

Diabetes in North Carolina: A Summary Report-2002

Prepared by:

**Edgardo Valeriano, MD, MPH
Janet Reaves RN, MPH
Deborah Porterfield MD, MPH
Corrine Munoz-Plaza, MPH**

**Diabetes Prevention and Control Branch
Division of Public Health
Department of Health and Human Services
Raleigh, North Carolina**

“Helping North Carolina citizens reduce the impact of diabetes through leadership, education, communication, and community involvement.”



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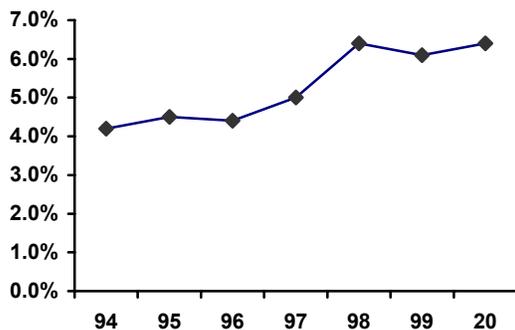
Introduction

Purpose

The purpose of this report is to provide the public and private sectors, as well as health care professionals, with a general summary of the prevalence, complications, health care costs, and risk factors associated with diabetes in North Carolina. We hope that this report will also serve to support the ongoing activities and programs that are taking place at local and state levels to prevent and control the burden of diabetes in North Carolina.

Diabetes: a Growing Public Health Problem in North Carolina

Figure 1. Diabetes prevalence trend from 1994-2000, North Carolina, BRFSS (4,14)



Diabetes is a chronic disease, which affects the body's ability to produce or respond to insulin. Insulin allows glucose (sugar) to enter the cells and be converted into energy. In uncontrolled diabetes, glucose and fats remain in the blood, damaging vital organs.

The number of people with diabetes in NC has surpassed one half million and continues to increase. At the same time, modifiable risk factors for the disease, such as lack of exercise, obesity/overweight and unhealthy diet, have increased in the last decade.

The North Carolina Diabetes Prevention and Control Program (DCP) is a public health program within the Division of Public Health, North Carolina Department of Health and Human Services, and is primarily funded by the Centers for Disease Control and Prevention, (CDC). The DCP serves the citizens of North Carolina by:

- Increasing awareness of diabetes and its complications;
- Monitoring the burden of the disease;
- Helping health care providers improve the quality of diabetes education and care given, and;
- Enhancing community-based efforts to reduce the burden of diabetes, through education and capacity building

The North Carolina Diabetes Advisory Council (DAC) was created in 1994 by the North Carolina Department of Health and Human Services, Division of Public Health. The Council has played a vital role in addressing the issues of diabetes through coordination, leadership, and advocacy and offers a forum for the many stakeholders in diabetes control in North Carolina.

The North Carolina Diabetes Strategic Plan 1999-2002 was developed by the DAC, the DCP and concerned citizens. The goal of the plan is to reduce the burden of diabetes. While the plan outlines major activities, it focuses on three major outcomes (7):

1. To increase the percentage of people with diabetes who receive recommended foot and eye exams, influenza and pneumonia vaccines, nephropathy assessment, and A1C testing.
2. To establish ten useful community-based programs for the prevention and control of diabetes.
3. To reduce health disparities for high-risk populations with respect to diabetes prevention and control.

Highlights

Diabetes: A Growing Public Health Problem in North Carolina

An estimated 584,000 people have diabetes in North Carolina; one third of whom do not know that they have the disease. African-Americans and other ethnic minorities have a higher prevalence of diagnosed and undiagnosed diabetes. The prevalence of diagnosed diabetes in the adult population increased 42% from 1995-2000 (4.5% vs. 6.4%) (4,14). This represents approximately 389,000 people with diagnosed diabetes in North Carolina.

