



**DELAWARE HEALTH
AND SOCIAL SERVICES**

DIVISION OF PUBLIC HEALTH

Diabetes Prevention and Control Program

302-744-1020

2009

The Burden of Diabetes in Delaware





Table of Contents

Executive Summary	iii
Prevalence	1
Risk Factors	5
Prevention and Management	8
Complications	10
Disparities	15
Cost of Diabetes	16
Mortality	20
State Initiatives for Healthy Communities	26
References	32
Definitions	34
Acronyms	35



Executive Summary

Since the mid-1990s, the prevalence of diabetes has more than doubled among Delawareans. In 1995, an estimated 4.3 percent of Delawarean adults had diabetes. By 2007, this number had increased to nearly 9 percent.¹ Presently, Delaware's diabetes prevalence rate is slightly higher than that of the nation. Approximately 58,000 Delawareans over the age of 18 currently have diabetes. Another 9,297 Delawareans have pre-diabetes – a condition that occurs when blood glucose (sugar) levels are higher than normal, but not yet classifiable as diabetes.²

At the national level, approximately 13 percent of African Americans and 8 percent of Caucasians have diabetes. In Delaware, this same health disparity exists, but to a lesser extent: roughly 11 percent of African American adults and 9 percent of Caucasian adults have diabetes.¹

Obesity is an especially strong risk factor for the development of type 2 diabetes. In recent years, the overweight/obesity prevalence rate in Delaware has increased at an alarming rate. Currently, 37 percent of Delawarean adults 18 and older are overweight (BMI = 25.0-29.9); an additional 28 percent are obese (BMI \geq 30).

Type 2 diabetes is a preventable and treatable condition. According to the National Diabetes Education Program (NDEP), people at high risk for the development of type 2 diabetes can prevent or delay the disease by losing 5-7 percent of their body weight. This can be accomplished by consuming a healthier diet and participating in 30 minutes or more of physical activity at least five days a week. People with diabetes can also take measures to help prevent the development of diabetes-related complications. Preventive health measures target eye, kidney, foot, teeth, and gum health.⁶

Diabetes-related complications include retinal disorders, ketoacidosis, coma, lower extremity amputations, heart and blood vessel diseases, stroke, and kidney failure. In Delaware, diabetes-related complications are occurring with increased frequency. In 1996, people with diabetes accounted for just over 10 percent of all hospitalizations in Delaware. By 2004, diabetes represented the primary or secondary diagnosis for 16 percent (59,425) of hospitalizations in the state.

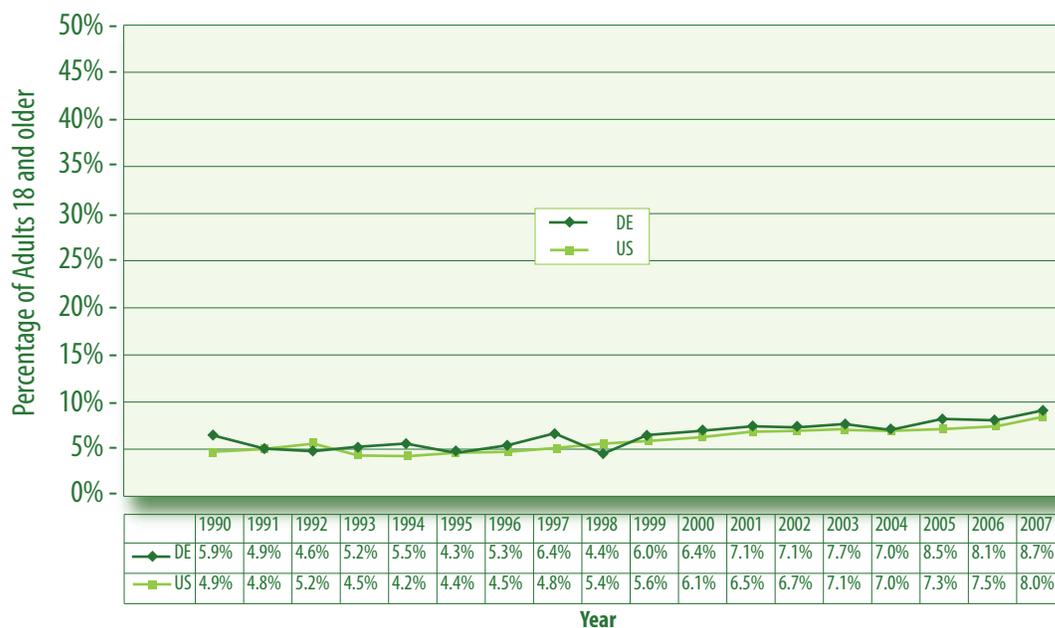
In Delaware, health care expenditures stemming from diabetes-related services and care approached nearly \$857 million from 2001-2004. This figure does not include additional indirect costs resulting from lost productivity, disability, and premature mortality. Medicare and Medicaid are the primary payers of diabetes-related hospitalization costs in Delaware.

Diabetes is the sixth leading cause of death in both the United States and Delaware. Between 1999 and 2004, diabetes directly accounted for 1,254 deaths among Delawareans.^{14,15}

Prevalence

Since the mid-1990s, the prevalence of diabetes has more than doubled among Delawareans. In 1995, an estimated 4.3 percent of Delawarean adults had diabetes. By 2007, this number had increased to nearly 9 percent (Figure 1).¹ Presently, Delaware's diabetes prevalence rate is slightly higher than that of the nation. Approximately 58,000 Delawareans over the age of 18 currently have diabetes. Another 9,297 Delawareans have pre-diabetes – a condition that occurs when blood glucose (sugar) levels are higher than normal, but not yet classifiable as diabetes.²

Figure 1: Percentage of Adults Reporting Having Been Told by a Doctor They Have Diabetes, Delaware vs. United States, 1990-2007



Source: Delaware Health and Social Services, Division of Public Health, Behavioral Risk Factor Surveillance System, 1990-2007. U.S. Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 1990-2007, for national data.

Delaware is comprised of New Castle, Kent, and Sussex Counties. The three counties differ substantially in terms of both land use and demographic composition. New Castle County, located in the northern portion of Delaware, is a largely urbanized area that includes the city of Wilmington. Kent County is located in the central portion of the state and consists of urban, suburban, and agricultural zones. The southernmost county – Sussex County – is predominately rural and home to a large number of poultry, dairy, and crop-growing farms and facilities. Eastern Sussex County includes the beach communities and draws a large number of retirees each year.

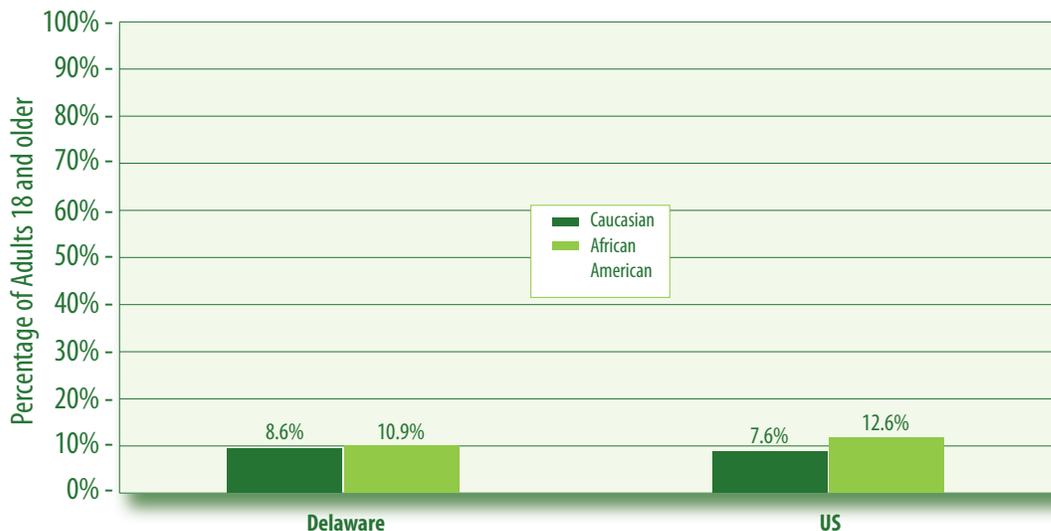


The diabetes prevalence increases as one travels south through the state. New Castle County has the lowest diabetes prevalence (7.5 percent). The prevalence of diabetes in Kent and Sussex Counties is 9.4 percent and 11.4 percent, respectively.

In Delaware, like the United States, the diabetes prevalence rate differs across race/ethnic groups. Hispanics, African Americans, and Native and Asian Americans have a higher risk of developing the disease than Caucasians. The difference in diabetes prevalence rates between Caucasians and minority populations may be due to differences in behavioral risk factors, genetics, socioeconomic factors, cultural variances, or some combination of these factors.²

At the national level, approximately 13 percent of African Americans and 8 percent of Caucasians have diabetes.¹ In Delaware, this same health disparity exists, but to a lesser extent. Across the state, roughly 11 percent of African American adults and 9 percent of Caucasian adults have diabetes (Figure 2). It is not yet possible to calculate a valid prevalence of diabetes among Hispanics, Native Americans, or Asians in Delaware due to the low number of Behavioral Risk Factor Surveillance System (BRFSS) respondents in these race groups.

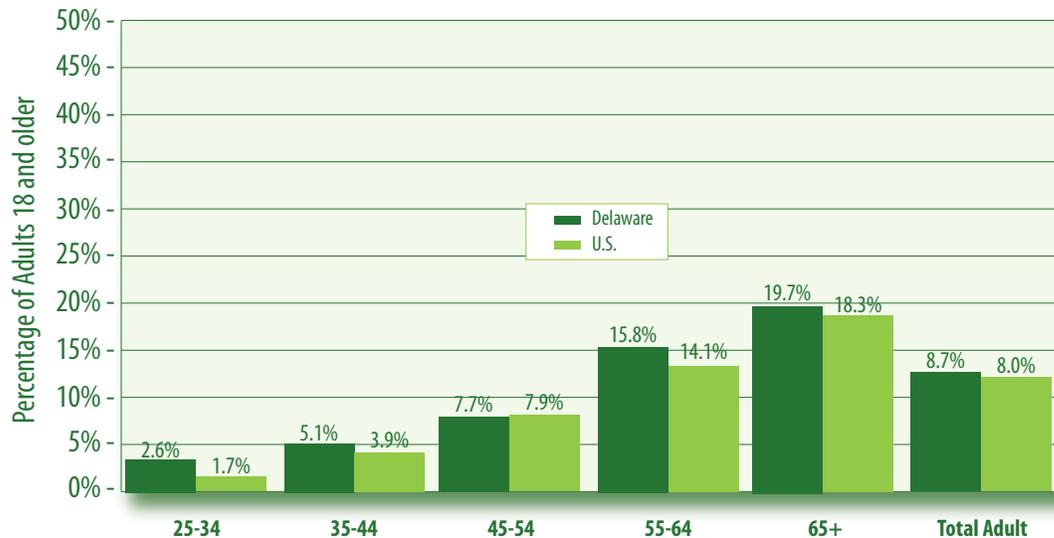
Figure 2: Adult Diabetes Prevalence by Race, Delaware vs. United States, 2007



Source: Delaware Health and Social Services, Division of Public Health, Behavioral Risk Factor Surveillance System, 2007. U.S. Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2007.

Advancing age is a strong risk factor for the development of type 2 diabetes. Almost 19 percent of Delawareans age 65 and older have diabetes. As shown in Figure 3, this prevalence rate far surpasses that of any other age category. As an example, the diabetes prevalence rate among Delawareans age 65 and older is almost four times greater than the diabetes prevalence rate among Delawareans age 35-44.

Figure 3: Percentage of Adults Reporting Having Been Told They Have Diabetes, by Age Group, Delaware vs. United States, 2007



Source: Delaware Health and Social Services, Division of Public Health, Behavioral Risk Factor Surveillance System, 2007. U.S. Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System, 2007, for national data.

Note: Data for 18-24 year age group suppressed due to low cell counts.

Education level and annual income are also associated with type 2 diabetes prevalence rates. Over 10 percent of Delawareans with less than a high school education have diabetes compared to less than 6 percent of Delawareans who graduated from college. Similarly, nearly 17 percent of Delawareans earning \$15,000-\$24,999 annually have diabetes compared to less than 7 percent of Delawareans with an annual income of \$50,000 or more.

