almost 3,000 patients with diabetes are on dialysis. Figure 3.22 presents the total number of patients with diabetes on dialysis based on data collected by the Southeastern Kidney Council.

Figure 3.22. Dialysis Prevalence with Diabetes as Major Diagnosis, SC, 1997-2006.



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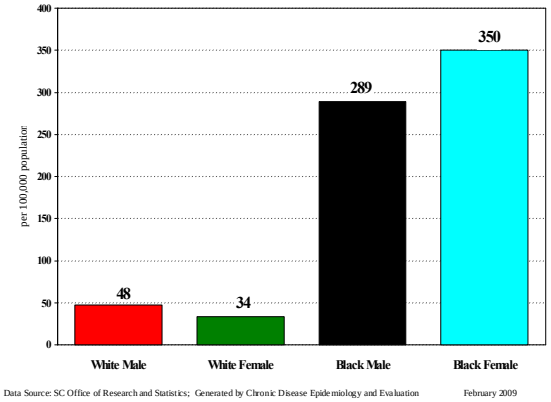
The vast majority of renal dialysis is now taking place in freestanding dialysis centers scattered around the state, and very little is taking place on an inpatient basis, except where the patient has been hospitalized for another reason.

For those patients being dialyzed in hospitals, blacks had a rate of dialysis higher than whites. The rate among black men was six times the rate among white men, and black women had a rate nine times the rate among white women Figure 3.23.

Figure 3.23. Age-Adjusted Hospitalization Rate of Diabetic Dialysis by Race-Sex, SC, 2006



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Diabetic Lower Extremity Amputation

The hospitalization rate for diabetic lower extremity amputation was disproportionately higher among black males than among black females or whites of either sex. In 2006, the rates among black males were almost twice the rates in black females and 2.5 times the rate of white males. Black males had five times the rates among white females, who consistently had the lowest rates (Figure 3.24). One very encouraging trend that has occurred is a consistent fall in hospitalization rates for lower extremity amputation in people with diabetes between 2001 and 2006. This is consistent among racial and gender groups and particularly evident in blacks. The age-specific rates increase with advancing age, especially among blacks (Figure 3.25).

Figure 3.24. Age-Adjusted Hospitalization Rate of Diabetic Lower Extremity Amputation by Race-Sex, SC, 1997-2006

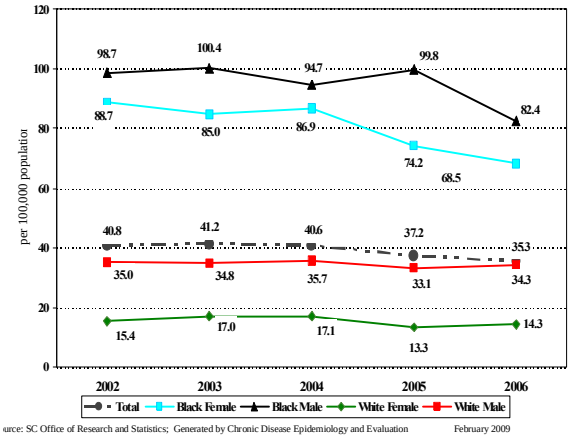

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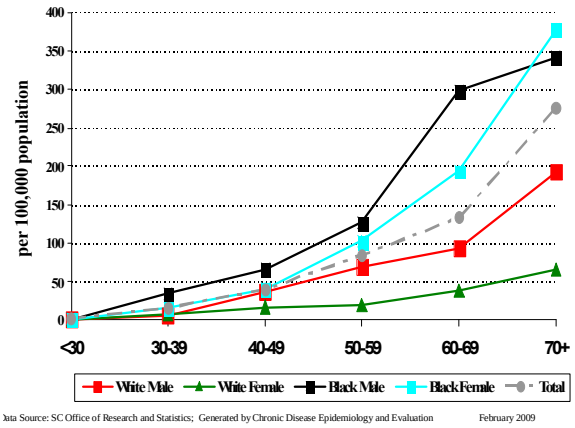
Figure 3.25. Age-Specific Hospitalization Rates for Diabetic Foot Amputation by Race-Sex, SC, 2006



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Births to Mothers with Diabetes

Gestational diabetes is associated with infant mortality, congenital malformations, and complications of labor and delivery. In general, two to three percent of pregnant women are diagnosed with gestational diabetes. Starting in 2004, South Carolina Vital Statistics birth certificate recorded diabetes status of the mother as either gestational or prepregnacy. Figure 3.26 shows the percentage of live births to mothers with diabetes in 2004 -2006. There were 2,621 live births to mothers with gestational diabetes in 2004, 2,669 in 2005 and 2,733 in 2006.

Figure 3.26. Percent of Live Births by Mother's Diabetes Status, SC, 2004 –2006

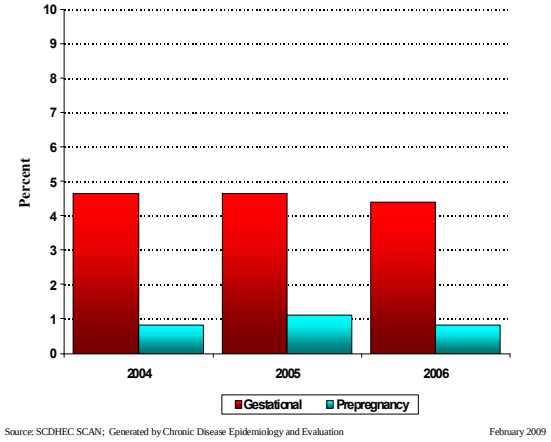

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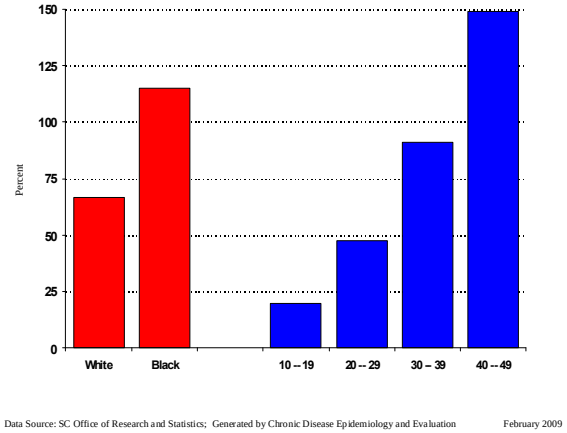
Figure 3.27 illustrates that the rate of hospitalization was higher among blacks than among whites and increased with age of pregnant women. The rate of hospitalization women age 40 years and older was more than six times the rate among women under 20 years of age.

Figure 3.27. Age-Adjusted Hospitalization Rate of Gestational Diabetes, SC, 2006



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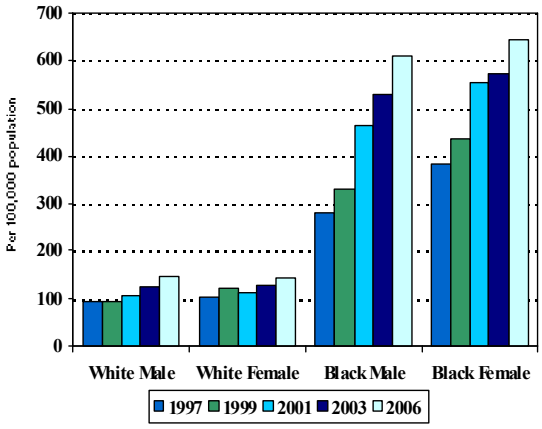
Emergency Room Visits

There is a striking racial disparity in the rates of emergency room visits for diabetes. In 2006, the rate of emergency room visits for diabetes as the primary diagnosis among blacks was more than five times the rate among whites (Figure 3.28). Compared to the data in 1997, the rate of emergency room visits increased among blacks and the racial disparity increased in rate.

Figure 3.28. Age-Adjusted Rate of ER Visits for Diabetes as the Primary Diagnosis by Race-Sex, SC, 1997-2006



Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiolgy and Evaluation February 2009

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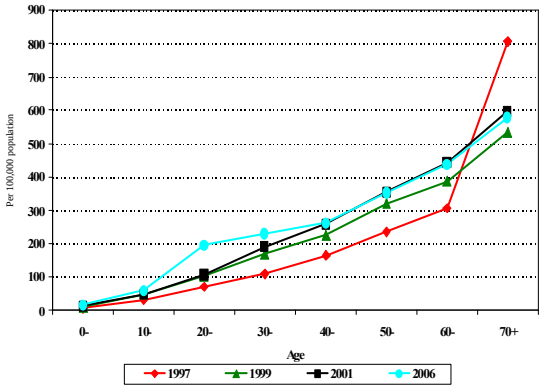
The rate of emergency room visits for diabetes increases with age. The rate was the highest (579.6/100,000) for patientsô age 70 and older. The age-specific rate among patients age 20-29 and 30-39 increased significantly from 2001 to 2006 (Figure 3.29).

Figure 3.29. Rates of ER Visits with Diabetes as the Primary Diagnosis by Age, SC, 1997-2006



Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

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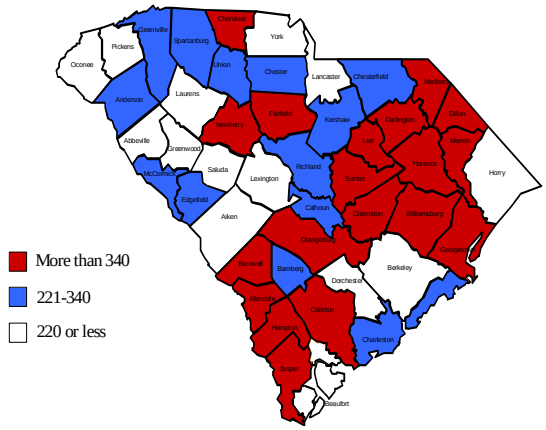
The rate of emergency room visits for diabetes varied among the 46 SC counties (Figure 3.30). Fifteen counties that had a rate of emergency room visits for diabetes greater than 300/100,000 in 2006 are located in an area situated from the northeastern part of the state to the southwestern area of the state. The majority of counties with a high rate of emergency room visits have a high prevalence of diabetes and/or a high proportion of minorities in their populations.

Figure 3.30. Age-Standardized Rate of ER Visits for Diabetes, (Primary Diagnosis), SC, 2006



SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

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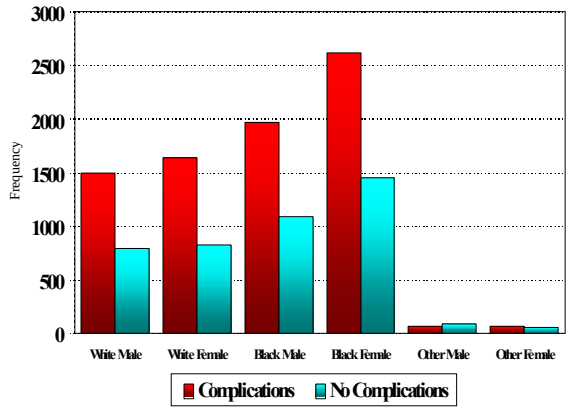
Figure 3.31 presents the number of emergency room visits for diabetes, both with and without diabetes complications. Women had more emergency room visits than men, and blacks had more visits than whites. Approximately two thirds of patients who visited emergency room for diabetes had diabetes complications.

Figure 3.31. Number of ER Visits with Selected Diabetic Complications by Race-Sex, SC, 2006

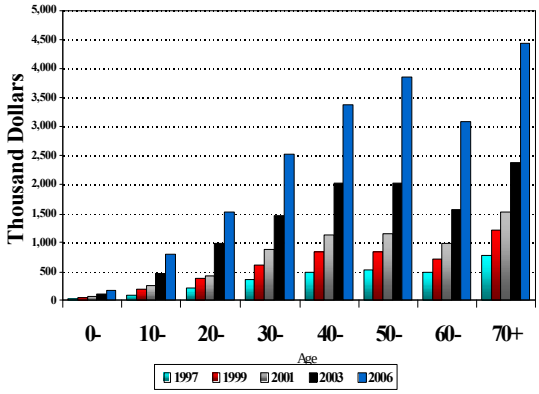


Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

For full view of graph, please see page 102

Total hospital charges for emergency room visits for diabetes increased with patientôs age. The age-specific total charges increased from $976,000 for patients under 20 years to over $4.4 million for patientsô 70 years and older. Figure 3.32 compares the age-specific hospital charges in 2001 to 2006. The total charges increased approximate 200% from 2001 to 2006. In addition, all age-specific charges increased from 78% to 158% between 2001 and 2006.

Figure 3.32. Total Charges for ER Visits with Diabetes as the Primary Diagnosis by Age, SC, 1997-2006



Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

For full view of graph, please see page 101

Summary

At 9.6%, the prevalence of diabetes in South Carolina is among the highest in the country and increases with age. Total numbers of hospital discharges with a primary diagnosis of diabetes are increasing. Total hospital charges for diabetes also have been increasing, and in 2006 were $2.8 billion. Average hospital charges are also increasing, and highest charges are seen in those over age 50. Medicare paid for over half of total charges in 2006. Length of hospital stay has changed very little in recent years. The prevalence of myocardial infarction and stroke are increased 5-fold among people with diabetes in South Carolina. Hospitalization rates for renal failure are more than doubled among blacks when compared with whites. Dialysis prevalence among diabetics has doubled in 8 years.

A problem area is the increasing use of the emergency room for diabetes visits over the past four years. In 2006, the rates among blacks were more than 5 times those of whites. ER visits for diabetics increased by at least 57% between 1997 and 2006. In black males the number has more than doubled. Total charges for ER visits by people with diabetes rose 200% between 2001 and 2006. Total charges in 2006 were $19.8 million, 44% were Medicare and 15% Medicaid.

We have a major problem in caring for people with diabetes in South Carolina. A major problem is the alarming increase in overweight or obese people to 65% of our South Carolina population. Hospital charges are close to $2.8 billion each year and there has been an increasing use of the emergency room for care.

A very encouraging trend is the more than 40% decrease in hospitalization for lower extremity amputations. This may be a direct result of aggressive efforts to educate persons with diabetes on foot care and the importance of regular foot exams, both self-checks and by their health care providers

Chapter Four
Mortality

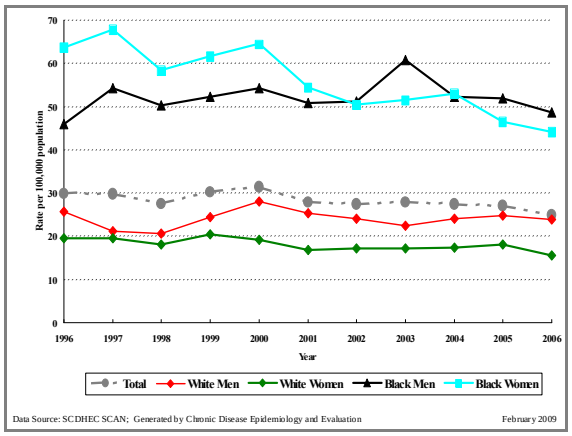
Introduction

Diabetes is listed as the sixth leading cause of death in South Carolina. In addition to death from acute complications, diabetes increases the risk of death from cardiovascular disease and end-stage renal disease. Although increased death rates are seen for all ages and races, minority populations and older populations experience the highest rates. The mortality data in this chapter are based on information listed on death certificates, and may underestimate the burden of diabetes as according to studies diabetes is likely to be under-reported on death certificates.

Mortality Rates

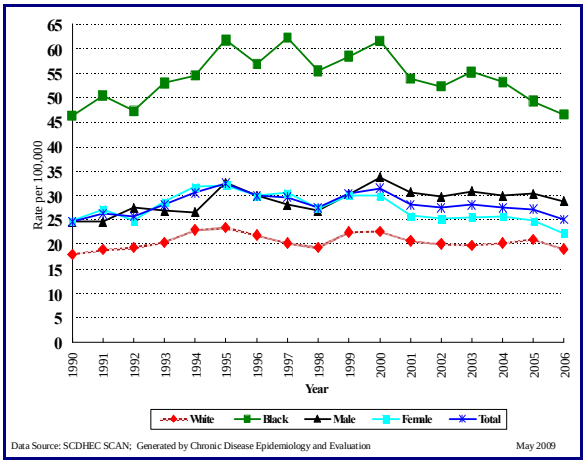
A total of 1,136 South Carolinians died from diabetes in 2006. Figure 4.1 shows that the age-adjusted mortality for which diabetes was the underlying cause of death decreased since 2000 and has remained around the rate of 27/100,000 population. Blacks had a mortality rate of 46.4/100,000 in 2006, more than 2.4 times the rate of 19/100,000 for whites. Men had a mortality rate 23% higher than women. During 1996 to 2006, the mortality rate of diabetes decreased by 14% for whites and 19% for blacks (Figure 4.2).

Figure 4.1. Age Adjusted Mortality Rate for Diabetes as the Underlying Cause of Death, SC, 1996-2006



For full view of graph, please see page 102

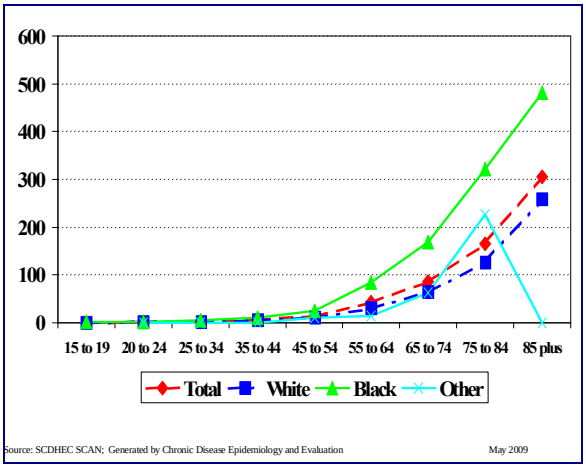
Figure 4.2. Age Adjusted Mortality Rates for Diabetes as the Underlying Causes of Death by Race, Sex, SC, 1996-2006



For full view of graph, please see page 103

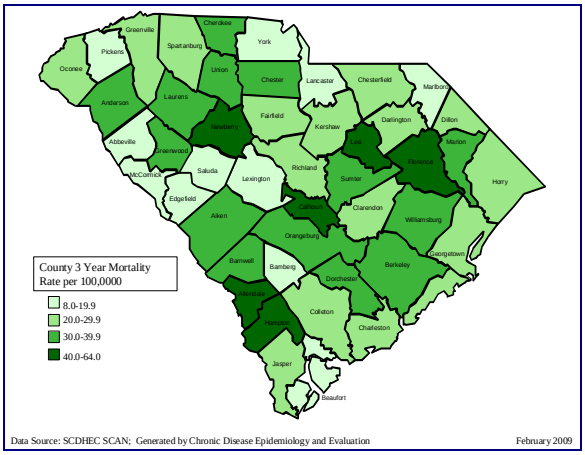
The age-specific mortality increases with age (Figure 4.3). Mortality rate almost doubled for every age group.

Figure 4.3. Age-Specific Crude Mortality Rate for Diabetes as the Underlying Cause of Death, SC, 2006



For full view of graph, please see page 104

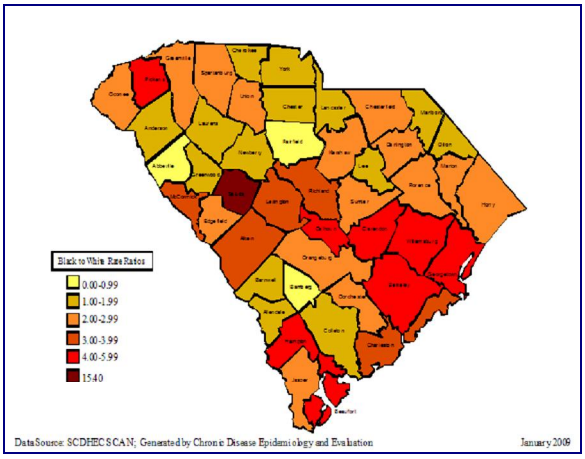
Figure 4.4. Age-Adjusted Mortality of Diabetes (Underlying Cause of Death), SC, 2003-2006



For full view of graph, please see page 105

The state average mortality rate was 26.5/100,000 in 2004-2006. Fifteen counties had an age-adjusted mortality higher than the state average and seven counties had a mortality rate lower than the state average. Most of the counties with high mortality are a cluster of counties in the Pee Dee area (Figure 4.4). This is a pattern consistent with that of for risk factors, prevalence of diabetes, and hospitalizations for diabetes.

Figure 4.5. Racial Rate Ratio of Diabetes as the Underlying Cause of Death, SC, 2004-2006



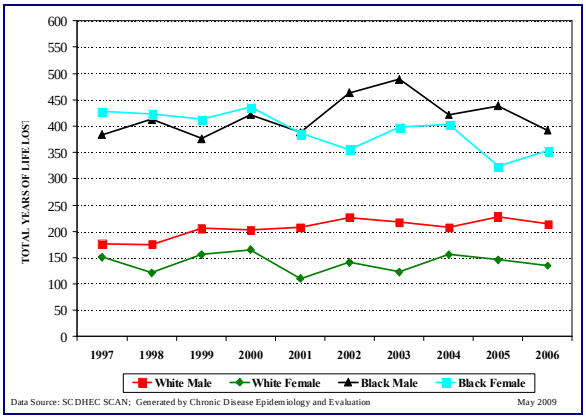
For full view of graph, please see page 106

Years of Potential Life Lost

Average life expectancy for people with diabetes is five to 10 years less than that of people without diabetes. Years of potential life loss (YPLL) is calculated by adding all the years of life for people with diabetes who died before normal life expectancy 75 years.

Figure 4.6 illustrates the YPLL due to diabetes from 1997 to 2006. In 1997-2006, 10,618 South Carolinians died from diabetes, which was listed as the underlying cause of death, with a total of 92,446 potential years of life loss. On average, life expectancy for people with diabetes in South Carolina was 7.9 years less than the ñnormalò life expectancy. Among people with diabetes, men have lost more years of potential life than women, and blacks potentially lost more years than whites.

Figure 4.6. Total Number of Years of Potential Life Lost[1] for Diabetes as Underlying Cause of Death by Race-Sex, SC, 1997-2006 (before the age of 75)



For full view of graph, please see page 107

Health People 2010 objectives:

Objective No. 5.5 ñ*Reduce the diabetes death rate.*ò
Target: 46 deaths per 100,000 population.

In Figure 4.2, the SC trend line depicted by Total shows the Age Adjusted Mortality Rate for Diabetes as the Underlying Cause of Death, 1996-2006. All along, the SC statistics 25 deaths per 100,000 population revealed that she has met this HP 2010 objective of 46 deaths. However, the as Figure 4.2 revealed, the health disparity remains to be a challenge for SC.

Summary

Approximately three thousand South Carolinians die from diabetes every year. Diabetes-related mortality appeared to decline in 1995-1997 after a decade long increase in South Carolina. Data in South Carolina indicated that mortality of diabetes increased exponentially with age. The majority (82%) of deaths from diabetes occurred among people aged 60 and older. Race-sex specific mortality tracked closely with the patterns of diabetes-related risk factors and morbidity. Minorities, predominantly Blacks, experienced a substantially higher death rate and greater years of potential life lost than whites.

Appropriate, innovative communication and education programs are needed to reduce the tremendous burden in this population. Meanwhile, increasing awareness, access to care, and diabetes management are critical for people with diabetes. Increasing resources of diabetes control in South Carolina, particularly rural health settings, targeting high-risk populations are objectives of DSC and SCDPCP.

[1] Years of potential life lost (YPLL) is a measure of the number of years not lived by each individual who died before reaching a predetermined age, usually 65 or 75. (NCHS switched to YPLL before 75 in 1996 and CHS switched in 2000.) This measure weights deaths at younger ages more heavily than deaths at older ages; the younger the age at death, the greater the number of years of potential life lost. The YPLL for a population is computed as the sum of all the individual YPLL for individuals who died during a specific time period.

Chapter Five
Data Resources

Today, there are multiple organizations, agencies, and programs that are working to decrease the burden of diabetes in South Carolina. This section of the report outlines diabetes data resources in South Carolina. It should be noted that these efforts are not all inclusive and the compilation of a more complete catalog of resources in South Carolina is ongoing. Anyone wishing to provide information in order to make the resources catalogue more inclusive can send contributions to the following address:

SC DHEC Office of Chronic Disease Epidemiology
Patsy Myers, DrPH
Chronic Disease Epidemiologist
Office of Chronic Disease Epidemiology and Evaluation SC DHEC
1800 St. Julian Place
Columbia SC 29201
(803) 545-4490
myerspm@dhec.sc.gov

Statewide Agencies that Provide and Interpret Data for Use in Monitoring the Burden of Diabetes

Diabetes Prevention and Control Program
Diabetes Prevention and Control Program
SC DHEC
1800 St. Julian Place
Columbia, SC 29201
(803) 545-4471
(803) 545-4503 fax

The SCDPCP is housed and managed within the SC DHEC, Bureau of Community Health and Chronic Disease Prevention.

The Program is administered by a core staff comprised of a Program Director/ Coordinator, Epidemiologist, Intervention/ Evaluator, Health Systems Coordinator, Lay Health Facilitator, Statewide Coalition Coordinator, and a Program Assistant, and is funded by the Centers for Disease Control and Preventions (CDC).

The overall goal of the program is to reduce the burden of diabetes in South Carolina. The objectives include:

- Defining and monitoring the burden of diabetes in South Carolina (Surveillance);
- Developing new approaches to reduce the burden of diabetes;
- Implementing specific approaches to reduce the burden; and
- Coordinating and integrating efforts to reduce the burden.

Diabetes Initiative of South Carolina
Daniel T. Lackland, DrPH
Board Chair
Medical University South Carolina
135 Cannon St, 3rd Floor
Charleston, SC 29425
Web site address:
http:/www.musc.edu/diabetes

SC DHEC Bureau of Community Health and Chronic Disease Prevention
Office of Chronic Disease Epidemiology and Evaluation
Khosrow Heidari, MS, MS, MA, Director
SC DHEC
1800 St. Julian Place
Columbia SC 29201
(803) 545-4490

Established in 2005, within the new Bureau of Community Health and Chronic Disease Prevention, the OCDE is comprised of several specialized epidemiologists and graduate assistants from the USC School of Public Health. Emphasis programs include diabetes, cardiovascular disease, and risk factor reduction. A close collaboration with the South Carolina Central Cancer Registry provides a capacity for cancer epidemiology as well. The Office performs directed analyses in support of the chronic disease control programs of SC DHEC. The staff also responds to requests for data analyses from SC DHEC district staff, health officials, and the public. OCDE leads the development of a variety of publications, and assists with the construction of others. Statistical analyses, interpretation, interpretation, and synthesis are principal capacities. OCDE database assets include vital records, hospital discharges, emergency room visits, BRFSS, demographic statistics; along with considerable graphic and mapping capacities.

Carolinas Center for Medical Excellence
246 Stoneridge Drive, Suite 200
Columbia, SC 29210
(803) 251-2215, local
(800) 922-3089, toll-free
(800) 735-8583, TTY
(803) 255-0897, fax

As a private, non-profit organization, Carolina Center for Medical Excellence (CCME) is the Peer Review/Quality Improvement Organization for South Carolina. Funded by the Health Care Financing Administration, CCME assures that South Carolinaôs Medicare beneficiaries receive medically necessary health services furnished in the appropriate setting and that the quality of care provided meets professionally recognized standards of health care.

South Carolina Primary Health Care Association
2211 Alpine Road Extension
P. O. Box 6923
Columbia, SC 29223
803-788-2778
http://scphca.org/

The SCPHCA was formed in response to a need to make health care services available in medically underserved areas of South Carolina. The mission is to assure that adequate and appropriate quality health care services are accessible and affordable to every South Carolina community.

SCPHCA membership offers opportunities to network with other people, agencies, governmental officials, and health centers to develop strategies, policies and programs that lead to the effective delivery of primary health care. The SCPHCA provides services such as: advocacy, research, information sharing, continuing education and training, shared services arrangements, technical assistance, training and consultation, project collaboration, policy monitoring and analysis, grant preparation assistance, clearinghouse activities, community development, and contract negotiations.

South Carolina Budget and Control Board Office of Research and Statistics (ORS)

The Health and Demographics Section of the Office of Research and Statistics receives, processes, distributes, and interprets health, demographic, and census data in South Carolina.

The Health Information maintained by the Health and Demographics Section includes: Medical record and billing data on inpatient hospital discharges, emergency room visits, and outpatient surgery; Inpatient health facilities; The South Carolina Client Master File; Licensed Health Manpower, Health Manpower Education; And periodic estimates of visits to private office physicians. Much of this data is presented on this website.

Addressing & Geocoding provides a means to understand and improve the distribution of limited resources by processes known as address matching and geocoding. Address matching integrates client databases, and geocoding pinpoints client locations on a map. When combined spatially, this information optimizes neighborhood communication between clients and service providers and also improves cooperation between agencies serving the same areas and clients. Much of this data is presented on this website

The Health and Demographics Statistical Section is the designated State Data Center for census information and acts as the coordinating unit for census information in the State. Census products include not only information from the Decennial Censuses but also from the Economic and Government Censuses and the County Business Patterns. Much of this data is presented on this website.

Behavioral Risk Factor Surveillance System

CDCôs BRFSS is a unique, state-based surveillance system active in all 50 states. This system is the primary source of state-based information on risk behaviors among adult populations. The system involves a lengthy survey questionnaire administered by phone.

The BRFSS was designed to allow comparisons between states, and between individual states and the nation. To facilitate comparisons, every state uses a similar method of selecting respondents and the same core questions.

The BRFSS of the SC DHEC was established in September 1985 through a cooperative agreement with the CDC. The primary purpose of the BRFSS is to collect and make available data on selected risk factors by conducting a monthly telephone survey of a representative sample of the stateôs adult (age 18 and over) population.

Office of Public Health Statistics and Information Systems

The Office of Public Health Statistics and Information Services (PHSIS) consists of three (3) main divisions: The Division of Vital Registry (a population-based registry of all live births, deaths, fetal deaths, marriages, divorces, adoptions, and induced termination of pregnancy occurring in South Carolina); The Division of Cancer Registry (a population based registry of all incidents of cancer in South Carolina); and The Division of Biostatistics (a statistical, epidemiological, and spatial analytical unit). With these three Divisions, PHSIS contains the core elements needed to carry out the agencyôs surveillance and assessment

responsibilities. The office is also responsible for conducting Internal Review Board oversight on all research conducted by the agency in order to ensure the protection of human subjects involved in research.

MUSC Hypertension Initiative
135 Rutledge Avenue, 1230 RT
Charleston, SC 29425
Phone: 843-792-1715
Fax: 843-792-0816
Web: http://worst2first.musc.edu

Internet Sites for National Diabetes Agencies and Organizations

American Diabetes Association
http://www.diabetes.org
1-800-DIABETES (342-2383)

American Association Diabetes Educators
http://www.diabeteseducator.org
1-800-338-3633

American Dietetic Association
http://www.eatright.org/cps/rde/xchg/ada/hs.xsl/index.html
1-800-877-1600

Juvenile Diabetes Research Foundation International
http://www.jdrf.org/
1-800- 533-CURE (2873)

National Certification Board for Diabetes Educators NCBDE (CDE Exam)
http://www.ncbde.org/
1-847-228-9795

National Diabetes Educator Initiative
http://www.ndei.org/
1-800-471-7745

National Institute of Diabetes and Digestive and Kidney Diseases
http://www.niddk.nih.gov
1-301-496-3583

National Diabetes Education Program
http://ndep.nih.gov/
1-888-693-NDEP (6337)

Center for Disease Control and Prevention/Diabetes
http://www.cdc.gov/diabetes/
1-800-CDC-INFO (232-4636)

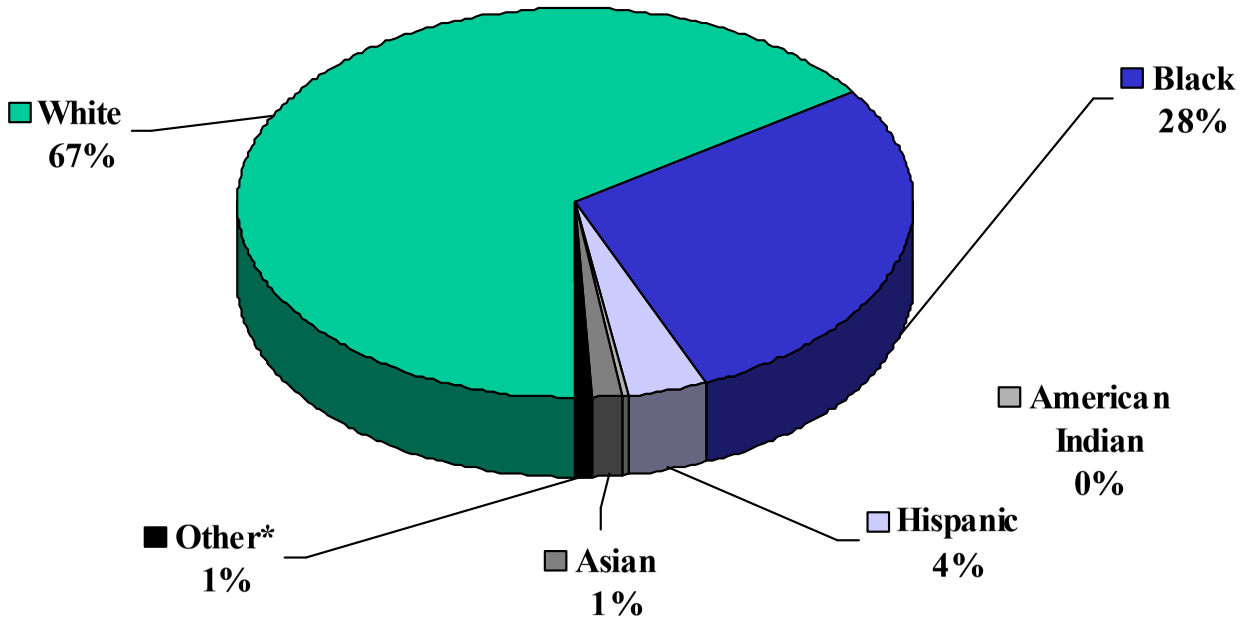
Summary

The preceding list of statewide and local resources for monitoring diabetes prevention and control is part of an ongoing effort to increase awareness and promote interventions that reduce the burden of diabetes. There are active efforts to train health care providers, to educate and encourage persons with diabetes to take control of their diabetes through self-management (dietary changes, exercises, smoking cessation, seeking regular medical care, and performing visual inspections of extremities), and to promote changes in the health care system and the community to improve diabetes outcomes.