Diabetes Complications

Diabetes is responsible for approximately 14,000 hospitalizations per year and 3,000 lower extremity amputations (2,4,16). Diabetes is also the leading cause of blindness, heart disease, hypertension, stroke, and kidney failure.

Mortality

In 2000, diabetes was the fifth leading cause of mortality in North Carolina, resulting in 2,078 deaths. This figure represents an increase of 30% in mortality when compared to 1994 (1,597 deaths) (2,15). Diabetes is also a significant contributing factor to other causes of death, such as heart disease, stroke, and kidney failure.

Economic Cost

Diabetes is costly. Nationally, the estimated cost of direct medical care for each person with diabetes is \$7,400 more than for a person without diabetes. In North Carolina, the 1998 estimated hospitalization cost for diabetes and related complications totaled more than \$1.5 billion (1,2).

Diabetes Prevention and Control Efforts

Diabetes is classified into three major categories, (1,3):

Gestational diabetes is a temporary condition that develops in 2%-5% of pregnancies, more frequently in obese women. Women with gestational diabetes are at risk of developing type 2 diabetes later in life.

Type 1 is characterized by an absolute deficiency of insulin and usually begins during childhood or early adolescence.

Type 2 usually develops in adults who are overweight, physically inactive, have a relative with diabetes or belong to racial/ethnic minority groups. About 90%-95% of all diabetes cases fall within this category.

Type 2 Diabetes is Preventable Research has shown that increasing activity/exercise levels and losing 10-15 pounds (for those who are overweight) decreases the chances of developing diabetes in 30-60% of those at risk of developing the disease (10,11).

Diabetes Control

The following measures are useful in controlling diabetes and preventing complications (1, 3, 8, 9,10,11,18, and 19).

- Weight control and daily exercise
- Healthy diet/meal planning
- Regular monitoring of blood glucose levels and keeping these levels as close to normal as possible
- Monitored A1C levels (two to four times per year)
- Annual flu vaccination and pneumonia update, as indicated
- Annual dilated eye, foot medical examination and microalbuminuria test
- Control of cholesterol levels and blood pressure

Diabetes Prevalence among Adults in North Carolina

BRFSS data Each year (since 1990) the Behavioral Risk Factor Surveillance System (BRFSS) interviews approximately 3,000 people in North Carolina about diabetes and other health problems and risk factors.

Figure 2. Prevalence diagnosed diabetes among adults, trend from 1995-2000; NC, USA (4,14)

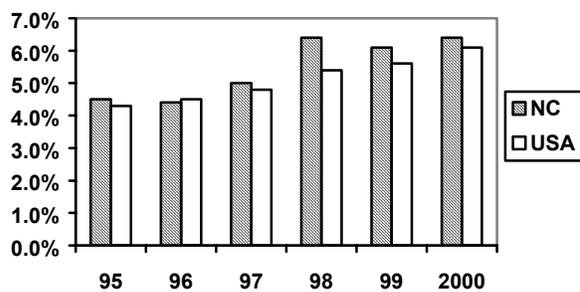


Table 1. Prevalence of diagnosed diabetes by race/ethnicity, NC, 2000 (5,6,14)

Race/Ethnicity	Weighted prevalence	People with Diabetes
White	5.9%	259,362
African-American	9.0%	109,800
Latino-American	3.7%	9,601
Native-American	10.2%	7,084
Asian/Pacific Island.	4.3%	3,573
Overall Prevalence	6.4%	389,420

Table 2. Prevalence of diagnosed diabetes by age and gender, NC, 2000, BRFSS (14)

Age/Gender	Weighted Prevalence	People with Diabetes
Age		
18-44 years	1.9%	62,947
45-64 years	9.5%	170,195
65 + years	16.2%	152,278
Gender		
Female	6.6%	207,169
Male	6.2%	182,251

Prevalence trend, 1995-2000, BRFSS

- Diabetes prevalence in North Carolina is higher than the US national prevalence.
- According to 1995-2000 BRFSS data, the prevalence of diabetes in adults in NC has increased 42% (4.5% vs. 6.4%).
- Approximately 389,000 North Carolina adults have been diagnosed with diabetes.
- Undiagnosed cases of diabetes account for one third of the total number of cases of diabetes (1). The total number of people with diabetes both diagnosed and undiagnosed is approximately 584,000.