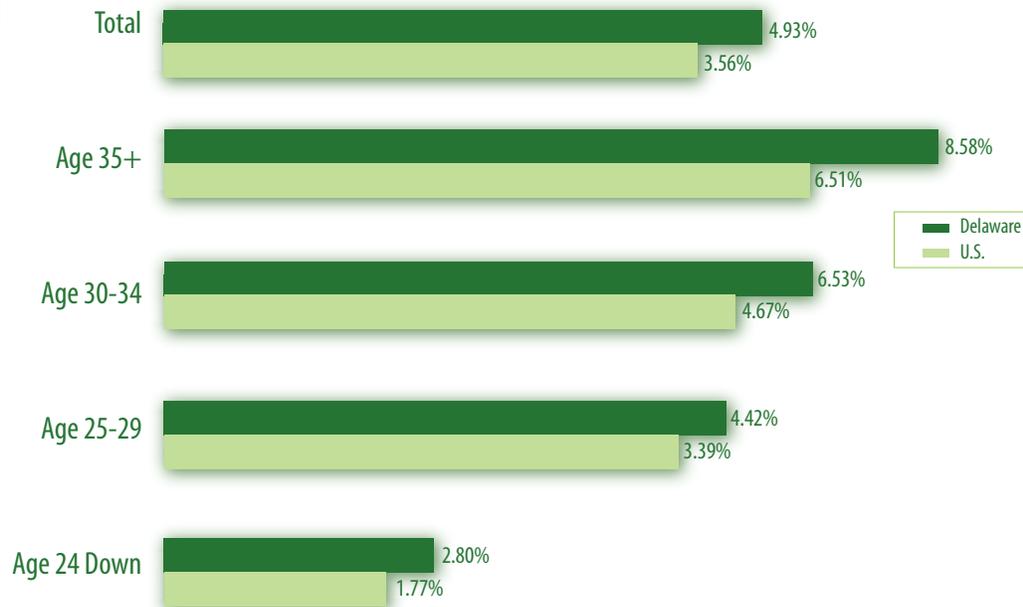
Interestingly, gender is not strongly associated with diabetes prevalence rates. Among adult Delawareans, 8.5 percent of males and 8.8 percent of females have diabetes. These gender-specific prevalence rates are similar to those in the U.S. At the national level, 8.1 percent of males and 7.9 percent of females have diabetes.

SPECIAL POPULATIONS

are at higher risk for both the prevalence of diabetes and its complications.

Each year, 135,000 expectant mothers in the United States develop gestational diabetes. Gestational diabetes is a documented risk factor for subsequent development of type 2 diabetes for both the mother and child. Additionally, gestational diabetes increases a woman's risk for pregnancy complications and increases her child's risk for obesity later in life. Women with gestational diabetes have a 50-65 percent increased risk for gestational diabetes in subsequent pregnancies.³ Delaware's gestational diabetes prevalence rate exceeds that of the United States (4.9 percent vs. 3.6 percent, respectively) (Figure 4).



Figure 4: Gestational Diabetes Prevalence: Delaware vs. United States, 2004

Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System, U.S. Department of Health and Human Services.

Adult Delawareans with disabilities have a higher prevalence of diabetes than those without reported disabilities. In a report published by the Delaware Division of Developmental Disabilities Services, 16 percent of adults with disabilities reported having diabetes.⁴

DIABETES DISPARITIES

Diabetes prevalence rates are higher among Delawareans who are:

- Obese
- African American
- Age 65 or older
- A high school graduate or less
- Earning less than \$25,000 a year
- Physically challenged

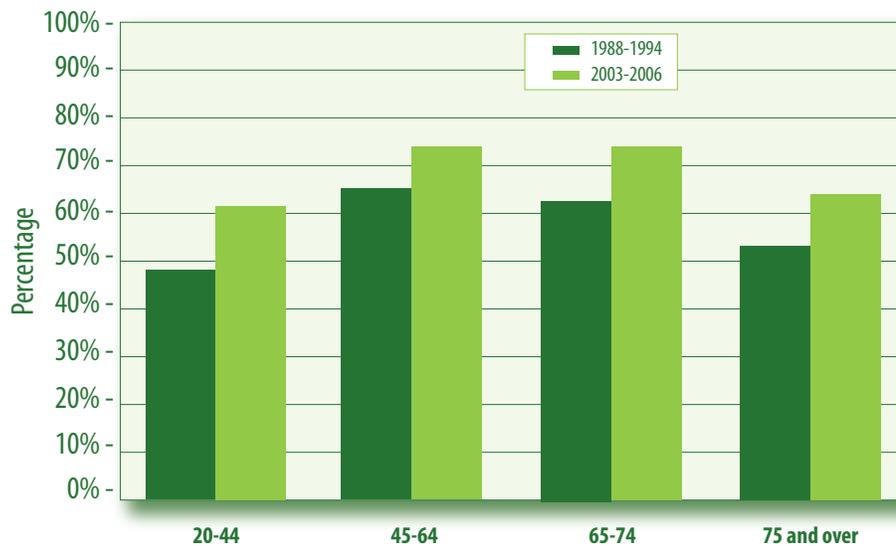
Risk Factors

Over the past two decades, the prevalence of diabetes risk factors has increased across the population. These trends suggest that, without immediate action, the diabetes burden will continue to increase in Delaware.

Type 2 diabetes risk factors belong to one of two categories: (1) modifiable risk factors or (2) non-modifiable risk factors. Modifiable risk factors – those that we have some degree of control over – include limited or no physical activity, overweight/obesity status, elevated fasting and/or post-meal glucose levels, and a high percentage of body fat (especially in the abdominal area). Preliminary research also suggests that excessive alcohol consumption and tobacco use may contribute to the development of type 2 diabetes; however, more research is necessary to establish causality. When these risk factors are reduced or eliminated through healthy lifestyle changes, a person's chance of developing type 2 diabetes substantially decreases. Non-modifiable risk factors for diabetes include family history of the disease, advancing age, and minority status. Unfortunately, no intervention can reduce or eliminate non-modifiable type 2 diabetes risk factors.

Obesity is an especially strong risk factor for the development of type 2 diabetes. Since the late 1980s, obesity rates in the U.S. increased for all age groups (Figure 5). By 2007, only one state (Colorado) had an obesity prevalence rate lower than 20 percent (Figure 6).¹

Figure 5: Measured Overweight/Obese among U.S. Adults by Age, 1988-1994 vs. 2003-2006

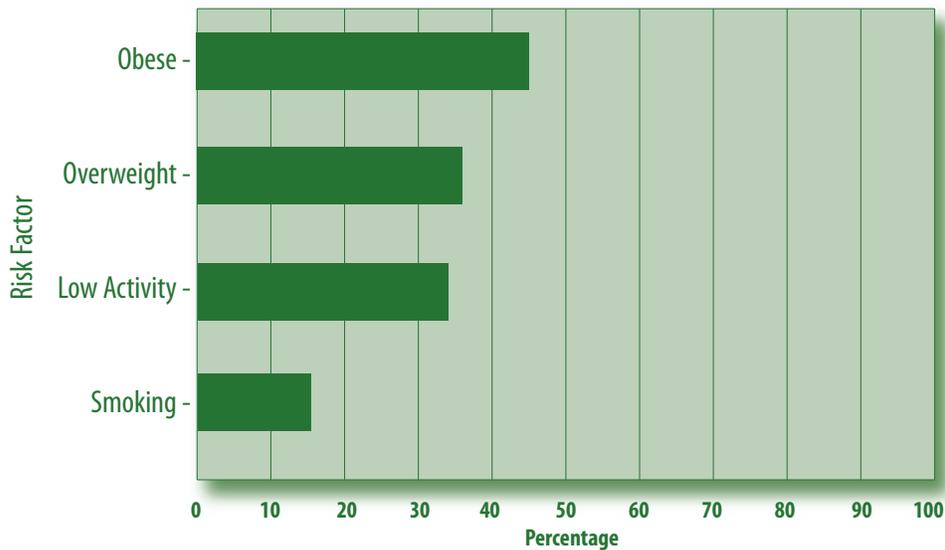


Source: Trends in Health and Aging Web site, National Health and Nutrition Examination Survey, accessed July 2007.



A high proportion of Delawareans with type 2 diabetes still engage in unhealthy behaviors (Figure 8). Among Delawareans who report having diabetes, 37 percent are overweight and an additional 47 percent are obese. Only 14 percent of Delawareans with diabetes have a BMI below 25, indicative of healthy weight status. Almost 35 percent of Delawareans with type 2 diabetes report low physical activity, and another 15 percent report smoking cigarettes regularly. Intervention strategies specifically designed to meet the needs of adults with type 2 diabetes may help promote healthy lifestyle change within this population.

Figure 8: Diabetes Risk Factor Prevalence among Adult Delawareans Who Report Having Diabetes, 2006



Source: Delaware Health and Social Services, Division of Public Health, Behavioral Risk Factor Surveillance System (BRFSS), 2006.



Prevention and Management

Every 24 hours in the United States, approximately 230 people with diabetes have an amputation, 120 people with diabetes suffer from kidney failure, and 55 people with diabetes go blind.⁵

Despite these grim statistics, it is important to remember that type 2 diabetes is a preventable and treatable condition. According to the National Diabetes Education Program (NDEP), people at high risk for the development of type 2 diabetes can prevent or delay the disease by losing 5-7 percent of their body weight. This can be accomplished by consuming a healthier diet and participating in 30 minutes or more of physical activity at least five days a week.⁵

People with diabetes can also take measures to help prevent the development of diabetes-related complications. Preventive health measures target eye, kidney, foot, teeth, and gum health. People with diabetes are strongly encouraged to follow these guidelines: receive annual dilated eye exams, routine testing for microalbuminuria, and regular dental exams; conduct daily at-home foot exams, and; achieve optimal blood pressure, cholesterol, and blood lipid control.

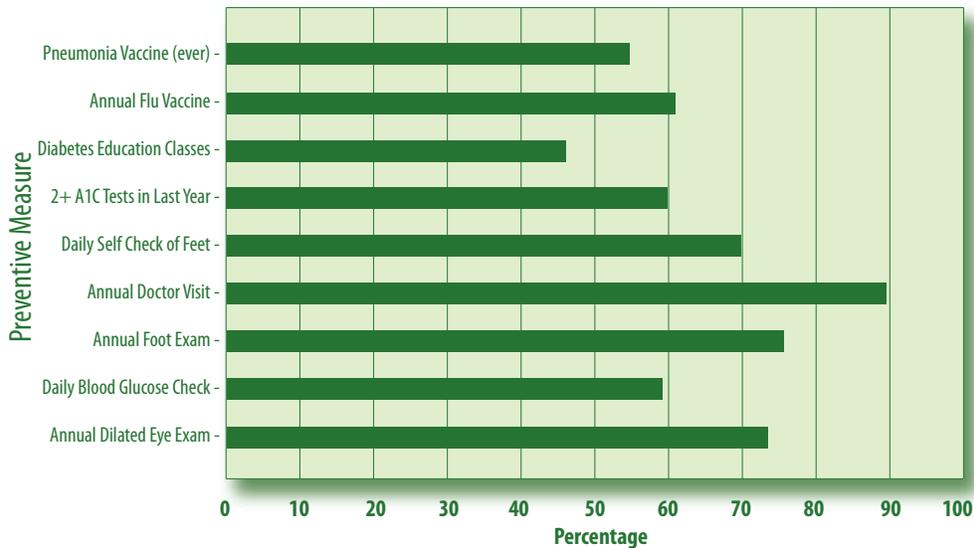
Engaging in these preventive health strategies markedly improves the health of people with diabetes. By improving his or her cholesterol profile and reducing blood lipid levels, a person with diabetes can reduce his or her risk of cardiovascular complications by 20-50 percent. Optimal blood pressure control reduces the risk of heart disease or stroke by 33-50 percent among persons with diabetes. Detecting and treating diabetic eye disease with laser therapy can reduce the development of severe vision loss by an estimated 50-60 percent. Comprehensive foot care programs can reduce amputation rates by up to 85 percent.⁶

Encouragingly, many Delawareans with diabetes engage in at least some preventive health measures (Figure 9). Roughly 90 percent of Delawareans with diabetes visit their doctors annually. Over 70 percent of Delawareans with diabetes receive annual dilated eye exams. Almost 70 percent perform daily self-checks of their feet.