APPENDIX

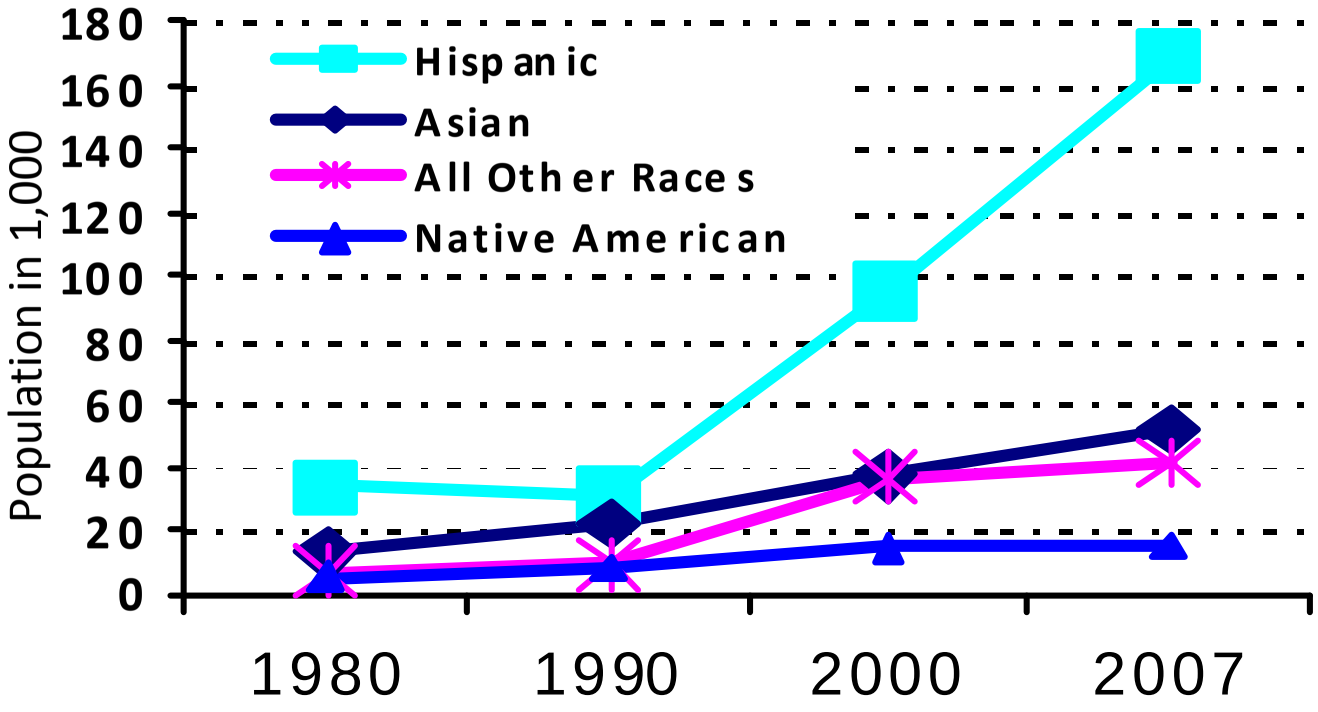
Figure 1.1. South Carolina Estimated Population Distribution as of July 1, 2007

Racial/Ethnic Distribution



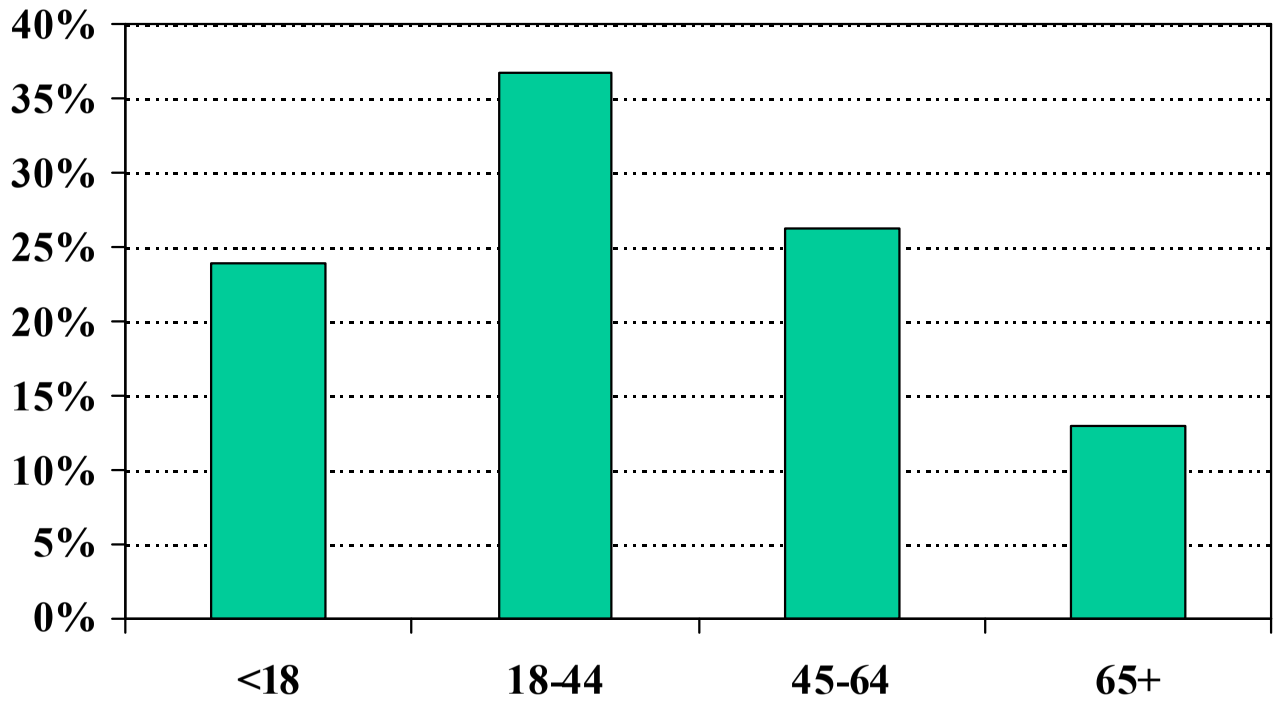
Data Source: ORS, Generated by DHEC Chronic Disease Epidemiology & Evaluation February 2009

Figure 1.2. Trends in Race/Ethnic Populations 1980-2005 (other than white and African American)



Data Source: ORS, Generated by DHEC Chronic Disease Epidemiology & Evaluation February 2009

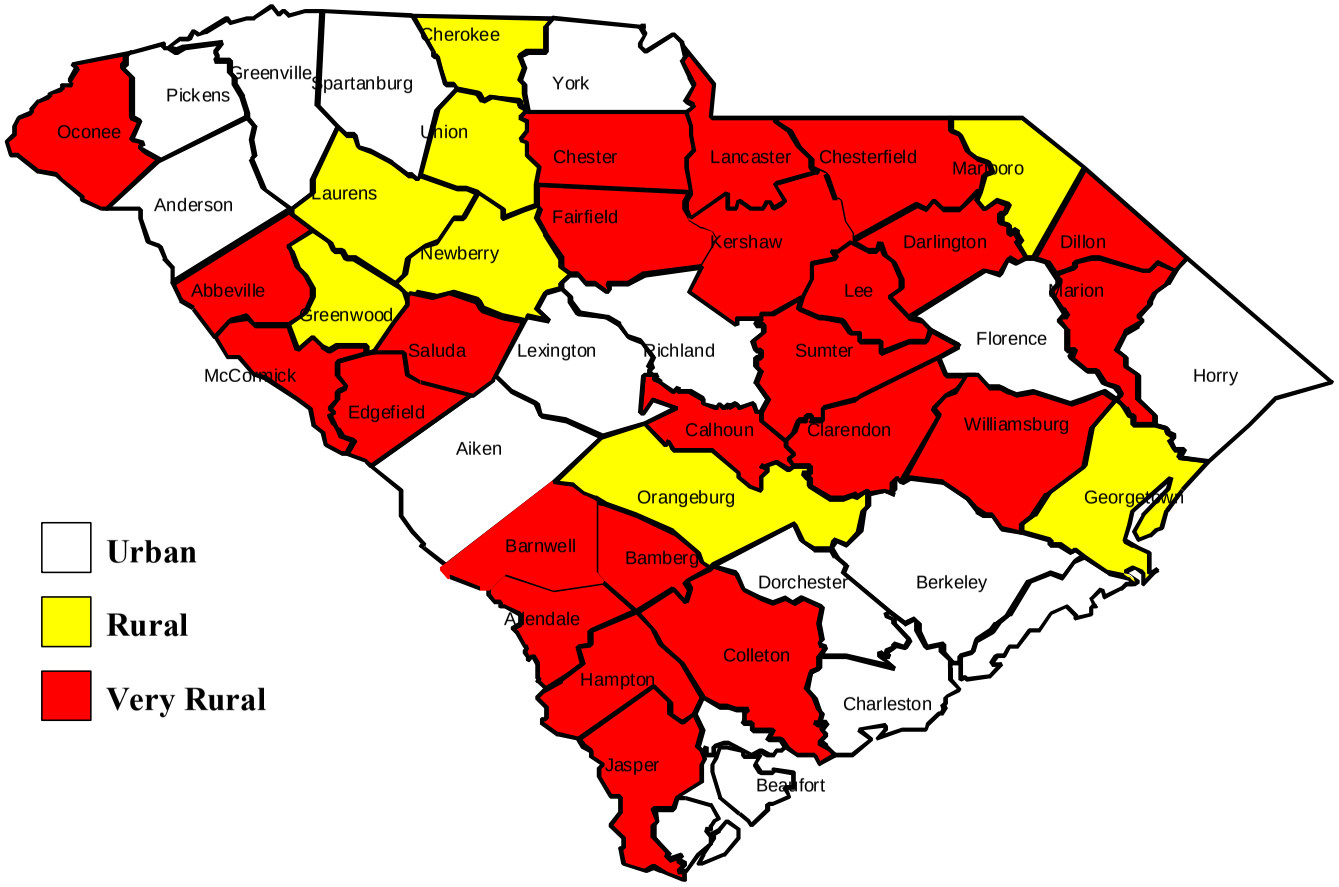
Figure 1.3. Age Distribution of Estimated Population as of July 1, 2008



Data Source: ORS, Generated by DHEC Chronic Disease Epidemiology & Evaluation February 2009

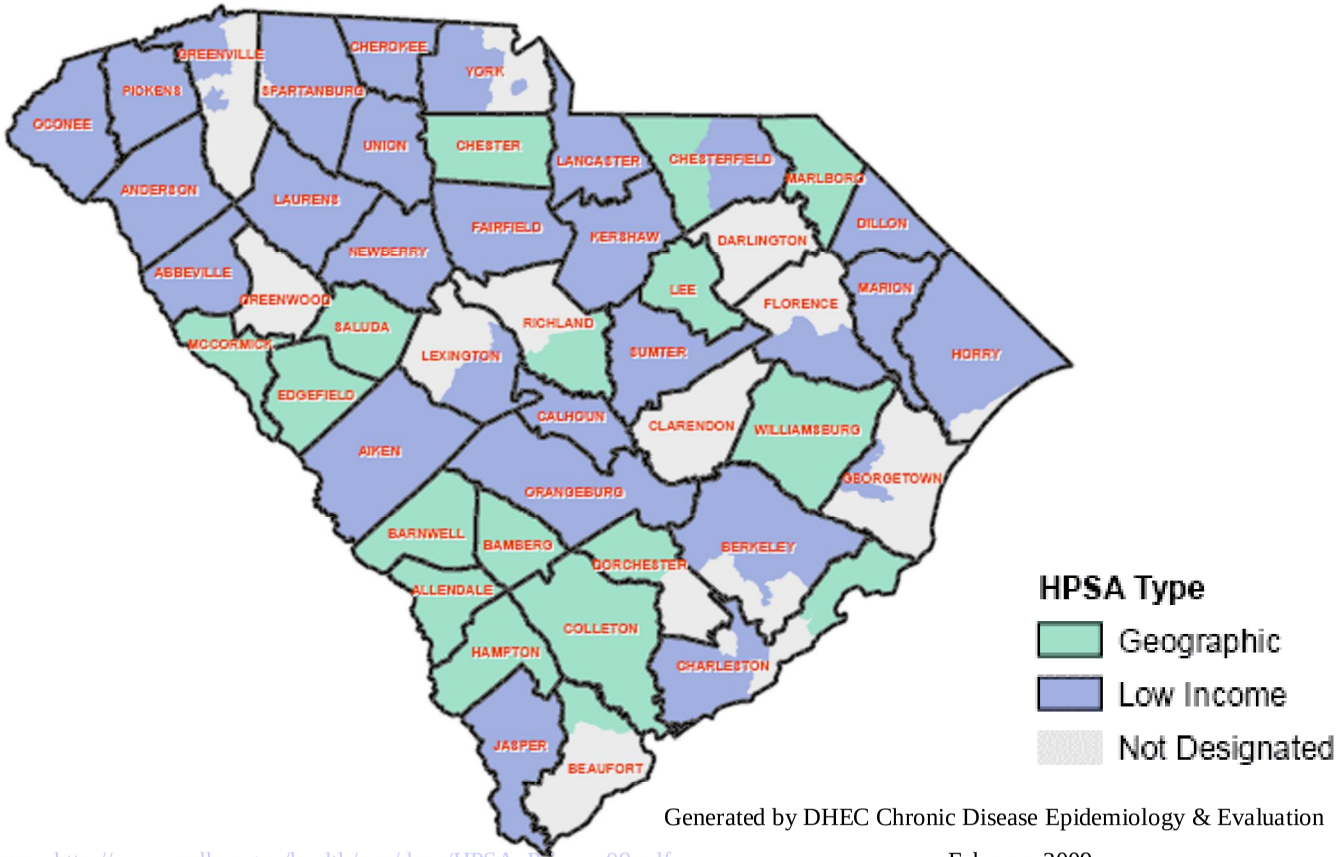
Figure 1.4. Urban, Rural and Very Rural Counties

Based on Size of Largest Town



Data Source: ORS, Generated by DHEC Chronic Disease Epidemiology & Evaluation February 2009

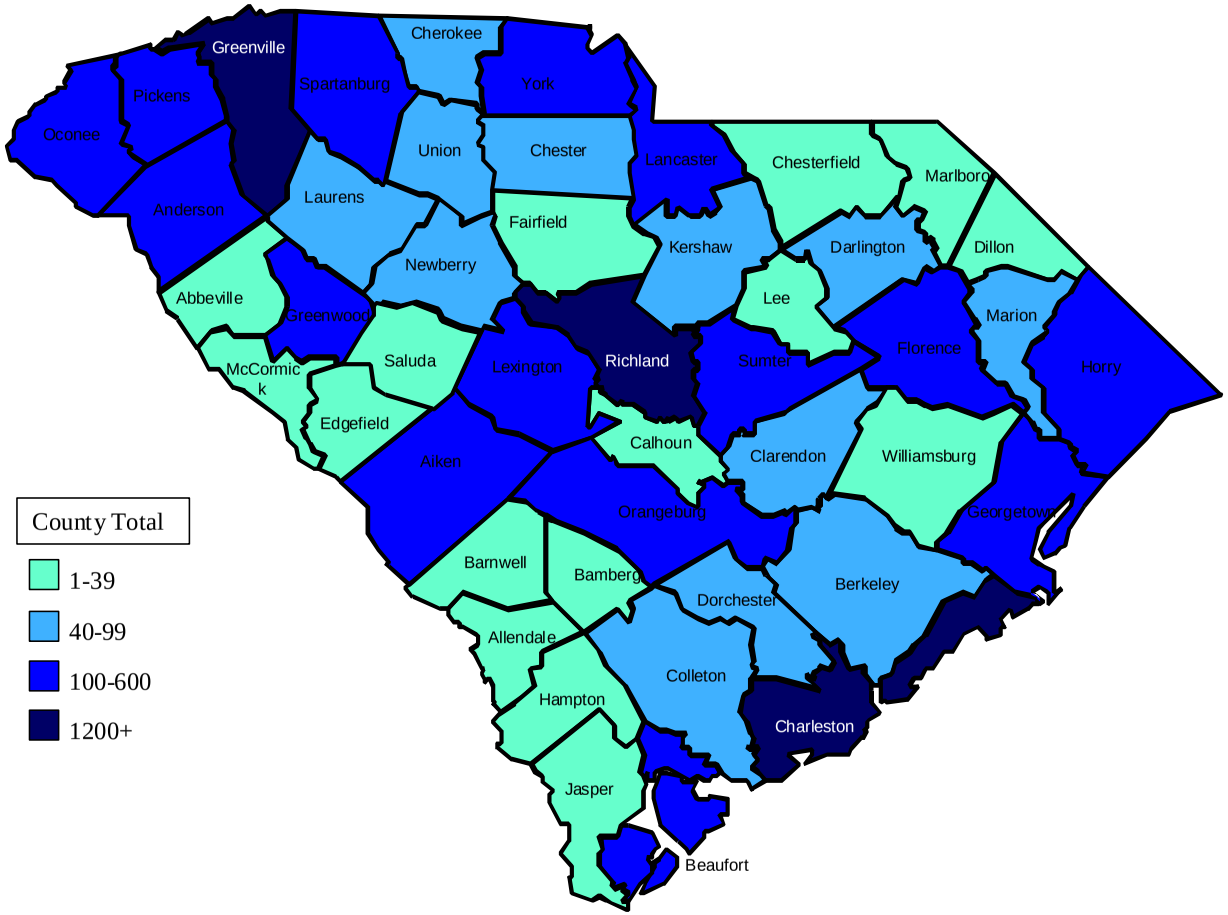
Figure 1.5. South Carolina Primary Care Health Professional Shortage Assessment by Type, as of June 2009



Generated by DHEC Chronic Disease Epidemiology & Evaluation

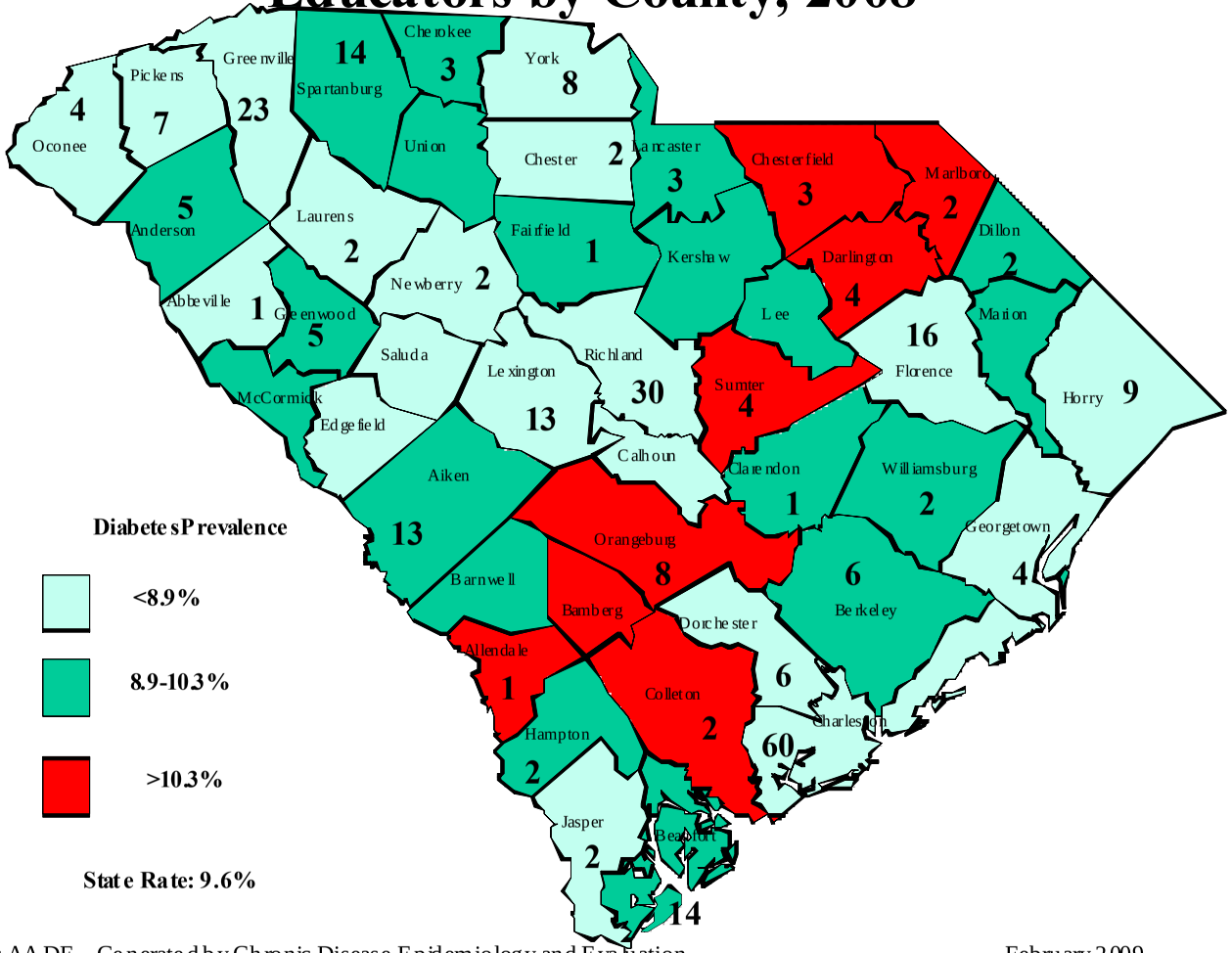
Data Source: http://www.scdhec.gov/health/opc/docs/HPSA_Primary09.pdf February 2009

Fig 1.6. Physicians Employed in South Carolina, 2005



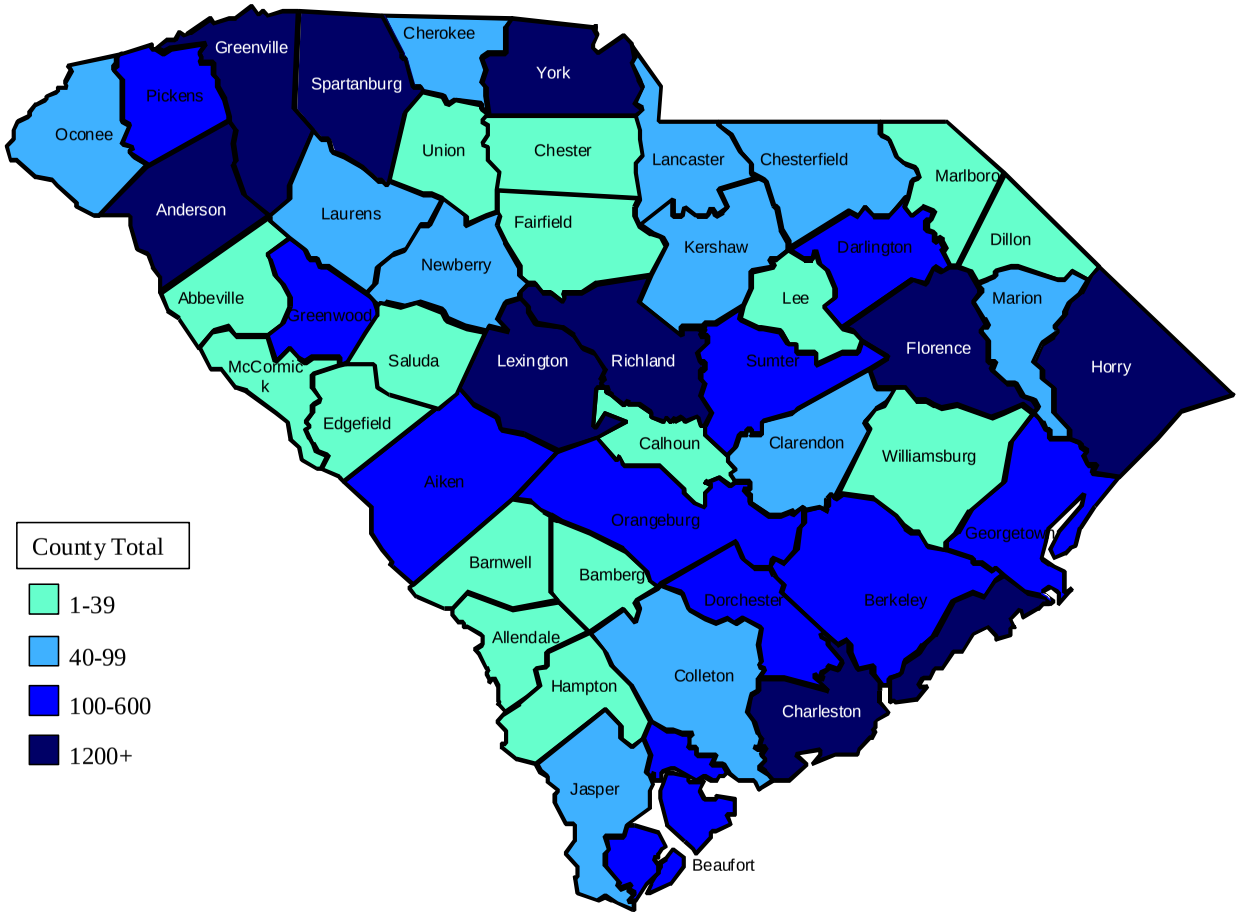
Data Source: ORS, Generated by DHEC Chronic Disease Epidemiology & Evaluation February 2009

Fig. 1.7. Number of Certified Diabetes Educators by County, 2008



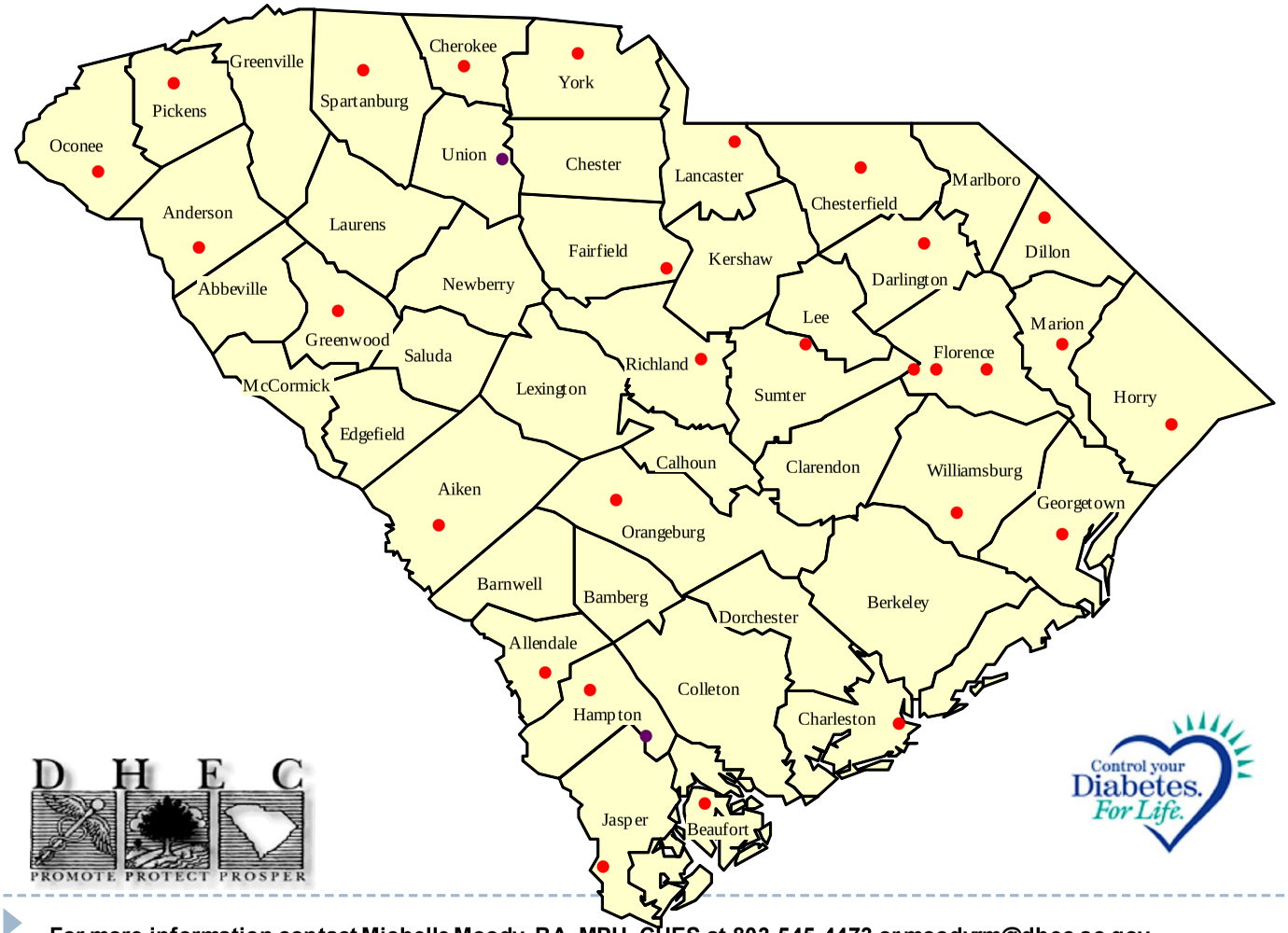
Data Source: AADE, Generated by Chronic Disease Epidemiology and Evaluation February 2009

Fig 1.8. Pharmacists Employed in South Carolina, 2005



Data Source: ORS, Generated by DHECôs Chronic Disease Epidemiology & Evaluation February 2009

Figure 1.9. South Carolina DPCP Diabetes Community Partners



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For more information contact Michelle Moody, BA, MPH, CHES at 803-545-4473 or moodyrm@dhec.sc.gov

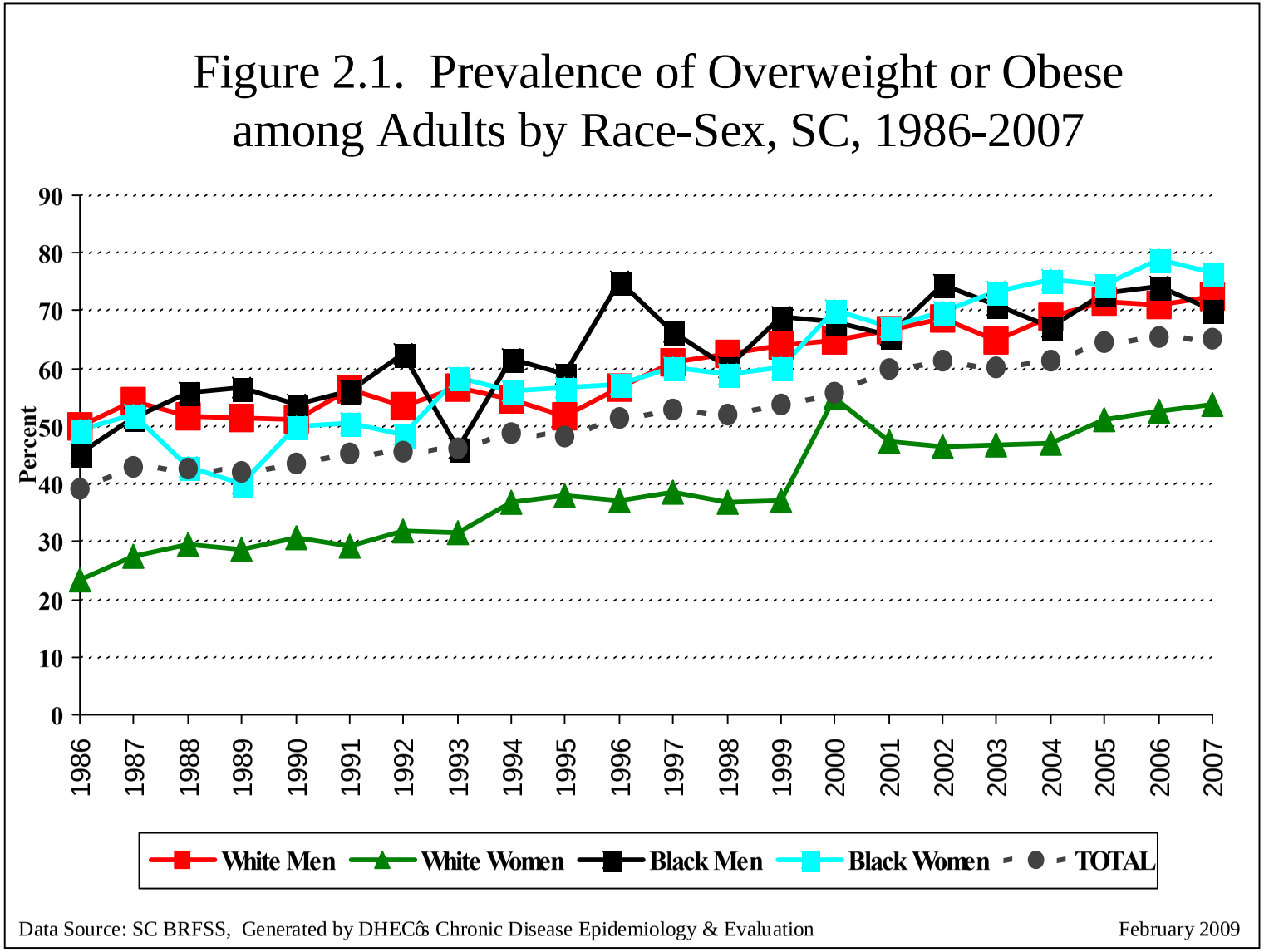
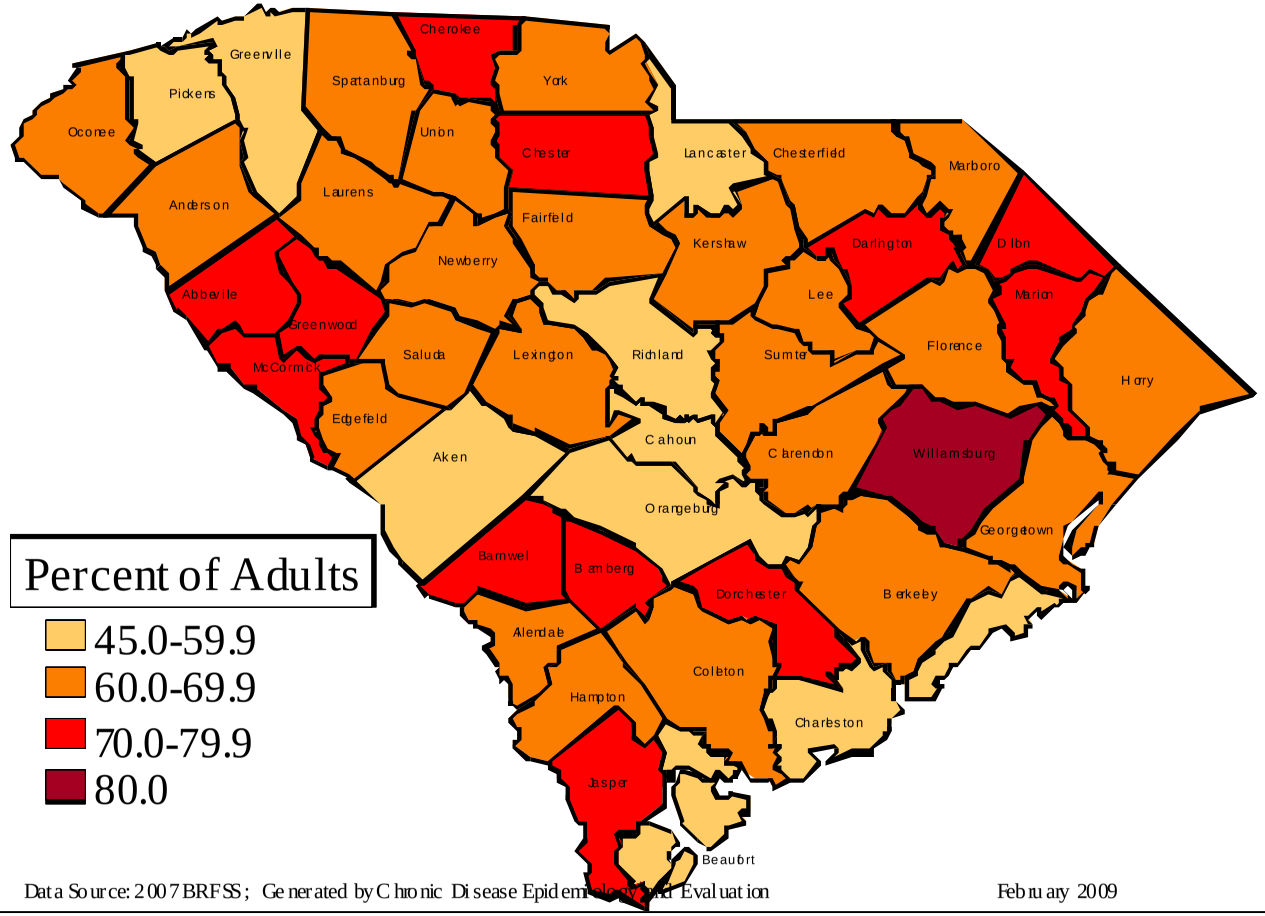