Prevalence by race/ethnicity in NC, 2000

Because of sample size and design constraints, the BRFSS survey only permits estimates of prevalence in White and African-American residents in North Carolina. The prevalence of diabetes among African-Americans is 1.5 times greater than compared to Whites (9% vs. 5.6%). The prevalence estimates for other racial/ethnic groups come from national data from the CDC (these estimates are explained in Appendix 1).

Prevalence by age and gender, NC, 2000, BRFSS

- Diabetes prevalence increases as the population ages. People older than 45 years have an overall prevalence higher than 9.5% and they constitute approximately 84% of the total diabetes population.
- The prevalence of diabetes by gender is slightly higher in females than in males (6.6% vs. 6.2%).

Diabetes and modifiable risk factors: obesity/overweight, lack of exercise, and unhealthy diet

Figure 3. Adult obesity prevalence trend, 1995-2000, NC, BRFSS (14)

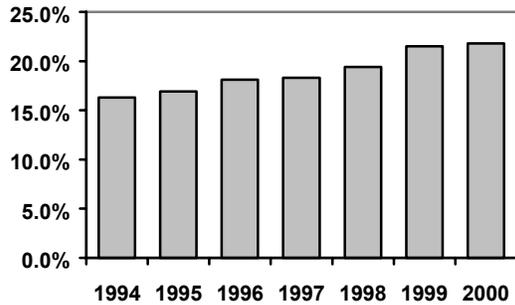


Figure 4. Prevalence of overweight in people with diabetes and in the general population, NC, 2000, BRFSS (14)

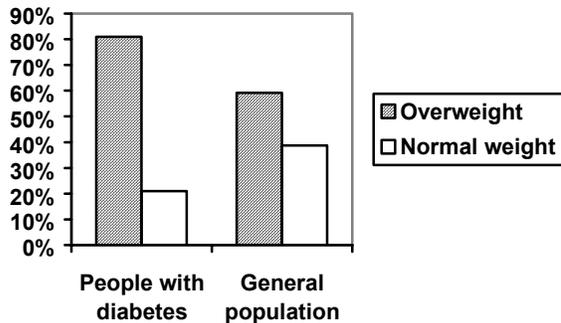
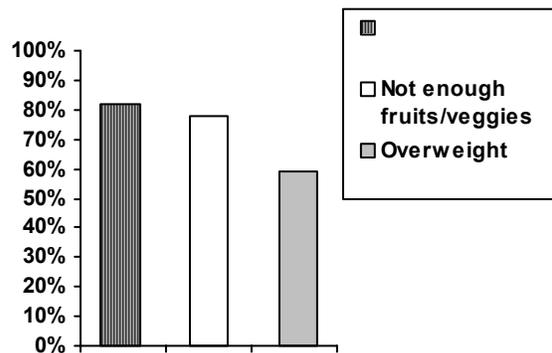


Figure 5. Prevalence of lack of regular exercise, unhealthy diets and overweight, NC, 2000, BRFSS (14)



Trend in adult obesity in NC

- The prevalence of obesity increased 34% from 1994-2000 (16.3% vs. 21.8%). In North Carolina approximately 1.2 adults are obese.
- Obesity/overweight is one of the main risk factors for Type 2 diabetes. Decreasing weight can prevent or delay the development of diabetes for those at risk of the disease (11,12).

