



# The State of Diabetes in South Carolina

**An Evaluation of the First Ten Year Strategic Plan of  
the Diabetes Initiative of South Carolina**

**Diabetes Initiative of South Carolina**

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## An Evaluation of the First Ten Year Strategic Plan of the Diabetes Initiative of South Carolina

*This report was prepared by*

South Carolina Department of Health and Environmental Control  
Office of Chronic Disease Epidemiology and Evaluation

*in collaboration with*

Medical University of South Carolina, Department of Neurosciences  
Medical University of South Carolina School of Nursing  
SC Department of Health and Environmental Control Division of  
Diabetes Prevention and Control  
Carolinas Center for Medical Excellence  
University of South Carolina School of Medicine

### Editorial Team

Patsy Myers, DrPH, MS, SCDHEC OCDEE  
Khosrow Heidari, MA, MS, MS, SCDHEC OCDEE  
Daniel T. Lackland, DrPH, DSC Chair, MUSC Dept. of Neurosciences  
Carolyn Jenkins, DrPH, FAAN, APRN-BC-ADM, RD, CDE, MUSC College of Nursing  
Mark Massing, PhD, MD, Carolinas Center for Medical Excellence  
Thomas Gaffney, MD, Practicing Physician  
Rhonda Hill, PhD, CHES, SCDHEC DPCP  
Shelly Ann Bowen, PhD, MS, CT (ASCP), SCDEHC DPCP

The editorial team wishes to extend a special thank you to John A. Colwell, MD, PhD, the founder of the Diabetes Initiative of South Carolina for his untiring commitment and dedication to the mission of reducing the burden of diabetes in South Carolina.

The authors would also like to thank the Division of Endocrinology at the Medical University of South Carolina, for their support and dedication.



## A MESSAGE FROM THE CHAIRMAN

Dear Fellow South Carolinians and Colleagues:

On behalf of the Board of Directors of the Diabetes Initiative of South Carolina (DSC) and the DSC Evaluation Writing Team, I am pleased to present ***The State of Diabetes in South Carolina: An Evaluation of the First Ten Years of the Diabetes Initiative of South Carolina***. The activities, successes, and challenges of DSC have been monitored and assessed by the DSC Surveillance Council over the past 10 years and have been organized in this detailed report.



Since its inception, DSC has been committed to the reduction of excess economic and health burdens related to the diabetes epidemic in our state. DSC works to establish partnerships that facilitate activities and interventions, creating a cost efficient network throughout South Carolina. Through effective collaboration with the Diabetes Prevention and Control Program of the SC Department of Health and Environmental Control, USC Schools of Medicine and Public Health, and the SC medical community, we have established many active programs of patient and healthcare provider education focused on diabetes prevention and control. A major focus of DSC is the elimination of health disparities from diabetes.

The report you are about to read carries a message that I hope all South Carolinians will take seriously. The message is this: The epidemic of diabetes and its complications are causing our citizens to have fewer healthy days and experience early, unnecessary deaths. This epidemic also is increasingly draining our pocketbooks. However, much progress has been made. This report will describe the significant reductions in amputations, and hospitalizations for heart disease and stroke for people with diabetes, as well as the increase in healthcare providers in underserved and high-risk areas for diabetes. This unique collaborative initiative has enhanced extramural funding opportunities of education programs, clinical care and research focused on diabetes, accounting for over \$50 million in the past decade.

We are grateful to the General Assembly for the establishment of this unique Initiative and to our partners for their time and effort to plan and conduct these programs, and to produce this document. As indicated in this report, the Diabetes Initiative of South Carolina has been associated with significant improvements in the diabetes burden in the state. Despite evidence showing major reductions in the economic and health burden of diabetes, much remains to be done.

The kinds of changes that will make a real impact on this problem need to come at all levels of the health care spectrum. I hope you will be inspired to become involved in helping South Carolinians to reduce their risk of diabetes and improve their own health. We look forward to implementing new strategies, evaluating them, and reporting our results for decades to come.

Sincerely,

A handwritten signature in black ink that reads "Daniel T. Lackland". The signature is written in a cursive, flowing style.

Daniel T. Lackland, DrPH  
Chair, Diabetes Initiative of South Carolina



## EXECUTIVE SUMMARY

The Diabetes Initiative of South Carolina (DSC) is an innovative, collaborative, public and private, clinical, research, educational, epidemiological effort focused on reducing the burden of diabetes in South Carolina. It was established by legislative action in July 1994 (Diabetes initiative of South Carolina Act n.d.). A governing Board was created, and an administrative structure which included three Councils: Diabetes Center, Outreach, and Surveillance was established. The purpose of DSC is to develop and implement a comprehensive statewide plan of community outreach programs, health professional education, and diabetes surveillance. The goal is to provide the tools for management of the disease in order to reduce severe complications and cost burdens for South Carolinians who suffer from diabetes mellitus. The Initiative represents a unique melding of private, state, and federal resources and agencies toward this common goal.

The DSC Ten Year Strategic Plan formulated in 1998 had nine goals including: 1) Target Diabetes High Risk Groups; 2) Reduce South Carolina Morbidity & Disability caused by amputations attributable to diabetes; 3) Reduce South Carolinians Preventable Hospital Admissions and Charges for Diabetes; 4) Reduce South Carolinians Preventable Visits to the Emergency Department (ED) by people with diabetes; 5) Develop more rigorous statistical methodology with which to estimate yearly changes in the prevalence of diabetes, diabetes complications, & the size of diabetic populations in SC. The purpose of this report is twofold: to address the extent to which referenced DSC 1998 goals were met between 1996 & 2007 and to facilitate discussion to frame the goals and objectives for SC for the next decade. This report summarizes a recent decade of SC's experience with meeting the goals set forth in the DSC Ten-Year Strategic Plan.

Many positive changes have occurred in the past decade. People with diabetes showed some improvement in lifestyle activities to improve health such as attempts to stop smoking and lose weight, especially by increasing physical activity. More than half of people with diabetes reported attending diabetes self management education (DSME) classes. During the past decade, SC Medicaid began covering DSME, enabling better access to DSME classes. The number and location of available DSME classes has increased in the past decade. According to the BRFSS, those who have taken DSME classes reported fewer days of poor physical and mental health.

Prevalence of glucose self monitoring has more than doubled, and at least 70% report doing foot self-exams. Having two or more A1Cs and professional foot exams has increased slightly and been consistently higher in African Americans. Eye exams remained consistently high. Almost one/half of SC hospitals have an Intensive Glucose Management Program in place, and one/third have one underdevelopment. As might be expected, the large/urban hospitals are much further along, with 65% having a program in place.

Preventable hospitalizations i.e. those with "uncomplicated diabetes" as a primary diagnosis has decreased by 35% in the past decade. Most of that can be attributed to hospitalizations from type 1 diabetes which has dropped by almost 75%, while hospitalizations

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from type 2 have increased by 30% in the past decade. Preventable ED visits from “uncomplicated” type 1 diabetes have decreased by almost 50% in the past decade.

Lower extremity amputation rates have decreased in all race groups, particularly in African Americans. African American females have shown the most improvement in amputation rates of all race or gender groups. Heart attacks in diabetes patients have been declining. Myocardial Infarction (MI) rates are consistently higher in African Americans, but they have dropped by 26% since their peak in 2001. MI Rates are higher in African American males, but have decreased the most in African American females. After rising steadily for years, the diabetes mortality rate has been declining steadily since its peak in 2000. Diabetes mortality in African American females has shown a significant decrease in past decade, the greatest improvement of any race/gender group.

Unfortunately, not all changes have been positive. Fruit and vegetable consumption has declined over the decade, and physical inactivity has not improved either. Overweight and obesity are both increasing in people with diabetes, but obesity is increasing at a much higher rate. At least half of people with diabetes perceived their health to be no more than fair or poor. The prevalence of foot self-exams has decreased somewhat.

Although coverage for diabetes has improved in general, the State Health Plan, one of the largest insurers in SC, does not offer coverage for DSME. Thirty-three of SC’s 46 counties, and parts of 6 counties, are designated as Health Professional Shortage areas. Nine counties have no Certified Diabetes Educator (CDE coverage). Only twelve counties have adequate CDE coverage. Of the ten counties with the highest diabetes prevalence, three have no CDE’s and four more have inadequate CDE coverage. As many as one-third of small/rural hospitals have no Intensive Glycemic Management Program and no plans to implement one.

Total number of diabetes hospitalizations is rising. Total length of stay for diabetes has increased steadily for the past 10 years, reflecting both an increase in numbers of people with the condition and increasing cost of diabetes care. The number of patients with 4 or more hospitalizations in a given year has more than doubled in the past decade. Preventable ED visits with “uncomplicated diabetes” as a primary diagnosis has increased by 30% in the past decade. The number of “uncomplicated” diabetes ED visits from type 2 diabetes has almost tripled in the past decade. The number of people with diabetes who have had 4 or more ED visits in a given year has doubled in the past decade. There is a significant correlation between diabetes ED visit and hospitalization rates and poverty in SC counties.

End-stage renal disease (ESRD) has become a major cause of concern. Cases of ESRD attributable to diabetes have increased by 66% and diabetes-attributable ESRD is becoming a higher proportion of all ESRD. African Americans have consistently had significantly higher ESRD rates than the white population, and rates are rising in all race groups. White males had the highest percent change of ESRD over 10 years. Diabetes mortality rates for African American population has been three to four times higher than for the white population, and African Americans have shown twice as many years of productive life lost due to diabetes.

Since formation of DSC over ten years ago, South Carolina has experienced significant improvements in many aspects of diabetes care and outcomes, e.g., improved patient and

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provider compliance with proven beneficial Guidelines of Care; improved numbers of Certified Diabetes Educators, especially in highest risk counties; striking reductions in preventable hospitalization rates for Type I diabetes; marked reductions in lower extremity amputations; improved diabetes surveillance methodology; improved and expanded diabetes educational programs for patients and health professionals; and improved collaboration among virtually all major public and private diabetes stake-holders in South Carolina. Over the past decade there have been active efforts to train health care providers, to educate and encourage persons with diabetes to take control of their diabetes through self-management, and to promote changes in the health care system and the community to improve diabetes outcomes.

That said, much remains to be done, e.g., rising prevalence of obesity and diabetes, rising prevalence of ESRD, the tripling of inflation-adjusted diabetes hospitalization costs. While some of the identified improvements may not be a direct result of DSC and DSC member efforts, the programs, strategies, & contributions by DSC & DSC members have been substantial. DSC's 2010-2020 Strategic Plan will reflect continuing aggressive efforts to reduce the burden of diabetes in South Carolina.



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## INTRODUCTION

### RATIONALE AND PURPOSE OF THIS REPORT

The Diabetes Initiative of South Carolina (DSC) was established by legislative action in July 1994 (Diabetes initiative of South Carolina Act n.d.) .A governing Board was created, and an administrative structure which included three Councils: Diabetes Center, Outreach, and Surveillance was established. The Board and Councils have liaisons with the Diabetes Control Program of the SC Department Health and Environmental Control (DHEC) and with the American Diabetes Association, SC Affiliate. In 1996, a report, *The Burden of Diabetes in South Carolina* was released by DHEC, which reflected the scope, impact, and costs of diabetes and its complications in South Carolina, using the most recently available data. The report was the result of close cooperation between the Diabetes Initiative Board, the Surveillance Council, and the Diabetes Prevention and Control Program of DHEC.

As defined by Section 44-39-50 amendment to 1976 Code of Laws for South Carolina, the Diabetes Outreach Council shall oversee and direct efforts in patient education and primary care including:

1. Promoting adherence to national standards of education and care.
2. Ongoing assessment of patient care, costs, and reimbursement issues for persons with diabetes in South Carolina.
3. Preparing an annual report and budget proposal for submission to the Diabetes Initiative of South Carolina Board.

An evaluation summit was hosted by DHEC in Columbia where numerous investigators and DSC participants reviewed each of the objectives, goals and strategies with the proposed evaluation measures from the 10-year strategic plan. The specific measures and data sources were identified for each objective and goal. A writing team was formed and a writing coordinator hired. The goals of the group are 1] the preparation of the evaluation technical report that will address the detail the evaluation measure and 2] the publication of a scientific manuscript that will describe the trends in outcomes measures associated with the DSC first ten-year period. In essence, both documents will focus on trends, changes and rates during the 10-year period. These measures will then be used to design the second 10-year strategic plan.

This report summarizes a recent decade of SC's experience with: 1) Targeting & refining the characteristics of SC's diabetes highest risk groups; 2) Diabetic toe, foot, below and above the knee amputations; 3) Changes in SC's diabetes hospital admissions, diabetes ER Visits, & hospital charges; 4) The extent to which small, medium, and large hospitals are used by South Carolinians because of diabetes; & 5) State statistical approaches to estimating the yearly prevalence of diabetes, diabetes complication rates, & diabetic populations in SC, i.e., development of improved statistical tools with which to monitor & improve diabetes care, prevention, & outcomes.

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The purpose of this report is to: 1) Address the extent to which referenced DSC goals were met between 1996 & 2006; 2) Suggest DSC goals & opportunities for the decade 2008-2018.

### SUMMARY OF DIABETES BURDEN IN SC

Diabetes is a disease in which the body does not produce or properly use insulin, a hormone that is needed to convert sugar, starches, and other food into energy needed on a daily basis. Genetics, obesity, and lack of exercise play a vital role in the development of diabetes. In the United States, there are 23.6 million people living with diabetes. Of these 23.6 million individuals, 17.9 million have been diagnosed with diabetes by a physician and 5.7 million are unaware that they have the disease (American Diabetes Association).

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 African Americans, experienced a substantially higher death rate and more years of potential life lost 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 African Americans 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

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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 (Office of Chronic Disease Epidemiology and Evaluation 2009).

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.

DIABETES INITIATIVE OF SC

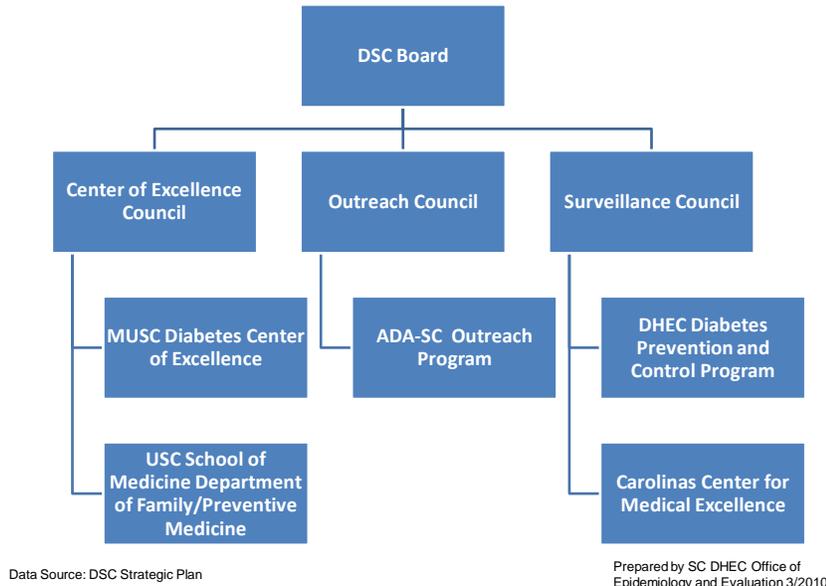
HISTORICAL BACKGROUND — RATIONALE FOR FORMATION OF DSC

The purpose of the Diabetes Initiative of South Carolina (DSC) is to develop and implement a comprehensive statewide plan of community outreach programs, health professional education, and diabetes surveillance. The goal is to provide the tools for management of the disease in order to reduce severe complications and cost burdens for South Carolinians who suffer from diabetes mellitus. The Initiative represents a unique melding of private, state, and federal resources and agencies toward this common goal. Nationally, South Carolina has a leading program which coordinates public efforts in the identification and management of this incurable chronic disease.

DSC STRUCTURE

There are three councils that make up the DSC: Center of Excellence, Outreach Council, and Surveillance Council. The Center of Excellence is responsible for developing and administering professional education programs for health professionals of all varieties in South Carolina, and to improve their knowledge and abilities to care for people with diabetes. The Outreach Council is responsible for the community interface, with a broad goal of improving diabetes care and education directed at people affected by diabetes. The Surveillance Council is responsible for acquiring, analyzing, and distributing epidemiologic information about diabetes including its prevalence costs, morbidity, and mortality.

**Fig. 1.0.0 Diabetes Initiative of South Carolina**



## DSC STRATEGIC PLAN

A ten year strategic plan has been developed by DSC to produce evidence of the progress towards achieving its nine goals. The goals of DSC include:

1. To improve knowledge of diabetes, quality of life, and access to prevention and intervention services for people at risk and those affected by diabetes.
2. To increase the utilization of short-term measures which lead to actions that will delay progression of complications of diabetes.
3. To address the needs of persons at risk and with diabetes by increasing services and education in health professional shortage areas in South Carolina.
4. To reduce the morbidity rates from diabetes-related complications.
5. To reduce the age-adjusted mortality rates from diabetes and its complications.
6. To decrease risks for select groups of people with diabetes where the prevalence and complication rates exceed those of others.
7. To reduce preventable hospital admissions and charges for diabetes.
8. To reduce preventable visits to the emergency room by people with diabetes.
9. To improve the statistical basis for estimating the prevalence of diabetes in South Carolina.

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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.

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.



## CHAPTER ONE

### GOAL I TO IMPROVE KNOWLEDGE OF DIABETES, QUALITY OF LIFE, AND ACCESS TO PREVENTION AND INTERVENTION SERVICES FOR PEOPLE AT RISK AND THOSE AFFECTED BY DIABETES.

Authors: Patsy Myers, Khosrow Heidari, Rhonda Hill, Mark Massing

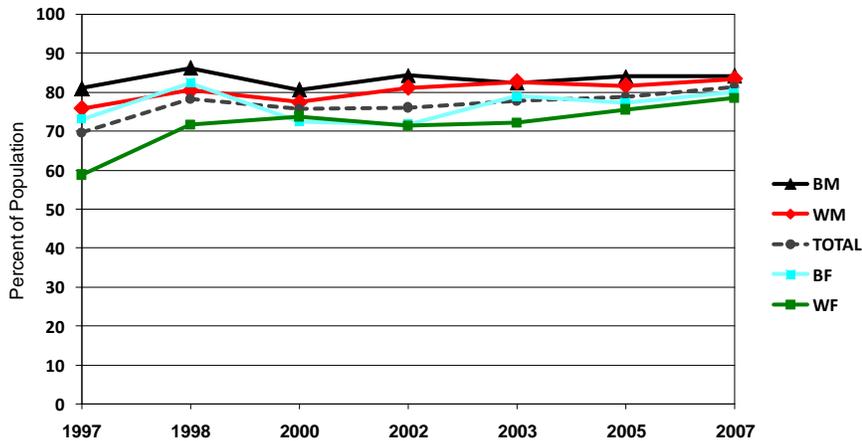
#### METHODS AND OPERATIONAL DEFINITIONS

About 5% to 10% of all people with diabetes 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. 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. The current information available on lifestyle comes from the Behavioral Risk Factor Surveillance System. Comparable data for 1997-99 not available for physical activity due to a change in the way physical activity was coded.

#### **AIM 1.1 INCREASE THE NUMBER OF PEOPLE WHO REPORT HEALTHIER LIFESTYLES (NUTRITION, EXERCISE, AND/OR WEIGHT CONTROL) BY 2% YEARLY.**

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.

**Figure 1.1.1. Prevalence of Consuming Fruits and Vegetables Less Than 5-A-Day among Adults by Race-Sex, SC, 1997-2007**

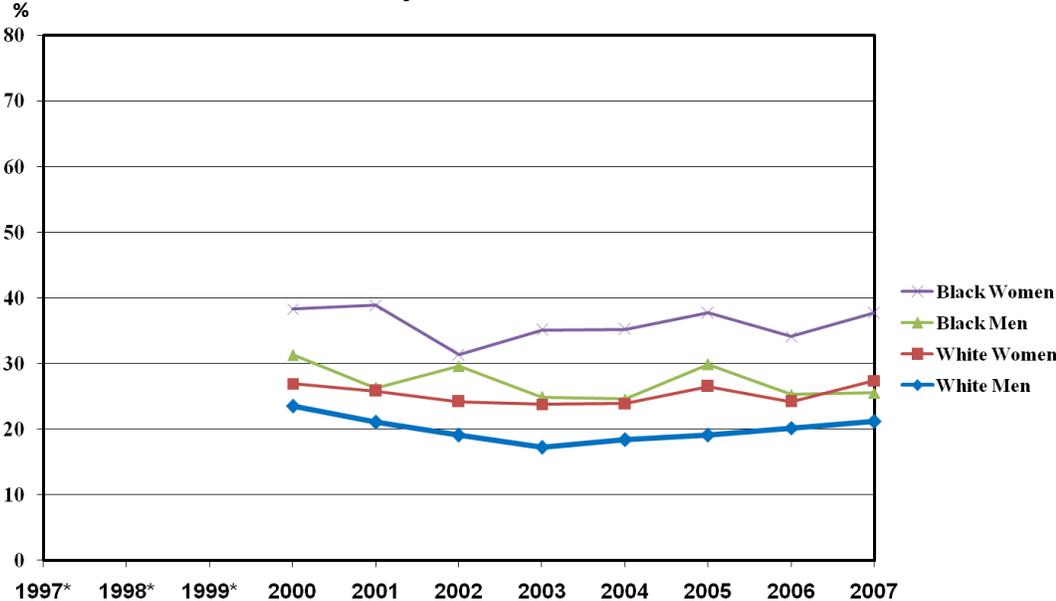


Data Source: BRFSS

Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

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. During 1997-2007, fruit and vegetable consumption decreased steadily in all race/gender groups. The least change was in African American men, of whom four out of five reported consuming less than five fruits and vegetables a day. The greatest change was in white women, where almost half of the women reported consuming five fruits and vegetables a day in 1997. In 2007, that number dropped to one in five.

**Figure 1.1.2. Prevalence of Physical Inactivity among Adults by Race-Sex, SC, 2000-2007**

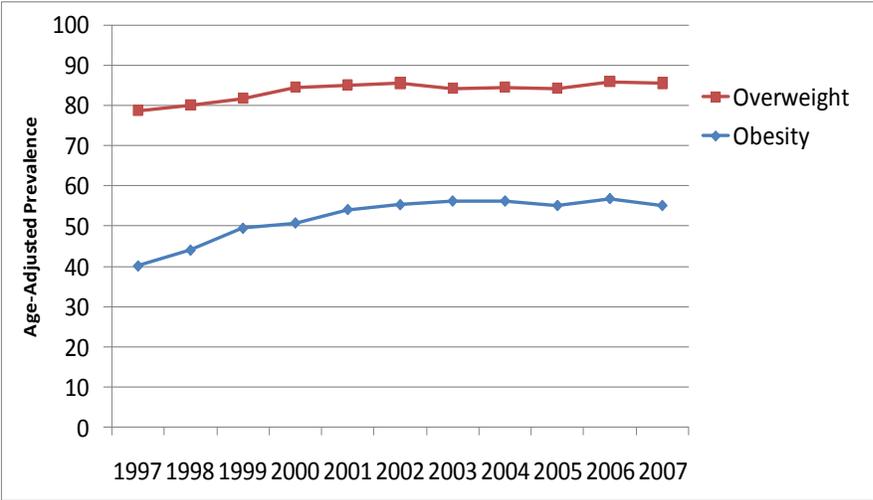


\*Data not available

Regular physical activity reduces the risk of being overweight and promotes the body’s 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 respondent’s regular job. Approximately 25% of South Carolina adults were physically inactive in 2007. Twenty-two percent of whites and 30% of African Americans were physically inactive. Black women had the highest prevalence of physical inactivity (34%) among four race-sex groups. Figure 1.1.2 shows that during 2000-2006, the prevalence of physical inactivity decreased among all groups. When examining physical activity from 2000-2007, there was an increase in the number of individuals participating in physical activity. It is known that as a person ages they are more likely to not exercise. In 2001, 83% of adults 18-24 were physically active compared with 64.8% of adults 65 and older. Income and education also played a vital role in how much physical activity was done by adults; as income and education increased, exercise increased.

Almost all adults with diabetes are overweight. According to BRFSS data 80-85% of people with diabetes are overweight. In that group, obesity has been steadily increasing over the past decade. Obesity rates in people with diabetes in South Carolina have increased from 40% in 1997 to 55% in 2007.

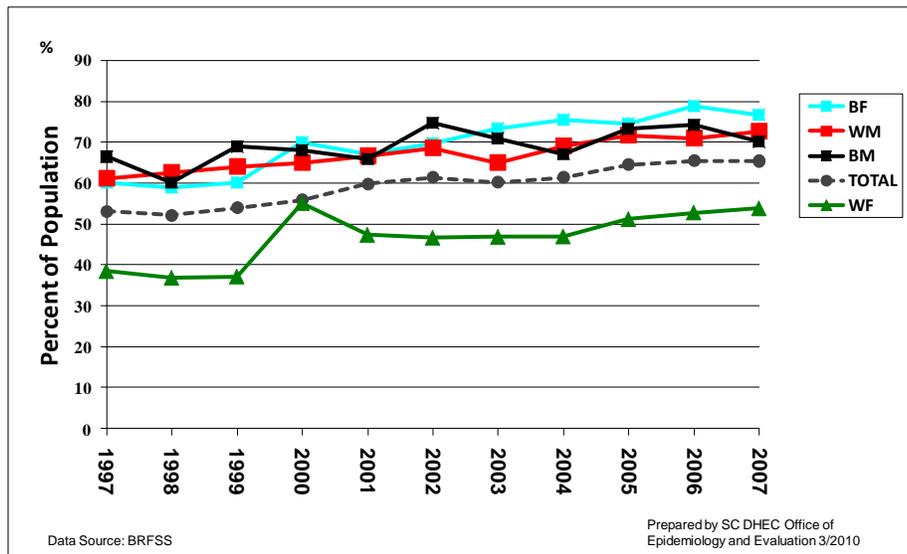
**Figure 1.1.3. Percentage of Adults with Diabetes Who Are Overweight or Obese, 1997 - 2007**



Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

Overweight (BMI  $\geq 25$  kg/m<sup>2</sup>) and obesity (BMI  $\geq 30$  kg/m<sup>2</sup>) are major risk factors of diabetes. Almost 80% of people with Type 2 are overweight. Overweight and obesity prevalence in South Carolina adults has 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 1.1.4).

**Figure 1.1.4. Prevalence of Overweight among Adults by Race-Sex, SC, 1987-2007**



Over a ten year period the number of individuals living in SC that are overweight or obese increased. In 1998, 16.9% of Whites and 35% of African Americans were obese. These numbers have increased over the years with age and SES. After examining the association between income and weight control, the number of individuals with higher income are overweight; however, obesity decreases.

**AIM 1.2 INCREASE THE NUMBER OF PEOPLE WHO ARE AWARE OF THE RISK FACTORS, SIGNS AND SYMPTOMS, AND BURDEN OF DIABETES BY 5% YEARLY.**

LOCAL DIABETES COALITIONS

The Community Coalitions sponsored by DHEC funded by CDC has provided health fairs and trained lay people on “living with diabetes” across SC. Over the last 10 years, nearly 2,500 participants have been provided information about diabetes. From 1995 – 2007, volunteer Certified Diabetes Educators have provided diabetes education through Prevention Partners, under the SC Budget and Control Board, to over 1,500 state employees in SC.

There are 27 coalition chapters across South Carolina, and members include community people, health professionals, and people living with diabetes. The significance of the coalitions lies in the fact that they provide a forum for local communities to plan and implement diabetes-related activities that are locally driven and controlled. These efforts are geared towards sharing resources, creating diabetes awareness, improving communication, collaborating with

## Diabetes Initiative of South Carolina Ten-Year Evaluation Report

coalition members from other communities, and soliciting corporate support for community projects. SC DPCP provides mini-grants on an annual basis to these local coalitions to help them build and sustain the necessary diabetes support infrastructure. The grants also help grantees develop and implement a plan to address diabetes-related issues in their communities.

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### Diabetes Today TRAINING

The SC DPCP provides CDC's DIABETES TODAY training across the state for communities that are interested in forming coalitions to reduce the burden of diabetes in their community and in developing interventions to promote improved diabetes prevention and control.

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### DIABETES 101

The SC DPCP provides "Diabetes 101" sessions to entities across the state that request updated information on preventing and managing diabetes. These sessions are designed to promote awareness of diabetes, its signs and symptoms, its risk factors, and opportunities for prevention to churches and other community groups.

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### ANNUAL AFRICAN AMERICAN CONFERENCE ON DIABETES

This conference is held every November in Columbia, SC, in observance of the National Diabetes Awareness Month and targets people living with diabetes, their caretakers, healthcare professionals, and other interested community members. Participants gather information on innovative programs in diabetes education, resources available for implementation, and self-management techniques for controlling the disease. There is a minimal (\$5) charge for the conference, and registration is required. The first conference was held in 1996 and drew 183 participants, and by 2003 registration had grown to 1010. Each year, concurrent sessions are held on foot and eye care, nutrition, physical activity, depression, medication and monitoring, 'ask the doctor', and other pertinent subjects. Past cosponsors of the conference have been the SC Cardiovascular Health Division and the SC Division of Tobacco Prevention and Control.

The African American Conference on Diabetes now in its 12th year has increased from under 200 participants to an average of 800 to 1,000 yearly. Respondents report an increased awareness of how to "live with diabetes".

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### MEDIA CAMPAIGNS

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#### FLU CAMPAIGN

Over the past eight years, the SC DPCP has collaborated with the SC DHEC Immunization Division and 52 health departments across the state, the SCPHCA/ CHCs, Rural Health Centers,

Senior Centers, the SC Pharmacists Association, and all media outlets to conduct an annual Flu Campaign. CDC Flu and Pneumonia campaign materials have been widely reproduced and used extensively statewide. News articles and public service announcements were written and distributed. Several materials were produced locally to supplement the ones received from national organizations. The campaign has resulted in increasing the overall total number of people who receive flu shots and the number of people with diabetes who receive the shots every year. The campaign reaches over 75,000 people annually.

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#### IMARA WOMAN

*IMARA WOMAN* is South Carolina's only statewide lifestyle publication for women of color. The magazine has been most successful in reaching the households of thousands of South Carolinians and providing them with information on a variety of lifestyle issues. The magazine's mission is to empower South Carolina's women of color by being a source of information and inspiration on matters of health, parenting, money management, professional development and family. Their readership is 30,000 and the publication is issued six times annually. Information found in *IMARA* is designed to specifically address lifestyle issues from a minority perspective. The magazine is culturally credible and strives to reach minority women from a wide range of economic backgrounds. The Bureau of Chronic Disease and Health Promotion had several programs write articles for the publication that addressed diabetes and/or risk reduction behaviors.

The Office of Minority Health also places educational and awareness information/ads that address the six priority health disparity areas, targeting women of color on a bi-monthly basis. (Breast and Cervical Cancer, Cardiovascular Disease, Diabetes, HIV, Immunizations, and Infant Mortality).