However, Delawareans with diabetes are missing many opportunities to further reduce their risk of developing diabetes-related complications. Less than 60 percent of Delawareans with diabetes perform daily blood glucose monitoring. Fewer than half of Delawareans with diabetes attend diabetes education classes. Particularly distressing is the finding that just over 60 percent of Delawareans with diabetes received two or more HbA1c tests in the past year, despite the fact that 90 percent of Delawareans with diabetes report visiting their doctors annually. Promoting standards of diabetes care across the state will help ensure that all Delawareans with the disease receive recommended preventive health care.



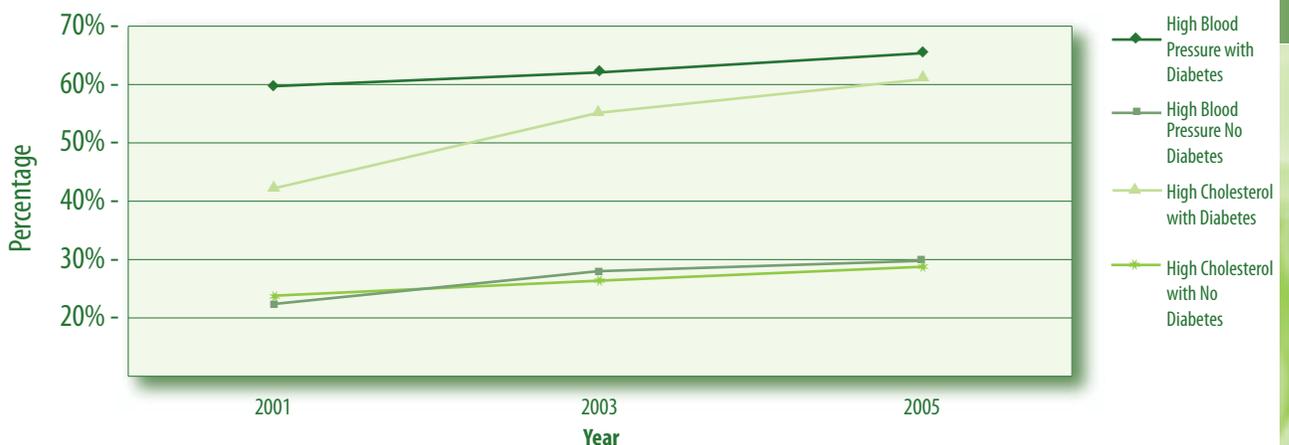
Figure 9: Percentage of Adult Delawareans with Diabetes Following Specific Preventive Measures, 2006



Source: Delaware Health and Social Services, Division of Public Health, Behavioral Risk Factor Surveillance System (BRFSS), 2006.

Sub-optimal adherence to recommended preventive health guidelines may partially explain the discouraging health trends shown in Figure 10. In 2005, nearly 65 percent of Delawarean adults with diabetes also had high blood pressure. In the same year, roughly 60 percent of Delawareans with diabetes had also had high cholesterol, reflecting a startling increase of nearly 20 percent in just four years.

Figure 10: Trend in Percentage Reporting High Blood Pressure and/or High Cholesterol by Diabetes Status, Delaware 2001, 2003, 2005



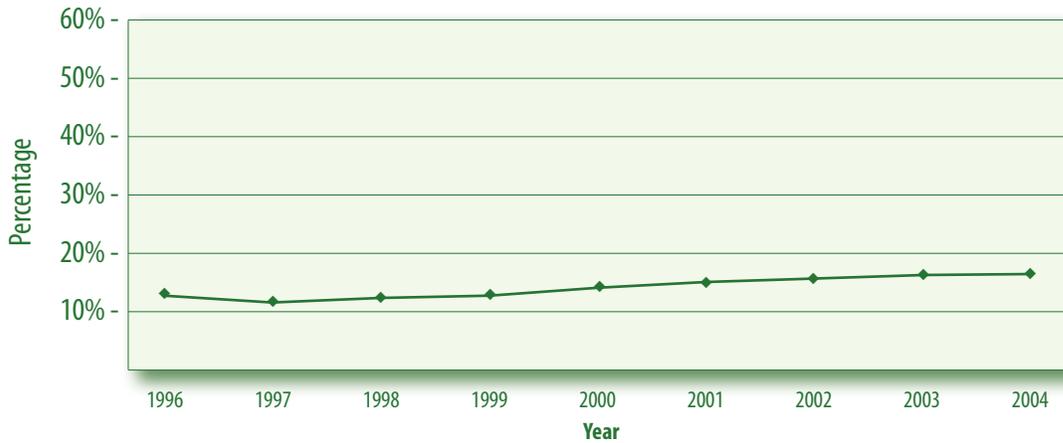
Source: Delaware Health and Social Services, Division of Public Health, Behavioral Risk Factor Surveillance System (BRFSS), 2001, 2003 and 2005.



Complications

Diabetes-related complications include retinal disorders, ketoacidosis, coma, lower extremity amputations, heart and blood vessel diseases, stroke, and kidney failure. In Delaware, diabetes-related complications are occurring with increased frequency. In 1996, people with diabetes accounted for just over 10 percent of all hospitalizations in Delaware. By 2004, diabetes represented the primary or secondary diagnosis for 16 percent (59,425) of hospitalizations in the state (Figure 11).

Figure 11: Trend in Hospital Discharges with any Diagnosis of Diabetes, Delaware, 1996-2004*

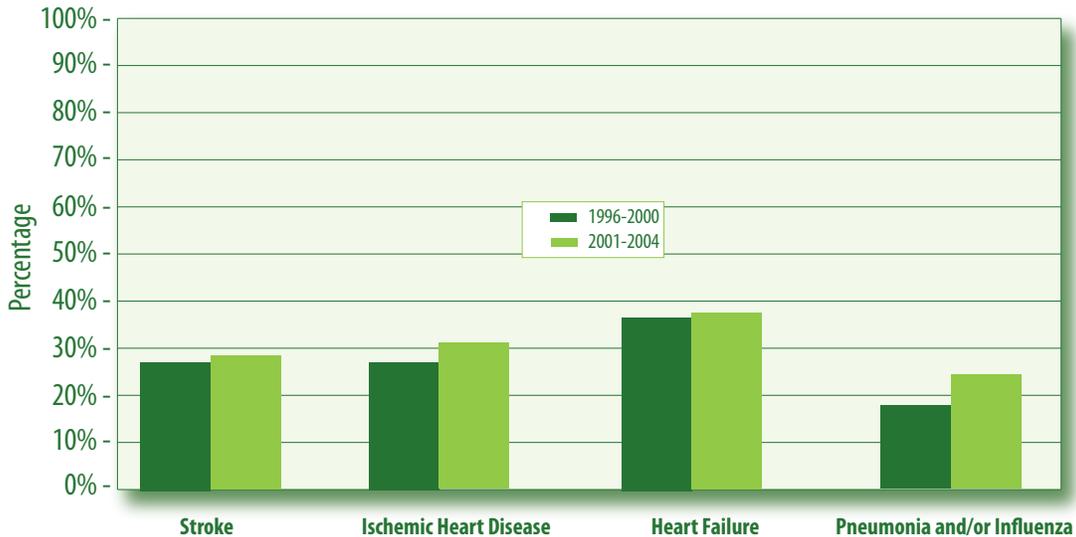


Source: Delaware Health Statistics Center, Hospitalization Discharge Data 1996-2004.

*Hospitalization Data for years 1996-2000 contains information for up to four secondary diagnoses. Data for 2001-2004 contains information for up to eight secondary diagnoses. Therefore, diabetes as a secondary diagnosis may be underreported for years 1996-2000.

As shown below in Figure 12, the proportion of hospitalizations among Delawareans with diabetes for stroke, heart disease, heart failure, pneumonia and/or influenza has increased over the past decade.

Figure 12: Comparison of Hospitalizations for Select Primary Diagnoses with a Secondary Diagnosis of Diabetes, Delaware, 1996-2000* vs. 2001-2004



Source: Delaware Health Statistics Center, Hospital Discharge Data 1996-2004.

*Hospitalization Data for years 1996-2000 contains information for up to four secondary diagnoses. Data for 2001-2004 contains information for up to eight secondary diagnoses. Therefore, diabetes as a secondary diagnosis may be underreported for years 1996-2000.

As described in the following sections, other diabetes-related complications substantially impact the health of Delawareans with the disease as well as the health care system throughout the state.

Retinal Eye Disorders

Diabetic retinopathy (eye disease) is a major cause of blindness among adults ages 20 to 74.⁷ People with diabetes have a 45 percent higher chance of being diagnosed with retinal disorders than those without diabetes. Between 2001 and 2004, Delaware hospitals treated 2,327 cases of retinal disorders. Approximately 60 percent of these cases (1,379) involved Delawareans with diagnosed diabetes.

Ketoacidosis

Ketoacidosis is characterized by high blood glucose with the presence of ketones in the urine and bloodstream; this complication often results from illness or taking too little insulin. Between 2001 and 2004, Delaware hospitals treated 1,522 cases of ketoacidosis. Ketoacidosis represented the most common primary diagnosis for hospitalizations involving Delawareans with diagnosed diabetes. Younger Delawareans represented the majority of ketoacidosis cases; over 71 percent of ketoacidosis hospitalizations involved Delawareans under the age of 45.

Coma

Coma is a serious, acute manifestation of diabetes that may result from severely high or low blood glucose levels. Serious cases of ketoacidosis may also progress to diabetic coma, rendering the person with diabetes unconscious. Between 2001 and 2004, over 63 percent of the diabetic coma hospitalizations involved Delawareans under the age of 65.

Lower Extremity Amputations

From 2001-2004, 69 percent of all hospital discharges for lower extremity amputations (LEAs) also had a primary or secondary diagnosis of diabetes. Peripheral neuropathy, vascular disease, and infection are all complications of diabetes that increase the likelihood of LEAs. These complications cause loss of sensation in the feet and legs, leading to lower leg deformities and inadequate blood supply. Resulting tissue damage may be severe enough to warrant LEAs.⁸

Between 2001 and 2004, the risk of LEAs among Delawareans with diabetes varied by gender and age. Among those with diabetes, males were 54 percent more likely than females to require LEAs; adults age 65 and older were 35 percent more likely to require LEAs compared to those under the age of 65. Interestingly, LEA risk did not differ substantially by race/ethnicity. Non-white Delawareans with diabetes were only 4 percent more likely to require LEA than their Caucasian counterparts.

Heart Disease and Stroke

People with diabetes are twice as likely to develop heart disease or suffer a stroke compared to people without diabetes. Additionally, heart disease and stroke tend to occur at earlier ages among people with diabetes. People with diabetes are more likely to die from a heart attack compared to people without diabetes. Furthermore, people with diabetes who survive a first heart attack are more likely to have a second heart attack.



The increased heart disease risk among people with diabetes is directly attributable to reduced vascular efficiency. Over time, high blood glucose levels lead to increased deposits of fatty materials on the inside of blood vessel walls. These deposits restrict blood flow, increasing the likelihood of heart disease and stroke.⁹

Between 2001 and 2004, Delaware hospitals treated over 11,000 heart disease-related cases for which diabetes was listed as a secondary diagnosis (Table 1).

Table 1: Number of Heart-Related Hospitalizations with Diabetes as a Secondary Diagnosis, Delaware, 2001-2004

Heart-Related Primary Diagnosis	Number of Hospitalizations
Ischemic Heart Disease	5,790
Stroke	2,757
Hypertensive Disease	2,111
Heart Failure	509

Source: Delaware Health Statistics Center, Hospital Discharge Data 2001-2004.

These data reflect an increase in the proportion of heart-related hospitalizations among Delawareans with diabetes. Compared to 1995-1999, proportionately more hospitalizations for ischemic heart disease, stroke, and heart failure occurred among Delawareans with diabetes from 2001-2004 (Table 2).