Prevalence of overweight among people with diabetes and the general population

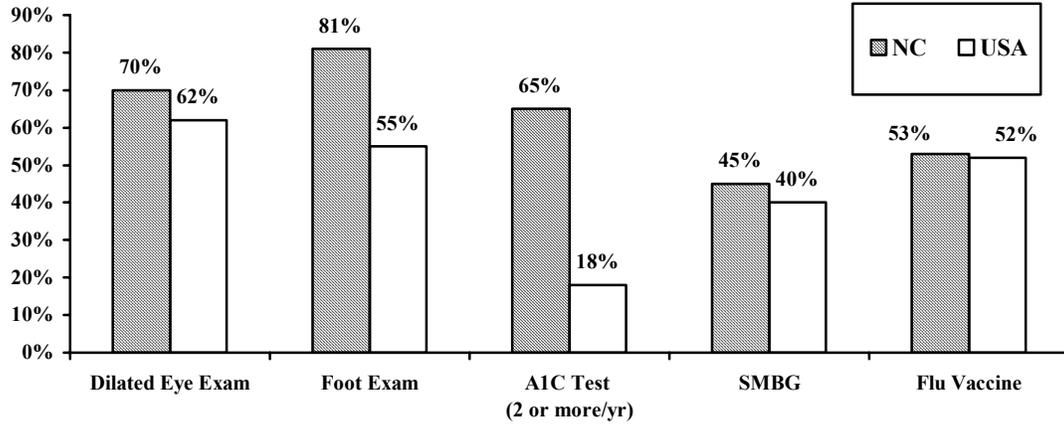
- Weight reduction in those who have diabetes and are overweight helps to control the disease and its complications.
- The 2000 BRFSS shows that 81% of the people with diabetes are overweight. In the general population, 60% are overweight.

Prevalence of people at risk of diabetes and other chronic diseases from lack of regular exercise, inadequate diet and overweight

- More than 60% of adults in North Carolina (around 3.65 million) are at some risk of developing diabetes or other chronic diseases. Lack of exercise and a diet high in fats/carbohydrates are major risk factors for Type 2 diabetes and other chronic diseases.
- In order to get enough fruits and vegetables people should generally eat five or more servings every day.
- Regular exercise means a daily regimen of 30-45 minutes of activity/exercise such as walking, dancing, mowing the lawn, or bicycling.

Prevalence of self-reported health care practices in people with diabetes

Figure 6. Prevalence of self reported health care practices, NC and USA, 2000, BRFSS (4,14)



The prevalence of self reported health care practices in North Carolina is higher than national estimates. However, a large proportion of people with diabetes still do not receive many of the preventive health care measures that can decrease the risk of developing further complications.

Table 3. People with diabetes at risk of complications, due to lack of preventive health care measures, NC, 2000, BRFSS (14,17)

Indicators	Prevalence	Number at risk of complications
No diabetes education classes	53.5%	208,300
No dilated eye exam	30.4%	118,300
No medical foot exam	19 %	74,000
No flu vaccine	47%	183,000
No pneumonia vaccine	58%	225, 863
Did not have 2 or more A1C	35%	136,296

According to BRFSS 2000 data, between 74,000-225,000 people with diabetes in North Carolina have some risk of further complications due lack of adequate preventive health practices. Reducing morbidity and mortality and improving quality of life for people with diabetes are major objectives of the state diabetes program.

Diabetes preventive health practices, NC, 2000, BRFSS

Self-management education is vital and can empower people to take charge of their diabetes and control blood sugar levels. However, in North Carolina, only 46% of people with diabetes have taken a diabetes self-management class or course (14).

Self-monitoring of blood glucose levels (SMBG) Effective control of blood glucose levels is the cornerstone for managing diabetes and preventing further complications (1,9,18,19). SMBG is an excellent tool for tracking glucose levels and keeping them in the recommended range. Daily SMBG is practiced by 45% of the population with diabetes; however, 11% of people with diabetes reported that they did not self-monitor their blood glucose in the last year (14).