The magazine promotes a series of seminars on health and wellness in several locations around the state. THE SC DPCP participates with seminars on diabetes. The 2003 tour stops were in Charleston, Columbia, and Florence (272 total participants). Each event was hosted at an educational facility located in a minority community. The DHEC DPCP has also contributed PSA's and articles to the magazine on subjects such as "Control Your Diabetes for Life – the AA Family Reunion"; "Small Steps, Big Rewards"; Flu and Pneumonia; "The ABCs of Diabetes"; Diabetes and Women; and the **relation between diabetes and feet**. The DPCP has been represented on WISTV's "Awareness" program; ETV program with P.A. Bennett; I-95 Gospel Radio Talk Show and other programs all to represent the *IMARA* Empowerment Tour.

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#### ACTIVITIES FOR CHILDREN WITH DIABETES (TYPE I)

The Carolina's largest camp for children with diabetes, Camp Adam Fisher, has grown over the last 15 years from providing education and fun for 140 campers to now over 200 yearly. REACH 2010 Grant housed at Medical University of SC has provided education for over 15,000 African Americans living with diabetes.

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SEARCH for diabetes in youth multi-center grant located at the University of SC, School of Public Health is developing a registry of youth with diabetes under age 20. From 2002 until present, SC has had a diagnosis of 2,845 under age 20. Each year an average of 270-275 children/adolescents are diagnosed with diabetes, which 9% of these have Type 2 diabetes.

**AIM 1.3 INCREASE THE NUMBER OF PERSONS WHO HAVE ACCESS TO CARE FOR PREVENTIVE SERVICES, SCREENING, AND INTERVENTIONS TO DECREASE THE BURDEN OF DIABETES BY 5% YEARLY.**

Diabetes care is covered by a wide variety of payers. In SC the major payers include Medicare, Medicaid, Veterans/DOD, and BCBS-SC. Within Medicare, diabetes coverage varies across Medicare Advantage programs and these differ from fee-for-service coverage. Medicaid also includes multiple payment structures for Medicaid fee-for-service and managed care. An additional major complication is the fact that payment policies and managed care programs change over time. There is not centralized location where this information resides Finding this historic information is especially challenging, and the complexity of the coverage policies requires much synthesis and interpretation. Due to such complexities, we have very little information in this area.

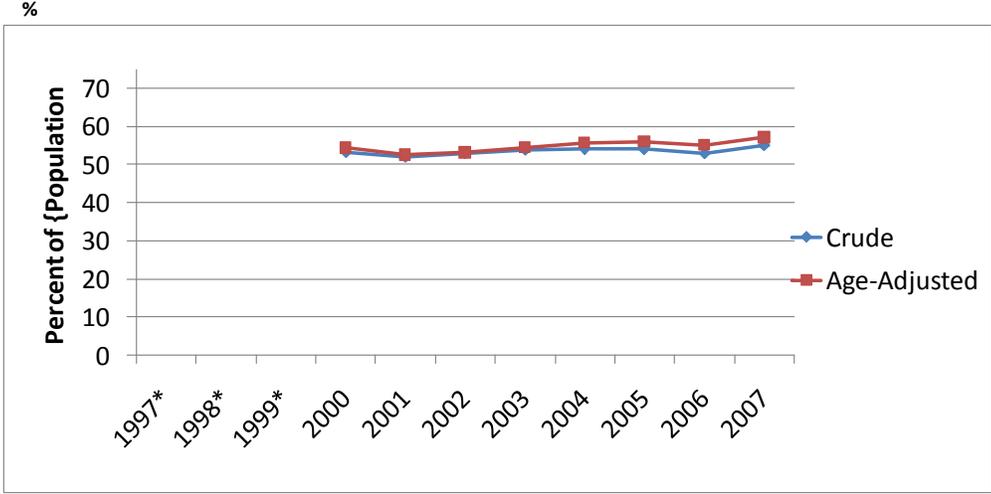
It is quite likely that payment policies have some impact on diabetes care and the way that care is delivered and documented in the medical record. If we want to understand how the impact of this, we should identify the important reimbursement areas and begin tracking the payment policies for each payer in a real time basis. In the future, a group should be assigned the task of developing a payment policy database, initializing it with current payment information, and updating this information as policies change over time.

**AIM 1.4 INCREASE THE NUMBER OF PERSONS WITH DIABETES AND THEIR FAMILIES WHO RECEIVE FORMALIZED SYSTEMATIC DIABETES EDUCATION BY 5% YEARLY.**

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%).

According to the BRFSS, the prevalence of those with diabetes who have attended Diabetes Self management Education (DSME) class has increased by approximately 5% since 2000. The prevalence of attendance to a DSME class has been gradually increasing each year, also the increase has not been dramatic (Fig. 1.4.1.)

**Figure 1.4.1. Percentage of Adults with Diabetes Ever Attending a Diabetes Self-Management Class, 1997 - 2007**



\*no data available

Data Source: BRFSS

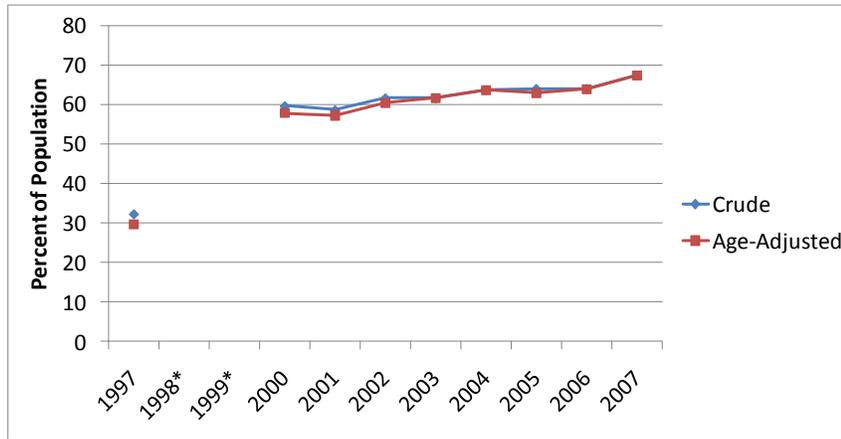
Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

**AIM 1.5. INCREASE THE NUMBER OF PERSONS WITH DIABETES WHO REPORT UTILIZATION OF KEY MONITORING GUIDELINES.**

“Key monitoring guidelines” are not specifically defined. If one is to interpret “Key Monitoring Guidelines” as those things a person with diabetes can do at home to monitor their diabetes status, then the most relevant readily available source of data would be the questions pertaining to gluces self-monitoring and daily foot self-exams from the diabetes module of the Behavior Risk Factor Surveillance System.

Glucose self-monitoring has increased 110% since 1997 when surveillance first began on this issue. Glucose self-monitoring has more than doubled in the past 10 years, going from 30% to 67%. Persons with diabetes who reported doing daily foot self-exams has decreased by 10% since 1999, going from 80% to just over 70%.

**Figure 1.5.1. Daily Glucose Self-Monitoring 1997 - 2007**

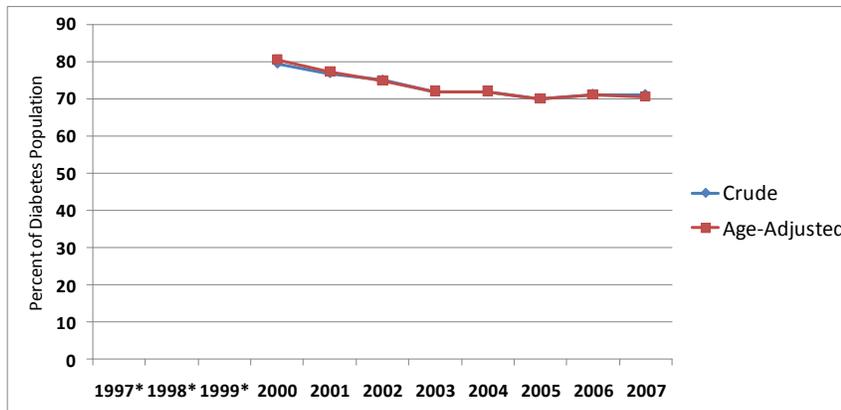


\*no data available

Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

Based on BRFSS data Foot self-exams have declined somewhat, from 80% in 2000, when data was first collected to 70% in 2007.

**Figure 1.5.2. Daily Foot Self-Exams 1997 - 2007**



\*no data available

Data Source: BRFSS

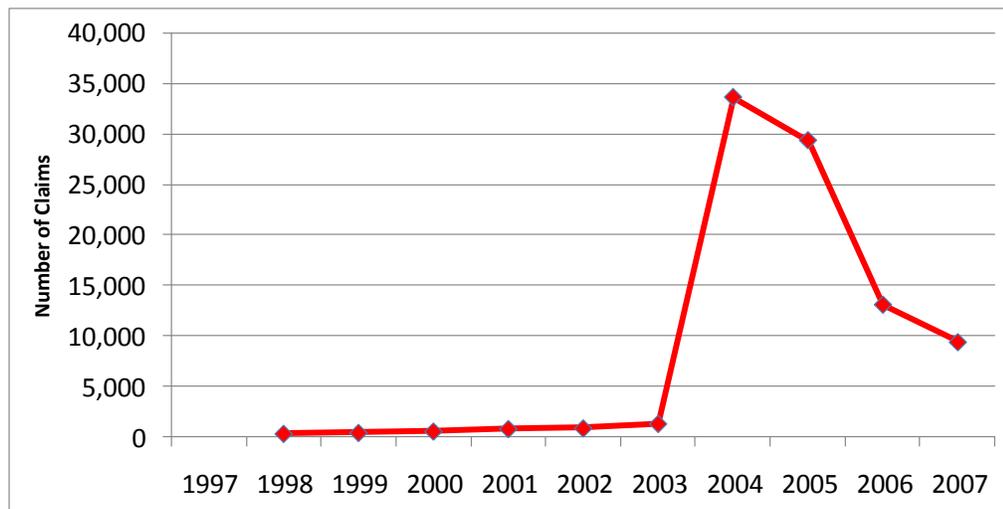
Prepared by SC DHEC Office of Epidemiology and Evaluation 11/1/2009

**AIM 1.6 EXPAND INSURANCE AND MANAGED CARE COVERAGE FOR PREVENTION AND INTERVENTION SERVICES FOR DIABETES THAT HAVE DOCUMENTED COST-EFFECTIVENESS.**

Insurance coverage is a complicated thing. We are likely to determine trends and rates of insurance enrollment, but coverage provided by specific plans has not been easy to determine. For example, it is easy to see how enrollment may have increased at the same time that coverage for specific conditions may have declined. In some ways this aim is related to Aim 1.3 above.

Some advances have been made in insurance coverage for diabetes education. The numbers of Medicaid recipients with a Diabetes Education Service code has raised from 366 persons in 1998 to 9,416 persons in 2007 (Figure 1.6.1)

**Figure 1.6.1. Medicaid recipients with a Diabetes Education Service Code**



Data Source: SC Medicaid Claims

Prepared by MUSC Dept. of Epidemiology  
2009

Additionally, DSC, the American Diabetes Association, and local Coalitions such as REACH Charleston and Georgetown Diabetes Coalition have worked together to change local and statewide policies for diabetes. Two significant policies included in the South Carolina Code of Laws are related to health insurance coverage and diabetes in schools. SC Code of Laws Section 38-71-46 addresses diabetes coverage in health insurance policies and diabetes education and states that individual or group health insurance policies in SC must:

“...provide coverage for the equipment, supplies,... medication indicated for the treatment of diabetes, and outpatient self-management training and education for the treatment of people with diabetes mellitus, if medically necessary, and prescribed by a health care professional.... who demonstrates adherence to minimum standards of care for diabetes mellitus as adopted and published by the Diabetes Initiative of South Carolina. This subsection does not prohibit a health maintenance organization or an individual or a group health insurance policy from providing coverage for medication according to formulary or using network providers.” (retrieved February 2, 2010 from <http://www.scstatehouse.gov/code/t38c071.htm>).

Another change relates to children and diabetes. SC Code of Laws, Title 59, Chapter 63, Article 1 Section 80 enacted in 2005 states that

“each school district shall require the development of individual health care plans for students with special health care needs. This plan shall be developed by the student's health care practitioner; the parent or legal guardian; the student, if appropriate; and the school nurse or other designated school staff member. Unless it would seriously jeopardize the health of the student or others, students who are capable of self-care may:

1. self-administer diabetes care anywhere and anytime.
2. carry diabetes supplies and medication anywhere and anytime. “

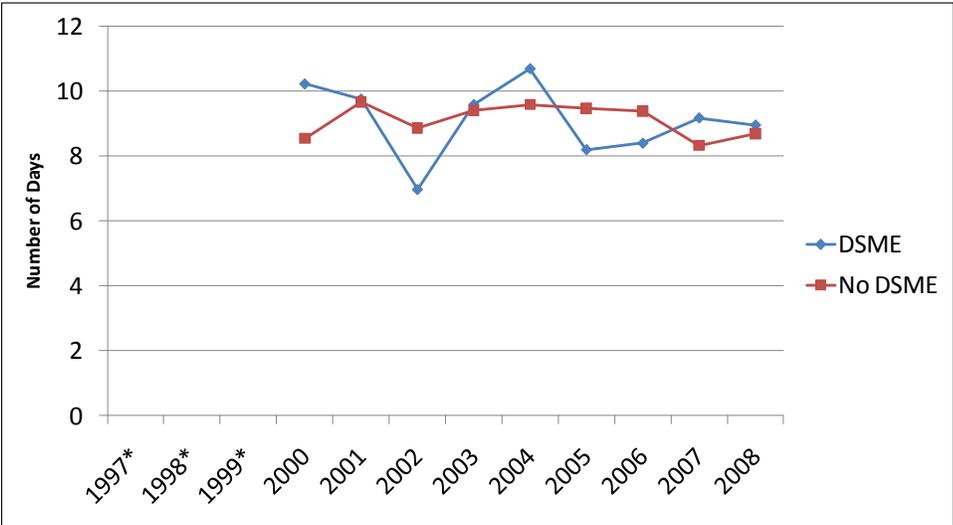
(SC Code of Laws retrieved February 2, 2010 from <http://www.scstatehouse.gov/code/t59c063.htm>)

**AIM 1.7 IMPROVE QUALITY OF LIFE FOR PERSONS WITH DIABETES THROUGH LEARNING AND SELF MANAGEMENT.**

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%), which is encouraging as this is the group that routinely demonstrates the highest complication rates.

Fig 1.7.1. According to BRFSS data for the past 8 years (2000-2008), diabetes management education has influenced quality of life for those participating. While there was no significant difference in mean number of days of poor physical health between those reporting DSME and those without, those with DSME showed a 12% decrease in number of days of poor physical health while no appreciable change was observed in those without DSME (fig. 1.7.1).

**Figure 1.7.1. Number of Days of Poor Physical Health by Diabetes Education Status**



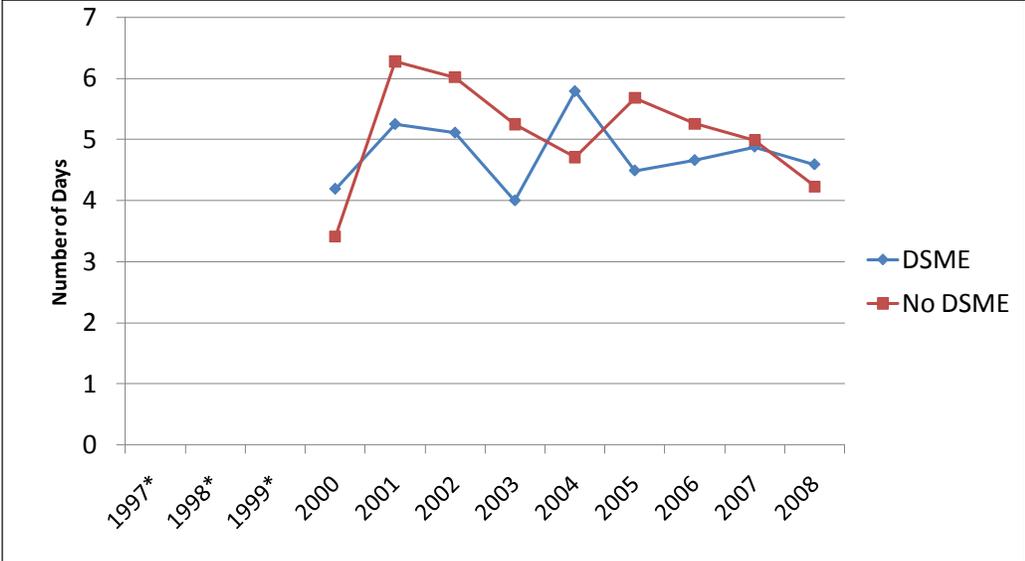
\*no data available

Data Source: BRFSS

Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

No difference was found in mean number of poor mental health days between those with DSME and those without, and mean number of days of poor mental health has increased in both groups. However, number of days of poor mental health increased more rapidly in those with no DSME (fig 1.7.2).

**Figure 1.7.2. Number of Days of Poor Mental Health by Diabetes Education Status**



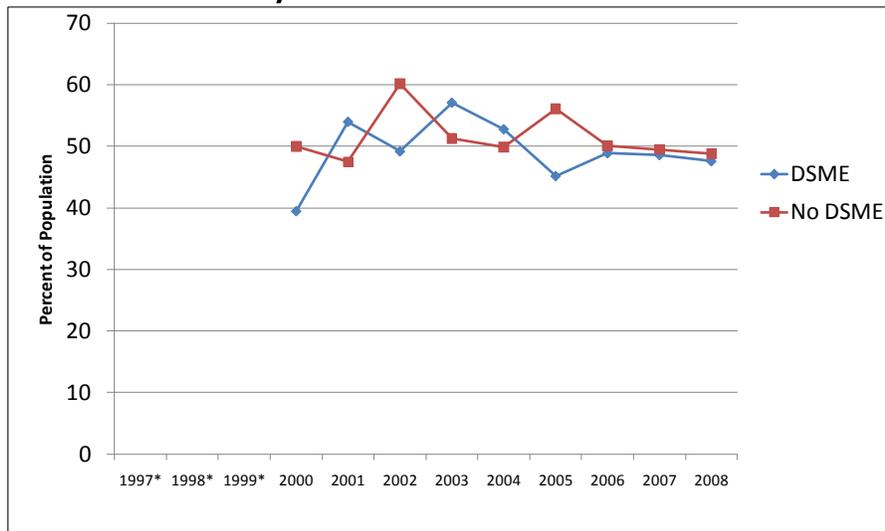
\*no data available

Data Source: BRFSS

Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

Prevalence of perceived fair or poor health remained stable at 50-% over the past 10 years in those with no DSME. The prevalence of perceived fair or poor health increased in those with DSME, from 39.5% in 2000 to 48.6% in 2007. (Fig 1.7.3)

**Figure 1.7.3. Prevalence of Perceived Fair or Poor Health by Diabetes Education Status**



Data Source: BRFSS

Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

## SIGNIFICANCE

Significant improvements have been made under this goal. Attendance in DSME classes has maintained at between 50 and 60% of diabetes population, rising slightly in the past 2 years. Prevalence of Glucose self monitoring has more than doubled, from 30% in 1997 to 68% in 2007 and at least 70% of people with diabetes report doing foot self-exams.

In the past decade, strides have been made in reimbursement for diabetes education, initially by Medicare and Medicaid and some insurance companies. Medicaid claims for DSME have increased dramatically from fewer than 400 in 1998, to a peak of 34,000 in 2004. Most recently claims have been averaging around 10,000 per year.

However, not all changes have been positive. Prevalence of eating more than 5 fruits and vegetables per day has decreased over the past decade. White females are the most likely to eat at least five fruits and vegetables a day, but African American males are least likely to eat 5 fruits and vegetables a day. Physical inactivity has not improved, especially in African American females. They are the group most likely to be physically inactive. Overweight and obesity are increasing both in people with diabetes and in the general population. Obesity is increasing at a much higher rate. Of the four race/gender groups evaluated, African American females were most likely to be overweight and white females least likely to be overweight. The prevalence of foot self-exams has decreased from 80% in 2000 to 70% in 2007.

## CHAPTER TWO

### GOAL II TO INCREASE THE UTILIZATION OF SHORT-TERM (SURROGATE) MEASURES WHICH LEAD TO ACTIONS THAT WILL DELAY PROGRESSION OF COMPLICATIONS OF DIABETES.

Authors: Authors: Patsy Myers, Khosrow Heidari, Mark Massing

#### METHODS AND OPERATIONAL DEFINITIONS

Most of the data in this chapter came from the BRFSS, mainly the diabetes module. This data is self-report and thus subject to some bias. The Intensive Glycemic Management Program data is the results of a survey of hospitals done by DSC. The results of this survey can be found on the DSC website ([www.musc.edu/diabetes](http://www.musc.edu/diabetes)). Other clinical data came from SC Medicare data, supplied by the Carolinas Center for Medical Excellence and insurance claims data published in the *Managed Care Digest Series SC Type 2 Diabetes Report*.

#### **AIM 2.1** INCREASE THE NUMBER OF PEOPLE WITH DIABETES BY 10% YEARLY IN TARGETED AREAS OF SOUTH CAROLINA WHO HAVE:

- \_ FOOT EXAMINATIONS
- \_ EYE EXAMINATIONS (DILATED PUPIL OR NON- MYDRIATIC CAMERA)
- \_ URINE CHECKS FOR MICROALBUMIN
- \_ LIPID PANEL

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#### \_ HEMOGLOBIN A1C

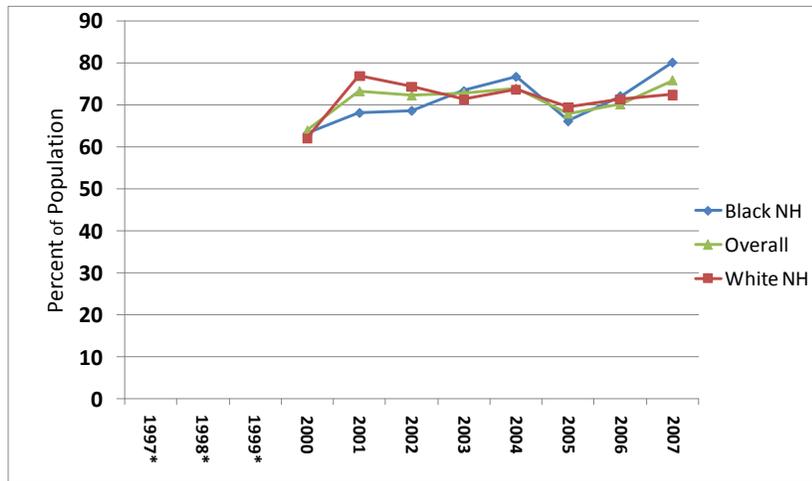
Hemoglobin A1c (HbA1c) or glycosylated hemoglobin is a recommended measure of average blood glucose level in the past 2-3 months. The American Diabetes Association recommends that people with diabetes should have their HbA1c checked every three months for monitoring long-term glucose control. In 2005-2006, more than 80% of people with diabetes had at least two HbA1c tests in the past year (Figure 2.1.1). 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.

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Based on BRFSS data, People with diabetes having at least two HgA1c's has increased significantly in all groups since 2000, the first year surveillance was initiated. The greatest increase has been in African Americans. They have shown a 25% increase in two or more A1c's annually, while the white population with diabetes has shown a 16% increase.

**Figure 2.1.1. Percentage of Adults with Diabetes Having Two or More A1c Tests in the Last Year, 2000 - 2007**



Data Source: BRFSS

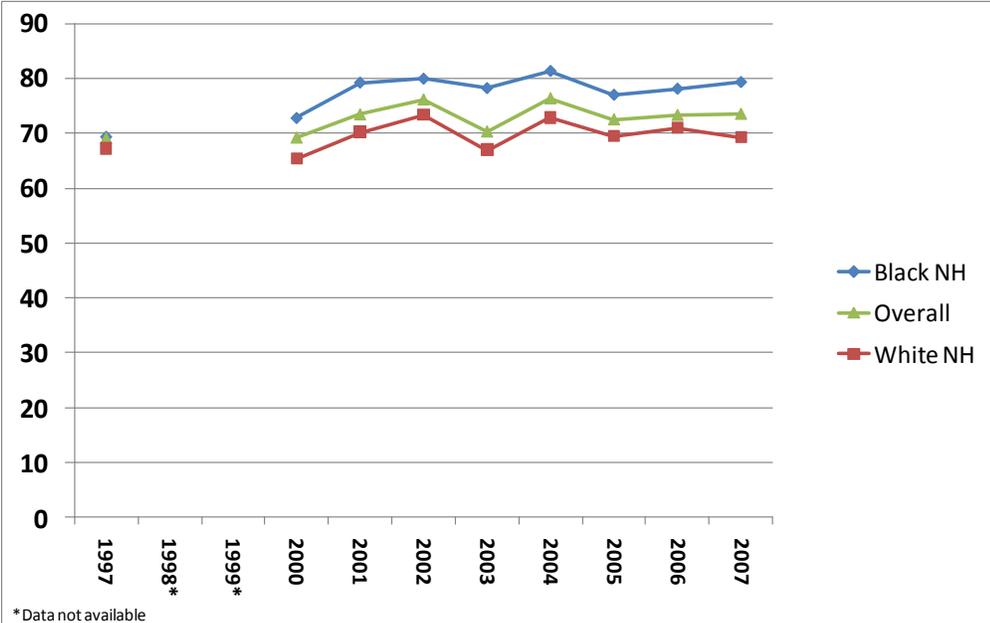
Prepared by SC DHEC Office of  
Epidemiology and Evaluation 3/2010

SC Medicare data shows that about 85% of diabetes patients are getting at least one A1c annually. This is true of both white and African Americans, and in all regions of the state. Males and patients less than age 65 are slightly less likely to get A1c's (Fig.2.1.5-2.1.2.1.8).

### FOOT EXAMINATIONS

The prevalence of foot exams being performed by an MD have increased slightly by 3% in the white population, even though foot self-exams have decreased. However, in African Americans, foot exam by a professional have increased by 14% since 1997. This has most likely contributed to the decrease in lower extremity amputations in African Americans.

**Figure 2.1.2. Foot Exams by Professional 1997-2007**



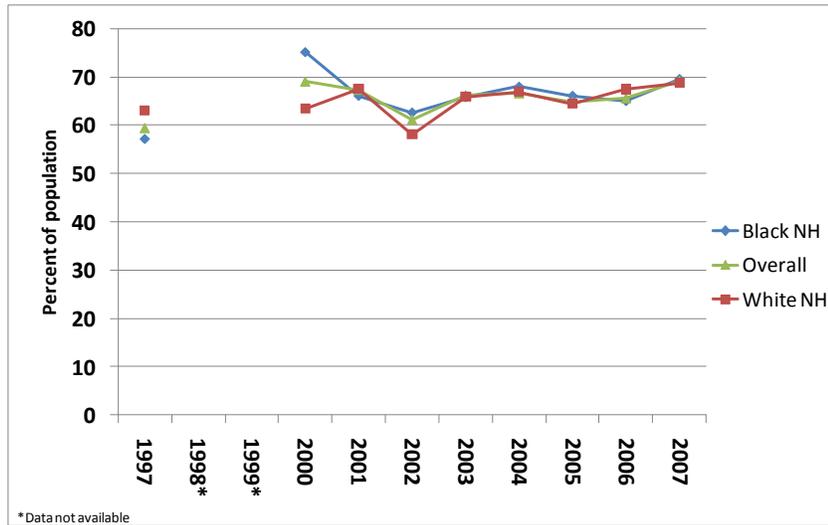
Data Source: BRFSS

Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

**EYE EXAMINATIONS (DILATED PUPIL OR NON- MYDRIATIC CAMERA)**

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 2.1.3 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. Unfortunately, however annual eye exams have decreased since 2000 in African Americans, who have shown a 7.5% decrease in prevalence of eye exams since 2000. Eye exams in the white population with diabetes have increased by 9% in the same period.

**Figure 2.1.3. Eye Exams by Professional 1997-2007**



Data Source: BRFSS

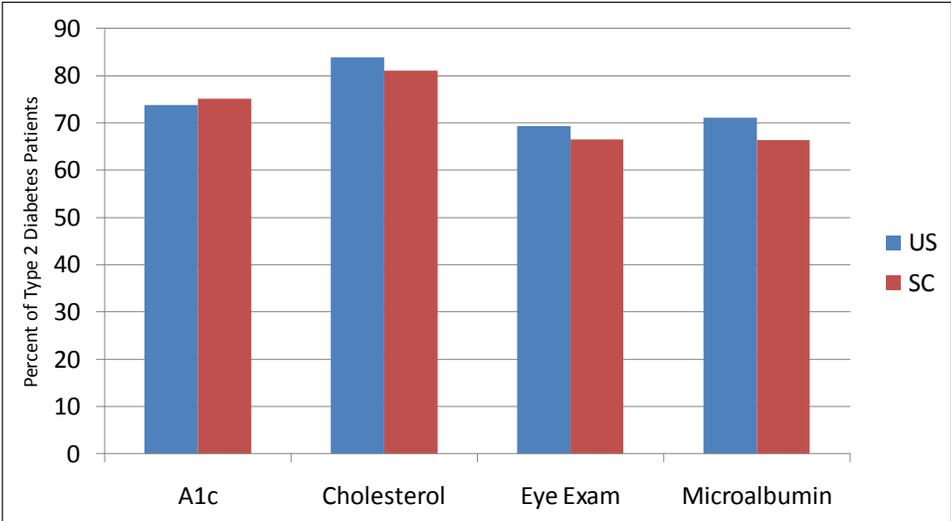
Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

SC Medicare data shows that slightly more than 50% of Medicare patients are getting eye exams. Female and white patients and those over age 70 are more likely to get eye exams. African Americans, patients less than age 65 and those living in the Pee Dee area are less likely to get eye exams (Fig.2.1.5-2.1.2.1.8).

#### URINE CHECKS FOR MICROALBUMIN

Evidence of urine checks for microalbumin has been very sparse. The only clinical data readily available has been from the *South Carolina Type 2 Diabetes Report* produced by Sanofi Aventis (Sanofi Aventis, 2010), which reports on diabetes indicators from a variety of data sources, including VBRFSS and insurance claims data, which includes Medicare and Medicaid. This report shows that approximately 70% of patients are getting at least one microalbumin per years. South Carolina rates were slightly lower than U.S. rates for 2008 (Fig 2.1.4.)

