

Diabetes Prevention and Control Program
Division of Public Health
Nebraska Department of Health and Human
Services

Department of Health & Human Services

DHHS

N E B R A S K A



NEBRASKA
Diabetes Prevention
and Control Program

The Impact of Diabetes in Nebraska

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INTRODUCTION

About Diabetes

Diabetes (also called diabetes mellitus or “sugar diabetes”) is a disease in which the body does not produce or properly use insulin, a hormone that is needed to convert glucose into energy. Insulin is normally secreted by the pancreas. Glucose cannot be sufficiently absorbed into the cells of the body from the bloodstream without insulin.

Diabetes is diagnosed through the identification of elevated blood glucose concentrations. Elevated blood glucose can occur if either insulin secretion or insulin action is impaired. The major forms of diabetes are:

- Type 1 diabetes, sometimes called insulin-dependent diabetes or juvenile-onset diabetes, usually begins in childhood or adolescence, though it can occur at any age. People with this type of diabetes produce little or no insulin, and they require insulin delivered by injection or a pump. About 5% of all cases of diabetes are classified as Type 1. There is no known way to prevent Type 1 diabetes.
- Type 2 diabetes, sometimes called non-insulin-dependent diabetes or adult-onset diabetes, usually develops in adults after the age of 40, and is by far the most common type of diabetes. People with Type 2 diabetes have insulin resistance, which means that they can produce insulin but they cannot use it to convert glucose into energy. A person with this type of diabetes may go undiagnosed for years because hyperglycemia (i.e., too much glucose in the blood) can develop gradually without noticeable symptoms. Treatment of Type 2 diabetes may require oral medications and/or insulin, but it can often be controlled by weight loss, improved nutrition, and exercise. People who are overweight, physically inactive, or have a family history of the disease are at an increased risk of developing Type 2 diabetes. In recent years, there has been a substantial increase in the number of children and adolescents diagnosed with Type 2 diabetes, which is attributed to the increased prevalence of obesity among youth.
- Gestational diabetes is the term given to diabetes that develops during pregnancy, and it occurs in about 2%-10% of all pregnancies. It is more common among obese women and women with a family history of diabetes. At the end of pregnancy, blood glucose levels return to normal in about 95% of

all cases. However, women who have had gestational diabetes are more likely to develop Type 2 diabetes later in life.

According to the most recent estimates from the Centers for Disease Control and Prevention (CDC), diabetes affects 25.8 million people in the United States – 18.8 million who have been diagnosed with the disease, and 7.0 million who have it but are as yet undiagnosed. About 1.9 million Americans age 20 years or older were diagnosed with diabetes in 2010. CDC also estimates that another 79 million U.S. adults age 20 or older have pre-diabetes, a condition in which fasting glucose or hemoglobin A1c levels are higher than normal but not high enough to be classified as diabetes. People with pre-diabetes have an increased risk of developing Type 2 diabetes.

Over the course of the disease, diabetes can lead to a variety of disabling and life-threatening complications, including heart disease, stroke, blindness, kidney failure, nerve damage, and lower-extremity amputation. People with diabetes are also subject to acute complications such as ketoacidosis, which is the result of severe insulin deficiency and can be fatal, while diabetes during pregnancy can have adverse effects on both mother and fetus. As a result, the risk of death among people with diabetes is about twice that of people of similar age but without diabetes. The overall cost of diabetes and its complications was estimated by CDC to be \$174 billion (including medical care, lost productivity, and premature death) in the United States in 2007 alone. Much of the morbidity and mortality that results from diabetes is preventable, however.

About the Nebraska Diabetes Prevention and Control Program

The Nebraska Diabetes Prevention and Control Program (DPCP) was established in 1977 within the Nebraska Department of Health, which is now part of the Nebraska Department of Health and Human Services (DHHS). The mission of the program is to reduce the impact of diabetes in Nebraska by promoting and improving diabetes prevention, management, and education. In recent years, program activities have focused primarily on public and professional education. The DPCP is funded by CDC, an agency within the U.S. Department of Health and Human Services.

About this report

The purpose of this report is to provide health care professionals, the public health community, policymakers, and the general public with the latest data that describe the impact of diabetes in Nebraska.

These data also represent a critical source of information for the DPCP, which uses them to identify specific issues of concern and to develop strategies to address them. This report was prepared by the DPCP, and is an update of editions published in 1995, 1997, 2003, and 2010. A detailed description of the data sources that were used to prepare this report is presented in Appendix A.

I. Prevalence

During the past decade, diabetes has become increasingly common, both in Nebraska and throughout the United States. According to data collected in 2010 by the Behavioral Risk Factor Surveillance System (BRFSS), 7.6% of Nebraska residents 18 years of age or older have been diagnosed with diabetes, which is a significant increase from 4.9% recorded in 2000 (*see Figure 1*). These prevalence rates translate into an estimated 103,000 Nebraska adults with diabetes in 2010, compared to about 60,000 in 2000 (*see Figure 2*). BRFSS data show that the prevalence of diabetes in Nebraska compares favorably to the rest of the nation, where the median diabetes prevalence rate among all 50 states in 2010 was 8.7%. BRFSS data from 2010 also indicate that there are more than 76,000 adults in Nebraska who have been diagnosed with pre-diabetes, although the total adult population with pre-diabetes, including diagnosed and undiagnosed cases, may be as high as 450,000.