Table 2: Hospital Discharges for Select Primary Diagnoses with Diabetes as a Secondary Diagnosis, Delaware, 1995-1999 vs. 2001-2004

Primary Diagnosis	1995-1999	2001-2004
Ischemic Heart Disease	26.7 %	31.4 %
Stroke	26.5 %	27.9 %
Hypertensive Disease	37.1 %	37.7 %
Heart Failure	15.3 %	21.6 %
LEA	31.1 %	36.6 %

Source: Delaware Health Statistics Center, Hospital Discharge Data 2001-2004 and Delaware Bureau of Health Planning & Resources Management, Delaware Health Statistics Center, Hospital Discharge Data 1995-1999.

Among Delawareans with diabetes, the odds of being hospitalized for heart-related diabetes complications vary by race/ethnicity. Between 2001 and 2004, compared to Caucasians with diabetes, non-white Delawareans with diabetes were 35 percent more likely to be hospitalized for ischemic heart disease, 52 percent more likely to be hospitalized for stroke, and 33 percent more likely to be hospitalized for heart failure.

Renal Disease

Renal disease is a serious condition in which the kidneys fail to rid the body of wastes. If not properly managed, renal disease will progress to kidney failure. Diabetes is the most common cause of disease-related kidney failure, accounting for nearly 45 percent of new cases annually. Currently, in the United States, more than 150,000 people are living with kidney failure because of diabetes.⁷



Between 2000 and 2006, Delaware hospitals treated 913 cases of diabetes-related kidney failure. Adults age 65 and older accounted for nearly 51 percent of these cases. Among younger age groups (adults younger than 45 years and adults age 45-64), comparatively more non-white Delawareans with diabetes were treated for end-stage renal disease than their Caucasian counterparts (Table 3).

Table 3: End-Stage Renal Disease Hospitalizations, by Age and Race, Delaware, 2000-2006*

	Age < 45 Number (%)	Age 45-64 Number (%)	Age 65 or Older Number (%)	Total Number (%)
White	68 (13.6%)	151 (30.1%)	282 (56.3%)	501 (100%)
Non-White	77 (18.7%)	153 (37.1%)	182 (44.2%)	412 (100%)
Total	145 (15.9%)	304 (33.3%)	464 (50.8%)	913 (100%)

Source: End Stage Renal Disease Network 4.

*Table rows sum to 100%.

Tables 4 and 5, located below, display the numbers of diabetes-related hospitalizations that occurred in Delaware between 2001 and 2004. Hospitalizations are categorized by specific diagnosis and broken down by age and sex. With the exception of hospitalizations due to ketoacidosis, the majority of diabetes-related hospitalizations occurred among Delawareans age 45 and older. Diabetes-related hospitalizations were fairly equally distributed among males and females.

Table 4: Diabetes-Related Hospitalizations by Primary Diagnosis and Age, Delaware, 2001-2004*

	<45 Years Number (%)	Age 45-64 Number (%)	65+ Years Number (%)	Total
DM without mention of complication	353 (51.3%)	198 (28.8%)	137 (19.9%)	688 (100%)
DM with ketoacidosis	1,092 (71.8%)	347 (22.8%)	83 (5.5%)	1,522 (100%)
DM with hyperosmolarity	65 (26.1%)	100 (40.2%)	84 (33.7%)	249 (100%)
DM with other coma	11 (17.7%)	21 (33.9%)	30 (48.4%)	62 (100%)
DM with renal manifestations	24 (18.9%)	50 (39.4%)	53 (41.7%)	127 (100%)
DM with ophthalmic manifestations	---	---	---	---
DM with neurological manifestations	199 (29.5%)	296 (43.9%)	180 (26.7%)	675 (100%)
DM with peripheral circulatory disorders	27 (5.5%)	187 (37.8%)	281 (56.8%)	495 (100%)
DM with other specified manifestations	212 (15.0%)	508 (35.9%)	694 (49.1%)	1,414 (100%)
DM with other unspecified manifestations	---	---	---	---
Total	2,010 (37.9%)	1,731 (32.6%)	1,562 (29.5%)	5,303 (100%)

Source: Delaware Health Statistics Center, Hospitalization Discharge Data 2001-2004.

---- Numbers have been suppressed in order to prevent possible identification of individuals.

*Table rows sum to 100%.



Table 5: Diabetes-Related Hospitalizations by Primary Diagnosis and Sex, Delaware, 2001-2004*

	Males Number (%)	Females Number (%)	Total
DM without mention of complication	354 (51.5%)	334 (48.6%)	688 (100%)
DM with ketoacidosis	726 (47.7%)	796 (52.3%)	1,522 (100%)
DM with hyperosmolarity	142 (57.0%)	107 (43.0%)	249 (100%)
DM with other coma	32 (51.6%)	30 (48.4%)	62 (100%)
DM with renal manifestations	55 (43.3%)	72 (56.7%)	127 (100%)
DM with ophthalmic manifestations	---	---	---
DM with neurological manifestations	294 (43.6%)	381 (56.4%)	675 (100%)
DM with peripheral circulatory disorders	299 (60.4%)	196 (39.6%)	495 (100%)
DM with other specified manifestations	767 (54.2%)	647 (45.8%)	1,414 (100%)
DM with other unspecified manifestations	---	---	---
Total	2,699 (50.9%)	2,604 (49.1%)	5,303 (100%)

Source: Delaware Health Statistics Center, Hospitalization Discharge Data 2001-2004.

--- Numbers have been suppressed in order to prevent possible identification of individuals.

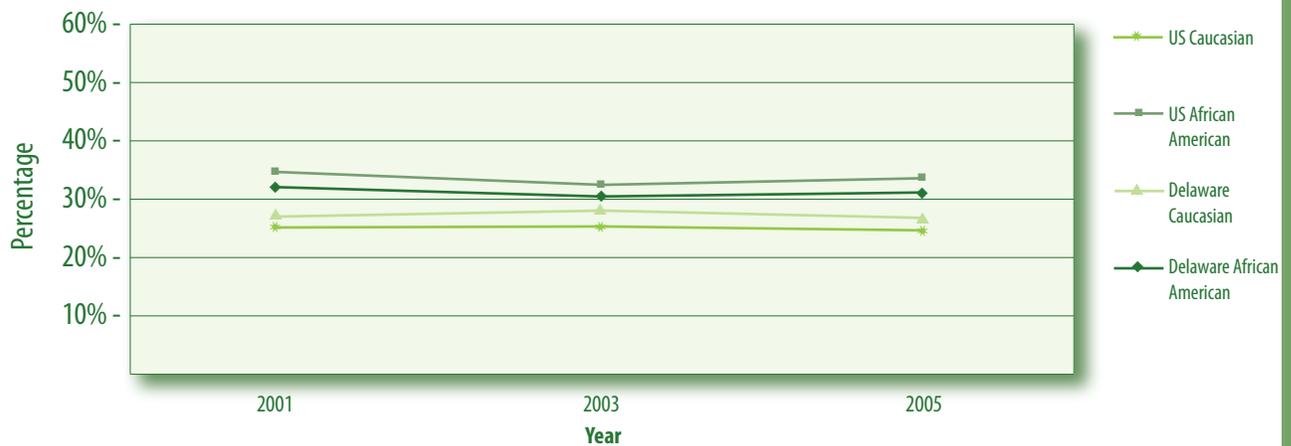
*Table rows sum to 100%.



Disparities

Across the United States and in Delaware, the likelihood of developing type 2 diabetes and associated complications varies substantially by race/ethnicity. As an example, diabetes-related kidney failure affects African Americans to a much greater extent than Caucasians. The reasons for this are unclear. One possibility is that the increased prevalence of diabetes-related kidney disease among African Americans is a direct result of uncontrolled blood pressure. In Delaware and the United States, African Americans have higher rates of hypertension than Caucasians (Figure 13). Other potential explanatory factors include differences in the access and quality of diabetes care between African Americans and Caucasians, as well as the comparatively higher prevalence of obesity among African Americans.⁷

Figure 13: Trend in Percentage of the Population with Hypertension, by Race, United States vs. Delaware, 2001, 2003, 2005



Source: Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2001, 2003 and 2005.

At the national level, health disparities also exist among race/ethnicity groups with respect to diabetes-related retinal disease and sub-optimal lipid profiles. In the United States, the rate of blindness due to diabetes is only half as high for Caucasians compared to minority populations. The Agency for Healthcare Research and Quality (AHRQ) found that African Americans with diabetes are more likely than Caucasians to have low levels of HDLs (high-density lipoproteins) and high levels of LDLs (low-density lipoproteins). This lipid profile translates into a greater risk for heart disease.⁷



Cost of Diabetes

Nationwide, in 2002, diabetes-related costs reached nearly \$132 billion.¹⁰ By 2007, this figure had reached \$174 billion, reflecting a 32 percent increase in diabetes-related costs over a 5-year period. Direct costs associated with health care and hospitalizations accounted for approximately \$116 billion. The remaining \$58 billion represented indirect costs, including costs due to unemployment, reduced productivity at work, and increased absenteeism. The most recently available data are equally as grim: in 2008, the American Diabetes Association estimated that one out of every five dollars spent on health care went to the treatment of diabetes-related complications.¹¹

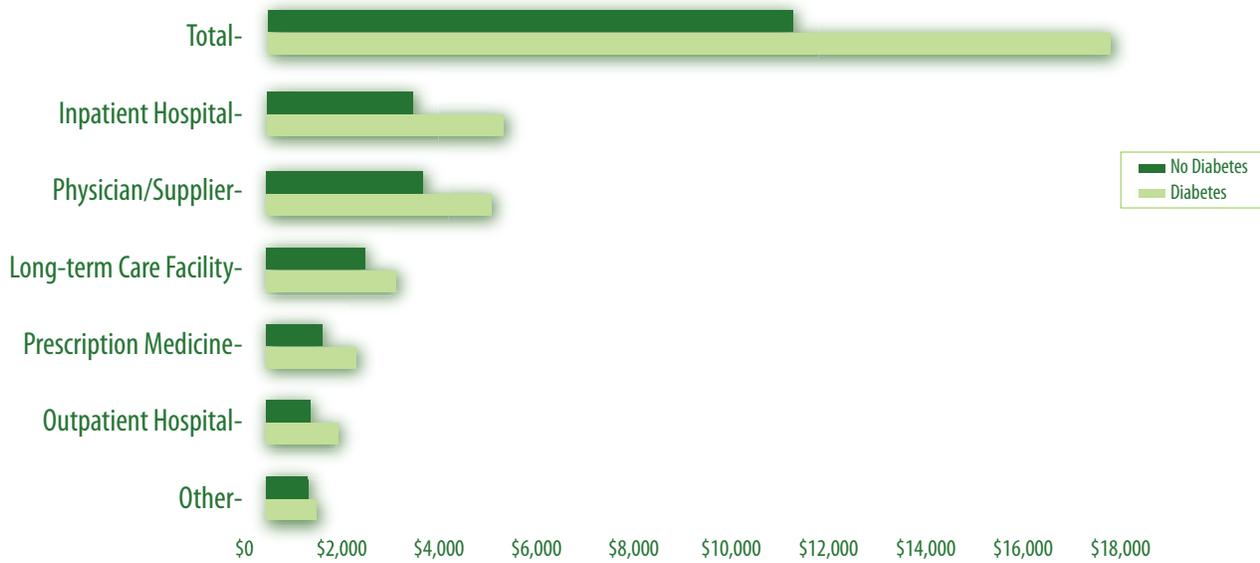
Costs associated with the treatment of diabetes and its related complications place an enormous financial burden not only on the individuals with diabetes, but on society at large. On average, people with diabetes pay \$1,600 in annual, out-of-pocket costs; these fees include insurance co-pays and deductibles. These out-of-pocket costs are significant considering that an estimated 40 percent of Delawarean adults with diabetes reported a family income of less than \$35,000 per year in 2005.¹²

Annual health care costs for a person with diabetes-related complications are about three times that of the average American without diabetes. Treatment for complications stemming from type 2 diabetes (including heart disease, stroke, eye damage, foot problems, and chronic kidney disease) is exorbitantly expensive. The median charge for a diabetes-related hospitalization was \$9,972. This means that half of all diabetes-related hospitalizations cost significantly more than \$10,000.¹²

Medicare is the primary payer for the majority of inpatient hospitalizations among people with diabetes. Nationwide, diabetes represents the third most costly chronic disease among the Medicare population (following heart disease and stroke). As shown below in Figure 14, compared to their peers without diabetes, Medicare beneficiaries over the age of 65 with diabetes contribute significantly more to U.S. health care expenditures in every treatment category.