**Fig.2.1.4. 2008 Diabetes Quality of Care Indicators For Type 2 Diabetes**



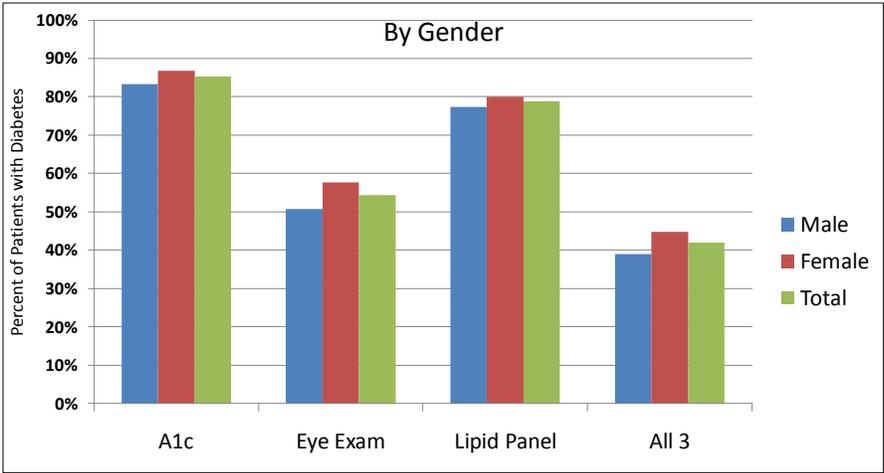
Data Source: Managed Care Data Series  
SC Type2 Diabetes Report 2010

Prepared by SC DHEC Office of  
Epidemiology and Evaluation 9/2009

LIPID PANEL

SC Medicare data indicates that 82.5% of SC people with diabetes on Medicare received a lipid panel in 2007. African Americans and those under age 65 are slightly less likely to receive a lipid panel. There was no difference by region in the percent of patients receiving lipid panels.

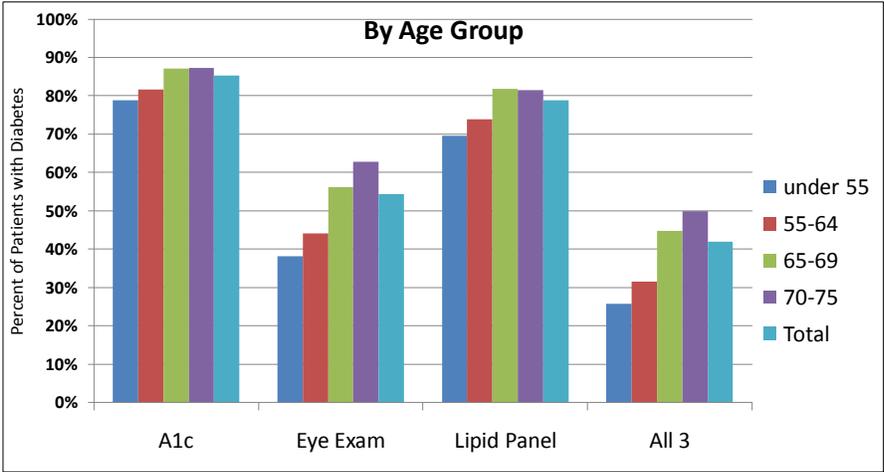
**Fig. 2.1.5. 2007 Medicare Diabetes Quality Indicators in SC**



Data Source: SC Medicare claims, supplied by CCME

Prepared by SC DHEC Office of Epidemiology and Evaluation, 9/2010

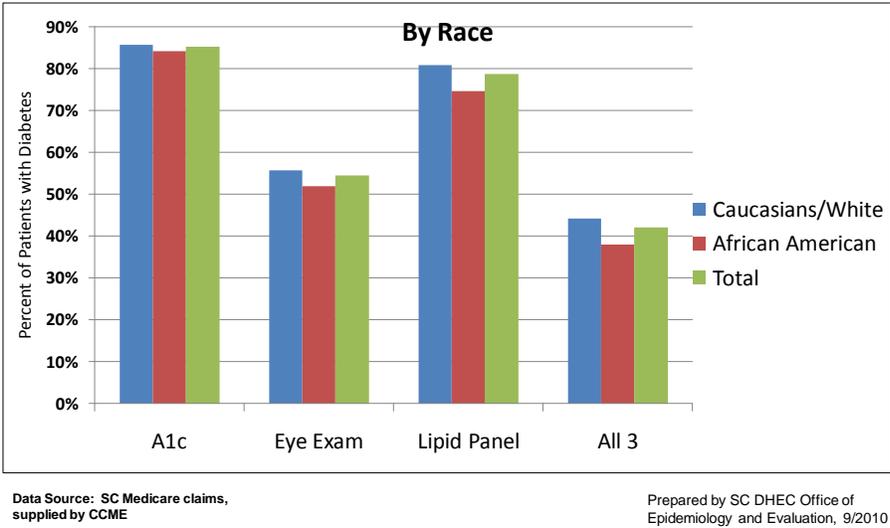
**Fig. 2.1.6 2007 Medicare Diabetes Quality Indicators in SC**



Data Source: SC Medicare claims, supplied by CCME

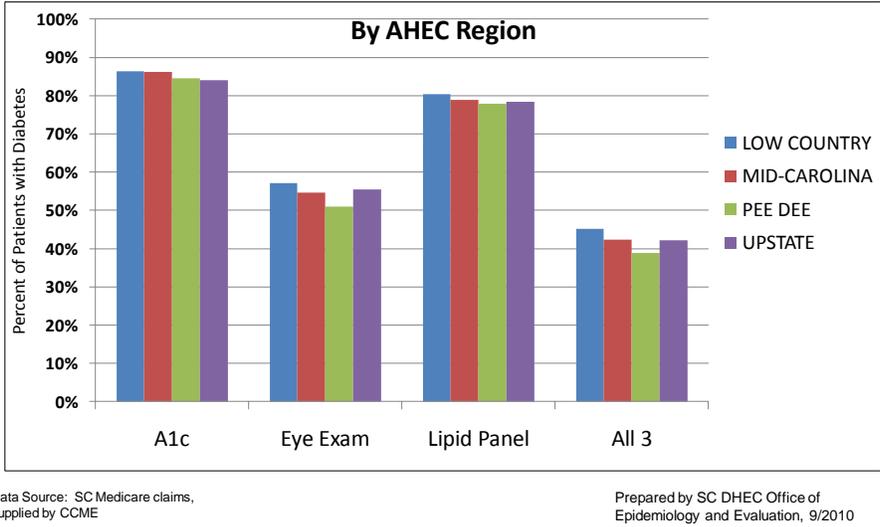
Prepared by SC DHEC Office of Epidemiology and Evaluation, 9/2010

**Fig.2.1.7. 2007 Medicare Diabetes Quality Indicators in SC**



According to SC Medicare data, 80% of Medicare patients with diabetes received at least one clinical monitoring indicator, including HgA1c, lipid panel, or eye exam. However, only 42% received all three. Males and African Americans were slightly less likely to receive all 3 services. Patients over age 65 were more than twice as likely to receive all three monitoring indicators.

**Fig.2.1.8. 2007 Medicare Diabetes Quality Indicators in SC**



**AIM 2.2 INCREASE SPECIFIC ACTIONS TO DECREASE PROGRESSION OF COMPLICATIONS BY 10% YEARLY:**

- \_ FOOT CARE INSTRUCTIONS
- \_ LASER THERAPY
- \_ ACE INHIBITOR THERAPY
- \_ DIET AND/OR DRUGS FOR ABNORMAL LIPIDS
- \_ INTENSIVE GLYCEMIC MANAGEMENT PROGRAM
- \_ OTHER RISK FACTOR REDUCTION STRATEGIES: ASPIRIN, SMOKING CESSATION PROGRAMS, EXERCISE

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### 2.2.1 FOOT CARE INSTRUCTIONS

Aggressive prevention efforts are underway around the state to improve the quality of and awareness of the need for foot care in diabetes. Prevention efforts based on foot-care training, screening, and awareness are explained in a variety of settings, including the physician and nurse training efforts, physician's offices, diabetes education classes, and the African American Diabetes Conference, sponsored annually by DHEC Diabetes Prevention and Control Program

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### 2.2.2 TRAINING OF HEALTH CARE PROVIDERS

- Training of USC medical students on foot care during diabetes rotation.
  - Began about 5 years ago.
- Continuing education programs for health professionals
- MUSC College of Nurses has developed a foot care course for nurses,
- Staff in physicians' offices trained to do foot care
- Training and Protocols Developed for Foot Assessment and Screening:-- Monofilament testing protocols, check sheet for training health professionals in monofilament testing. Testing to be done during each diabetes clinic visit.

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### 2.2.3 COMMUNITY EDUCATION AND AWARENESS EFFORTS

- Seminar on foot care. More than 100 attended session, 96 filled out evaluation form. Of those who attended, 98% said they had a better understanding of foot care after attending the session.
- DSC has developed "**Check Yourself to Protect Yourself**, a foot care module for use in educating the community.
- Posters in physicians' offices asking patients to remove their shoes and socks for foot checks

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### 2.2.4 LASER THERAPY

## Diabetes Initiative of South Carolina Ten-Year Evaluation Report

At this time no evidence is readily available that indicates that laser therapy is in common use with respect to diabetes management.

### 2.2.5 ACE INHIBITOR THERAPY

No data available at this time.

### 2.2.6 DIET AND/OR DRUGS FOR ABNORMAL LIPIDS

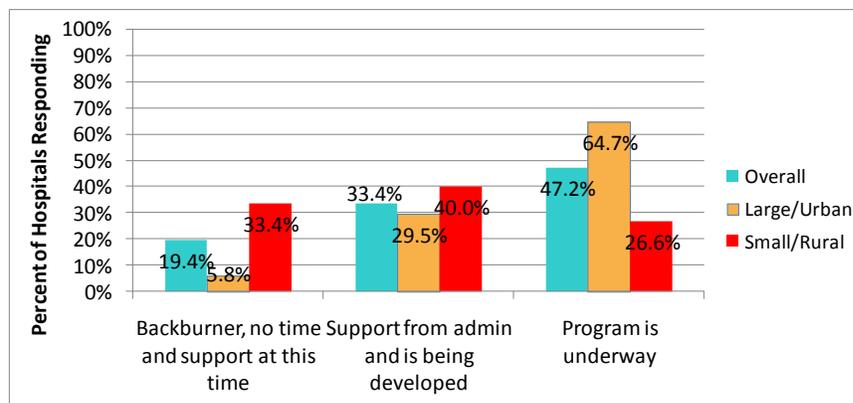
No data available at this time.

### 2.2.7 INTENSIVE GLYCEMIC MANAGEMENT PROGRAM

#### 2.2.7.1 SC ACUTE INPATIENT GLYCEMIC MANAGEMENT'S (IGMP) NEEDS ASSESSMENT

A total of 63 hospitals sent an invitation to participate in the survey. Of that, 32 hospitals responded, for a total response rate of 50.8%. Of those who responded more than half (51.5%) reported to have a program in place. Another 36% reported to have a program under development (fig 2.2.7). As might be expected, the larger, urban hospitals were more than 2.5 times as likely to have an Inpatient Glycemic Management program in place as the smaller rural hospitals.

**Fig. 2.2.7.1. Current Status in implementing an inpatient glycemic management program (IGMP) by large/urban and small/rural hospitals**



N=33 hospitals answered this question

Data source: IGMP Needs Assessment Survey, [www.musc.edu/diabetes](http://www.musc.edu/diabetes)

Prepared by IGMP Task Force 9/2009

## Diabetes Initiative of South Carolina Ten-Year Evaluation Report

Table 2.2.7.1 shows the components of the IGMP reported by SC hospitals. The most common component in place was use of electronic data on blood sugars. Other common components of the programs were patient self-management education and patient discharge planning.

**Table 2.2.7.1 Components of IGMP in place**

<b>IGMP Component</b>	<b>Percent of Hospitals Reporting A IGMP</b>
Electronic data on blood sugars	95.8
Pt. Education regarding self mgt and survival skills	8.08
Pt. Discharge planning (transition to outpatient care)	84.0
Strategies for pt. safety related to limiting formulary for insulin products	80.0
Proper coding admits related to diabetes	79.2
Strategies to transition of sub-q insulin from IV insulin	73.9
Physician & nurse education for implementation of glycemic mgt.	72.0
Preoperative of blood sugars	54.5
Medical nutrition therapy (consistent carb counting)	54.2
A1c testing on admits for pts. w/ known diabetes and hyperglycemia	39.1
Strategies for pt. safety related to limited sliding scale use	37.5

Table 2.2.7.2 shows the barriers to initiating an IGMP. The most common barrier reported was getting widespread acceptance from the physicians. Budget issues were reported less often than acceptance and prioritizing by hospital clinicians and administration.

**Table 2.2.7.2 Barriers to IGMP implementation**

<b>Barriers to IGMP</b>	<b>Percent of Hospitals without IGMP</b>
Getting widespread physician acceptance	71.0
No physician champions	51.6
No data on current outcomes	41.9
Not priority for clinicians	38.7
Insufficient knowledge	38.7
Other budget/resource issues	38.7
No "tools"	29.0
Not priority for admin	25.8
Budge issues for glycemic Mgt	16.1

The top priorities for developing and implementing an Intensive Glycemic Management program, as determined by the IGMP task force include standardized protocols/policies/order

## Diabetes Initiative of South Carolina Ten-Year Evaluation Report

sets, education initiatives for relevant staff and developing outcomes and/or performance measures for monitoring and evaluation.

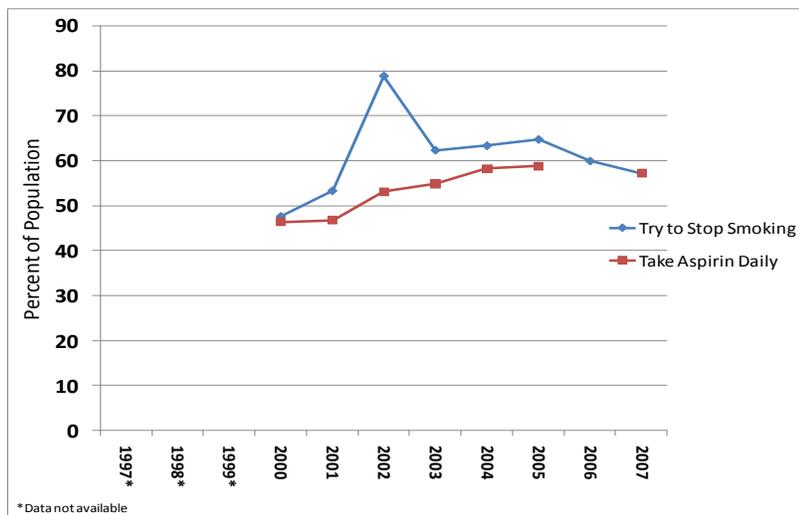
Recommendations of the Task Force:

- DSC (and partners)
  - Add sessions on inpatient glycemic management (such as best practices and policies) to DSC Educational Programs
  - Support development & implementation of a public domain calculator
- SCHA
  - Develop protocol/policy samples using experts
  - Design & develop content for education using experts
  - Provide “train the trainer” program to use developed content at local sites
  - Develop/maintain web-site with tools

### OTHER RISK FACTOR REDUCTION STRATEGIES: ASPIRIN, SMOKING CESSATION PROGRAMS, EXERCISE

BRFSS data showed those people trying to stop smoking increase by 41.2% from 1997 - 2007, and those taking aspirin daily increased by 23.5%, from 46% in 1997 to 57% in 2007. (fig 2.2.1).

**Figure 2.2.1. Lifestyle Improvement by People with Diabetes**



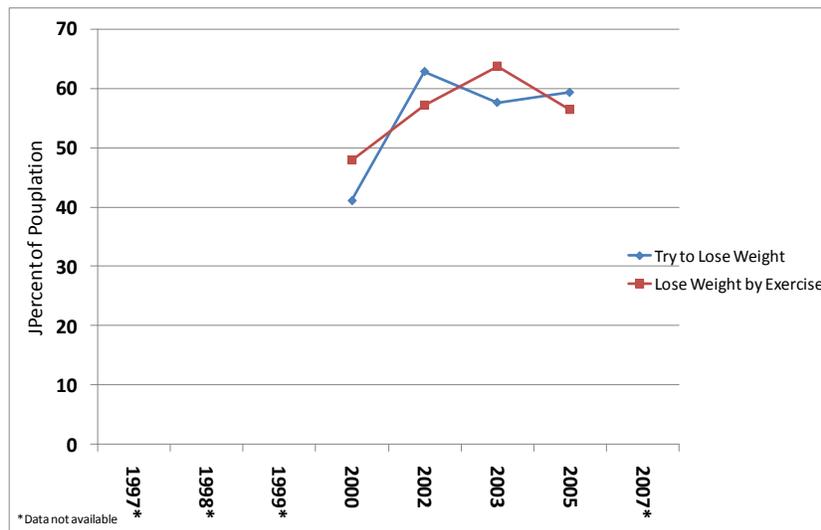
Data Source: BRFSS

Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

Those with diabetes who reported trying to lose weight, increased by 44% in 5 years, from 42% in 2000 to 59% in 2006, the only years for which information is available. In the same time period (2000-2006), those with diabetes who reported trying to lose weight by increasing physical activity increased by 18% from 48% in 2000 to 56% in 2006 (fig 2.2.2).

Based on BRFSS data, more people with diabetes are trying to live a healthier lifestyle now than were 5-6 years ago.

**Figure 2.2.2. People with Diabetes Attempting to Lose Weight**



Data Source: BRFSS

Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

**\_ EDUCATION RELATED TO SELF-MANAGEMENT FOR RISK FACTOR REDUCTION**

See section 1.4. Prevalence of people attending self-management education has not increased since 2000, however, it has maintained at approximately 50%.

**AIM 2.3 EXPAND COVERAGE/REIMBURSEMENT BY MANAGED CARE AND INSURANCE FOR THE FOLLOWING ACCORDING TO ADA GUIDELINES:**

- \_ HEMOGLOBIN A1C AT LEAST SEMIANNUALLY
- \_ MICROALBUMIN ASSESSMENT AND INTERVENTIONS, IF ELEVATED
- \_ LIPID PANEL AND INTERVENTIONS, IF ELEVATED
- \_ FOOT EXAMINATION AND INTERVENTIONS AS NEEDED
- \_ DILATED EYE EXAMINATION ANNUALLY WITH INTERVENTIONS AS INDICATED

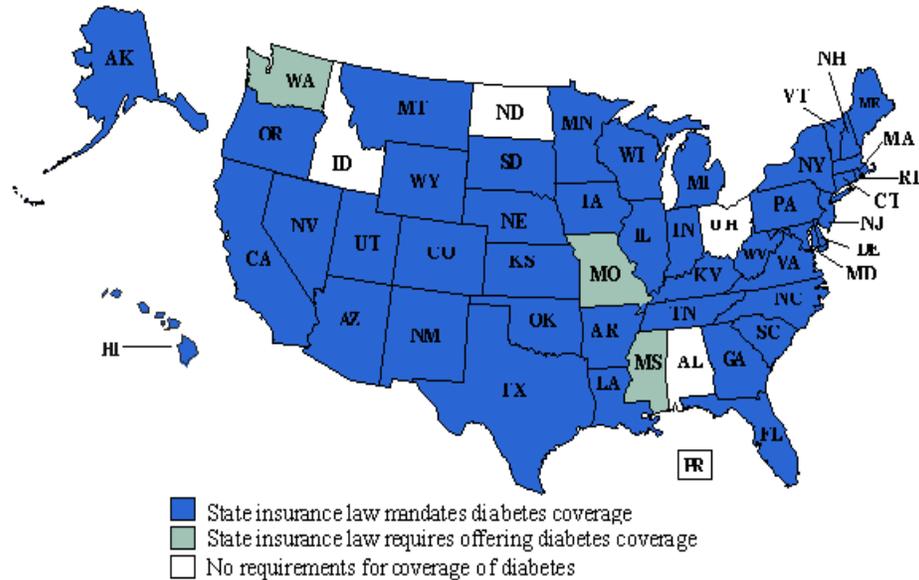
\_ DIABETES EDUCATION WITH ANNUAL ASSESSMENT AND UPDATE

A major accomplishment in the area of health care coverage was passage by the General Assembly of Bill # 3928, which establishes third party payment for out-patient self-management and education for people with diabetes, according to care guidelines to be set by The Initiative. This legislation was prepared after multiple meetings and input by affected parties, and was approved by The DSC Board in September, 1998. It has two major components: (1) coverage by third party payers for equipment, supplies, and outpatient self-management and education for the treatment of people with diabetes mellitus.

Adherence to minimal standards of care for diabetes mellitus, as adopted and published by The Diabetes Initiative of S.C. is required. (2.) Diabetes out-patient self management education is to be provided by a registered or licensed health care professional with certification in diabetes by The National Certification Board of Diabetes Educators, or by an accredited program approved by DSC or by the Diabetes Control Program, SC DHEC. The Legislative Task Force is developing criteria for minimal guidelines for care as well as criteria for accredited education programs by DSC and SC DCP-DHEC. This important legislation will significantly improve the lives of people with diabetes and will provide strong mechanisms in support of the long range goals of The Diabetes Initiative of South Carolina. Strict guidelines for certification of diabetes educators are included *DSC Annual Report, 1999*.

*SC Law SC ST § 38-71-46 Specifically states: On or after Jan 1, 2000, every health maintenance organization, individual and group health insurance policy, or contract issued or renewed in state must provide coverage for diabetes. Coverage must include Medication, Equipment and supplies, Education, Services, Outpatient self-management training.*

**Figure 2.3.1. State Diabetes Coverage Requirements within Private Insurance**



Map data updated December 2009 based on NCSL research.  
<http://www.ncsl.org/Default.aspx?TabId=14504>

Prepared by SC DHEC Office of  
 Epidemiology and Evaluation 3/2010

However, not all people in South Carolina who have health insurance are covered for self-management education. State health insurance laws only apply to about 45 percent of all private market health policies - those "fully insured plans" in which mostly small and medium sized businesses pay premiums. Federal ERISA law applies to the other 55 percent of policies that are sometimes called "self-insured plans- that is, policies in which the employer assumes the financial risk for providing health care benefits to its employees, rather than buying insurance. There is no federal law mandate for diabetes insurance coverage. (Source: Employee Benefit Research Institute, February 2008). Thus, there is no federal mandate for self-insured plans to cover diabetes education. Currently the SC State Employees' Insurance Plan, which covers more than 422,000 South Carolinians, including state employees, retirees and their families, does not cover diabetes self-management education.

**AIM 2.4 EXPAND DIABETES DISEASE MANAGEMENT PROGRAMS IN COLLABORATION WITH MANAGED CARE ORGANIZATIONS.**

A number of programs in SC have been developed to reach people across the state. The number of Certified Diabetes Educators (CDE) has increased from 25 in 1998 to over 300. These

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health professionals include MD's, nurses, dietitians, pharmacists and counselors who focus on providing patients with diabetes education see from 2 to 12 patients a day.

The Diabetes Initiative has provided training for Vocational Rehabilitation counselors in recognizing and understanding diabetes. From 1998-2007 over 14,000 clients were served whether by paying for diabetes education, supplies or helping to find a job.

**AIM 2.5 EVALUATE ONGOING RESEARCH FINDINGS RELATED TO IMPROVED CLINICAL CARE FOR DIABETES, AND TRANSLATE TO 90% OF SOUTH CAROLINA PRIMARY CARE PROVIDERS TO DECREASE PREVENTABLE PROGRESSION OF COMPLICATIONS.**

The information about this aim was not available at the time of release of this publication. It is our hope to complete this section in the near future.

### SIGNIFICANCE

Prevalence of having two or more A1cs in one year increased from 60% to 80% since 2000. Very little difference was reported by race. However, A1c testing in the African American population has been rising slightly faster than white pop. Prevalence of professional foot exams has increased slightly, from 70% to about 73% overall. Prevalence has been consistently higher in the African American population and has raised more quickly in the African American population vs the white population of people with diabetes. Eye exams by professional have remained fairly stable over the past decade, ranging from 60-70% of people with diabetes, and have shown no differences by race.

Almost one-half (47%) of SC hospitals have an Intensive Glucose Monitoring Program in place, and one-third have one underdevelopment. As might be expected, the large/urban hospitals are much further along, with 65% having a program in place. However, as many as one-third of small and rural hospitals have no programs and no plans to implement one at this time.

Based on BRFSS, some improvement in lifestyle activities to improve health, such as attempts to stop smoking and daily aspirin regimens, has been seen. Both of these activities have increased from about 47% to almost 60%. The number of people with diabetes attempting to lose weight, especially by increasing physical activity, increased from 40% to almost 60% since 2000, when data was first available.

Reimbursement for diabetes care has improved somewhat. SC is one of 44 states plus DC whose state law mandates diabetes coverage. However, coverage for DSME is not mandated. Four states have no requirement for diabetes coverage, and 3 others state that coverage must be offered. The State Health Plan, one of the largest insurers, does not offer coverage for DSME.

## CHAPTER THREE

### GOAL III TO ADDRESS THE NEEDS OF PERSONS AT RISK AND THOSE WITH DIABETES BY INCREASING SERVICES AND EDUCATION IN HEALTH PROFESSIONAL SHORTAGE AREAS IN SOUTH CAROLINA.

Authors: Patsy Myers, Khosrow Heidari, Mark Massing, Rhonda Hill

#### METHODS AND OPERATIONAL DEFINITIONS

##### 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.

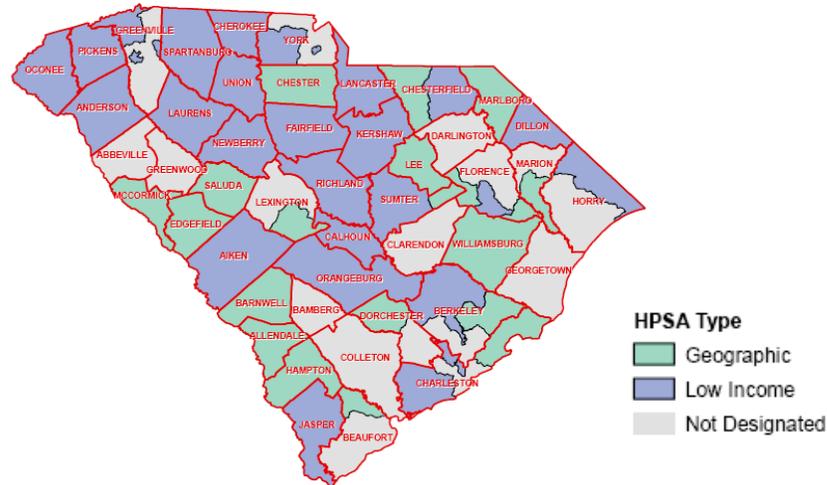
There are three major types of HPSA designations:

- 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 3.0.1 depicts the distribution of current medical professional shortage area in South Carolina.

Twenty-nine counties were defined medical professional shortage areas, and 16 counties had areas within the county that were defined as medical professional shortage areas.

**Figure 3.0.1 South Carolina Primary Care HPSA by Type, as of June 2007**



Data Source: SC DHEC

Prepared by SC DHEC Office of Epidemiology and Evaluation 3/2010

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 “sliding fee scale” 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 Carolina’s Community Health Centers may be obtained at: <http://www.scphca.org/findcenter.htm>)

## PHYSICIANS

Table 3.0.1. lists the number of Physicians (based on data from SC Statistical Abstract) in those specialties most involved with diabetes care and the percent change over 10 years. 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.

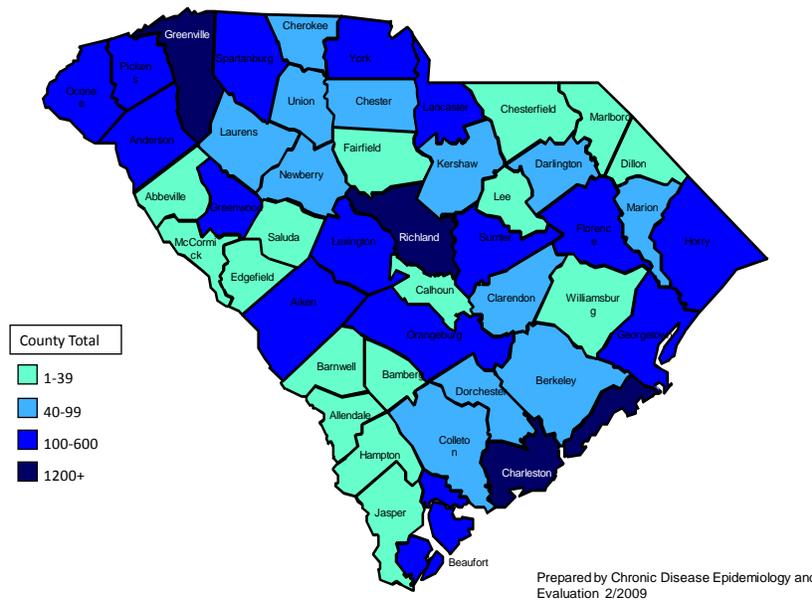
However, while the number of physicians needed for diabetes care remains inadequate, the situation has improved over the past 10 years. Family/General practitioners have doubled, and internists have more than doubled. The number of cardiologists has increased by 126%, and number of endocrinologist has quadrupled in 10 years.

**Table 3.0.1. Physician Specialties most involved in Diabetes Care in South Carolina**

Specialty	1995 # of MDs in the state	2005 # of MDs in the state	% Change	Diabetes Patients Per Physician (2005)
Internal Medicine	394	1,056	168.0%	307.8
Cardiology	119	269	126.1%	1,208.2
Endocrinology	11	53	381.8%	6,132.1
Nephrology	43	101	134.9%	3,217.8
Neurology	54	128	137.0%	2,539.1
Ophthalmology	177	248	40.1%	1,310.5
Family/General Practice	747	1,536	105.6%	211.6

Data source: SC Statistical Abstract 2007

**Fig 3.0.1. Physicians Employed in South Carolina, 2005**



Data Source: SCDHEC SCAN; ORS

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 Carolina’s physicians are located in three major city areas; very few of them practice in the counties that have higher prevalence rates for diabetes.

**AIM 3.1 INCREASE ACCESS TO DIABETES EDUCATION FOR THOSE AT RISK AND THOSE DIAGNOSED WITH DIABETES IN HEALTH PROFESSIONAL SHORTAGE AREAS BY 10% EACH YEAR.**

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 pharmacist’s 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.