Figure 1. Estimated Percentage of Nebraska Adults with Diagnosed Diabetes, 2000-2010

(Source: Nebraska Behavioral Risk Factor Surveillance System)

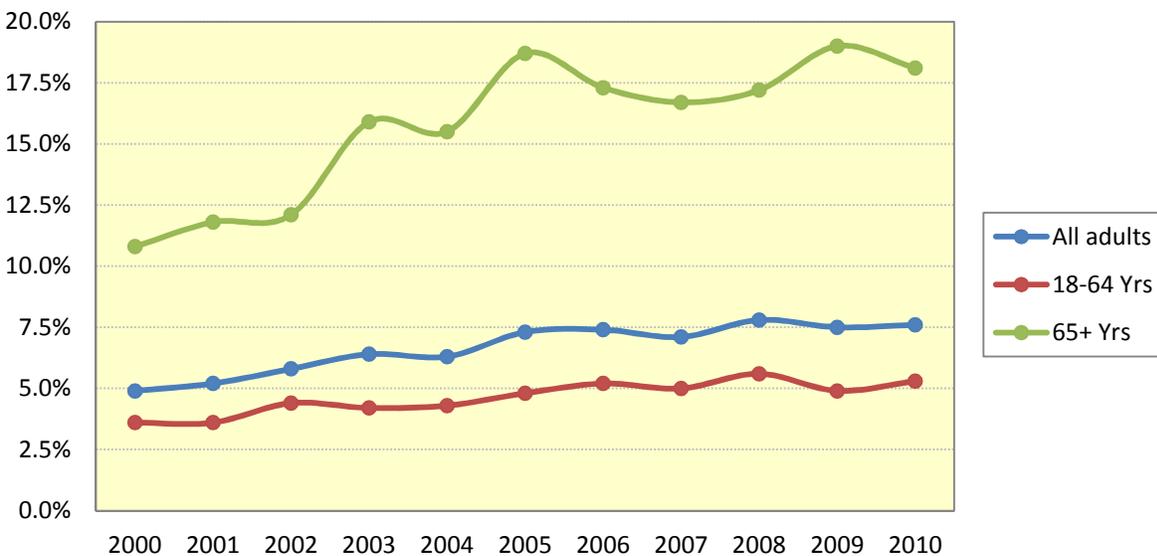
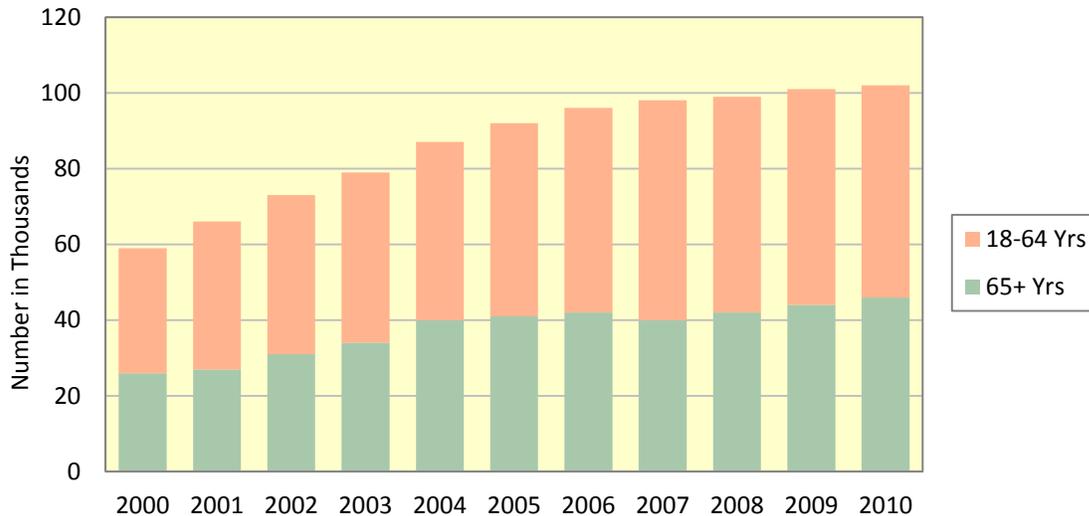


Figure 2. Estimated Number of Nebraska Adults with Diagnosed Diabetes, 2000-2010

(Source: Nebraska Behavioral Risk Factor Surveillance System)



Nebraska BRFSS data also show that men are more likely to have diabetes than women, and that the percentage of adults with diabetes is greatest among those with the least education and the lowest household income. Significant racial and ethnic disparities also exist, with African-Americans, Native Americans, and Hispanics in Nebraska all at high risk for developing diabetes. After adjusting for age differences, the percentage of African-American (12.0%), Native American (11.2%) and Hispanic (11.5%) adults in Nebraska who have been diagnosed with diabetes is significantly higher than the percentage for whites (7.2%), according to BRFSS data collected during the past five years (2006-2010). Also of concern is the increasing prevalence of diabetes among the elderly, particularly since Nebraska's population is getting older. More than one of every six (18.1%) Nebraska residents age 65 and older had diagnosed diabetes in 2010, compared to only about one in 10 (10.8%) at the start of the decade. With the size of Nebraska's 65-and-older population projected to increase by more than 50% during the next two decades (from 246,000 in 2010 to 375,000 in 2030), the number of people in Nebraska who have diabetes will probably not decrease any time soon.

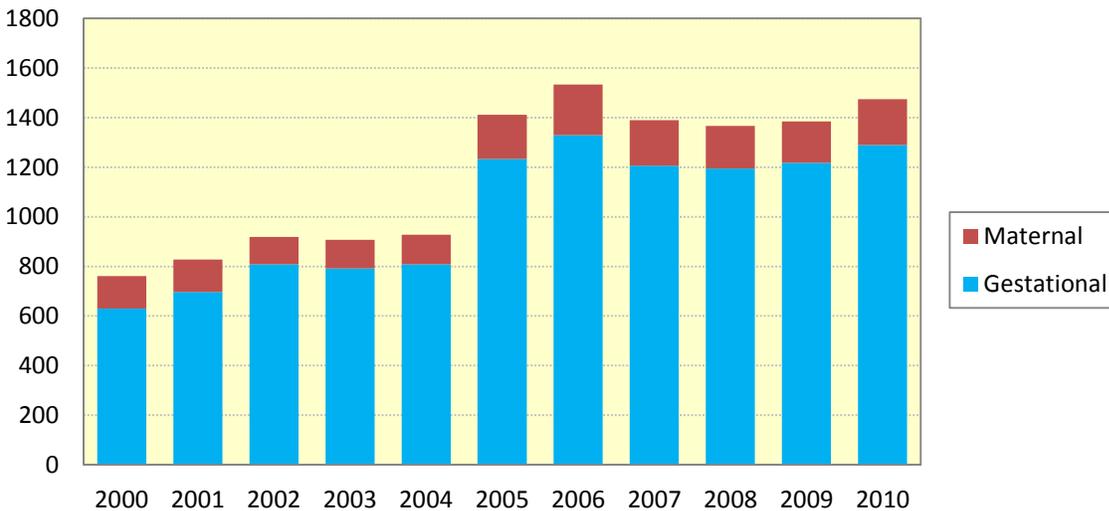
Both the number and rate of cases of gestational diabetes have doubled in Nebraska during the past decade (*see Figure 3*), although revisions to the Nebraska birth certificate in 2005 may be responsible for some of this increase. The number of babies born to Nebraska women with gestational diabetes rose from 630 in 2000 to 1,290 in 2010. These figures represent an increase from 2.6% of the state's live birth total in 2000 to 5.0% in 2010. Between 2000 and 2010, Nebraska women with gestational diabetes gave birth to 11,207 babies. Within this cohort, gestational diabetes was identified more frequently among Native

