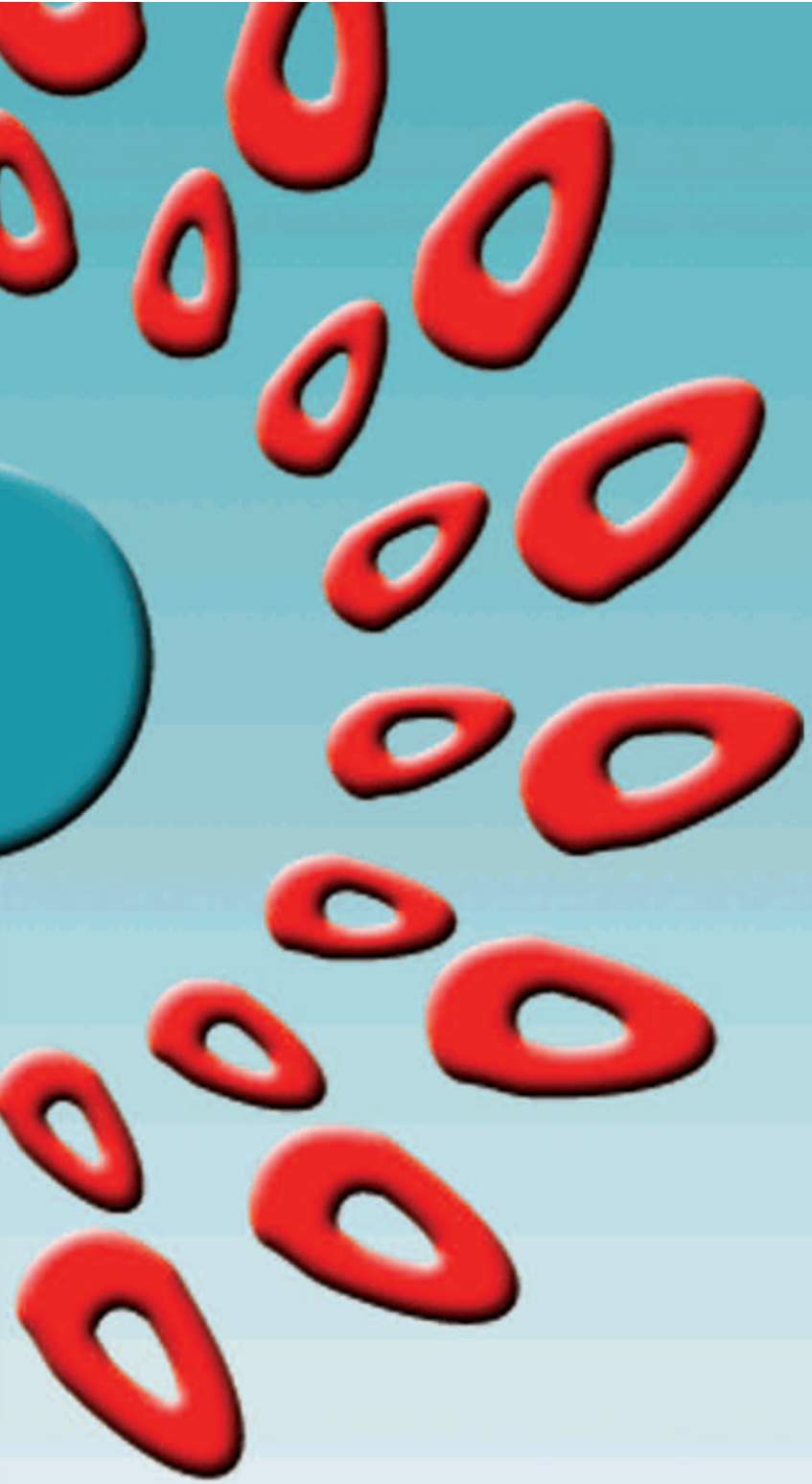

Diabetes in Indiana

A Report on
Diabetes Morbidity
and Mortality

Diabetes Prevention
and Control Program
Indiana State Department of Health

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A Report on Diabetes Morbidity and Mortality

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Dear Reader:

The Indiana State Department of Health, Diabetes Prevention and Control Program, and the Diabetes Advisory Council (DAC) are pleased to present the most recent Indiana Diabetes Report.

As much as 8.1% of Indiana's adult population has been diagnosed with diabetes compared to the national average of 7.5%. Diabetes was the 6th leading cause of death in Indiana in 2005. It was the 4th leading cause of death for blacks, 7th for whites, and 6th for Hispanics/Latinos in 2005. While highly effective treatment exists, diabetes is often uncontrolled or poorly controlled, needlessly keeping those who suffer with the disease from school, work, and leisure activities. Anyone, anywhere, at any age, can develop diabetes. Many adults have had diabetes for several years before their symptoms are recognized. By the time they are diagnosed, a great many have already started to develop complications of diabetes — visual impairment, kidney failure, heart disease, stroke, and nerve damage. Detecting and diagnosing diabetes early means that it can be treated and the risk of serious complications can be reduced.

The consequences of diabetes are costly. In 2007, the total annual economic cost of diabetes in the United States was estimated to be $174 billion. This does not include social costs such as pain and suffering, care provided by non-paid caregivers, or excess medical costs associated with undiagnosed diabetes. Those with diabetes have medical expenditures 2.3 times greater than what expenditures would be in the absence of diabetes. The prevalence of obesity in Indiana contributes to the diabetes burden – increasing the number of individuals who are diagnosed with type 2 diabetes.

Part of the Diabetes Prevention and Control Program's vision is to make the public aware of the impact of diabetes in our state primarily through data surveillance and reporting. It is our goal that the data is used as indicators and evidence, to inform strategic plans, for decision-making, for program improvement, and for needs assessment.

This is our "Call To Action." Our challenge today is activating our communities and organizations.

For a Healthier Tomorrow,

Judith A. Monroe MD

JUDITH A. MONROE, M.D.
STATE HEALTH COMMISSIONER

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Scope of the Problem

- 8.1% of Indiana's adult population reported that they had been **diagnosed with diabetes**[(1)] compared to the national average of 7.5%.[(2)]
- It is estimated that 3% of the Indiana population has **undiagnosed diabetes**.[(3)]
- Diabetes was the 6th **leading cause of death** in Indiana in 2005. It was the 4th leading cause of death for Blacks, 7th for Whites, and 6th for Hispanics/Latinos.[(5)]
- Individuals with diabetes incurred **an average expenditure** of $11,744 per year ($6,649 attributed to diabetes), which is about 2.3 times higher than what expenditures would be in the absence of diabetes.[(4)] Assuming that the 384,000 Indiana adults with diagnosed diabetes have similar medical costs, over 4.5 billion dollars would have been spent on medical care with about 2.6 billion dollars directly attributed to diabetes in 2006.

Populations at Risk

- **Older age** – Individuals 65 years and older (12.4% of Indiana's population) had a diabetes prevalence of 20%.[(1)]
- **Race/Ethnicity**
  - Black adults (8.1% of Indiana's population) had a diabetes prevalence of 10%.[(1)]
  - Hispanic/Latino Americans adults (4.1% of Indiana's population) had a diabetes prevalence of 4%.[(1)] (Please note: The change in Hispanic diabetes prevalence between years has not been statistically significant.)
  - Asian, Native Hawaiian/Pacific Islanders, American Indian/Alaskan Native, or other adults (2.3% of the population) had a diabetes prevalence of 8%.[(1)]
  - Those identifying themselves as having two or more races (0.7% of Indiana's population) had a diabetes prevalence of 15%.[(1)]
- **Gestational diabetes –** In 2006, 2% of women reported they had been diagnosed with gestational diabetes (diabetes during pregnancy).[(1)] Of these women , 20–50% have a chance of developing diabetes in the next 5–10 years and about 5–10% will have type 2 diabetes immediately following pregnancy.[(3)]
- **High blood glucose or pre-diabetes** – 26% of Indiana's have pre-diabetes putting them at risk for developing diabetes later in life.[(3)]
- **Overweight or obese** – 63% of adults in Indiana were overweight or obese in 2006.[(1)]
- **Sedentary lifestyles** – 25% of Indiana adults did not get participate in any physical activity in the past month.[(1)]
- **Smoking** – 24% of Indiana's adult population in 2006 were current tobacco smokers.[(1)]

Diabetes in Indiana: An Overview

Complications due to Diabetes

- **Death –** 1,721 individuals died from diabetes as the underlying cause of death, and 3,163 individuals died from diabetes as a contributing cause of death.(5)
- **Hospitalizations** – 9,894 individuals admitted to the hospital as inpatients had the primary diagnosis of diabetes.(6)
- **Heart attack –** 17% of individuals with diabetes have had a heart attack, and 16% have been told by a health care professional that they have angina or coronary heart disease.(7)
- **Stroke –** 8% of those with diabetes have been diagnosed with a stroke.(7)
- **Blindness** – 554 new cases of legal blindness and 272 new cases of visual impairment were due to diabetic retinopathy in adults over 17 years of age.(8) Of adults with diabetes, 18% have been told that their diabetes has affected their eyes or caused retinopathy.(1)
- **Kidney disease** – 812 of the 2,030 new cases of end stage renal disease were in people with diabetes.(9)
- **Lower extremity amputations** – 1,763 individuals with a primary hospital discharge diagnosis of diabetes underwent a lower extremity amputation.(6)
- **Depression** – 28% of individuals with diabetes have been diagnosed with a depressive disorder.(1)
- **Dental Disease** – 40% of adults with diabetes have had six or more (including all) teeth removed compared to the 16% in adults without diabetes.(2)

References:

All population estimates are from United States Census Bureau. American Community Survey, 2006, http://quickfacts.census.gov/qfd/states/18000.html.

1. Indiana State Department of Health. Behavioral Risk Factor Surveillance System Survey Data, 2006.
2. Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data, 2005 and 2006.
3. Centers for Disease Control and Prevention (CDC). National Diabetes Fact Sheet, 2005, http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2005.pdf.
4. American Diabetes Association, http://www.diabetes.org.
5. Indiana State Department of Health, Mortality Data, 2005.
6. Indiana State Department of Health, Indiana Hospital Discharge Data, 2005.
7. Indiana State Department of Health, Behavioral Risk Factor Surveillance System Survey Data, 2005.
8. Indiana Blind Registry Data, 2005.
9. The Renal Network, 2005, www.therenalnetwork.org.

Introduction

In the United States, the diabetes epidemic has been growing rapidly. From 1963 to 1975, there was a sharp increase in diabetes during which prevalence went from 13.6 to 25.8 per 1,000 Americans. Diabetes prevalence leveled off in 1975 but more than doubled by 1990 (26.4 to 54.5 per 100,000). The prevalence continues to grow, increasing by almost 5% each year.[1]

In 2005, there were 1.5 million new cases (incidence) of diabetes diagnosed in people 20 years or older. Of those, 202,000 new cases were among individuals aged 20-39 years, 727,000 were aged 40-59 years, and 575,000 were individuals over 60 years of age. The estimated total number (prevalence) of people in the United States with diabetes in 2005 was 21 million people, roughly 7% of the population. Of the estimated 21 million people with diabetes, 14.6 million were diagnosed cases and 6.2 million were undiagnosed cases. It is estimated that almost one-third of all diabetes cases are undiagnosed.[2]

Diabetes is the most common chronic disease among children in the United States and is becoming more prevalent. Approximately 150,000 people aged 18 years or younger have diabetes, meaning roughly one in every 400-600 children and adolescents are affected. Typically when diabetes occurs in children, it is assumed to be type 1 or juvenile-onset diabetes. More than 13,000 children are diagnosed with type 1 diabetes each year. However in the past two decades, the frequency of type 2 diabetes has been increasing among this population. Unfortunately, the extent of this increase is unknown. To address this data gap, the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) funded a five-year, multi-center study, *SEARCH for Diabetes in Youth,* to examine the status of diabetes in children and adolescents in the United States. They found the crude prevalence to be estimated at 1.82 cases per 1,000 youth and the overall prevalence estimate for diabetes in children and adolescents was approximately 0.18%. The study is ongoing in hopes of gaining a better understanding of the effect of diabetes on the younger population.[2]

This nationwide increase in diabetes incidence and prevalence is also seen in Indiana's population. In some cases, the prevalence in Indiana is higher than the national average. Diabetes is a public health issue because the disease and its complications are largely preventable. The Diabetes Prevention and Control Program (DPCP) at the Indiana State Department of Health (ISDH) compiles and disseminates diabetes data based on the most recent mortality and morbidity data available, as well as behavior risk survey information. The majority of data available on diabetes relates to adults. Therefore, the focus of this report is adults 18 years and older. The objective of this report is to provide general information about diabetes including its causes and complications and trends in incidence and prevalence. The report also describes diabetes-related morbidity and mortality in the state. The hope is that this report will be used to identify areas in diabetes prevention and care that need more attention, to highlight issues that need funding and resources, and to help evaluate programs and efforts to reduce the burden of diabetes in Indiana.[3]

Types of Diabetes

Diabetes mellitus is a group of diseases characterized by high levels of blood glucose resulting from defects in insulin production, insulin action, or both. Insulin is necessary for the body's regulation of blood glucose levels. It is a hormone produced in the pancreas and functions to convert sugars, starches, and other foods into energy. If diabetes is not controlled, over time, glucose and fat remain in the blood and damage vital organs. The build-up of glucose in the blood is called hyperglycemia.[2]

Type 1 diabetes, formerly known as juvenile-onset diabetes or insulin-dependent diabetes mellitus, most often appears during childhood or adolescence and accounts for 5-10% of all diagnosed cases of diabetes. In type 1 diabetes, the body's immune system destroys the cells that produce insulin. Since the body produces little or no insulin, people with type 1 diabetes must take insulin daily through injection or an insulin pump to survive. Type 1 diabetes is usually diagnosed within a short time, because the symptoms are severe and the onset is rapid.[2]

Type 2 diabetes, formerly called adult-onset diabetes or non-insulin-dependent diabetes, usually begins as insulin resistance, a disorder in which the cells do not use insulin properly. As the need for insulin rises, the pancreas gradually loses its ability to produce insulin. Type 2 accounts for 90–95% of people diagnosed with diabetes. Often people can control their blood glucose by exercising regularly and watching what they eat. Type 2 diabetes most often appears in people older than 40 years of age but is increasingly being diagnosed in children and teens and is no longer considered an adults-only disease.[2]

Gestational diabetes is a form of glucose intolerance diagnosed in some women during pregnancy that also increases their risk of developing type 2 diabetes in the future. Gestational diabetes requires treatment during pregnancy to normalize maternal blood glucose levels to avoid complications in the infant.[2]

Other types of diabetes mellitus result from specific genetic conditions, surgery, drugs, infections, malnutrition, and other illness. Such types only account for 1-5% of all diagnosed cases.[2]

Pre-diabetes is a term used to distinguish people who are at increased risk of developing type 2 diabetes. People with pre-diabetes have higher blood sugar than normal, though not high enough to be diagnosed with diabetes. Pre-diabetes is characterized by impaired fasting glucose (IFG) or impaired glucose tolerance (IGT) and in some cases both. IFG is a condition where the fasting blood sugar level is 100 to 125 milligrams per deciliter (mg/dL) after an overnight fast, and IGT is a condition where the blood sugar level is 140 to 199 mg/dL after a two-hour oral glucose tolerance test.[2] Each year about 4-9% of people with pre-diabetes will develop type 2 diabetes.[4]

Causes of Diabetes

The exact causes of developing both type 1 and type 2 are unknown, although they appear to be different. The onset of type 1 diabetes is suspected to follow exposure to an "environmental trigger," such as an unidentified virus, stimulating an immune attack against the insulin-producing pancreas cells in some genetically predisposed people.[2] The cause of type 2 appears to be genetic but has a large environmental component. Although a person can inherit a tendency to develop type 2 diabetes, it usually takes another factor (such as obesity) to initiate disease development.[5]