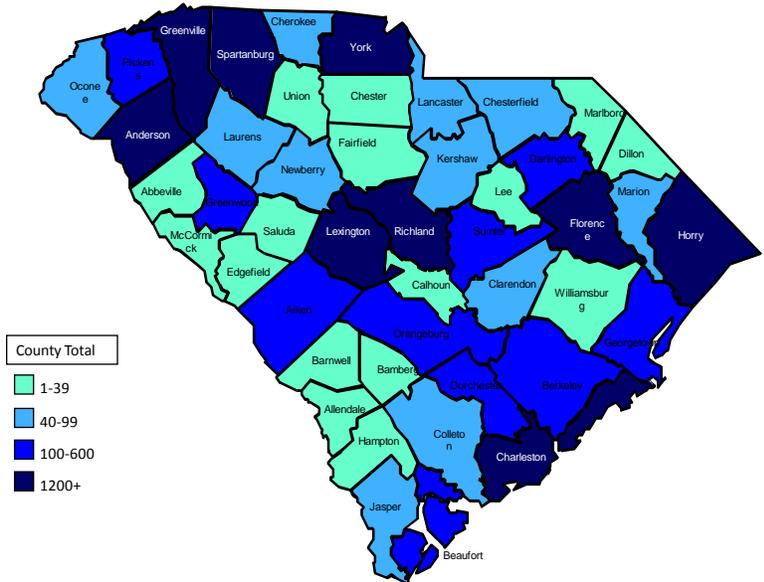
**Table 3.1.1. Number of Other Health Professionals, SC**

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%

Data Source: ORS

\* Abstracted from 1996 Burden of Diabetes Report

**Fig 3.1.1. Pharmacists Employed in South Carolina, 2005**



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

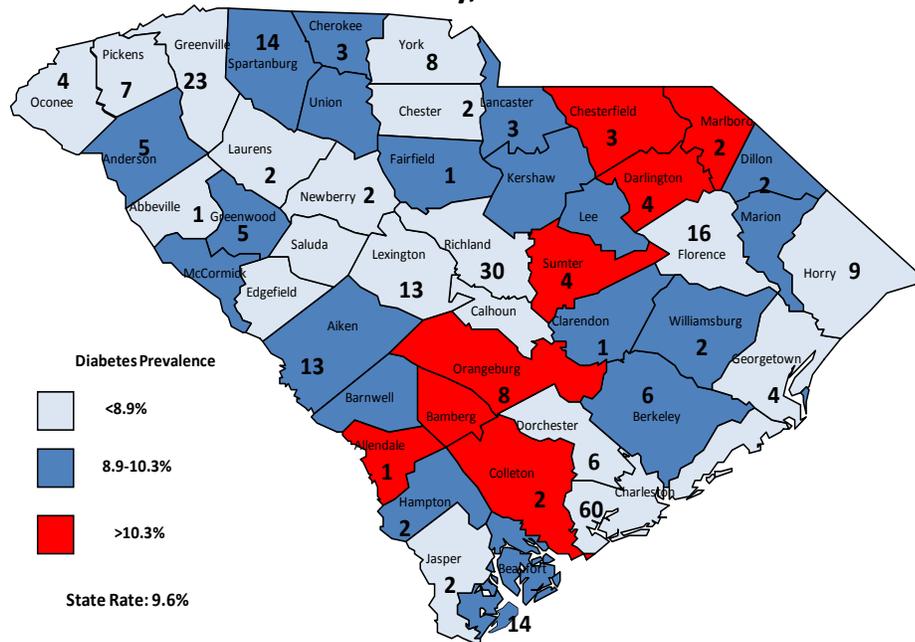
February 2009

**AIM 3.2 INCREASE THE NUMBER OF HEALTH PROFESSIONALS WITH UPDATED TRAINING IN DIABETES FOR HEALTH PROFESSIONAL SHORTAGE AREAS AT A RATE OF 5% PER YEAR.**

**CERTIFIED DIABETES EDUCATORS**

There are 298 Certified Diabetes Educators (CDE) in South Carolina as of 2008. This is an increase of 250% from 1997. On average, one CDE needs to serve 15,500 residents in South Carolina. Figure 3.2.1 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 of diabetes, three, Saluda, Marlboro, and Edgefield, have no CDEs and four more have inadequate CDE coverage,

**Fig. 3.2.1. Number of Certified Diabetes Educators by County, 2008**



Data Source: 2007 BRFSS; AADE

Prepared by Chronic Disease Epidemiology and Evaluation 2/2009

**AIM 3.3 IDENTIFY HIGH RISK, UNDERSERVED COMMUNITIES AND COLLABORATE WITH OTHER AGENCIES TO IMPROVE HEALTH PROMOTION, DISEASE PREVENTION, AND DIABETES CARE.**

**REACH 2010**

REACH 2010: Charleston and Georgetown Diabetes Coalition is a CDC-funded program that is based in College of Nursing and the DSC is the central collaboration agency. The aim of the program is to reduce diabetes disparities for 12,000 African Americans with diagnosed diabetes living in Charleston and Georgetown Counties. Three major activities include community empowerment, education, and advocacy, health systems change, and Coalition power. Five community health advisors are trained and provide diabetes education and advocacy where people live, work, worship, play, and seek health care. Diabetes Educator-CHA diabetes education programs are provided to community health centers and groups that provide clinical care to persons with diabetes. Local diabetes coalitions work together to improve diabetes self-management. Program evaluation outcomes related to diabetes disparities are shown below:

Disparities identified by REACH 2010: Charleston and Georgetown Diabetes Coalition

<p><b>DECREASED:</b></p> <ul style="list-style-type: none"> <li><b>Per capita income</b></li> <li><b>Access to care and education</b></li> <li><b>Funding and insurance</b></li> <li><b>Care and education</b></li> <li><b>Satisfaction with care</b></li> <li><b>Medications and continuing care</b></li> <li><b>Treatment</b></li> <li><b>Diabetes control (HbA1c, blood pressure, cholesterol/lipids)</b></li> <li><b>Trust in health provider and health system</b></li> </ul>	<p><b>INCREASED:</b></p> <ul style="list-style-type: none"> <li><b>Prevalence of diabetes</b></li> <li><b>Complications:</b> <ul style="list-style-type: none"> <li><b>Amputations</b></li> <li><b>Renal failure (dialysis)</b></li> <li><b>Cardiovascular disease</b></li> </ul> </li> <li><b>Emergency medical service use</b></li> <li><b>Emergency department visits</b></li> <li><b>Hospitalizations</b></li> <li><b>Costs of care</b></li> <li><b>Deaths, especially from cardiovascular disease</b></li> </ul>
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REACH has established diabetes education classes in four community health center sites and currently one of the programs is an ADA Recognized Education Program (Enterprise Neighborhood Health Program). In addition to education, two of the sites are using the Diabetes Electronic Management System to assist the sites in improving care through ongoing monitoring of care.

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**LAY HEALTH PROMOTORAS**

The MHP initiated a Lay Health Promotoras component in 2002. During the reporting period, Lay Health Promotoras complemented outreach services by providing health education sessions on campus/area-specific health issues and health disparity topics and provision of support to ensure farm worker involvement in their own health care. Health disparity areas addressed included: immunizations, HIV/AIDS, Cardiovascular Disease, and Diabetes. Lay Health Promotoras generated 466 encounters, and provided 49 “charlas” (health education sessions) during this period.

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**AMEC/DHEC PARTNERSHIP**

The African Methodist Episcopal Church (AMEC)/DHEC Partnership, which is based on the AMEC Strategic Health Plan, involves the AME churches of the Seventh Episcopal District of South Carolina and DHEC health districts and coalitions statewide through the DHEC Strategic Plan. The AMEC and SC DHEC saw this as an opportunity to improve health, eliminate disparities and promote healthy communities. The partnership calls for the development of relationships (formal and informal) between specific churches around the state and DHEC health districts and local health departments, community-based organizations and coalitions. Through these relationships unique contracts in which the health departments, consultants or organizations provide health and wellness services to the churches are executed.

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CLOSING THE HEALTH GAP

As part of the “Closing the Gap” initiative, Take a Loved One to the Doctor Day’s aim was to reduce health disparities affecting communities of color by motivating individuals to visit or make an appointment to see a health professional. The South Carolina Department of Health and Environmental Control (SC DHEC) Office of Minority Health took the lead in promoting *Take a Loved One to the Doctor Day*. As a result: Educational awareness message was designed as a prescription pad that was distributed to 18 organizations and health care facilitates that participated in promoting this initiative. Over 10,000+ (include media) people from different ethnic and age groups participated in a variety of health activities.

- On May 18, 2003, SC ETV aired a live television special on diabetes entitled, “Rx, Prescription for Life”. The special featured Dr. Louis Sullivan, Former U.S. Secretary of HHS; B.B. King, Entertainer and Diabetes Spokesperson; and several local diabetes providers and educators. The program spotlighted Type II diabetes and how it affects those diagnosed, how they can better manage, and how fast the disease is affecting younger individuals. A major spotlight was on prevention of the disease and the importance of diet and exercise.

**AIM 3.4 DECREASE COST BARRIERS TO DIABETES SERVICES AND EDUCATION THROUGH COLLABORATION WITH INSURANCE AND MANAGED CARE COMPANIES.**

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SOUTH CAROLINA ALLIANCE OF HEALTH PLANS (SCAHP)

A growing resource that deals with the adherence of its members to recommended diabetes guidelines is the South Carolina Alliance of Health Plans (SCAHP). Information about its programs and initiatives are available on its website (10). The SCAHP sponsors the Diabetes University in conjunction with its members. This is a collaborative program designed to help South Carolinians with diabetes live healthier lives. Diabetes University began in March 2001, and has since been held in the cities of Columbia, Florence, Charleston, Greenville, Myrtle Beach and Lancaster in South Carolina. Local physicians and healthcare professionals lead educational sessions on topics that include diabetes self-management, eye care, foot care, heart health, kidney health, nutrition and physical activity. Each year the program closes with a motivational speaker to empower the audience to take control of their diabetes. The success of Diabetes University has not gone unnoticed; SCAHP has received awards from The American Diabetes Association for outstanding community service.

The number of children that are developing type 2 diabetes is growing rapidly, and SCAHP considers the health of students with diabetes a high priority. SCAHP developed a diabetes education model focusing on the management of both type 1 and type 2 diabetes encompassing nutrition, physical activity and insulin pump therapy in the school setting. The program, named "ABC's of Diabetes," was offered to school nurses across the state in five different locations. All nurses and school personnel that attend these programs received continuing education credits. The program continues to be offered on a request basis.

In the past, reimbursement for diabetes equipment and supplies had been inconsistent. In spite of the intuitive and proven benefits of preventive strategies, Medicare, Medicaid, private insurers, and managed care organizations had initially been reluctant to provide coverage for them. Payers have often made decisions that take into account only the short-term by focusing on the here-and-now costs of coverage while ignoring the long-term cost effectiveness. Thus, devoid of adequate coverage and reimbursement, people with diabetes have had limited access to essential education services and lacked the tools necessary to optimally manage their disease.

However, the status of coverage of and reimbursement for diabetes self-management training, equipment, and supplies is finally improving (11). Until recently, reimbursement for anything beyond physician office visits was nonexistent or inadequate, posing major barriers to quality care (12). There have been major changes in the area of diabetes care funding and medical nutrition therapy, components of which are now mandated by state legislation (11). Government and private insurers and payers have realized that it is a financially sound and cost-effective approach to take a long-term view of diabetes and its chronic complications (13). Thus, the trend towards supporting the implementation of standards of care, preventive strategies, and early treatment is on the rise (14,15,16).

In accordance with the rest of the nation, legislation for Health Care Coverage for Diabetes Self-Management Training, Equipment, and Supplies in South Carolina ([S.C. code 38-71-46](#)) was enacted on May 27, 1999. On March 29, 2000, S.494 was signed and expanded the law to provide for coverage of FDA approved diabetes medication, while H.4441, signed June 14, 2000, established limited conditions for denials if a health care professional fails to adhere to the minimal standards of care.

**AIM 3.5 EXPAND EDUCATION TO REDUCE IDENTIFIED RISK FACTORS FOR DIABETES AND ITS COMPLICATIONS.**

BRFSS data shows that South Carolina has a high prevalence rate among all racial groups for physical inactivity, unhealthy eating, and cigarette smoking with obesity being significantly higher among African Americans. 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. The target population at large is not aware how to prevent this disease nor are they aware of self-management behaviors that will enable them to prevent complications. For many in South Carolina, the media and lay health offerings are the only means of education they receive.

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**DIABETES TODAY TRAINING /LOCAL DIABETES COALITIONS**

Community-based coalitions of professional and grassroots leaders are formed to influence long-term health and welfare practices for their communities. The South Carolina coalitions have been a source of empowerment for the local communities to work on diabetes

prevention and management at the local level. South Carolina is a rural and underserved state with a noted healthcare shortage and limited access to care.

Since 1997, South Carolina has collaborated with local communities to establish 35 diabetes coalitions across the state. Of the 26 coalitions, 21 of them are currently still active and producing outcomes while the remaining 5 have experienced challenges and need leadership and guidance. The SC DPCP will provide them with training and skills to improve their community capacity.

Only the 21 active coalitions are at a stage of readiness to provide awareness in their local areas and have done so through the planning and development of diabetes resource guides; nutrition and exercise classes, mini-conferences featuring “Ask the Doctor” sessions, and mass media activities such as a billboard on “signs and symptoms of diabetes”, and radio PSAs. Currently, seven of the 21 coalitions are funded through the SC DPCP to provide knowledge and skills related to diabetes prevention and management.

In the past five years, the CDC Diabetes Today (DT) curriculum has been implemented to support coalition development and build infrastructure in the community statewide. The objective was achieved in building local coalitions in areas consistent to the three pilot CHCs utilizing the DT model. Coalition assessment site visits revealed the need to develop structure and define roles and responsibilities of participants to advance coalitions from the developmental phase to implementation and sustainment. Mini-grant funding was an approach used to address the findings revealed by the coalition assessment. Eight community coalitions from across the state applied for the mini-grants and seven were funded, ranging from \$1800 to \$2000 each. There are 26 counties out of the 46 in South Carolina that have coalitions. Three of the 26 coalitions serve as steering committees.

The Annual Statewide Coalition meeting is held on the eve of the DSC Annual Symposium. At this meeting, members share best practices and “shamelessly steal” ideas from each other. Some chapters share their stories by way of poster presentations. Representatives from the statewide meeting reviewed samples of By-Laws from other organizations and then developed their own statewide Principles of Organization to govern the coalitions

The SC DPCP provides CDC's [DIABETES TODAY](#) training across the state for communities that are interested in forming coalitions to reduce the burden of diabetes in their community and in developing interventions to promote improved diabetes prevention and control.

The Community Coalitions sponsored by DHEC funded by CDC has provided health fairs and trained lay people on “living with diabetes” across SC. Over the last 10 years, nearly 2,500 participants have been provided information about diabetes. From 1995 – 2007, volunteer Certified Diabetes Educators have provided diabetes education through Prevention Partners, under the SC Budget and Control Board, to over 1,500 state employees in SC.

## Diabetes Initiative of South Carolina Ten-Year Evaluation Report

One of the major success stories with the Diabetes Today program has been the Georgetown County Diabetes CORE Group. The group, was trained in 1997, and through collaborations and partnership with community organizations and faith communities, has built a strong community support for diabetes. Some of the accomplishments of the CORE Group include:

- Organizing an annual banquet and ongoing solicitation of funds from businesses for diabetes-related activities in communities. These fund-raising activities have enabled the group to provide financial assistance for medications to medically indigent people with diabetes in the communities.
- Establishing a partnership with the REACH 2010: Charleston and Georgetown Diabetes Coalition to reduce health disparities among minority populations in South Carolina. Through this partnership, the CORE Group has increased its influence in the Georgetown and surrounding counties as advocates for people with diabetes and diabetes-related issues. Through empowerment and community diabetes education, the relationship has enabled the group to hire a full-time Community Health Advocate and a Social Worker.
- Receiving a Rural Health Outreach Grant for expansion of a Community Health Center in the Choppee community, and obtained donated office space. Additionally, the CORE Group was awarded a seed grant from the SC DPCP for coalition activities including the development of a resource manual to assist others with finding resources for people with diabetes.
- Assessing the materials and information on diabetes in the library and finding them to be inadequate for support of self-directed learning. Through collaborating with public library administrators and collection development librarians, the CORE Group selected new books and videos for purchase and recommended that outdated diabetes materials be removed from library shelves. Customized guides known as pathfinders and a bookmark were created to lead community members to the new diabetes resources. In addition, the CORE Group, secured funds for diabetes materials in the libraries by writing letters to state legislative officials requesting funds. “Learn About Diabetes” posters were developed and showcased to encourage people to ask their health care providers questions, join their local diabetes coalition, and visit their local library to checkout diabetes materials for personal learning and diabetes self-management.

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### DTAC/AFRICAN AMERICAN CONFERENCE ON DIABETES

In 1995, a group of 25 African American health care professionals and other health advocates joined together to form the SC Diabetes Today Advisory Council (DTAC). The mission of the group is to make a difference in the diabetes epidemic within the African American community. The group is a spinoff of the American Diabetes Association’s African American Program.

DTAC was started to educate the public about the seriousness of diabetes and to stress the motto, “Diabetes: Not a Family Tradition”. The original median to disseminate this information was through Black owned newspapers, radio stations, minority television talk

shows and church newsletters/bulletins. However, in 1996, DTAC co-sponsored with the American Diabetes Association and Providence Hospital the African American Conference on Diabetes. That initial conference drew 183 African Americans from across the state where information on the prevention and management of diabetes was disseminated through concurrent sessions and plenary speakers. For the past three years, the DHEC Bureau of Chronic Disease Prevention and Health Promotion have served as fiscal sponsor of the conference. Focus groups have also been held to ascertain participants' perceptions and ideas on how the annual conferences have influenced how they manage their diabetes.

This conference is held every November in Columbia, SC, in observance of the National Diabetes Awareness Month and targets people living with diabetes, their caretakers, healthcare professionals, and other interested community members. Participants gather information on innovative programs in diabetes education, resources available for implementation, and self-management techniques for controlling the disease. There is a minimal (\$5) charge for the conference, and registration is required. The first conference was held in 1996 and drew 183 participants, and by 2003 registration had grown to 1010. Each year, concurrent sessions are held on foot and eye care, nutrition, physical activity, depression, medication and monitoring, 'ask the doctor', and other pertinent subjects. Past cosponsors of the conference have been the SC Cardiovascular Health Division and the SC Division of Tobacco Prevention and Control.

The African American Conference on Diabetes now in its 12th year has increased from under 200 participants to an average of 800 to 1,000 yearly. Respondents report an increased awareness of how to "live with diabetes". A sample program agenda for the African American Conference on Diabetes might include the following:

- -What is Diabetes
- -Faith and Diabetes Education
- -What is a Food Pyramid
- -Eat To Live
- -How To Check Your Feet
- -Ask the doctor about Feet and Medications
- -Ask the Doctor about Teeth and Eyes
- -What about Diabetes and Men's Health
- -Diabetes and Sexuality
- -Medication and Monitoring
- -Diabetes and Heart Disease
- -Diabetes and Kidney Disease

SIGNIFICANCE

Thirty-three of SC's 46 counties, and parts of 6 counties, are designated as Health Professional Shortage areas. Only 7 counties, and parts of 6 counties, have been designated as having adequate health professionals. However, while the number of physicians needed for diabetes care remains inadequate, the situation has improved over the past 10 years. Family/General practitioners have doubled, and internists have more than doubled. The number of cardiologists has increased by 126%, and endocrinologists have quadrupled in 10 years. The number of CDE's is still inadequate, but the number of CDE's has more than tripled in 10 years.

## CHAPTER FOUR

### GOAL IV TO REDUCE THE MORBIDITY AND DISABILITY RATES FROM DIABETES-RELATED COMPLICATIONS.

Authors: Patsy Myers, Khosrow Heidari, Rhonda Hill

#### METHODS AND OPERATIONAL DEFINITIONS

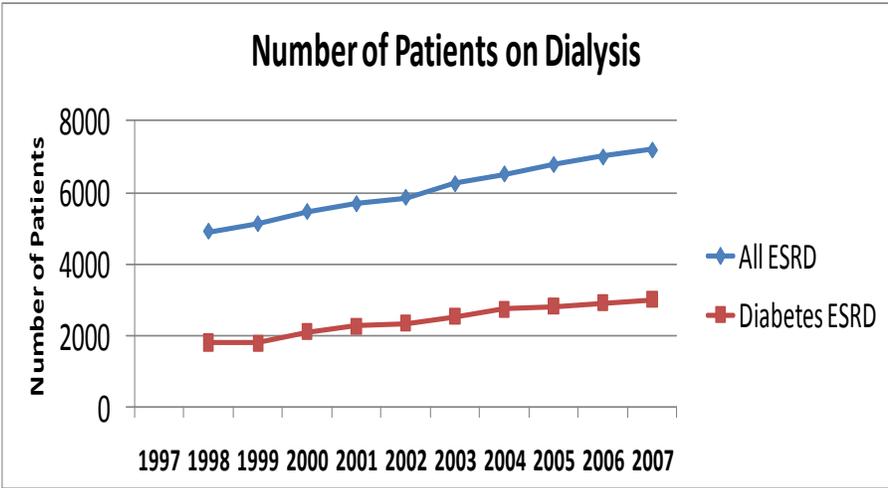
With the exception of end stage renal disease (ESRD), the source for data on diabetes complications and comorbidities was the hospital inpatient and ED visit dataset provided by the Office of Research and Statistics. ESRD data was obtained from the Southeastern Kidney Council (<http://www.esrdnetwork6.org>), a part of the National ESRD network. This organization collects data from freestanding dialysis units and provides continuous quality improvement measures to those dialysis centers. Information on community activities was obtained from annual reports from the SC DHEC Diabetes Prevention and Control Program and DHEC Preventive Health Block Grant Health Promotion program. Mortality data came from SCDHEC Division of Biostatistics.

#### **AIM 4.1 REDUCE THE PREVALENCE OF ESRD ATTRIBUTED TO COMPLICATIONS OF DIABETES BY 10% FROM 28.1 TO 25.3/100,000 POPULATION.**

Prevalence of end-stage renal disease (ESRD) has increased in South Carolina. According to the Southeastern Kidney Council data, 4900 SC residents were receiving dialysis in 1997. By 2007, that number had increased to 7200, a 45% increase. Of those the number whose ESRD was attributable to diabetes has increased as well, from 1800 in 1998 to 3060 in 2007, a 67% increase (fig 4.1.1.).

The percent of ESRD attributable to diabetes increased steadily from 37% in 1998 to a peak of 43% in 2003, and has maintained at 42% since then (fig 4.1.2.) Diabetes-attributable ESRD rates have increased by 45% in the past 10 years, from 47.9/100,000 in 1998 to 69.5/100,000 in 2007, where the total ESRD rate has only increased by 28%. Thus, ESRD attributable to diabetes has been growing faster than the population and faster than the overall ESRD rate (fig 4.1.3.)

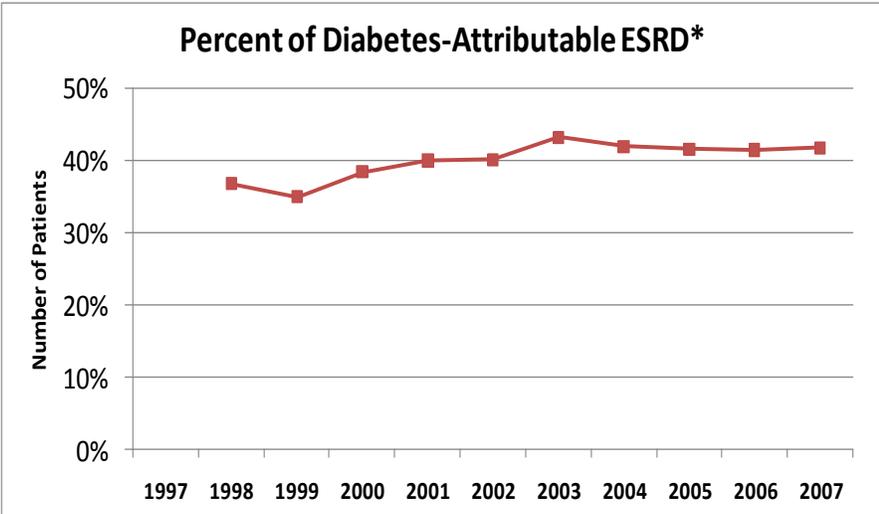
**Fig. 4.1.1 End-Stage Renal Disease Attributable to Diabetes**



Data Source: ESRD Network #6

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

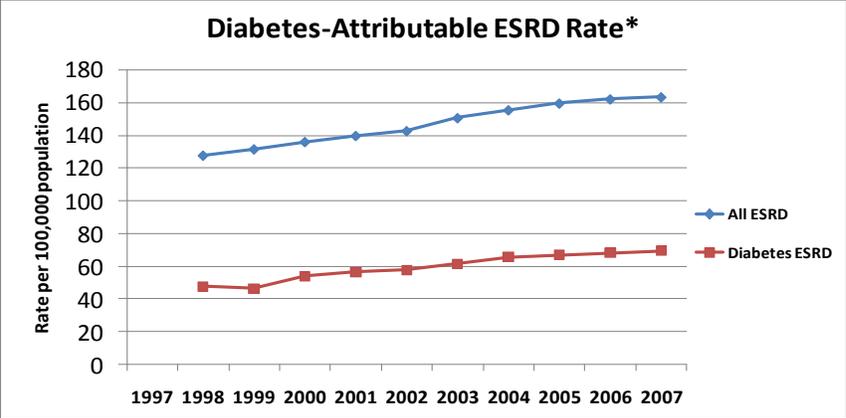
**Fig.4.1.2. End-Stage Renal Disease Attributable to Diabetes**



\*Diabetes ESRD Prevalence/All ESRD Prevalence  
Data Source: ESRD Network #6

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

**Fig. 4.1.3. End-Stage Renal Disease Attributable to Diabetes**



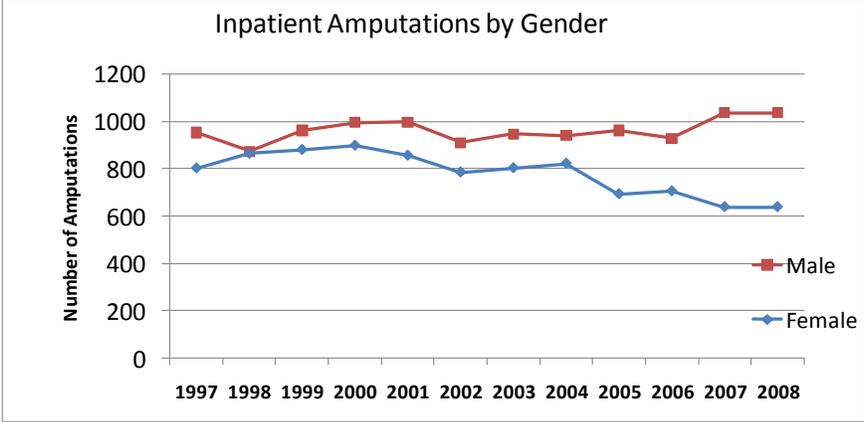
\*Diabetes ESRD Prevalence/SC Population  
Data Source: ESRD Network #6

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

**AIM 4.2 REDUCE THE NUMBER OF AMPUTATIONS WITH DIABETES AS THE CAUSE BY 10% FROM 1,348/YEAR TO 1,213/YEAR.**

South Carolina hospitals performed a total of 19,280 lower extremity amputations related to diabetes from 1997-2007. Of those, 29% were African American females, 25% were African American males, 16% were white females and 30% were white males. The overall number of lower extremity amputations has been decreasing steadily each year, from 1757 in 1997 to 1650 in 2007, a five percent decrease over ten years (fig. 4.2.1-4.2.3).

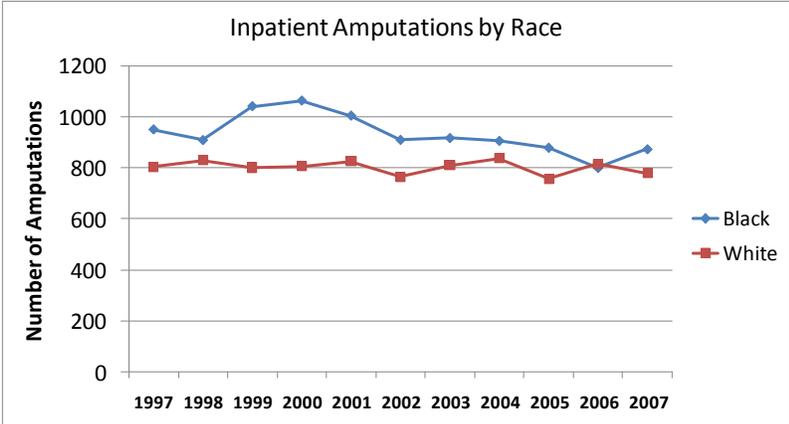
**Fig. 4.2.1. Lower Extremity Amputations**



Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

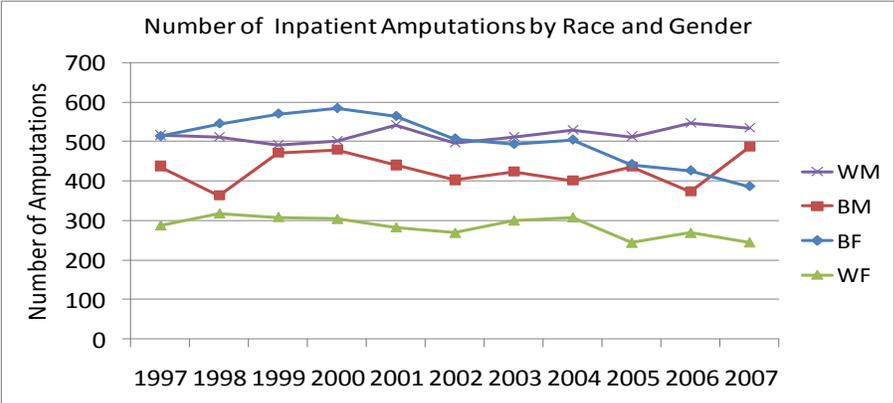
**Fig.4.2.2. Lower Extremity Amputations**



Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

**Fig. 4.2.3. Lower Extremity Amputations**

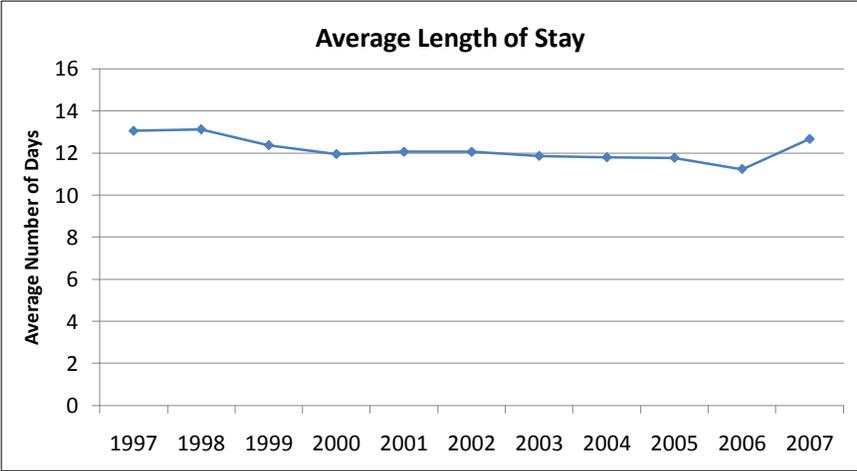


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**AIM 4.3 REDUCE THE AVERAGE LENGTH OF STAY IN THE HOSPITAL FOR AMPUTATION (FOR PERSONS WITH DIABETES) BY 10% FROM 16.3 TO 14.7 DAYS.**

Average length of stay for diabetes-related Lower Extremity Amputations (LEA’s) has been steadily falling for the past 10 years until 2007, when it showed an increase. We have not seen a decrease of more than about 2% over the past 10 years. The average length of stay for LEA’s tends to be extremely long by today’s standards. Surgery for lower-extremity amputations tends to involve stays of from 11 to 13 days, depending on the race/gender group, a hospital stay of almost two weeks. The only group for which the average length of stay is falling is white females.