Americans (6.7%), Asian/Pacific Islanders (6.6%), and Latinas (4.6%) than among either whites (3.7%) or African Americans (2.9%). Prevalence also rose with the age of the mother, with rates about three times higher for women 35 and older compared to women under the age of 25.

The number and rate of maternal (i.e., pre-existing) diabetes has also increased substantially in Nebraska during the past decade (see Figure 3). The number of babies born to Nebraska women with maternal diabetes rose from 131 in 2000 to 184 in 2010. These figures represent an increase from 53 per 1,000 live births in Nebraska in 2000 to 71 per 1,000 in 2010. Between 2000 and 2010, Nebraska women with maternal diabetes gave birth to 1,696 babies.

Figure 3. Number of Nebraska Live Births with Gestational and Maternal Diabetes, 2000-2010

(Source: Nebraska birth certificates)



II. Risk Factors

For Type 1 diabetes, there are no known modifiable risk factors that can lower a person’s chances of developing the disease. For Type 2 diabetes, however, both obesity and lack of physical activity are significant risk factors, making lifestyle changes such as better nutrition, weight control, and regular physical activity highly advisable. For some people who have Type 2 diabetes and are obese, diabetes symptoms will disappear completely if normal weight is restored.

People who have diabetes also suffer an increased risk of developing a number of disabling and life-threatening complications, including heart disease, stroke, kidney failure, blindness, neuropathy

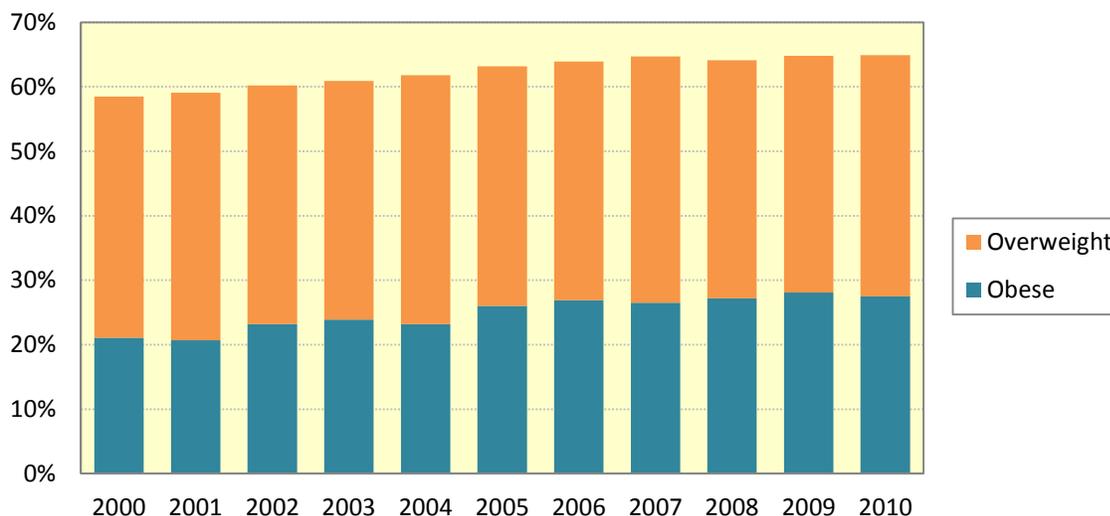
(inflammation and degeneration of peripheral nerves), and peripheral vascular disease, which can ultimately lead to amputation of the lower extremities. In addition to obesity and lack of physical activity, high blood pressure (hypertension), cigarette smoking, and high cholesterol are known risk factors for both coronary heart disease and stroke. High blood pressure is also a risk factor for diabetes-related blindness, kidney disease, neuropathy, and peripheral vascular disease, and contributes to the progress of these diseases after their onset. Cigarette smoking and high cholesterol are risk factors for peripheral vascular disease, while smoking can hasten the decline of kidney function among people with diabetes.

The increasing prevalence of diabetes in Nebraska has been accompanied by a simultaneous increase in the prevalence of obesity and overweight. Continuing the trend of the 1990s, the percentage of Nebraska adults who are obese has increased to even greater levels since 2000 (*see Figure 4*). A person is considered obese if their Body-Mass Index (BMI) is 30 or greater; the BMI is calculated by dividing a person's weight by the squared value of their height. According to the 2010 BRFSS, 27.5% of Nebraska adults – more than one in four – are obese, compared to 21.1% in 2000. More than one in seven (14.8%) obese adults in Nebraska also has diabetes, making it four times more prevalent in comparison to healthy-weight adults, among whom the prevalence of diabetes is only 3.2%. Nebraska BRFSS data also show that obesity is most prevalent in middle age, is less common among college graduates compared to those without a college degree, and is more prevalent among African-Americans and Native Americans compared to whites.

In addition to obesity, BRFSS data collected in 2010 estimate that more than one-third (37.3%) of Nebraska adults are overweight. A person is considered overweight if their BMI value is between 25 and 29, which is above the healthy weight level but below obesity. The prevalence of diabetes among overweight Nebraska adults (6.5%) is more than twice the rate among healthy-weight adults (3.2%). Added together, almost two-thirds (64.9%) Nebraska adults are either overweight or obese. However, one encouraging development is that the steadily increasing prevalence of obesity and overweight that has occurred in Nebraska since 1990 appears to have slowed and even stopped during the past few years (*see Figure 4*).