Symptoms

Symptoms of diabetes include frequent urination, extreme thirst and hunger, unusual weight loss, increased tiredness, irritability, blurred vision, very dry skin, numbness and tingling in the hands and feet, and slow healing of cuts and bruises. Nausea, vomiting, and stomach pains can also accompany some of these symptoms in the abrupt onset of type 1 diabetes.[2]

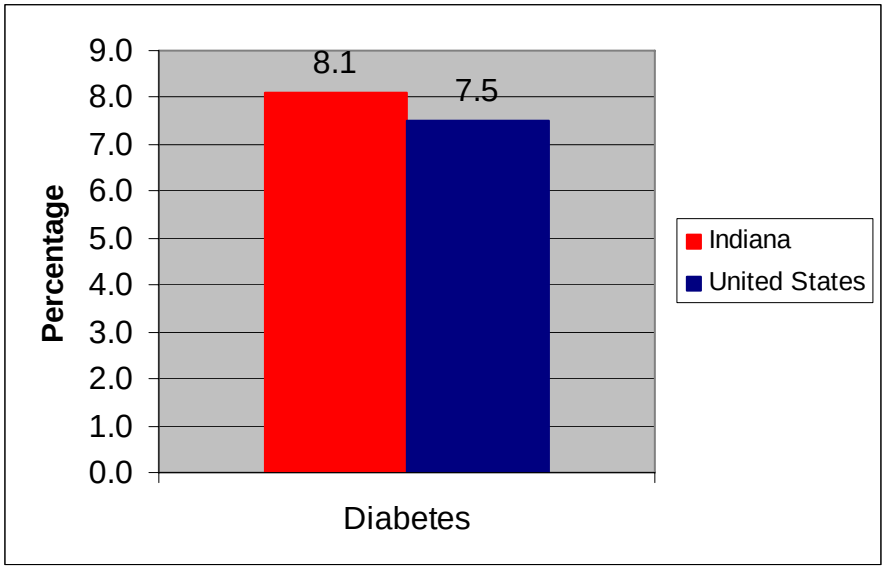
Incidence and Prevalence

The incidence and prevalence of diabetes in Indiana are similar to those at the national level. Adult diabetes prevalence data in Indiana come from the Behavioral Risk Factor Surveillance System (BRFSS). BRFSS is the world's largest, on-going telephone health survey system, tracking health conditions and risk behaviors for adults (18 years or older) in the United States yearly since 1984. According to Indiana's 2006 BRFSS data, 8.1% of Indiana's adult population reported that they have been told by a doctor that they have diabetes, which was greater than the national average of 7.5% (Figure 1).[6,7] Figure 2 shows the increasing prevalence of diabetes in Indiana since 1995.[6]

The 8.1% prevalence among adults is just a fraction of the diabetes epidemic in Indiana. It is estimated that about 3% of the population has undiagnosed diabetes.[2] Another 26% of adults are estimated to have pre-diabetes, meaning they have blood sugar levels above normal but not high enough to be diagnosed as diabetes.[8] Those with pre-diabetes are at higher risk for developing diabetes in their lifetime.

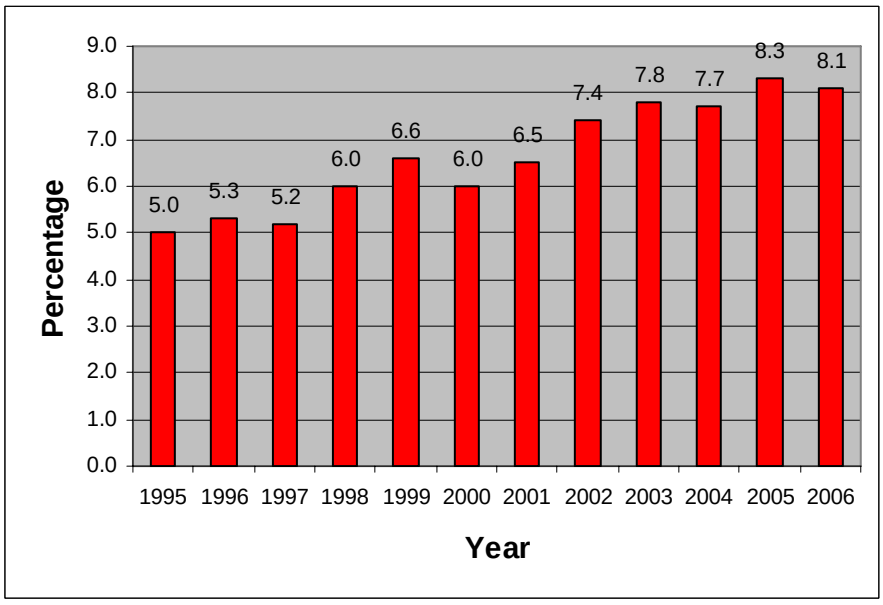
The concern about pre-diabetes in recent years has prompted the CDC to add a pre-diabetes response to the diabetes question to the BRFSS in 2004. Figure 3 shows the Indiana pre-diabetes prevalence as compared to the United States.[6,7] These data only capture those who are aware of their pre-diabetes status not those undiagnosed. As stated above, it is estimated that 26% of the population falls in this category.[8] It is likely that the pre-diabetes prevalence will increase in the future especially as the rate of obesity increases.

Figure 1: Diabetes Prevalence, Indiana Compared to the United States, 2006



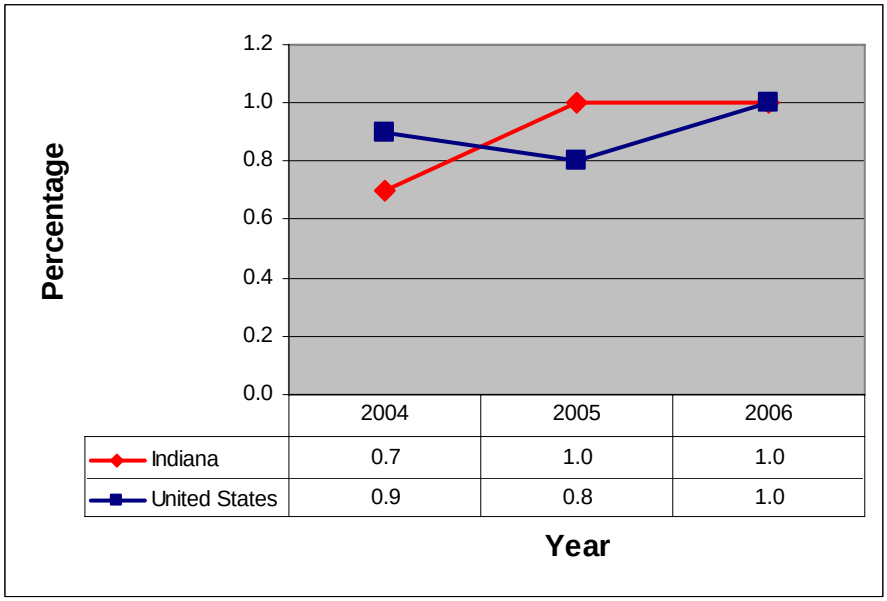
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2006 BRFSS Data

Figure 2: Diabetes Prevalence, Indiana, 1995-2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 1995-2006 BRFSS Data

Figure 3: Pre-Diabetes Prevalence, Indiana Compared to the United States, 2004-2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2004-2006 BRFSS Data

Risk Factors

Risk factors for type 1 include autoimmune, genetic, and environmental factors. However, less is known about type 1 than type 2, which is largely preventable. Risk factors for type 2 diabetes include both genetic and lifestyle factors that are classified as either non-modifiable or modifiable. Although there are two different classifications, interactions can occur between the two. For example, genes can predispose an individual to developing diabetes but often environmental and behavioral factors activate the genetic predisposition.[5]

Non-modifiable risk factors include gender and previous gestational diabetes, age, and genetic factors such as race/ethnicity. Although less clear, education and income level play a role in type 2 diabetes as those with lower levels of education and income tend to have a higher prevalence of diabetes. Whether these factors are modifiable or not depends on circumstances. Modifiable risk factors include obesity, physical inactivity, and nutritional factors. Obesity is the most important risk factor for development of type 2 diabetes. Other factors worth noting include low birth weight, exposure to a diabetic environment in utero, and a potential inflammatory component, but further research is need in these areas.[5]

Gender and Gestational Diabetes

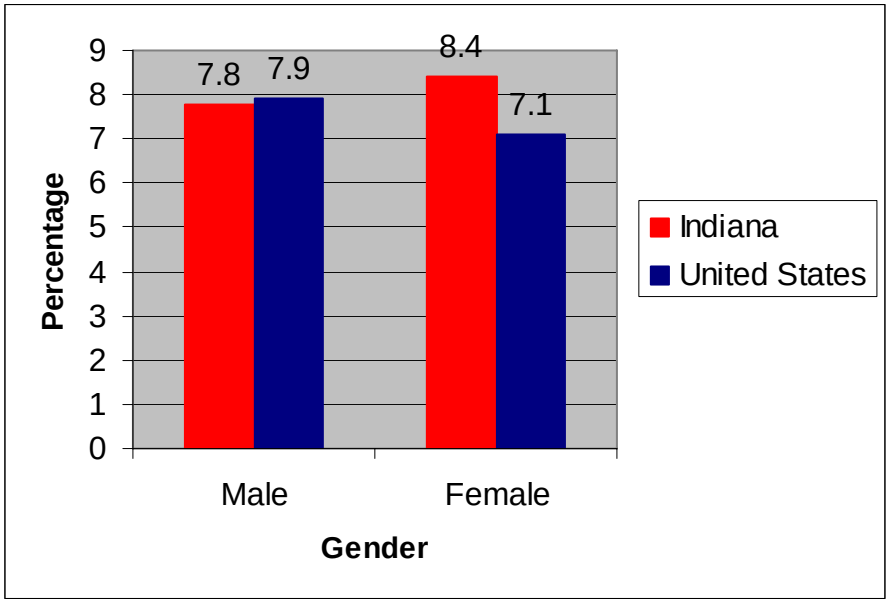
In 2006, adult females in Indiana had a higher diabetes prevalence (8.4%) than males (7.8%) though it was not statistically significant, and they had a higher prevalence than the United States average prevalence (7.1%) (Figure 4).[6, 7] Female prevalence has not always been higher than male prevalence as seen in Figure 5.

Women are at greater risk, especially those who had gestational diabetes. Gestational diabetes increases a woman's chances of developing diabetes after pregnancy or years later. Women who are diagnosed with gestational diabetes have a 20-50% chance of developing diabetes in the next 5-10 years. A portion of women with gestational diabetes (5-10%) will have type 2 diabetes immediately following their pregnancy. Black, Hispanic/Latino, and American Indian females are at greater risk of developing gestational diabetes, as are those who are overweight or obese (55.9% of women in Indiana – 2006 BRFSS) or have a family history of diabetes.[2]

In 2006, 1% of Indiana adult women reported that they had been diagnosed with gestational diabetes which was higher than the national prevalence of 0.8%. The prevalence of gestational diabetes has been steadily increasing since 2001 when prevalence was at its lowest (0.6%) (Figure 6). As expected, women most affected by gestational diabetes are those 25-44 years of age (Figure 7). Minorities reported a higher prevalence of gestational diabetes when compared to Whites (Figure 8).[6]

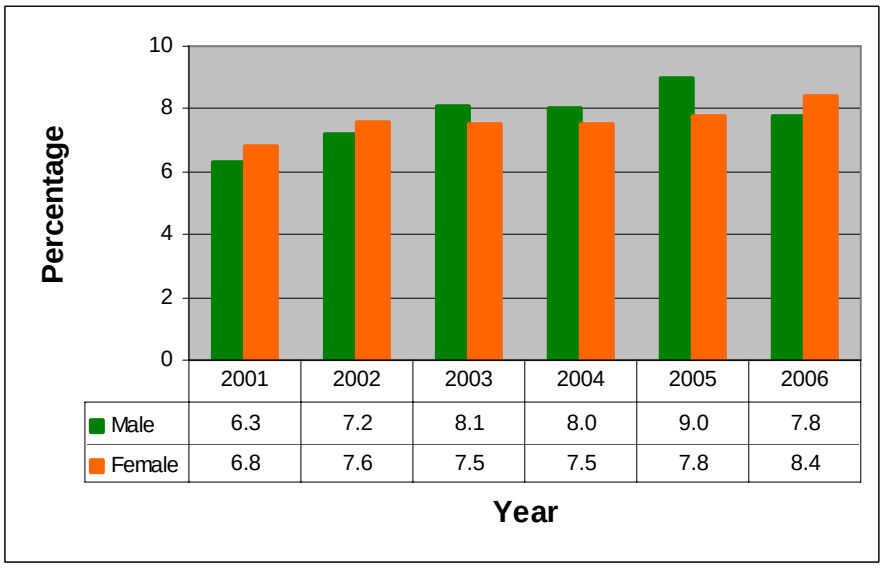
Information from ISDH vital records offers a more comprehensive description of gestational diabetes in Indiana as it includes all women not just those over 18 years of age. In 2005, there were 1,558 births to mothers with gestational diabetes. This number has been increasing in the past decade as shown in Figure 9. Overall, the percentage has increased but in the past few years the numbers have remained similar (Figure 10). In 2005, there were 1,467 births (1.7% of all births) to mothers who had diabetes prior to pregnancy (Figures 11 and 12). As expected, the numbers and percentages have increased in the past ten years.[9]

Figure 4: Diabetes Prevalence by Gender, Indiana Compared to the United States, 2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2006 BRFSS Data

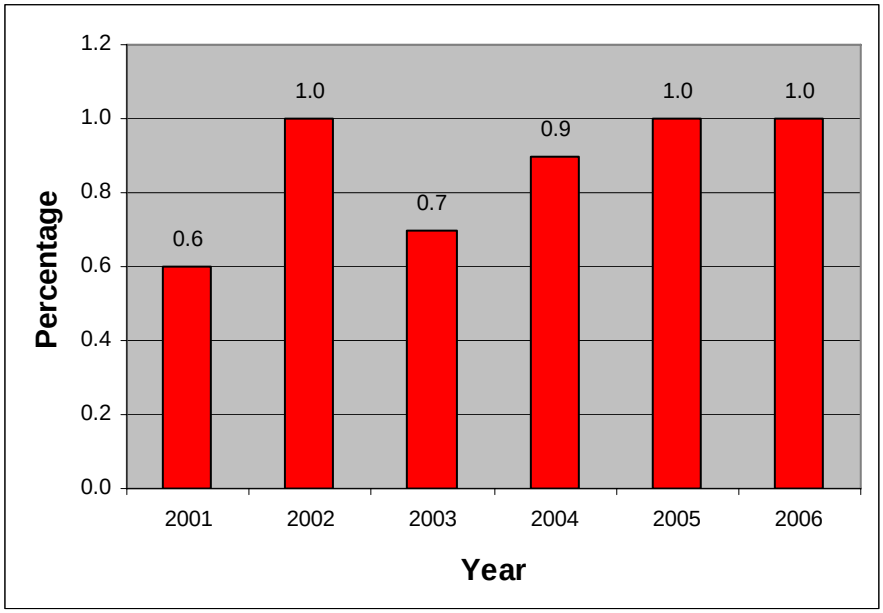
Figure 5: Diabetes Prevalence by Gender, Indiana, 2001-2006



	2001	2002	2003	2004	2005	2006
Male	6.3	7.2	8.1	8.0	9.0	7.8
Female	6.8	7.6	7.5	7.5	7.8	8.4