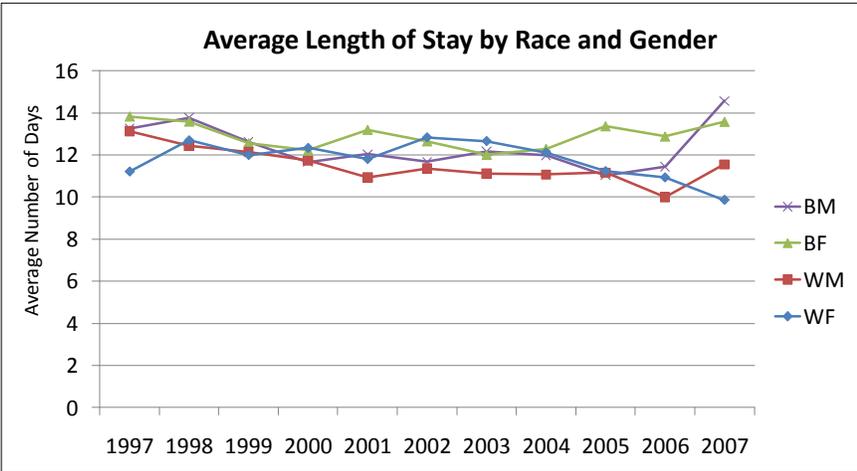
4.3.1. Lower Extremity Amputations



Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

4.3.2. Lower Extremity Amputations



Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

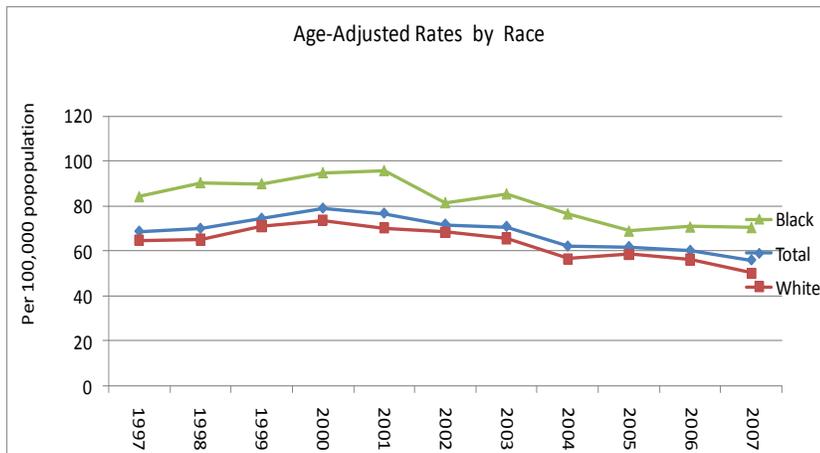
**AIM 4.4 REDUCE HOSPITALIZATION RATES FOR MAJOR VASCULAR COMPLICATIONS FOR PERSONS WITH DIABETES BY 10% INCLUDING:**

- 4.4.1. MYOCARDIAL INFARCTION FROM 7.4/10,000 POPULATION.
- 4.4.2. CHRONIC RENAL FAILURE FROM 7.7/10,000 POPULATION.
- 4.4.3. AMPUTATIONS FROM 3.7 TO 3.3/10,000 POPULATION.

4.4.1 MYOCARDIAL INFARCTION

MI hospitalization rates in diabetes patients have decreased by 18% over the past 10 years. The reduction is slightly higher in females than in males (-20.2% vs. -18.5%). Heart attacks in the white diabetes population have decreased significantly more than in African Americans with diabetes. Even with reductions in MI rates, there are still racial and ethnic disparities. African American MI rates have been 30-40% higher than rates in the white population. Within gender groups disparities still exist. MI rates in white males with diabetes have decreased by 23% whereas those in African American males have decreased by only 13%.

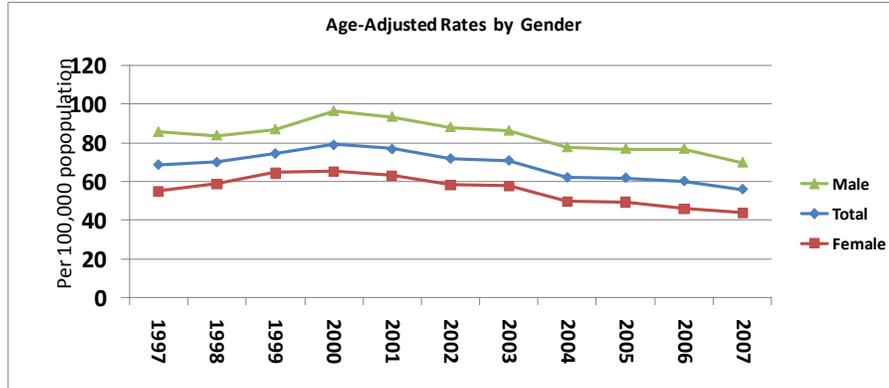
**Figure 4.4.1.1 Hospitalization Rates for Myocardial Infarction in Diabetes Patients**



Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

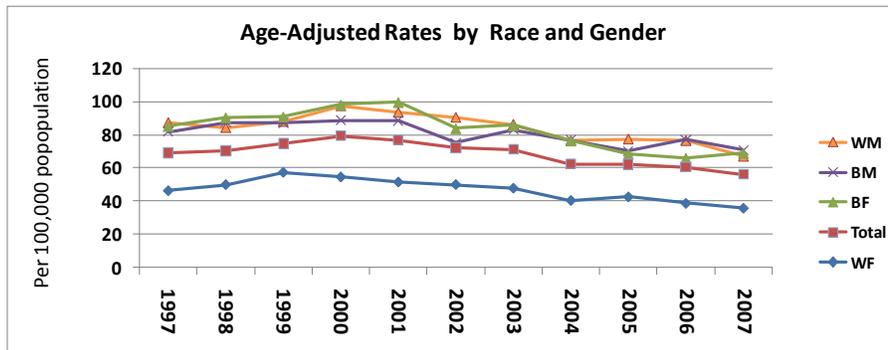
**Figure 4.4.1.2 Hospitalization Rates for Myocardial Infarction in Diabetes Patients**



Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 3/2010

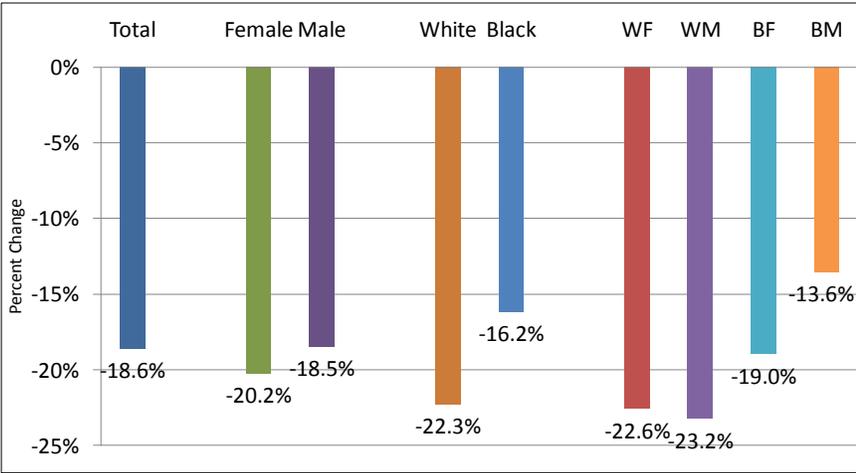
**Figure 4.4.1.3 Hospitalization Rates for Myocardial Infarction in Diabetes Patients**



Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

**Fig. 4.4.1.4. Percent Change in MI Hospitalization Rates in Diabetes Patients over 10 Years (1997-2007)**



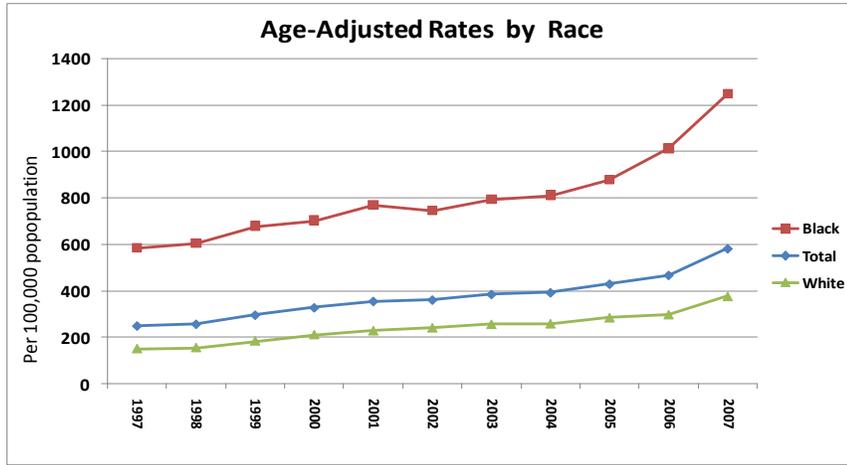
Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 32010

**4.4.2 CHRONIC RENAL FAILURE**

Hospitalization rates for ESRD in people with diabetes have increased astronomically in the past 10 years. Overall, age-adjusted ESRD rates have more than doubled in the past decade, increasing by 133%. Racial disparities in ESRD rates are huge. Rates in the African American population have consistently been three to four times that in the white population. However rates are increasing faster in the white population. In the past decade, ESRD rates have increased by 150% in the white population and by 113% in African Americans. White males have shown the highest increase in rates, with rates increasing by 167%, an increase of more than 2.5 times in 10 years. The highest rates have consistently been in African American females who have rates four to five times that of white females.

**Figure 4.4.2.1 ESRD Hospitalization Rates in Diabetes Patients**

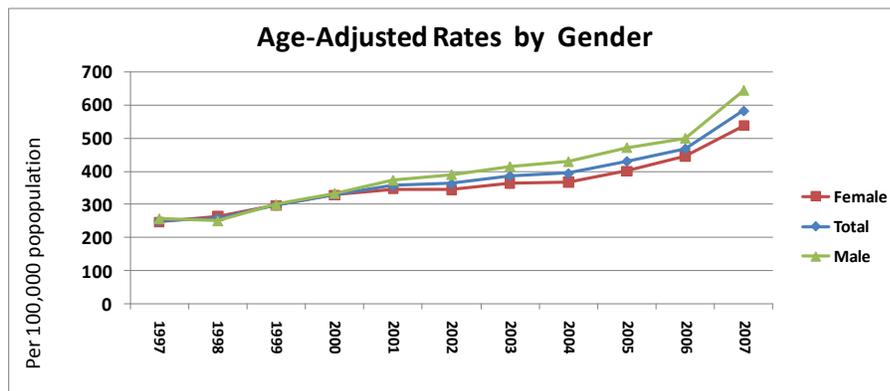


Data Source ESRD Network #6

Prepared by Chronic Disease Epidemiology and Evaluation 3/2010

Increases have been larger in males than in females, with rates in males increasing by 150%, whereas in females ESRD rates have increased by 116%.

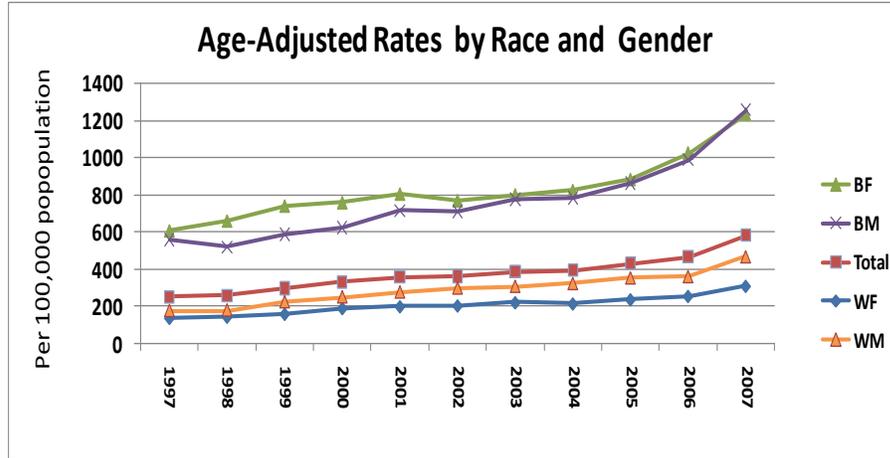
**Figure 4.4.2.2 ESRD Hospitalization Rates in Diabetes Patients**



Data Source ESRD Network #6

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

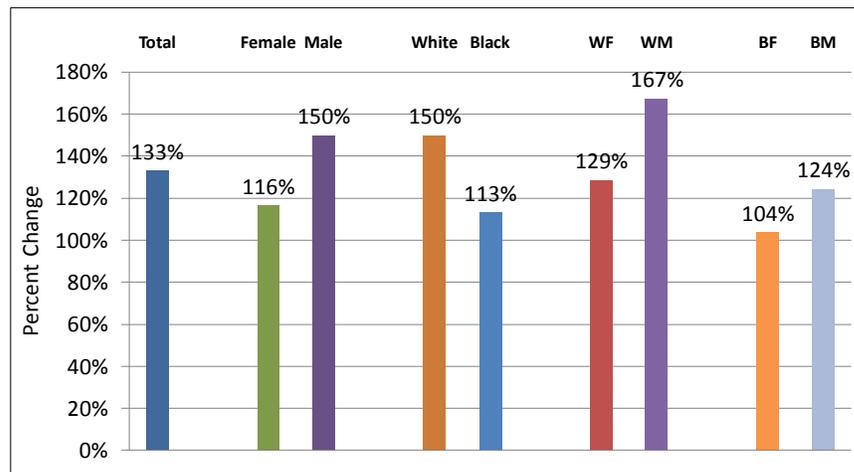
**Figure 4.4.2.3. ESRD Hospitalization Rates in Diabetes Patients**



Data Source ESRD Network #6

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

**Fig. 4.4.2.4. Percent Change in ESRD Rates in Diabetes Patients over 10 Years (1997-2007)**



Data Source ESRD Network #6

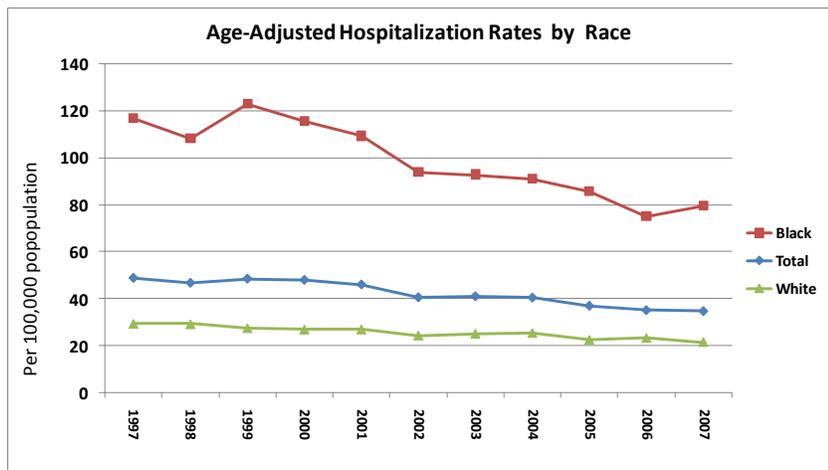
Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

4.4.3 LOWER EXTREMITY AMPUTATIONS

South Carolina’s lower extremity crude amputation rate fell from 8 per 1,000 diabetes population to 3 per 1,000 in 2006. This accounted for a 63% reduction in ten years. When compared to the U.S., there was also a reduction in lower extremity amputation on the national level during 1996-2006. In SC, the toe, foot, above, and below knee amputation rates remained unchanged from 1996-2001. However, from 2001-2006 these diabetic amputations declined steadily. The amputation rates were highest among African Americans, but from 2001-2006 there was an improvement in these rates.

Age-adjusted rates of LEAs are decreasing every year, in all race and gender groups. The overall lower-extremity amputation (LEA) rate has decreased by 29% in the past 10 years. The rate has increased more dramatically in African Americans than in the white population and in females more than males (fig. 4.4.3.1.)

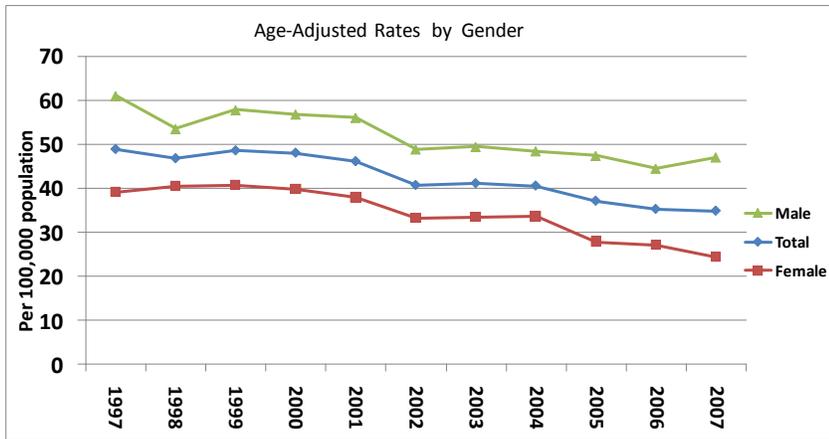
**Figure 4.4.3.1. Lower Extremity Amputations**



Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

**Figure 4.4.3.2. Lower Extremity Amputations**

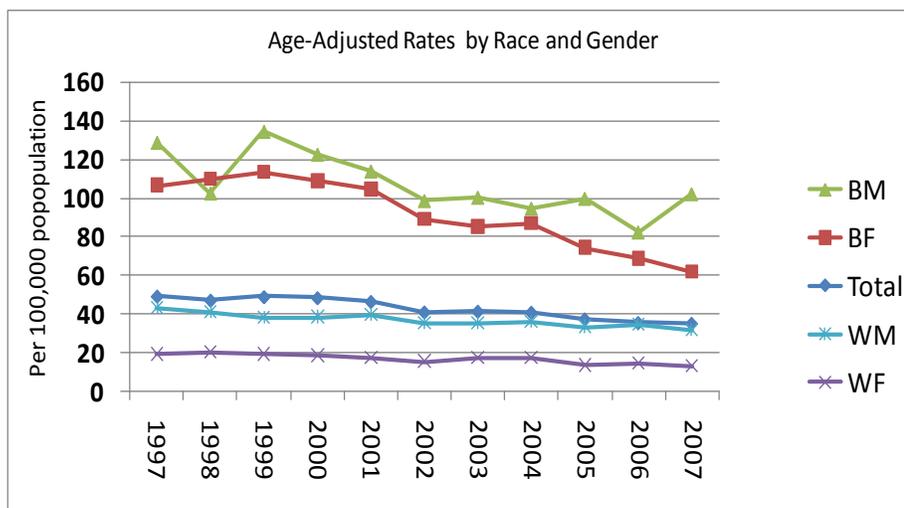


Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

The greatest improvement has been in African American females, whose lower extremity amputation rates have dropped by 42% in the past decade. The least amount of improvement has been in African American males, who historically have had by far the highest LEA rates of any race-gender group (fig. 4.4.3.3). An overview of changes in age-adjusted LEA rates is seen in fig 4.4.3.4.

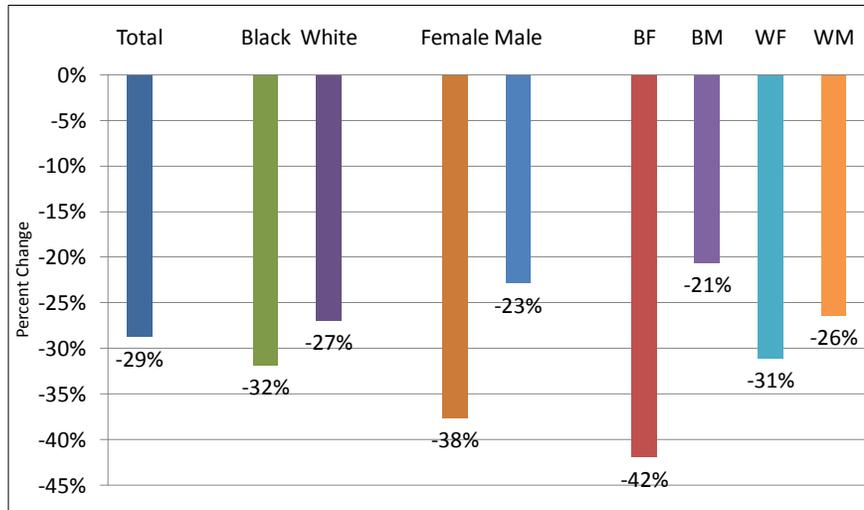
**Figure 4.4.3.3. Lower Extremity Amputations**



Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

**Fig. 4.4.4.4. Percent Change in Lower Extremity Amputation Rates over 10 Years (1997-2007)**



Data Source: ORS Hospital Discharge Data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

**AIM 4.5 REDUCE COMPLICATION RATES FROM DIABETES PREGNANCIES BY 10% INCLUDING:**

- 4.5.1 PERINATAL MORTALITY FROM 22.6 TO 20.3/1,000 DELIVERIES.
- 4.5.2 INFANT MORTALITY FROM 12.1 TO 10.9/1,000 LIVE BIRTHS.
- 4.5.3 ABNORMAL CONDITIONS OF NEWBORN FROM 15.5% TO 14.0%.

**AIM 4.5.1 PERINATAL MORTALITY RATE:**

The perinatal mortality is the sum of the fetal mortality and the neonatal mortality. The World Health Organization defines the perinatal mortality as the "deaths occurring during late pregnancy (at 22 completed weeks gestation and over), during childbirth and up to seven completed days of life." We will refer to this definition of the perinatal mortality as definition I. An alternative definition (II) includes fetal death and up to 28 days of life.

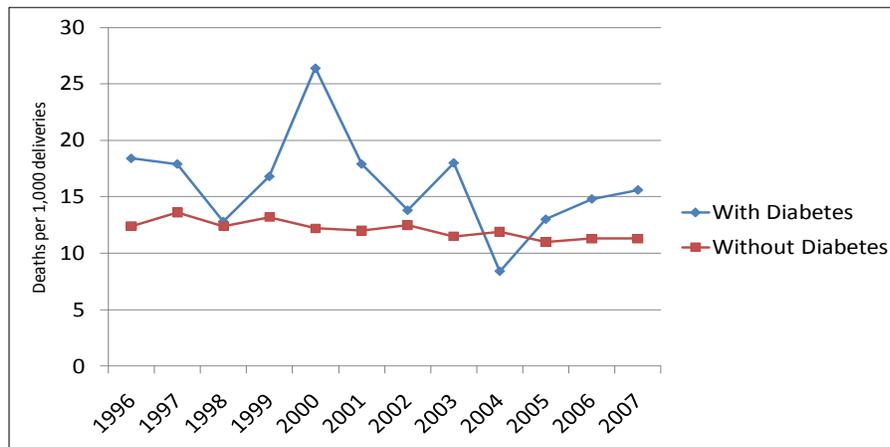
In South Carolina there were a total of 725 perinatal deaths which was 11.24 per 1,000 deliveries in 2007. This was an improvement in perinatal mortality in SC 2006 which the rate was 12.5 per 1,000 deliveries. The table 4.5.1 displays the number of perinatal deaths (definition I) to mother with diabetes condition as it was captured by the birth certificate.

**Table 4.5.1 Number of and Rate of perinatal mortality\* among mothers with and without diabetes**

Year	With Diabetes		Without Diabetes		Total	
	Number	Rate	Number	Rate	Number	Rate
1996	30	18.4	612	12.4	642	12.5
1997	29	17.9	686	13.6	715	13.6
1998	22	12.8	648	12.4	670	12.4
1999	30	16.8	696	13.2	726	13.2
2000	48	26.4	663	12.2	713	12.6
2001	35	17.9	647	12.0	682	12.1
2002	30	13.8	654	12.5	686	12.5
2003	39	18.0	611	11.5	652	11.7
2004	26	8.4	638	11.9	666	11.7
2005	43	13.0	595	11.0	641	11.1
2006	48	14.8	664	11.3	714	11.4
2007	52	15.6	671	11.3	725	11.4

Source: SC PHSIS

**Fig.4.5.1. Perinatal Mortality Rate among Mothers With and Without Diabetes**



Data Source: SC DHEC Vital Records

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

The perinatal mortality rate among diabetic mothers remained higher than those without diabetes consistently over the past decade using 1996 to 2007 data.

AIM 4.5.2 INFANT MORTALITY RATE:

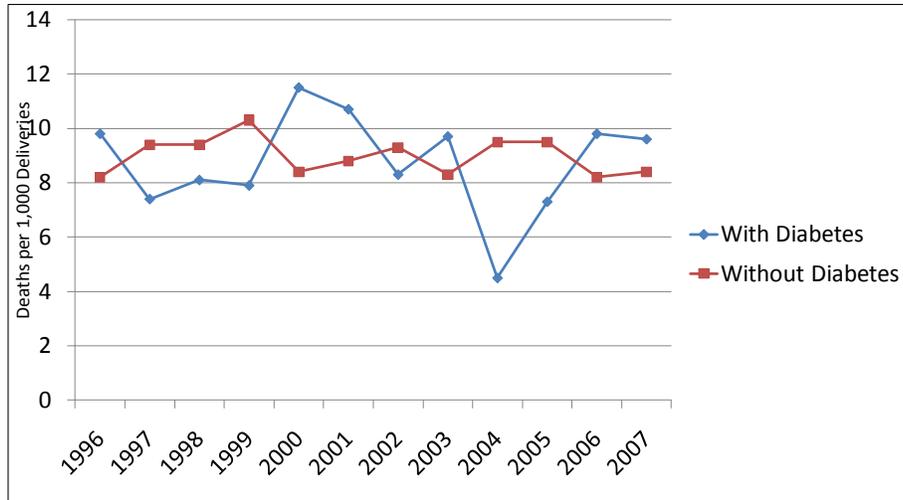
Infant mortality is defined as the number of infant deaths before the first birthday. The infant mortality rate is calculated by dividing the number of infant deaths by total number of live births multiplied by 1,000. Infant mortality rate in 1996 among mothers with diabetes was 9.8 per 1,000 live births while among non-diabetes mothers it was 8.2 per 1,000 live births. As table 4.5.2 shows the infant mortality rates has fluctuated over the past decade for both groups, however, SC is slightly better off than it used be in 1996.

**Table 4.5.2 Number of and Rate of Infant mortality among mothers with and without diabetes**

Year	With Diabetes		Without Diabetes	
	Number	Rate	Number	Rate
1996	16	9.8	405	8.2
1997	12	7.4	475	9.4
1998	14	8.1	492	9.4
1999	14	7.9	544	10.3
2000	21	11.5	457	8.4
2001	21	10.7	472	8.8
2002	18	8.3	486	9.3
2003	21	9.7	440	8.3
2004	14	4.5	510	9.5
2005	24	7.3	517	9.5
2006	32	9.8	481	8.2
2007	32	9.6	499	8.4

Source: SC PHSIS

**Fig. 4.5.2. Infant Mortality Rate among Mothers With and Without Diabetes**



Data Source: SC DHEC Vital Records

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

#### AIM 4.5.3 ABNORMAL CONDITIONS OF NEWBORN:

The Abnormal Conditions of the Newborn is defined in the live birth certificate as (item # 54):

- Assisted ventilation required immediately following delivery
- Assisted ventilation required for more than six hours
- NICU admission
- Newborn given surfactant replacement therapy
- Antibiotics received by the newborn for suspected
- neonatal sepsis
- Seizure or serious neurologic dysfunction
- Significant birth injury (skeletal fracture(s), peripheral
- nerve injury, and/or soft tissue/solid organ hemorrhage which requires intervention)

If any of the above boxes on the birth certificate is marked by the birthing place staff, the infant is classified as a newborn with abnormal condition.

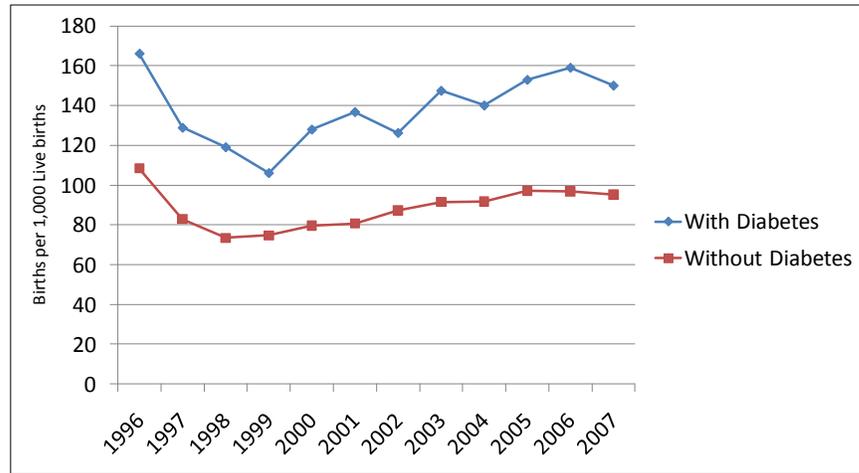
**Table 4.5.3 Number of and Rate of Newborns with Abnormal Condition among mothers with and without diabetes**

Year	With Diabetes		Without Diabetes		Total	
	Number	Rate	Number	Rate	Number	Rate
1996	271	166.2	5364	108.4	5,635	110.3
1997	209	128.9	4195	82.9	4,404	84.4
1998	205	119.1	3825	73.4	4,030	74.9
1999	189	106.1	3952	74.7	4,141	75.7
2000	233	128.0	4309	79.6	4,542	81.2
2001	268	136.8	4343	80.7	4,611	82.7
2002	274	126.3	4558	87.2	4,833	88.8
2003	320	147.5	4875	91.5	5,197	93.7
2004	434	140.1	4899	91.7	5,342	94.5
2005	506	153.0	5271	97.2	5,797	100.8
2006	517	159.1	5707	96.8	6,234	100.2
2007	499	150.1	5678	95.3	6,183	98.2

Source: SC PHSIS

In 1996, there were a total of 5,638 newborns with abnormal condition in SC, or 110.3 per 1,000 live births. A small percentage of these newborn were to the mothers with diabetes condition, although their rates (166.2) were relatively higher than if the mother did not have diabetes (108.4). Over time both rates dropped. In 2007, the number and rate of newborns with abnormal condition among mothers with diabetes were 499 and 150.1 respectively.