Figure 4. Percentage of Nebraska Adults who are Obese or Overweight, 2000-2010

(Source: Nebraska Behavioral Risk Factor Surveillance System)



In contrast to obesity and overweight, measures of physical activity among Nebraska adults have shown substantial improvement during this decade. BRFSS data collected in 2009 found that more than half (51.1%) of Nebraska adults reported that they are physically active (i.e., they engage in moderate physical activity for at least 30 minutes on five or more days per week, or they engage in vigorous physical activity for at least 20 minutes on three or more days per week), and this figure is up from the 34.2% recorded in 2001. Regardless of age or gender, people with diabetes are less likely to be physically active than are people without diabetes, although the recent trend is positive: According to the BRFSS, 37.8% of Nebraska adults with diabetes reported in 2009 that they had participated in some type of regular physical activity during the past month, compared to 27.1% in 2001.

Two important risk factors for diabetes complications – high cholesterol and hypertension – currently afflict more than half of all adults in Nebraska who have diabetes. According to the 2009 BRFSS, two-thirds (68.2%) of Nebraska adults with diabetes have been told that they have high blood pressure, 61.8% have been told that they have high cholesterol, and 48.4% have both conditions. Earlier in the decade, in 2001, these figures stood at 38.5% for high cholesterol and 62.6% for hypertension. By contrast, BRFSS data also show that the prevalence of smoking among Nebraska adults with diabetes has been declining steadily in recent years, with the rate recorded in 2010 (12.8%) only half as large as the 1995 rate (23.5%).

Over the past several decades, there has been a significant increase in the proportion of U.S. children who are obese, which in turn has led to a substantial increase in the number of cases of Type 2 diabetes among children and adolescents. According to the most recent findings of the National Health and Nutrition Examination Survey (NHANES), conducted during 2009 and 2010, the prevalence of obesity among children and adolescents 2-19 years of age was 16.9%. For these data, obesity was defined as a BMI at or above the 95th percentile of the BMI-for-age growth charts. A recent analysis of NHANES data gathered between 1999 and 2010 among youth 2-19 years of age indicated that a significant increase in obesity had occurred among males but not among females.

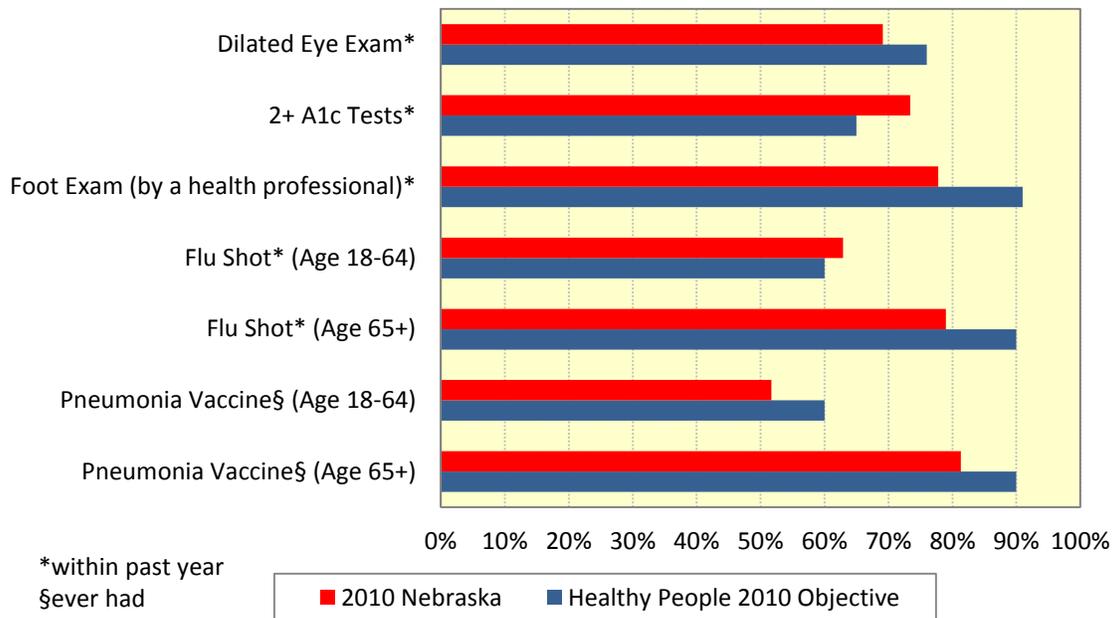
III. Health Care

Proper care and management of diabetes are important for two reasons: there is at present no cure for diabetes, and many of the adverse health outcomes associated with diabetes are preventable or can be delayed or minimized with appropriate management and treatment. Most diabetes care must be individualized based on the type and severity of diabetes as well as other patient characteristics. Continuing care is crucial in the management of diabetes, and treatment must be evaluated and modified as necessary. Since the majority of diabetes care is self-care, patient education in self-management is essential. Clinical care should also include an initial evaluation, establishment of treatment goals, development of a management plan, and monitoring and treatment of cardiovascular and other complications.

To ensure quality health care for people with diabetes, the Nebraska Diabetes Prevention and Control Program has spearheaded the development of guidelines to help clinicians provide the most effective care for their patients with diabetes. These guidelines, known as the Nebraska Diabetes Consensus Guidelines, were developed in conjunction with primary and specialty care physicians, diabetes educators, and representatives of the major managed care health plans in Nebraska, and are based largely on the American Diabetes Association's recommended standards of care. The guidelines include recommendations for lifestyle behaviors, physical activity, tobacco cessation, sick day management and urine ketone testing, medication administration, monitoring blood glucose control, treatment of hypoglycemia, nutrition management, foot care, eye care, dental care, nephropathy screening, hypertension control, lipid management, diagnosis of pre-diabetes, and aspirin therapy. The Nebraska Diabetes Consensus Guidelines are available on the DPCP website at http://www.dhhs.ne.gov/publichealth/Documents/guidelines_2011.pdf.