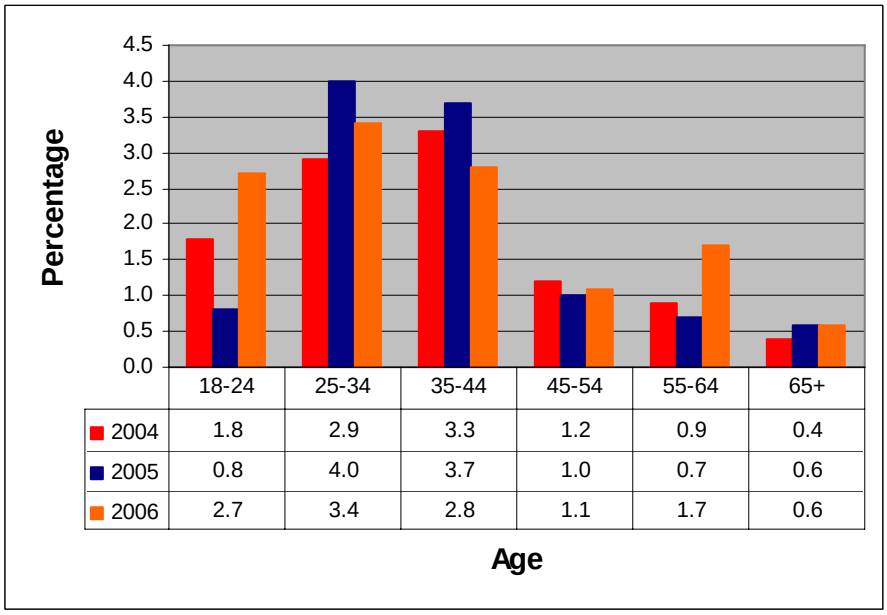
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2001-2006 BRFSS Data

Figure 6: Female Prevalence of Pregnancy-Related Diabetes, Indiana, 2001-2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2001-2006 BRFSS Data

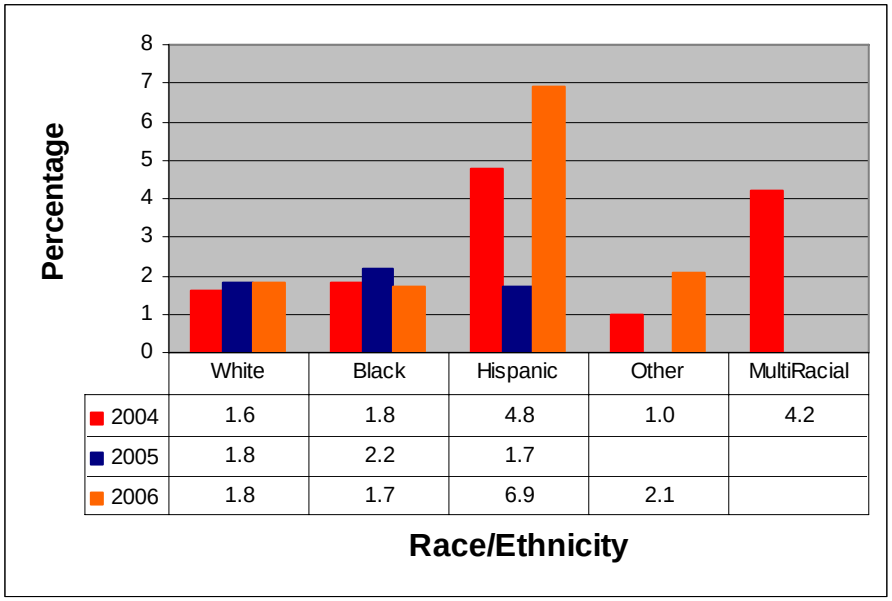
Figure 7: Female Pregnancy-Related Diabetes by Age, Indiana, 2004-2006



	18-24	25-34	35-44	45-54	55-64	65+
2004	1.8	2.9	3.3	1.2	0.9	0.4
2005	0.8	4.0	3.7	1.0	0.7	0.6
2006	2.7	3.4	2.8	1.1	1.7	0.6

Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2004-2006 BRFSS Data

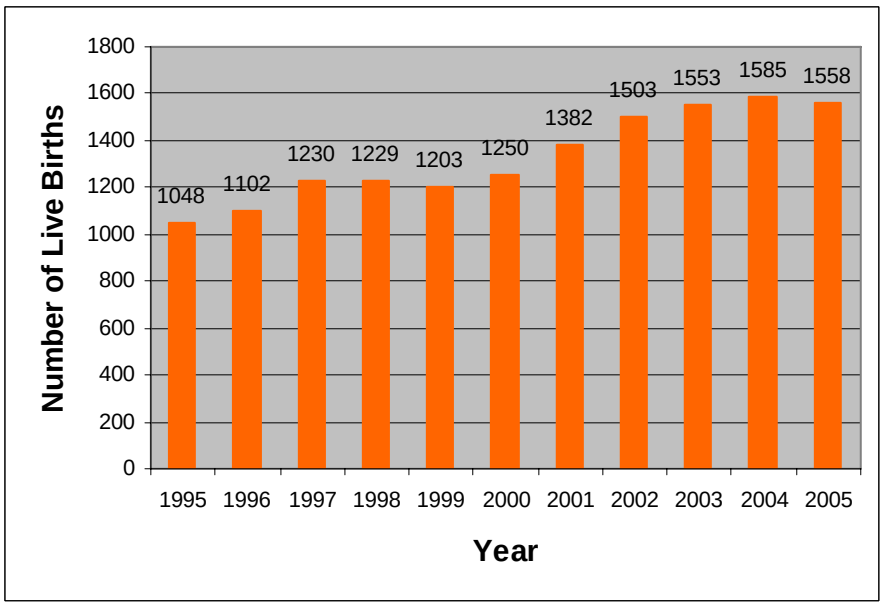
Figure 8: Female Pregnancy-Related Diabetes by Race/Ethnicity, Indiana, 2004-2006



	White	Black	Hispanic	Other	MultiRacial
2004	1.6	1.8	4.8	1.0	4.2
2005	1.8	2.2	1.7		
2006	1.8	1.7	6.9	2.1	

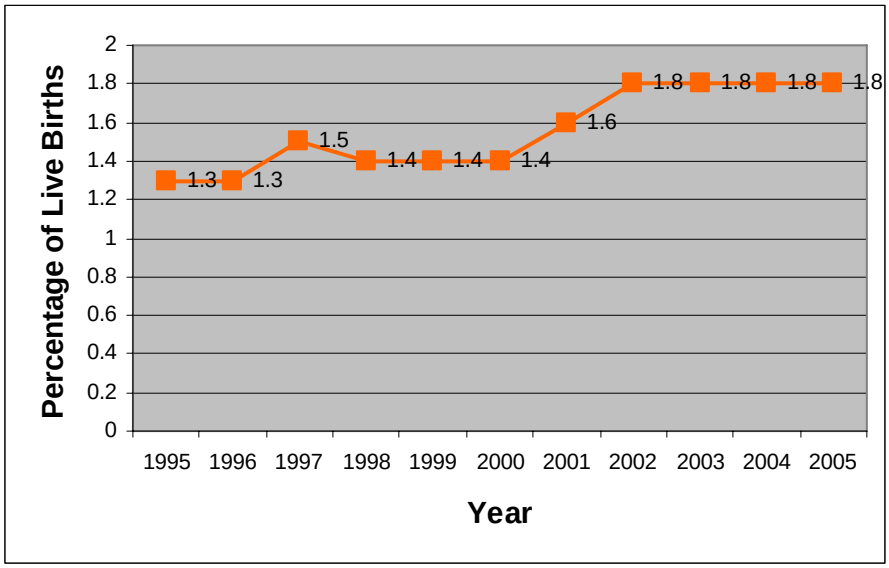
Note: Data for Other and MultiRacial for 2005 and data for MultiRacial for 2006 were N/A.
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2004-2006 BRFSS Data

Figure 9: Number of Live Births to Mothers with Gestational Diabetes, Indiana, 1995-2005



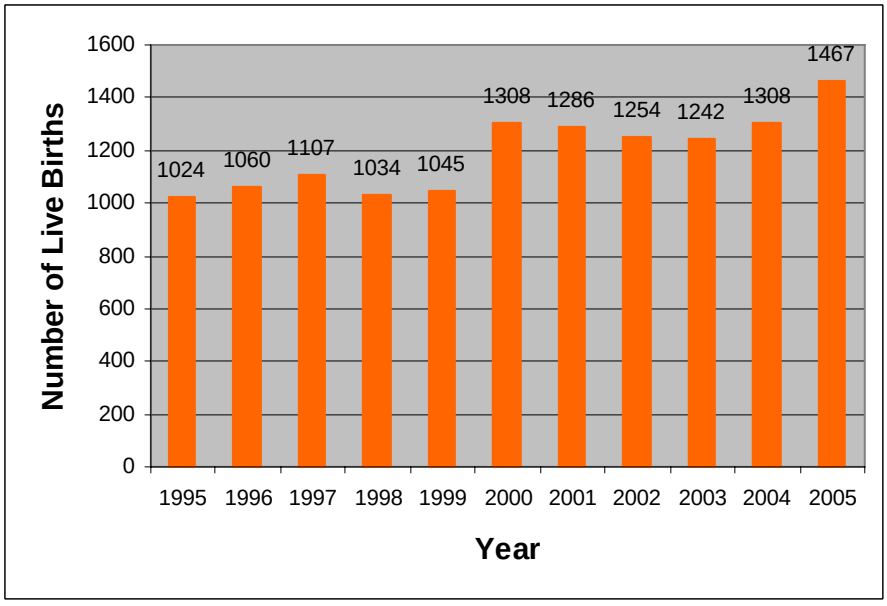
Source: Indiana State Department of Health, Vital Records, 1995-2005 Data

Figure 10: Percentage of Live Births to Mothers with Gestational Diabetes, Indiana, 1995-2005



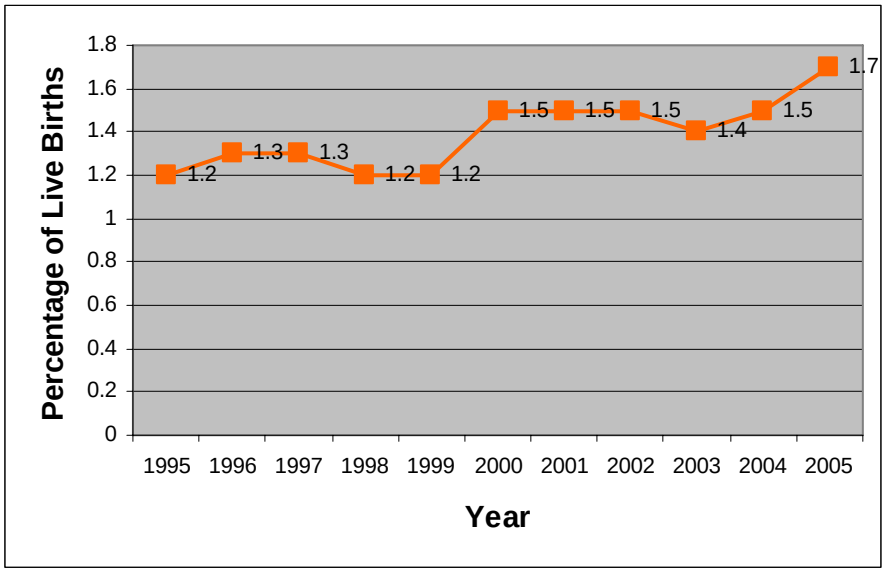
Source: Indiana State Department of Health, Vital Records, 1995-2005 Data

Figure 11: Number of Live Births to Mothers with Pre-Existing Diabetes, Indiana, 1995-2005



Source: Indiana State Department of Health, Vital Records, 1995-2005 Data

Figure: 12: Percentage of Live Births to Mothers with Pre-Existing Diabetes, Indiana, 1995-2005

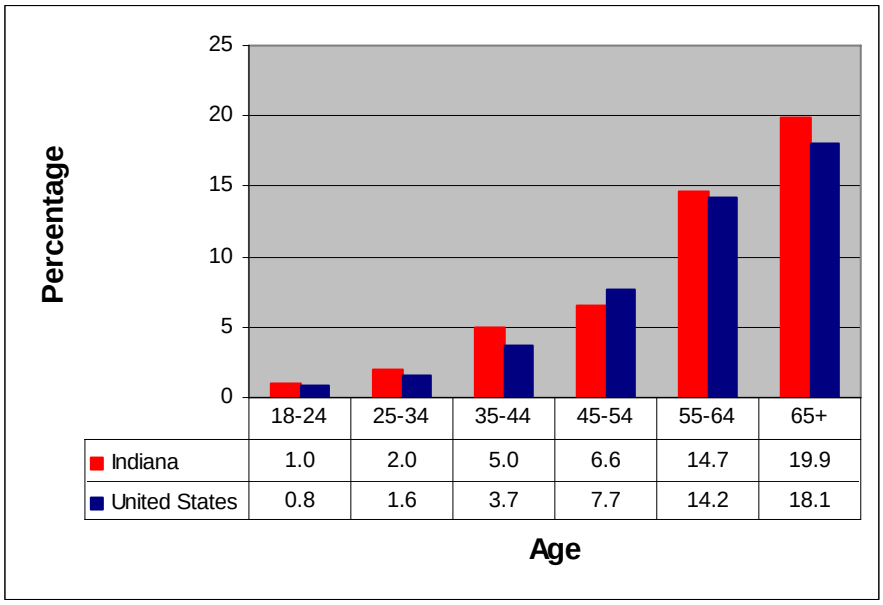


Source: Indiana State Department of Health, Vital Records, 1995-2005 Data

Age

Over 12% of the Indiana population is 65 years or older, representing an approximate increase of 5.7% from 1995 to 2005. It is estimated that by 2025, the number of older Indiana residents will increase to 19% or 1.3 million older persons.[10] This will present a challenge, because individuals 65 years and older have the greatest diabetes prevalence (19.9%) compared to all other age groups (Figure 13).[6] Indiana had a higher diabetes prevalence in all age categories compared to the United States except for those 45-54 years of age (Figure 13).[6, 7] Figure 14 shows the diabetes prevalence in each age category since 2001. The majority of adults with diabetes reported that they were first diagnosed between 46-60 years of age, which has been consistent since 2002 (Figure 15).[6]

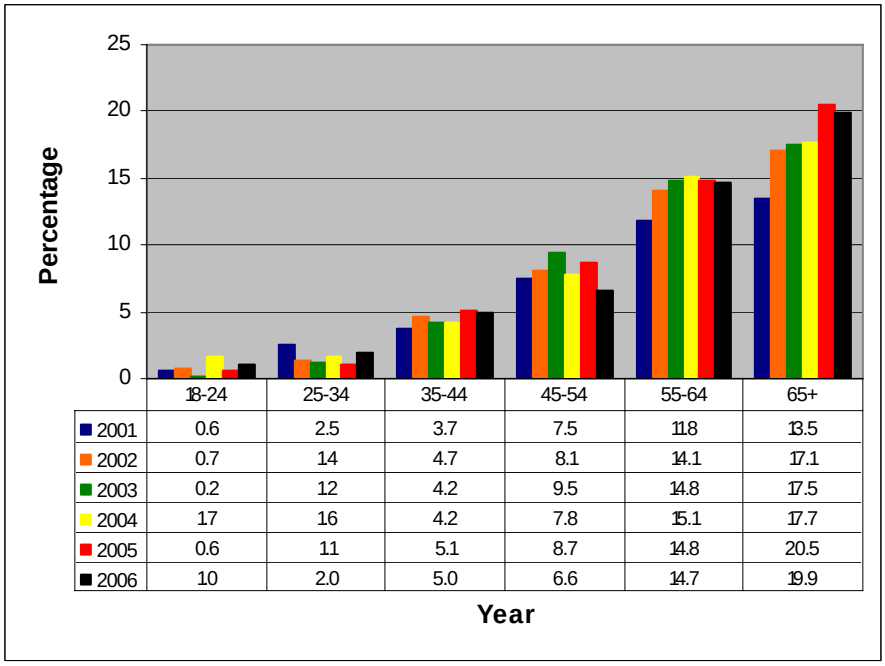
Figure 13: Diabetes Prevalence by Age, Indiana Compared to the United States, 2006



	18-24	25-34	35-44	45-54	55-64	65+
Indiana	1.0	2.0	5.0	6.6	14.7	19.9
United States	0.8	1.6	3.7	7.7	14.2	18.1

Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2006 BRFSS Data

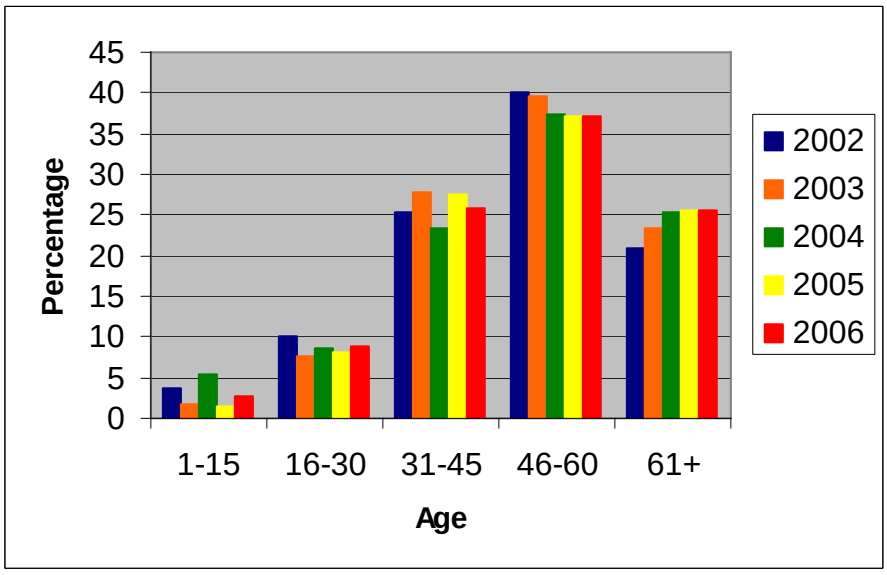
Figure 14: Diabetes Prevalence by Age, Indiana, 2001-2006



	18-24	25-34	35-44	45-54	55-64	65+
2001	0.6	2.5	3.7	7.5	11.8	13.5
2002	0.7	1.4	4.7	8.1	14.1	17.1
2003	0.2	1.2	4.2	9.5	14.8	17.5
2004	1.7	1.6	4.2	7.8	15.1	17.7
2005	0.6	1.1	5.1	8.7	14.8	20.5
2006	1.0	2.0	5.0	6.6	14.7	19.9

Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2001-2006 BRFSS Data

Figure 15: Age when Diabetes was First Diagnosed, Indiana, 2002-2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "How old were you when you were told you have diabetes?"
Source: Indiana 2002-2006 BRFSS Data

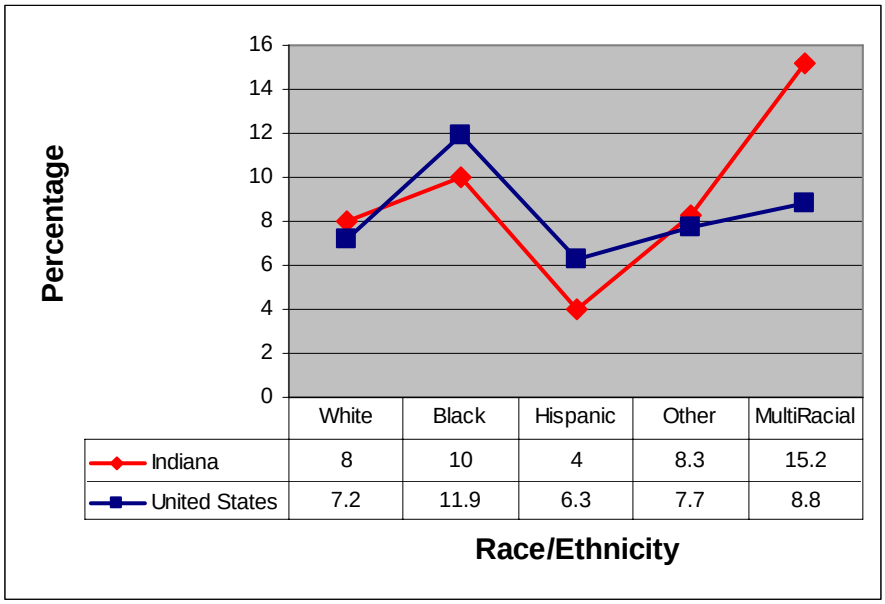
Race/Ethnicity

United States Census Data for 2006 indicated that 8.7% of Indiana's population was Black, 4.7% was Hispanic/Latino, and 1.3% was Asian American/Pacific Islander. Compared to surrounding Midwest states, Indiana had the second largest Hispanic/Latino population and the fourth largest Black population. Although Indiana does not have Native Americans living in exclusive communities (reservations), 0.3% of Indiana's population was Native American.[10]

Blacks and Hispanic/Latinos are much more likely to have diabetes, to develop its complications, and to die from the disease at an earlier age compared to their White counterparts. According to the 2006 BRFSS, Blacks had a 10% prevalence, Hispanic/Latinos had a 4% prevalence, and Whites had an 8% prevalence (Figure 16). Whites, multiracial, and individuals identified as "other" had a higher diabetes prevalence than the United States averages (Figure 16), however the differences were not statistically significant. When comparing the prevalence among years, nearly all categories showed an increase in diabetes prevalence (Figure 17).

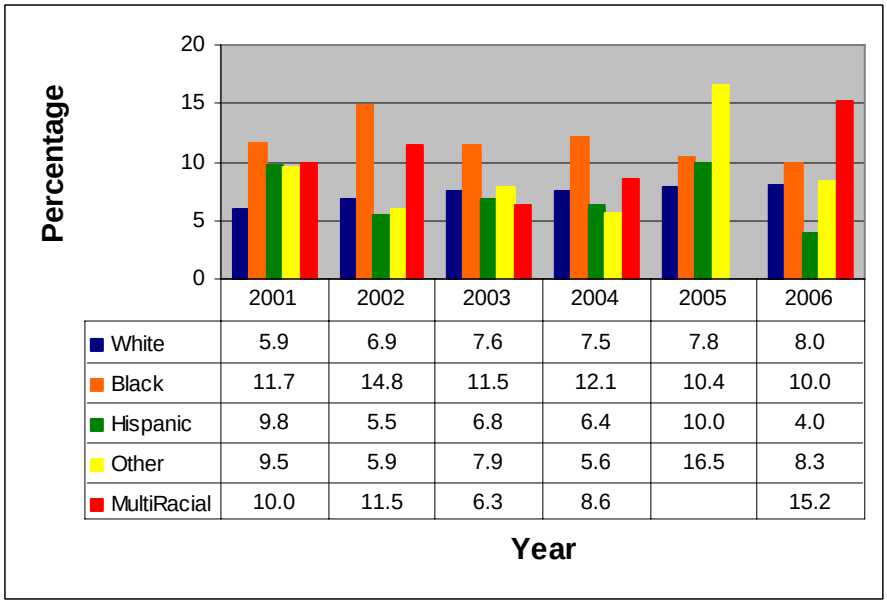
Please note that while the prevalence of diabetes for Hispanics/Latinos, other and multiracial respondents fluctuated from 2001 to 2006, the differences were not statistically significant. The fluctuation was most likely due to the number of respondents from those race/ethnicity categories. For example, the number of "other" race respondents ranged from 73 to 121 in those six years.

Figure 16: Diabetes Prevalence by Race/Ethnicity, Indiana Compared to the United States, 2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2006 BRFSS Data

Figure 17: Diabetes Prevalence by Race/Ethnicity, Indiana, 2001-2006



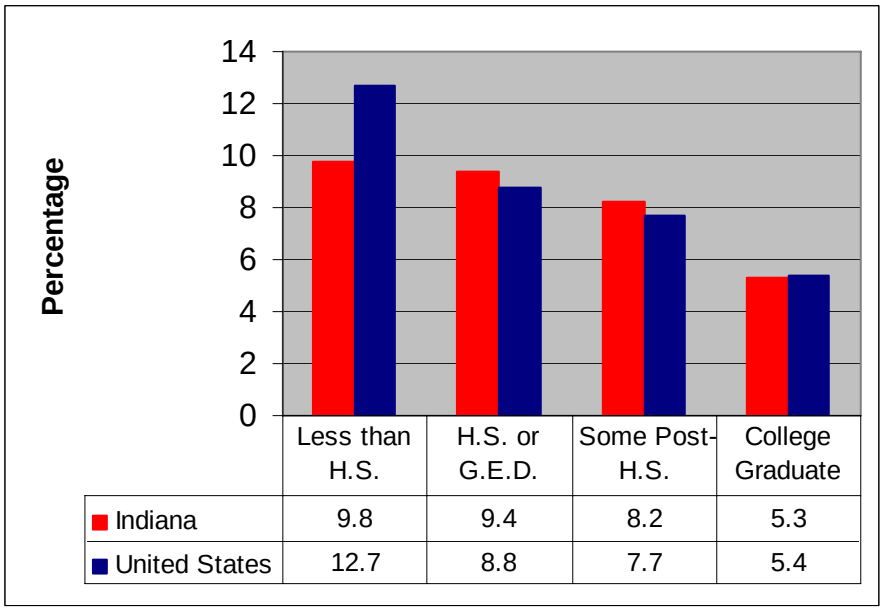
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2001-2006 BRFSS Data

Education and Income

Prevalence of diabetes and income level are related. Individuals with less income tend to have a higher prevalence of diabetes. In 2006, the prevalence of diabetes was the greatest among adults with less than a high school diploma (9.8%) and the prevalence was the lowest (5.3%) among those with a college degree (Figure 18). The differences between the levels of education were statistically significant. This trend has been consistent for the past six years (Figure 19).[6]

Also, the less income individuals have the more likely they are to have diabetes. In 2006, the prevalence for those with an annual household income (from all sources) of less than $15,000 was 14.1% compared to only a 5% prevalence in those that had a yearly income of $50,000 (Figure 20). The differences between the levels of income in relation to diabetes prevalence are statistically significant. This trend has been fairly consistent since 2001 (Figure 21).[6]

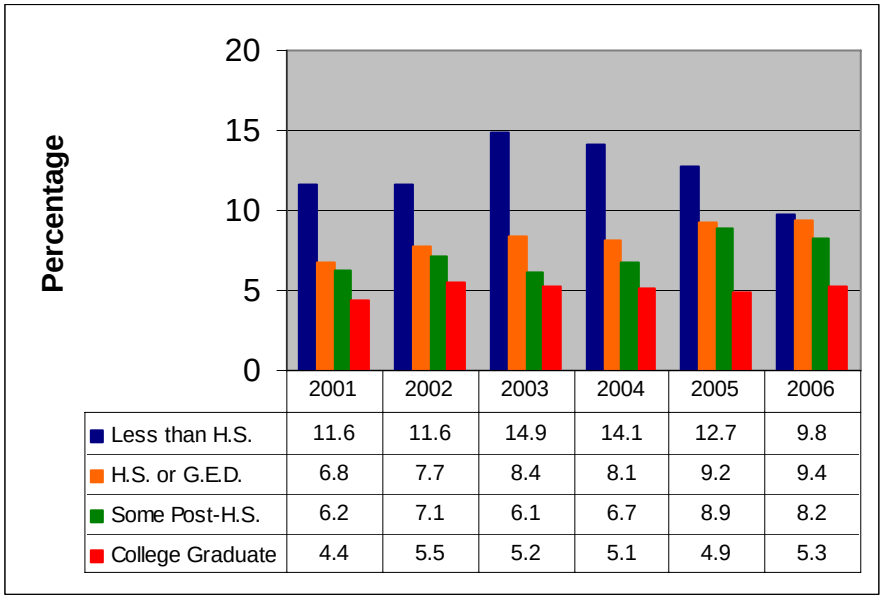
Figure 18: Diabetes Prevalence by Education, Indiana Compared to the United States, 2006



	Less than H.S.	H.S. or G.E.D.	Some Post-H.S.	College Graduate
Indiana	9.8	9.4	8.2	5.3
United States	12.7	8.8	7.7	5.4

Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2006 BRFSS Data

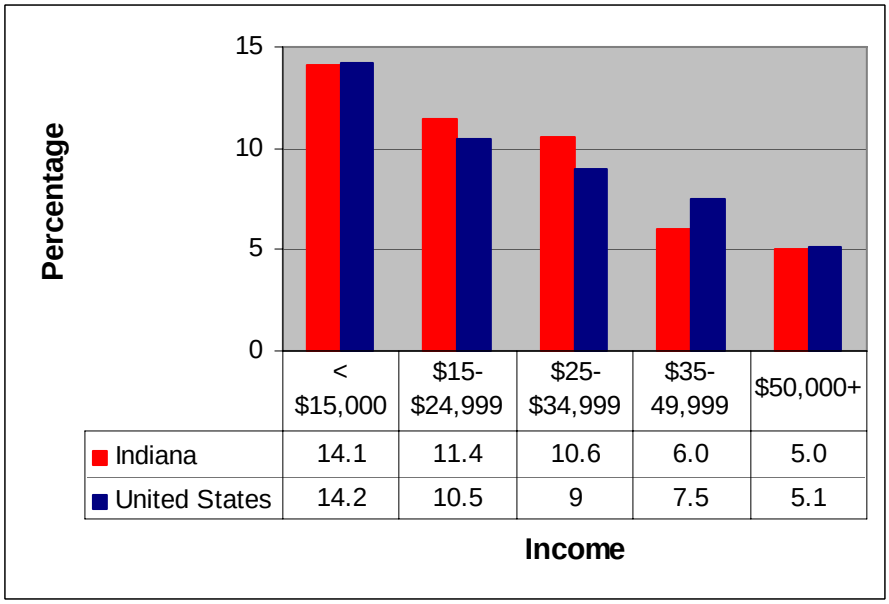
Figure 19: Diabetes Prevalence by Education, Indiana, 2001-2006



	2001	2002	2003	2004	2005	2006
Less than H.S.	11.6	11.6	14.9	14.1	12.7	9.8
H.S. or G.E.D.	6.8	7.7	8.4	8.1	9.2	9.4
Some Post-H.S.	6.2	7.1	6.1	6.7	8.9	8.2
College Graduate	4.4	5.5	5.2	5.1	4.9	5.3

Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2001-2006 BRFSS Data

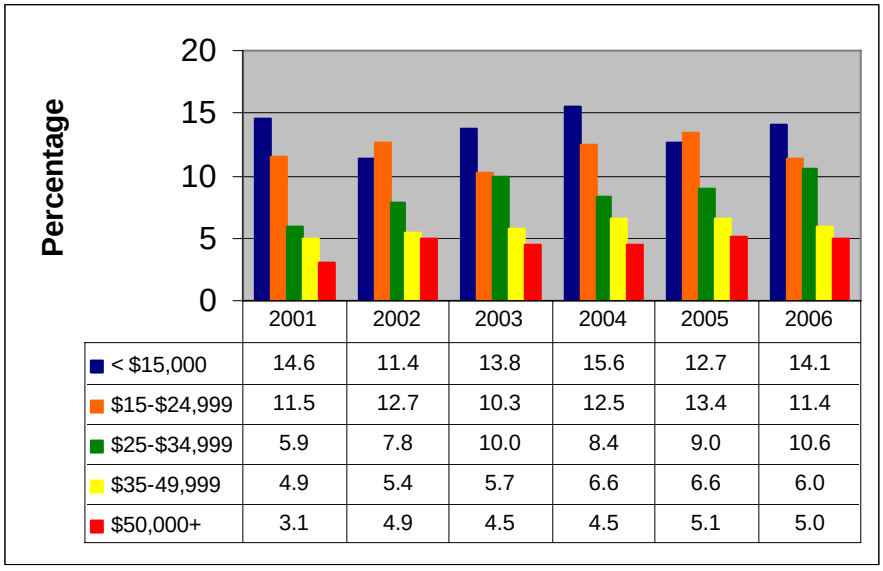
Figure 20: Diabetes Prevalence by Annual Income, Indiana Compared to the United States, 2006



	< $15,000	$15-$24,999	$25-$34,999	$35-49,999	$50,000+
Indiana	14.1	11.4	10.6	6.0	5.0
United States	14.2	10.5	9	7.5	5.1

Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2006 BRFSS Data

Figure 21: Diabetes Prevalence by Income, Indiana, 2001-2006



	2001	2002	2003	2004	2005	2006
< $15,000	14.6	11.4	13.8	15.6	12.7	14.1
$15-$24,999	11.5	12.7	10.3	12.5	13.4	11.4
$25-$34,999	5.9	7.8	10.0	8.4	9.0	10.6
$35-49,999	4.9	5.4	5.7	6.6	6.6	6.0
$50,000+	3.1	4.9	4.5	4.5	5.1	5.0

Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever been told by a doctor that you have diabetes?"
Source: Indiana 2001-2006 BRFSS Data

Obesity, Physical Inactivity, and Nutrition

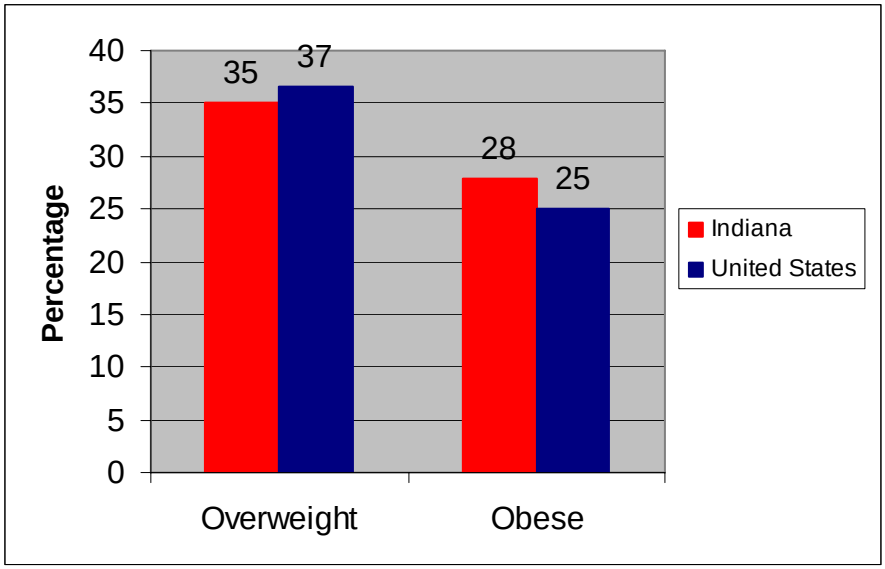
More than 80% of people with type 2 diabetes are overweight or obese.[11] According to the 2006 BRFSS, 63% of Indiana's adults were overweight or obese compared to the national level of 62% (Figure 22). Figure 23 shows the relationship and change among the body mass index (BMI) categories as the Indiana progresses towards greater obesity. Figures 24 and 25 show the specific percentages of overweight and obese adults in Indiana. Males tended to be more overweight than females; however females were just slightly more obese than males (Figure 26). In 2006, Black adults had the highest obesity prevalence, and Hispanic adults had the highest prevalence of overweight (Figure 27).[6]

Physical activity has decreased over recent decades and has been a major contributing factor in the increase in obesity. Studies have shown physical activity to be an independent predictor of type 2 diabetes development.[5] In 2005, 73% of Indiana adults did not get 20 minutes or more of vigorous physical activity three times a week. Nearly 78% of women and 68% of men reported that they did not meet this standard. When comparing race/ethnicity, 26% of Whites and 29% of Blacks reported meeting the standard. Hispanics/Latinos reported getting the most exercise (36%) but the percentage was still low.[6]

Obesity is occurring at an earlier age. The increase in childhood obesity is now being accompanied by a rapid increase in type 2 diabetes in children and adolescents. Twenty years ago, type 2 diabetes was a disease of the middle and late years of life. Now, among some populations, type 2 is almost as prevalent as type 1 in young people.[2] The Youth Risk Behavior System (YRBS) was developed in 1990 to monitor priority health risk behaviors that contribute markedly to the leading causes of death, disability, and social problems among youth (9^{th} through 12^{th} grades) in the United States. In 2003, 12% of 9^{th}–12^{th} graders were overweight which increased to 15% in 2005 and decreased in 2007 to 14% (Figure 28). In 2007, 44% of high school-aged adolescents reported that they were physical active, a statistically significant increase from 32% in 2005 (Figure 29). In 2007, 29% reported watching three or more hours of television a day which was a statistically significant decrease from 32% in 2005.[12]

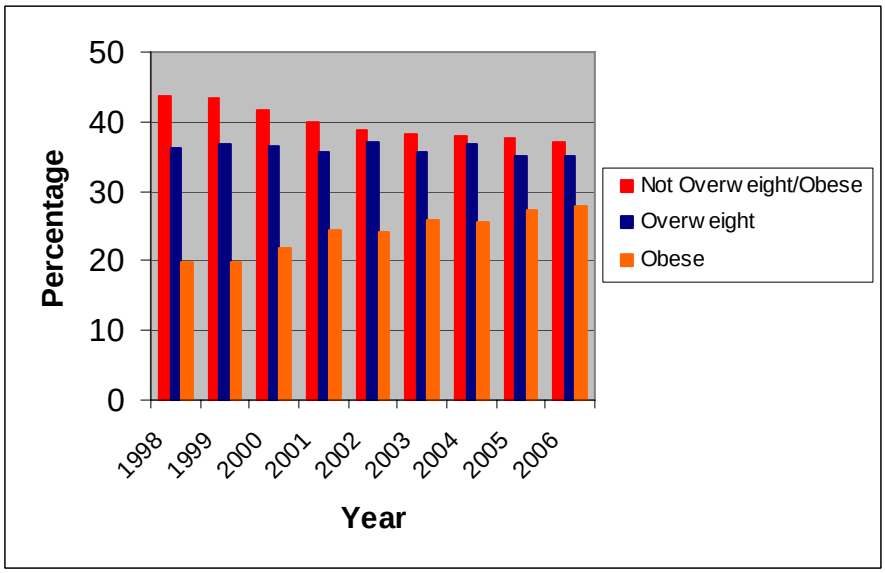
Nutritional factors also play a role, yet their role is more uncertain because of the difficulty of collecting accurate dietary data. High total calorie and low dietary fiber intake, high glycemic load and low polyunsaturated to saturated fat ratio may lead to type 2 diabetes. Data on food intake in Indiana residents is limited. However in 2005, only 22% of adults reported that they consumed fruits or vegetables five or more times a day.[6]

Figure 22: Overweight and Obese Adults, Indiana Compared to the United States, 2006



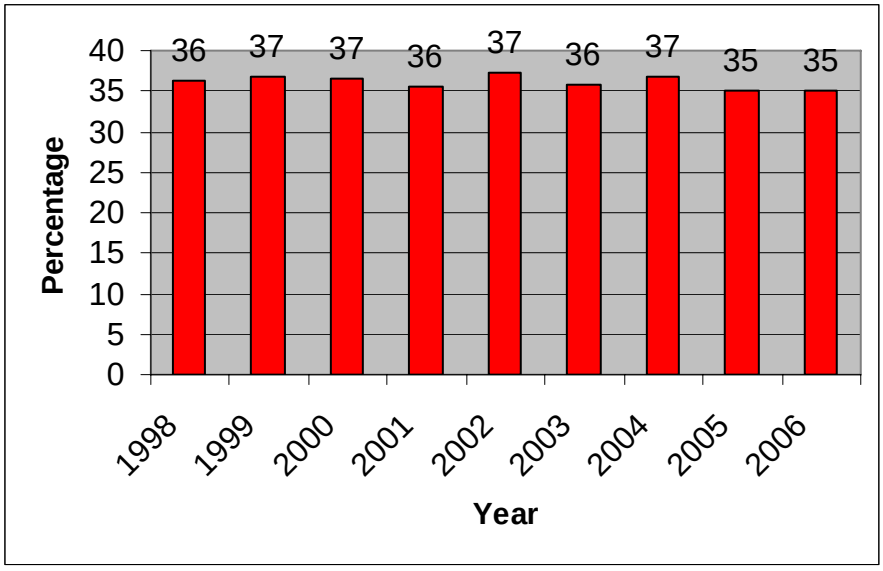
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Overweight as BMI 25 – 29.9, and obese as BMI ≥ 30.
Source: Indiana 2006 BRFSS Data

Figure 23: Overweight and Obese Adults, Indiana, 1998-2006



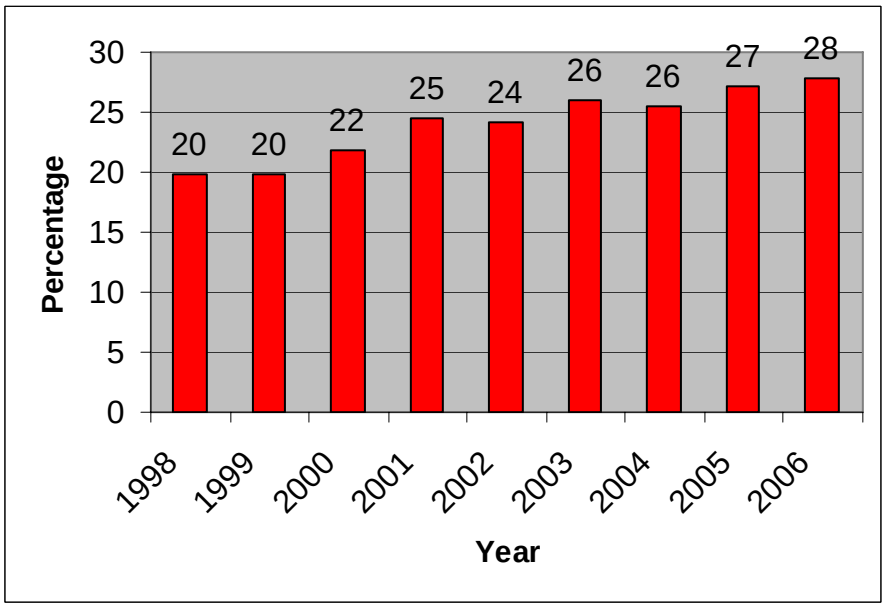
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Normal is defined as BMI < 24.9, overweight as BMI 25 – 29.9, and obese as BMI ≥ 30.
Source: Indiana 2006 BRFSS Data

Figure 24: Overweight Adults, Indiana, 1998-2006



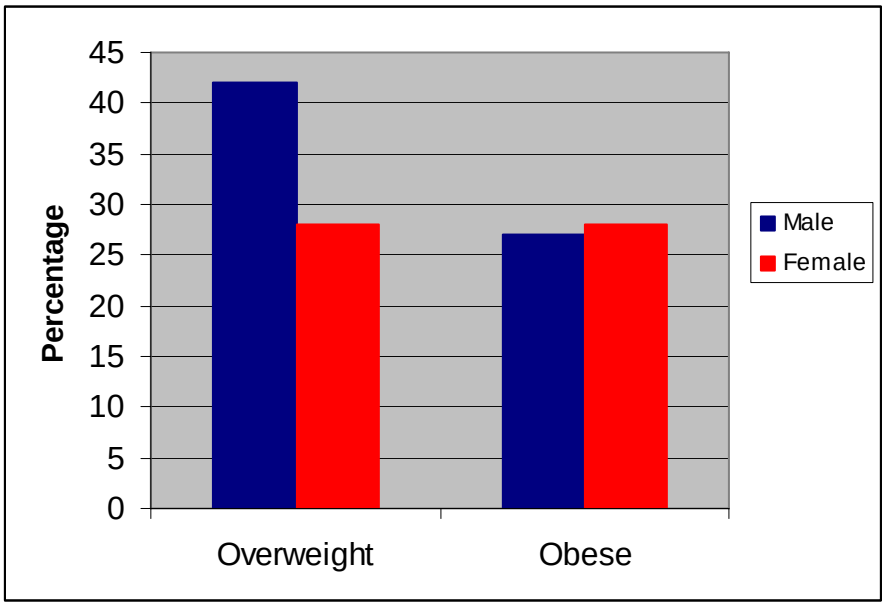
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Overweight as BMI 25 – 29.9.
Source: Indiana 2006 BRFSS Data

Figure 25: Obese Adults, Indiana, 1998-2006



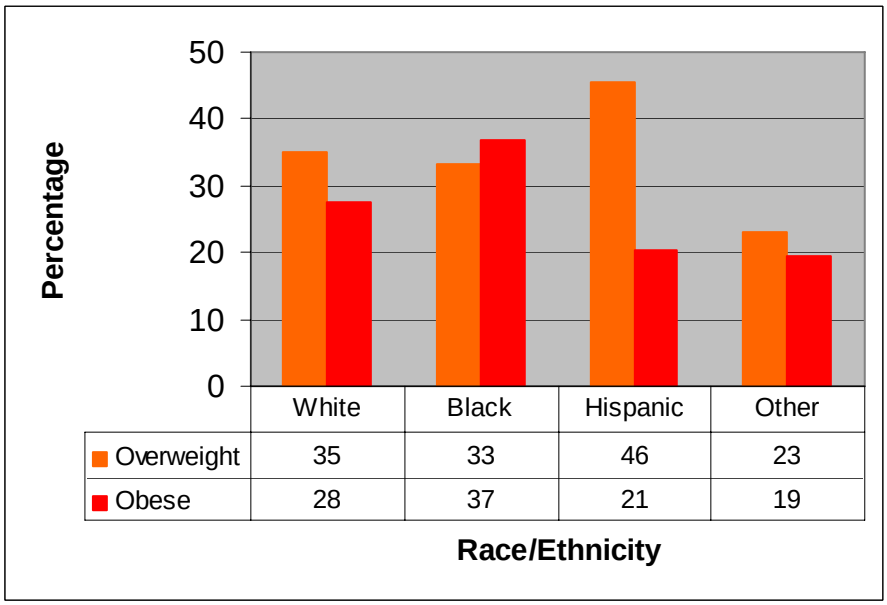
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Obese as BMI $\geq$ 30.
Source: Indiana 2006 BRFSS Data

Figure 26: Overweight and Obese Adults by Gender, Indiana, 2006



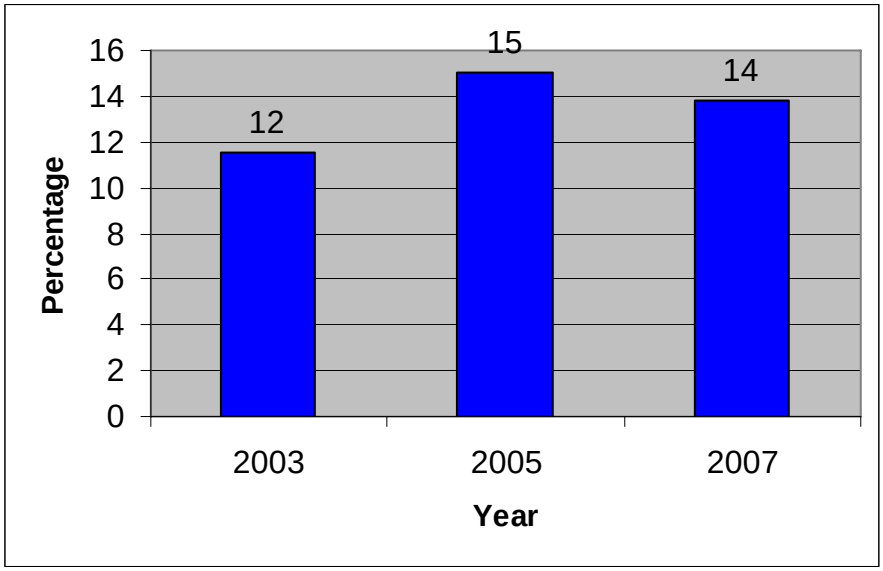
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Overweight as BMI 25 – 29.9, and obese as BMI ≥ 30.
Source: Indiana 2006 BRFSS Data