**Fig. 4.5.3. Rate of Newborns with Abnormal Condition among mother with and without diabetes**



Data Source: SC DHEC Vital Records

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

One of our strategies should be engaging other Maternal Child Health professionals, researchers, epidemiologists and their designees to help the DSC and serve on various subcommittees to achieve the next round of strategic goals and objective

**AIM 4.6 REDUCE DEATHS FROM DIABETIC KETOACIDOSIS (DKA) FROM 34 TO 30.**

Diabetic Ketoacidosis (DKA) is defined as the condition that cells don't get the glucose they need for energy, your body begins to burn fat for energy, which produces ketones. Ketones are acids that build up in the blood and appear in the urine when your body doesn't have enough insulin. High levels of ketones can poison the body. When levels get too high, you can develop diabetic ketoacidosis, or DKA (source: <http://www.diabetes.org/living-with-diabetes/complications/ketoacidosis-dka.html>). In 1997 among 1,029 diabetic deaths, there were a total of 34 with DKA. In 2007 there were 1,230 diabetic deaths of whom 34 were due to DKA. Table 4.6.1 shows the number and rate of diabetic deaths due to DKA from 1996 to 2007 by race and gender.

Table 4.6.1 Number of Diabetic Mortality Due to DKA\* by Sex

Year	Male		Female		Total	
	Number	Rate	Number	Rate	Number	Rate
1996	16	0.89	17	0.89	33	1.84
1997	16	0.88	22	1.13	38	2.09
1998	14	0.76	14	0.70	28	1.51
1999	11	0.59	14	0.70	25	1.33
2000	14	0.72	25	1.21	39	2.00
2001	21	1.06	16	0.77	37	1.87
2002	19	0.95	7	0.33	26	1.30
2003	12	0.59	19	0.89	31	1.54
2004	23	1.12	24	1.11	47	2.30
2005	23	1.11	13	0.60	36	1.74
2006	29	1.38	19	0.86	48	2.28
2007	13	0.61	21	0.93	34	1.58

Source: SC PHSIS

\* Diabetic Ketoacidosis (DKA) is defines to be cells don't get the glucose they need for energy, your body begins to burn fat for energy, which produces ketones. Ketones are acids that build up in the blood and appear in the urine when your body doesn't have enough insulin. High levels of ketones can poison the body. When levels get too high, you can develop diabetic ketoacidosis, or DKA. ICD-9={250.1} and ICD-10={E10.1, E11.1, E12.1, E13.1, E14.1}

Table 4.6.2 Number of Diabetic Mortality Due to DKA and Contributing Condition by Sex

Year	Male		Female		Total	
	Number	Rate	Number	Rate	Number	Rate
1996	16	0.89	17	0.89	33	1.84
1997	16	0.88	22	1.13	38	2.09
1998	14	0.76	14	0.70	28	1.51
1999	11	0.59	14	0.70	25	2.00
2000	14	0.72	25	1.21	39	1.87
2001	21	1.06	16	0.77	37	1.30
2002	19	0.95	7	0.33	26	1.54
2003	12	0.59	19	0.89	31	2.30
2004	23	1.12	24	1.11	47	2.30
2005	28	1.35	19	0.87	47	2.27
2006	35	1.66	22	0.99	57	2.71
2007	19	0.88	25	1.11	44	2.05

Source: SC PHSIS

**AIM 4.7 ESTABLISH A REGISTRY FOR CASES OF BLINDNESS DUE TO DIABETES.**

At this time no registry for blindness due to diabetes has been established. The South Carolina Commission for the Blind keeps statistics on the numbers of people with vision impairment in SC but they don't have information on the origin of the blindness, i.e. retinopathy, birth defect, etc. There are no plans at this time by either DSC or SCCB to establish such a registry.

**AIM 4.8 INCREASE THE NUMBER OF RISK REDUCTION ACTIVITIES AT THE COMMUNITY LEVEL.**

The number of risk reduction activities has increased exponentially in the past 10 years, thanks in part to support from CDC's Preventive Health Block Grant. This annual grant supports health promotion activities through state health departments. In South Carolina, a large portion of these funds go to support activities of regional health promotion staff. These individuals work with partners in their community to plan and implement activities which promote healthy lifestyles. Community partners may include local governments, worksite, faith organizations, community coalitions, such as diabetes coalitions, tobacco coalitions, multi-agency task forces for health promotion, schools, non-profit organizations, and other community organizations. Over the past 10 years, the type of health promotion activity has evolved from mainly "one-shot" programs, such as health fairs and presentations to community groups, to evidence-based activities which have been proven to show results and a shift from awareness and education efforts to efforts to affect policy and environmental changes.

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SCHOOL-AND DAY CARE-BASED PROGRAMS

Many of the activities focus on preschool and school-age children and their families, since this is where many lifestyle habits are formed. Some of these programs include "Color Me Healthy" <http://www.colormehealthy.com>, a program designed for use in day care centers to teach preschoolers and their families about healthy diet and physical activity. This program was developed in North Carolina jointly by the Cooperative Extension Service and NC Div. of Public Health. It was adapted for use in SC in 2003 and initiated in 82 sites that year. From 2003 to 2008 the program has expanded from the original 82 sites to more than 800 sites, a ten-fold expansion in five years (reference).

Many community efforts have involved schools. The School Health Index <https://apps.nccd.cdc.gov/shi/Default.aspx> is a self-assessment and planning tool that schools can use to improve their health and safety policies and programs. Schools across the country have made many changes in their health and safety policies and programs after implementing the SHI. Examples of some of the changes that have been made include:

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- Developed walking clubs and adopted Kids Walk to School programs
- Increased time for physical education
- Improved the nutritional quality of meals being served at school
- Removed unhealthy food choices from vending machines

“Five-A-Day for Better Health.” Coordinated by the SC DHEC's Division of Nutrition and Physical Activity, Five-A-Day for Better Health is a nationwide nutrition campaign to encourage fruit and vegetable consumption. The national five- a-day programs give annual awards to teachers who use innovative approaches to addressing fruit and vegetable consumption through school programs. In 1999, two SC teachers received two of the five awards, the first multiple winners for any state. SC DHEC's Nutrition Consultant also serves as the coordinator for the Five-A-Day Program and works closely with the SC DPCP staff to promote fruit and vegetable consumption education and awareness as a modifiable "lifestyle" - risk factor for diabetes.

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### PROGRAMS IN FAITH-BASED SETTINGS

Other health promotion activities involve a variety of initiatives in faith-based settings. These include efforts to establish healthy eating policies for church gatherings, promoting physical activity by creating walking trails, and implementing a variety of healthy lifestyle programs, including Body and Soul developed by CDC, <http://bodyandsoul.org>. Search you Heart, from the American Heart Association <http://www.americanheart.org/presenter.jhtml?identifier=3041580t>, as well as others.

Lighten Up! is a faith-based program dedicated to supporting healthier lifestyles of participants. The mission of Lighten Up! is to inspire, teach, and encourage all people to improve health through nutrition, exercise, and spiritual growth. Over the past 4 years, 621 persons (84% female, 54% African American, 18% with history of diabetes or blood glucose  $\geq 126$  mg/dl at baseline, with average age of 54 years) have completed the program. At baseline, 84% had BMI  $\geq 25$  kg/m<sup>2</sup> and 54%  $\geq 30$  kg/m<sup>2</sup>, 49% had cholesterol  $\geq 200$  mg/dl, and 55% have history of elevated blood pressure or systolic blood pressure  $\geq 140$  mmHg. Outcome data revealed a mean weight loss of 4 lb, 0.7 unit reduction in BMI, lowered systolic blood pressure and average of 4 points, triglyceride was lowered 12 points and total cholesterol reduced by 5 points. All these changes were statistically significant.

At least 47 different churches in South Carolina have conducted Diabetes Sundays at their church reaching as estimated 5,000 persons participating in diabetes related activities.

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### COMMUNITY AND HOSPITAL-BASED PROGRAMS

For Diabetes Alert Day, many local hospital diabetes programs, community groups, and health professionals provide information and screening for diabetes. PRO-Hampton County

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Diabetes Connection offers annual activities and community risk reduction programs for community residents. Note: The ADA African American Program was the basis for the current Diabetes Today Advisory Committee (D-TAC) and the annual African American Diabetes Day.

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### ENTERPRISE HYPERTENSION AND DIABETES MANAGEMENT AND EDUCATION PROGRAM

A community-based risk reduction program for Charleston's Enterprise Community (population 24,000 with 13.6% reporting diagnosis of diabetes) was initiated in 1997. Almost 1,000 persons have enrolled in the program and received healthy lifestyle information from an interdisciplinary team who specialize in diabetes care and prevention. Of those enrolled, 9% have diabetes, 62% have hypertension, and 29% have both diabetes and hypertension. For those who participated for at least one year, mean systolic blood pressure decreased from 141 to 136 mm Hg ( $p < 0.0002$ ), mean blood cholesterol decreased from 202 to 184 mg/dl ( $p < 0.02$ ). For those with diabetes (or diabetes and hypertension), A1c decreased by 0.7% with no significant change in body weight. For those with hypertension (and no diabetes), body weight decreased by 12 pounds over 1 year. This project formed the basis for REACH 2010, and was initially developed in collaboration with DSC and the DSC Outreach Council.

One of the initiatives focused on the occupational skill-building activities for women on welfare to transition to work. The Diabetes Initiative Outreach Council and REACH 2010 provide diabetes prevention and healthy lifestyles education as an integrated part of learning to use the Internet to locate accurate health information. Of all women who completed the program, 84% were employed at the end of one year.

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### PARTNERS IN WELLNESS

A collaborative program funded by the Duke Endowment Foundation to document and reduce risks for hypertension and diabetes is a program for students at Historically Black Colleges and Universities (HBCU) that promotes health awareness among African American students in the areas of diabetes, hypertension, obesity, and cardiovascular diseases. Students who take the course participate in community outreach programs to reduce risks. Approximately 600 students from the six South Carolina HBCUs have completed a one-semester course, and all students have developed and implemented projects related to diabetes and diabetes prevention in their communities. This program has formed the basis for the Outreach Core for Project EXPORT, and is currently being expanded to a two-semester course at South Carolina State University.

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### COMPLETE STREETS

One of the most effective initiatives to promote increased physical activity by walking and bicycling is a policy initiative called "Complete Streets" <http://www.completestreets.org>. Complete streets are designed and operated to enable safe access for all users. Pedestrians,

bicyclists, motorists, and public transportation users of all ages and abilities are able to safely move along and across a complete street. Complete Streets policies direct transportation planners and engineers to consistently design with all users in mind including drivers, public transportation riders, pedestrians, and bicyclists as well as older people, children, and people with disabilities. This involves installing sidewalks, wider bike lanes and altering intersections to make them more user-friendly for pedestrians and cyclists. Currently, several SC communities are in the initial stages of implementing Complete Streets policies.

## SIGNIFICANCE

Many improvements have been made in rates of diabetes complications and comorbidities. Age adjusted rates for MI in diabetes patients have been steadily declining. White females have had consistently lower MI rates. White males had the greatest decline in MI rates over 10 years. LEA rates have been decreasing in all race groups. Although rates still significantly higher in black population, rates have decreased significantly in black population. African American females have had the most improvement in LEA rates of all race or gender groups.

However, not all diabetes comorbidities have improved. Cases of ESRD have increased by almost 50%. Of those, cases of ESRD attributable to diabetes have increased by 66%. African American females and African American males had consistently highest ESRD rates, and no difference existed by gender. Black population has consistently had significantly higher ESRD rates than white population, and rates are rising in all race groups. Diabetes attributable ESRD is becoming a higher proportion of all ESRD.

Health promotion and diabetes prevention activities in communities across the state have increased significantly in the past decade. This is due to efforts by the DHEC Preventive Health Block Grant, Diabetes Prevention and Control Program, REACH 2010, and a variety of other organizations interested in the health of South Carolina's citizens. DSC has served as a forum for networking and information sharing among these groups.

## CHAPTER FIVE

### GOAL V TO REDUCE THE AGE-ADJUSTED MORTALITY RATES FROM DIABETES AND ITS COMPLICATIONS.

Authors: Khosrow Heidari, Patsy Myers

#### METHODS AND OPERATIONAL DEFINITIONS

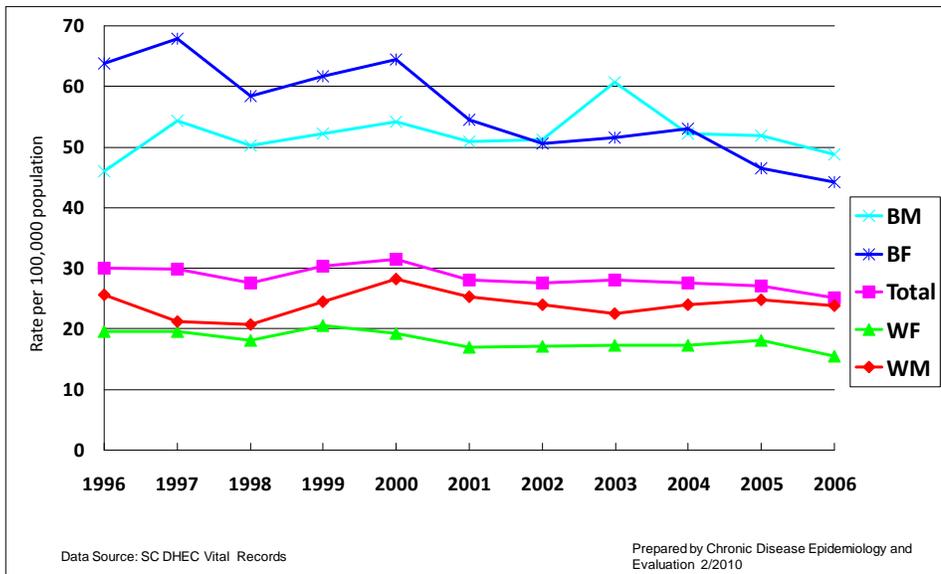
Mortality data comes from the SC death certificate data set, available from the SC DHEC Office of Public Health Statistics and Information Systems. Mortality statistics are derived from diabetes as the underlying cause of death. This does not include deaths from diabetes as a contributing cause of death. Age-adjustment is done by the direct method. The Years of Potentially Life Lost (YPLL) is a measure of loss of productivity due to premature death. YPLL is calculated by adding all the years of life for people with diabetes who died before normal life expectancy (70 years for men and 76 years for women).

**AIM 5.1** REDUCE AGE-ADJUSTED MORTALITY RATES FOR DIABETES AS A LISTED CAUSE OF DEATH BY 10% FROM 73.5 TO 66.0 PER 100,000 POPULATION.

#### MORTALITY

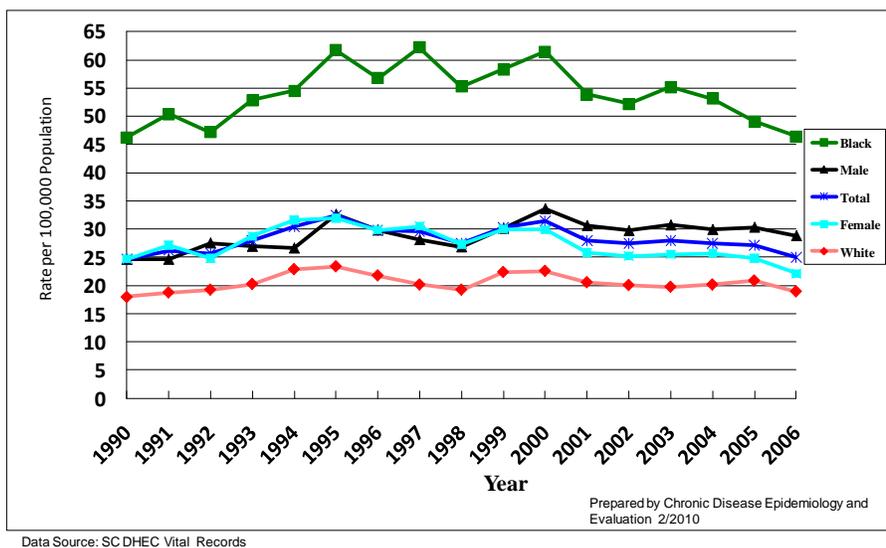
A total of 1,136 South Carolinians died from diabetes in 2006. Figure 5.1.1 shows that the age-adjusted mortality for which diabetes was the underlying cause of death decreased since 2000 and has remained around the rate of 27/100,000 population. African Americans had a mortality rate of 46.4/100,000 in 2006, more than 2.4 times the rate of 19/100,000 for whites. Men had a mortality rate 23% higher than that among women. During 1996 to 2006, the mortality rate of diabetes decreased by 14% for whites and 19% for African Americans.

**Figure 5.1.1. Age Adjusted Mortality Rate for Diabetes as the Underlying Cause of Death, SC, 1996-2006**



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 located a cluster of counties in the Pee Dee area. This pattern is consistent with that for risk factors, prevalence of diabetes and hospitalizations for diabetes.

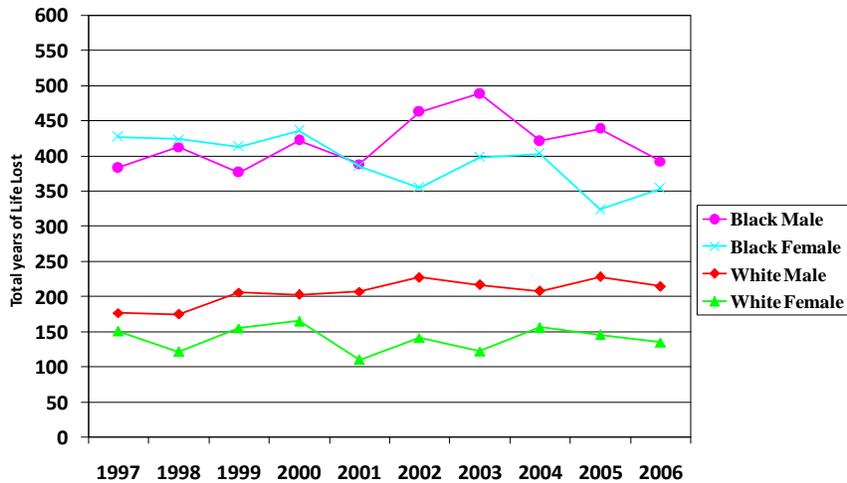
**Figure 5.1.2. Age Adjusted Mortality Rates for Diabetes as the Underlying Causes of Death by Race, Sex, SC, 1990-2006**



YEARS OF POTENTIAL LIFE LOST

The average life expectancy for people with diabetes is five to ten years less than for people without diabetes. The 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 (70 years for men and 76 years for women). As illustrated in Figure 5.1.3, 10,021 South Carolinians died from diabetes, which was listed as the underlying cause of death with a total of 53,901 potential years of life lost. On average, life expectancy for people with diabetes in South Carolina was 7.9 years less than the “normal” life expectancy. Among people with diabetes, men might have lost more years of potential life than did women, and African Americans potentially lost more years than did whites.

**Figure 5.1.3. Total Number of Years of Potential Life Lost Before the age of 75 for Diabetes as Underlying Cause of Death by Race-Sex, SC, 1997-2006**



Data Source: SC DHEC Vital Records

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HEALTHY PEOPLE 2010 OBJECTIVES:

Healthy People 2010 objective 5.5 goal was to “reduce the diabetes-related death rate.” Its main target was forty-six deaths per 100,000 populations.

Objective 5.6 of Healthy People 2010 goal was to “reduce diabetes-related deaths among persons with diabetes,” by targeting 7.8 deaths per 1,000 persons with diabetes.

Healthy People 2010 objective 5.7 goal was to “reduce deaths from cardiovascular disease in persons with diabetes.” Its target was 299 deaths per 100,000 persons with diabetes.

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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 African Americans, 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.

### **AIM 5.2 TARGET EFFORTS TO DECREASE MORTALITY RATES BY 10% IN THE 8 COUNTIES WITH HIGHEST RATES.**

In 1997 the top eight counties with diabetes mortality rates were: Lee, Williamsburg, Dillon, Marion, Chester, Allendale, Union, Calhoun (See Appendix A.x for all county statistics by race). Other than Williamsburg and Allendale counties, the other six counties have improved their ranking between 1997 and 2007. The overall diabetes prevalence and mortality rates have been on the rise for the past decade. Thus, it is not feasible to expect the rates for this group of counties to improve. Gain in ranking for a county is at the expense of another.

For this group of counties, the goal of reducing mortality rates has not been realized yet. See Table 5.2.1 for the comparison of 1997 to 2007 age adjusted diabetes mortality rates.

**Table 5.2.1 1997-2007 Diabetes Death Rates (Age Adjusted 2000)**

County	1997		2007		Gain in Rank
	Rate	Rank	Rate	Rank	
Allendale	52.7	6	70.6	3	-3
Calhoun	42.5	8	18	38	+30
Chester	53.5	5	41.4	6	+1
Dillon	58.5	3	35.6	11	+8
Lee	65.4	1	44.6	4	+3
Marion	55.9	4	42.6	5	+1
Union	52.6	7	34.7	12	+5
Williamsburg	60.6	2	79	1	-1

**AIM 5.3 DEVELOP SYSTEMS TO INCREASE ACCURACY OF REPORTING DIABETES ON DEATH CERTIFICATES. ADJUST ABOVE AIMS TO TAKE INCREASED REPORTING INTO ACCOUNT, IF ACCOMPLISHED.**

THE SCDHEC Office of Public Health Systems and Information Services (PHSIS), has been involved in an effort to improve the accuracy and completeness of death certificates, including converting from a paper-based record to a web-based system. The following is a description of the process from the PHSIS web site ( SCDHEC Office of Public Health Statistics and Information Systems, 2006).

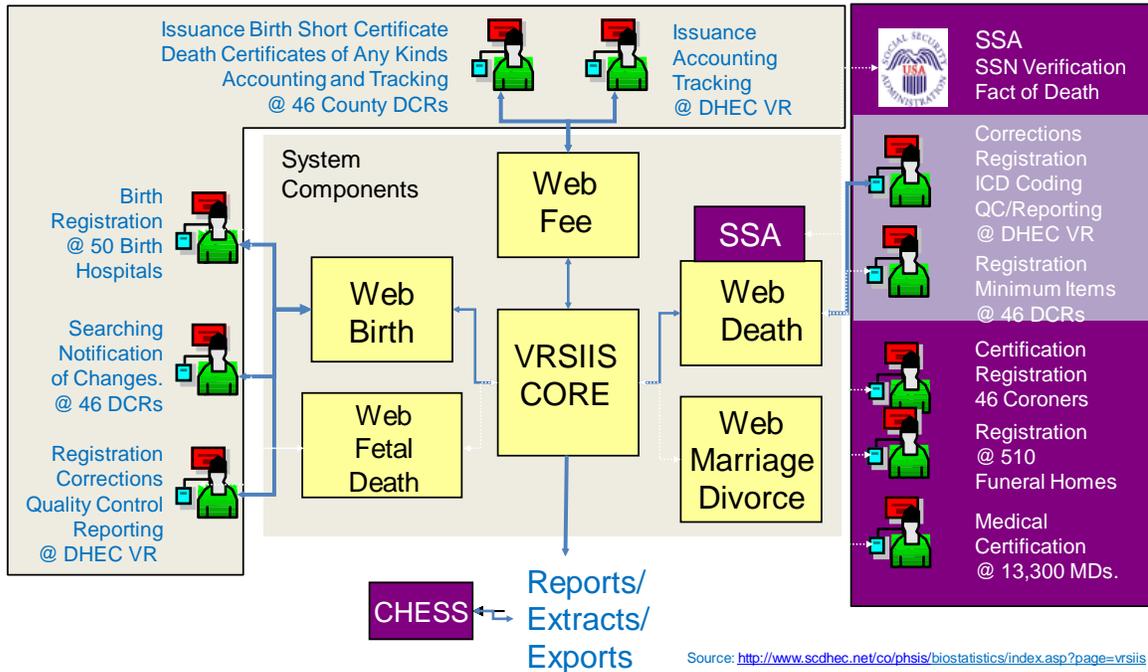
A web-based electronic death registration system (WebDeath) has been developed for South Carolina allowing death registration to occur via the Internet. The WebDeath System will improve timeliness and quality of death registration. It will enable participants of death registration to register death certificates with local and state registrars electronically.

WebDeath will provide online access so decedent fact of death, cause of death and demographic information can be entered by multiple death registration participants working on the same case. It will also eliminate the need to 'physically' locate physicians to obtain signatures when physicians use the WebDeath System. WebDeath allows medical certification of cause of death as well as the support of the completion and registration of a death certificate that is partially electronic and partially paper.

Additional features of the WebDeath System include: electronic completion and signatures (personal identification number or PIN) for medical certification of the cause of death; electronic completion and signatures (personal identification number or PIN) for demographic verification; real time verification of decedent names and social security numbers with the Social Security Administration; reduced staff time required for filing death certificates; and the ability for funeral directors to electronically request certified copies of death certificates. The WebDeath System will support trade calls electronically.

Because of the complexity of the WebDeath System, extensive input into the system has been and will continue to be received from funeral directors, morticians, coroners, physicians, and medical records personnel as it is further developed.

**Fig. 5.3.1. South Carolina Vital Record and Statistics Integrated Information Systems Dual Functions**  
 Legal and Statistics



**SIGNIFICANCE**

Encouraging trends have been happening in diabetes mortality rates. Rates have consistently been highest for African American females, and lowest for white females. African American females have shown a significant decrease in the past decade, the greatest improvement of any race/gender group. After rising steadily for years, the diabetes mortality rate for African American females has been declining steadily since its peak in 2000. Years of productive life lost (YPLL) has declined steadily in African American females, as well.

Unfortunately, while progress has been made, huge disparities still remain in diabetes mortality. Diabetes mortality rates for the African American population has maintained at three to four times higher than for the white population. Both African American males and females have more than twice as many years of productive life lost as white males and females, and years of productive life lost for African American males has stayed consistently high.

## CHAPTER SIX

### GOAL VI TO DECREASE RISKS FOR SELECT GROUPS OF PEOPLE WITH DIABETES WHERE THE PREVALENCE AND COMPLICATION RATES EXCEED THOSE OF OTHERS.

Author: Shelly Ann Bowen

#### METHODS AND OPERATIONAL DEFINITIONS

This chapter focuses more on summarizing interventions and initiatives created to reduce disparities in high risk populations.

#### **AIM 6.1** DECREASE THE RATE OF COMPLICATIONS AMONG AFRICAN-AMERICANS AND NATIVE AMERICANS BY 10%:

- \_ MORTALITY FROM 32.5 TO 29.2/100,000 (NWF) AND 26.7 TO 24.0/100,000 (NWM)
- \_ PERINATAL MORTALITY FROM 29.0 TO 26.1/1,000 DELIVERIES
- \_ INFANT MORTALITY FROM 17.4 TO 15.7/1,000 LIVE BIRTHS
- \_ AMPUTATIONS FROM 31.6% TO 28.4% (NWF)
- \_ ESRD (DIALYSIS) FROM 48.5% TO 43.6% (NWF) AND 25.6% TO 23.0% (NWM)

In an effort to decrease the rate of diabetes complications among minorities programs through DSC partnership to improve care and education such as Body Checks for People with Diabetes has been implemented. Body Checks for People with Diabetes was an intervention designed to train lay - persons to assist with improving diabetes self-management and care. Additional to individual level interventions DSC received funding from the Centers for Disease Control and Prevention to establish a Center of Excellence to eliminate health disparities related to diabetes. Through this center a randomized clinical trial to evaluate the effectiveness of a comprehensive diabetes self-management intervention that utilizes telemedicine to improve adherence to American Diabetes Association Clinical Practice Guidelines for adults with Type 2 diabetes living in rural South Carolina was funded.

A number of programs/projects have been funded and implemented over the past ten years in an effort to decrease overall perinatal and infant mortality in African Americans. Perinatal mortality in African Americans has been impacted. Encouraging trends are apparent

regarding pregnancy and diabetes. These probably reflect improved blood sugar control. Rates of congenital malformations (an indication of poor blood sugar control during pregnancy) fell and infant mortality (also dependent upon good blood sugar control) also declined. Media interventions such as articles and advertisements highlighted gestational diabetes and how to give a healthy start to both mom and baby. The Office of Minority Health also featured articles on “Count Your Steps” which encouraged women to get moving.

Infant mortality in African Americans: A study focusing on the *Impact of Maternal Obesity and Diabetes on Racial Disparities in Infant Health* was funded through the Center for Health Disparities Research at MUSC to collect preliminary data to examine whether the prevalence of high birth weight infants and maternal diabetes during pregnancy has increased and whether race/ethnic group is associated with poor maternal and infant outcomes following the birth of a high birth weight infant or an infant exposed to maternal diabetes during pregnancy. Scheduled to be published in *Current Diabetes Reports* findings stated that once diagnosed with GDM, a woman has a 7-fold increased risk of developing type 2 diabetes relative to women who did not have diabetes during pregnancy. In addition, up to one third of women with GDM have overt diabetes, impaired fasting glucose, or impaired glucose tolerance identified during postpartum glucose screening completed within 6 to 12 weeks. Therefore, the American Diabetes Association, the World Health Organization and the American College of Obstetricians and Gynecologists currently recommend postpartum glucose screening following GDM. However, despite this recommendation, in many settings the majority of women with GDM fail to return for postpartum glucose testing. Studies conducted to date have not comprehensively examined the health care system, the physician, or the patient determinants of successful screening. These studies are required to help develop standard clinical procedures which enable and encourage all women to return for postpartum glucose screening following GDM. Kelly J. Hunt<sup>1</sup>, PhD, Sarah L. Logan<sup>1</sup>, MS, Deborah L. Conway<sup>2</sup>, MD, Jeffrey E. Korte<sup>1</sup>, PhD Postpartum Screening Following GDM: How Well are We Doing?

*SEARCH for Diabetes in Youth 2: South Carolina Site was previously developed during the South Carolina Diabetes Child & Adolescent Registry (SEARCH) study and funded by the CDC/NIDDK (NIH). The purpose of the project was to maintain a network of standardized surveillance systems of childhood diabetes that targeted accurate documentation of the prevalence and incidence of specific diabetic phenotypes among diverse populations. PI: Elizabeth Mayer-Davis at USC Beth Mayer-Davis et al., Testing the Accelerator Hypothesis: the SEARCH for Diabetes in Youth Study. In press, Diabetes Care, 2005; pg 402*

### Emergency Department (ED) Visits

Within the report an intervention that reported impact on ED visits was Commun-I-Care. This intervention linked persons with diabetes in need of care and education with agencies that provided support and care. Following enrollment in the program, Emergency Department visits and hospitalizations have significantly decreased for people with diabetes, and participant reported satisfaction with the program is excellent.

Emergency Department Use by African Americans with Diabetes was funded by NIH – National Institute for Nursing Research. This qualitative/quantitative study examined non-emergent use of the ED. PI: Dr. Carolyn H. Jenkins at M.U.S.C (2006)

## SIGNIFICANCE

This chapter provides information on some of the DSC partnership interventions and research initiatives that have shown impact on diabetes outcomes in SC. Interventions such as Commun-I-Care which has shown to significantly decrease ED visits among those who enrolled in one of the many programs proven to work among vulnerable people at risk for complications due to diabetes.

The need for continued aggressive measures for reducing complications in diabetes in vulnerable populations is both imperative and urgent. Efforts to decrease risk of complications within vulnerable and disparate groups with diabetes where the prevalence and complication rates exceed those of others will continue to show positive outcomes when individual and systems level interventions are implemented collaboratively and as different entities continue to work together to develop new approaches. Academic research plays an important role in the creating and testing of interventions that will prove impactful when translated into practice. The challenge is to sustain these endeavors through ongoing funding of these initiatives and programs that we know for sure works within the population.