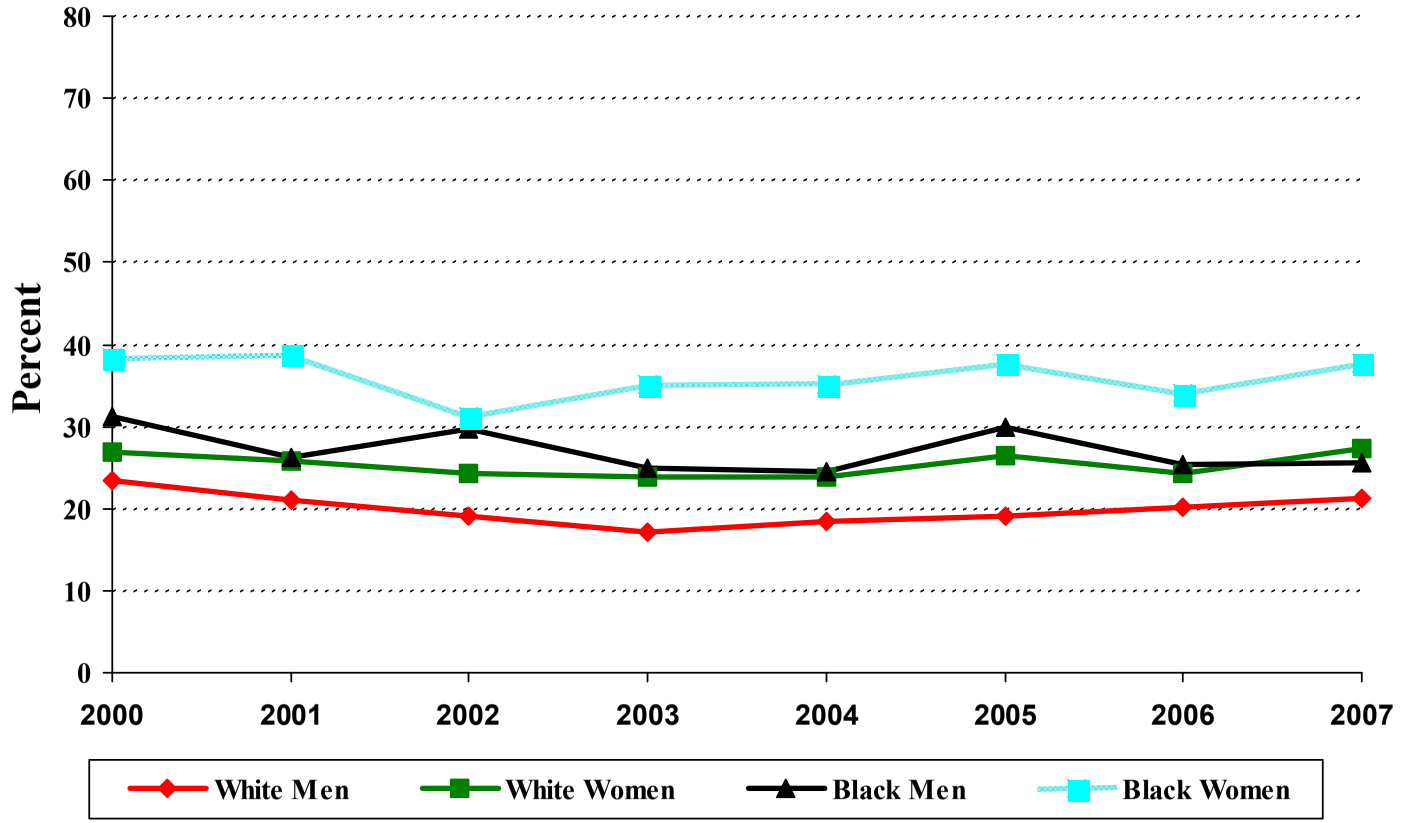
Figure 2.1. Prevalence of Overweight or Obese among Adults by Race-Sex, SC, 1986-2007
Percent
90
80
70
60
50
40
30
20
10
0
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
White Men
White Women
Black Men
Black Women
TOTAL
Data Source: SC BRFSS, Generated by DHECôs Chronic Disease Epidemiology & Evaluation
February 2009

Figure 2.2. Prevalence of Overweight or Obese among Adults, 2007



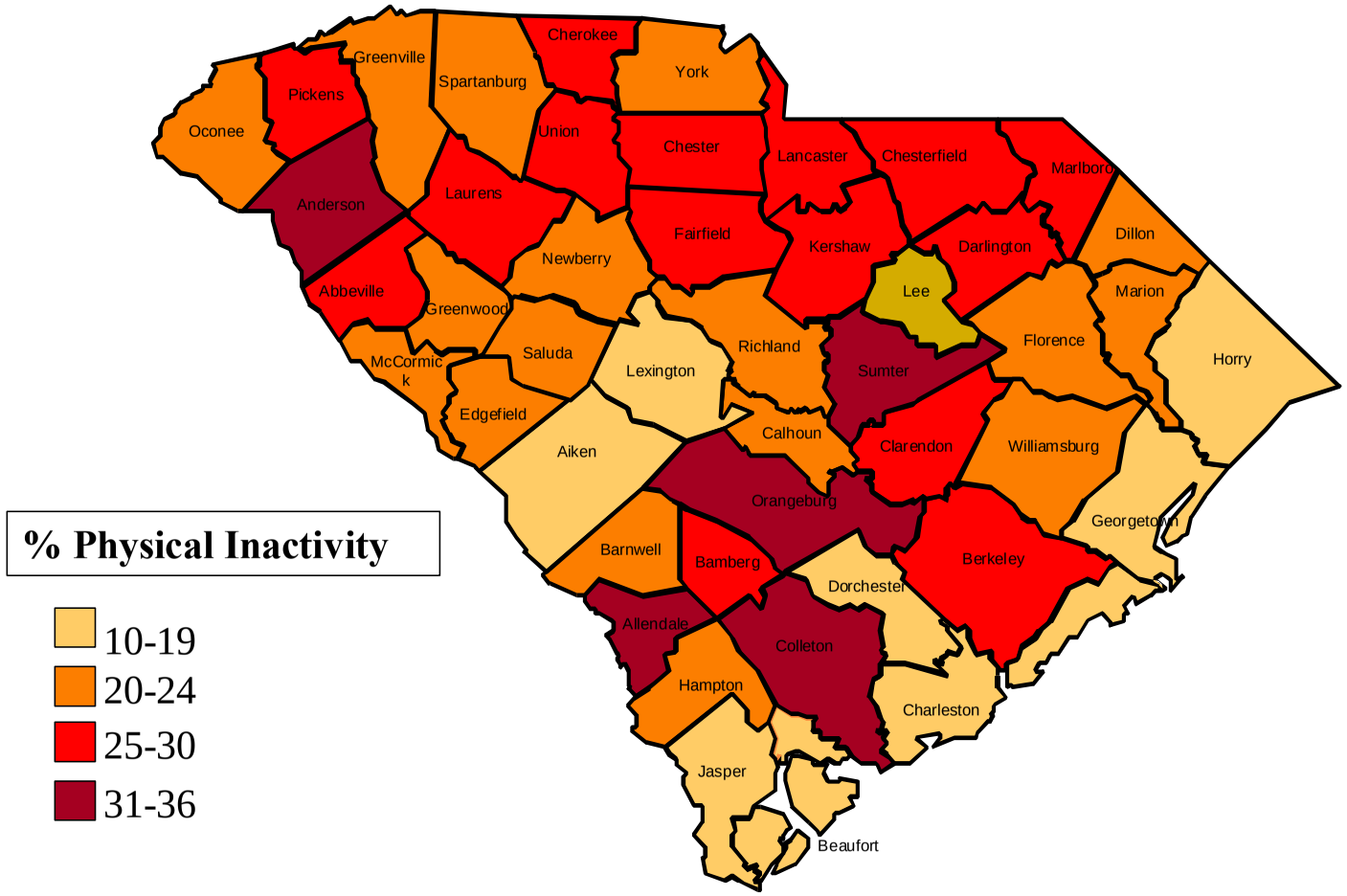
Data Source: 2007 BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.3. Prevalence of Physical Inactivity among Adults by Race-Sex, SC, 2000-2007



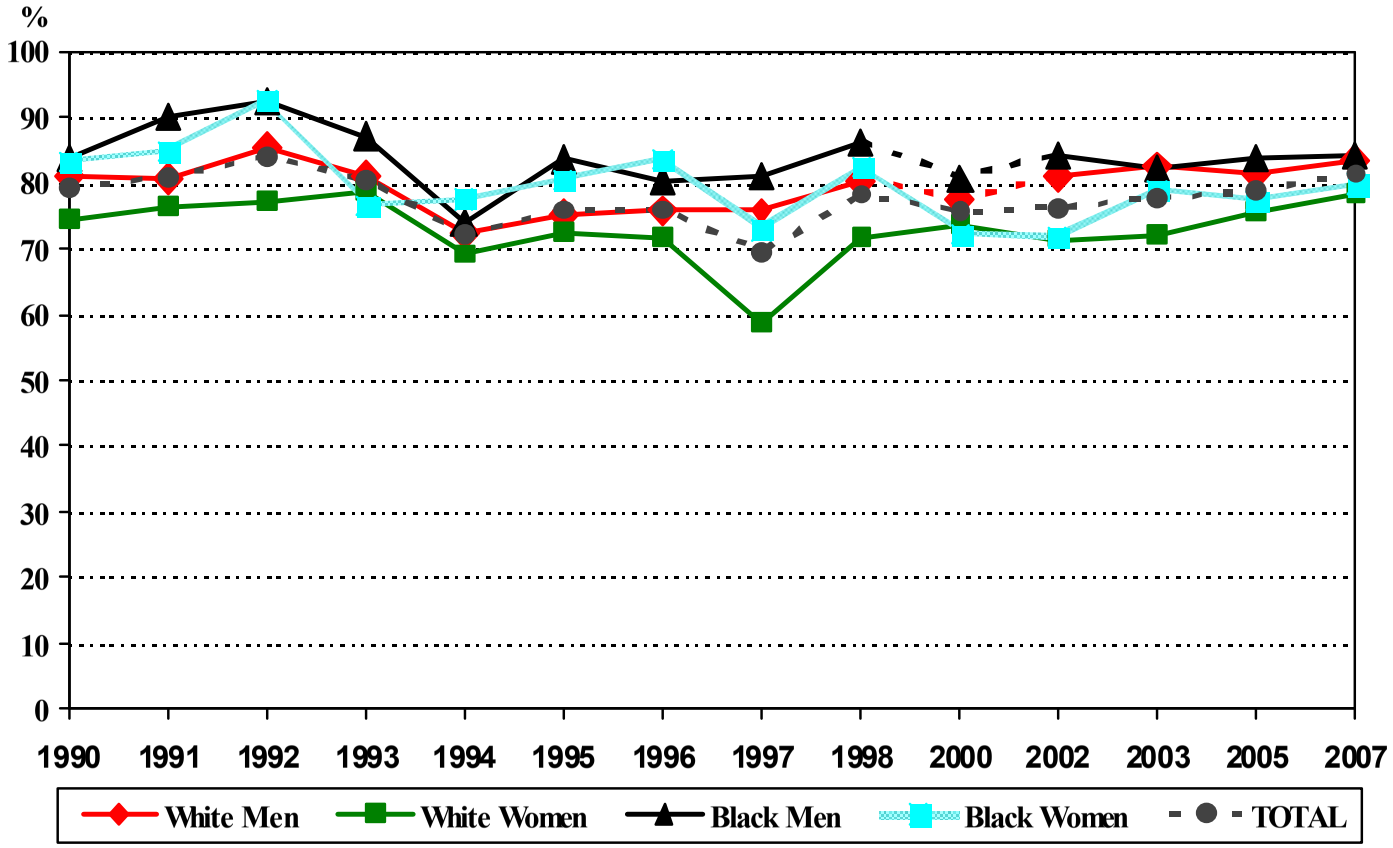
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.4. Prevalence of Physical Inactivity among Adults, SC BRFSS, 2007



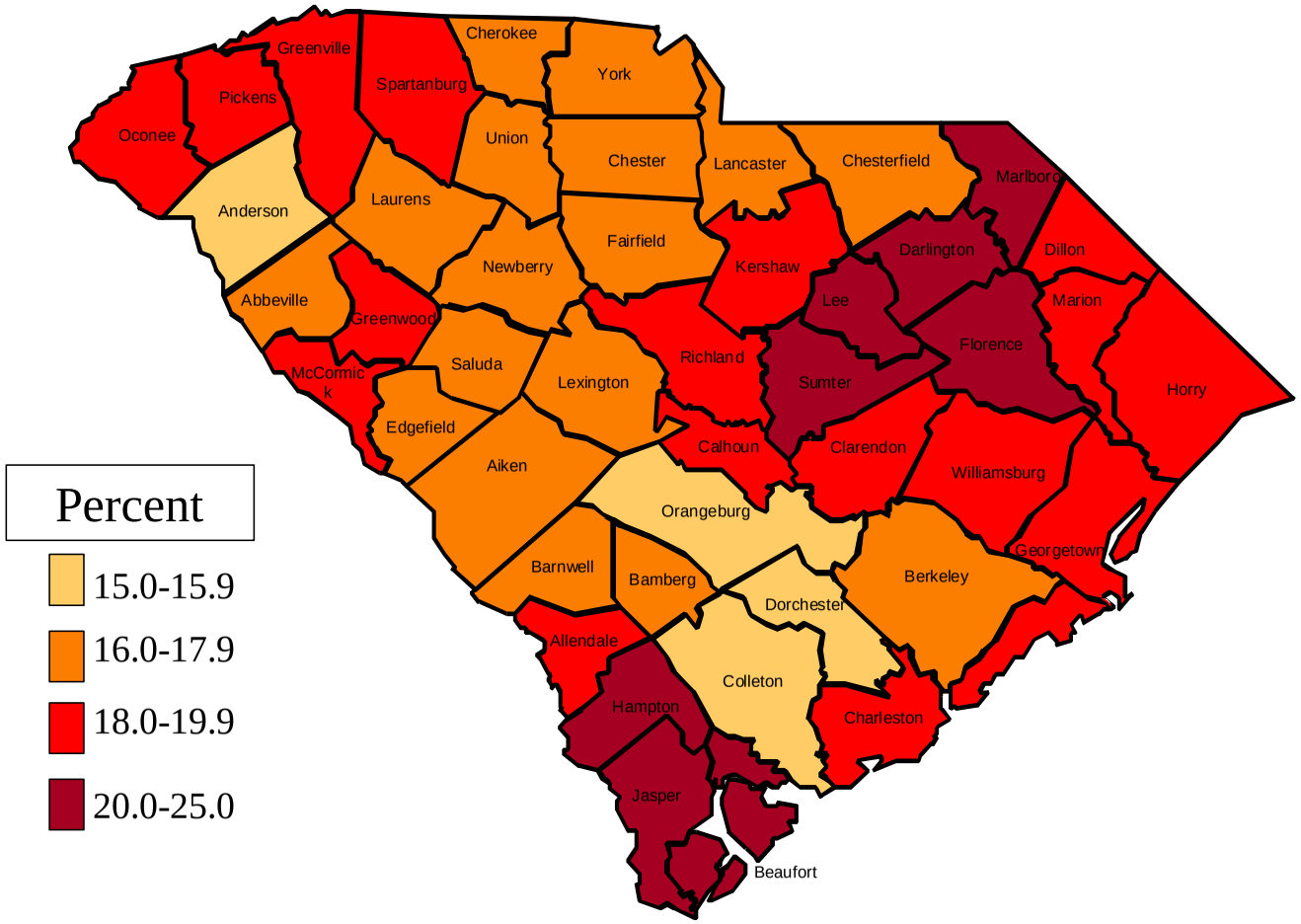
Data Source: SCDHEC SCAN; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.5. Prevalence of Consuming Fruits and Vegetables Less Than 5-A-Day among Adults by Race-Sex, SC, 1990-2007



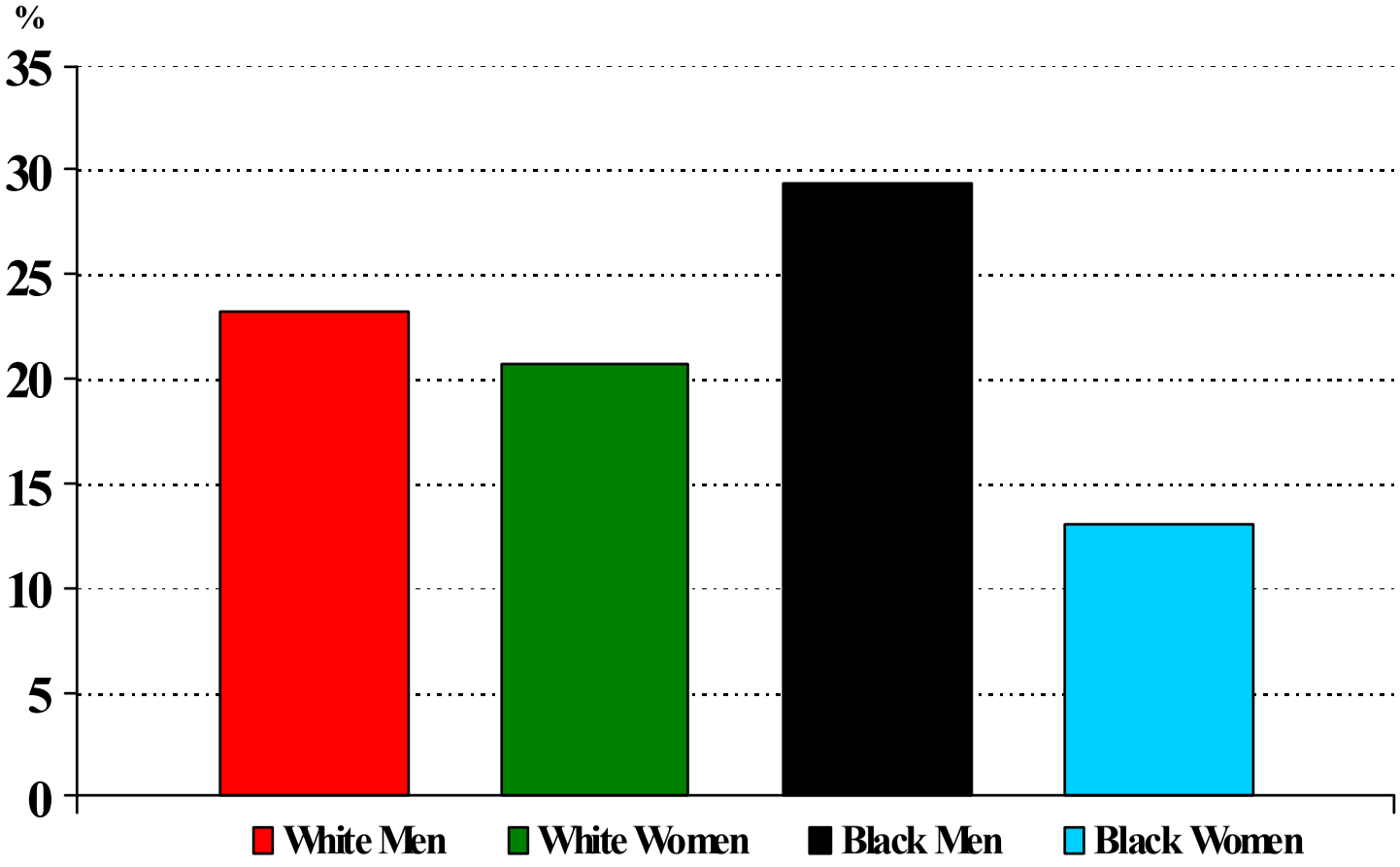
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.6. Prevalence of Consuming Fruits and Vegetables Less than 5-A-Day among Adults, SC BRFSS, 2007



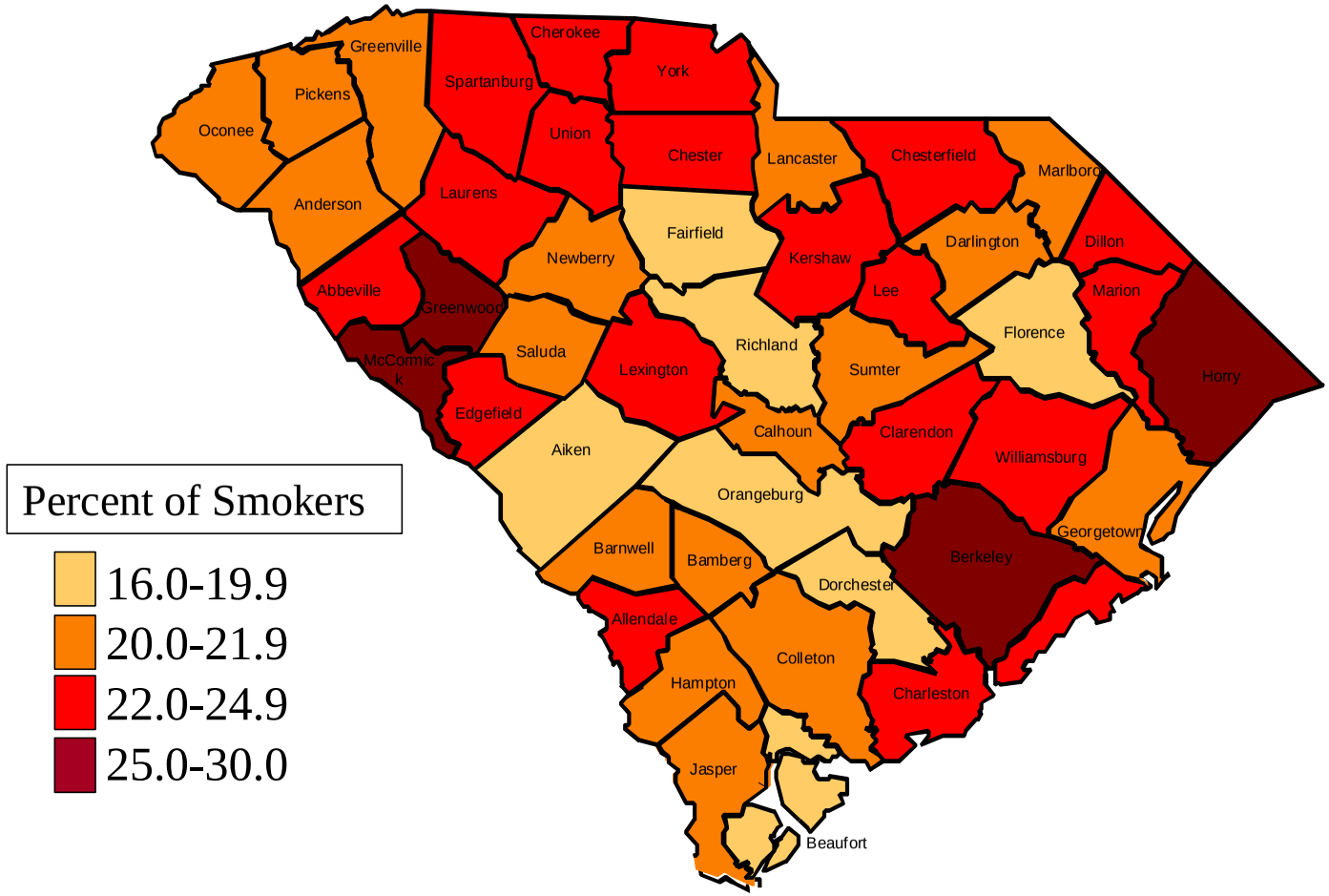
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.7. Prevalence of Current Cigarette Smoking among Adults with Diabetes by Race-Sex, SC, 2007



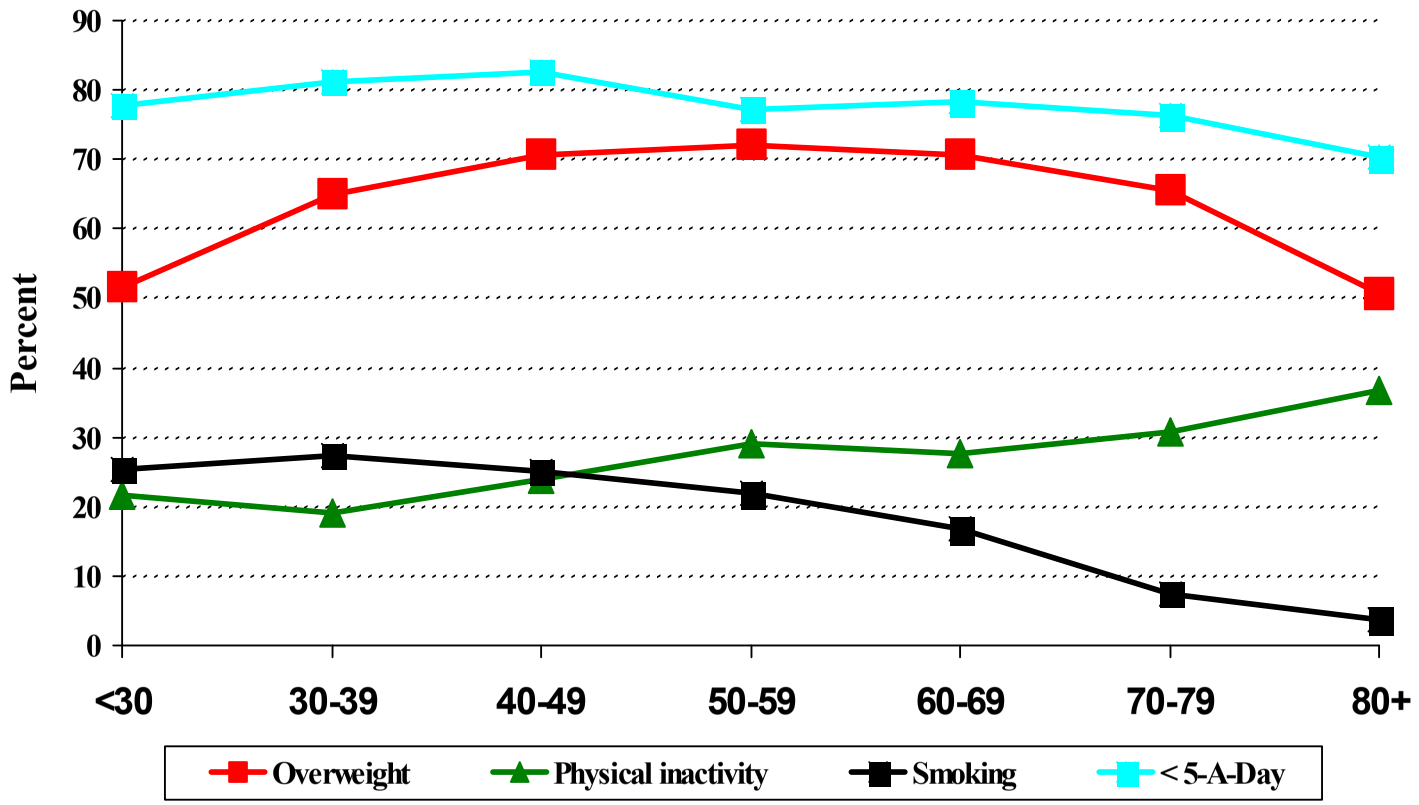
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.8. Prevalence of Smoking among Adults, SC BRFSS, 2007



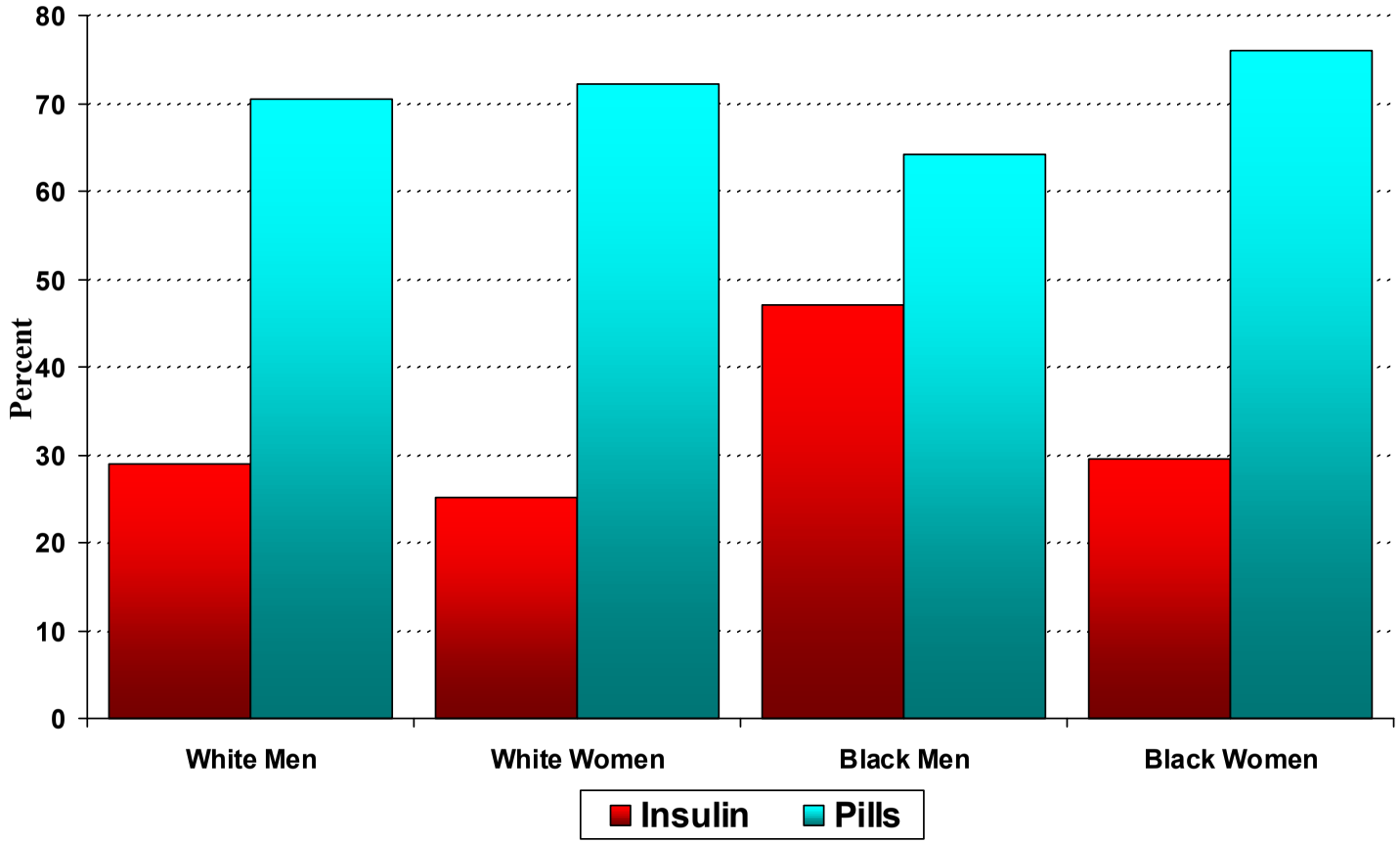
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.9. Age-Specific Prevalence of Major Behavioral Risk Factors among Adults, SC BRFSS, 2007

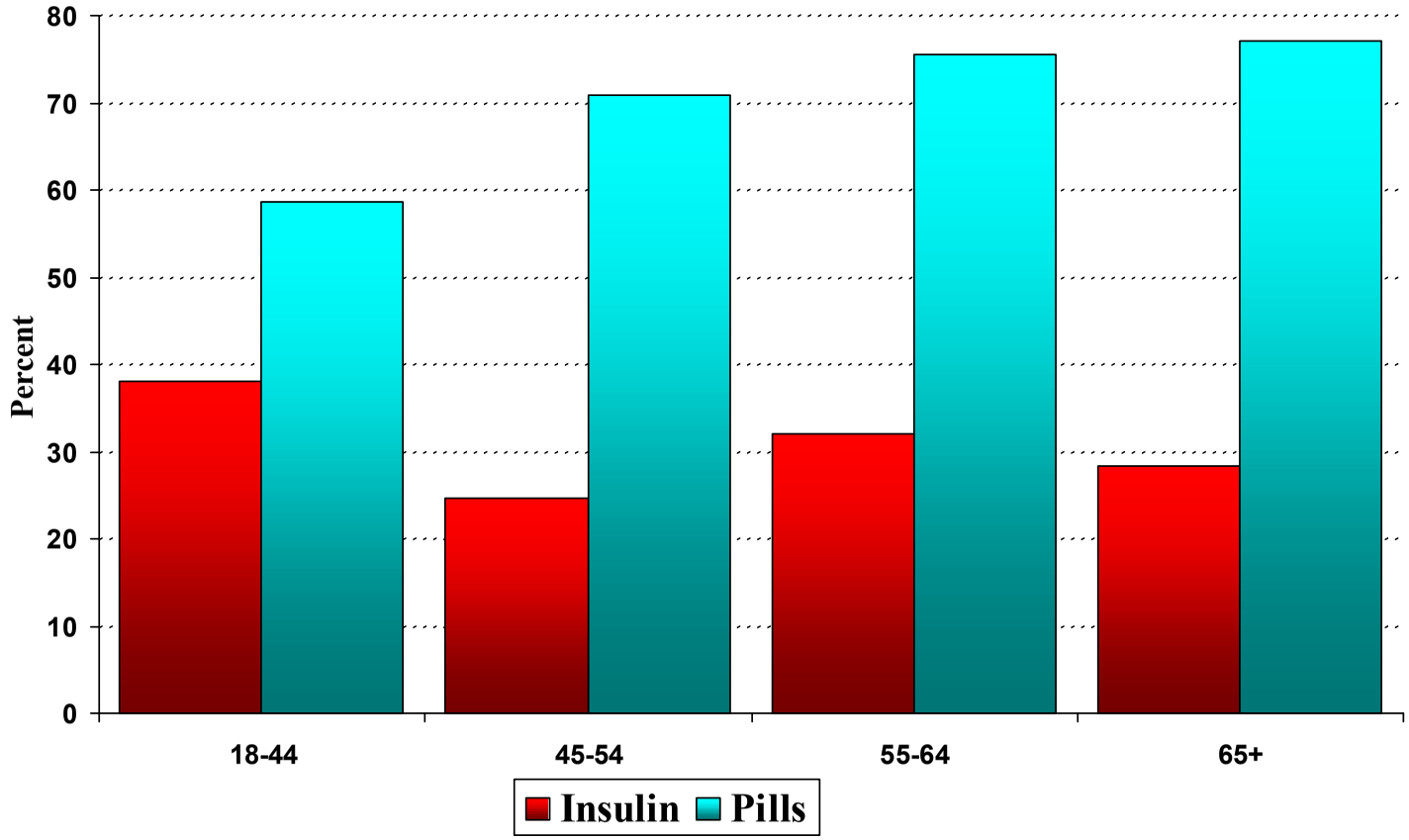


Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.10. Prevalence of Taking Insulin or Diabetes Pills Among People with Diabetes by Race and Sex, SC, 2007