Figure 14: U.S. Health Care Expenditures for Medicare Beneficiaries Age 65 and Over (Age Adjusted), With and Without Diabetes, by Type of Service, 2003 (in Millions of Dollars)



Source: Trends in Health and Aging Web site, Medicare Current Beneficiary Survey, accessed July 2007.

Table 6, below, displays a breakdown of 2002 U.S. health care expenditures attributable to diabetes and its related complications. Costs are broken down by medical condition and utilized services. In 2002 alone, U.S. health care costs associated with treating diabetes reached nearly \$92 billion.

Table 6: Health Care Expenditures Attributable to Diabetes, by Medical Condition and Type of Service, United States, 2002 (in Millions of Dollars)

	Inpatient Days	Office Visits	Outpatient Visits	ER Visits	Nursing Home Visits	Home Health Visits	Hospice Care	Other	Total
Diabetes	\$2,043	\$1,591	\$761	\$140	\$4,263	\$1,504	\$13	\$12,916	\$23,231
Neurological Symptoms	\$1,096	\$104	\$26	\$29	\$1,339	\$96	\$4	\$52	\$2,748
Peripheral Vascular Disease	\$746	\$54	\$27	\$14	\$159	\$89	\$1	\$31	\$1,121
Cardiovascular Disease	\$9,740	\$2,093	\$767	\$312	\$2,128	\$620	\$74	\$1,892	\$17,626
Renal Complications	\$977	\$157	\$62	\$75	\$438	\$71	\$6	\$92	\$1,879
Metabolic Complications	\$38	\$188	\$52	\$2	\$18	\$3	\$0	\$126	\$426
Ophthalmic Complications	\$11	\$241	\$61	\$9	\$2	\$7	\$0	\$92	\$422
Other Complications	\$212	\$28	\$9	\$19	\$27	\$9	\$0	\$14	\$318
General Medical Conditions	\$25,473	\$5,578	\$1,549	\$1,562	\$5,504	\$1,531	\$445	\$2,447	\$44,091
Total	\$40,337	\$10,033	\$3,315	\$2,162	\$13,878	\$3,930	\$543	\$17,662	\$91,861

Includes ambulance services, outpatient medications, oral agents, insulin, and supplies. American Diabetes Association. (2003). Economic Diabetes Costs in the United States in 2002, Diabetes Care, 26:917-932, 2003. Lewin Group, Inc., Falls Church, VA.



However, health care expenditures represent just one portion of total costs associated with diabetes. Including indirect costs, the total cost of diabetes in 2002, alone, exceeded \$131 billion in the U.S. (Table 7).

Table 7: Total Expenditures Attributable to Diabetes, by Cost Component, United States, 2002
(in Millions of Dollars)

Cost Component	Total cost (in Millions)
Health care Expenditures	\$91,861
Institutional care	\$54,215
Hospital inpatient care	\$40,337
Nursing home care	\$13,878
Outpatient care	\$20,130
Physician office-based care	\$10,033
Emergency care	\$2,162
Ambulance services	\$146
Hospital outpatient care	\$3,315
Home health care	\$3,930
Hospice care	\$543
Outpatient medication and supplies	\$17,516
Outpatient medication	\$5,516
Insulin and delivery supplies	\$6,991
Oral agents	\$5,009
Indirect costs due to lost productivity	\$39,810
Lost work days	\$4,503
Restricted activity days	\$6,256
Mortality	\$21,558
Permanent disability	\$7,494
Total Cost	\$131,672

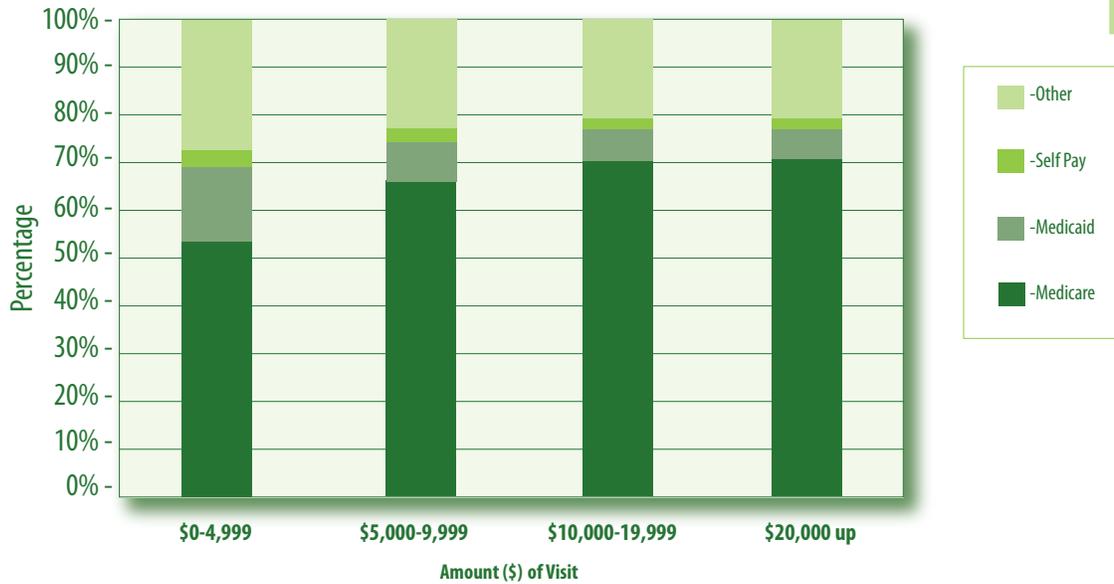
Cost component percentages do not necessarily sum to category totals because of rounding.
American Diabetes Association. (2003). Economic Diabetes Costs in the United States in 2002, Diabetes Care, 26:917-932, 2003. Lewin Group, Inc., Falls Church, VA.

In Delaware, health care expenditures stemming from diabetes-related services and care approached nearly \$857 million from 2001-2004. This figure does not include additional indirect costs resulting from lost productivity, disability, and premature mortality. The ADA estimates that in 2006, alone, the total cost of diabetes in Delaware exceeded \$492 million. Across the state, almost \$319 million was spent on medical care and an additional \$173 million was accrued in lost productivity.

As shown below in Figure 15, Medicare and Medicaid are the primary payers of diabetes-related hospitalization costs in Delaware. It is also important to note that a small proportion of diabetes-related hospitalizations are paid out-of-pocket by Delawareans with diabetes; this re-emphasizes the substantial economic burden of diabetes for both the individual and the larger population.



Figure 15: Comparison of Cost by Payment Types for Hospital Visits with any Diagnosis of Diabetes (N=59,425), Delaware 2001-2004



Source: Delaware Health Statistics Center, Hospital Discharge Data 2001-2004.

In the future, given the increasing prevalence of diabetes, the growing racial and ethnic diversity within the U.S., and the aging population, diabetes-related costs will continue to soar. According to the American Diabetes Association (ADA), if diabetes prevalence rates remain constant over time, the number of people nationwide diagnosed with diabetes will increase to 14.5 million by 2010 and 17.4 million by 2020. Given these estimates, the ADA suggests that annual health care costs directly attributable to diabetes will reach \$156 billion by 2010 and \$192 billion by 2020. If obesity prevalence continues to increase, these estimated treatment costs will be even higher.¹⁰

Experts suggest that diabetes-related health care spending can be reduced through improved access to preventive care, more comprehensive disease management, and the development of new treatment technologies. Comprehensive diabetes management is an especially cost-effective strategy for reducing the development of diabetes-related complications. The National Diabetes Education Program estimates that optimal blood pressure control cuts health care costs by almost \$1,000 over the lifetime of a person with type 2 diabetes. Over a span of just five years, foot care programs save another \$1,000 per person in diabetes-related health care costs. Outpatient training can help people self-manage their diabetes, reducing the likelihood of hospitalization. It is estimated that every \$1 invested in outpatient training reduce health care costs by almost \$9. Preconception and prenatal health care for women with diabetes reduces the chances of diabetes-related complications for mothers and babies. Every \$1 invested in preconception and prenatal health care reduces later health care costs by up to \$5.19.⁵



Mortality

Every 24 hours, an average of 810 Americans die from diabetes and related complications. Nationwide, diabetes accounts for over 200,000 deaths per year. Diabetes is the sixth leading cause of death in both the United States and in Delaware (Table 8).¹³

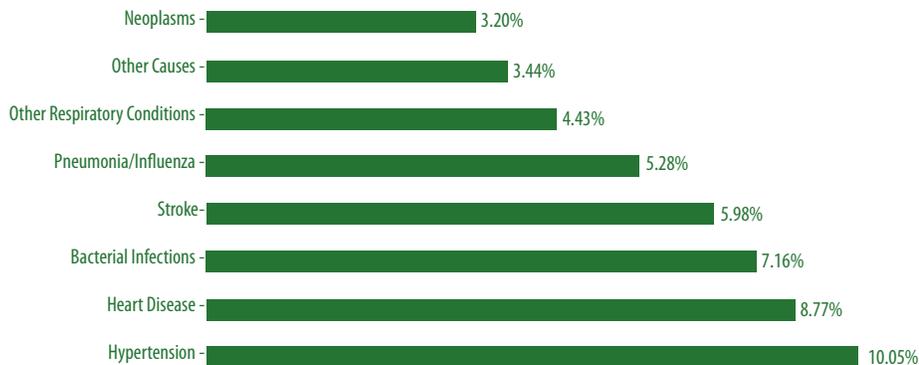
Table 8: Leading Causes of Death, Delaware vs. United States, 2005

Rank	Delaware	Rank	U.S.
1	Heart disease	1	Heart disease
2	Cancer	2	Cancer
3	Chronic lower respiratory diseases	3	Cerebrovascular diseases
4	Cerebrovascular diseases	4	Chronic lower respiratory diseases
5	Accidents (unintentional injuries)	5	Accidents (unintentional injuries)
6	Diabetes mellitus	6	Diabetes mellitus
7	Alzheimer's disease	7	Alzheimer's disease
8	Influenza and pneumonia	8	Influenza and pneumonia
9	Septicemia	9	Nephritis, nephritic syndrome and nephrosis
10	Nephritis, nephritic syndrome and nephrosis	10	Septicemia

Sources: Delaware Vital Statistics Annual Report 2005, Mortality. Retrieved September 17, 2007 from <http://www.dhss.delaware.gov/dhss/dph/hp/files/mort05.pdf>. National Center for Health Statistics: Preliminary Data for 2005 (Deaths). Retrieved September 17, 2007 from <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/prelimdeaths05/prelimdeaths05.htm>.

Between 1999 and 2004, diabetes directly accounted for 1,254 deaths among Delawareans.^{14,15} Diabetes-related complications also accounted for a large percentage of deaths in the state. In Delaware, between 1999 and 2004, diabetes was a contributing factor in 10 percent of deaths due to hypertension, 9 percent of deaths due to heart disease, and 7 percent of deaths due to bacterial infections (Figure 16).

Figure 16: Percentage of Deaths from Specific Underlying Causes with a Mention of Diabetes (N=2,228), Delaware 1999-2004

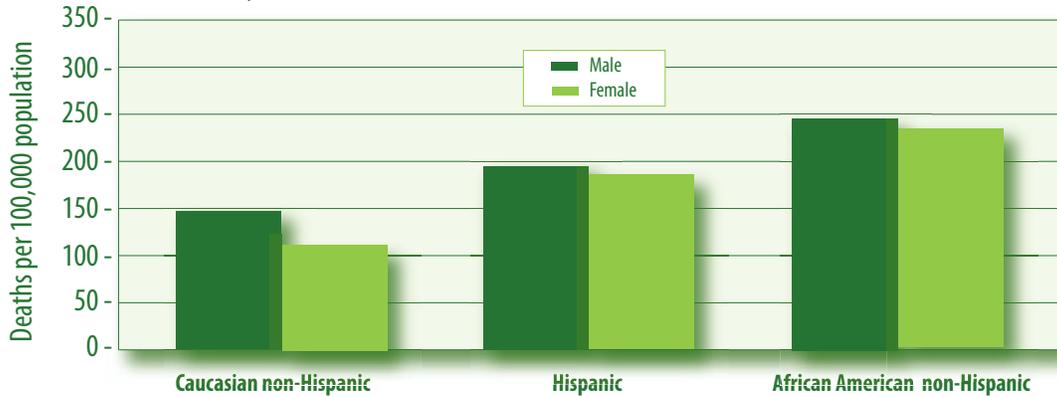


Source: Delaware Health Statistics Center, Mortality Data 1999-2004.