# CHAPTER SEVEN

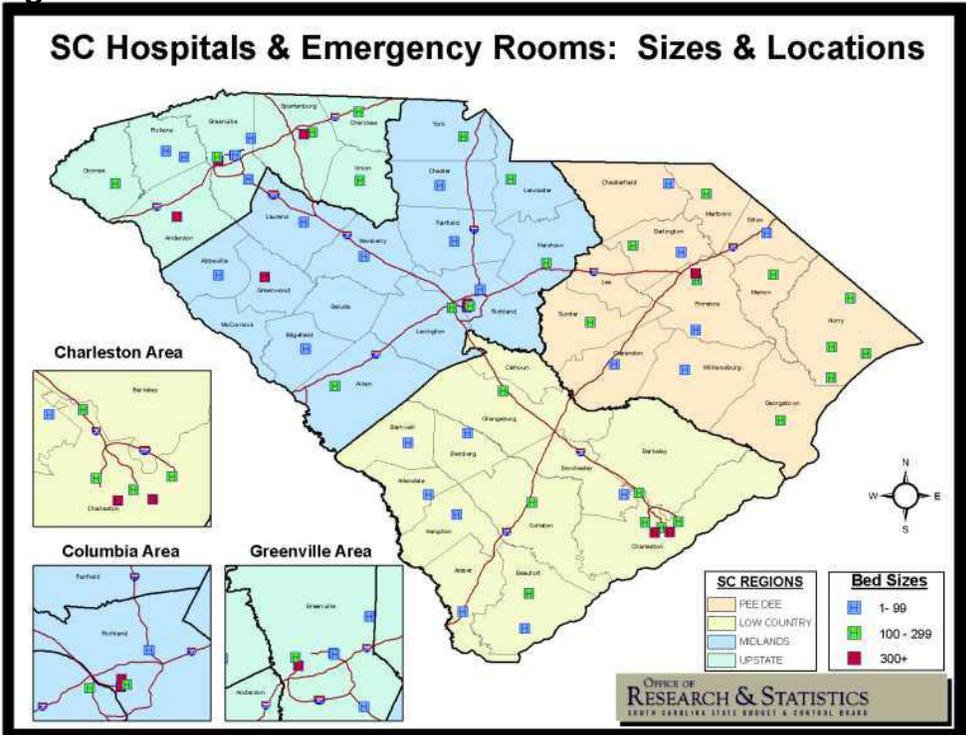
## GOAL VII. DECREASE PREVENTABLE HOSPITAL ADMISSIONS AND CHARGES

Authors: Patsy Myers, Khosrow Heidari

### METHODS AND OPERATIONAL DEFINITIONS

“Preventable” hospital admissions are defined as those diabetes visits without complications, a visit with diabetes a primary diagnosis code of 250.0, indicating diabetes with no further complications. Theoretically these are visits that could have been prevented by timely and effective outpatient care. This has been defined as a visit with diabetes a primary diagnosis code of 250.0, indicating diabetes with no further complications. Diagnosis codes of 250.1-250.9 indicate diabetes complications. The “uncomplicated” diabetes was then subdivided into type 1 and type 2 diabetes.

Figure 7.0.1

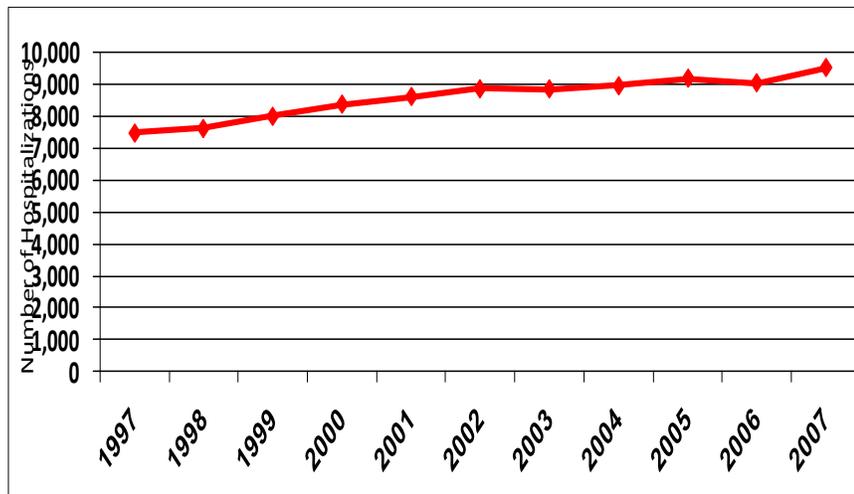


**AIM 7.1 REDUCE THE ANNUAL NUMBER OF HOSPITALIZATIONS FOR DIABETES BY 10% PER YEAR FROM**

A decrease in hospital admissions and charges was met by DSC for admissions but not for charges. Diabetes hospitalizations rates improved despite a gradually increasing total number of hospitalizations attributable to the increasing prevalence of diabetes. Hospital charges for inpatients with diabetes increased exponentially from 1996-2006.

Between 1996 and 2006, there was a net 28% increase in the number of hospitalizations for diabetics in SC. There were 90,711 hospitalizations with a primary discharge diagnosis of diabetes between 1996 and 2007 with hospital charges totaling \$1,321,003,239. This does not include the patients hospitalized for diabetic co-morbid conditions such as coronary artery disease, stroke, and renal failure. In 1996, there was an increase in the number of hospitalizations for diabetes as a primary discharge diagnosis in SC. This is shown in figure 4.

**Figure 7.1.1. Total Number of Hospitalizations for Diabetes as the Primary Diagnosis, SC, 1997-2006**

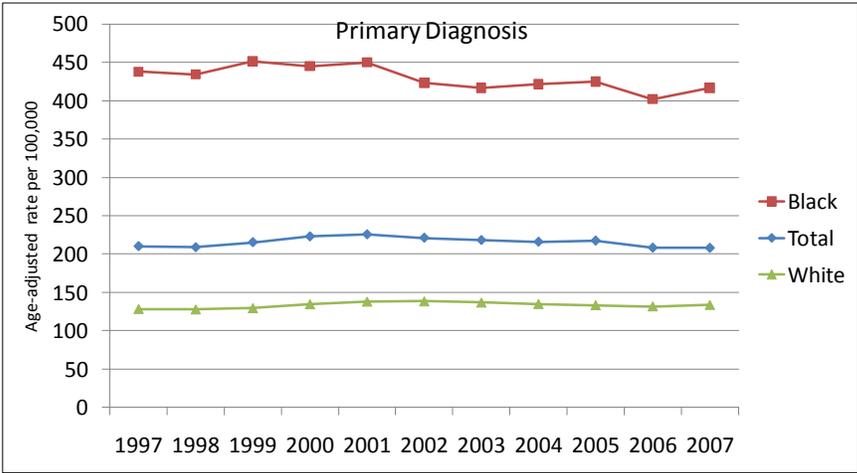


Data Source: ORS hospital discharge data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

There was a decrease in SC hospitalizations for diabetes as a primary diagnosis among African Americans, however, hospitalization rates for whites has remained stable (Figure 7.1.2). Diabetes hospitalization rates for African American have remained consistently three times that of the white population.

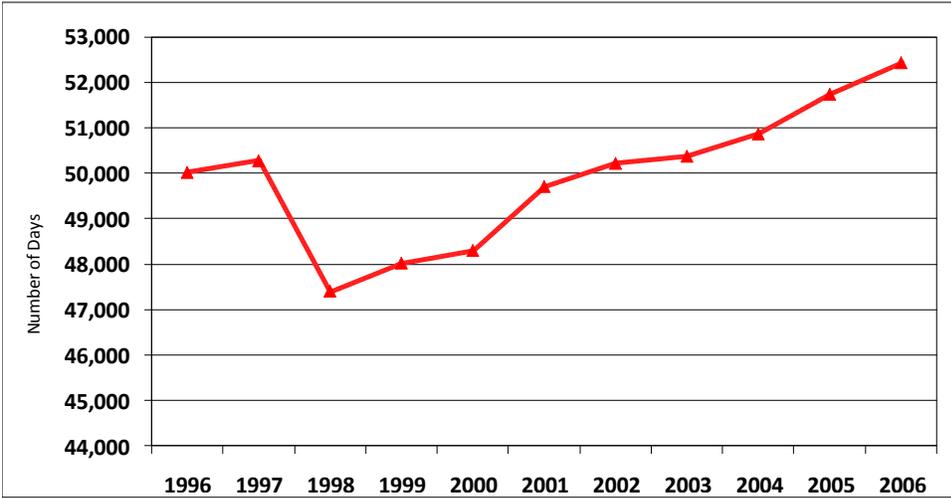
**Figure 7.1.2. Diabetes Hospitalization Rates by Race**



Data Source: ORS hospital discharge data

Prepared by Chronic Disease Epidemiology and Evaluation 10/2010

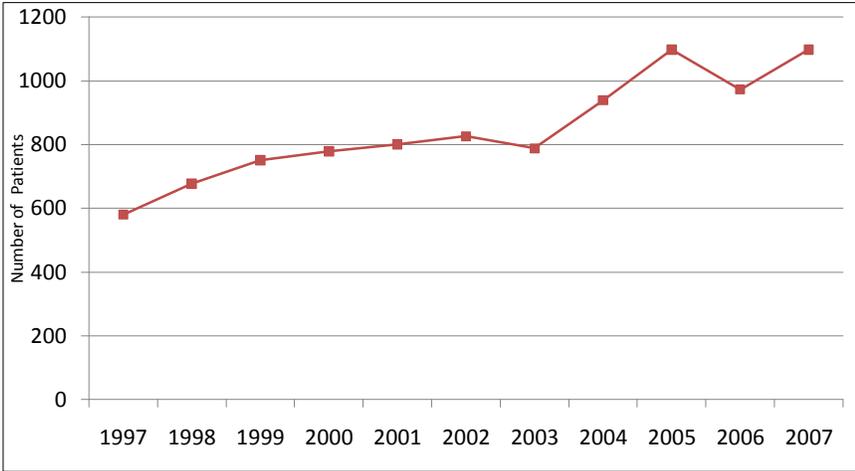
**Figure 7.1.3. Total Length of Hospital Stay for Patients with Diabetes as the Primary Diagnosis, 1996-2006**



Data Source: ORS hospital discharge data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

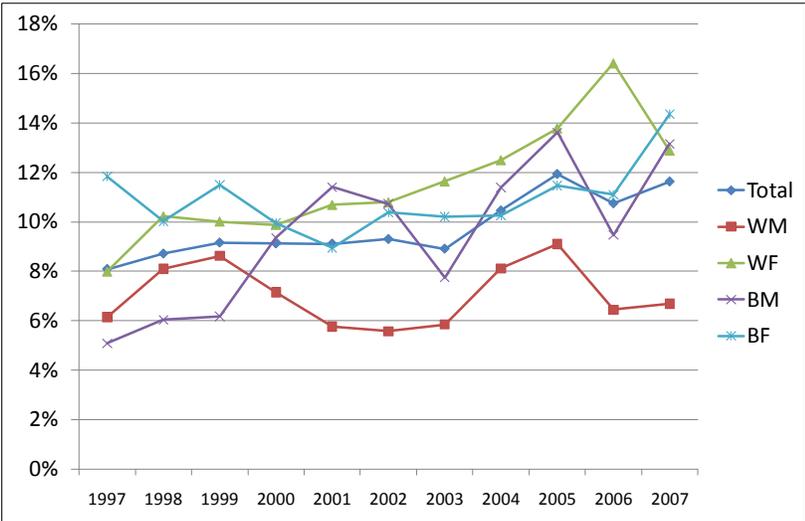
**Fig. 7.1.4. Number of Diabetes Patients with 4 or more hospitalizations**



Data Source: ORS hospital discharge data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

**Figure 7.1.5. Percent of Diabetes Patients with 4 or more Hospitalizations**



Data Source: ORS hospital discharge data

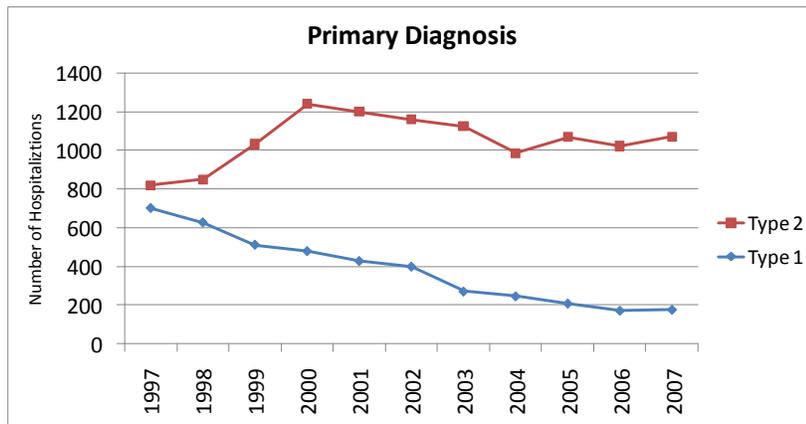
Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

The number of patients with 4 or more repeat hospitalizations has almost doubled in the past decade (Fig. 7.1.4).

AIM 7.2 DECREASE THE PERCENTAGE OF VISITS FOR UNCOMPLICATED DIABETES.

There has been an overall decrease in the number and percent of inpatient hospitalizations for “uncomplicated” diabetes. However, hospitalizations for type 2 diabetes have been increasing. Type 1 hospitalizations have shown a three-fold decrease in the past decade.

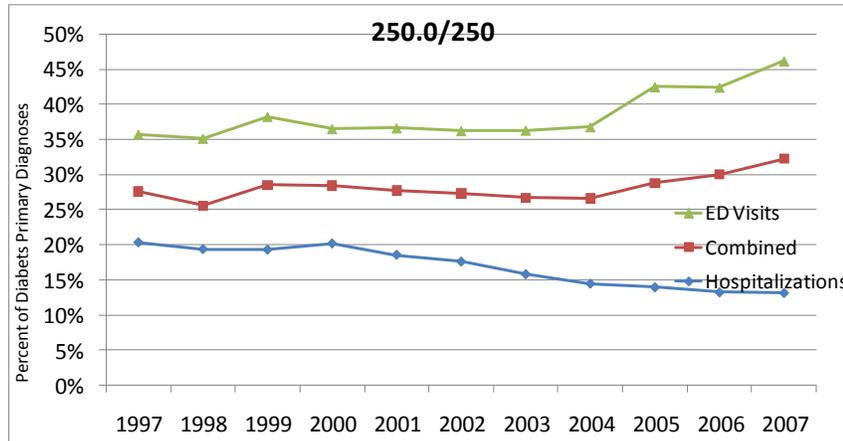
Fig. 7.2.1. Types of “Uncomplicated” Diabetes Hospitalizations



Data Source: ORS hospital discharge data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

**Fig. 7.2.2. Percent of Hospitalizations for “Uncomplicated” Diabetes**



Data Source: ORS ED visit and hospital discharge data

Prepared by Chronic Disease Epidemiology and Evaluation 2/2010

## SIGNIFICANCE

The most dramatic change in the past 10 years involves hospitalizations from type 1 diabetes. Numbers of hospitalizations from type 1 diabetes have dropped by almost 75%, whereas hospitalizations from type 2 have increased by 30%. The percent of hospitalizations from “uncomplicated diabetes” as a primary diagnosis has decreased by 35% in the past decade. However, this decrease may be due to a policy change in insurance reimbursement for inpatient diabetes treatment. These patients now may be treated in the emergency department as opposed to inpatient care.

Unfortunately, not all changes are positive. Total number of diabetes hospitalizations is rising, even considering restrictions in reimbursement. Age –adjusted rates for diabetes hospitalizations have increased over the past decade. Females have historically had higher rates than males, although rates for males have risen faster than females. Total length of stay for diabetes has increased steadily for the past 10 years, reflecting both increasing numbers of hospitalizations and increasing length of stay. The number of patients with 4 or more hospitalizations in a given year has more than doubled in the past decade.

## CHAPTER EIGHT

### GOAL VIII REDUCE PREVENTABLE VISITS TO THE EMERGENCY ROOM BY PEOPLE WITH DIABETES.

Authors: Patsy Myers, Khosrow Heidari, Thomas Gaffney

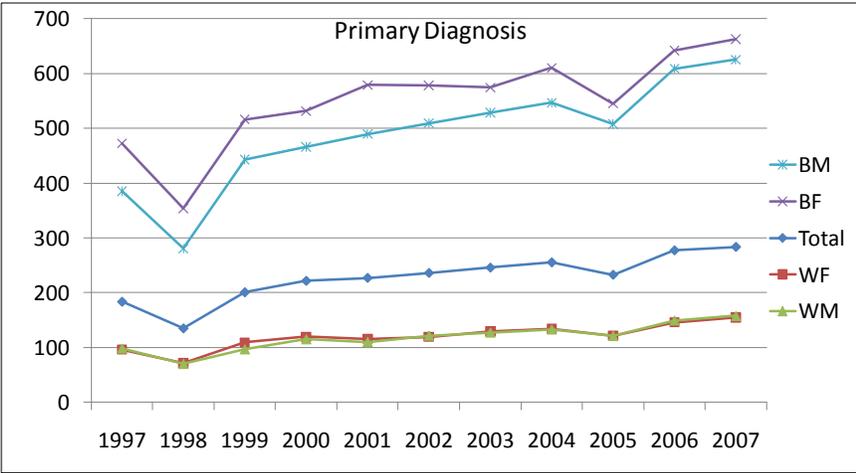
#### METHODS AND OPERATIONAL DEFINITIONS

“Preventable” visits to the Emergency Department have been defined as those diabetes visits without complications. This has been defined as a visit with diabetes a primary diagnosis code of 250.0, indicating diabetes with no further complications. Diagnosis codes of 250.1-250.9 indicate diabetes complications. The “uncomplicated” diabetes was then subdivided into type 1 and type 2 diabetes.

#### **AIM 8.1 REDUCE THE ANNUAL NUMBER OF EMERGENCY ROOM VISITS FOR DIABETES BY 10% PER YEAR FROM 10,628 TO 9,565.**

Visits to the Emergency Department with a primary diagnosis of diabetes increased by 152% from 1997 to 2007. The increase in diabetes ER visit rates was dependent on age and race. The highest ER visit rates were among 65-85 year olds and African Americans. The rates for African American females increased from 472 per 100,000 in 1997 to 663 per 100,000 in 2007. African American males showed the greatest increase in rates. Rates for white males and females increased by 61% from 96 and 97 per 100,000, respectively in 1997 to 157 and 155 per 100,000, respectively in 2007 (Fig .8.1.1).

**Fig. 8.1.1. Diabetes ED Visits by Race and Gender**

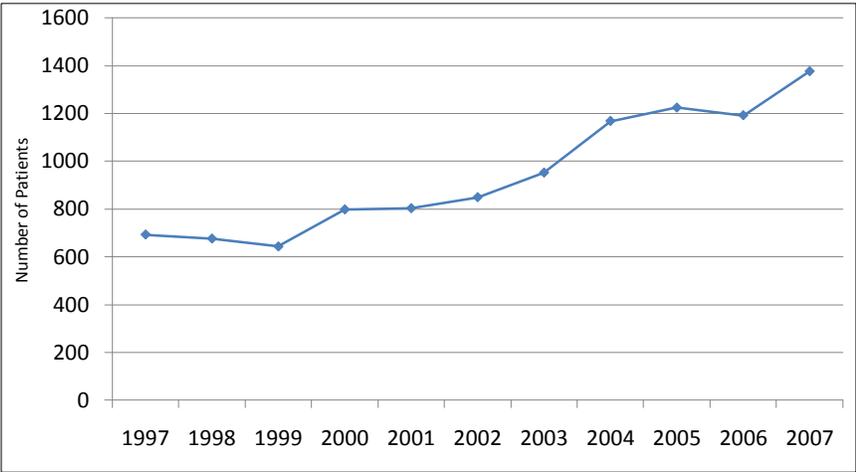


Data Source: ORS Emergency Department discharge data

Prepared by Chronic Disease Epidemiology and Evaluation 10/2010

Repeat ED visits have increased astronomically. The number of patients with four or more ED visits in a year has doubled in the past decade. The largest increase has been in African American males, whose repeat hospitalizations of four or more per year has tripled in the past decade (Fig 8.1.2).

**Fig. 8.1.2. Number of Diabetes Patients with 4 or more ED visits**



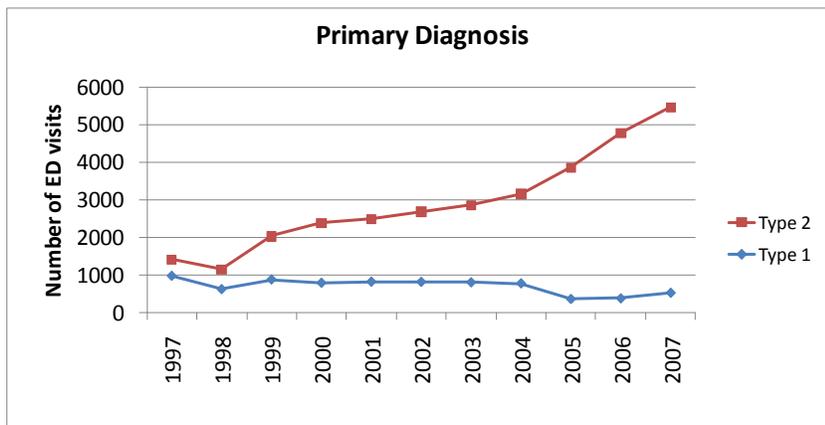
Data Source: ORS ED visit data

Prepared by Chronic Disease Epidemiology and Evaluation 6/2010

**AIM 8.2 DECREASE THE PERCENTAGE OF VISITS FOR UNCOMPLICATED DIABETES FROM 79% TO 71%.**

The number of “uncomplicated” has increased dramatically in the past 10 years. ED visits for “uncomplicated” type 2 diabetes have increased more than five-fold, while ED visits for Type 1 diabetes have gone down slightly (Fig. 8.2.1.)

**Fig. 8.2.1. Types of “Uncomplicated” Diabetes ED Visits**



Data Source: ORS ED visit data

Prepared by Chronic Disease Epidemiology and Evaluation 4/2010

**SIGNIFICANCE**

This goal has not been met. Instead, there was a 126% increase in the number of diabetes ER visits between 1996 and 2006. The greatest increase in ER visits occurred among African Americans and there were age dependent, year to year, increases in racial disparity.

The astronomical rise in ED visits for patients with diabetes described above may also be partially explained by changes in insurance coverage for hospitalizations. i.e., some of these ED visits might have been inpatient admissions in the past. The number of “uncomplicated” diabetes ED visits from type 1 diabetes has decreased by almost 50% in the past decade. The number of people with diabetes who have had 4 or more ED visits in a given year has doubled in the past decade. The number of “uncomplicated” diabetes ED visits from type 2 diabetes has almost tripled in the past decade.

## CHAPTER NINE

### GOAL IX TO IMPROVE THE STATISTICAL BASIS FOR ESTIMATING THE PREVALENCE OF DIABETES AND DIABETES RELATED COMPLICATIONS IN SOUTH CAROLINA.

Authors: Patsy Myers, Tom Gaffney, Khosrow Heidari

#### METHODS AND OPERATIONAL DEFINITIONS

South Carolina's Office of Research & Statistics (ORS) Staff has developed a Medicaid, Medicare & State Health Plan Claims based dataset which linked to American Community Survey Census estimates & ICD-9 Hospital Discharge & Outpatient Charge Codes constitutes annually updatable, statewide evidence based, registry-like tool that permits estimates of age, race and gender based diabetes prevalence, complications, & diabetes populations. Though highly promising, sufficient time has not elapsed to explore the value of this tool for estimations, design & evaluation of the impact of preventive interventions, patient, provider, & public education, i.e., possible DSC Goals for 2010-2020.

#### **AIM 9.1. SCREEN HIGH-RISK INDIVIDUALS SO AS TO IDENTIFY UNDIAGNOSED INDIVIDUALS WITH DIABETES.**

2003-2004 Several local agencies provided a total of 227 free health screens for diabetes, blood pressure, cholesterol, HIV and syphilis, and Body Mass Index. Of those screened, 50 percent warranted further testing by their primary care physician in one or more area, excluding HIV and syphilis. Health care providers also provided immediate assessment and recommendations for follow-up medical examination to those who screened high-risk.

A 2003 Pilot (Diabetes Initiative of South Carolina 1997) Diabetes Detection Initiative: DHEC's Diabetes Prevention and Control Staff, participated in a 2003 national CDC supported city, county, regional Pilot Diabetes Detection Initiative targeting Orangeburg, SC, one of ten High Risk Diabetes Pilot Detection Sites studied in the United States, i.e., Orangeburg, SC; East Harlem, NY; Springfield and Mt Holyoke, Ma; Fayette & Greenbrier Counties, WV; Flint, MI; Choctaw Indian Nation, OK; Wichita-Sedgwick County, KS; Wind River Indian Reservation, WY; Oakland, CA; and Seattle, WA.

Part of this study was an evaluation of a "Risk Assessment Test" developed for the American Diabetes Association.

## Diabetes Initiative of South Carolina Ten-Year Evaluation Report

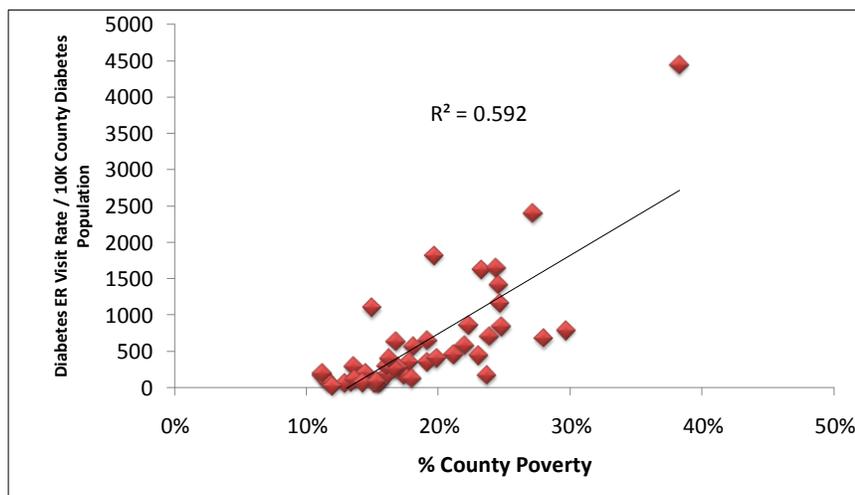
Strategies to engage community participants, encourage completion of the risk test, assess barriers to new case follow up by providers, & estimate detection effectiveness were evaluated.

The average number of new cases of diabetes diagnosed in the eight Clinics possessing a Diabetes Registry was 11.5 per month or an estimated average of ~ 138 new cases per year for each Clinic.

Paraphrased Conclusion of Two Published Reports <sup>[1], [2]</sup>: Detection of diabetes in high risk populations in the United States is easier said than done and will not be an effective public health strategy unless new cases detected have facilitated access to Primary Care Providers, and improved care, i.e., a possible DSC Aim or Goal for 2010-2020.

Identifying Some of SC's Highest Risk Geographic Locations & Populations for Possible Zip Code Analyses, Screening, Preventive Interventions, & Preventable Diabetes Hospitalization Charge Reductions,: Based on 2005 and 2006 data, DSC's Diabetes Surveillance Council Members determined the statistical association between SC County poverty levels & the prevalence of diabetes & risk of preventable diabetes hospitalizations and Emergency Room Visits in each such county in SC..

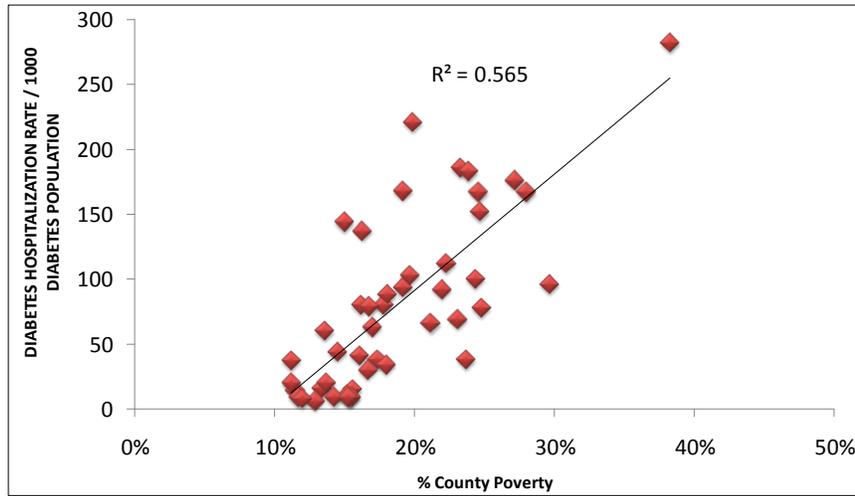
**Fig. 9.1.1. SC County Diabetes ER Visit Rate / 10 K Diabetes Population vs % County Poverty 2006**



Data Source: ORS Hospital discharges and Census data

Prepared by Thomas Gaffney, M.D. 2/2010

**Fig. 9.1.2. SC County Diabetes Hospitalization RATES / 1000  
Diabetes Population vs % County Poverty 2006**



Data Source: ORS Hospital discharges and Census data

Prepared by Thomas Gaffney, M.D. 2/2010

The data support the conclusion that in 2005 and 2006, the only years analyzed so far, SC Counties with highest levels of poverty had the highest prevalence of diabetes (data not shown), and highest preventable diabetes hospitalization rates and preventable ER Visit Rates and conceivably have the highest proportion of undiagnosed and inadequately controlled diabetes in SC.

Though highly provocative, sufficient time has not elapsed to explore the value of this county level outcome information as a guide to studies of the relationship between SC zip-code median incomes and zip code diabetes hospitalization rates, ER Visit Rates and hospital charges in SC’s highest risk counties. The same is true with respect to studies of the prevalence of undiagnosed Impaired Fasting Glucose, Pre-Diabetes, and Uncontrolled Diabetes in population dense zip codes within SC’s highest risk counties, i.e., possible DSC Aims or Goals for 2010—2020.

Importance of County-Level Income Versus County Level Diabetes Outcome Information: Rationale for Aggressive High Risk Population Screening & Preventive Interventions on Behalf of SC’s Highest Risk Counties, Zip-Codes, and Populations: Jiang et al reported that “in 2006, nearly 4.4 million hospital admissions, totaling \$30.8 billion in hospital costs could potentially have been prevented with timely and effective ambulatory care or adequate self-management<sup>[3]</sup>” of Ambulatory Care Sensitive Conditions such as diabetes.