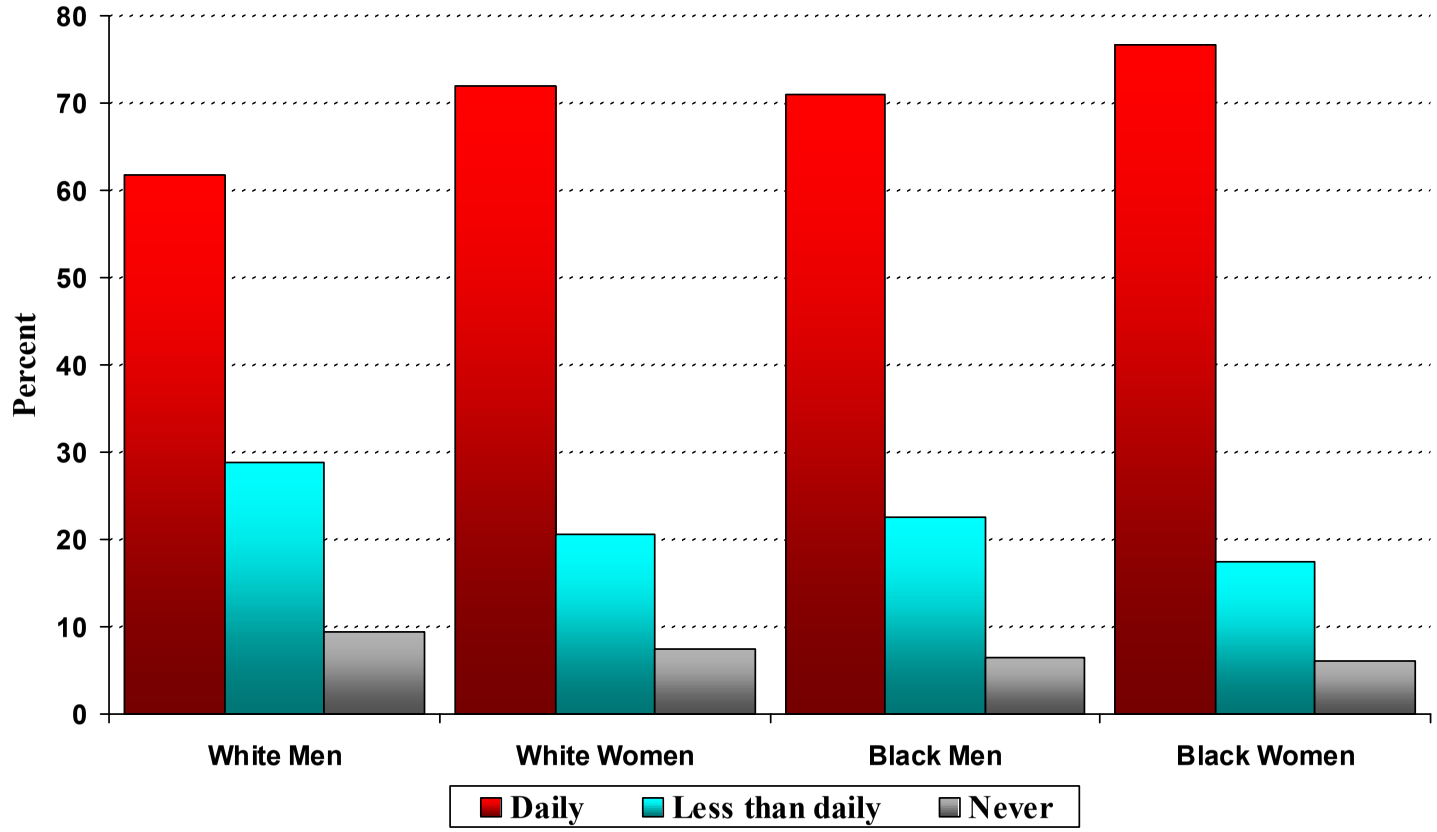


Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009



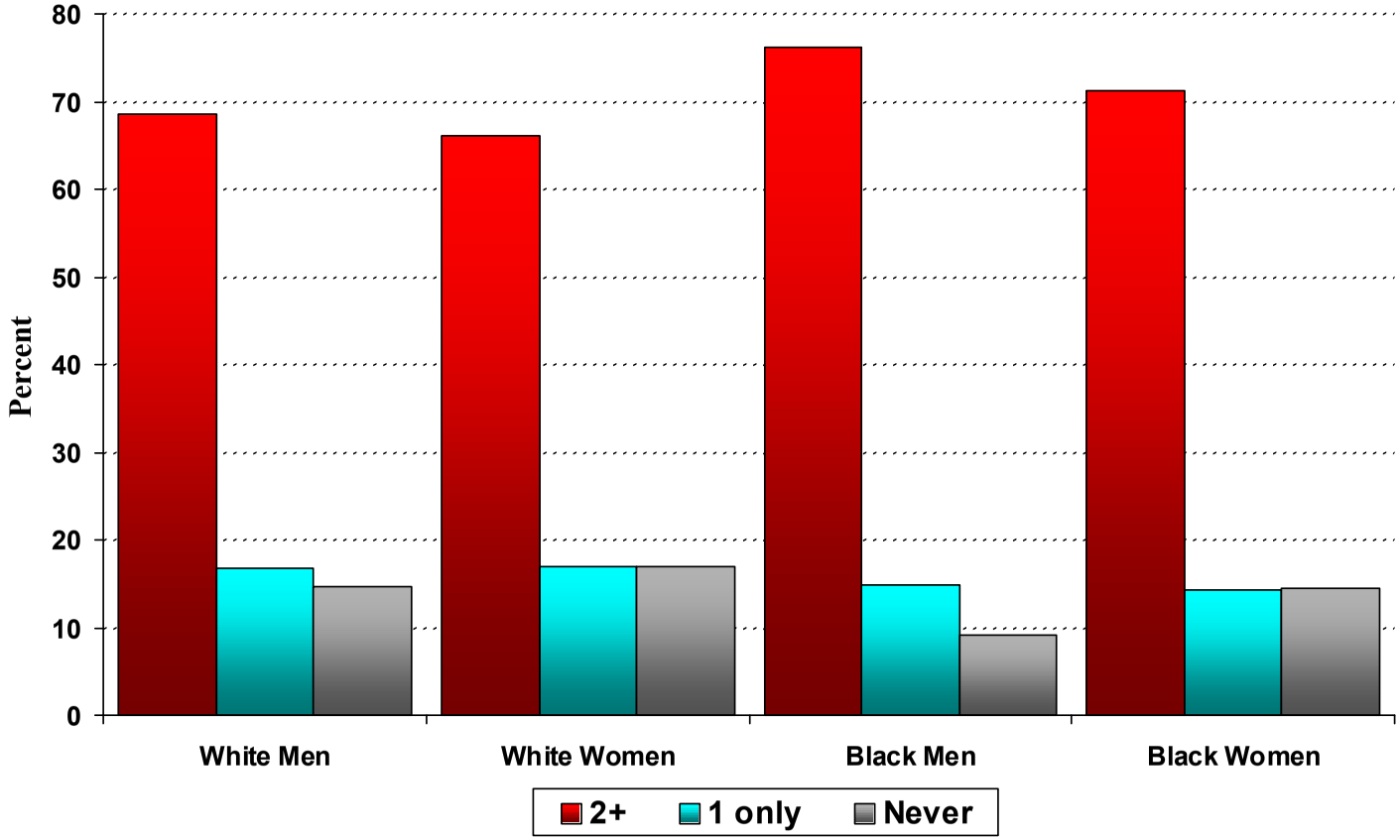
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.12. Prevalence of Having Blood Glucose Checked among People with Diabetes by Race, Sex, SC, 2007



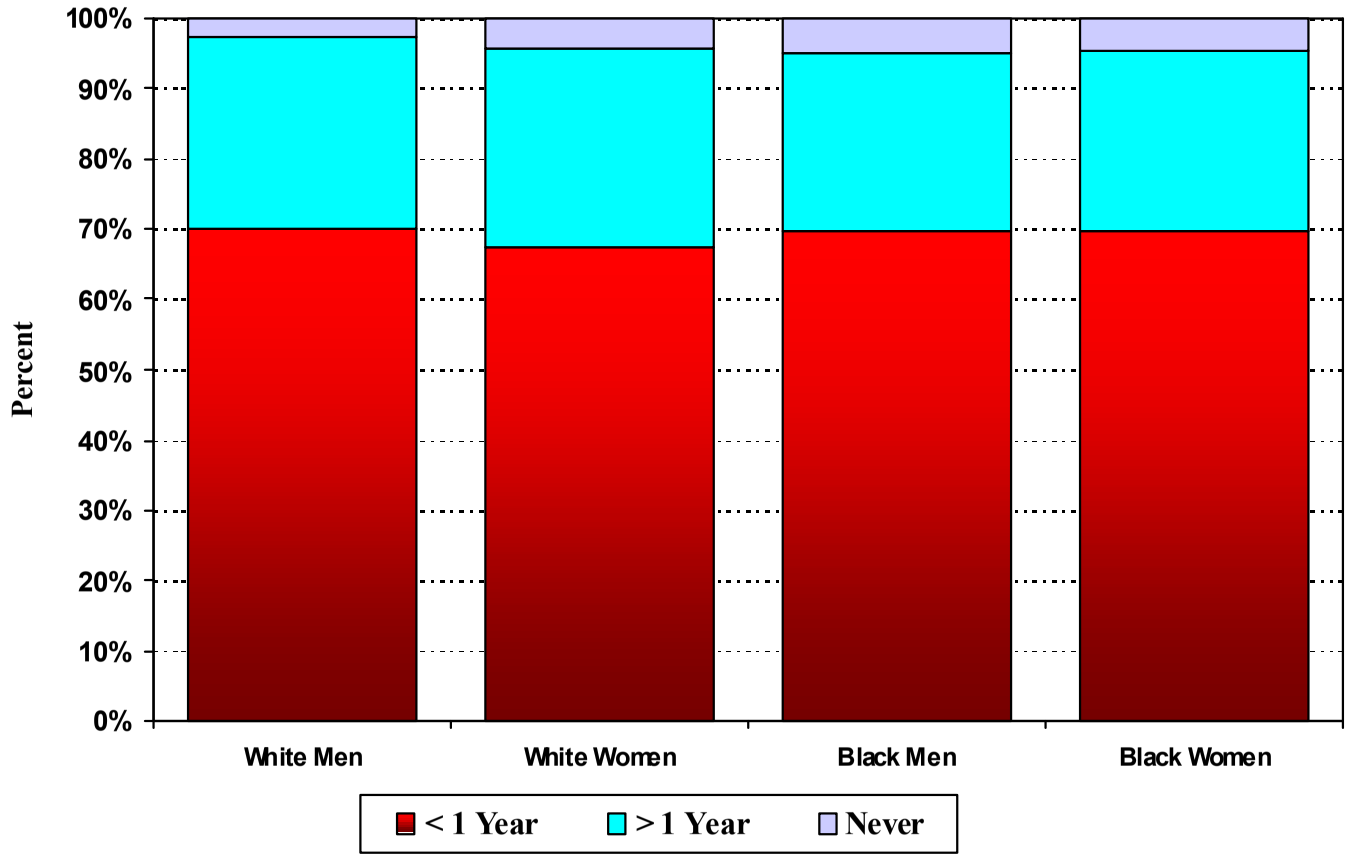
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.13. Prevalence of Having HbA1c Checked among People with Diabetes, SC, 2007



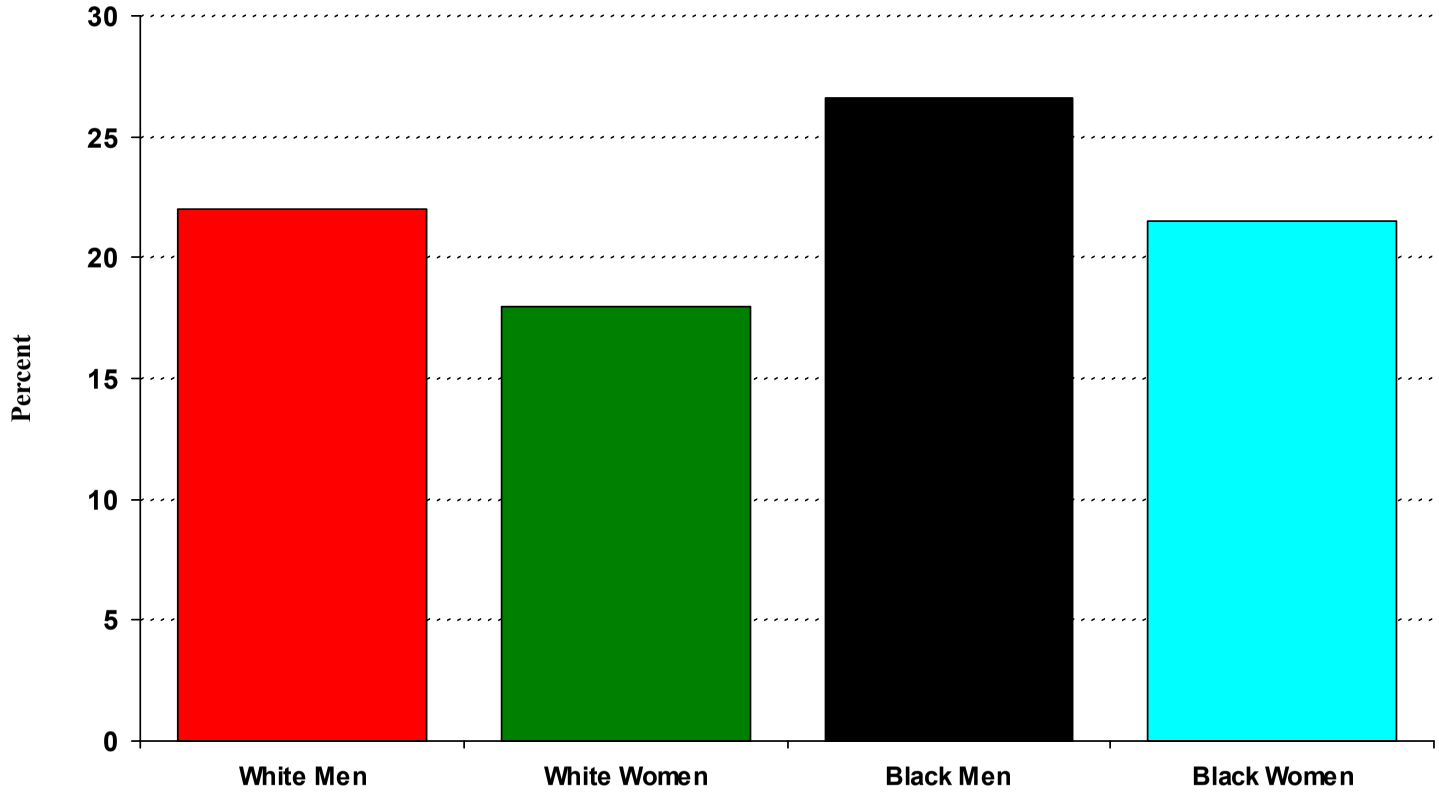
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.14. Prevalence of Having Eyes Examined among People with Diabetes by Race-Sex, SC BRFSS, 2007



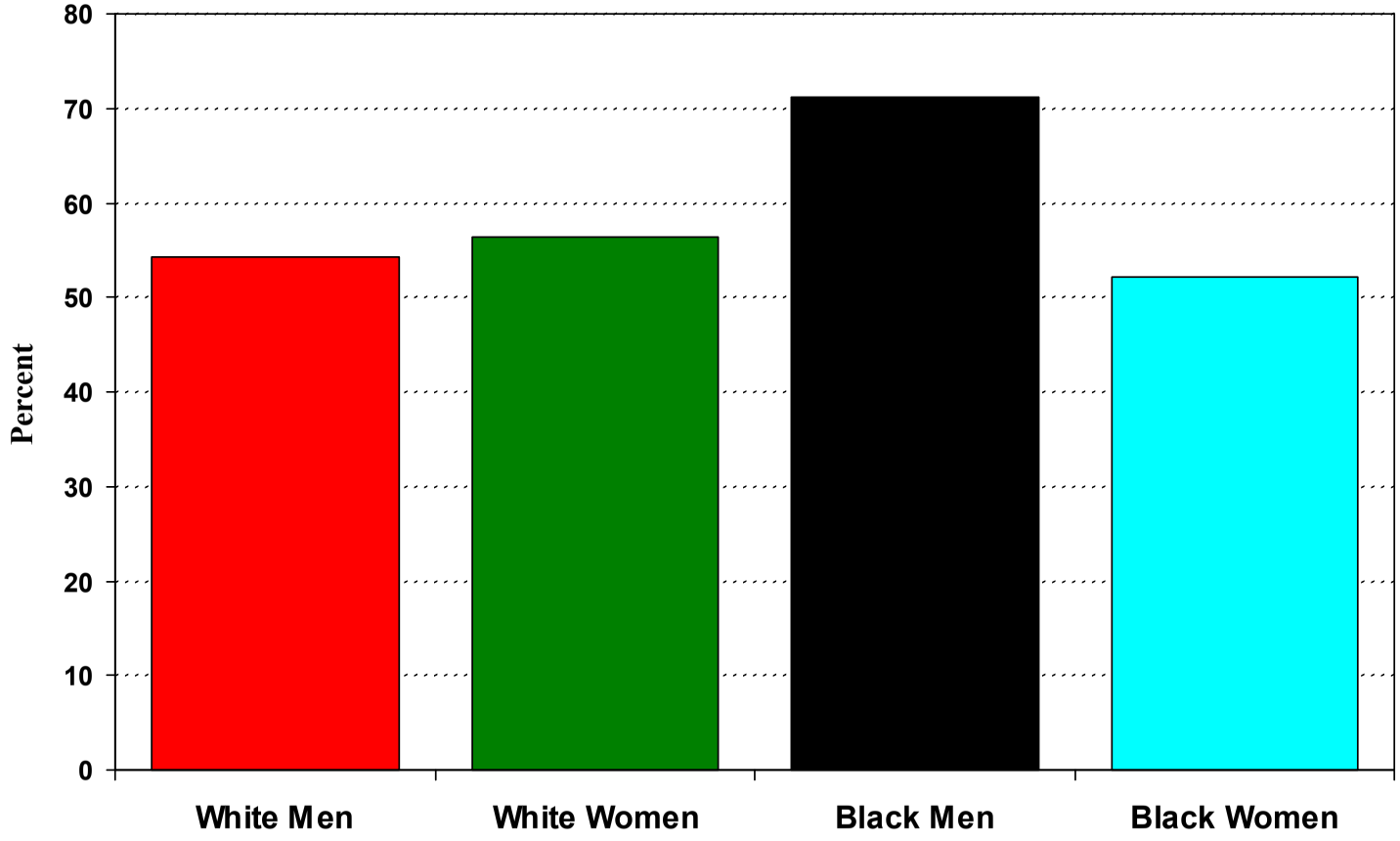
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.15. Prevalence of Eyes Being Affected by Diabetes among People with Diabetes, SC, 2007



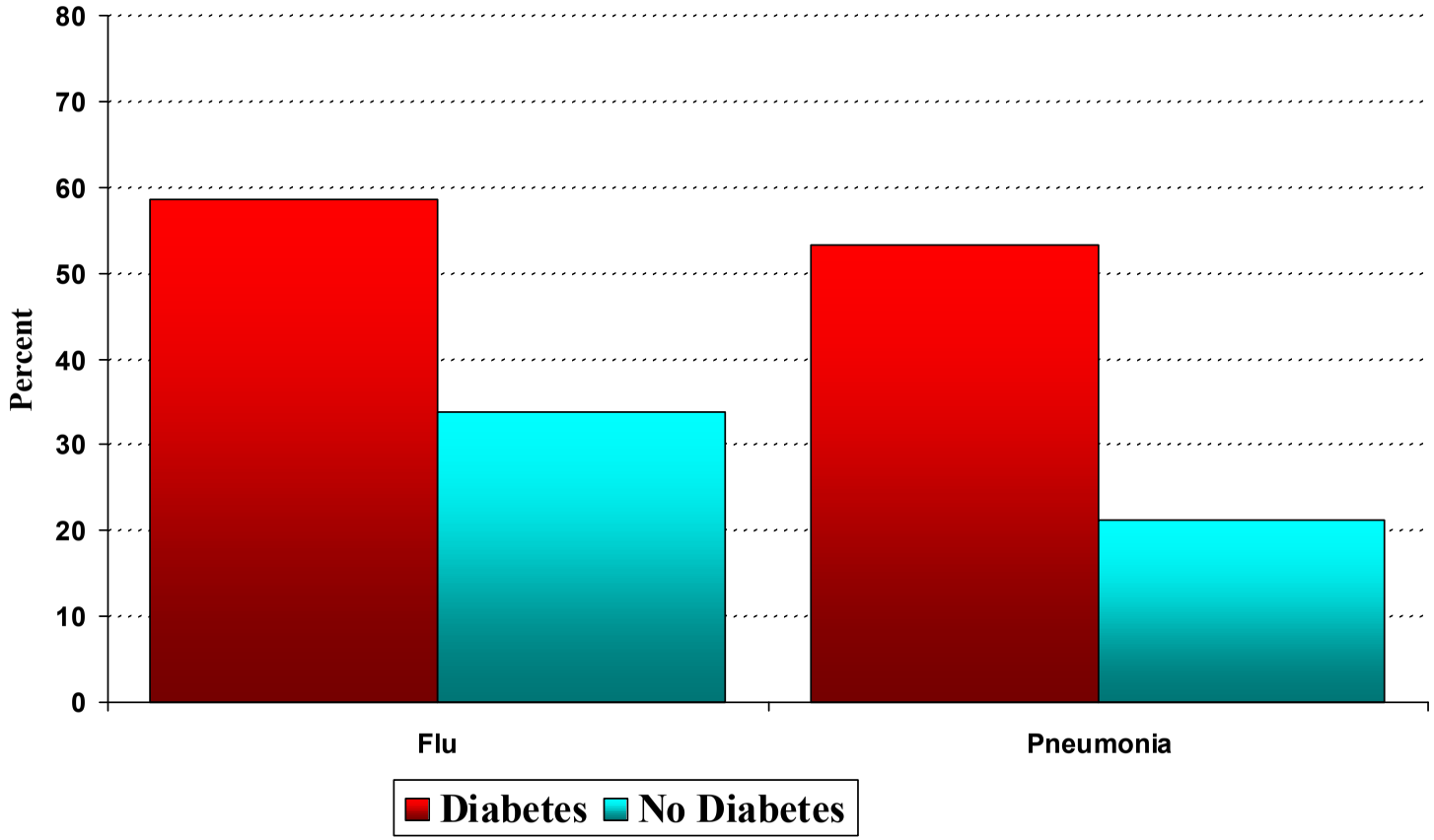
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.16. Prevalence of Having Taken a Course for Managing Diabetes among People with Diabetes, SC, 2007



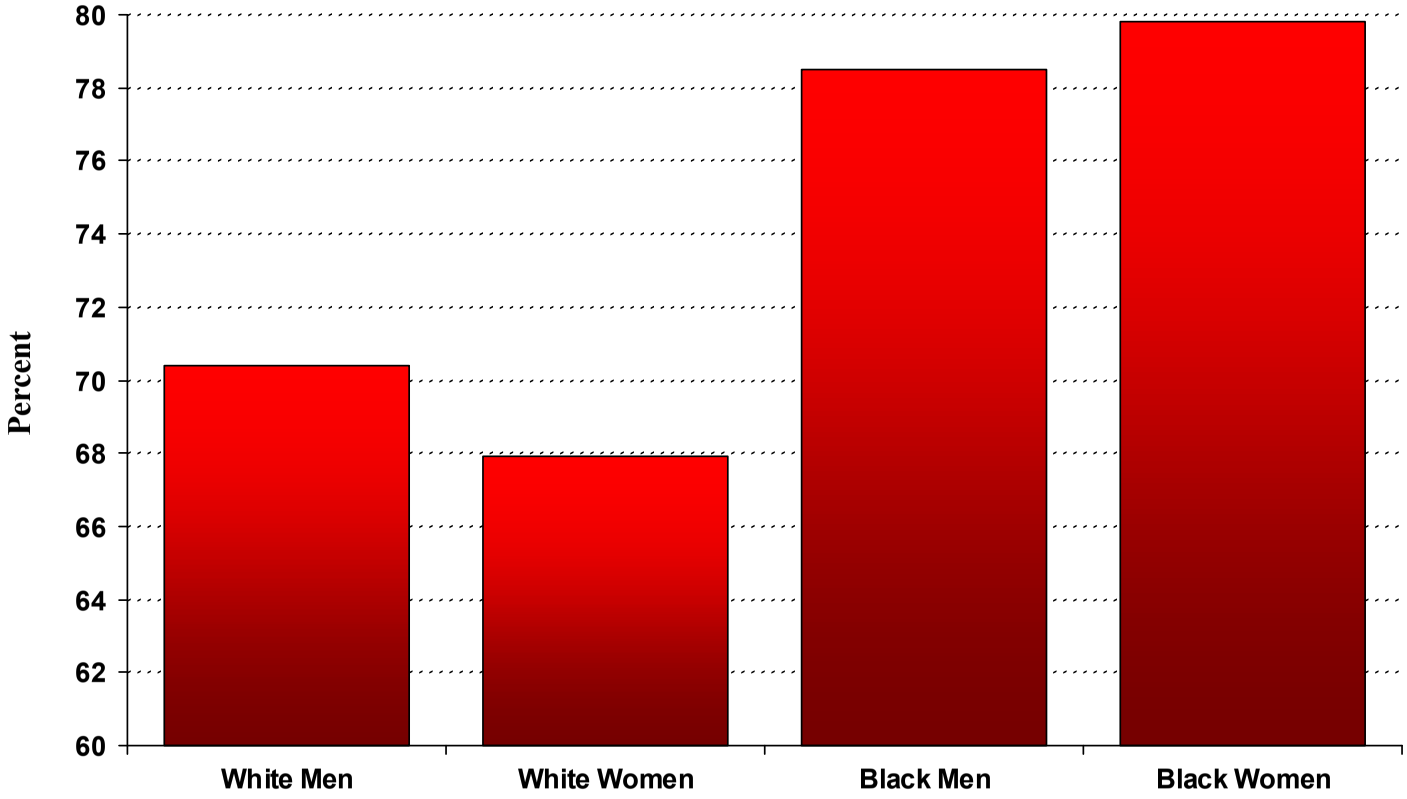
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.17. Prevalence of Receiving Flu Shot in Past 12 Months and Ever Received Pneumonia Vaccine among People with Diabetes, SC, 2007.



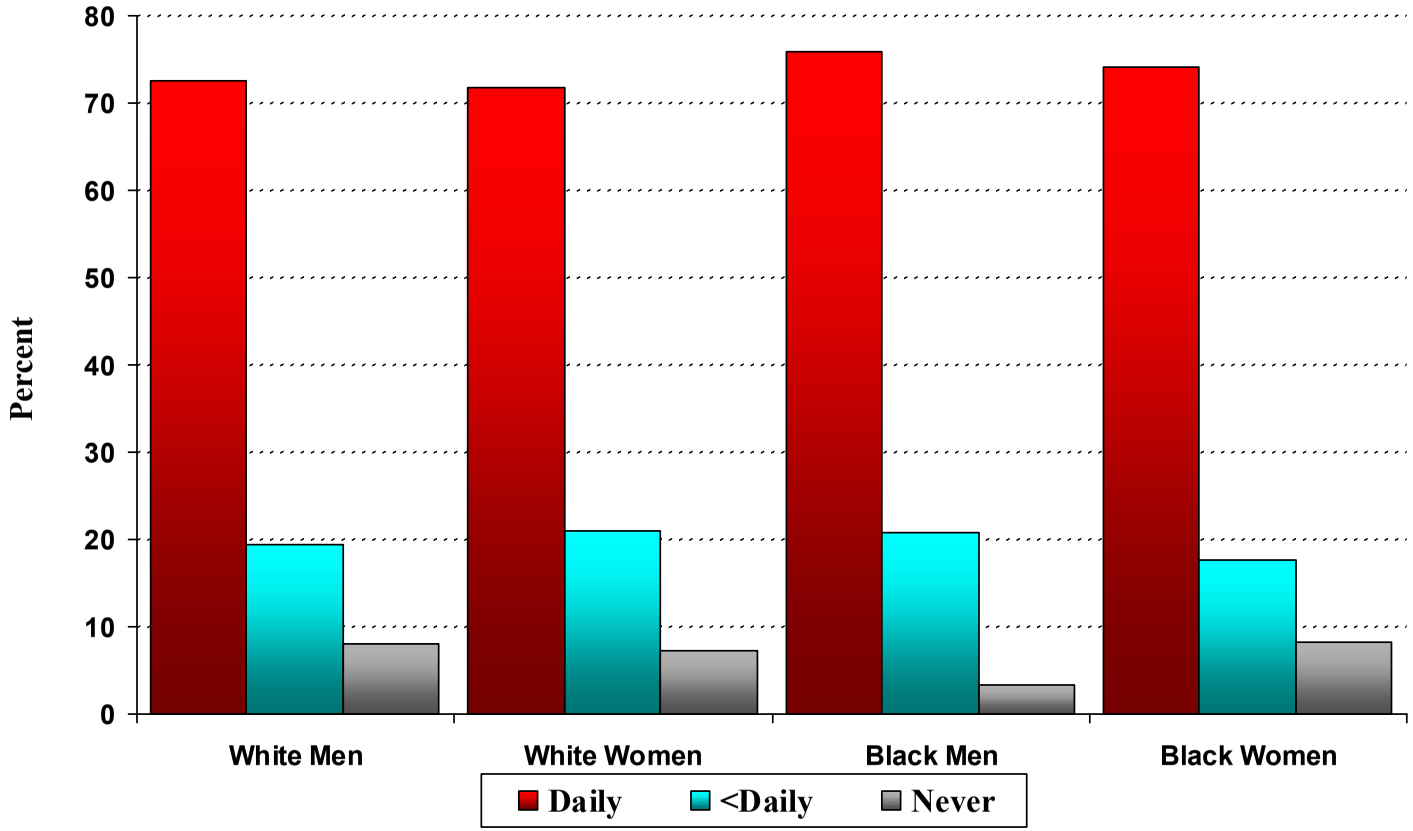
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.18. Prevalence of Having Feet Checked by a Health Professional in the Last Year among People with Diabetes, SC, 2007



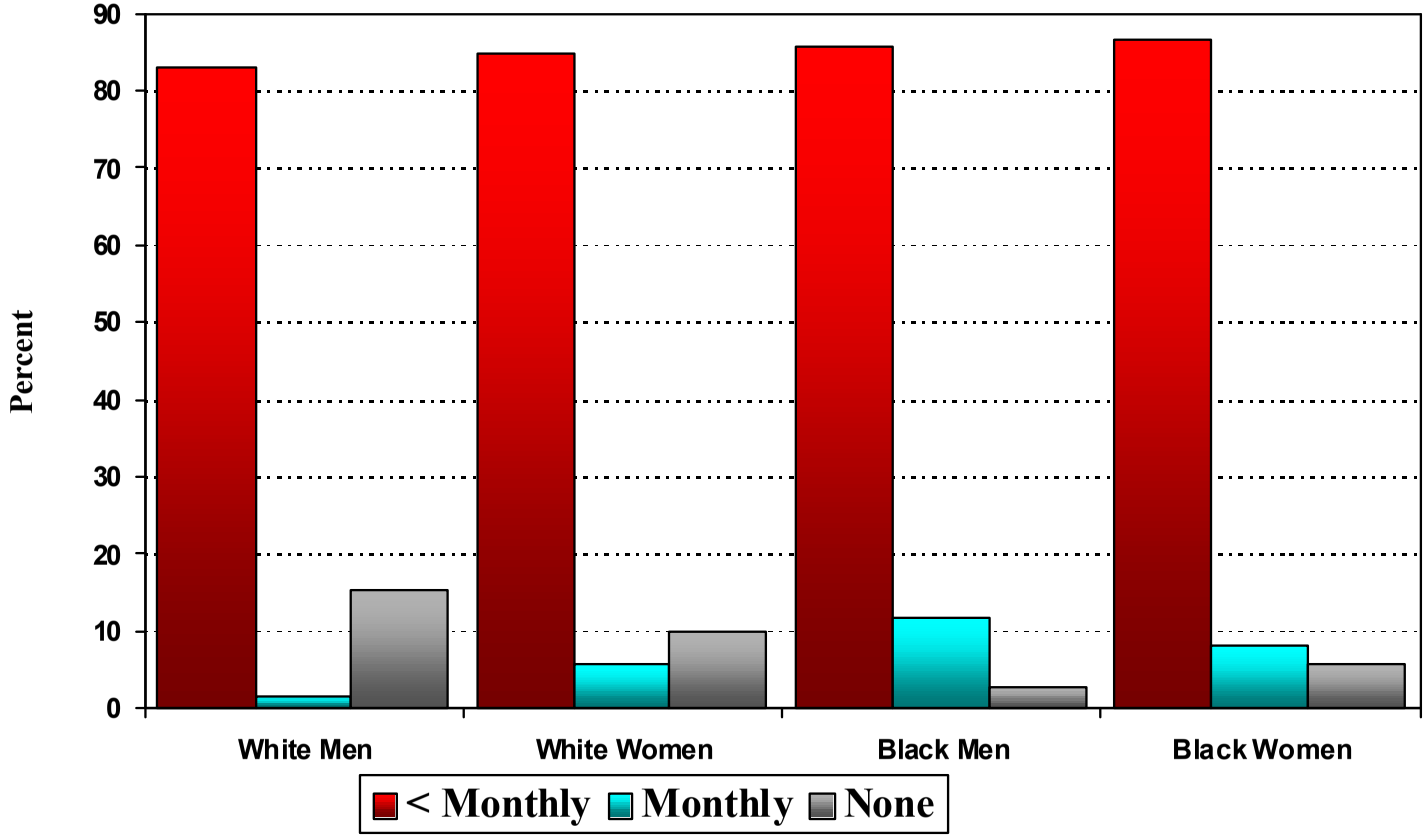
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.19. Prevalence of Self-Checking Feet for Sores or Irritations among People with Diabetes, By Race, Sex, SC, 2007



Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 2.20. Prevalence of Seeing a Health Professional for Diabetes in Past Year, SC, 2007



Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

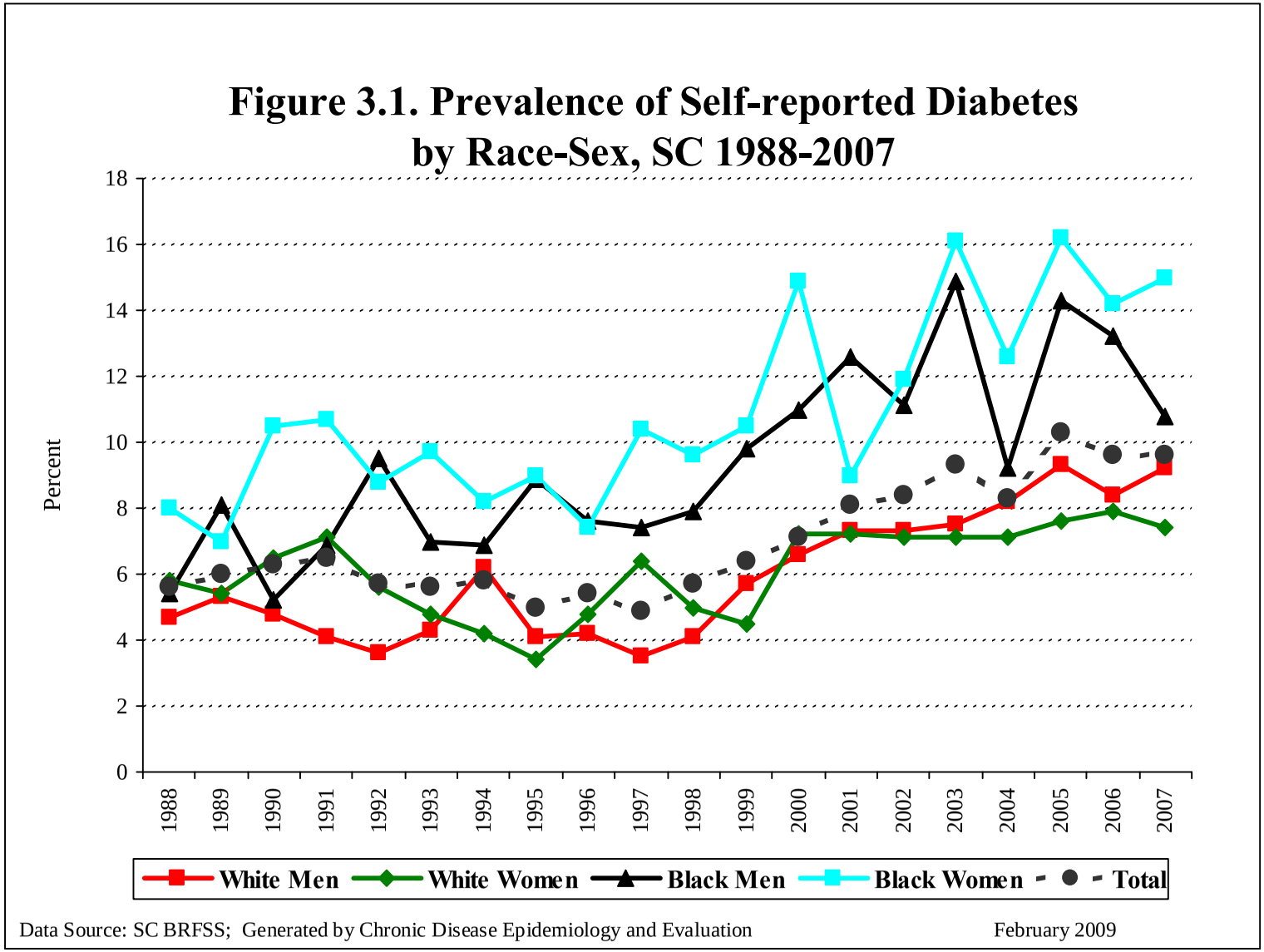


Figure 3.1. Prevalence of Self-reported Diabetes by Race-Sex, SC 1988-2007
Percent
0
2
4
6
8
10
12
14
16
18
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
White Men
White Women
Black Men
Black Women
Total
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation
February 2009

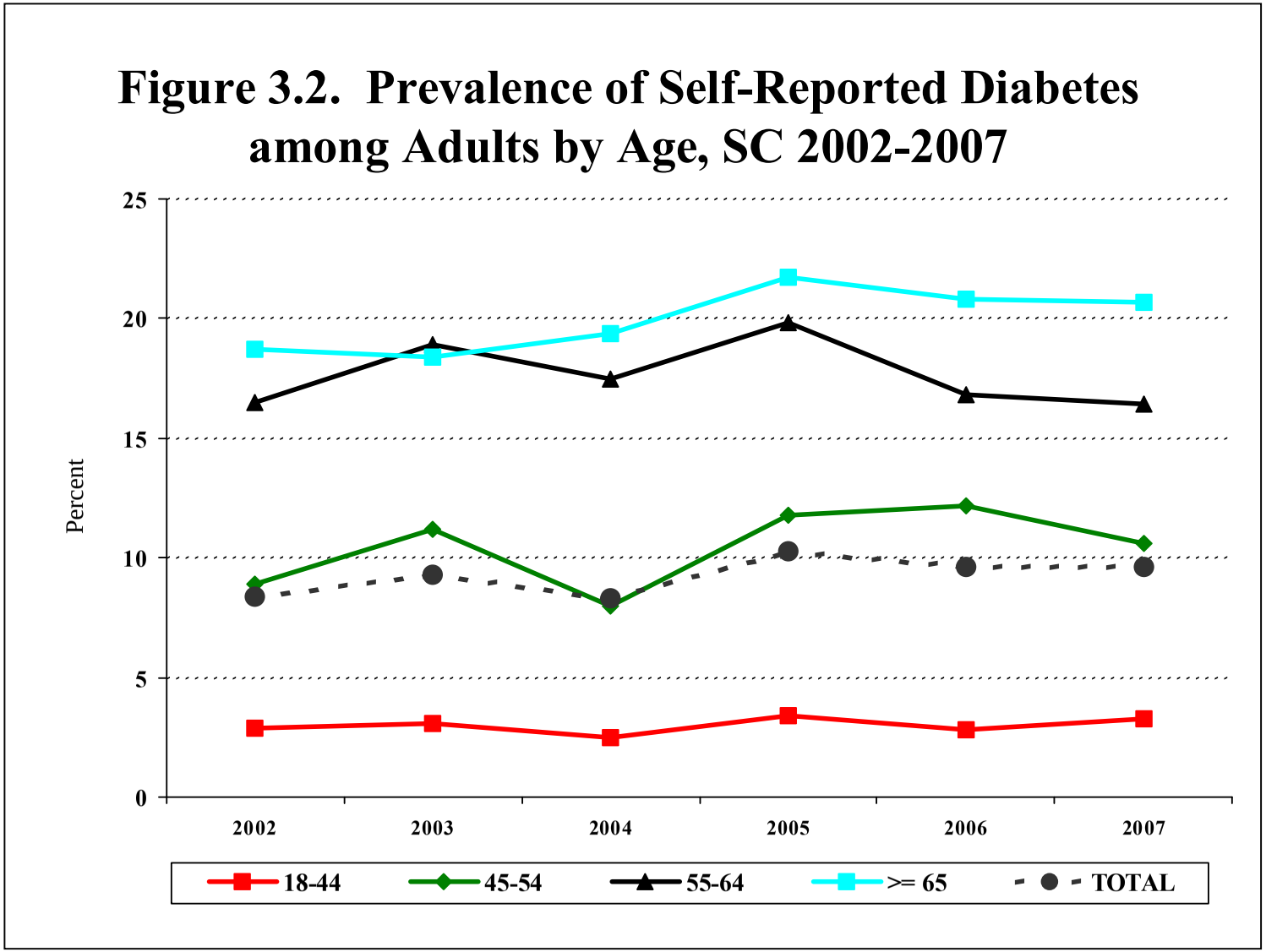
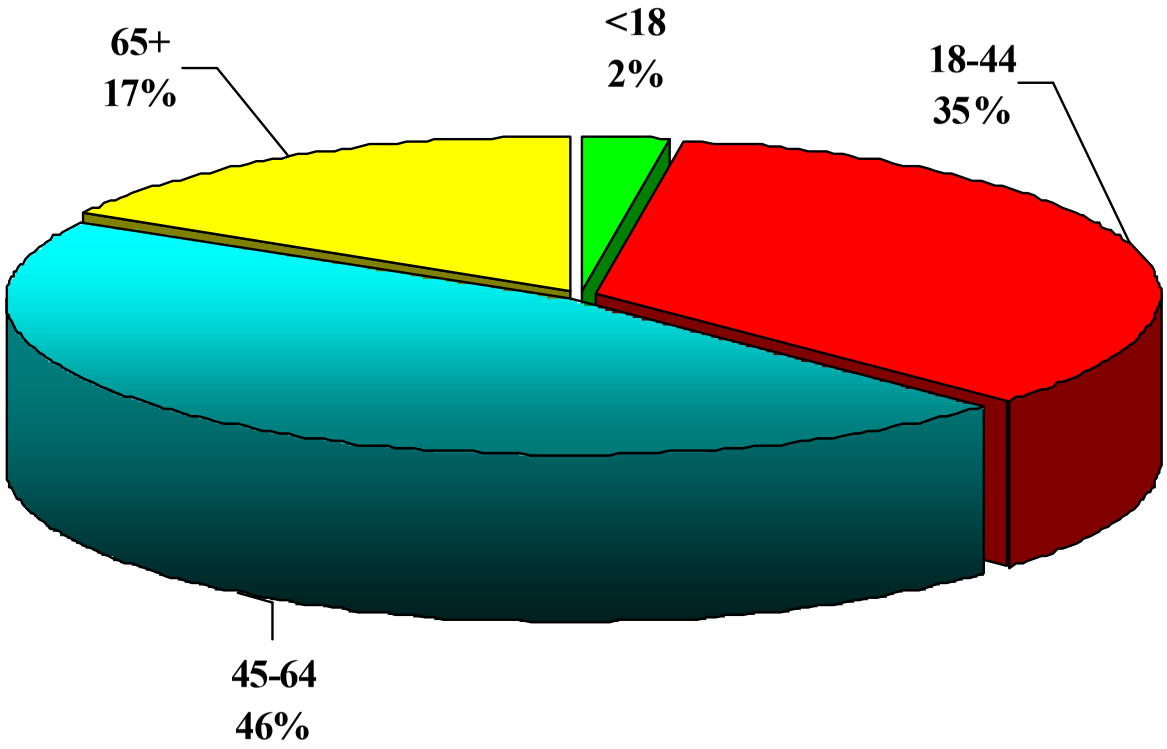


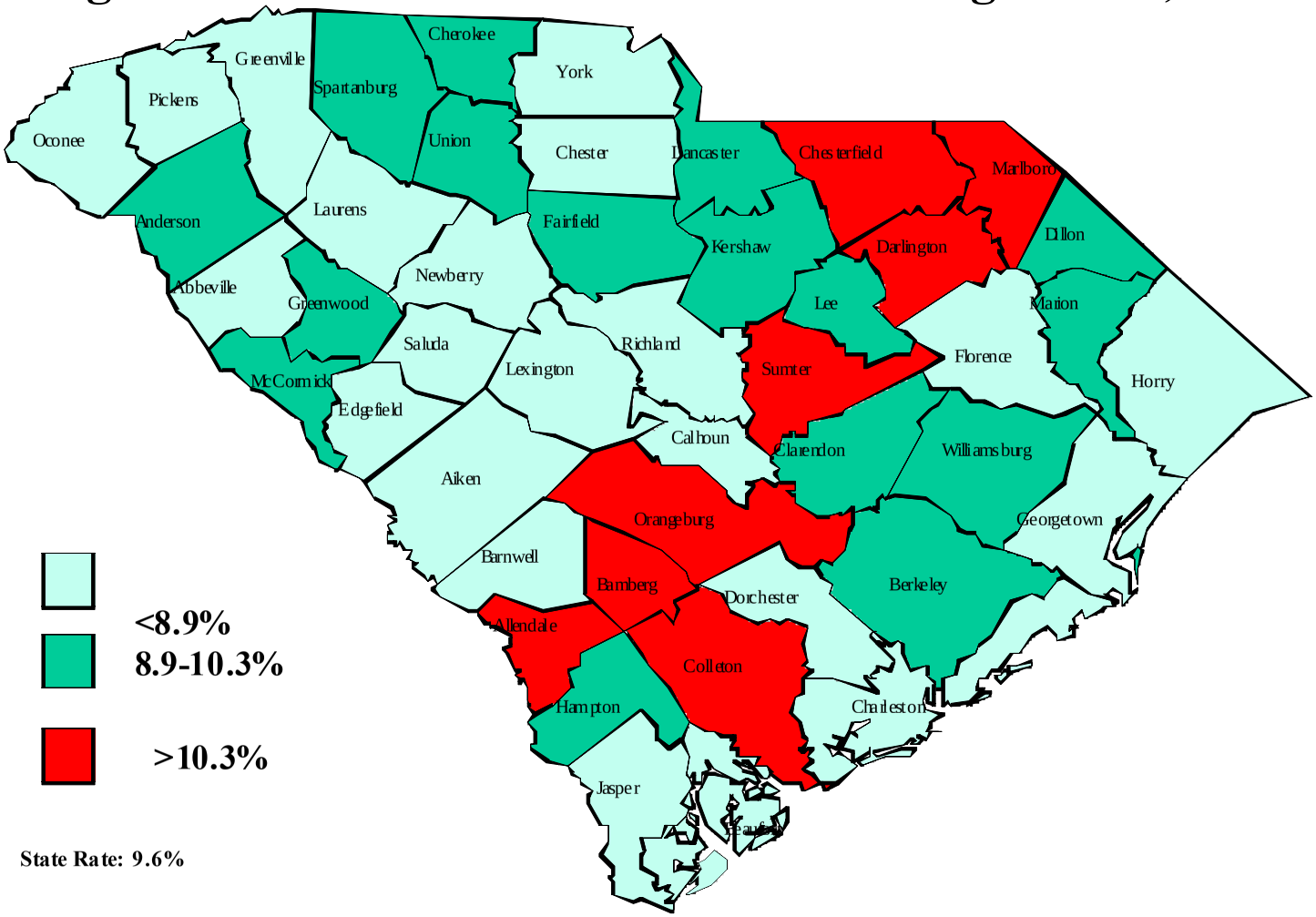
Figure 3.2. Prevalence of Self-Reported Diabetes among Adults by Age, SC 2002-2007
Percent
25
20
15
10
5
0
2002
2003
2004
2005
2006
2007
18-44
45-54
55-64
>= 65
TOTAL

Figure 3.3. Age of Diagnosis of Diabetes among People with Diabetes, 2007



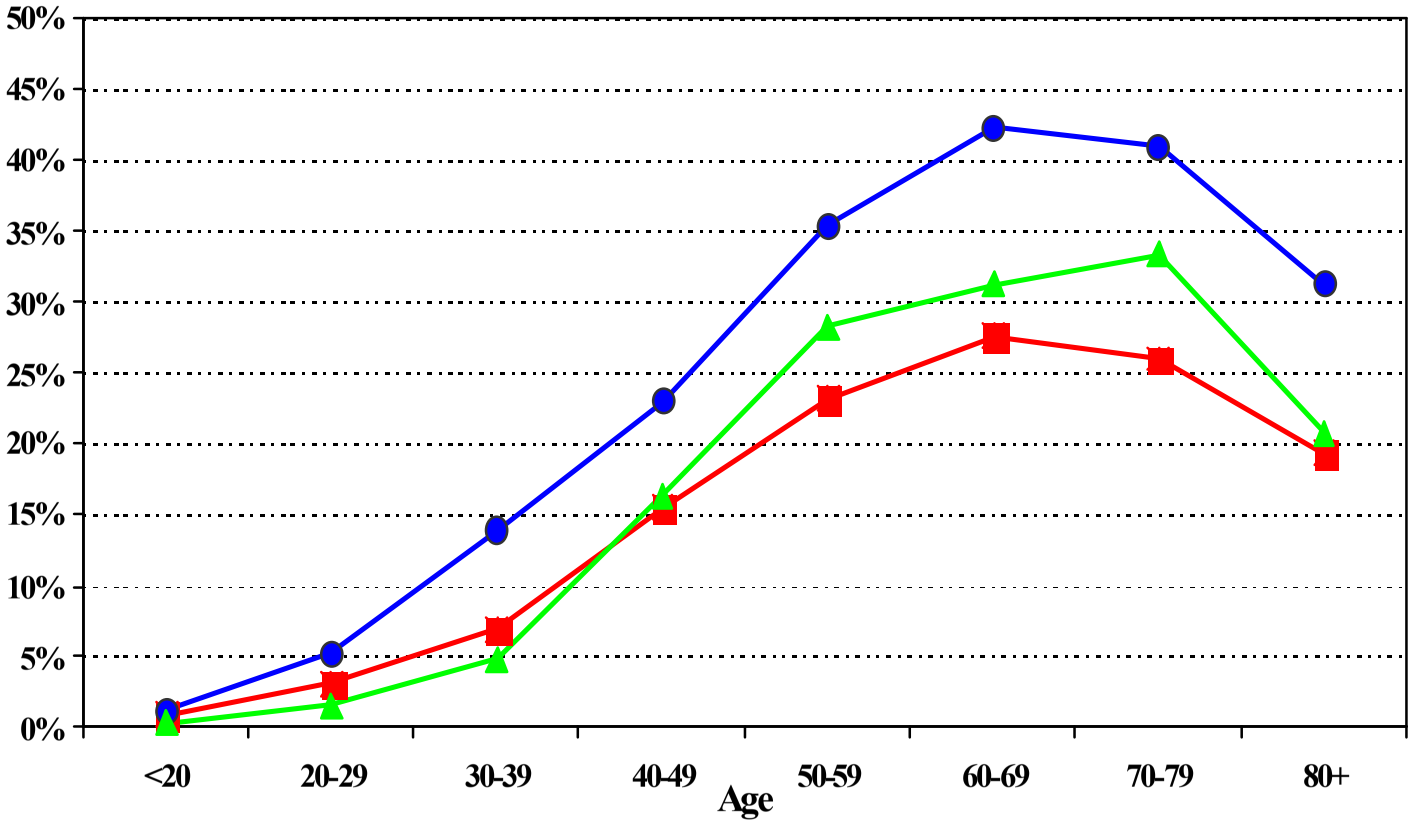
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.4. Prevalence of Diabetes among Adults, 2007



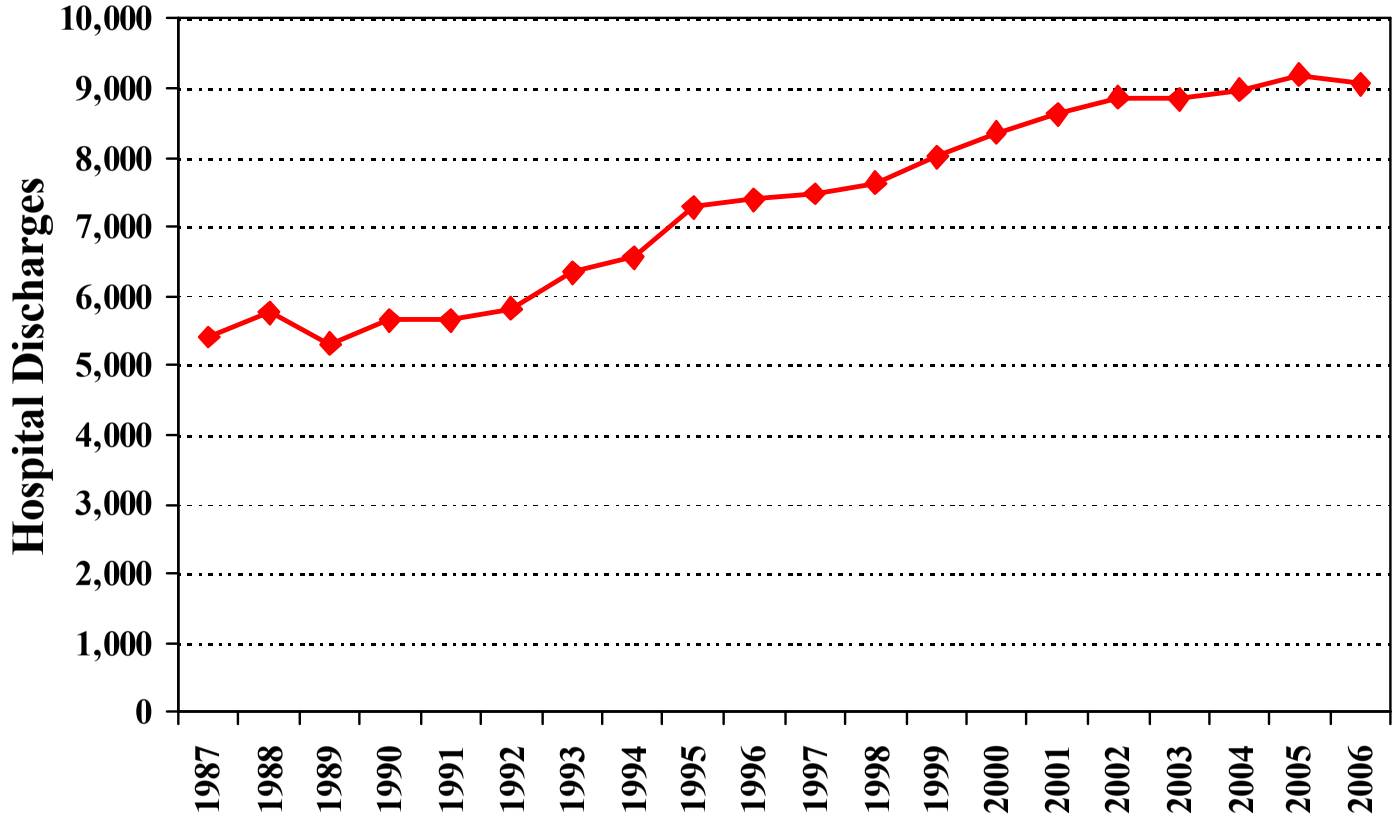
Data Source: SCBRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.5. Proportion of Hospitalizations with Diabetes of All Hospitalizations by Race-Age 2006



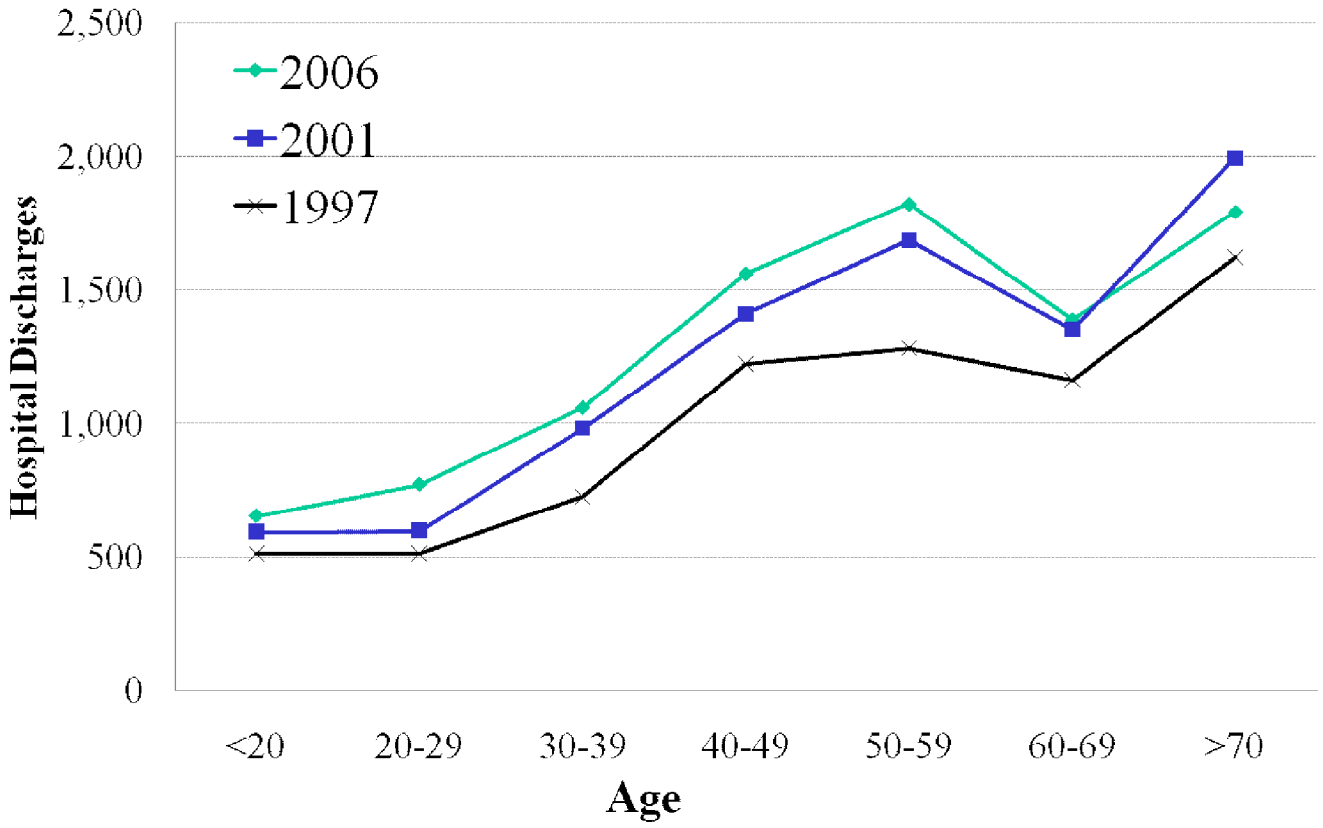
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.6. Total Number of Hospitalizations for Diabetes as the Primary Diagnosis, SC, 1987-2006



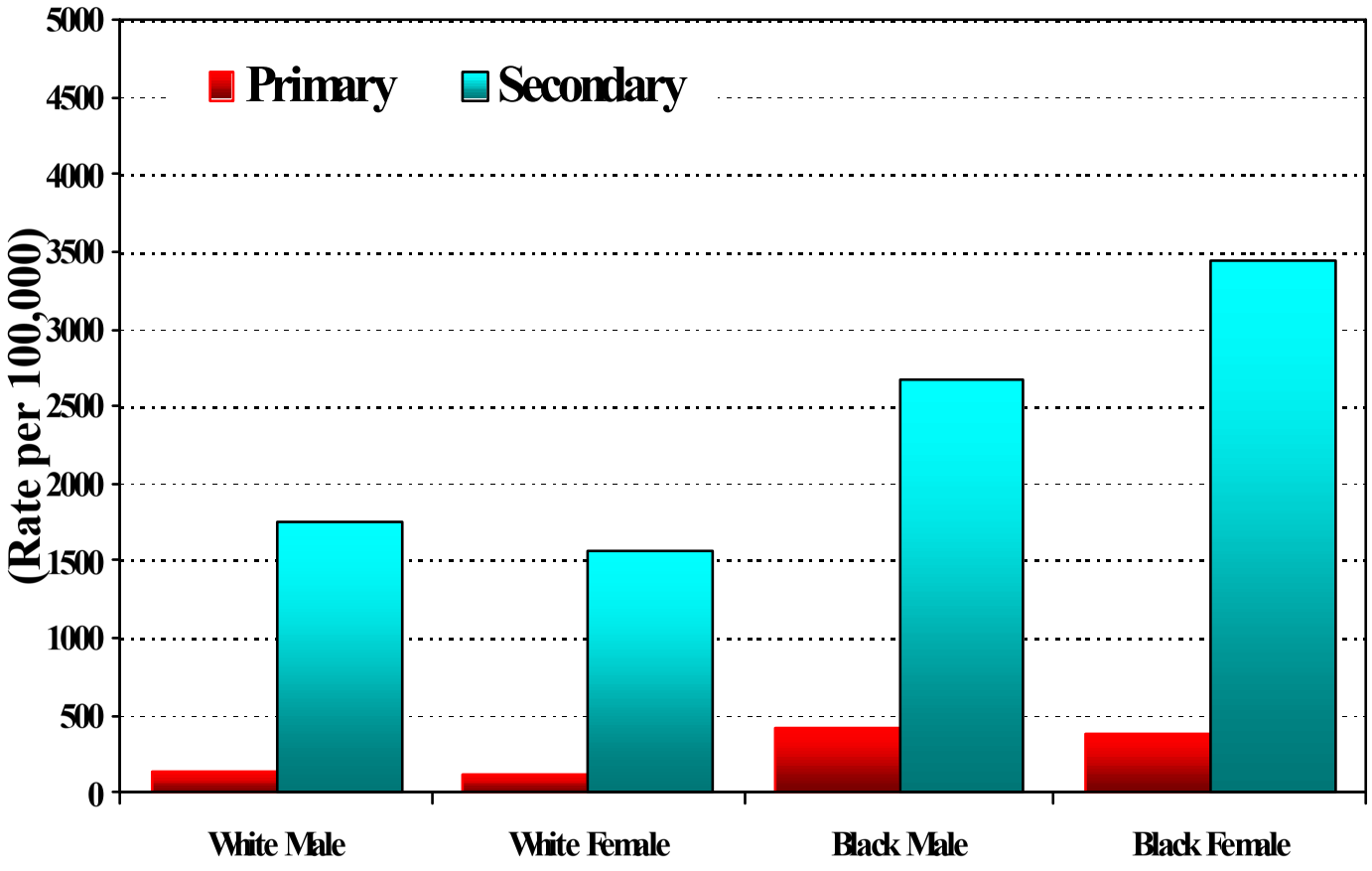
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.7. Number of Hospital Discharges with Diabetes as the Primary Diagnosis by Age, SC, 1997, 2001 and 2006



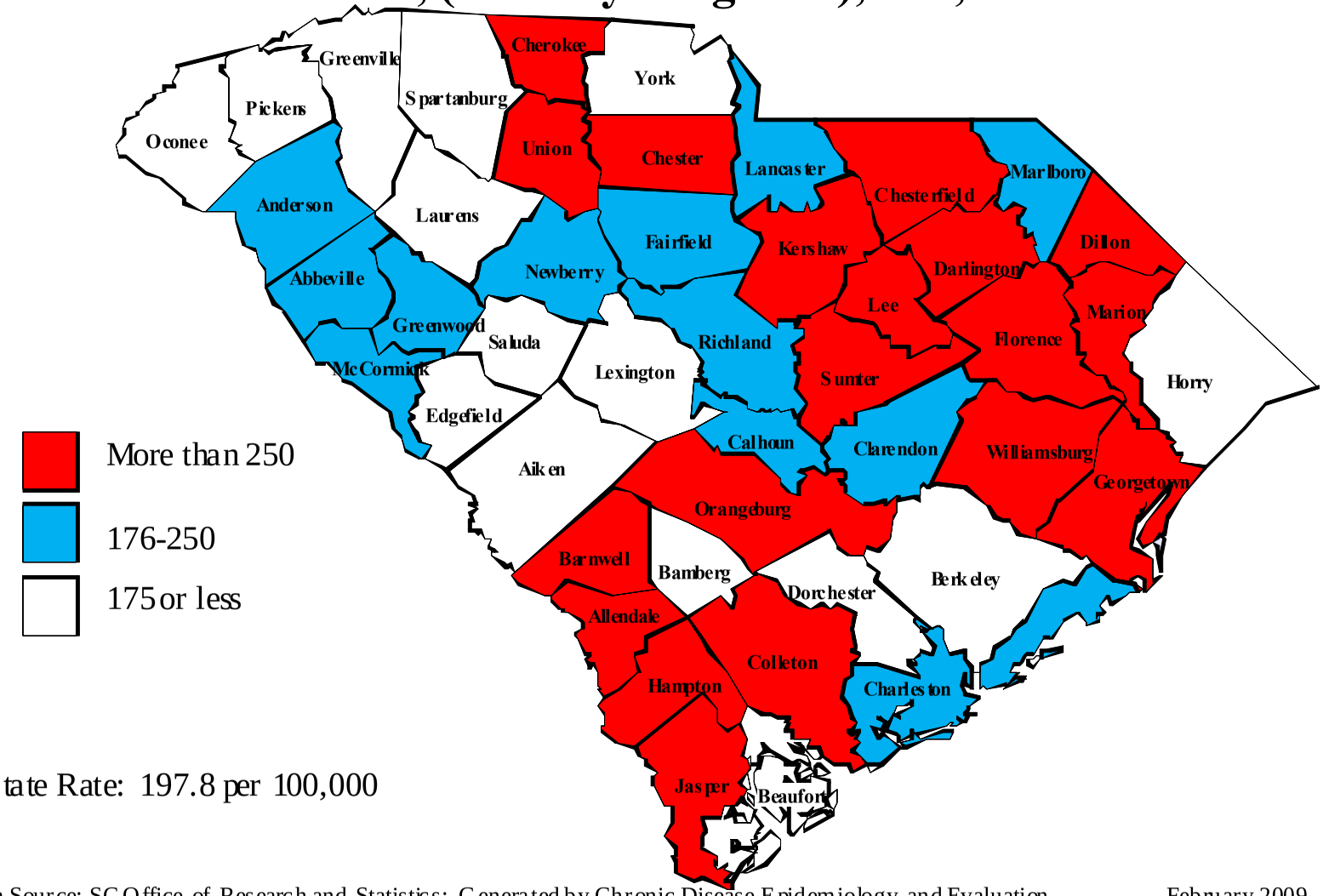
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.8. Rate of Hospitalizations with Diabetes as Primary or Secondary Diagnosis, 2006 (Rate per 100,000)



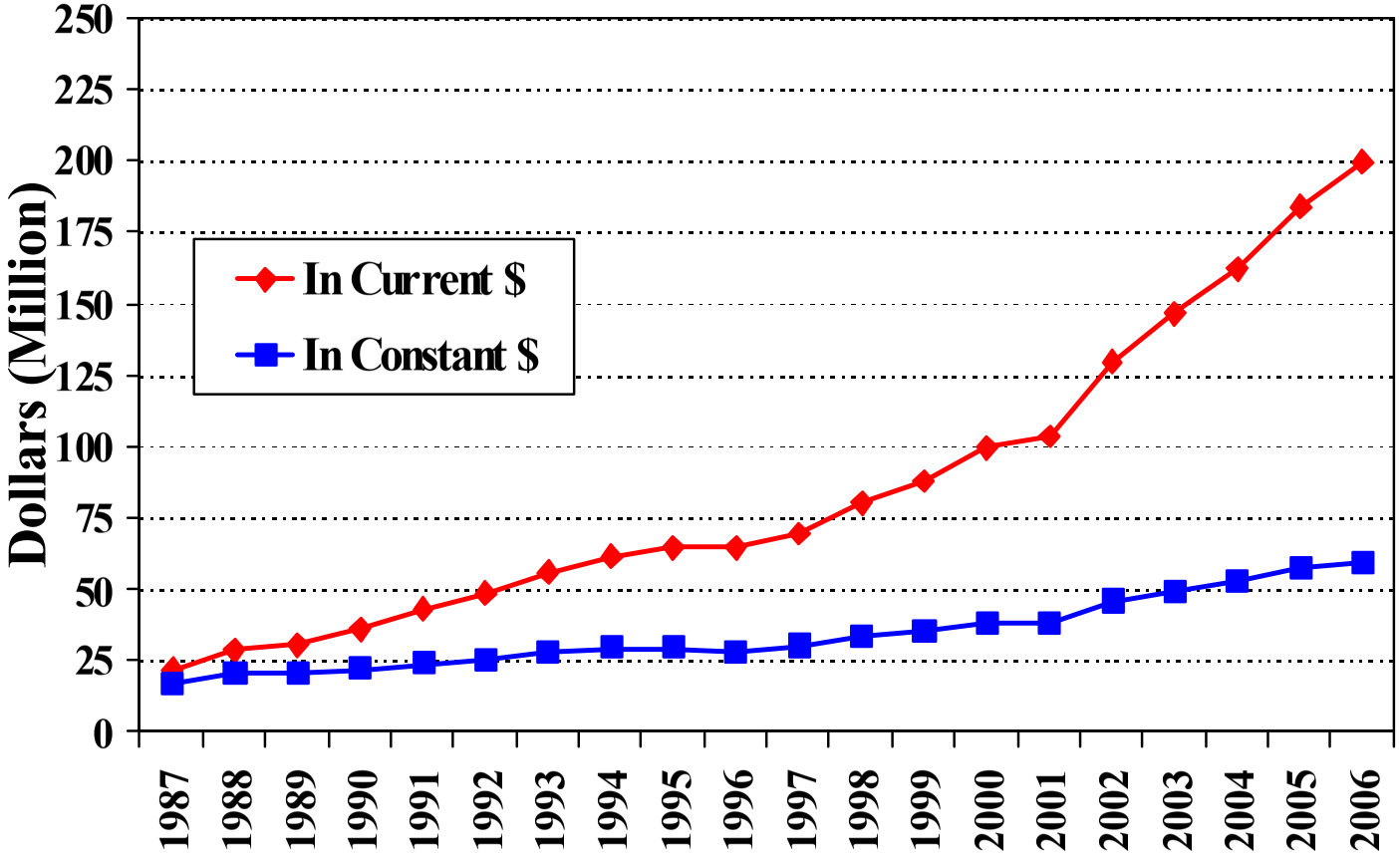
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.9. Age-Standardized Rate of Hospitalizations for Diabetes, (Primary Diagnosis), SC, 2006