Figure 27: Overweight and Obese Adults by Race/Ethnicity, Indiana, 2006



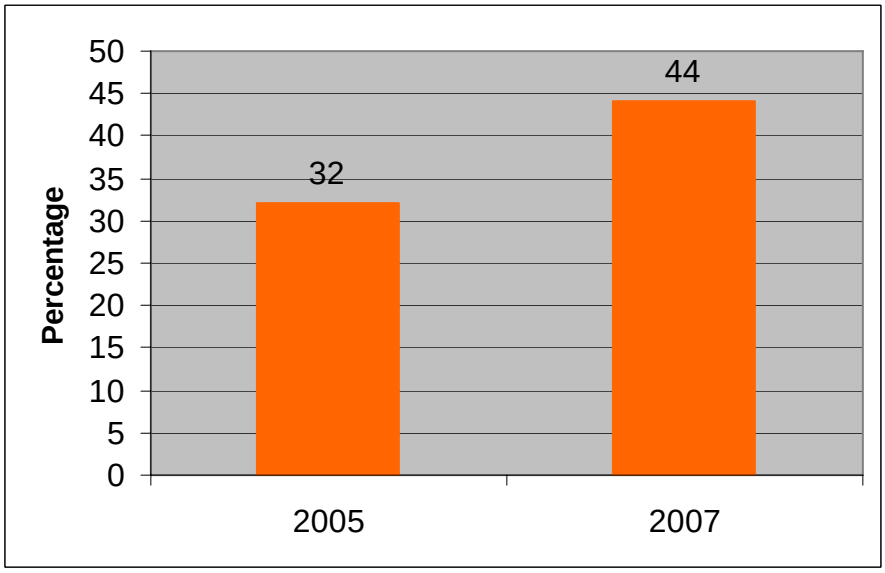
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Overweight as BMI 25 – 29.9, and obese as BMI ≥ 30.
Source: Indiana 2006 BRFSS Data

Figure 28: Overweight* Students, Indiana, 2003 and 2005



*At or above the 95th percentile for body mass index, by age and gender. The body mass index is calculated based on self reported weight and height data.
Percentages are weighted to population characteristics.
Survey was asked of individuals in 9th through 12th grades.
Overweight as BMI 25 – 29.9.
Source: Indiana 2003 and 2005 YRBS Data

Figure 29: High School Students who were Physically Active for 60 Minutes on at Least Five of the Past Seven Days, Indiana, 2005



Percentages are weighted to population characteristics.
Survey was asked of individuals in 9th through 12th grades.
Source: Indiana 2005 YRBS Data

Complications

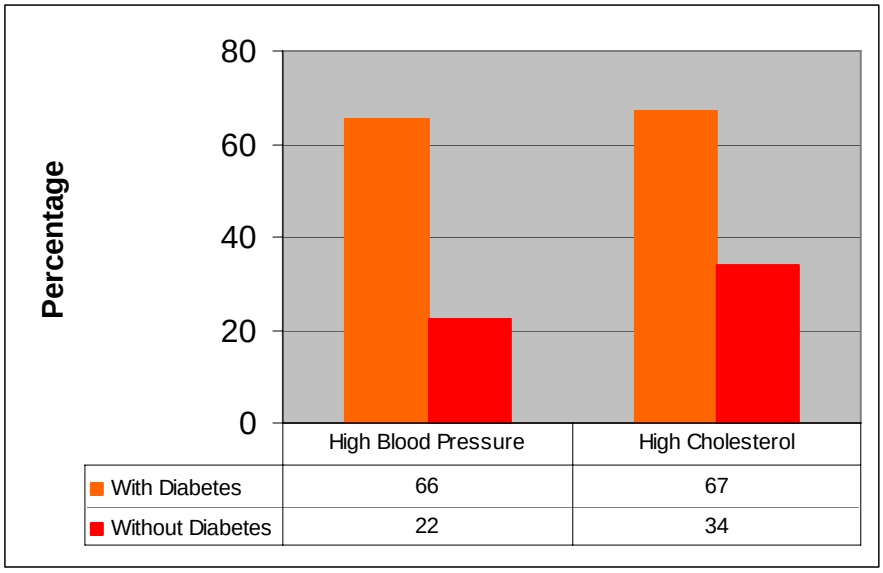
Diabetes is a serious disease, at times causing death even in those who have not developed complications. Cardiovascular complications are the leading cause of mortality and long-term morbidity for individuals with diabetes. Diabetes is a leading cause of blindness, kidney disease, and lower extremity amputations.

Cardiovascular Complications

High blood pressure and high cholesterol lead to coronary artery disease (heart disease), myocardial infarction (heart attack), and stroke. Heart disease and stroke account for about 65% of deaths in people with diabetes. Adults with diabetes are two to four times more likely to die of heart disease than adults without diabetes, and they are two to four times more at risk of having a stroke.[2]

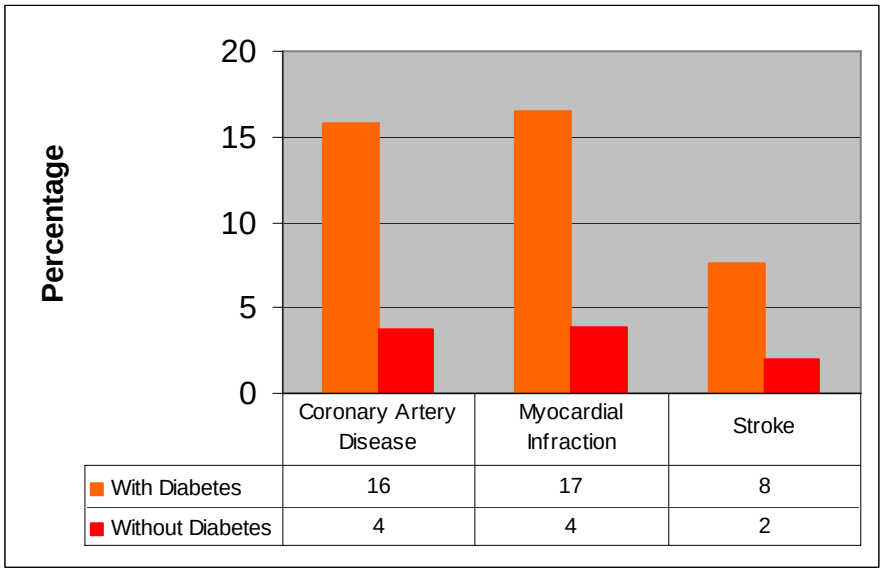
In 2005, 66% of adults in Indiana with diabetes had high blood pressure (Figure 30), and 91% were taking medication for it. Sixty-seven percent reported having high cholesterol (Figure 30). Approximately 16% of adults with diabetes reported having coronary artery disease compared to 4% of adults without diabetes (Figure 31). Almost 17% reported having had a myocardial infarction compared to 4% of adults without diabetes (Figure 31), and 8% reported having had a stroke compared to 2% of adults without diabetes (Figure 31).[6]

Figure 30: High Blood Pressure and High Cholesterol in Those with and without Diabetes, Indiana, 2005



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Questions: “Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?” and "Have you ever been told by a doctor, nurse, or other health professional that your blood cholesterol is high?"
Source: Indiana 2005 BRFSS Data

Figure 31: Coronary Artery Disease, Myocardial Infarction, and Stroke in Adults with and without Diabetes, Indiana, 2005



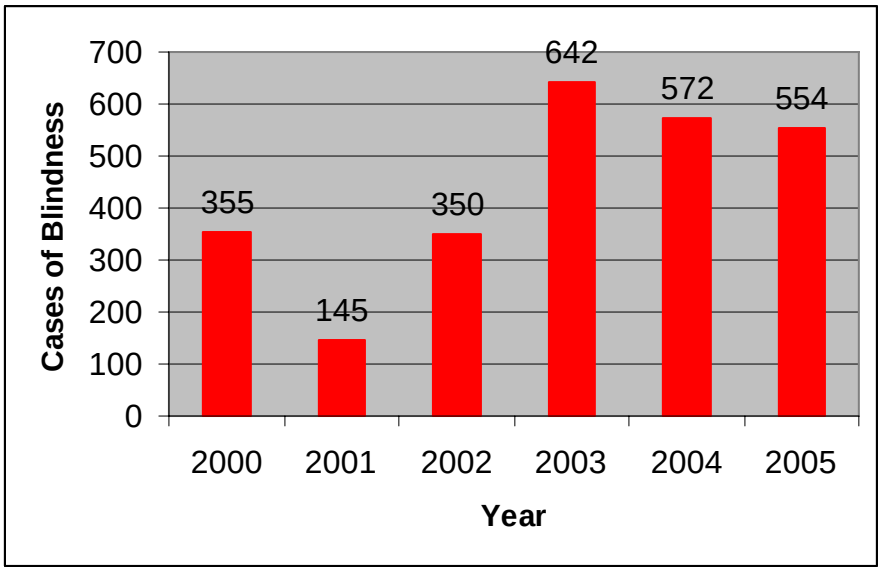
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Questions: “Has a doctor, nurse, or other health professional ever told you that you any of the following? Heart attack, also called a myocardial infarction? Angina or coronary heart disease? Stroke?"
Source: Indiana 2005 BRFSS Data

Blindness and Visual Impairment

High blood glucose and high blood pressure cause small blood vessels to swell and leak liquid into the retina of the eye, which blurs vision and sometimes leads to blindness. Diabetes is the leading cause of new cases of blindness among adults 20–74 years of age. Diabetic retinopathy is the cause in 12,000–24,000 new cases of blindness every year in the United States.[2]

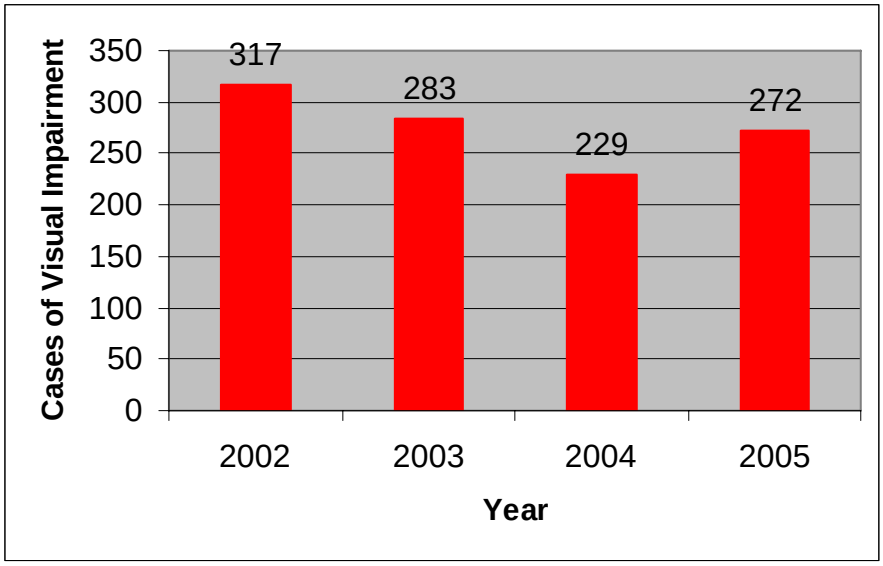
In 2005 for Indiana adults aged 17 and older, there were 554 new cases of legal blindness (Figure 32) and 272 new cases of visual impairment due to diabetic retinopathy (Figure 33) added to the Indiana Blind Registry.[13] In 2006, 18% of adults with diabetes reported that they had retinopathy or that their diabetes had affected their eyes (Figure 34).[6]

Figure 32: New Cases of Blindness due to Diabetes, Indiana, 2000-2005



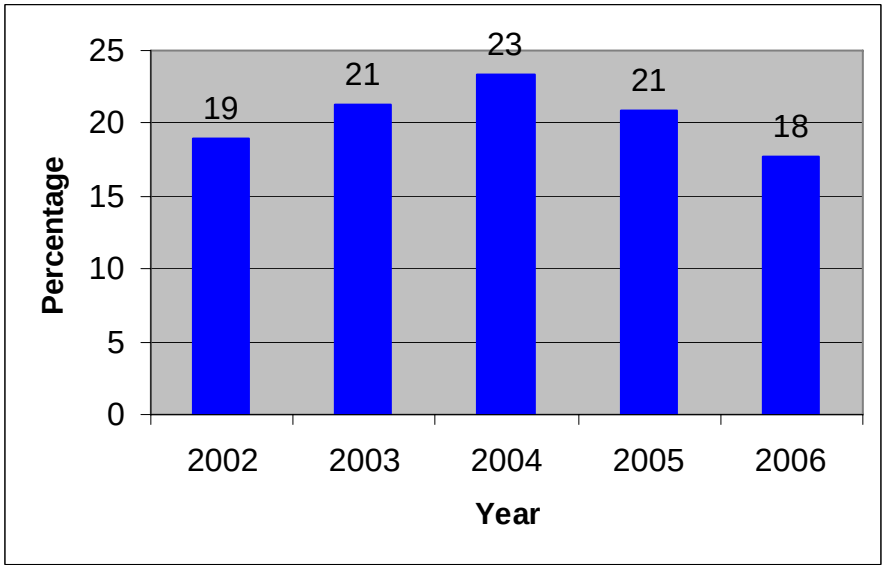
Source: Indiana Blind Registry 2000–2005 Data

Figure 33: New Cases of Visual Impairment due to Diabetes, Indiana, 2002-2005



Source: Indiana Blind Registry 2002–2005 Data

Figure 34: Percentage of Adults with Diabetes who had Retinopathy, Indiana, 2002-2006



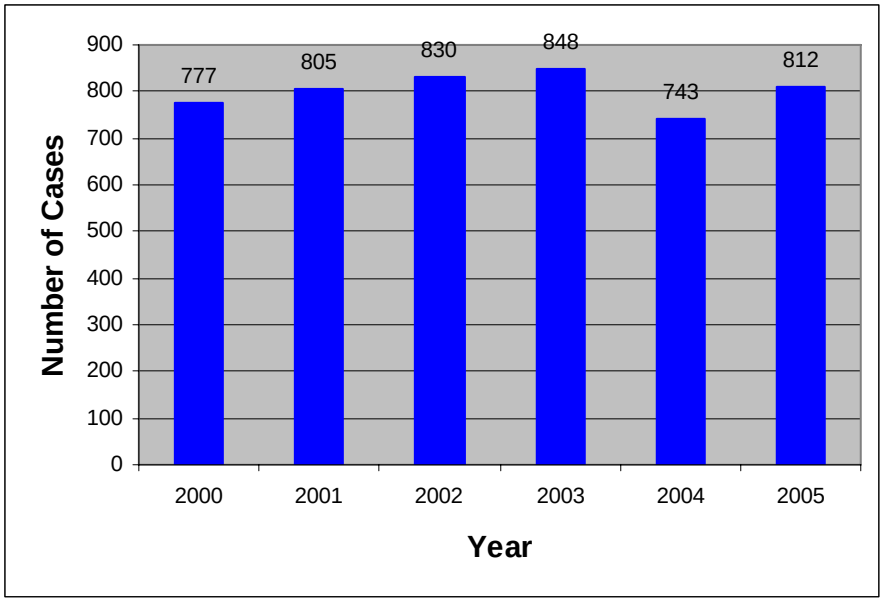
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Has a doctor ever told you that diabetes has affected your eyes or that you had retinopathy?"
Source: Indiana 2002-2006 BRFSS Data

Kidney Failure

In diabetic kidney disease, cells and blood vessels in the kidneys are damaged which affect the organ's ability to filter out waste. When kidneys fail, waste builds up in the blood and the blood needs to be filtered through a machine (dialysis) or a kidney transplant becomes necessary. In the United States, diabetes was the leading cause of kidney failure in 2002, accounting for 44% of new cases. In 2002, there were 44,400 people who began treatment for end-stage renal disease (ESRD), and 153,730 people with ESRD due to diabetes were living on chronic dialysis or with a kidney transplant in the United States and Puerto Rico.[2]