Figure 5. Percentage of Nebraska Adults with Diabetes Who Have Received Preventive Care Services (2010) and Healthy People 2010 Objectives

(Source: Nebraska Behavioral Risk Factor Surveillance System)



In addition to the Nebraska Diabetes Consensus Guidelines, the Division of Diabetes Translation at CDC has developed a set of national objectives that address clinical care for people with diabetes. These objectives include dilated eye exams (recommended annually), A1c measurements (at least two per year), foot exams (annual), influenza vaccination (annual) and pneumococcal vaccination (once). The U.S. Department of Health and Human Services also included these five preventive care services as part of their 2010 national objectives, known as the Healthy People 2010 objectives, and set specific targets for each one. Data from the 2010 BRFSS show that Nebraska has achieved two of these objectives: The percentage of adults with diabetes who have had at least two A1c tests within the past year and the percentage of adults 18-64 years old with diabetes who have had a flu shot within the past year (*see Figure 5*).

There are several additional questions on the BRFSS survey concerning diabetes-related preventive health care and self-care, including office visits to a health professional for diabetes care, self-blood glucose monitoring (SBGM), foot self-examination, and diabetes education. Two of these indicators, SBGM and diabetes education, were included in the Healthy People 2010 national objectives for diabetes. For SBGM, the objective was to increase the proportion of adults with diabetes who perform SBGM at least once daily to 61% by 2010. For diabetes education, the objective was to increase the proportion of people

with diabetes who receive formal diabetes education to 60% by the year 2010. Data from the 2010 BRFSS show that Nebraska successfully met both of these objectives, with 67.4% of respondents reporting that they performed SBGM at least once daily and 61.7% reporting that they had ever taken a diabetes self-management course or class. BRFSS data collected during 2010 also show that 91.3% of Nebraska adults with diabetes had seen a health professional at least once during the past year for diabetes care and that 66.8% checked their feet daily (or had a friend or family member check them) for sores and irritations.

A persistent challenge to providing recommended levels of clinical care is that a substantial percentage of people who have diabetes do not have health insurance. Data from the 2010 Nebraska BRFSS show that, among adults under the age of 65, 17.3% of those with diabetes do not have health insurance. The economic costs associated with the management and treatment of diabetes are high, and people who do not have health insurance and lack adequate financial resources face a significant challenge to obtaining recommended care. It is not uncommon for people who do not have health insurance to wait until a crisis develops before seeking medical care, which can have devastating consequences for people with diabetes.

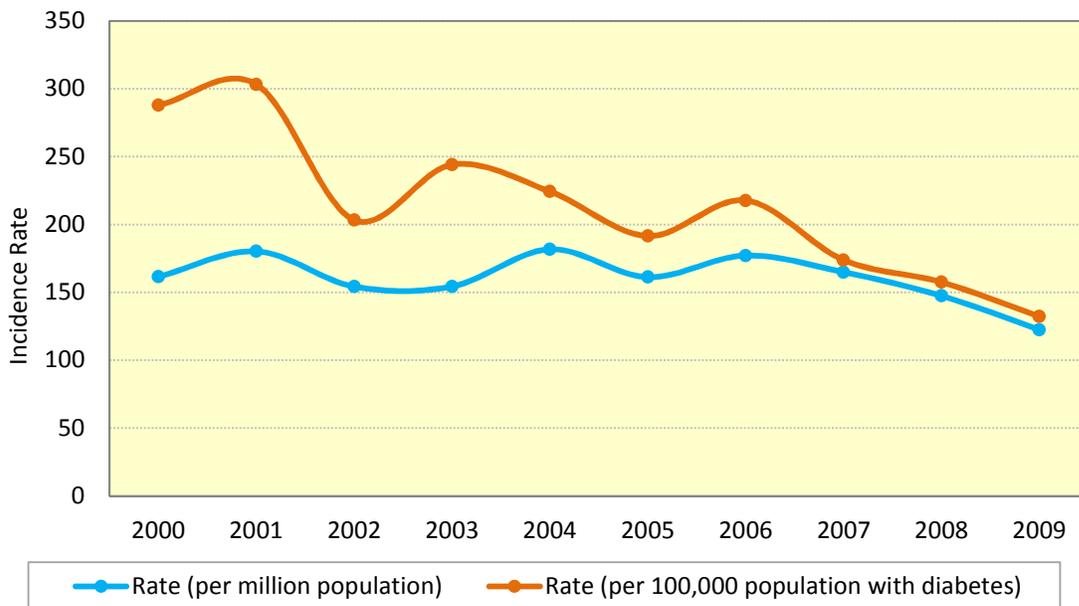
IV. Complications

People with diabetes can experience a number of complications, which can be classified as either acute, long-term, or pregnancy-related. The acute complications of diabetes can occur at any time and can usually be corrected, while the long-term complications may take decades to develop and are often irreversible. The long-term complications of diabetes include cardiovascular disease, microvascular disease, and neuropathy. Microvascular complications include diabetic retinopathy and kidney disease, which if untreated, can lead to blindness and kidney failure (also known as end-stage renal disease, or ESRD). Loss of sensation in the legs and feet due to neuropathy or impeded blood supply can result in peripheral vascular damage that can, in turn, lead to ulcers and amputations of the toes, feet, and legs. Among the acute metabolic complications of diabetes, diabetic ketoacidosis (DKA) is one of the most serious, and can be fatal. DKA is usually confined to people who have Type 1 diabetes, and is the result of insulin insufficiency. A pregnancy complicated by diabetes can have adverse health effects on both the mother and her baby.