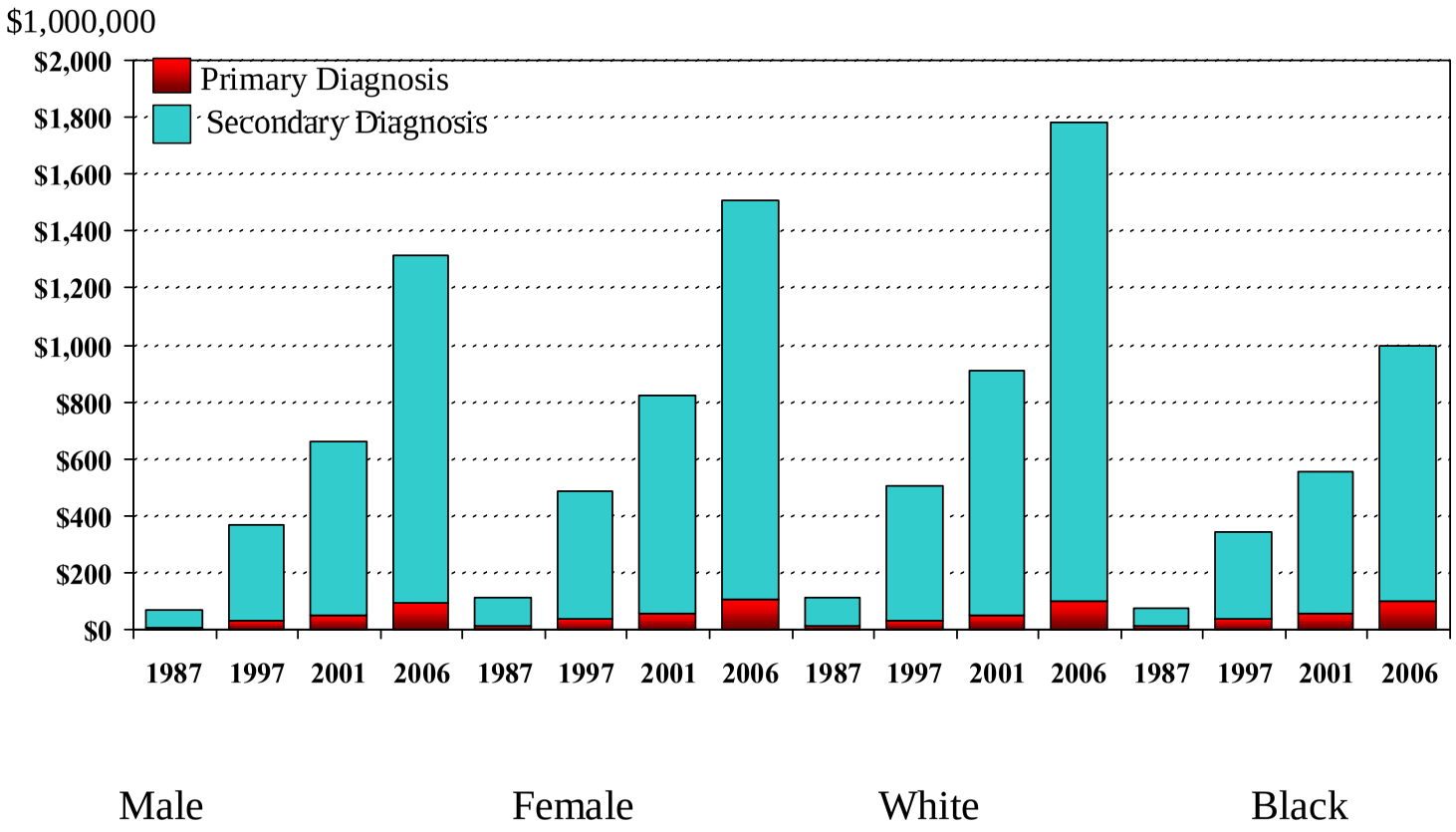
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.10. Total Hospital Charges (Million Current & Constant $) for Diabetes as the Primary Diagnosis, SC, 1987-2006



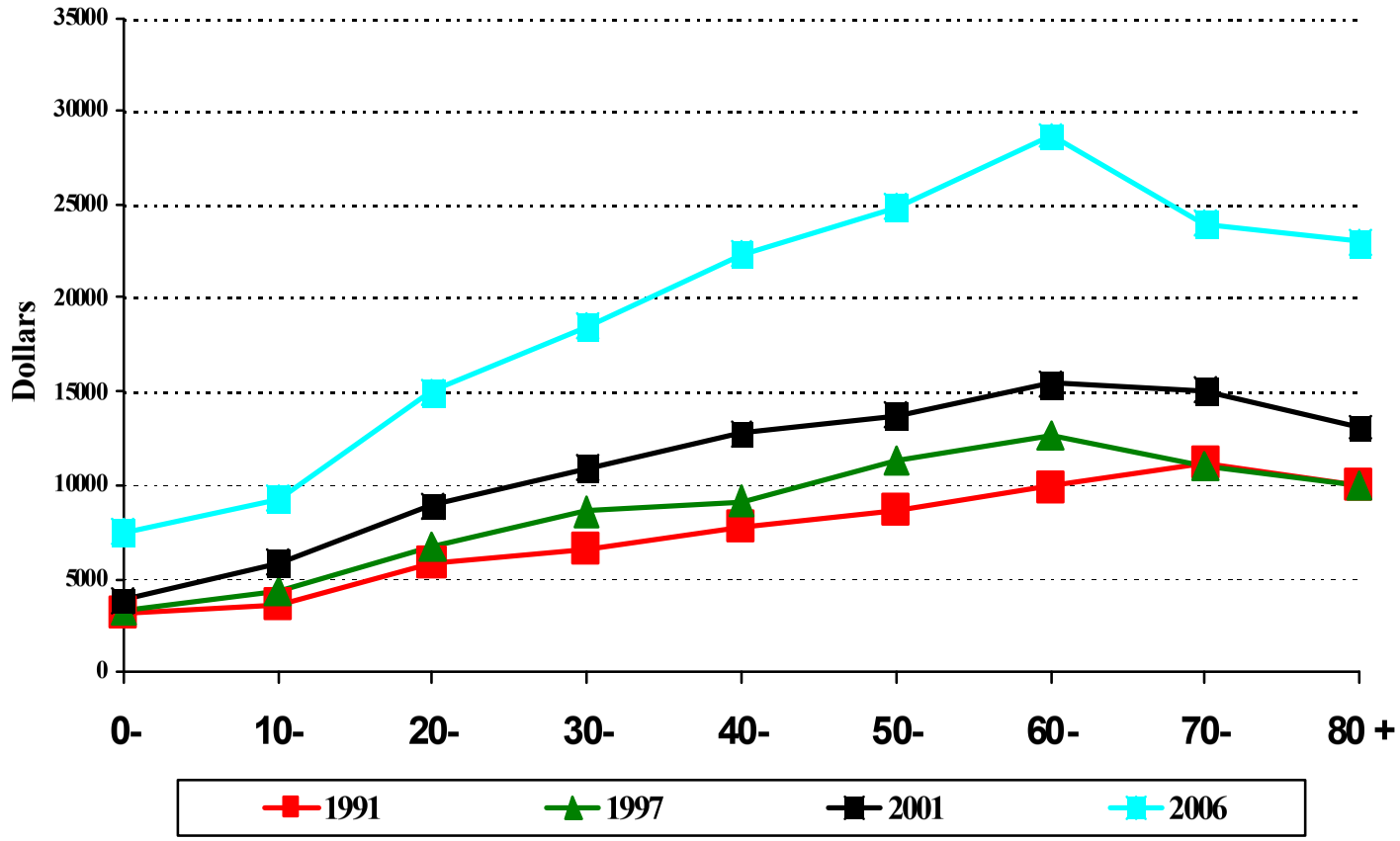
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.11. Total Charges for Hospitalization among Patients with Diabetes by Race-Sex, 1987, 1997, 2001, and 2006



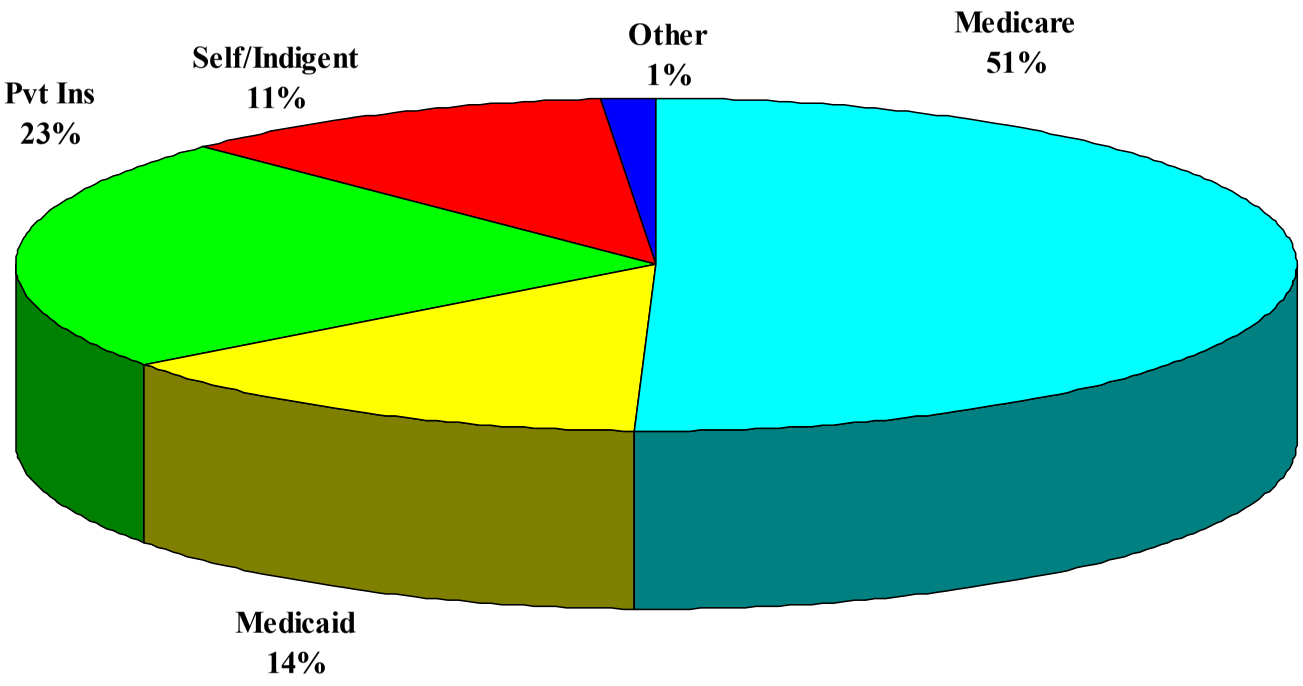
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.12. Average Hospital Charge for Diabetes as Primary Diagnosis by Age, SC, 1991-2006



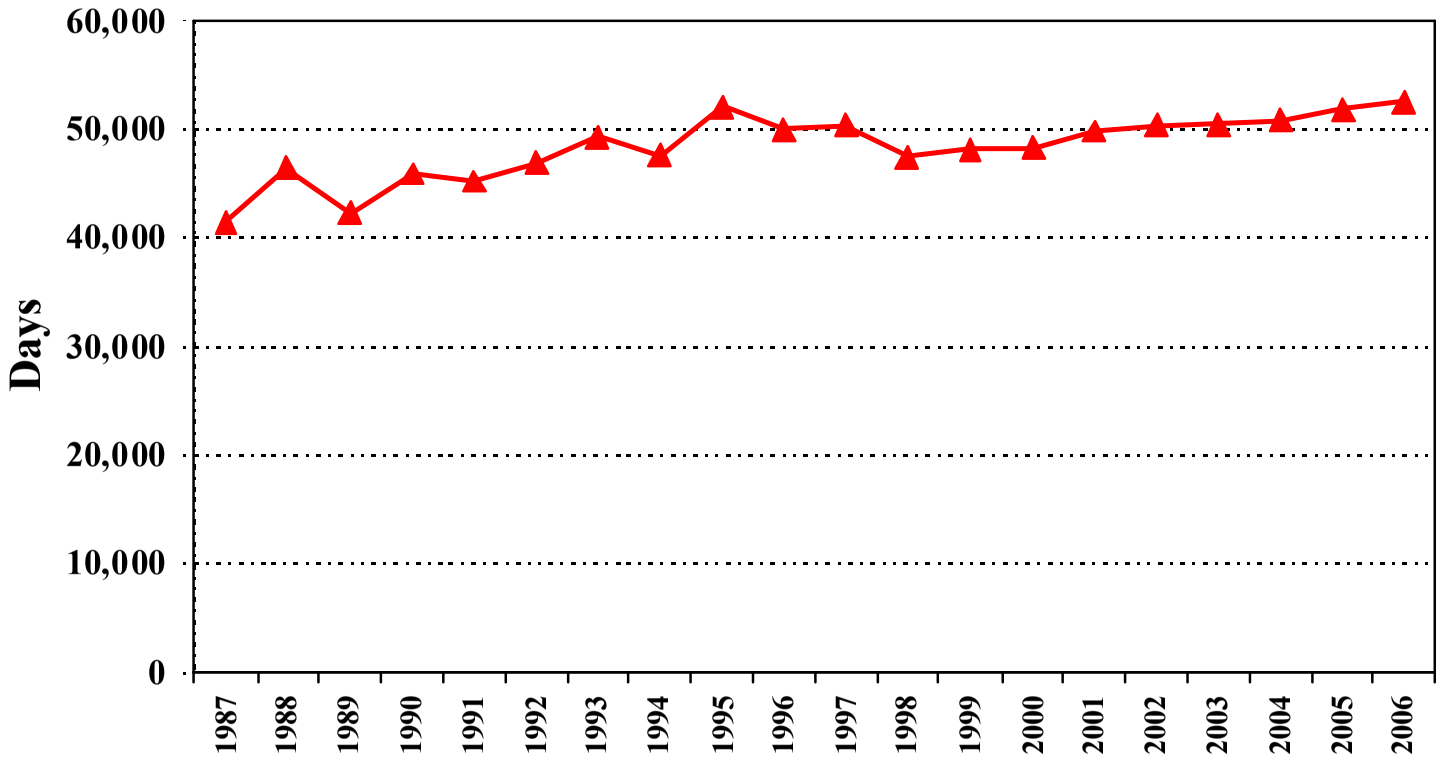
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.13. Sources of Payment for Hospitalization among Patients with Diabetes as the Primary Diagnosis, SC, 2006



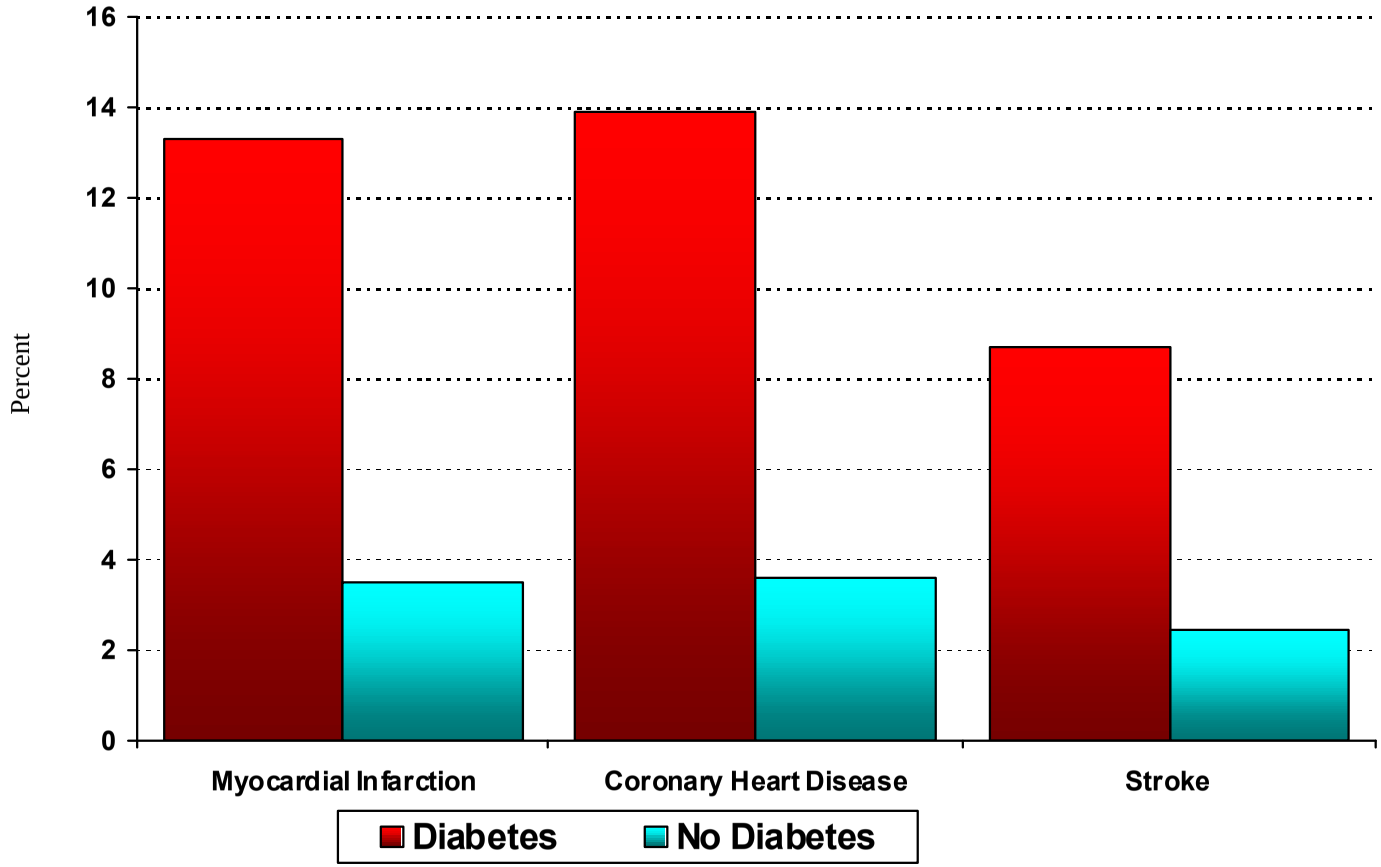
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.14. Total Length of Hospital Stay for Patients with Diabetes as the Primary Diagnosis, 1996-2006



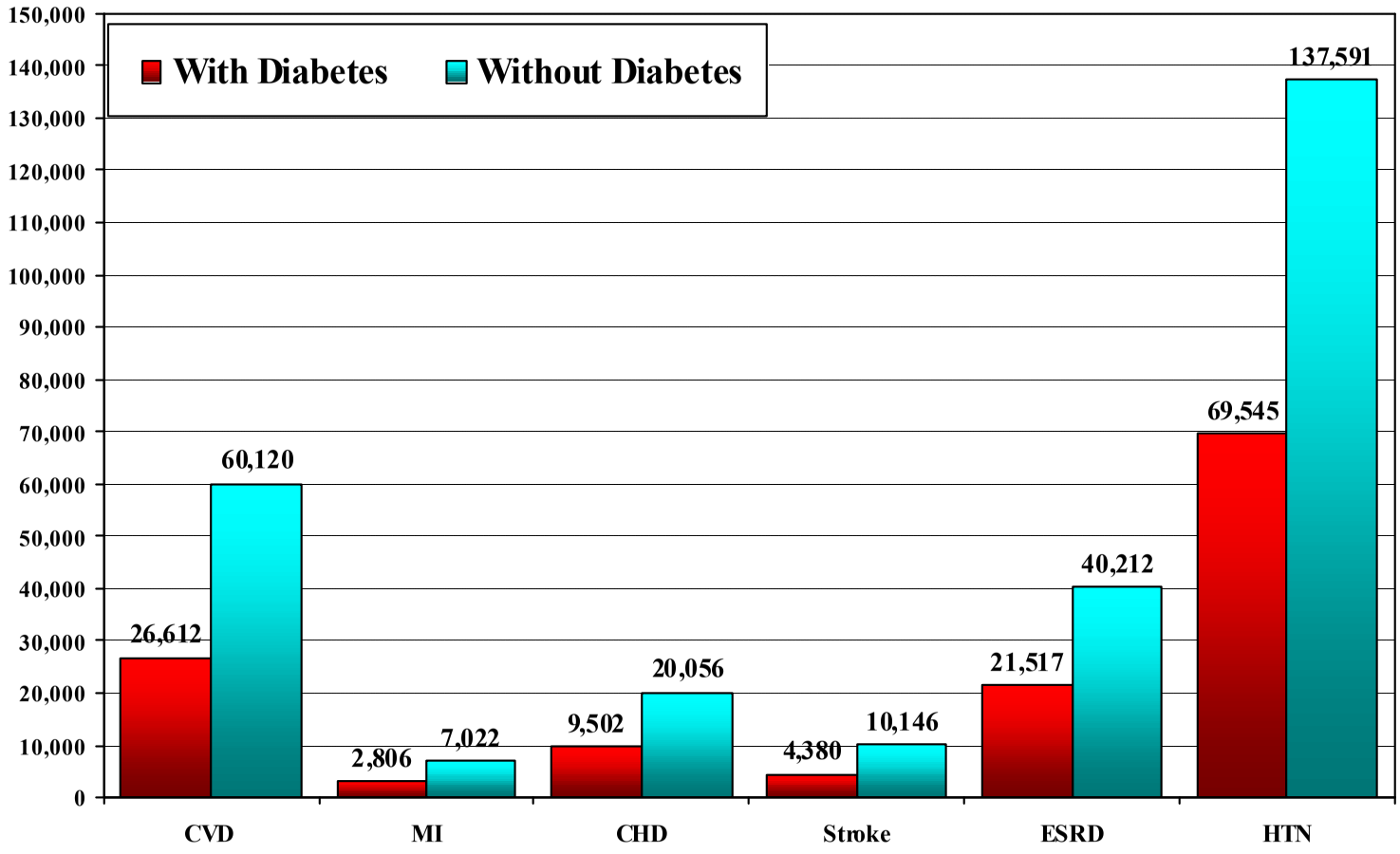
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.15. Prevalence of CVD and Stroke by Diabetes Status, SC, BRFSS 2006



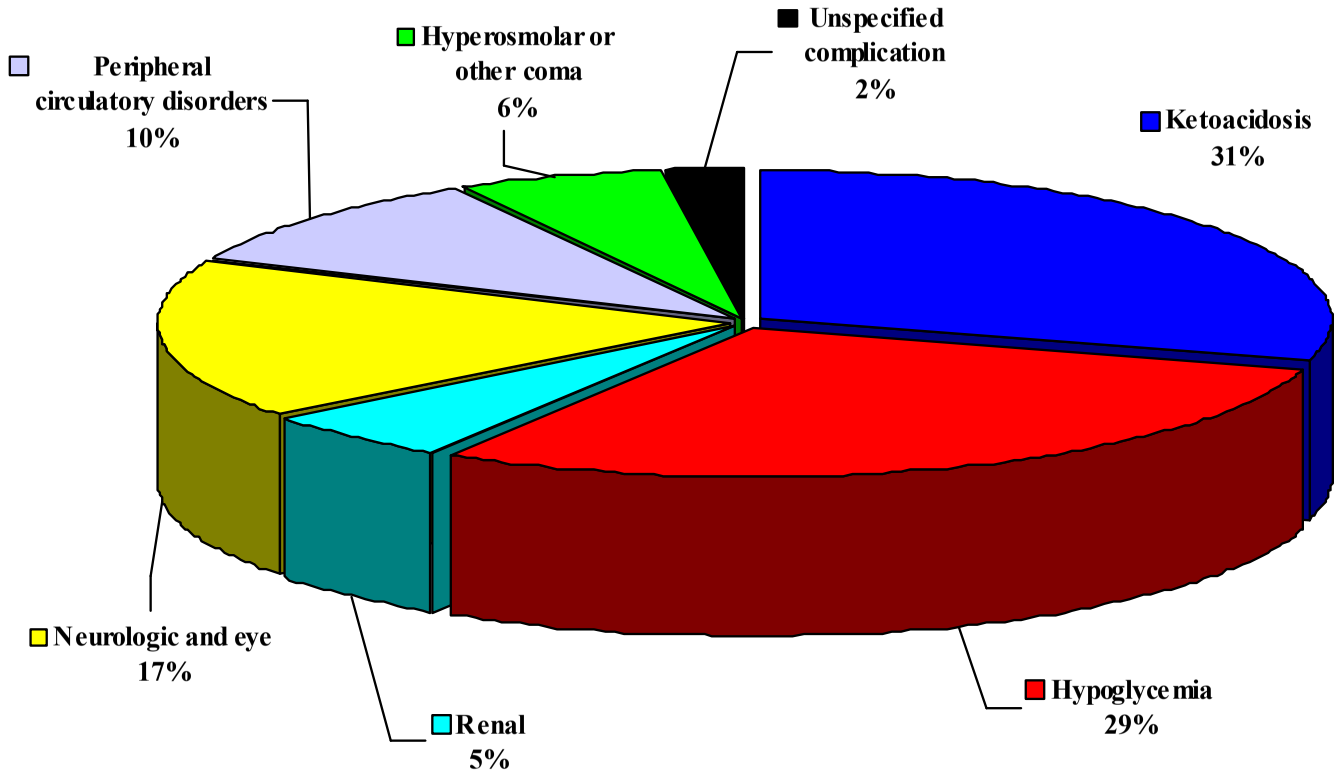
Data Source: SC BRFSS; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.16. Number of Hospitalizations for Major Diseases & Procedures by Diabetes Status, SC, 2006



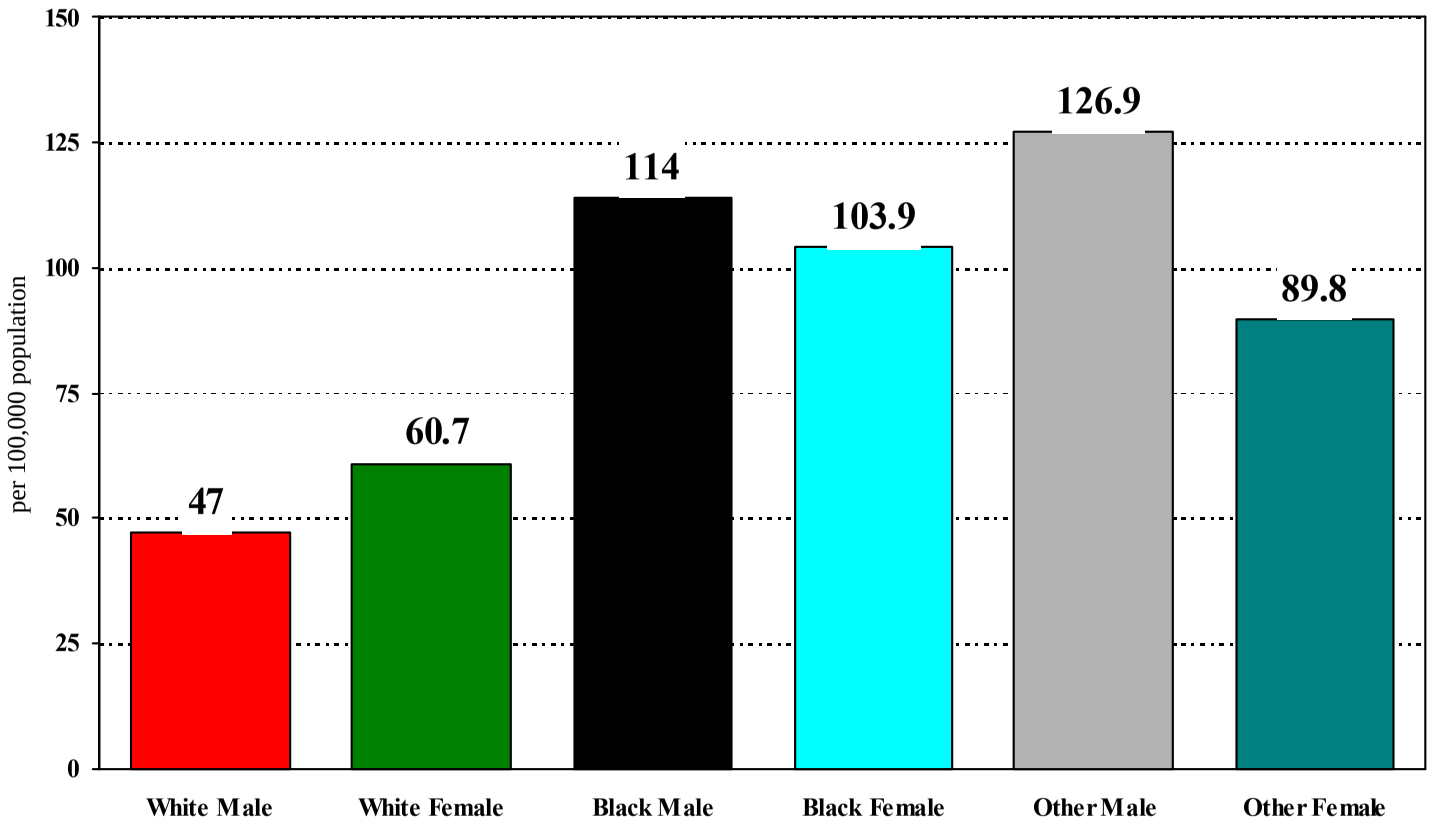
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.17. Distribution of Complications among Inpatients with Diabetes as Primary Diagnosis, SC, 2006



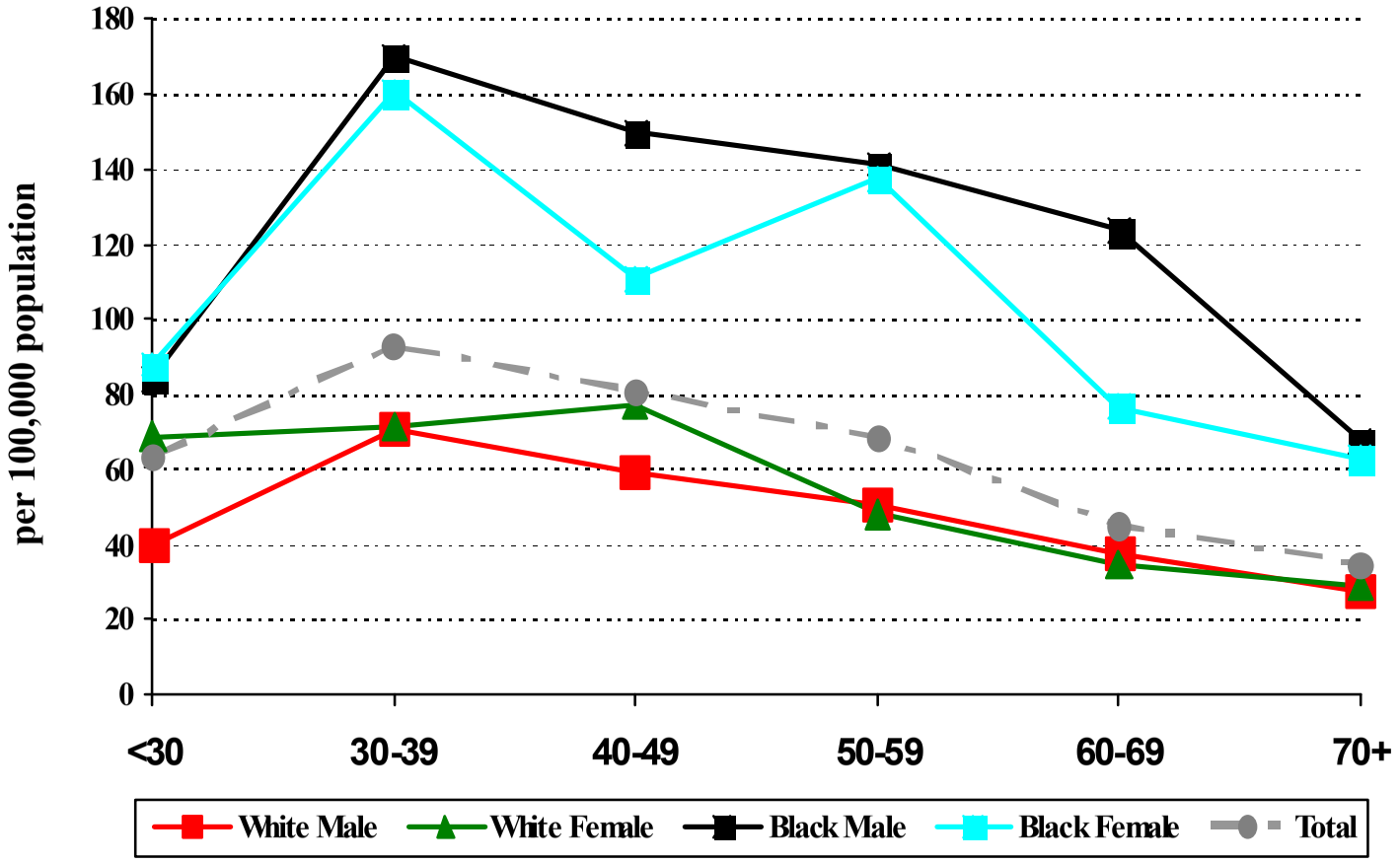
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.18. Age-Adjusted Hospitalization of Diabetic Ketoacidosis by Race-Sex, SC, 2006