At the national level, diabetes mortality rates vary depending on race/ethnicity and sex. Among Americans age 65 and older, the diabetes mortality rate for African Americans is higher than that for Hispanics or Caucasians, regardless of sex (Figure 17). Across all race/ethnicity groups, the diabetes mortality rate for males is higher than that for females. However, this gender disparity is most pronounced among Caucasians.

Figure 17: Age-Adjusted Diabetes Mortality Rates among Persons Age 65 and Over, by Sex and Race/Ethnicity, United States, 2004

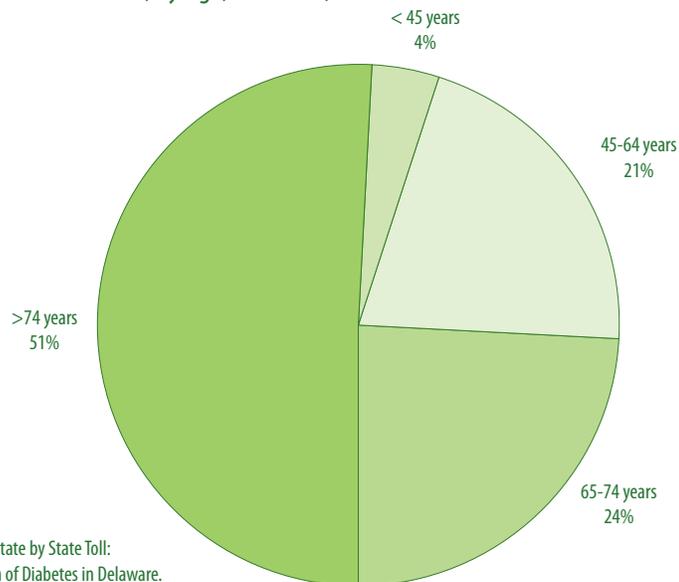


Source: Trends in Health and Aging Web site, National Vital Statistics System, accessed July 2007.

Recent data suggest that the gender disparity in diabetes mortality rates is less pronounced in Delaware than the United States. In 2003, approximately 51 percent of Delawareans who died from diabetes-related causes were male. In other words, the number of diabetes-related deaths among Delawareans are divided nearly equally among males and females.

The risk of dying from diabetes increases as age increases. As seen in Figure 18, over half of the deaths attributed to diabetes in 2003 occurred among Delawareans over age 75. Of note, however, is that 25 percent of Delawareans who died from diabetes in 2003 were under the age of 65. This sobering statistic solidifies the point that diabetes is not just a concern for the elderly; rather, it should be taken seriously by people of all age groups.

Figure 18: Diabetes-Related Deaths, by Age, Delaware, 2003



Source: JDRF, State by State Toll: Burden of Diabetes in Delaware.



In 2004, Delaware's diabetes-related mortality rate ranked 26th highest in the nation (Table 9). Delaware's diabetes mortality rate of 24.1 per 100,000 indicates that, in 2004, approximately 24 out of every 100,000 Delawareans died from diabetes-related causes.

Table 9: Diabetes-Related Mortality Rates, State Rankings, 2004

State	Rate per 100,000	Rank	State	Rate per 100,000	Rank
District of Columbia	40.1	1	Mississippi	23.5	27
Louisiana	39.9	2	Missouri	23.5	28
West Virginia	38.2	3	Kansas	23.4	29
New Mexico	31.7	4	New Hampshire	23.3	30
Tennessee	31.6	5	Pennsylvania	23.2	31
Oklahoma	30.9	6	Montana	22.6	32
Alabama	30.7	7	Virginia	22.6	33
Texas	29.5	8	Georgia	22.3	34
Ohio	29.0	9	Vermont	22.3	35
Kentucky	28.6	10	Alaska	22.2	36
Michigan	28.4	11	California	22.2	37
Utah	28.1	12	Rhode Island	22.0	38
Arkansas	28.0	13	Wyoming	22.0	39
Oregon	27.8	14	Wisconsin	21.8	40
New Jersey	27.6	15	Florida	21.5	41
South Carolina	27.5	16	Minnesota	21.4	42
North Carolina	26.9	17	Arizona	20.8	43
Indiana	26.4	18	Nebraska	20.4	44
Maryland	26.4	19	Iowa	19.4	45
Idaho	26.3	20	New York	18.9	46
North Dakota	26.3	21	Connecticut	18.8	47
South Dakota	25.1	22	Massachusetts	18.4	48
Washington	25.0	23	Colorado	18.1	49
Maine	24.5	24	Nevada	14.0	50
Illinois	24.2	25	Hawaii	13.4	51
Delaware	24.1	26			

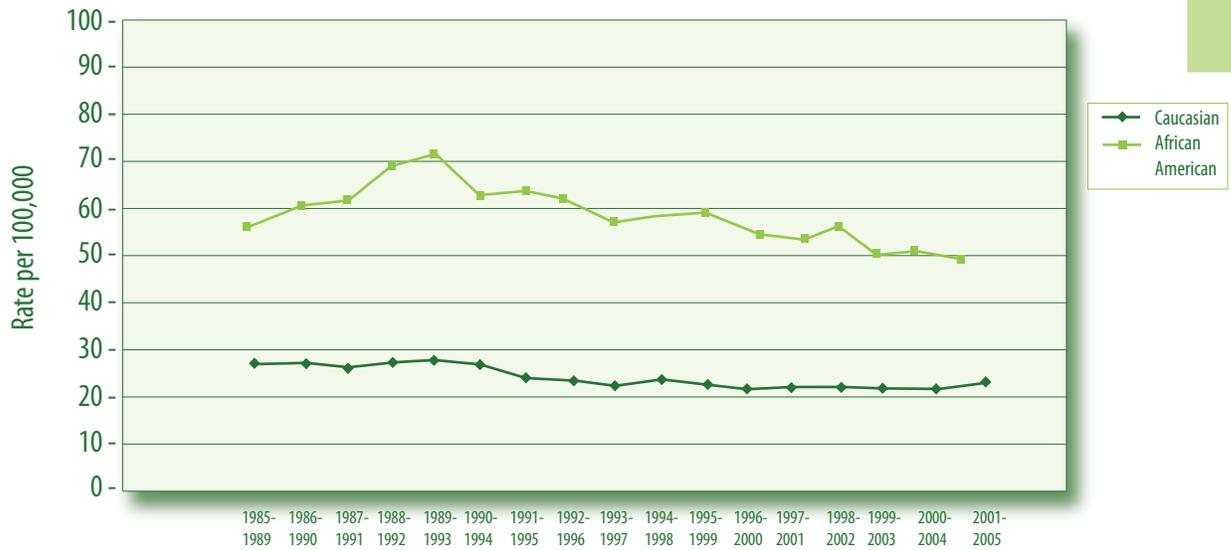
Source: United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Compressed Mortality File (CMF) compiled from 1999-2004, Series 20 No. 2], Accessed 7/23/2007 via the CDC WONDER On-line Database; Kaiser Family Foundation.

Note: Age-adjusted rates per 100,000 U.S. standard population. Populations used for computing death rates are postcensal estimates based on the 2000 census. Since death rates are affected by the population composition of a given area, age-adjusted death rates should be used for comparisons between areas because they control for differences in population composition. Data are for 2004.

Since 1985, Delaware's diabetes mortality rate has decreased among African Americans and Caucasians. However, the decline in diabetes mortality was more pronounced for African Americans than Caucasians (see Figure 19).



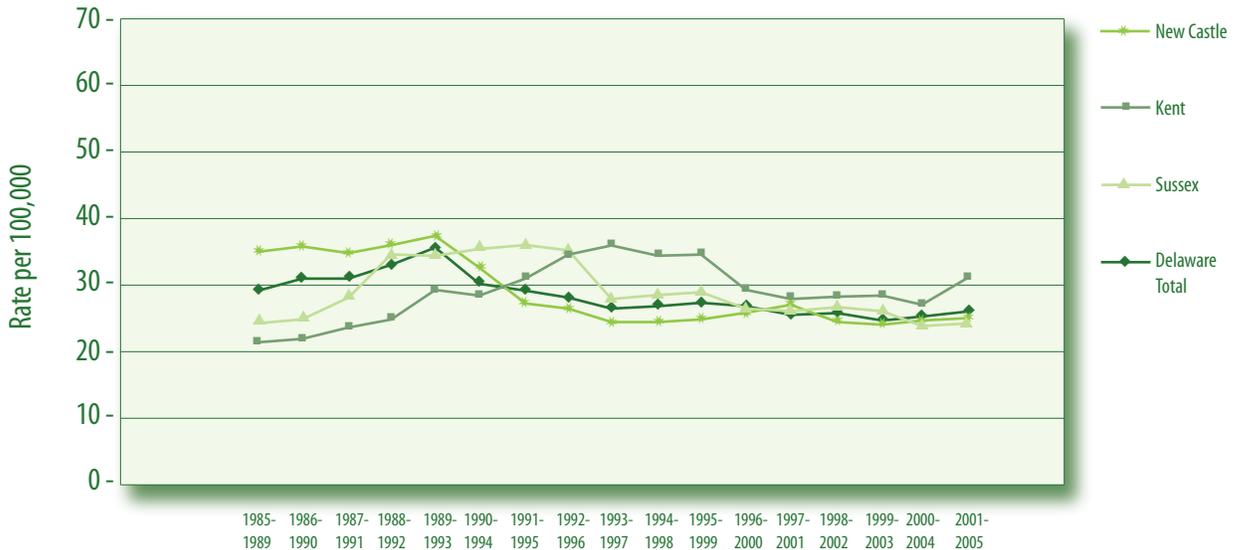
Figure 19: Five-Year Average Age-Adjusted Diabetes Mortality Rates by Race, Delaware, 1985–2005



Source: Delaware Health Statistics Center, Mortality Data 1985-2005.

Interestingly, the extent of decline in diabetes mortality varies by county. In Kent County, the diabetes-related mortality rate has actually increased since 1985. New Castle and Sussex Counties have experienced overall declines in diabetes mortality rates since 1985. The rate of decline in diabetes mortality was more pronounced in New Castle County compared to Sussex County (Figure 20).

Figure 20: Five-Year Average Age-Adjusted Mortality Rates for Diabetes, by County, Delaware 1985-2005

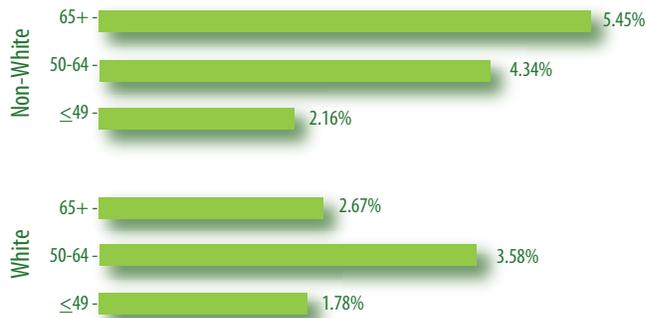


Source: Delaware Health Statistics Center, Mortality Data 1985-2005.

Among Caucasians in Delaware, the percentage of diabetes-related deaths was highest among 50-64 year olds. Among non-Caucasians, the largest percentage of diabetes-related deaths occurred among individuals age 65 or older. However, across all age groups, the percentage of diabetes-related deaths in Delaware was higher among non-Caucasians than Caucasians (Figure 21).



Figure 21: Percentage of Deaths with Diabetes as the Underlying Cause of Death, by Race and Age Group, Delaware, 1999-2004



Source: Delaware Health Statistics Center, Mortality Data 1999-2004.

A similar trend is observed across counties. In all three Delaware counties, non-Caucasians have a higher percentage of diabetes-related deaths compared to Caucasians (Figure 22).