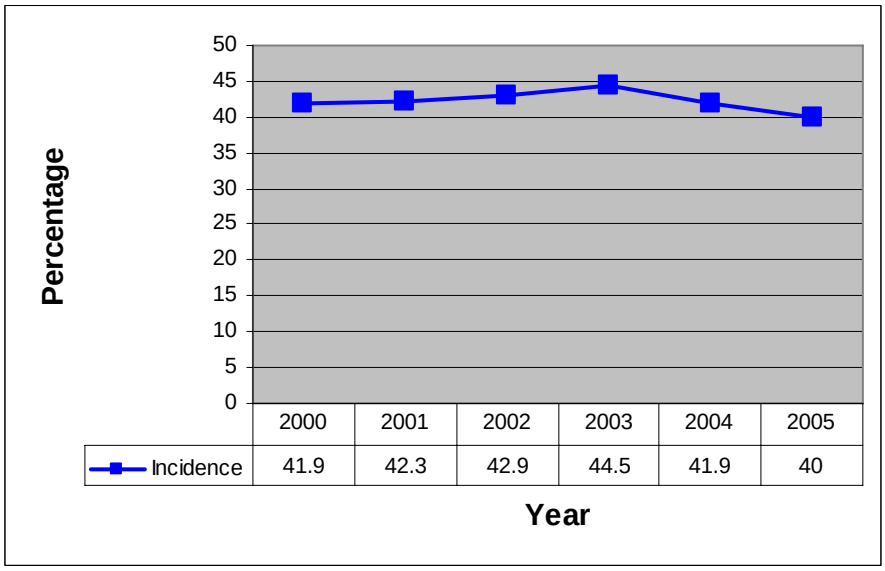
In 2005, there were 812 new cases of diabetes-related ESRD (Figure 35) in Indiana which accounted for 40% of all ESRD incident cases (Figure 36). While it appears the incidence has decreased in the past few years, the prevalence continues to rise. In 2005, there were 2,479 total cases of diabetes-related ESRD (Figure 37), representing 41.2% of all ESRD cases (Figure 38). Eighty-one individuals with diabetes-related kidney failure received a kidney transplant in 2006 (Figure 39). The number of people with diabetes receiving kidney transplants has doubled since 1995.[14]

Figure 35: New Cases of Diabetic-Related End-Stage Renal Disease, Indiana, 2000-2005



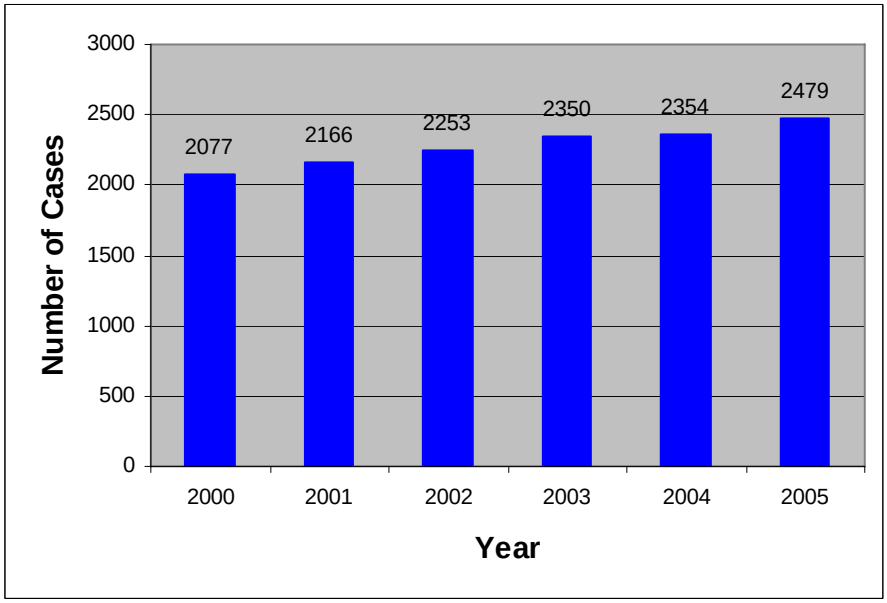
Source: The Renal Network 2000–2005 Data

Figure 36: Percentage of New End-Stage Renal Disease Patients who have Diabetes, Indiana, 2000-2005



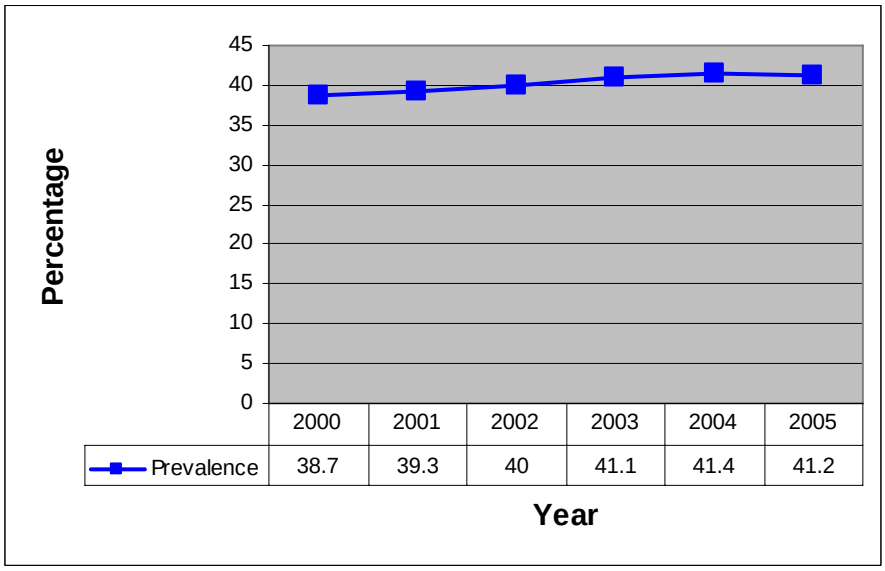
Source: The Renal Network 2000–2005 Data

Figure 37: Prevalence of Diabetic-Related End-Stage Renal Disease, Indiana, 2000-2005



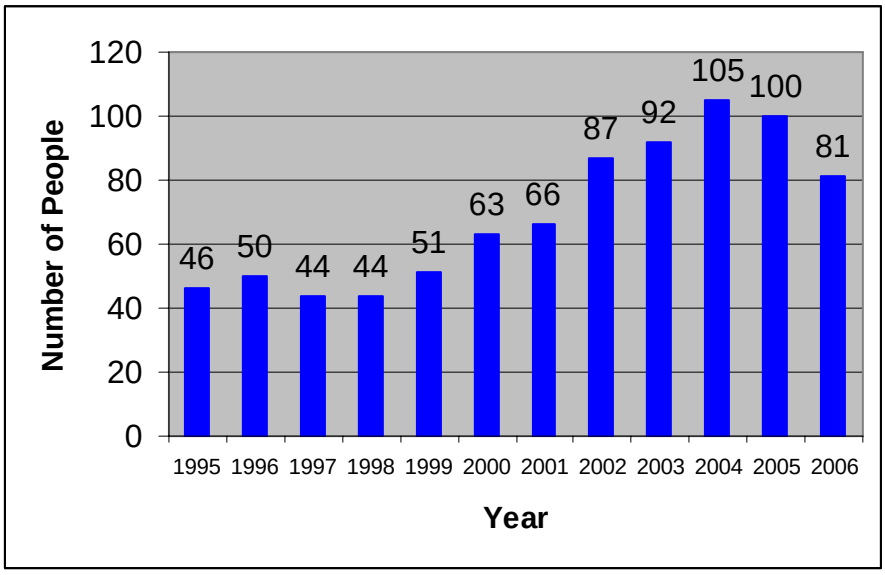
Source: The Renal Network 2000–2005 Data

Figure 38: Percentage of All End-Stage Renal Disease Patients who have Diabetes, Indiana, 2000-2005



Source: The Renal Network 2000–2005 Data

Figure 39: Adults who Received a Kidney Transplants Because of Their Diabetes, Indiana, 1995-2006



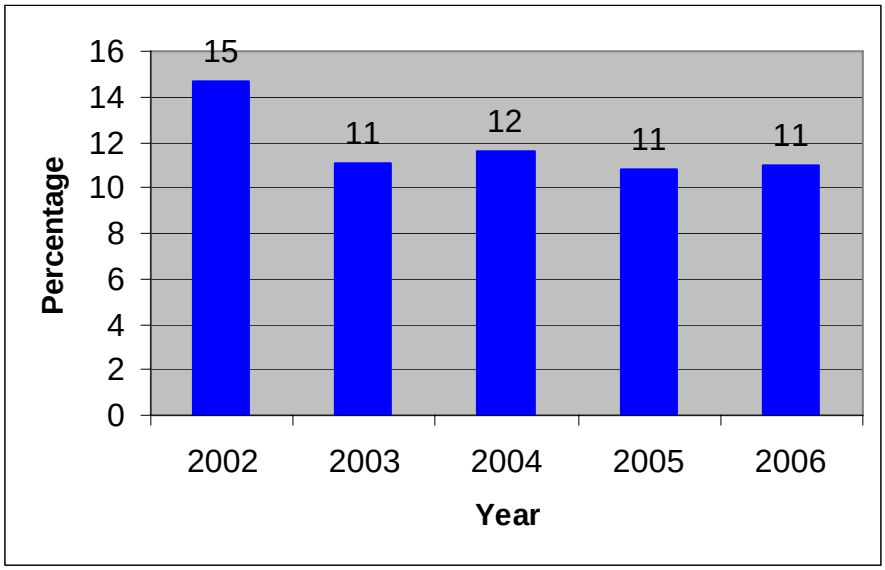
Source: The Renal Network 1995–2006 Data

Nerve Damage and Amputations

Having high blood glucose in the body for several years can damage the blood vessels that carry oxygen to nerves and nerve coverings. Nerve damage caused by diabetes is called diabetic neuropathy and results in impaired sensation or pain in the feet or hands, slowed digestion of food, carpal tunnel syndrome, and other nerve problems. About 60–70% of people with diabetes experience mild to severe forms of neuropathy. The most common type is peripheral neuropathy which affects the arms and legs. Almost 30% of people with diabetes over 40 years of age have impaired sensation in their feet. Severe forms of nerve disease can lead to amputations with more than 60% of nontraumatic lower extremity amputations occurring in people with diabetes. Amputations can be a result of ulcers developing on the feet when there is not a sensation to warn the individual that damage is occurring or amputations can be a result of poor circulation.[2]

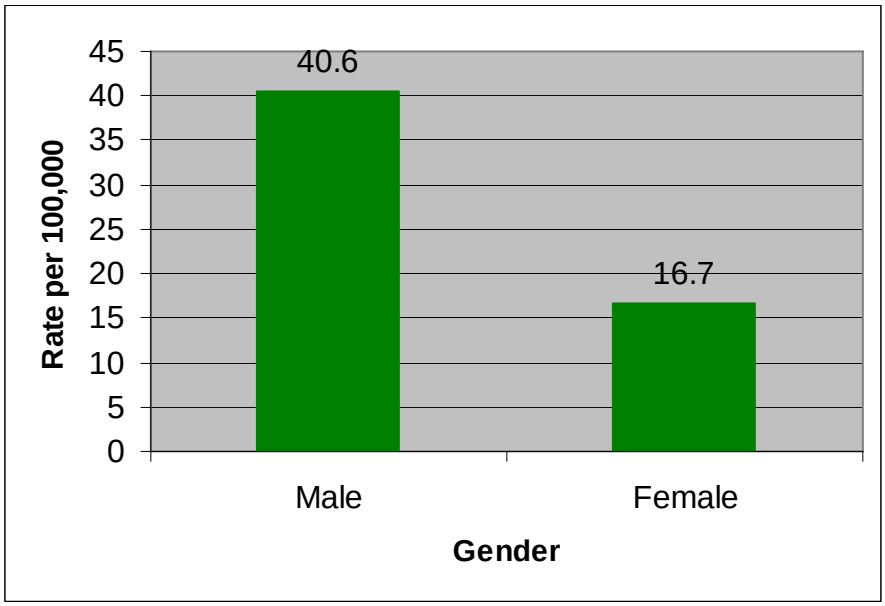
According to the 2006 Indiana BRFSS data, 11% of adults with diabetes reported having sores or irritation on their feet that took more than four weeks to heal (Figure 40). If circulation becomes progressively worse, lower extremity amputation may be necessary. In 2005 among Indiana residents hospitalized with a primary discharge diagnosis of diabetes, 1,763 individuals underwent a lower extremity amputation. Of those that had an amputation, 598 were female (16.7 per 100,000), and 1,165 were male (40.6 per 100,000) (Figure 41). Figure 42 shows the racial/ethnic breakdown for lower extremity amputation. There were 1,229 amputations in the White population (20.8 per 100,000) and 274 in the Black population (66.3 per 100,000). Black males had the highest rate (92.8 per 100,000) followed by Black females (45.4 per 100,000), White males (30.9 per 100,000), and White females (12.5 per 100,000) (Figure 43).[15]

Figure 40: Adults with Diabetes who had Sores or Irritations on Their Feet that took Longer than Four Weeks to Heal, Indiana, 2002-2006



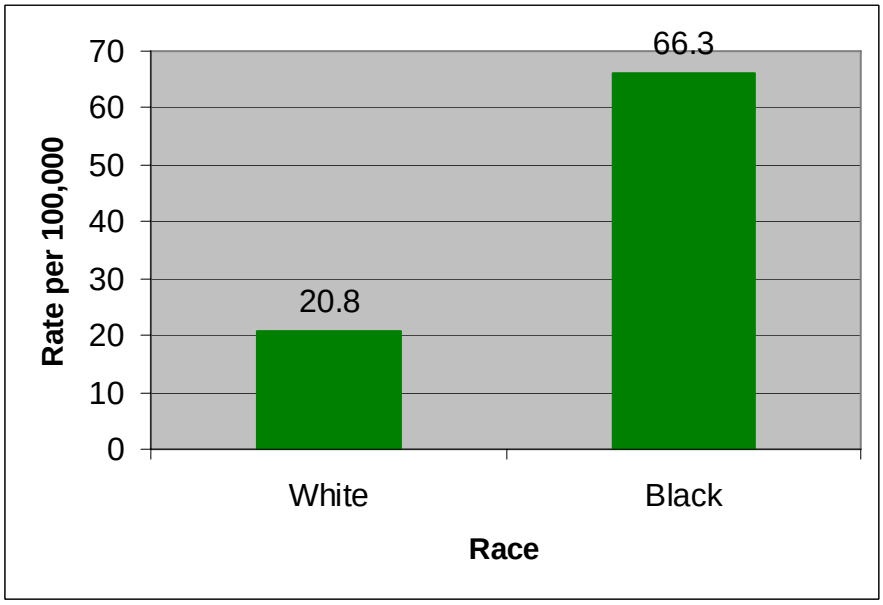
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever had any sores or irritations on your feet that took more than four weeks to heal?"
Source: Indiana 2002-2006 BRFSS Data

Figure 41: Rates of Diabetes-Related Lower Extremity Amputations by Gender, Age-Adjusted, Indiana, 2005



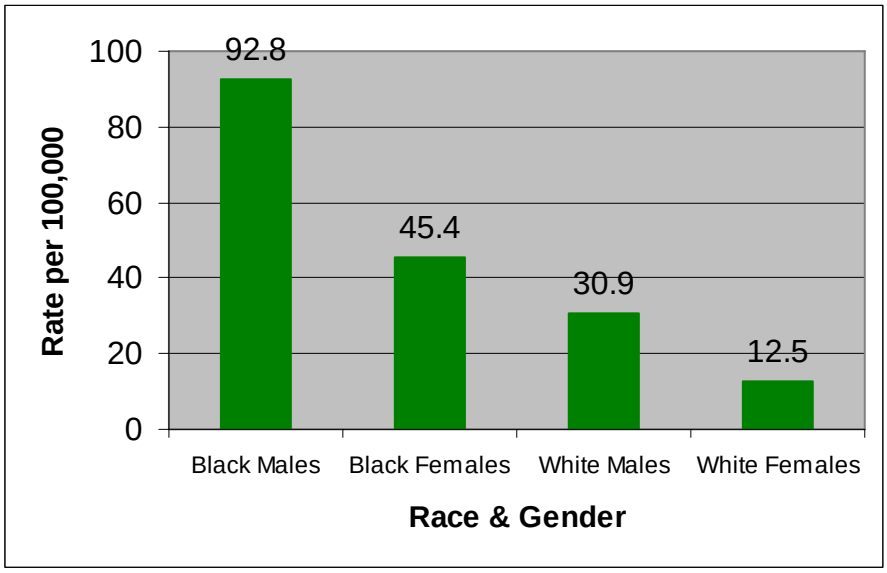
Source: Indiana Inpatient Hospital Discharge 2005 Data