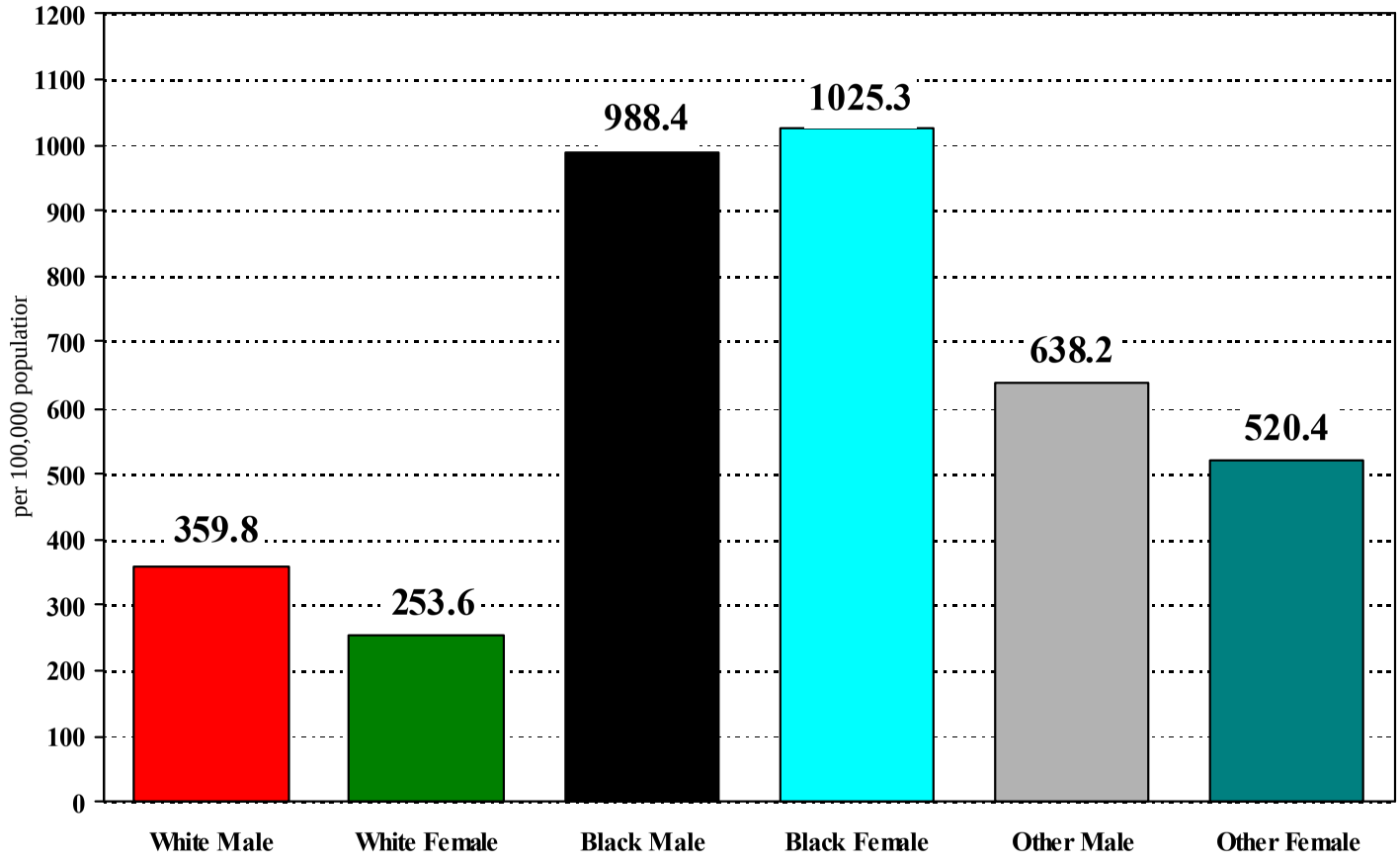
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.19. Age-specific Hospitalization Rates of Diabetic Ketoacidosis by Race-Sex, SC, 2006



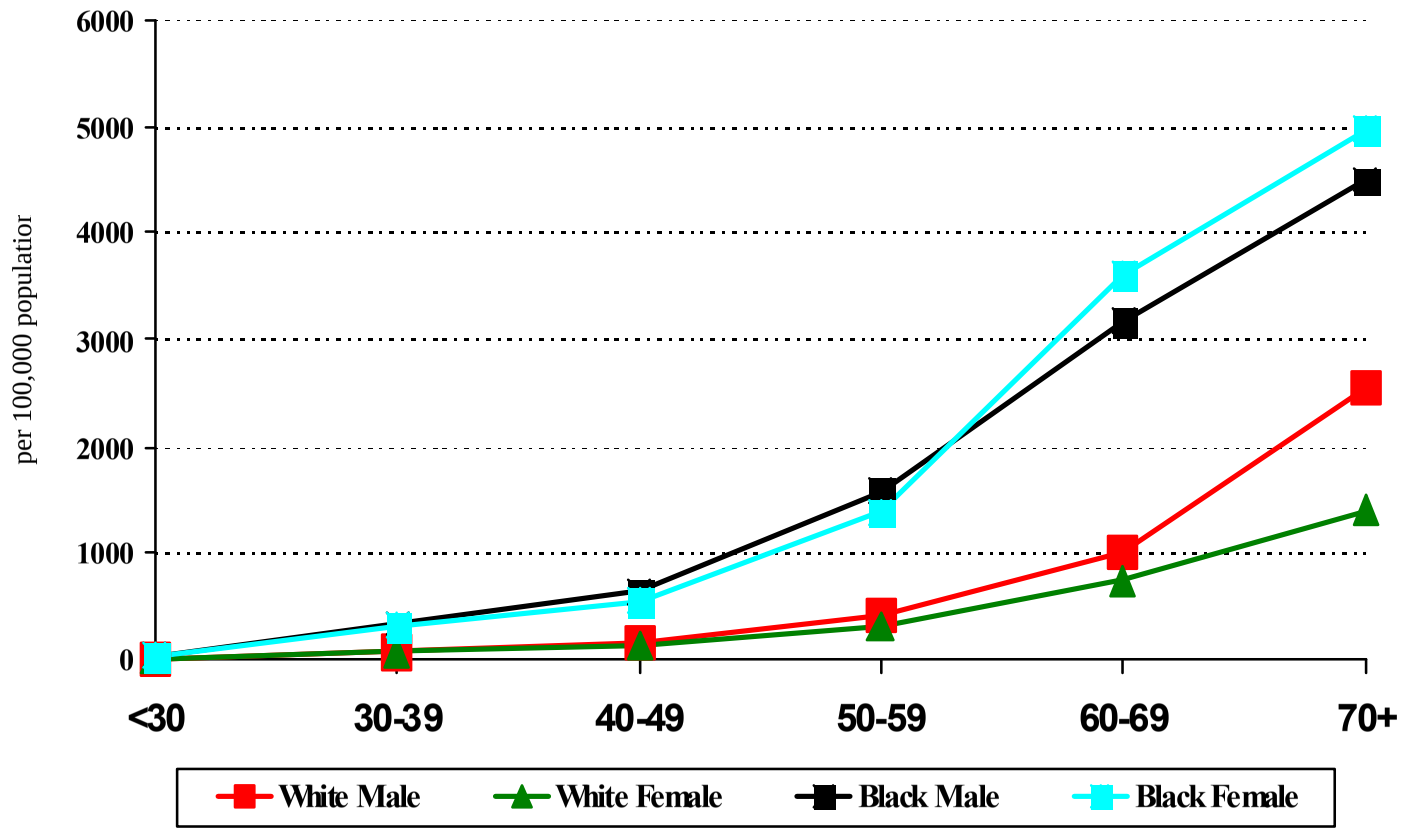
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.20. Age-Adjusted Hospitalization Rate of Diabetic Renal Failure by Race-Sex, SC, 2006

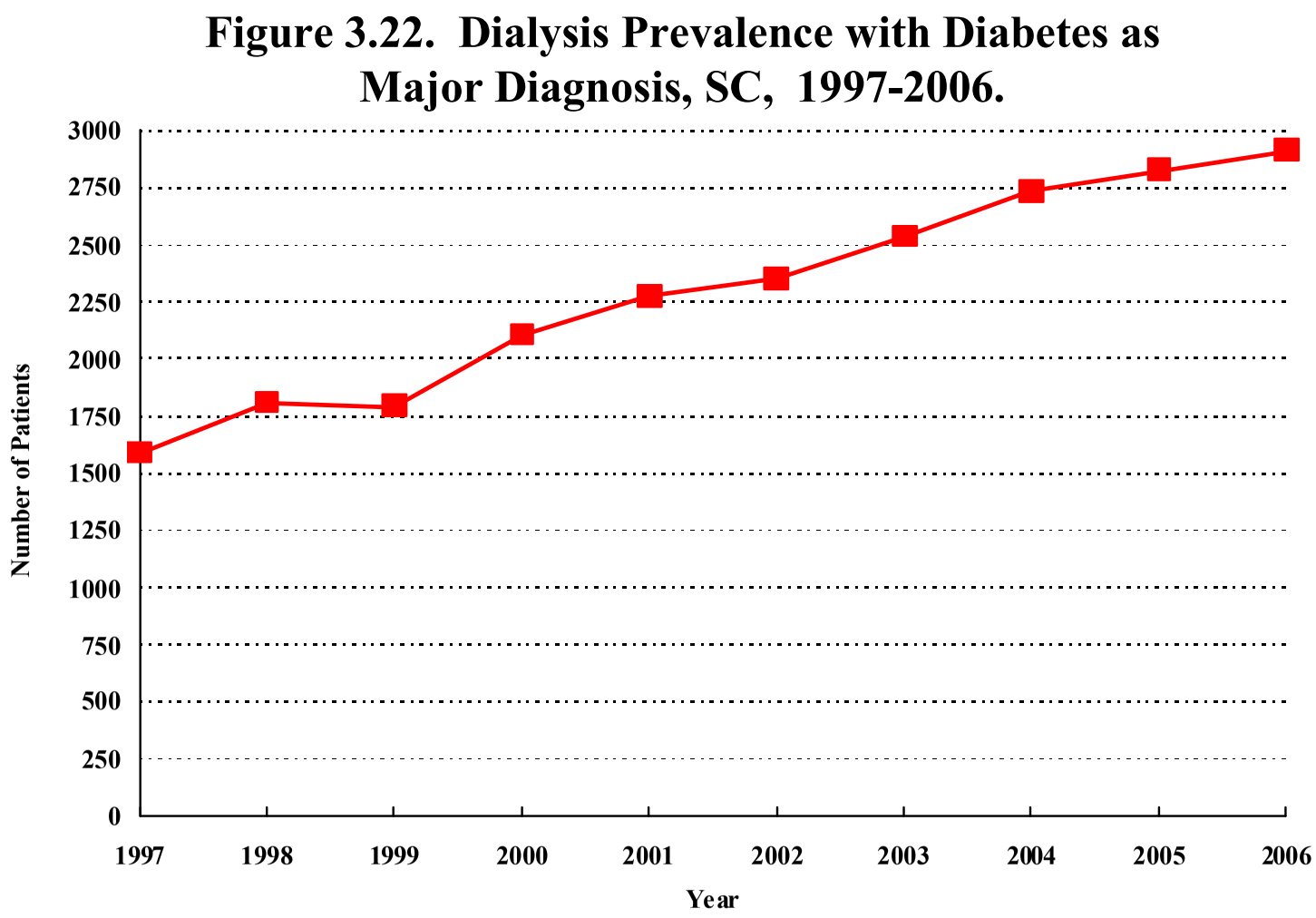


Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.21. Age-Specific Hospitalization Rate of Diabetic Renal Failure by Race-Sex, SC, 2006

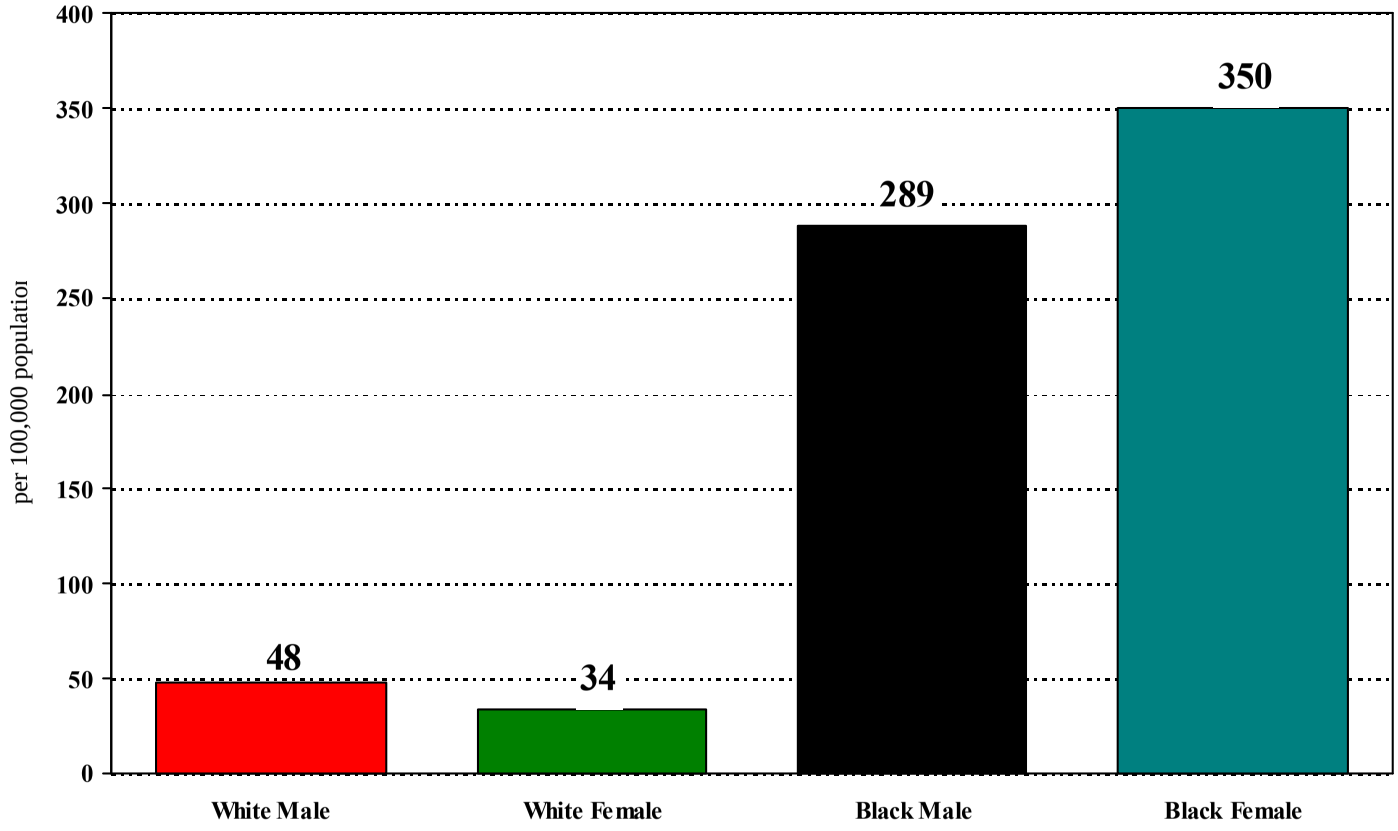


Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009



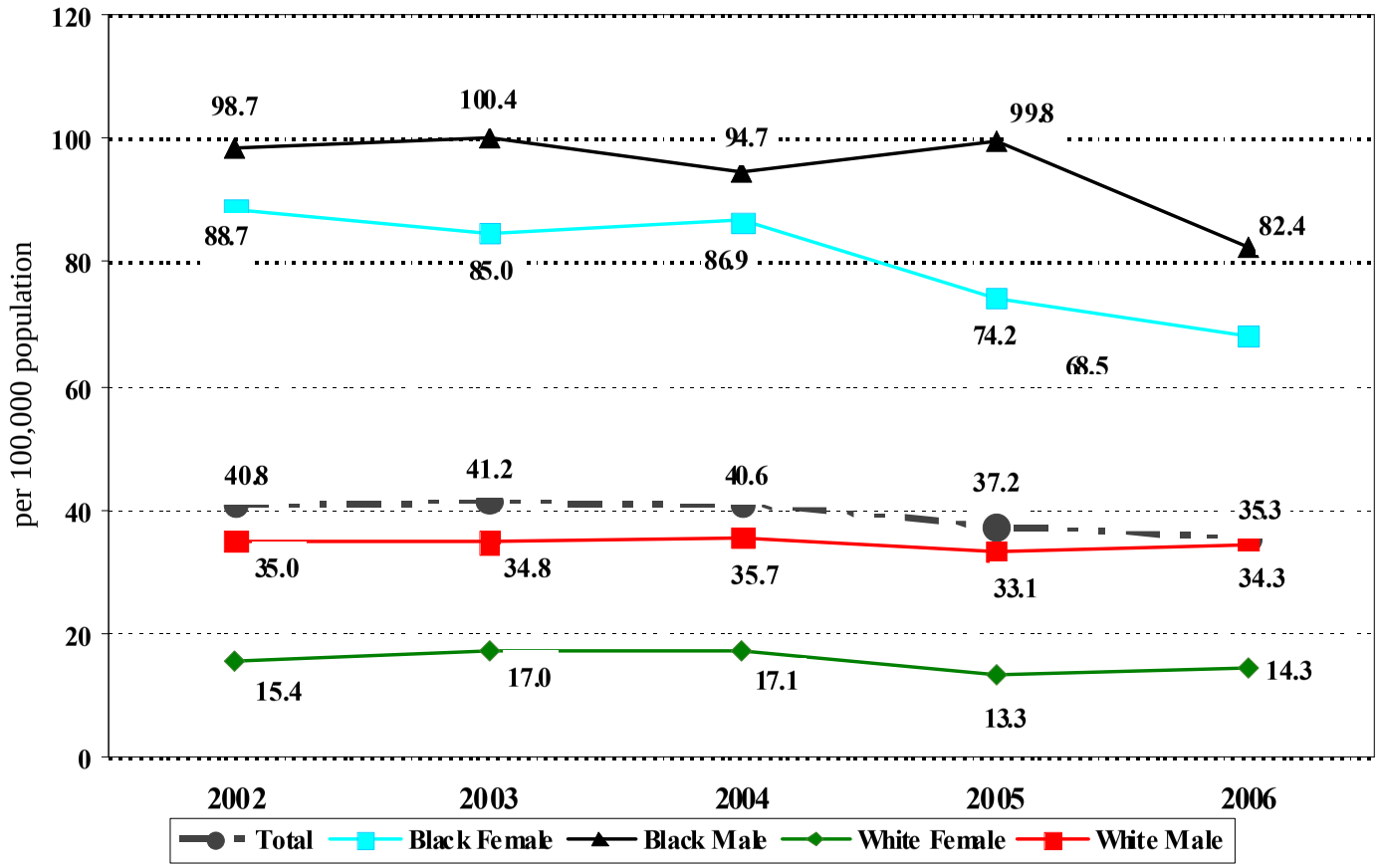
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.23. Age-Adjusted Hospitalization Rate of Diabetic Dialysis by Race-Sex, SC, 2006



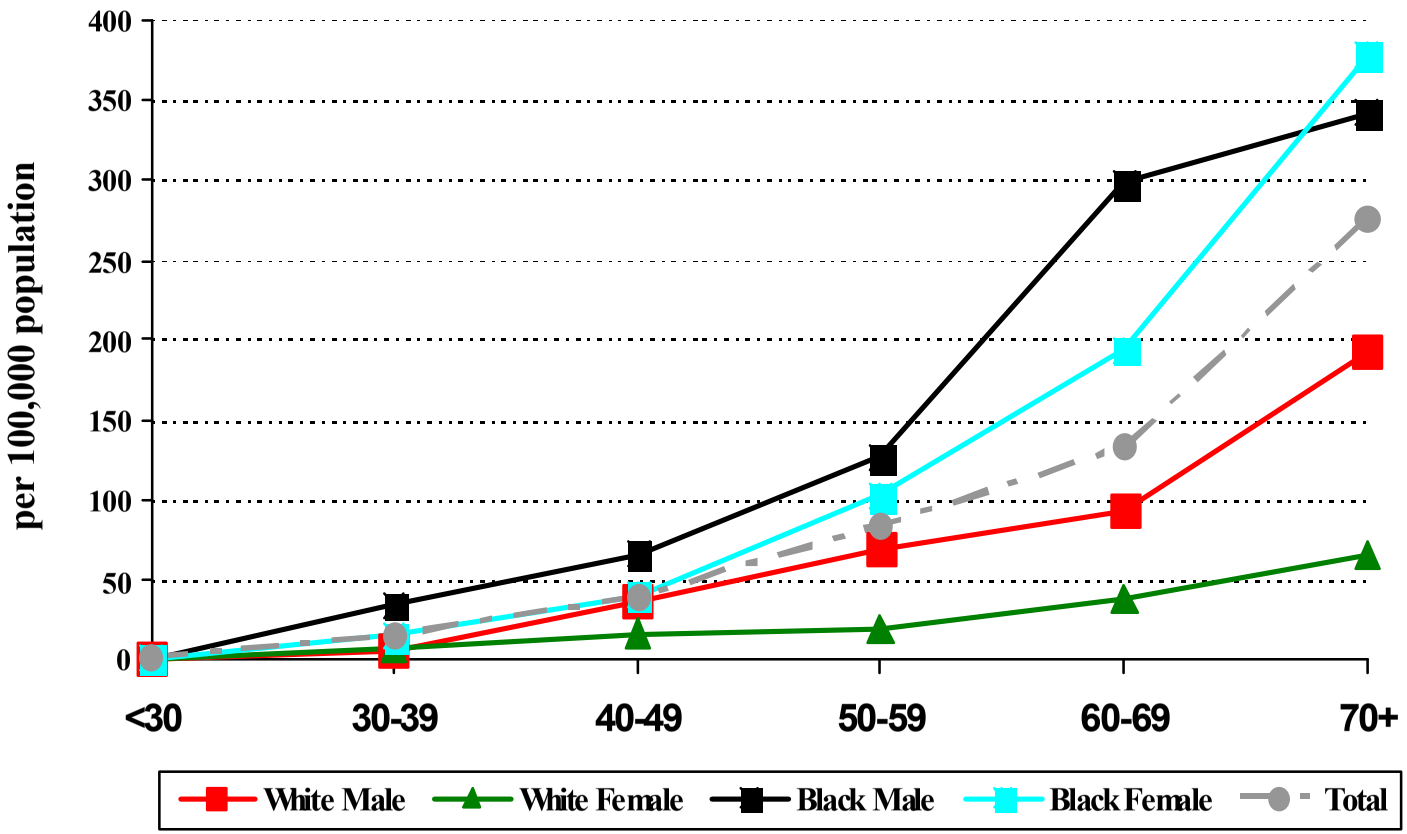
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.24. Age-Adjusted Hospitalization Rate of Diabetic Lower Extremity Amputation by Race-Sex, SC, 1997-2006



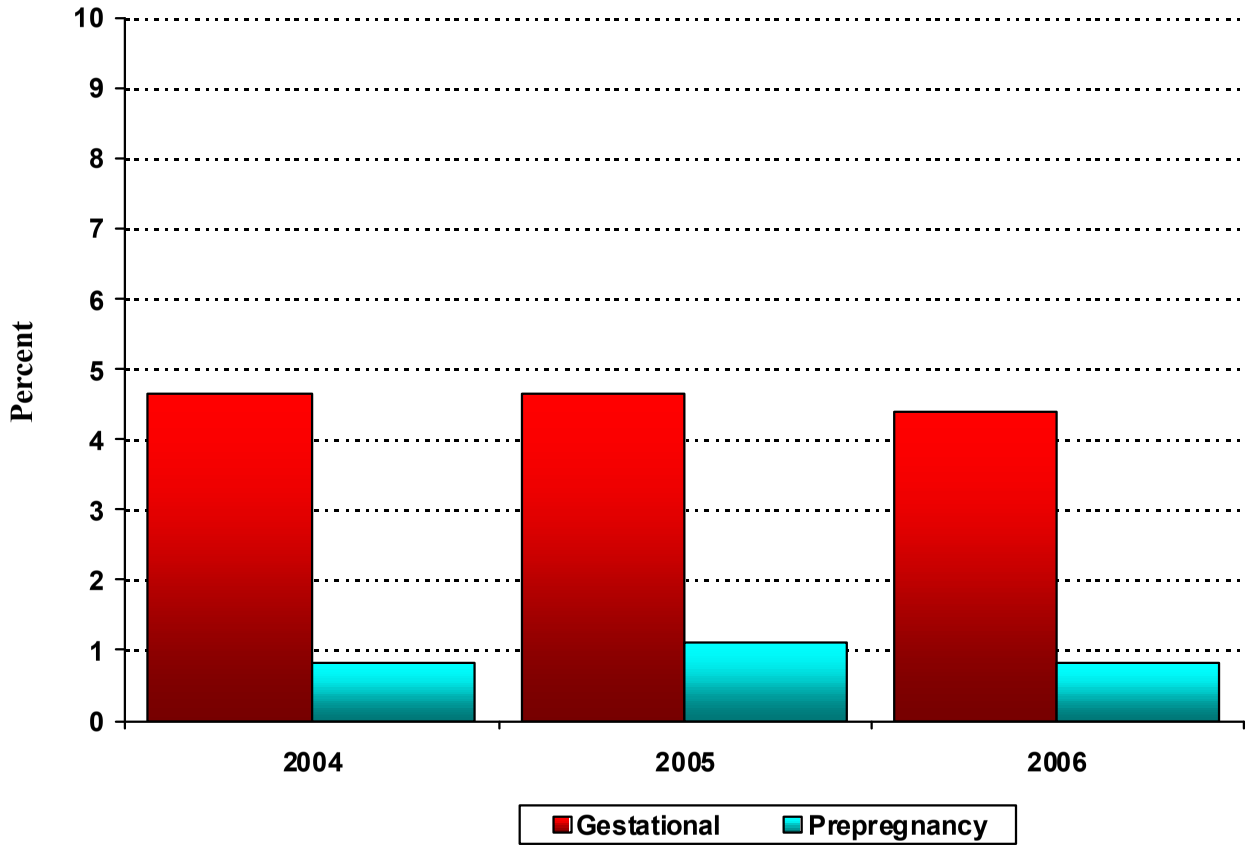
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.25. Age-Specific Hospitalization Rates for Diabetic Foot Amputation by Race-Sex, SC, 2006



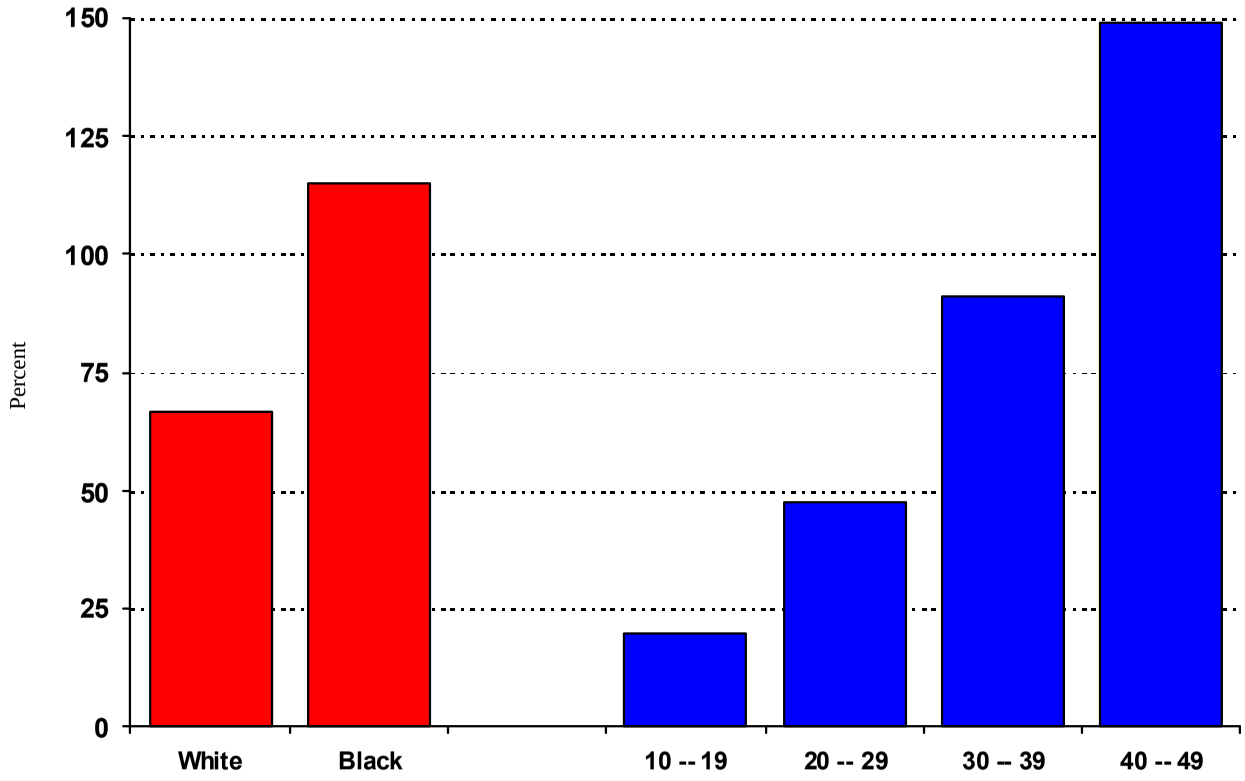
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.26. Percent of Live Births by Mother's Diabetes Status, SC, 2004 -2006



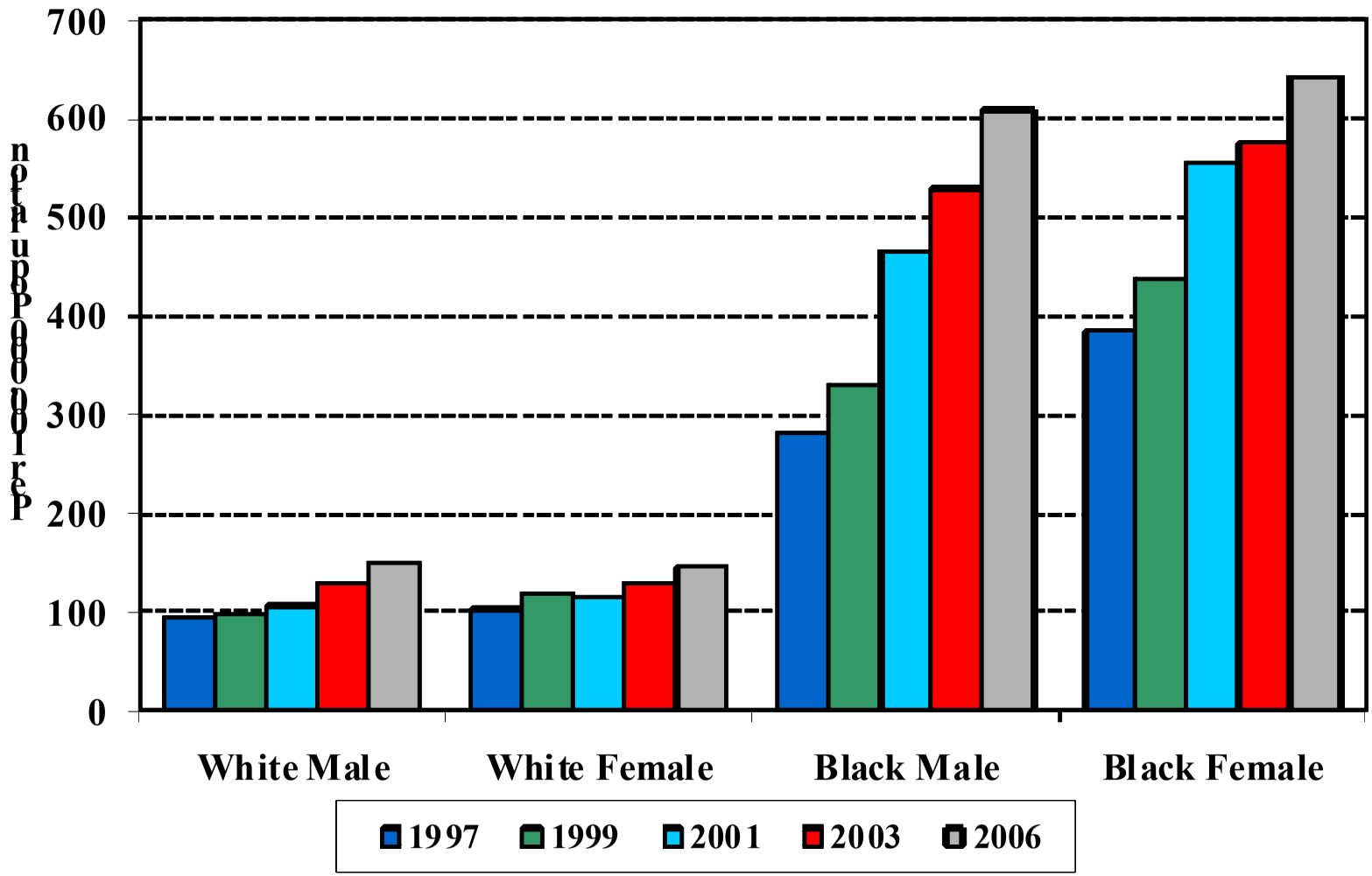
Data Source: SCDHEC SCAN; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.27. Age-Adjusted Hospitalization Rate of Gestational Diabetes, SC, 2006



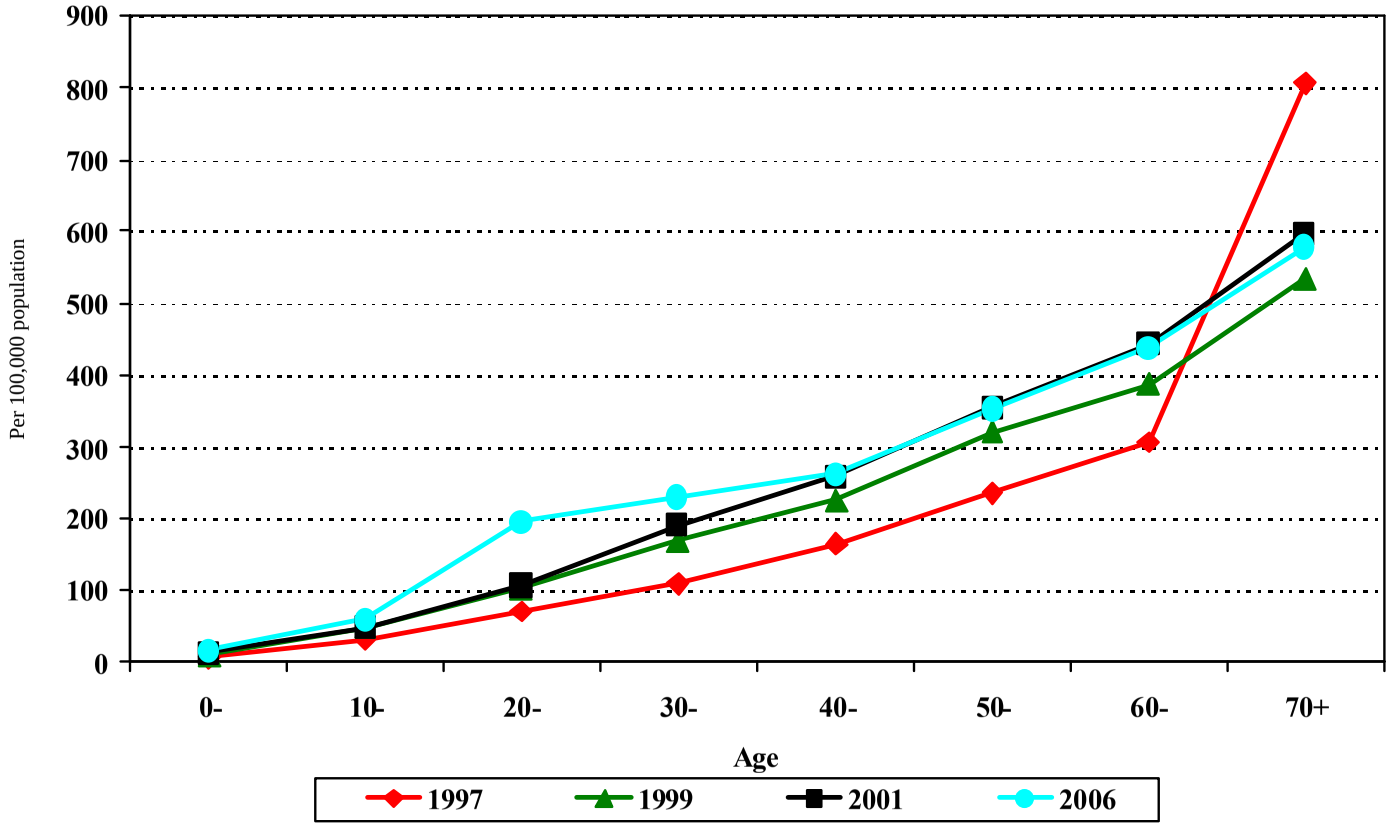
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.28. Age-Adjusted Rate of ER Visits for Diabetes as the Primary Diagnosis by Race-Sex, SC, 1997-2006