Between 2000 and 2009, 2,198 cases of ESRD were diagnosed among Nebraska residents with diabetes. Diabetes was the leading cause of kidney failure in Nebraska during these years, accounting for more than two of every five (42.8%) new ESRD cases. Compared to whites, diabetes-related ESRD occurred far

more frequently among African-Americans, Native Americans, and Hispanics, even after controlling for the higher prevalence of diabetes within these populations. Unlike the decade of 1990s, when the incidence of diabetes-related ESRD in Nebraska more than doubled, the incidence of diabetes-related ESRD began to decline during the most recent decade, even as the number of people with diabetes continued to increase. After peaking in 2004 at a rate of 181.7 (diabetes-related ESRD diagnoses per one million adult population), incidence has since declined to 122.5 in 2009 (*see Figure 6*). When calculated for just the population that has diabetes, these rates decline even more dramatically, from 287.9 (ESRD diagnoses per 100,000 adult population with diabetes) in 2000 to 132.2 in 2009, a drop of over 50% (*see Figure 6*). A recent study that documented a similar trend at the national level did not attribute the declining incidence of diabetes-related ESRD to any single factor, but suggested that the reasons might include reductions in the risk factors for kidney disease (which include hyperglycemia and hypertension) and better treatment of kidney disease, which slows the loss of kidney function and thus delays the onset of ESRD.

Figure 6. Incidence of Diabetes-Related End-Stage Renal Disease (ESRD) Among Nebraska Residents, 2000-2009
(Source: US Renal Data System)



A large proportion of the cost of diabetes is attributable to inpatient hospital care. During the year 2010, there were 35,821 in-patient hospitalizations in Nebraska (excluding non-Nebraska residents) which listed diabetes as one of the discharge diagnoses. The total length of stay for all diabetes-related hospitalizations was 177,399 days, for an average length of stay of 5.0 days per hospitalization. The total charge for all diabetes-related hospitalizations in 2010 was nearly \$1.2 billion, with an average charge of

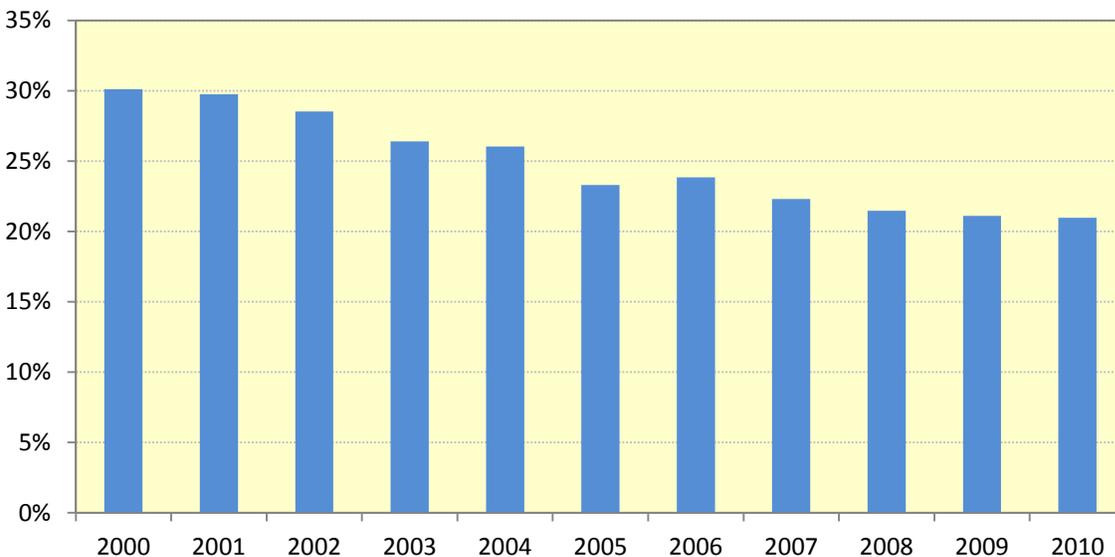
over \$33,000. The average cost of a diabetes-related hospitalization was more than double the amount recorded a decade earlier (\$14,244, the average for the year 2000), although the average charge for a non-diabetes-related hospitalization increased by a similar rate over the same period.

The number of diabetes-related hospitalizations that occurred in Nebraska during 2010 translates into a rate of 180.0 (discharges per 10,000 population), which is an increase from the 21,744 diabetes-related hospitalizations and discharge rate of 122.5 recorded in 2000. This change most likely reflects the increasing size of the population with diabetes that occurred in Nebraska during this period. When calculated for just the population with diabetes, these same data show that hospitalization rates were almost unchanged, going from 269.5 (discharges per 1,000 population with diabetes) in 2000 to 272.1 in 2010.

Over 7,500 of the diabetes-related hospitalizations that occurred in Nebraska during 2010 listed cardiovascular disease (CVD) as the primary discharge diagnosis. CVD, which includes both coronary heart disease and stroke, was the most frequent primary discharge diagnosis among diabetes-related hospitalizations. However, as a proportion of all diabetes-related hospitalizations, CVD has declined dramatically during the past decade, being listed as the primary discharge diagnosis in just one in five (21.0%) hospitalizations among people with diabetes in 2010 compared to 30.1% in 2000 (see Figure 7).

Figure 7. Percentage of Diabetes-Related Hospitalizations Among Nebraska Residents with a Primary Discharge Diagnosis of Cardiovascular Disease (CVD), 2000-2010

(Source: Nebraska hospital discharge data)



Diabetic ketoacidosis (DKA) accounted for 862 of the diabetes-related hospitalizations that occurred in Nebraska during 2010. More than three of every four (77.4%) DKA hospitalizations also included an emergency room visit. DKA accounted for more than one of every six (17.5%) diabetes-related hospitalizations in 2010 that involved a person under the age of 45, and about two-thirds (67.4%) of all DKA hospitalizations occurred among people younger than 45. DKA hospitalizations have shown neither an increasing nor decreasing trend in recent years: since 2000, between 2.0% and 2.5% of all diabetes-related hospitalizations per year have included a discharge diagnosis of DKA.

There were 440 lower-extremity amputations (LEAs) performed in 2010 among Nebraska residents with diabetes, and this number excludes amputations that were the result of trauma. Diabetes has long been the leading cause of non-traumatic lower-limb amputations, both in Nebraska and throughout the United States. During the past decade, people with diabetes have accounted for over 60% of all non-traumatic LEAs performed at Nebraska hospitals. An encouraging finding from these data is that Nebraska's rate of non-traumatic LEAs in 2010 (2.8 per 1,000 people with diabetes) was better than necessary to achieve the national Healthy People 2010 objective of 2.9.