Figure 22: Percentage of Deaths with Diabetes as the Underlying Cause of Death, by Race and County, Delaware, 1999-2004

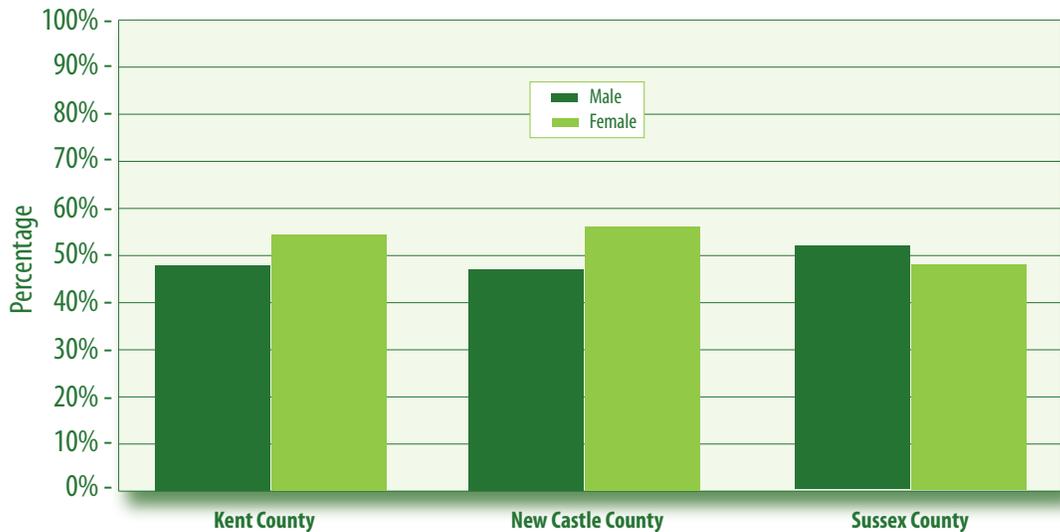


Source: Delaware Health Statistics Center, Mortality Data 1999-2004.



In Kent and New Castle Counties, females had a higher percentage of diabetes-related deaths compared to males. In Sussex County, this trend is reversed. The percentage of diabetes-related deaths among males in Sussex County is larger than that of Sussex County females (Figure 23).

Figure 23: Percentage of Deaths with Diabetes as the Underlying Cause of Death, by Sex and County, Delaware 1999-2004



Source: Delaware Health Statistics Center, Mortality Data 1999-2004.

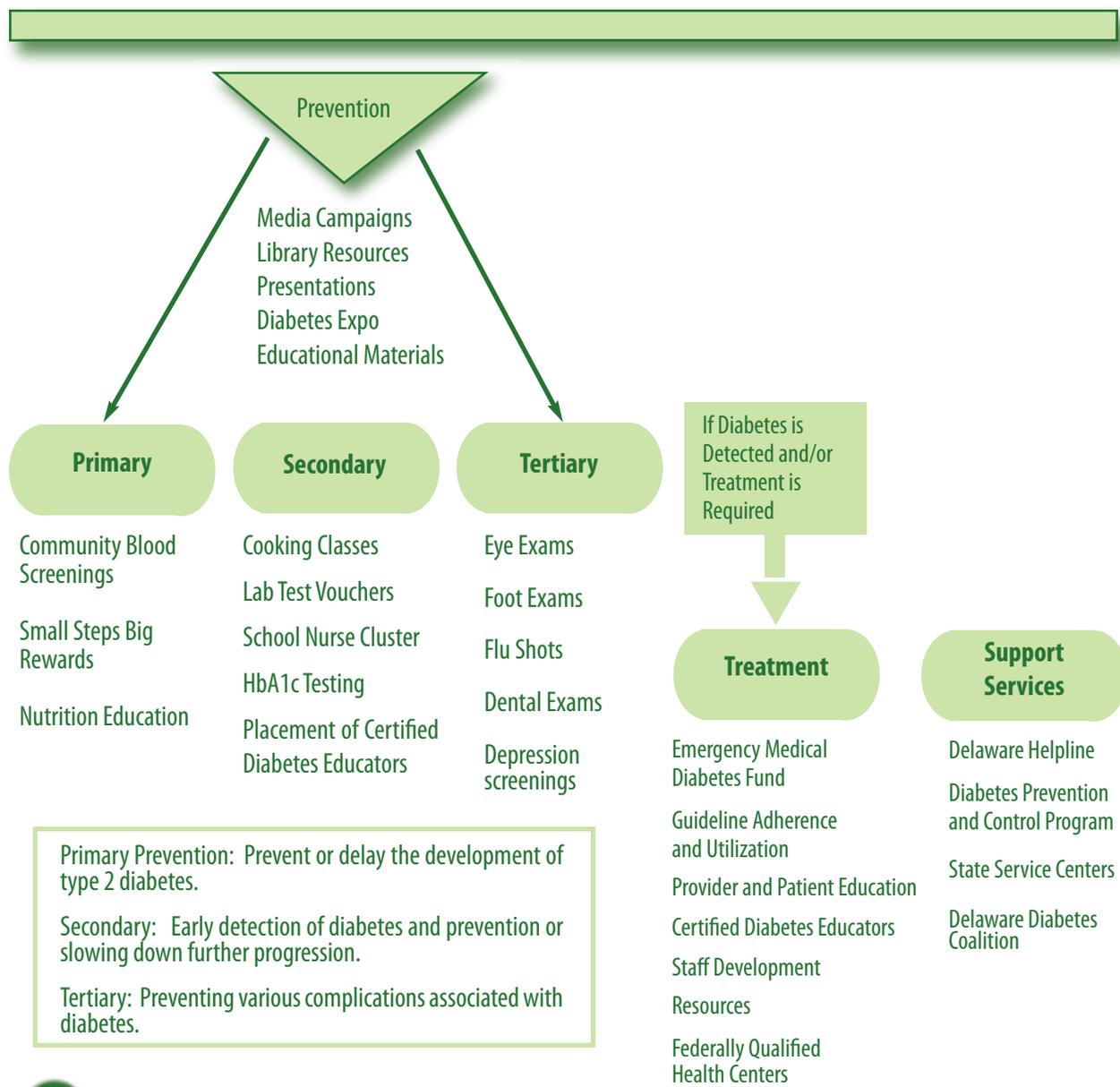


State Initiatives for Healthy Communities

Impacting the System of Diabetes Health Care

The Delaware Division of Public Health's (DPH) Diabetes Prevention and Control Program (DPCP) has implemented comprehensive approaches for improving diabetes care in the state. These approaches include primary, secondary, and tertiary prevention strategies, as well as treatment and support services for Delawareans with diabetes.

Programs are designed for Delawareans at high risk for development of diabetes and its related complications. DPCP initiatives include: screening for early detection of diabetes; improving access to care, and; educating providers, people with diabetes, and at-risk Delawareans. Programs are designed to help ensure all Delawareans receive the care they need to alleviate the emotional, physical, and financial burdens associated with diabetes.

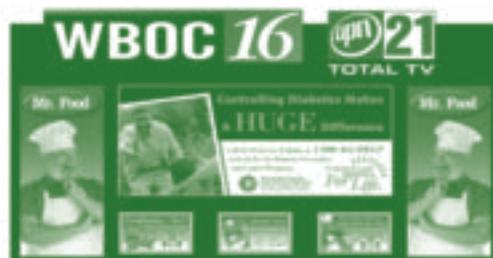


Primary Prevention Prevention Outreach Efforts

The Primary Prevention Trial (PPT) provided important outcomes that changed the way diabetes is addressed in today's society. PPT results proved, through science-based evidence, that type 2 diabetes could be prevented by engaging in daily physical activity and other lifestyle modifications. Primary prevention, through the application of social changes, will be complex and lengthy. Although this may be a cumbersome task, the results, if achieved, will provide great financial savings and vast improvement to the quality of life for those at risk for the disease.

Awareness, Education and Prevention Media Campaigns

The DPCP has developed ongoing media campaigns to raise awareness of diabetes in Delaware. Campaign messages encourage Delawareans to take advantage of specific services, reduce high-risk behaviors, and achieve an optimal level of disease management. The DPCP uses multiple sources to disseminate campaign messages, including cable and major network television, print media, radio, billboards, theater screens, city buses, and specialty advertisements. Messages are disseminated in both English and Spanish. Between 2006 and 2007, over 326,000 households in Delaware were reached by television media alone.



Educational Materials



The DPCP provides diabetes educational materials to health professionals, organizations, people with diabetes and their caregivers. In 2007, the DPCP distributed over 20,000 pieces of educational materials to those attending the Delaware State Fair. Free diabetes education materials for your program are available at www.ndep.nih.gov.



Diabetes Library Resource Centers

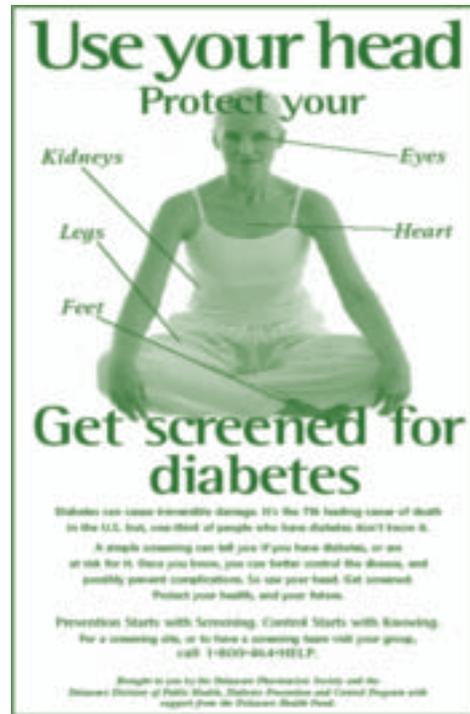
The diabetes library resource centers help increase public awareness of the risks and impacts associated with diabetes. Physicians refer patients with diabetes to one of the 35 libraries or two book mobiles for accurate educational information related to diabetes self-care. The books and videos cover topics such as gestational diabetes, nutrition and cooking, and raising a child with diabetes.



Additionally, the DPCP has distributed videos, cassettes, and manuals appropriate for people with diabetes, their family members, friends, colleagues, and health professionals. The materials are available in both English and Spanish, and are accredited by the American Diabetes Association, the Centers for Disease Control and Prevention, the National Institutes of Health, the American Association of Diabetes Educators, and the National Diabetes Education Program. Visit your local library today and learn ways to improve management of your diabetes.

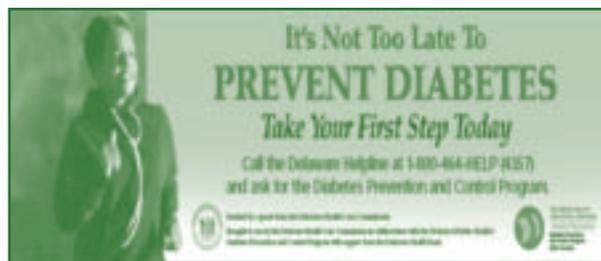
Community Blood Screenings

Early detection is important for optimal diabetes management. It is important to diagnose the disease at an early stage before complications develop. The Screening, Education, and Referral Project targets high-risk populations as well as the general population. Between 2006 and 2007, the Delaware Pharmacists Society screened almost 3,000 Delawareans for diabetes. Of those screened, 514 participants were referred to their provider for elevated HbA1c levels and another 259 participants were identified as having pre-diabetes. The Early Diabetes Detection Project has screened more than 11,000 Delawareans in the past five years. Also, starting in late 2007, the Blood Bank of Delmarva began the largest mass screening project ever conducted in the United States. This project provides diabetes screening to all blood donors who are not currently diagnosed with diabetes. The Blood Bank estimates it will screen almost 10 percent of Delawareans in the project's first two years.



Small Steps, Big Rewards

National, evidence-based studies show that type 2 diabetes can be prevented with as little as 30 minutes of physical activity five days a week. The Small Steps, Big Rewards program was designed by the Centers for Disease Control and Prevention and promotes healthy lifestyle habits as small, achievable steps in the overall goal of diabetes prevention and management.