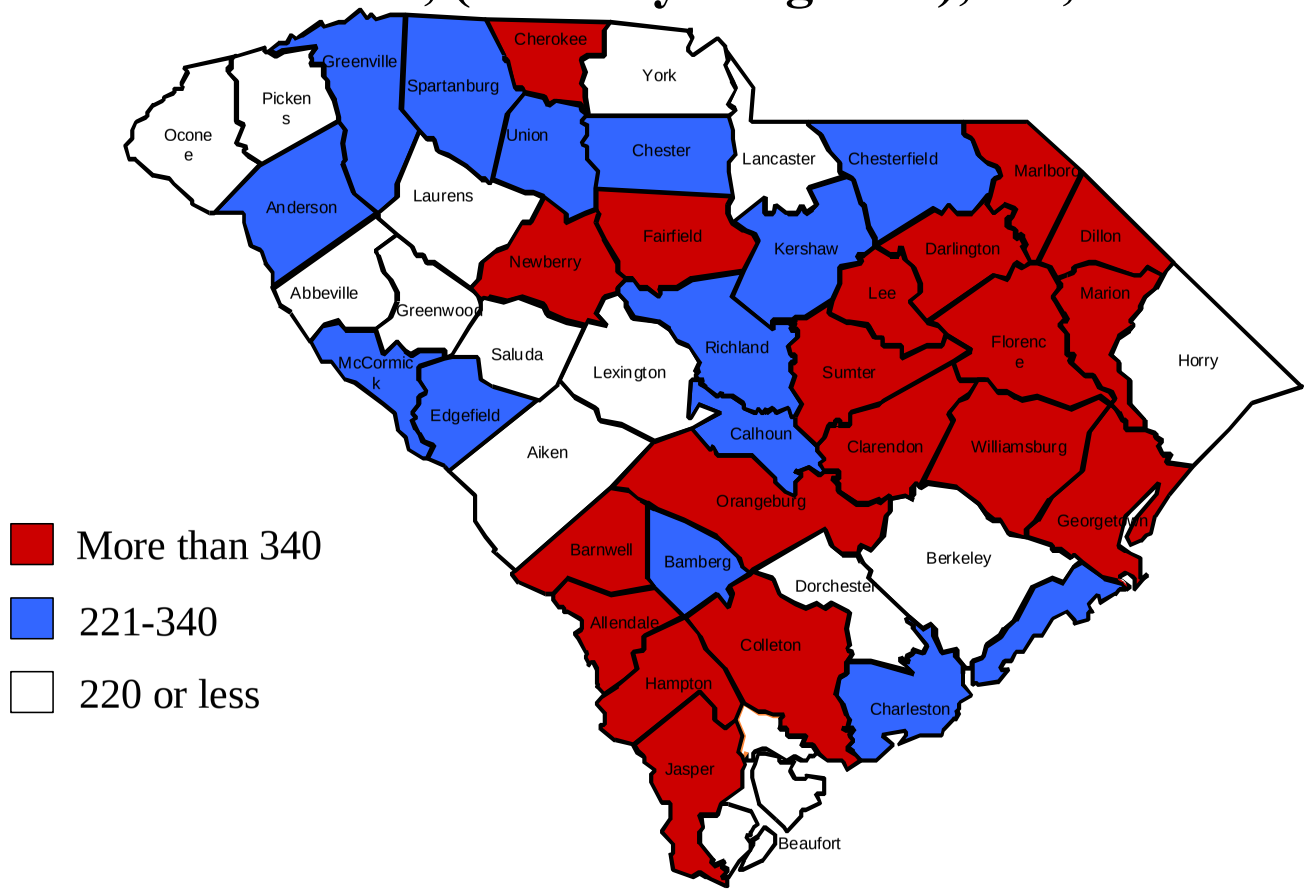
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.29. Rates of ER Visits with Diabetes as the Primary Diagnosis by Age, SC, 1999, 2001 and 2006



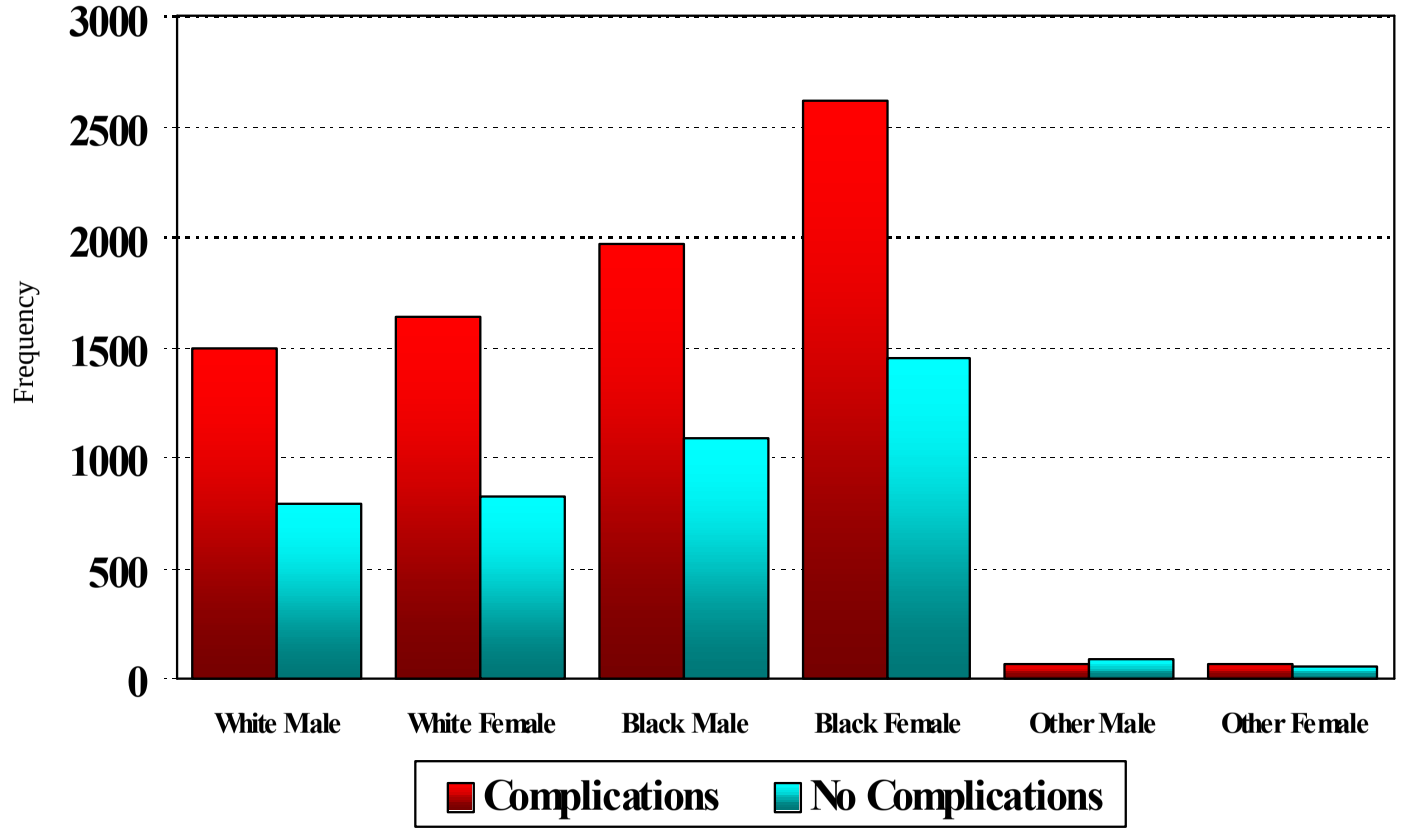
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.30. Age-Standardized Rate of ER Visits for Diabetes, (Primary Diagnosis), SC, 2006



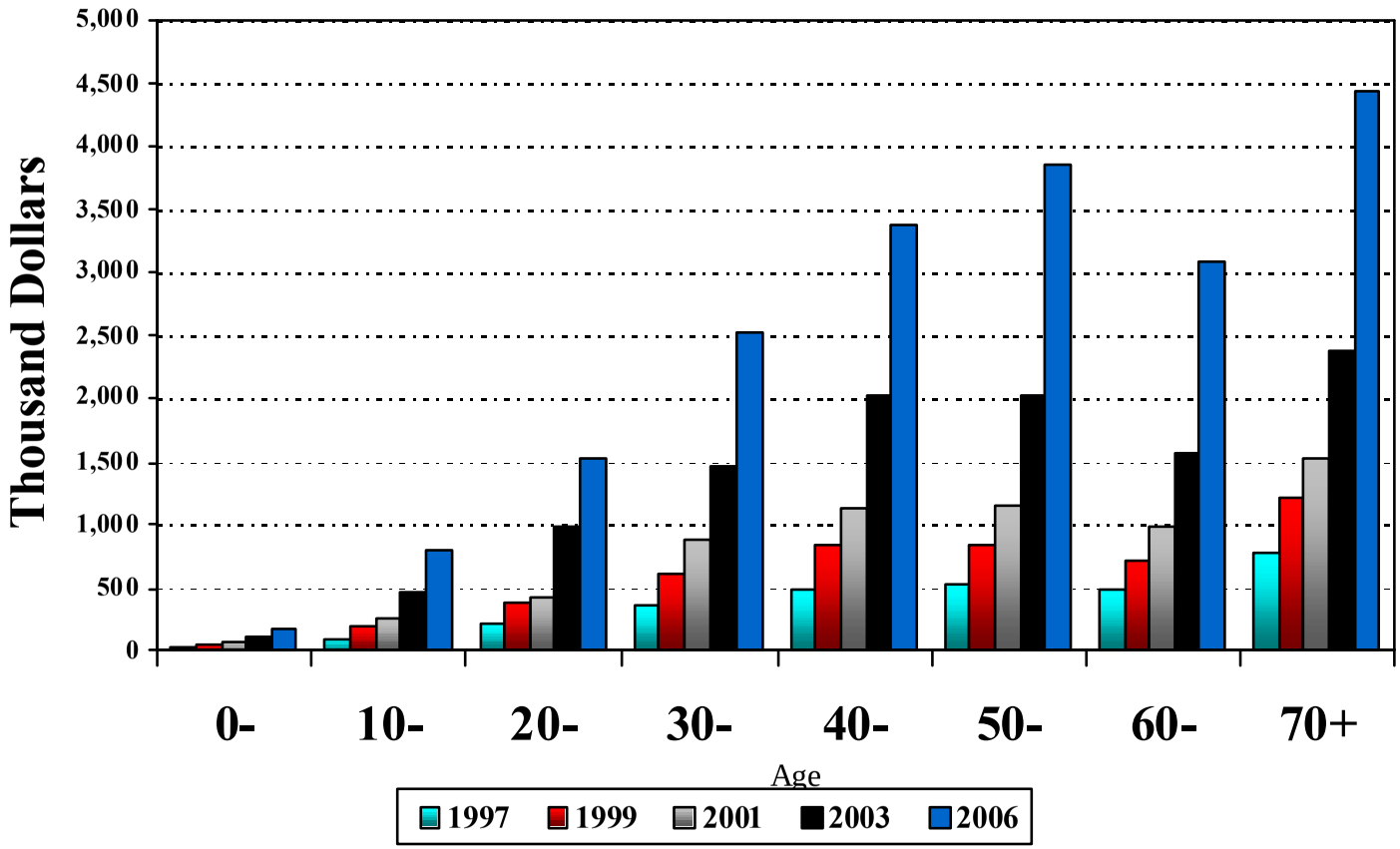
Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.31. Number of ER Visits with Selected Diabetic Complications by Race-Sex, SC, 2006

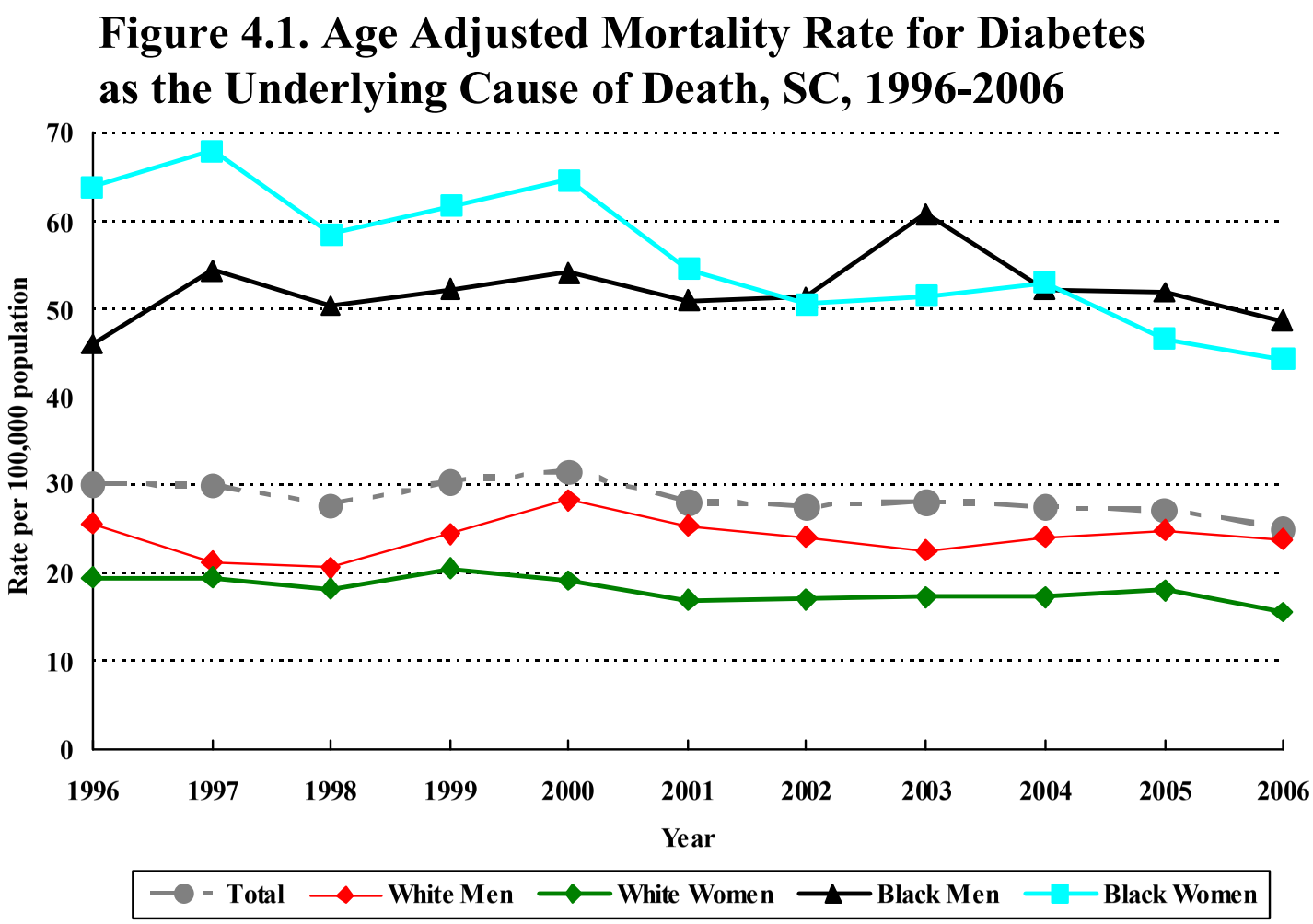


Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 3.32. Total Charges for ER Visits with Diabetes as the Primary Diagnosis by Age, SC, 1997-2006

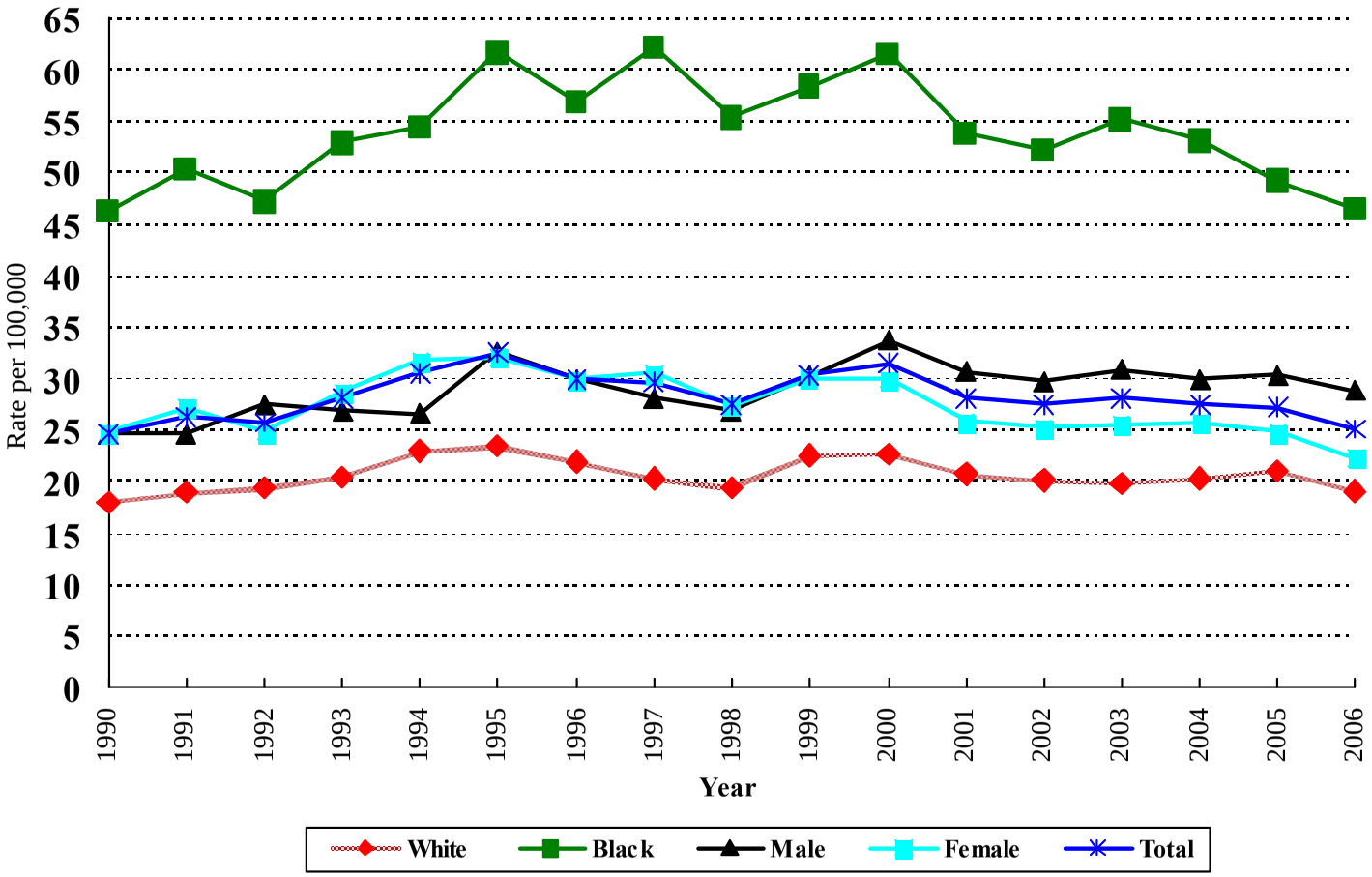


Data Source: SC Office of Research and Statistics; Generated by Chronic Disease Epidemiology and Evaluation February 2009



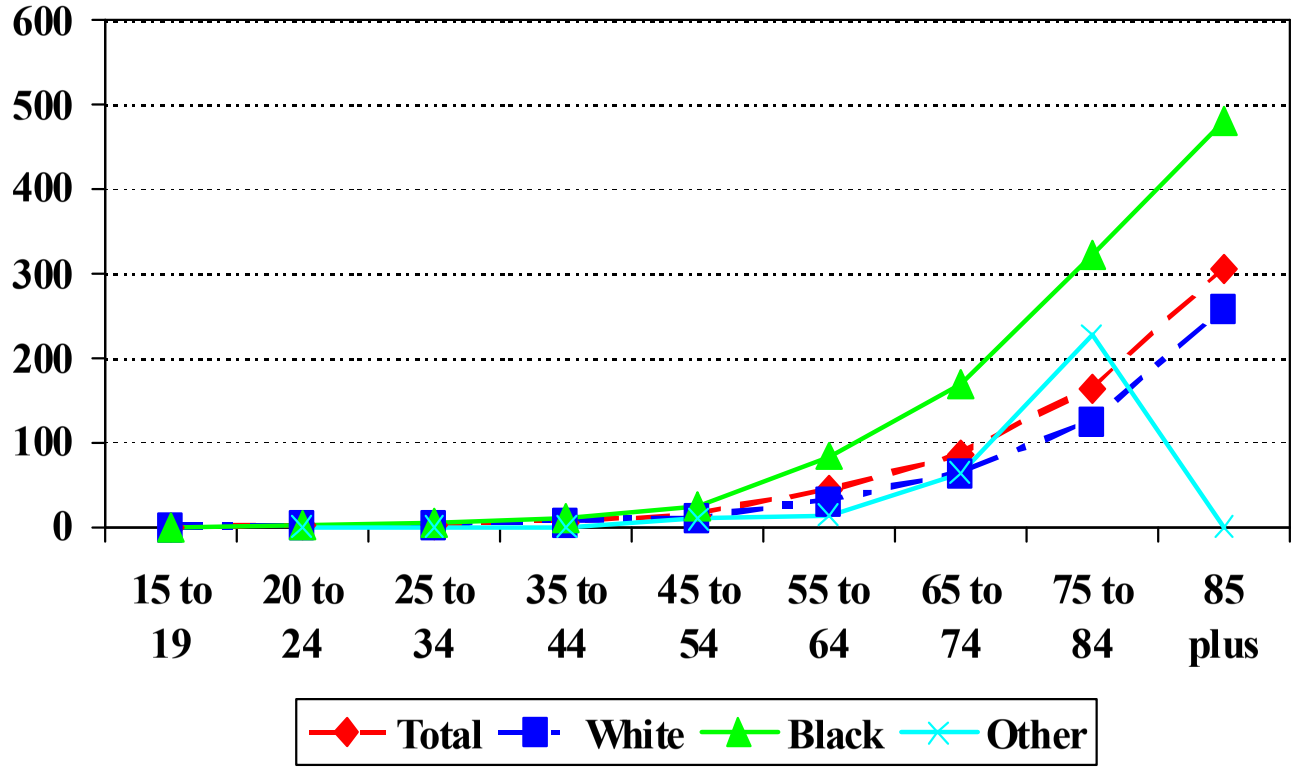
Data Source: SCDHEC SCAN; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 4.2. Age Adjusted Mortality Rates for Diabetes as the Underlying Causes of Death by Race, Sex, SC, 1990-2006



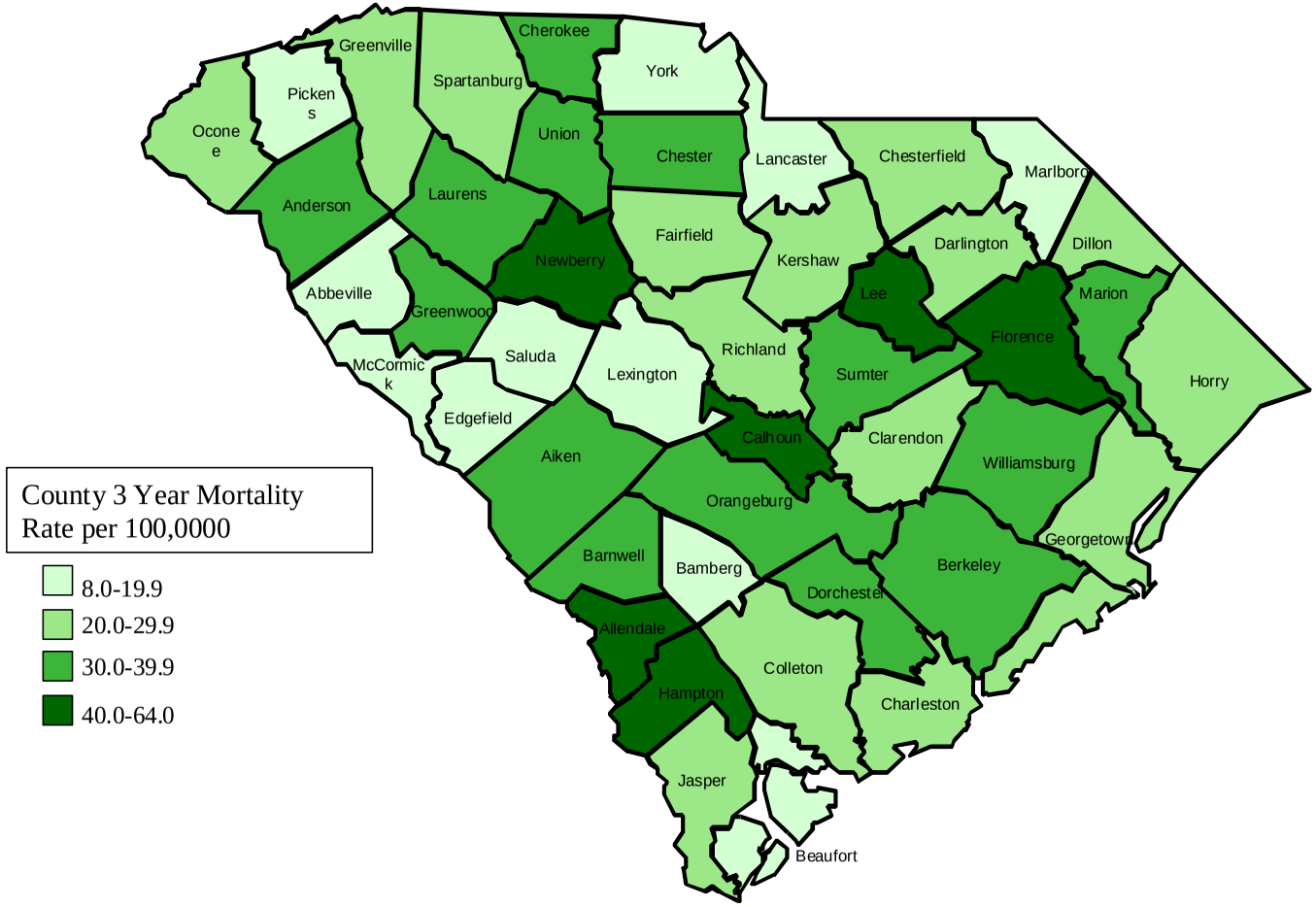
Data Source: SCDHEC SCAN; Generated by Chronic Disease Epidemiology and Evaluation May 2009

Figure 4.3. Age-Specific Crude Mortality Rate for Diabetes as the Underlying Cause of Death, SC, 2006



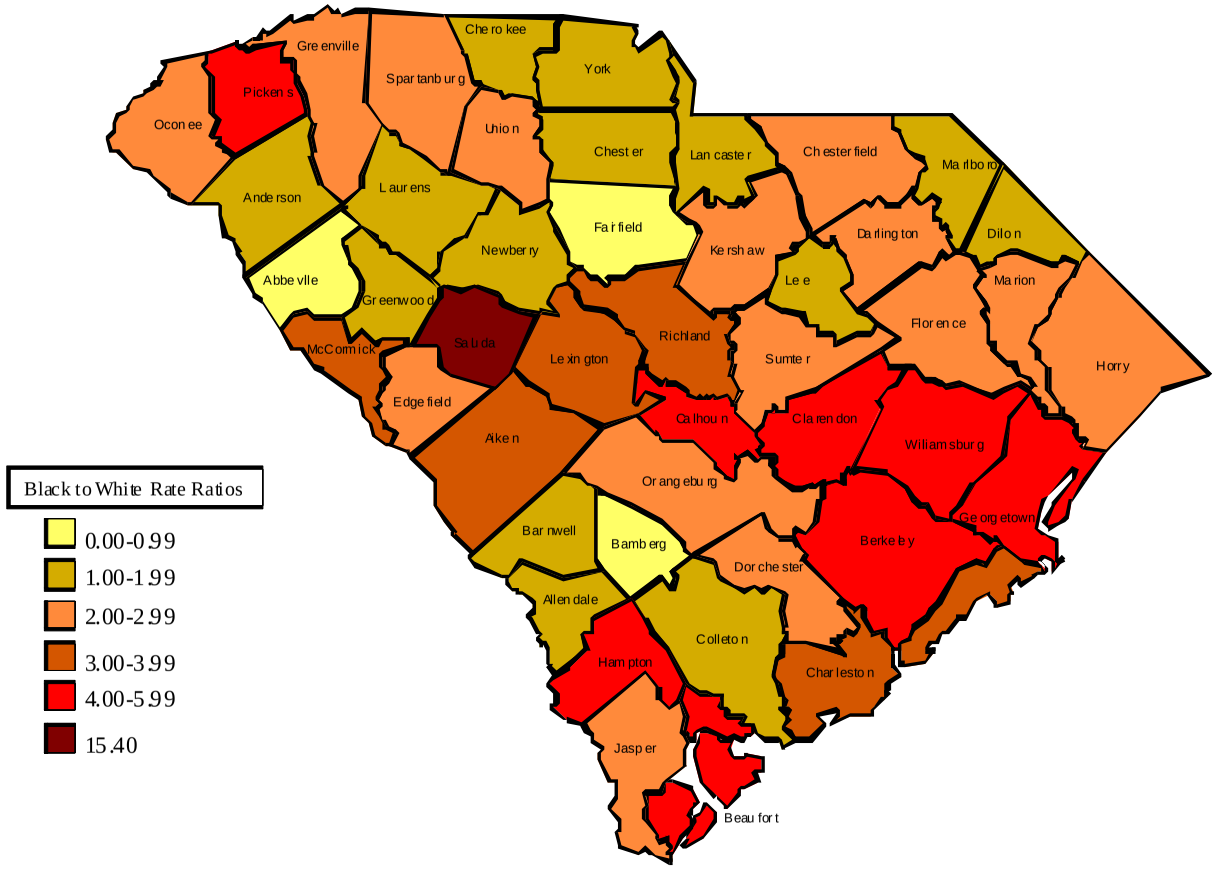
Data Source: SCDHEC SCAN; Generated by Chronic Disease Epidemiology and Evaluation May 2009

Figure 4.4. Age-Adjusted Mortality of Diabetes (Underlying Cause of Death), SC, 2003-2006



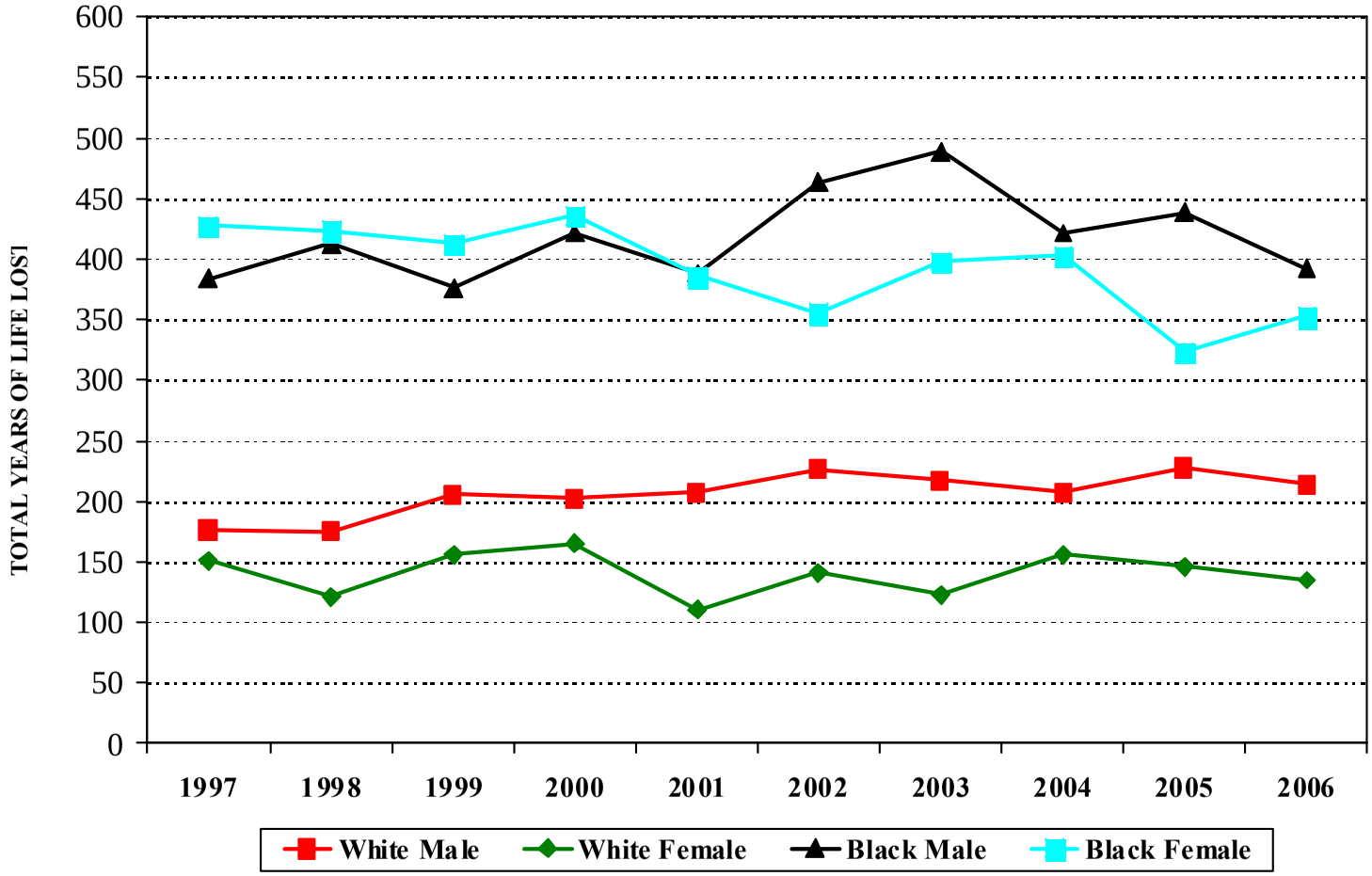
Data Source: SCDHEC SCAN; Generated by Chronic Disease Epidemiology and Evaluation February 2009

Figure 4.5. Racial Rate Ratio of Diabetes as the Underlying Cause of Death, SC, 2004-2006



Data Source: SCDHEC SCAN; Generated by Chronic Disease Epidemiology and Evaluation January 2009

Figure 4.6 . Total Number of Years of Potential Life Lost for Diabetes as Underlying Cause of Death by Race-Sex, SC, 1997-2006 (before the age of 75)



Data Source: SCDHEC SCAN; Generated by Chronic Disease Epidemiology and Evaluation May 2009

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