V. Mortality

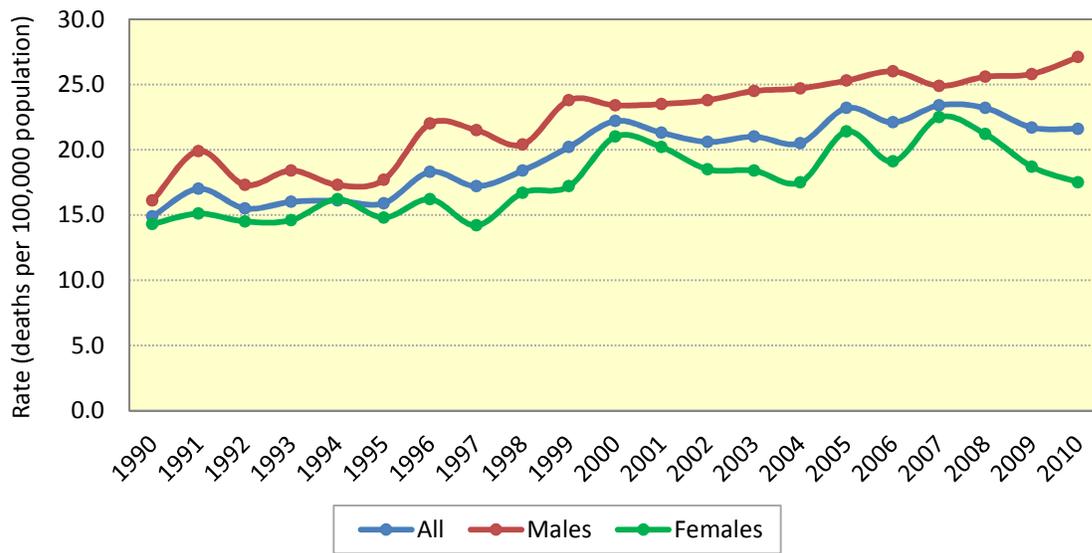
Diabetes has been ranked among the top 10 leading causes of death in the United States since before World War II, and it is now the nation's seventh leading cause of death. In recent years, over 70,000 deaths per year throughout the United States have been directly attributed to diabetes, and it has contributed to an additional 230,000 deaths per year. However, since diabetes is listed on the death certificate of less than half of all people who have diabetes at the time of their death, mortality statistics significantly underestimate the impact of the disease. Factors that increase the risk of death for people with diabetes include increasing age, age at onset of diabetes, duration of diabetes, and cardiovascular disease risk factors (smoking, hypertension, high cholesterol, physical inactivity, and obesity).

During the past five years (2006-2010), 2,273 Nebraska residents died from diabetes (i.e., diabetes was the underlying, or primary, cause of death listed on their death certificate), making it the state's seventh leading cause of death during these years. The diabetes mortality rate for Nebraska during this period (22.4 [average annual deaths per 100,000 population]) was almost equal to the most recent five-year mortality rate for the United States (23.3, for the years 2004-2008). Diabetes mortality in Nebraska increased significantly during the 1990s and the early years of the following decade, peaking in 2007 with 472 deaths and a mortality rate of 23.4 (deaths per 100,000 population), but has since declined slightly

(see Figure 8). This increase in mortality was largely driven by the increasing size of Nebraska's population with diabetes. However, when the rates are restricted to just the portion of the population that has diabetes, they show that mortality rates have been declining steadily during the past decade, from 352.5 (deaths per 100,000 population with diabetes) in 2000 to 191.8 in 2010. This trend suggests that recent improvements in care and treatment available to people with diabetes have reduced morbidity and increased lifespan.

Figure 8. Diabetes Mortality Rates, by Gender, Nebraska, 1990-2010

(Source: Nebraska vital statistics)

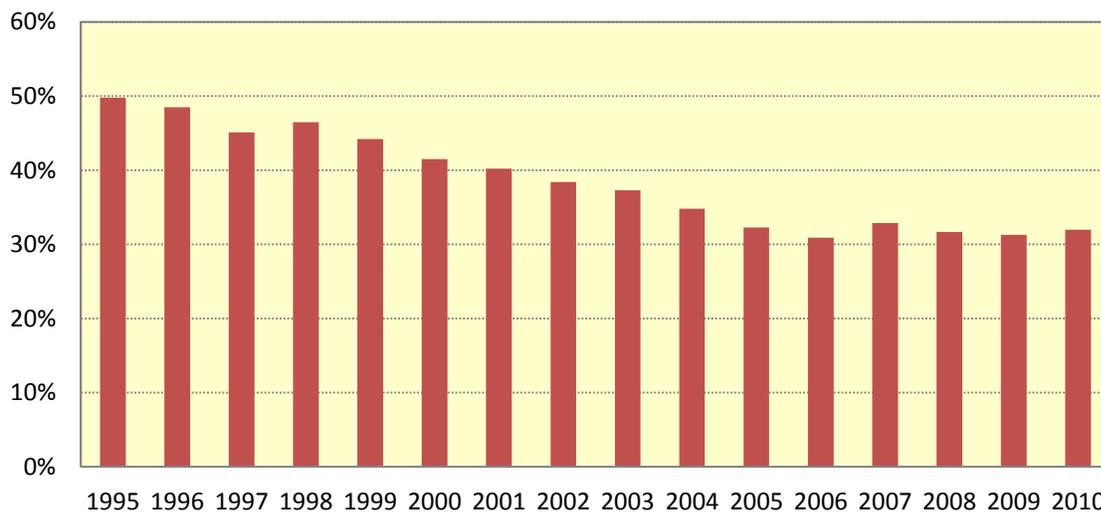


Premature deaths (i.e., deaths occurring under the age of 65) accounted for 472 (20.8%) of Nebraska's diabetes deaths during the years 2006-2010. Diabetes mortality was significantly higher among men than for women during these years, by a rate of 25.9 (average annual deaths per 100,000 male population) vs. 19.8 (average annual deaths per 100,000 female population), continuing a long-standing trend (see Figure 8). The diabetes mortality rate for the state's African-Americans during 2006-2010 (58.9 [average annual deaths per 100,000 population]) was nearly three times the rate for the white population (21.0), while the rate for Native Americans (101.0) was almost five times the white rate. For Hispanics, the diabetes mortality rate (32.3) was more than 50% greater than the white rate. However, some of these disparities are due to the higher prevalence of diabetes within the African-American, Native American, and Hispanic populations.