Secondary Prevention

Lab Vouchers and HbA1c Testing

Part of managing diabetes is to receive annual tests recommended by the *Clinical Guidelines for Diabetes Care*. Since 2005, over 3,000 HbA1c tests (quarterly blood sugar readings) have been provided to uninsured or underinsured Delawareans with diabetes through the program.

School Nurse Cluster

A comprehensive training course was developed for public, private, and vocational school nurses in Delaware. The cluster provides extensive education about new treatment methods, the prevention of type 2 diabetes in children, and methods for keeping children with diabetes healthy in the school setting. Since this program was established, almost 10 percent of school nurses have completed the 90-hour training course.



Tertiary Prevention

Eye and Foot Exams



The diabetes program uses a multi-layered approach to address diabetes foot and eye care in the state. This program provides information about dilated retinal eye exams to people with diabetes, promotes the use of standard eye examination forms for health plans, and encourages ophthalmologists, optometrists, and podiatrists to report exam results to primary care or referring physicians. The program also educates Delawareans with diabetes about their medical benefit coverage.

The DPCP also promotes eye and foot care through media campaigns, distribution of educational materials to providers, people with diabetes, and their caregivers, and pharmacy bag stuffers urging people with diabetes to obtain eye and foot exams.

Flu Shots

The DPCP promotes the National Diabetes Education Program's "A Flu Shot Could Save Your Life" campaign. Ongoing outreach is conducted statewide at worksites, pharmacies, providers' offices, community centers, and health care facilities. Program initiatives include newsletters, posters, reminder cards, scorecards, media campaigns, presentations, and provider education sessions focusing on the importance of flu shots, especially among people with diabetes.



Between 2006 and 2007, more than 300 flu shots were provided at Westside Health Center – one of four federally-qualified health centers in Delaware. Westside Health Center serves high-risk uninsured or underinsured Delawareans. During the same time period, 7,300 letters were sent to Medicare beneficiaries diagnosed with diabetes to remind them of the importance of flu shots.



Dental Exams

Between 2006 and 2007, the DPCP provided 60 dental vouchers to uninsured and underinsured patients with diabetes at Westside Health Center. Vouchers included a dental exam, hygiene visit, x-ray, and dental supplies (toothpaste, toothbrush, floss, and educational materials).

Depression Screening

The “It’s Your Life . . . Take Control” Depression Screening Project was a collaborative program conducted by a group of community organizations with the common goal of improving the health of Delawareans. Depression screening guidelines and copies of the Patient Health Questionnaire (PHQ) screening tools were mailed to all primary care physicians in Delaware. In addition, managed care organizations (MCOs) mailed a depression education brochure and the screening tool to their members with chronic conditions. In an accompanying letter, members were asked to self-screen with the PHQ. If they screened positive for depression, members were encouraged to discuss their results with their physician.



Diabetes Treatment

Treatment Guidelines

Delaware has developed guidelines to ensure uniform diabetes care in both the hospital and provider settings. The goal of standardization and simplification is best achieved when only one set of guidelines is utilized by all MCOs and hospitals. Local physicians assisted in creating treatment guidelines based on national standards, which has created a sense of ownership of the guidelines, enhancing familiarity and acceptance. Between 2005 and 2006, 240 physicians and health care professionals received diabetes treatment guidelines training. Almost 1,000 inpatient guidelines were distributed to providers across the state.

Emergency Medical Diabetes Fund

The Emergency Medical Diabetes Fund (EMDF) was established in 2005 through the Delaware State Service Centers. The EMDF provides diabetes services, medications, and supplies to eligible Delawareans with diabetes, and pays up to \$400 for items directly related to emergency diabetes care. Since 2005, the EMDF has provided emergency care services to 1,576 Delawareans with diabetes. Almost half of those being served by the EMDF program are African American, a population at high-risk for the development of diabetes complications.

Certified Diabetes Educators



Development of the federally-qualified health centers (FQHCs) and community health centers has contributed toward improving health outcomes for Delawareans. These centers link the high-risk populations with available diabetes services, thereby reducing health disparities and long-term complications from diabetes.

Currently, all four of the state’s FQHCs participate in the Diabetes Health Disparity Collaborative. Certified Diabetes Educators (CDEs) have been placed at each of the FQHCs. CDEs provide in-person, over-the-phone, and group consultations with clients and staff. Between 2006 and 2007, CDEs conducted more than 1,000 in-person consultations. Over 80 percent of clients who met with CDEs were African American or Hispanic.



Support Services

An infrastructure exists for Delawareans who need help managing their diabetes. These programs provide technical support, provider and patient education, and resources for people with diabetes, those at risk for developing the disease, and their families.

Delaware Helpline

The Delaware Helpline provides referrals for callers in need of diabetes services, medications, or supplies. From 2004-2007, 687 people called the Delaware Helpline seeking assistance with their diabetes.

Delaware
Helpline
1-800-464-4357

Diabetes Prevention and Control Program (DPCP)

The DPCP provides educational materials, community and worksite interventions, wellness promotion, statistics, professional education, and links to state and national resources.

Delaware Diabetes Coalition (DDC)

DDC, Inc., strives to improve the quality of life for all Delawareans affected by diabetes; its efforts are focused on diabetes awareness, prevention, identification and dissemination of services, and advocacy. Since 1996, the DDC has distributed 26,500 patient resource guides to people with diabetes, care givers, and health professionals. Each year, the Diabetes Wellness Expo provides educational training to more than 300 Delawareans with diabetes and caregivers.

National Diabetes Education Program

Founded in 1997, the National Diabetes Education Program (NDEP) is a federally sponsored initiative that involves public and private partners to improve treatment and outcomes for people with diabetes. NDEP also promotes early diagnosis, and efforts to prevent or delay the onset of diabetes. The NDEP provides free educational resources and additional information on their Web site at www.ndep.nih.gov.



References

1. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (2006). *Behavioral Risk Factor Surveillance System Survey Data*. Retrieved August 8, 2007 from <http://apps.nccd.cdc.gov/brfss/display.asp?cat=DB&yr=2006&qkey=1363&state=DE>.
2. American Diabetes Association. (2007). *Pre-Diabetes*. Retrieved August 15, 2007, from <http://www.diabetes.org/pre-diabetes.jsp>.
3. Kim, Catherine MD, MPH, Katherine M. Newton, PHD and Robert H. Knopp, MD: *Gestational Diabetes and the Incidence of Type 2 Diabetes*. *Diabetes Care* **25**:1862-1868, 2002.
4. Delaware Health and Social Services, Division of Developmental Disabilities Services. (2006). *Health Risks of Adults with Disabilities in the State of Delaware: A Retrospective Analysis of Data from the Behavioral Risk Factor Surveillance System*. Retrieved August 8, 2007 from <http://dspace.udel.edu:8080/dspace/bitstream/19716/2460/4/HealthRisksOfAdultsWithDisabilities2.pdf>
5. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (2008). *November is American Diabetes Month*. Retrieved on May 28, 2009 from <http://www.cdc.gov/features/livingwithdiabetes>.
6. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (2006). *Preventing Diabetes and Its Complications*. Retrieved on August 8, 2007 from <http://www.cdc.gov/print.do?url=http://www.cdc.gov/nccdphp/publications/factsheets/Prevention/diabetes.htm>
7. Agency for Healthcare Research and Quality. (2001). *Diabetes Disparities Among Racial and Ethnic Minorities*. November 2001. AHRQ Publication No. 02-P007. Rockville, MD. Retrieved on September 22, 2007 from <http://www.ahrq.gov/research/diabdisp.htm>.
8. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (1991). *Lower Extremity Amputations Among Persons with Diabetes Mellitus*. *Morbidity and Mortality Weekly Report*, November 01, 1991. 40(43):737-739.
9. U.S. Department of Health and Human Services, National Diabetes Information Clearinghouse. (2005). *Diabetes, Heart Disease and Stroke* (NIH Publication No. 06-5094), Washington, DC: U. S. Government Printing Office.
10. American Diabetes Association. (2003). *Economic Diabetes Costs in the United States in 2002*. *Diabetes Care*, **26**:917-932, 2003. Lewin Group, Inc., Falls Church, VA.
11. American Diabetes Association. (2008). *Economic Diabetes Costs in the United States in 2007*. *Diabetes Care*, **31**:596-615, 2008. Lewin Group, Inc., Falls Church, VA.



12. State of Diabetes. *The Cost of Diabetes Complications*. Retrieved May 26, 2009 from http://www.stateofdiabetes.com/cost_of_complications.html.
13. American Diabetes Association. *Number of Americans With Diabetes Nears 21 Million*. Retrieved May 26, 2009 from <http://docnews.diabetesjournals.org/content/3/1/1.1.full>.
14. Delaware Health and Human Services, Division of Public Health. (2005). *Delaware Vital Statistics Annual Report 2005*. Retrieved September 6, 2007 from <http://www.dhss.delaware.gov/dph/hp/2005.html>
15. American Diabetes Association. (2005). *Progress in the Estimation of Mortality due to Diabetes*. *Diabetes Care*, **28**:2320-2321, 2005.



Definitions

Diabetic Retinopathy – diabetic eye disease; damage to the small blood vessels in the retina of the eye; loss of vision may result.

Diabetes Mellitus – a condition characterized by hyperglycemia resulting from the body's inability to use blood glucose for energy. In type 1 diabetes, the pancreas no longer makes insulin and therefore blood glucose cannot enter the cells to be used for energy. In type 2 diabetes, either the pancreas does not make enough insulin or the body is unable to use insulin correctly.

Insulin – a hormone that helps the body use glucose (a simple form of sugar) for energy. The beta cells in the pancreas make insulin. When the body cannot make enough insulin, insulin is taken by injection or insulin pump.

Ketoacidosis – an emergency condition in which extremely high blood glucose levels, along with a severe lack of insulin, result in the breakdown of body fat for energy and an accumulation of ketones in the blood and urine; untreated diabetic ketoacidosis can lead to coma and death.

Ketone – a chemical produced when there is a shortage of insulin in the blood and the body breaks down body fat for energy. High levels of ketones can lead to ketoacidosis.

Kidney/Renal Failure – a chronic condition in which the body retains fluid and harmful wastes build up because the kidneys no longer work properly; also called end-stage renal disease. A person with kidney failure needs dialysis or a kidney transplant.

Neuropathy – disease of the nervous system. The three major forms in people with diabetes are peripheral neuropathy, autonomic neuropathy, and mononeuropathy. The most common form is peripheral neuropathy, which affects mainly the legs and feet.

Renal Disease – a disease of the kidneys; renal failure means the kidneys have stopped working.

Retina – the light-sensitive layer of tissue that lines the back of the eye. Diabetic retinopathy is an eye disease which damages the small blood vessels in the retina and can result in blindness.

Definitions are taken from *The Diabetes Dictionary*, published by the National Institute of Diabetes and Digestive and Kidney Diseases, U.S. Department of Health and Human Services, National Institutes of Health (NIH Publication No. 02-3016).



Acronyms

ADA: American Diabetes Association

AHRQ: Agency for Healthcare Research and Quality

BMI: Body Mass Index

BRFSS: Behavioral Risk Factor Surveillance System

CDC: Centers for Disease Control and Prevention

CDEs: Certified Diabetes Educators

DDC: Delaware Diabetes Coalition

DM: Diabetes Mellitus

DPCP: Diabetes Prevention and Control Program

DPH: Division of Public Health

EMDF: Emergency Medical Diabetes Fund

FQHCs: Federally Qualified Health Centers

HDLs: High-Density Lipoproteins

JDRF: Juvenile Diabetes Research Foundation

LDLs: Low-Density Lipoproteins

LEA: Lower Extremity Amputations

MCOs: Managed Care Organizations

NDEP: National Diabetes Education Program

PHQ: Patient Health Questionnaire

PPT: Primary Prevention Trial



This publication was supported by Grant/Cooperative Agreement Number U32/CCU322696-05 from CDC. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC.



The Burden of Diabetes in Delaware

Kidney Failure
Blindness
Heart Attack
Stroke
Amputation
Financial
Dental Disease
Flu
Pneumonia
Neuropathy
Depression
Sexual Dysfunction
Pregnancy Risk
Behavior Change
Ketoacidosis



**DELAWARE HEALTH
AND SOCIAL SERVICES**

DIVISION OF PUBLIC HEALTH

Diabetes Prevention and Control Program

302-744-1020