Hemoglobin A1C (A1C) is a useful test to monitor the average glucose level in the past two or three months. Several studies have shown that the closer to normal the A1C levels are, the lower the probability of developing complications. The American Diabetes Association (ADA) recommends that people who maintain good glycemic control receive an A1C test every six months. For people who generally do not maintain good glycemic control, an A1C test is recommended more frequently (1). Sixty-five percent of people with diabetes reported having two or more A1C tests in the last year (BRFSS, 2000), and 10.4% of people with diabetes reported that they did not have an A1C test in the previous year (14).

Foot self-exam In 1998, 3,034 lower extremity amputations were reported in North Carolina due to diabetes (2). According to the 2000 BRFSS survey, 9.2% of people with diabetes (an estimated 35,000 people) reported having an ulcer, sore, or lesion that lasted more than four weeks. However, 12 % of the people with diabetes reported they do not check their feet and 19% reported they did not receive a foot exam by their health care provider within the last year (14).

Influenza and pneumococcal vaccine In 2000, 1,936 deaths reportedly resulted from influenza or pneumonia in North Carolina (15). People with diabetes are six times more likely to be hospitalized due to complications from influenza and are at an increased risk of dying from pneumonia compared to those that do not have diabetes. In North Carolina however, 47% of people with diabetes did not receive flu vaccine within the last year and 58% reported that they have never had a pneumococcal vaccine (14). A flu shot is recommended annually for people with diabetes and a pneumococcal vaccine every five years and once over age 65.

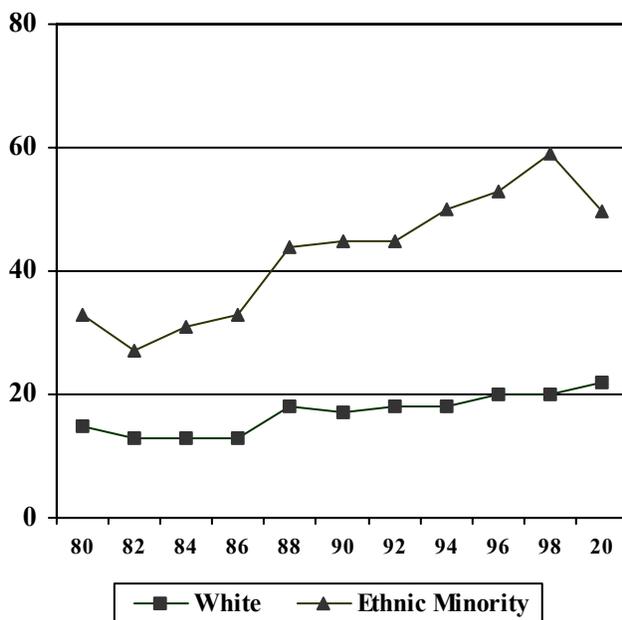
Dilated annual eye exam Retinopathy is a microvascular complication of diabetes. Diabetes retinopathy is a serious threat to vision. Appropriate screening and care could prevent diabetes-related blindness (1). In North Carolina, 25% of people with diabetes reported having been told by their physicians that they have an eye problem; however, 30% of people with diabetes did not have a dilated eye exam within the last year (14).

Burden of Diabetes among North Carolinians

Table 5. Hospitalization costs for diabetes related complications, NC, 2000 (16)

Condition	Discharges/ Costs
Diabetes as primary cause	Discharges 13,914 Costs \$129,255,024
Cardiovascular disease	Discharges 44,711 Costs \$629,390,277
Renal dialysis/transplantation	Discharges 8,409 Costs \$132,501,061
Lower extremity amputation	Discharges 3,124 Cost \$66,660,094
Any diagnosis of diabetes	Discharges 150,928 Cost \$1,771,797,348

Figure 6. Diabetes mortality trend (age adjusted rates) by White and minority groups from 1980-2000 (2,13)



Diabetes Morbidity

Diabetes affects the daily life of many North Carolinians, causing complications that include blindness, kidney failure, heart attacks, strokes and lower limb amputations. In 2000, 150,928 people were discharged from hospitals with a diagnosis of diabetes in North Carolina.