In addition to those deaths directly attributed to diabetes, diabetes contributed to the death of an additional 6,066 Nebraska residents between 2006 and 2010, i.e., diabetes was listed on their death certificate as a

contributing, but not the underlying cause of death. Deaths that list diabetes on the death certificate as either the underlying or a contributing cause of death are considered diabetes-related. Diabetes-related mortality in Nebraska increased steadily during the 1990s and throughout most of the next decade, reaching a peak of 1,721 deaths and a rate of 84.0 (deaths per 100,000 population) in 2008. However, when the data are calculated for just the population that has diabetes, diabetes-related mortality in Nebraska declined substantially during the past decade, from 911.6 (per 100,000 population with diabetes) in 2000 to 633.1 in 2010. During the years 2006-2010, diabetes-related mortality rates in Nebraska were higher for African-Americans (166.7 [deaths per 100,000 population per year]), Native Americans (226.1), and Hispanics (91.5) compared to whites (78.6) and Asian/Pacific Islanders (73.7).

Figure 9. Percentage of Diabetes-Related Deaths Among Nebraska Residents Attributed to Cardiovascular Disease (CVD), 1995-2010
(Source: Nebraska vital statistics)



During the past five years (2006-2010), cardiovascular disease (CVD) has been the leading cause of death among people with diabetes, and 2,650 of the diabetes-related deaths that occurred in Nebraska during those years listed CVD on the death certificate as the underlying cause of death. As in the general population, CVD mortality among Nebraska residents with diabetes has been declining for well over a decade. Just 15 years ago, in 1995, CVD accounted for nearly half (49.8%) of all diabetes-related deaths in Nebraska, compared to 32.0% in 2010 (*see Figure 9*). Expressed as a rate, CVD mortality among Nebraska residents with diabetes fell from 369.3 (deaths per 100,000 population with diabetes) in 1995 to 180.8 in 2010. Nebraska’s 2010 rate for CVD deaths among people with diabetes was far better than necessary to achieve the national Healthy People 2010 objective of 299.0.

APPENDIX A — Sources of Data Used in this Report

Behavioral Risk Factor Surveillance System

The data on diabetes and risk factor prevalence that are presented in this report were collected as part of the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a random-sample telephone survey of non-institutionalized adults (age 18 years and older) conducted in all 50 states, the District of Columbia, and several U.S. territories, with support from CDC. In Nebraska, the BRFSS is administered by the University of Nebraska Medical Center, in conjunction with the Department of Health and Human Services (DHHS), and conducts over 16,000 landline surveys per year. The BRFSS survey contains questions on a wide variety of health-related topics, and includes a question that asks survey participants if they have ever been told by a doctor that they have diabetes. Responses to this question were used to develop the estimates of diabetes prevalence presented in this report. The BRFSS also includes a series of questions concerning diabetes-related preventive health care and self-care that are asked only of people who have diabetes. All of the data from the BRFSS that are presented in this report are based on weighted data rather than the raw numbers of responses to a question. The weights adjust for over- or under-sampling of age and gender groups.

Death certificates

The diabetes mortality data presented in this report were obtained from death certificates on file with DHHS. Mortality data are available for every deceased Nebraska resident, whether death occurs in Nebraska or out of state. Information collected on the death certificate include demographics (age at death, gender, race), date and place of death, and the underlying (i.e., primary) and contributing causes of death. For deaths occurring in or before 1998, causes of death are coded according to the Ninth Edition of the World Health Organization's International Classification of Disease (ICD-9). For deaths occurring in 1999 or later, causes of death are coded according to the Tenth Edition of the World Health Organization's International Classification of Disease (ICD-10). All of the mortality rates presented in this report were age-adjusted to the 2000 U.S. standard population.

Birth certificates

The data pertaining to diabetes and pregnancy were obtained from birth certificates on file with DHHS. Natality data are available for every Nebraska newborn, whether birth occurs in Nebraska or out of state.

Information collected on the birth certificate include personal and parental identifiers, date and place of birth, maternal medical risk factors (including diabetes), obstetric procedures, events and method of delivery, condition of the newborn, and congenital anomalies of the child.

Hospital discharges

The data presented in this report that pertain to diabetes-related hospitalizations were obtained from the statewide hospital discharge database maintained by the Nebraska Association of Hospitals and Health Systems (NAHHS). NAHHS compiles information from UB-92 claims forms submitted by hospitals throughout the state. Information collected on each discharge include patient demographics (age, gender, place of residence), date of discharge, length of stay, primary and secondary diagnoses, procedure(s) performed, primary source of payment, and cost of hospital stay. However, this database is limited to in-patient hospitalizations only, and does not collect information on discharges from federally operated hospitals in Nebraska or from out-of-state hospitals where Nebraska residents receive care. All of the hospital discharge rates presented in this report were age-adjusted to the 2000 U.S. standard population.

End-Stage Renal Disease Network

Data concerning end-stage renal disease (ESRD) were obtained from the United States Renal Data System (USRDS). Funded by the National Institute of Diabetes and Digestive and Kidney Diseases, in conjunction with the Centers for Medicare and Medicaid Services (part of the US Department of Health and Human Services), the USRDS is a national data system which collects, analyzes, and distributes information about ESRD in the United States. The USRDS data presented in this report were originally gathered by ESRD Network #12, which is one of the nation's 18 ESRD Network Organizations established by the U.S. Social Security Administration to monitor the quality of care given to ESRD patients by providers of dialysis services and transplantation. Information collected by the ESRD Network Organizations include personal identifiers, patient demographics, primary cause of renal failure, treatment history, Medicare payments, and transplant data. All of the diabetes-related ESRD incidence rates presented in this report were age-adjusted to the 2000 U.S. standard population.

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