Huang et. al. recently reported that the U.S. “diabetes population and related costs are expected to at least double in the next 25 years<sup>[4]</sup>” projecting “the number of Americans with diagnosed and undiagnosed diabetes will increase from 23.7 million to 44.1 million. During the same time period, annual spending related to diabetes is expected to increase from \$113 billion

to \$336 billion in constant 2007 dollars”. “Without significant changes in public or private strategies, this population and cost growth are expected to add a significant strain to an (already severely<sup>[5]</sup>) overburdened health care system”. The same is especially true for SC’s most economically disadvantaged counties and zip codes.

**AIM 9.2. ESTABLISH A REGISTRY (OR STATEWIDE DATABASE) FOR DIABETES EVALUATION**

A State Diabetes Registry might consist of a chronological, electronic, database containing patient-specific, diagnostic, therapeutic, self-management, clinical outcome, demographic, charge, insurer, address, & provider information on every patient with diabetes in SC.

The value of a Registry, depending on how it is constructed, is that it can permit and facilitate repeated time based measurements of the burden of diabetes in localities throughout a State reflective of the longitudinal and aggregate effects of preventive interventions on diabetes prevalence, hospitalizations, Emergency Room Visits, complications, disability, mortality, insurer and societal costs in counties, zip codes, neighborhoods, and block groups, throughout the State.

Although not technically a registry, the ORS Staff’s claims based, census, ICD-9 Code tool described above permits diabetes registry-like analyses & provides a new tracking tool for patients, health professionals, insurers, indeed all SC diabetes & public health stakeholders. This database is a combination of State Health Plan, Medicaid and Medicare claims data for a given year. It offers the ability to use “hard” data from known populations to calculate prevalence, which could be an advantage over BRFSS.

However, there are some limitations.

- The assumption that Medicaid is representative of the poor population under age 65; this method should be accurate for children and adults under age 45; however, for the 45 and older population, they are largely on Medicaid because of disability – we don’t know whether there would be more of a pre-disposition to diabetes in this population.
- The assumption that State Health Plan is representative of the population at or above 200% of poverty under age 65; we don’t know if the SHP population is skewed toward higher educational levels than the state population estimated to be above 200% of poverty; if there is a difference, we could be under-estimating the prevalence in this component of the population.
- The database does not include claims data from any private insurance carrier except the State Health Plan. This is for state employees only, and does not include private-sector employees. Thus, a large segment of the state’s population is not being represented. We don’t know if diabetes prevalence rates would be different in this group, and thus, change the prevalence rates as determined by this database.

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It is important that providers and insurers can link provider and insurer-captured claims data like Hg A1c, BMI, etc to the ORS system enabling both practice-specific and insurer specific diabetes outcome analyses in a privacy protected, manner. ORS Health-Information-Exchange work with Self Memorial Hospital, associated primary care providers, & others extends the potential for ORS/DHEC/DSC/ Insurer diabetes surveillance & patient/provider feedback mechanisms by extracting hospital & outpatient EMR data to produce inclusive, highly informative, longitudinal, records.

### SIGNIFICANCE

DSC Member Individual and collaborative accomplishments pertaining to Goal IX, arguably far exceed DSC stated 1998 Goal IX. That said, sufficient time has not elapsed to test & demonstrate the enormous potential practical value of DSC's Member 1998-2008 individual and collaborative Goal IX related accomplishments, e.g., new statistical tools with which to monitor patient & population outcomes and patient/provider's short & long term preventive goals, new Health Information Exchange Capabilities with huge implications for local, regional, & statewide diabetes & DSC surveillance efforts, improved care and communication between providers, hospitals, and patients, new MUSC based Hypertension Initiative strategies to extend and improve collaborative hypertension and diabetes outcome analyses with Private and Public Practices and Insurers, new high risk geo-coding diabetes and hypertension tracking strategies to identify and assist high risk geographic locations and populations, facilitation of collaborative research & preventive interventions, elimination of unnecessary duplication in laboratory & imaging procedures, cost reduction, and reduction of Private and Public Safety Net Insurer costs, and last but not least a strengthening of collaboration and communication among all SC public and private DSC diabetes stakeholders interested in improving diabetes surveillance, outcomes, education, and research.

## SUMMARY AND OVERALL CONCLUSIONS

### WERE GOALS MET? IF NOT, WHY NOT?

Two of nine cited DSC Ten Year Goals were met in whole, and six others were met in part, or significant progress was made between 1997 & 2007. Goal 2, “To increase the utilization of short-term measures which delay progression of complications of diabetes” and Goal 3, “To increase services and education in health professional shortage areas in South Carolina” were met. Increases were observed in utilization of semi-annual A1Cs, professional foot exams and Eye exams. Almost one-half (47%) of SC hospitals have an Intensive Glucose Monitoring Program in place, and one-third have one underdevelopment. Based on BRFSS, some improvement in lifestyle activities to improve health among people with diabetes has been made, such as attempts to stop smoking, daily aspirin regimens, attempts to lose weight and increase physical activity. Reimbursement for diabetes care has improved somewhat. The number of physicians needed for diabetes care has improved over the past 10 years. The number of family/general practitioners has doubled, internists have more than doubled, cardiologists have increased by 126%, and endocrinologists have quadrupled in 10 years. The number of CDE’s is still inadequate, but has more than tripled in 10 years.

Significant progress has been made on these goals, although they were not completely met:

- Goal 1. To improve knowledge of diabetes, quality of life, and access to prevention and intervention services,
- Goal 4. To reduce the morbidity rates from diabetes-related complications.
- Goal 5. To reduce the age-adjusted mortality rates from diabetes and its complications.
- Goal 6. To decrease risks for select groups of people with diabetes where the prevalence and complication rates exceed those of others
- Goal 7. To reduce preventable hospital admissions and charges for diabetes.
- Goal 9. To improve the statistical basis for estimating the prevalence of diabetes in South Carolina.

Attendance in DSME classes has maintained at between 50 and 60% of diabetes population. Glucose self monitoring has more than doubled, and at least 70% of people with diabetes report doing foot self-exams. In the past decade, strides have been made in reimbursement for diabetes education, initially by Medicare and Medicaid and some insurance companies. Many improvements have been made in rates of diabetes complications and comorbidities. Myocardial infarctions in diabetes patients have been steadily declining. Amputation rates have been decreasing in all race groups, but particularly in African American females. Encouraging trends have been happening in diabetes mortality rates. African American females have shown a significant decrease in the past decade, the greatest improvement of any race/gender group. One of the most dramatic changes in the past 10 years involves hospitalizations from type 1 diabetes. Numbers of hospitalizations from type 1

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diabetes have dropped by almost 75%, whereas hospitalizations from type 2 have increased by 30%. Health promotion and diabetes prevention activities in communities across the state have increased significantly in the past decade. This is due to efforts by the DHEC Preventive Health Block Grant, Diabetes Prevention and Control Program, REACH 2010, and a variety of other organizations interested in the health of South Carolina's citizens. DSC has served as a forum for networking and information sharing among these groups.

Goal 9 related accomplishments, e.g., new statistical tools with which to monitor patient & population outcomes and patient/provider's short & long term preventive goals, have been significant. Although not technically a registry, the ORS staff's claims based, census, ICD-9 Code tool permits diabetes registry-like analyses & provides a new tracking tool for patients, health professionals, insurers, indeed all SC diabetes & public health stakeholders. This database includes combined State Health Plan, Medicaid and Medicare claims files. While it has some limitations, mainly that it does not represent all segments of the population; it can provide some useful insights.

Unfortunately, not all changes in the past decade have been positive. Fruits and vegetable consumption has decreased, and physical inactivity has not improved. Overweight and obesity are increasing both in people with diabetes and in the general population. ESRD rates attributable to diabetes have increased, particularly in African Americans. Huge disparities still remain in diabetes mortality. Diabetes mortality rates for the African American population have maintained at three to four times that of the white population. Diabetes hospitalizations are rising, even considering restrictions in reimbursement. Age –adjusted rates for diabetes hospitalizations have increased over the past decade, and repeat hospitalizations are rising significantly. The number of patients with 4 or more hospitalizations in a given year has more than doubled in the past decade.

Goal 8, "To reduce preventable visits to the emergency room by people with diabetes" has not been met. Instead, there was a 126% increase in the number of diabetes ER visits between 1996 and 2006. The greatest increase in ER visits occurred among African Americans and there were age dependent, year to year, increases in racial disparity.

The astronomical rise in ED visits for patients with diabetes described above may also be partially explained by changes in insurance coverage for hospitalizations. i.e., some of these ED visits might have been inpatient admissions in the past. The number of people with diabetes who have had 4 or more ED visits in a given year has doubled in the past decade. The number of "uncomplicated" diabetes ED visits from type 2 diabetes has almost tripled in the past decade.

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### AREAS OF SIGNIFICANT PROGRESS

- Increase in Diabetes Health Professionals
- Increase in Healthy Lifestyle Practices by People With Diabetes

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- Decrease in Lower Extremity Amputations
- Decrease in Hospitalizations of Type I Diabetes
- Decrease in Diabetes Mortality in African Americans

### LESSONS LEARNED

The evaluation undertaken of this project has been an education for all involved. One impact of this process has been the continuing realization that, while a vast amount of data exists for diabetes surveillance, monitoring of clinical outcomes, policy changes and protocols used by health care providers is still a challenge. This process is becoming at the same time more feasible from a technology standpoint, with the evolution of the electronic medical record, and more of a challenge, with increasing restrictions and limitations from the Health Information Portability and Accountability Act (HIPAA). The privacy and confidentiality of patient protected health information is always of extreme importance, and doing finely targeted surveillance and research while protecting the individual's privacy continues to be a challenge. South Carolina is fortunate to have Office of Research and Statistics (ORS) where an integrated data warehouse resides. Our surveillance has been enhanced with the ORS vision and invaluable contribution.

This process has been essential to developing priorities for the development of the new strategic plan. Some of the greatest lessons learned from this process will greatly improve the new strategic plan. Perhaps the greatest lesson learned in strategic planning is not to set out to "change the world" with respect to diabetes, but, based on the data and indicated needs, focus efforts in specific, targeted areas, both from a program standpoint, and geographically. In addition, each objective developed should have a predetermined source of data and method of monitoring and reporting, so that at the end of the specified time period, the evaluation will already be accomplished, and the task will simply be to summarize existing results. If no source of data exists, then one objective should be to identify and /or develop a source of data for monitoring each objective.

### WHERE TO GO FROM HERE

The Diabetes Initiative of South Carolina is an innovative, collaborative, public and private, clinical, research, educational, epidemiological and statistical analytical effort focused on diabetes surveillance and reducing the burden of diabetes in South Carolina. Since formation of DSC over ten years ago, South Carolina has experienced significant improvements in many aspects of diabetes care and outcomes, e.g., improved patient and provider compliance with proven beneficial Guidelines of Care; improved numbers of Certified Diabetes Educators, especially in highest risk Counties; striking reductions in preventable hospitalization rates for diabetes Types I and II; marked reductions in lower extremity amputations; improved diabetes surveillance methodology; improved and expanded diabetes educational programs for patients and health professionals; and improved collaboration among virtually all major public and private diabetes stake-holders in South Carolina.

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That said, much remains to be done, e.g., address the rising prevalence of obesity and diabetes throughout the State, rising rates of ESRD, the tripling of inflation-adjusted diabetes hospitalization costs between 1997 and 2007, and exploding ED visit rates for “uncomplicated” Type 2 diabetes.

Surveillance gaps need to be filled. A great need exists to monitor clinical indicators accurately and consistently across the state. The potential is there. Increasing uses of electronic medical records can facilitate this process. The key is to get proper agreements in place to allow the sharing of de-identified data for the purpose of surveillance and monitoring of key clinical indicators.

Although some of the identified improvements may not be a direct result of DSC and DSC Member efforts and programs, the programs, strategies, & contributions by DSC & DSC Members have been substantial. DSC’ 2010-2020 Strategic Plan will reflect continuing aggressive efforts to reduce the burden of diabetes in South Carolina. Possible future directions may include:

- Targeting African American males for education and interventions
- Focusing efforts on reducing ED visits for uncontrolled type 2 diabetes
- Focusing efforts on reducing diabetes-attributable renal disease
- Continuing aggressive foot care education efforts
- Continuing efforts to increase CDE’s, targeting high-risk counties
- Establishment of a Diabetes Registry. Possibly using New York City’s A1c Registry as a model
- Developing a method for tracking clinical indicators and physician care protocols
- Developing a method for tracking changes in policy issues that affect people with diabetes, such as:
  - legislation
  - insurance coverage and reimbursement
  - changes in Medicare and Medicaid
- Build in specific evaluation strategies for each goal in the new Strategic Plan

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Title 44 Health S.C. Code SECTION 44-39-20.

## TECHNICAL NOTES

### SOURCES OF DATA

#### SC POPULATION DATA

The U.S. Census Bureau annually produces estimates of resident population for each state and county using a component of population change method at the county level. To produce the state population estimates, all county populations are summed. The estimate of each county's population is produced, starting with the base population from either Census 2000 or the revised population estimate for the prior year. Then the demographic components of population change calculated for that time period are added or subtracted. Basically, the estimated number of births is added and the estimated number of deaths is subtracted for the time period. Next, the estimates of net domestic migration, net international migration, are accounted for.

#### BRFSS

The BRFSS has been collected in SC since 1984, and currently has a sample size of more than 9,000. The BRFSS includes the diabetes module annually to collect data on quality of diabetes care in SC. Starting in 2010, the survey instrument will also include the pre-diabetes module.

For analysis of BRFSS data, special procedures in SAS software are used to take into account sampling method and weighting of data. Percentages are obtained by frequency distributions of selected variables, and standard errors are calculated. Percentages are not calculated for any indicator with any cell size of less than 50 responses. Obesity prevalence is calculated by categorizing BMI, which is calculated from height and weight. Routine analysis of BRFSS for diabetes surveillance includes prevalence of diabetes by race, gender, age, and geographic region. The diabetes module is analyzed annually by race, gender, age group and geographic region, where sample size allows. Lifestyle factors including BMI, prevalence of obesity, physical activity, and fruit and vegetable consumption are analyzed annually by demographic groups and geographic region.

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.

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#### HOSPITAL DISCHARGES, ER DISCHARGES, AND OUTPATIENT SURGERY DATA

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 in-state hospitals. The hospital discharge dataset contains an average of 550,000-560,000 records annually, and total ER visits range from 1.2 million to 1.5 million annually. This dataset covers every inpatient, outpatient, and ER visit made in SC in a given year. Data includes patient demographics, dates of admission and discharge, ICD 9 codes for primary and secondary diagnoses, primary and secondary procedures done, charges and source of payment, and patient disposition, i.e. discharge to home, skilled care facility, transfer to another hospital, or death.

Hospital discharge and ER visits are used to calculate age-adjusted hospitalization rates by ICD9 code, total charges by ICD9 code, total and average length of stay by ICD9 code. These indicators can be calculated by race, gender, age group, county, or any combination thereof. Analyses are done using SAS. Of particular interest are age-adjusted diabetes hospitalization rates for primary and secondary diagnoses, hospitalization rates for diabetes complication, including diabetic ketoacidosis, neuropathy, retinopathy, end-stage renal disease, and heart disease and stroke. Age-adjusted rates of lower-extremity amputations are monitored by race and gender on an annual basis.

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.

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#### SOUTHEASTERN KIDNEY COUNCIL DIALYSIS DATA

Endstage renal disease data is provided by the Southeastern Kidney Council Dialysis data also known as the End-Stage Renal Disease (ESRD) Network #6. Under the direction of the Center for Medicaid and Medicare Services, the End-Stage Renal Disease (ESRD) Network Program consists of a national network of 18 ESRD Networks, responsible for each U.S. state, territory, and the District of Columbia. ESRD Networks work with consumers and ESRD facilities and other providers of ESRD services to refine care delivery systems to make sure ESRD patients get the right care at the right time. The Program's responsibilities include collecting data to measure quality of care ([www.esrdnetwork6.org](http://www.esrdnetwork6.org)). The SE Kidney Council collects data from free-standing dialysis centers in SC, NC, GA, FL, TN and VA, and included a total of 7,199 patients in SC, in 2007. This data is available in the form of aggregate data available at state or county level for diabetes-related kidney disease prevalence and incidence. This data can be accessed from the website ([www.esrdnetwork6.org](http://www.esrdnetwork6.org)).

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#### BIRTH AND DEATH CERTIFICATE DATA

Mortality Data is provided by SC Dept. of Environmental Control Division of Biostatistics. The Division is responsible for registering all vital events that occur in South Carolina, which include births, deaths, fetal deaths, induced terminations of pregnancy, marriages and divorces. The number of deaths in 2006 was 38,723. This is used to calculate age-adjusted cause of death for diabetes as an underlying cause of death, and as a contributing cause of death.

SC DHEC mortality data is accessible mainly through the South Carolina Community Assessment Network (SCAN) <http://scangis.dhec.sc.gov/scan>. SCAN is an interactive web-based data retrieval system for community assessment, planning and health practices. Users can create tables, charts, and maps according to their interests and specifications at the DHEC Region, County, or Zip-Code level. Birth Certificate Data, Death Certificate Data, and demographics are among the data sets available on the SCAN system. Each data set can be used to generate tables and/or maps. Age-adjusted mortality rates are produced by underlying cause of death and may be computed by race, gender, ethnicity, and county or DHEC region. If special analysis of the mortality data beyond the capabilities of SCAN is needed, we work with the Division of Biostatistics for data analysis.

Birth certificate data is used to generate rates of births to mothers with diabetes prior to pregnancy and to mothers diagnosed with gestational diabetes.

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#### HEALTH PROFESSIONS DATA

Data on numbers of current health professionals involved in the diagnosis and treatment of diabetes is obtained from a number of sources, including the SC Statistical Abstract provided by the SC Office of Research and Statistics, the SC Medical Association, SC Dietetic Association, and the American Association of Diabetes Educators.



## APPENDICES

### SC CODE OF LAWS TITLE 44 CHAPTER 39 "DIABETES INITIATIVE OF SOUTH CAROLINA ACT"

#### Title 44 - Health

#### CHAPTER 39.

#### DIABETES INITIATIVE OF SOUTH CAROLINA

##### **SECTION 44-39-10.** Short title.

This chapter may be cited as the "Diabetes Initiative of South Carolina Act".

**SECTION 44-39-20.** Establishment of Diabetes Initiative of South Carolina Board; purpose; members; terms; filling vacancies; election of chair; meetings; expenses.

(A) There is established within the Medical University of South Carolina the Diabetes Initiative of South Carolina Board. The purpose of this board is to establish a statewide program of education, surveillance, clinical research, and translation of new diabetes treatment methods to serve the needs of South Carolina residents with diabetes mellitus. The provisions of this chapter and the initiatives undertaken by the board supplement and do not supplant existing programs and services provided to this population.

(B) The board consists of:

(1) the following officials or their designees;

- (a) the President of the Medical University of South Carolina;
- (b) the Director of the Department of Health and Environmental Control;
- (c) the Director of the State Department of Health and Human Services;
- (d) the President of the South Carolina Medical Association;
- (e) the President of the South Carolina Affiliate of the American Diabetes Association;
- (f) the President of the American Association of Diabetes Educators;
- (g) the President of the South Carolina Academy of Family Physicians;
- (h) the head of the Office of Minority Health in the Department of Health and Environmental Control;
- (i) Governor of South Carolina Chapter of the American College of Physicians;

(2) a representative of the Governor's office, to be appointed by the Governor;

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(3) a member of the Joint Legislative Committee on Health Care Planning and Oversight, to be appointed by the chairman;

(4) four representatives appointed by the President of the Medical University of South Carolina for terms of four years, two of whom must be from the general public and one each from the Centers of Excellence Advisory Committees, all of whom must be persons knowledgeable about diabetes and its complications and whose term of office is four years.

(C) A vacancy on the board must be filled for the remainder of the unexpired term in the manner of original appointment.

(D) The board shall elect from its members a chair for a term of two years.

(E) The board shall meet at least quarterly or more frequently upon the call of the chairman. Members of the board not employed by the State or its political subdivisions shall receive per diem, subsistence, and mileage as provided by law for members of state boards, commissions, and committees while engaged in the work of the board.

### **SECTION 44-39-30. Powers and duties of board.**

The powers and duties of the Diabetes Initiative of South Carolina Board are to:

(1) annually assess the effects of diabetes mellitus in South Carolina, and the status of education, clinical research, and translation of new diabetes treatment methods in South Carolina;

(2) oversee all operations of the Center of Excellence Advisory Committees, and the Diabetes Outreach Council including:

- (a) reviewing annual reports;
- (b) establishing annual budgets;
- (c) setting annual priorities;

(3) make annual budget requests to the General Assembly to support the activities of the Diabetes Initiative of South Carolina Board;

(4) conduct diabetes surveillance activities including:

- (a) obtaining data and maintaining a statewide data base
- (b) analyzing data and reviewing trends on mortality and morbidity in diabetes;
- (c) developing means to and disseminating important data to professionals and the public;
- (d) developing proposals for grant funding.

(5) submit an annual report to the Governor and the General Assembly;

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(6) other activities necessary to carry out the provisions of this chapter.

**SECTION 44-39-40.** Establishment of Diabetes Center of Excellence; powers; duties; functions; advisory committee; council.

(A) A Diabetes Center of Excellence is established at the Medical University of South Carolina. The center shall develop and implement programs of professional education, specialized care, and clinical research in diabetes and its complications, in accordance with priorities established by the Diabetes Initiative of South Carolina Board. The Center of Excellence must submit an annual report to the Diabetes Initiative of South Carolina Board.

(B) The activities of the center must be overseen and directed by the Center of Excellence Advisory Committee. The council consists of members appointed by the president of the Medical University of South Carolina. The functions of the council include:

- (1) reviewing programs in professional education, specialized care, and clinical research developed by the Center;
- (2) assisting in the development of proposals for grant funding for the center's activities;
- (3) preparing an annual report and budget proposal for submission to the Diabetes Initiative of South Carolina Board.

**SECTION 44-39-50.** Establishment of Diabetes Outreach Council; powers; duties; functions.

(A) There is created in the Medical University of South Carolina the Diabetes Outreach Council with three members appointed by the president of the university.

(B) The Diabetes Outreach Council shall oversee and direct efforts in patient education and primary care including:

- (1) promoting adherence to national standards of education and care;
- (2) ongoing assessment of patient care costs and reimbursement issues for persons with diabetes in South Carolina;
- (3) preparing an annual report and budget proposal for submission to the Diabetes Initiative of South Carolina Board.

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APPENDIX A.x:

**1997 Diabetes Death Rates**

County	White	Black	Other	All Races	Rank
Lee	29.4	108	0	65.4	1
Williamsburg	13.1	100	0	60.6	2
Dillon	42.1	106	0	58.5	3
Marion	41.1	68.9	733.7	55.9	4
Chester	38.8	96.6	0	53.2	5
Allendale	0	89.6	0	52.7	6
Union	52.5	51.6	0	52.6	7
Calhoun	9.9	80.1	0	42.4	8
Berkeley	37.1	61	0	40.8	9
Cherokee	31.4	104	0	40.7	10
Florence	23.4	76.2	0	40.1	11
Abbeville	34	63.6	0	38.7	12
Darlington	30.1	56.3	0	38.2	13
Sumter	25.5	50.5	0	36	14
Richland	18.8	75.5	0	35	15
Charleston	17.7	77	0	34.8	16
Georgetown	17.6	73	0	34.8	16
Kershaw	40.7	15.2	0	34	18
Colleton	8.7	75.5	0	33.6	19
Bamberg	10	53.7	0	32.8	20
Saluda	21.3	66.7	0	32.4	21
Fairfield	23.9	48.5	0	30.6	22
Jasper	0	59.8	0	30.4	23

County	White	Black	Other	All Races	Rank
Chesterfield	22.2	48.7	0.0	28.4	24
Marlboro	6.1	53.9	166.5	28.0	25
Anderson	26.4	40.0	0.0	27.9	26
Hampton	9.5	51.8	0.0	27.7	27
York	14.6	84.3	93.0	27.2	28
Lexington	23.7	58.8	61.0	26.4	29
Orangeburg	11.7	47.0	0.0	26.4	29
Beaufort	17.3	70.0	0.0	26.3	31
Dorchester	5.9	90.1	0.0	25.8	32
Spartanburg	18.7	67.8	0.0	25.8	32
Horry	20.7	57.9	0.0	25.5	34
Newberry	24.7	32.1	0.0	25.3	35
Pickens	24.9	14.3	0.0	24.2	36
Greenville	17.9	71.5	0.0	24.1	37
Barnwell	14.6	47.1	0.0	23.8	38
Clarendon	6.4	43.1	0.0	23.5	39
McCormick	16.0	22.9	0.0	20.2	40
Laurens	11.1	50.9	0.0	19.0	41
Greenwood	19.9	11.3	0.0	18.6	42
Aiken	12.3	41.9	0.0	17.5	43
Edgefield	9.2	29.6	0.0	16.6	44
Oconee	16.1	0.0	0.0	14.7	45
Lancaster	6.0	18.8	0.0	8.4	46

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Appendix A.y Diabetes Death rates (Per 100,000 population)

County	1997*	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007
Abbeville	38.7	28.7	17.7	20.4	33	16.1	13.3	13.4	15.4	9.4	21.8
Aiken	17.5	36.7	24.8	36	35.3	23.2	29.7	32.5	32.9	26.3	27
Allendale	52.7	37.4	67.7	44.9	61.7	35.1	45.4	51.5	95.6	43.4	70.6
Anderson	27.9	29.6	30.8	34.1	20.1	32.5	22	26.2	31.4	35.4	34.7
Bamberg	32.8	12	17.1	27.7	0	44.2	16.3	16.6	4.7	22.4	25.2
Barnwell	23.8	9.2	32.6	31.7	48.3	43.1	28.5	28.1	40.2	25.4	21.4
Beaufort	26.3	23.7	18	12.9	13.4	16	10.7	13.4	14.7	10.3	13.1
Berkeley	40.8	38	36.1	42.5	49.2	34.2	24.8	32.6	25.6	37.8	25.3
Calhoun	42.4	14.6	39.4	5.7	65.7	18	4.5	55.1	56.6	18.2	18
Charleston	34.8	27.5	27.5	36.4	25.4	27.1	31.6	30.6	28.8	25	26.9
Cherokee	40.7	50	45	32.5	44.1	42.8	51	51.4	32.7	26.8	28.2
Chester	53.2	25.4	50.4	61.3	37.7	32.9	56.7	42.2	31.8	40.7	41.4
Chesterfield	28.4	24	20.2	29.6	20.9	9.8	30.1	30.8	21.9	30.8	16.5
Clarendon	23.5	21.9	22.1	21.6	27.7	35.1	19.6	20.3	34	23.5	19.3
Colleton	33.6	29.9	29.9	35.5	39.2	26.2	27.6	23.7	35.9	23.7	17.1
Darlington	38.2	21.8	58	44.3	31.6	17.7	27.7	30	24.7	19.2	27.4
Dillon	58.5	31.6	47	30	45.9	27	39	15.5	24.5	35	35.6
Dorchester	25.8	28.3	30.9	32	26.6	29.3	30.4	22.7	27.8	40.8	33.4
Edgefield	16.6	10.1	16.7	32.8	28.4	23.1	13.8	25	12	7.8	13.5
Fairfield	30.6	40.7	54.3	44.8	42.4	20.6	49.2	19.5	23.6	29.7	29.7
Florence	40.1	44.2	40.9	42.8	32.6	40.9	22.3	44.5	36.2	42	29.3
Georgetown	34.8	22.1	19.9	22.1	23.2	25.6	20.1	21.4	28.1	18.4	14.6
Greenville	24.1	25.4	36.8	35.5	26.3	33	32.9	27.2	30.2	21.7	24.2
Greenwood	18.6	14.6	31.6	34.6	26.3	44.4	31.8	46.6	26.1	24.4	33.9
Hampton	27.7	40.5	20.7	29.3	38.6	34.3	32.4	54.4	59.1	32.9	73.1
Horry	25.5	21	19.4	28.6	23.3	19.5	22.1	23.7	23.8	21.6	13.6
Jasper	30.4	18.6	12.4	9.7	44.9	42.9	12.1	30.3	20	30.8	25.2
Kershaw	34	33.9	33.3	39.9	22.1	34.2	35.4	36.4	31.5	19.3	40.9
Lancaster	8.4	15.5	26.9	11.2	8.4	17.6	8.2	11.1	13.8	18.2	19.6
Laurens	19	10.6	34.8	39.5	25.5	31.7	48.5	26.7	40.8	31.9	36.2
Lee	65.4	20.8	29.8	20.9	30.2	59.5	89	83.6	62.4	33.2	44.6
Lexington	26.4	24.4	26	27.2	25.6	17.1	19.1	16	15.1	20	23.2
McCormick	20.2	24.1	10.8	17.6	29	15.8	21.5	32.6	5.5	6.5	37.1
Marion	55.9	43.5	46.1	57.1	40.7	41.2	27.3	42.7	29.9	22.9	42.6
Marlboro	28	31.9	34.3	50.6	25	28.3	10	6.7	14.1	27	32.2
Newberry	25.3	20.1	19.9	33.5	33.3	49.8	48.2	46.9	48.9	58.7	22.4
Oconee	14.7	16.8	18.1	14.6	17.2	16.3	18	28.1	21.5	24.6	20.3
Orangeburg	26.4	33.1	27.6	29.9	31.2	31.1	49	40.6	35.7	39	34.5
Pickens	24.2	10.7	27.9	19.7	30.5	22.2	15.6	17.6	10.9	14.6	10.8
Richland	35	29.5	32.4	27.6	30.6	24.5	29.7	24.7	26.3	14.8	27
Saluda	32.4	24.8	11.4	22.6	14.8	5	41.1	27.2	0	0	14.3
Spartanburg	25.8	27.1	29.2	27.5	29.1	24.2	26.5	23.6	27.5	25	32.3
Sumter	36	51.3	42	41.8	34.2	46.2	42.6	27.2	41.9	44	36.4
Union	52.6	25.6	35.8	20	20.6	44.9	39.7	27.3	45.6	31.5	34.7
Williamsburg	60.6	67.4	55.1	79.3	41	36.7	53.7	30.9	40.8	40.2	79
York	27.2	24.8	25.4	24	26.2	16.5	21.8	22.1	14.5	20.1	20.6

\* Rates per 100,000 Age Adjustment (2000 Standard Population)

\*\* ICD-9 designated mortality

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<sup>[1]</sup> Final Report: Diabetes Detection Initiative: Finding the Undiagnosed, Batelle Centers for Public Health Research and Evaluation, April, 2005

<sup>[2]</sup> Am. J. Health Behav. 2007; 31:632-642

<sup>[3]</sup> Nationwide Frequency and Costs of Potentially Preventable Hospitalizations, 2006. C. Allison Russo, and Marguerite L. Barrett, ( 2007)

<sup>[4]</sup> Projecting the Future Diabetes Population Size and Related Costs for the U. S. E. S. Huang, A. Basu, M. O'Grady, & J. C. Capretta Diabetes Care, Volume 32, Number 12, Pages 2225-2229, December, 2009

<sup>[5]</sup> Inserted