Diabetes is economically costly In North Carolina, hospitalization costs for patients with diabetes, where diabetes was the primary cause, were more than \$129 million. However, hospitalization costs reached \$1.7 billion when taking into account people with diabetes who were hospitalized for any diabetes-related or non-related condition.

Mortality

Mortality rates for diabetes have increased in the last decade among all racial/ethnic groups.

- In 2000, the age-adjusted mortality rate was 2.5 times higher among minority groups than among whites.
- In 2000, diabetes was the fifth leading cause of death among North Carolinians, contributing to 2,078 deaths as a primary cause and 5,938 deaths as a contributory cause (15).

Ten Leading Causes of Death in NC, 2000

Cause of Death	Number	Death Rate*
Heart Disease	19,649	243.0
Cancer	15,747	194.8
Cerebrovascular disease	5,692	70.4
Chronic lower resp. dis.	3,695	45.7
Diabetes Mellitus	2,078	25.7
Pneumonia & Influenza	1,936	23.9
Other unintent. injuries	1,833	22.7
Motor vehicles injuries	1,635	20.2
Alzheimer disease	1,725	21.3
Nephritis, nephrot synd.	1,132	14.8
Total Deaths	71,732	887.2

* Death rates x 100,000

Table 6. Diabetes mortality by race, gender and age; NC, 2000 (13)

Race*	Number	Rates
White	1,305	21.8
Minority	773	49.8
Gender*		
Male	914	23.3
Female	1,164	28.0
Age		
< 45 years	75	1.5
45-64 years	502	27.0
65 and + years	1,497	144.9

*Rates adjusted by age x 100,000

The age adjusted mortality rate is higher in minorities than in whites (49.8 vs. 21.8), respectively) and in females than in males (28.0 vs. 23.3). The specific mortality rate increases with age. Differences in health care practices, early detection and preventive services, and other coexisting conditions (i.e., hypertension) could explain the higher mortality rates among minorities.

More health care interventions are needed in order to prevent the increasing trend of mortality in the entire diabetes population with special attention directed to trends in minority populations.

Appendix. 1

Table 7. Diabetes prevalence by race, sex and age groups, 2000

<i>Race/sex</i>	<i>Overall prevalence</i>	<i>18-44 years</i>	<i>45-64 years</i>	<i>65+ years</i>
<i>White male *</i>	5.9%	1.6%	8.7%	14.7%
<i>White female *</i>	6.1%	1.2%	7.4%	14.5%
<i>African-American male *</i>	8.3%	4.0%	13.8%	22.4%
<i>African-American female*</i>	9.9%	2.7%	15.2%	25.0%
<i>Hispanic male +</i>		1.8%	12.0%	19.0%
<i>Hispanic female +</i>		1.8%	11.5%	25.0%
<i>Native-American/Alaskan male +</i>		3.2%	18.0%	20.0%
<i>Native American /Alaskan fem</i>		4.1%	22.0%	25.0%
<i>Asian, male/female +</i>		1.8%	9.2%	16.0%
<i>Overall prevalence *</i>	6.4%	1.8%	9.2%	16%

Note: Prevalence of diabetes among Hispanic, Native Americans and Asians could not be estimated from the BRFSS survey in NC

Source: * BRFSS survey, NC, 2000.

+ *Hispanic Self reported prevalence of diabetes among Hispanics-US, 1994-97, MWWR 48:8-12,1999.*

+ *Native American/Alaskan; Prevalence of diabetes among American Indians and Alaska natives by sex and age group, 1990-97. Diabetes Care, 23:1786-90, 2000*

+ *Asian. Estimates using the BRFSS NC, 2000 prevalence by age group.*

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