Figure 42: Rates of Diabetes-Related Lower Extremity Amputations by Race, Age-Adjusted, Indiana, 2005



Source: Indiana Inpatient Hospital Discharge 2005 Data

Figure 43: Rates of Diabetes-Related Lower Extremity Amputations by Race and Gender, Age-Adjusted, Indiana, 2005



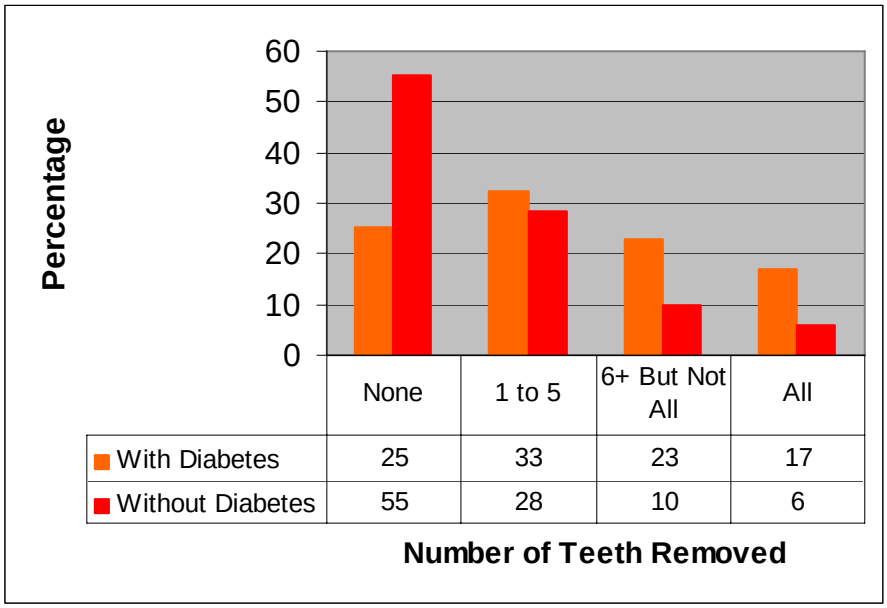
Source: Indiana Inpatient Hospital Discharge 2005 Data

Dental Disease

Because of high glucose levels in the blood, people with diabetes tend to have more problems with their gums and teeth. Periodontal (gum) disease is more common in people with diabetes. Young adults with diabetes have about twice the risk of having periodontal disease than those without diabetes. Around one-third of people with diabetes have severe periodontal disease with loss of attachment of the gums to the teeth measuring five millimeters (about 3/8 inch) or more. Other problems include fungal infections, poor post-surgery healing, and dry mouth.[2]

In 2006, 73% of Indiana adults with diabetes reported that they had at least one permanent tooth removed compared to 44% of adults without diabetes. Twenty-three percent of people with diabetes had six or greater permanent teeth removed but not all their teeth compared to those without diabetes (10%) (Figure 44). Of adults with diabetes, 17% had all their teeth removed compared to 6% of adults without diabetes.[6]

Figure 44: Number of Teeth Removed, Adults with and without Diabetes, Indiana, 2006

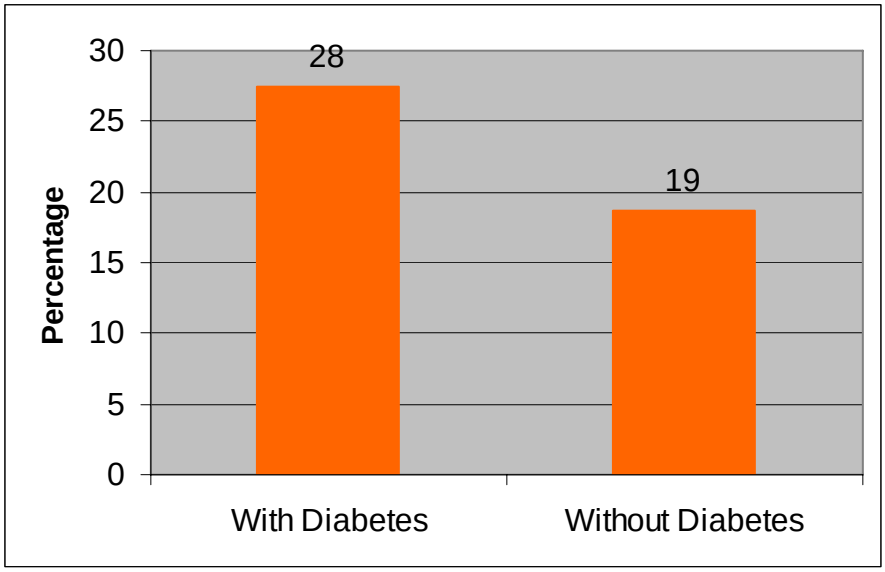


Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "How many of your permanent teeth have been removed because of tooth decay or gum disease? Include teeth lost to infection, but do not include teeth lost for other reasons, such as injury or orthodontics."
Source: Indiana 2006 BRFSS Data

Depression

Studies show that diabetes doubles the risk of depression. The psychological stress of having diabetes as well as the metabolic effect of the disease on the brain both play a role in causing depression. The risk of depression increases as more diabetic complications develop.[2] In 2006, 28% of adults with diabetes reported that they have been diagnosed with depression compared to 19% of adults who did not have diabetes (Figure 45).[6]

Figure 45: Depressive Disorder in Adults with and without Diabetes, Indiana, 2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Has a doctor or other healthcare provider ever told you that you have a depressive disorder including depression, major depression, dysthymia, or minor depression?"
Source: Indiana 2006 BRFSS Data

Pregnancy Complications

Poorly controlled diabetes before conception and during the first trimester of pregnancy can result in major birth defects in 5-10% of pregnancies and can cause spontaneous abortions in 15-20% of pregnancies. Uncontrolled diabetes during the second and third trimesters of pregnancy can result in excessively large babies, posing a risk to the mother and child.[2]

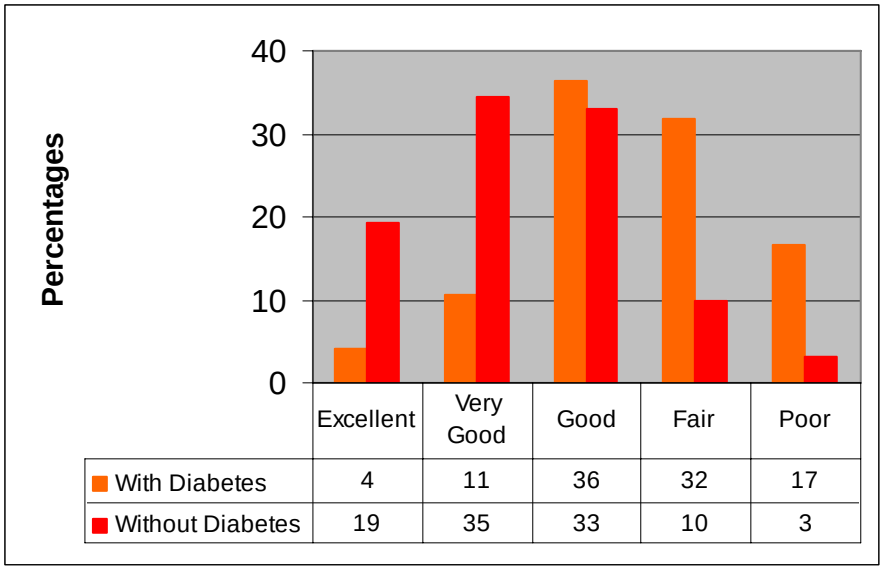
Other Complications

If diabetes is not managed, it can lead to biochemical imbalances that can cause acute life-threatening events such as diabetic ketoacidosis (DKA) and hyperosmolar (nonketotic) coma. DKA is a state of inadequate insulin levels resulting in high blood sugar and accumulation of organic acids and ketones in the blood and is primarily seen in individuals with type 1 diabetes. It is common in DKA to have severe dehydration and significant alterations of the body's blood chemistry. DKA can lead to coma and death in some individuals. DKA is seen primarily in

patients with type 1 (insulin-dependent) diabetes. The incidence is roughly 2/100 patient years of diabetes, with about 3% of type 1 diabetic patients initially presenting with DKA. It can occur in type 2 (non–insulin-dependent) diabetic patients as well. Hyperglycemic hyperosmolar nonketotic coma is characterized by severe hyperglycemia, dehydration, and altered mental status in the absence of ketosis. It typically occurs in those with type 2 diabetes particularly older persons following a cerebral vascular accident. The incidence is 17.5 cases per 100,000 people.[16]

Overall, people with poorly controlled diabetes are more susceptible to illness and once they become sick, they often have a worse prognosis. For example, those with diabetes are more likely to be hospitalized or die because of pneumonia or influenza than people without diabetes.[2] Having diabetes affects general health and daily physical activity. Almost 50% of adults with diabetes reported in 2006 that in general their health was fair or poor (Figure 46). Very few reported their health to be excellent or very good especially when compared to adults without diabetes (Figure 46). The status of a person's health has a great impact on their daily activities. In 2006, twice as many adults with diabetes reported having activity limitations compared to those without diabetes (Figure 47).[6]

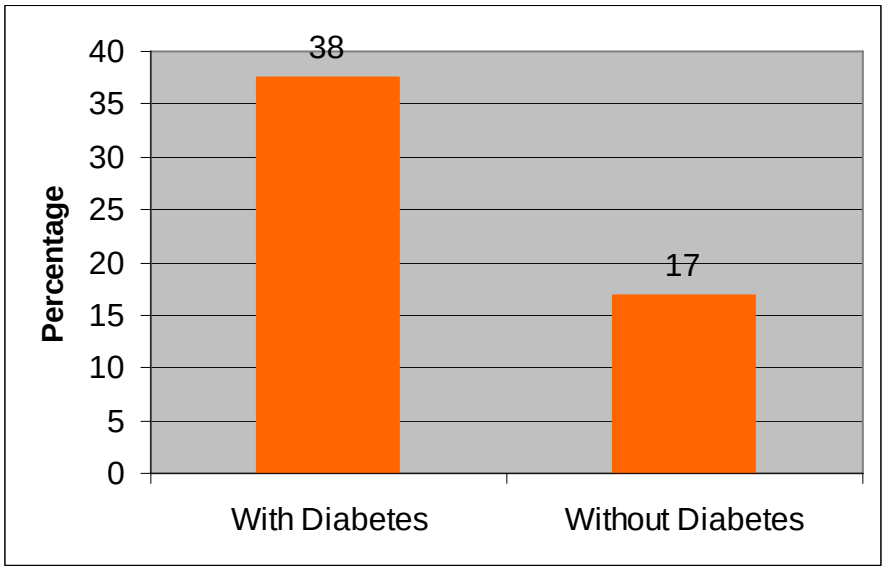
Figure 46: General Health of Adults with and without Diabetes, Indiana, 2006



	Excellent	Very Good	Good	Fair	Poor
With Diabetes	4	11	36	32	17
Without Diabetes	19	35	33	10	3

Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Would you say that in general your health is. . .?"
Source: Indiana 2006 BRFSS Data

Figure 47: Activity Limitations due to Health Problems, Adults with and without Diabetes, Indiana, 2006

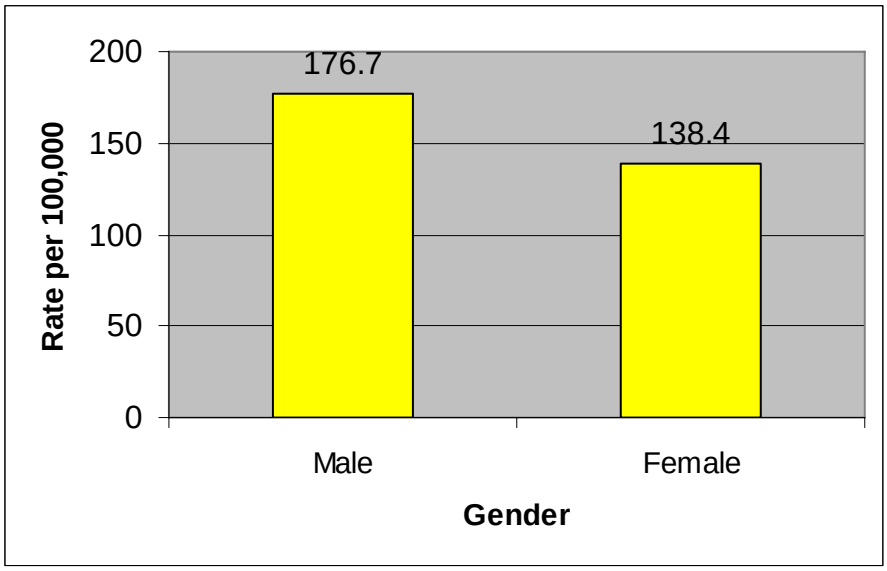


Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Are you limited in any way in any activities because of physical, mental, or emotional problems?"
Source: Indiana 2006 BRFSS Data

Inpatient Hospitalizations

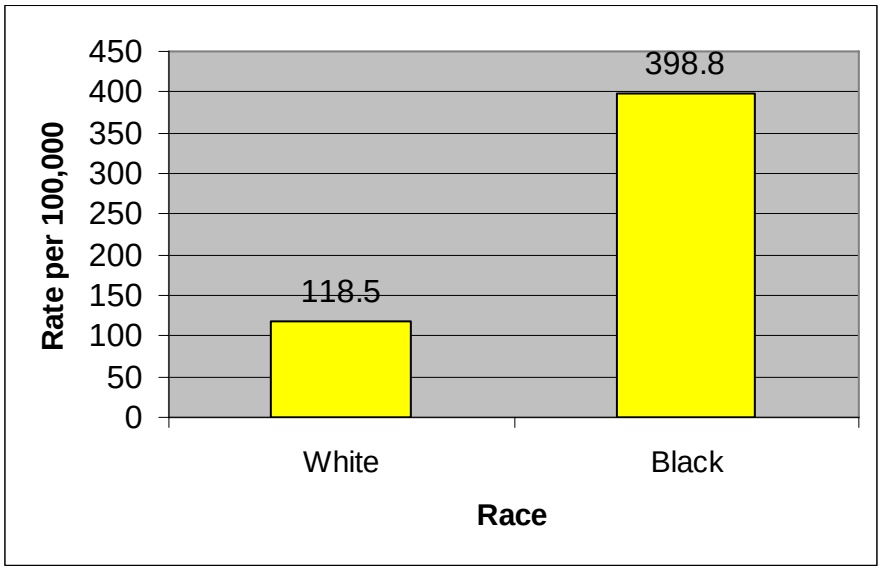
In 2005 among Indiana residents of all ages, there were 9,894 inpatient hospitalizations with a primary discharge diagnosis of diabetes, corresponding to an age-adjusted rate of 155.9 per 100,000. The number of hospitalizations were similar in males (5,259) and females (4,635), though the age-adjusted rate for females was lower (138.4 per 100,000) than for males (176.7 per 100,000) (Figure 48). There were large differences between racial/ethnic groups; the number of hospitalizations for Whites was 6,793 compared to 1,884 for Blacks. However, the age-adjusted hospitalization rates were 118.5 per 100,000 for Whites and 398.8 per 100,000 for Blacks (Figure 49). Black males had the highest rate (453.5 per 100,000) followed by Black females (356.9 per 100,000), White males (132.8 per 100,000), and White females (106.4 per 100,000) (Figure 50).[15]

Figure 48: Inpatient Hospitalization Rates where Diabetes was the Primary Cause by Gender, Age-Adjusted, Indiana, 2005



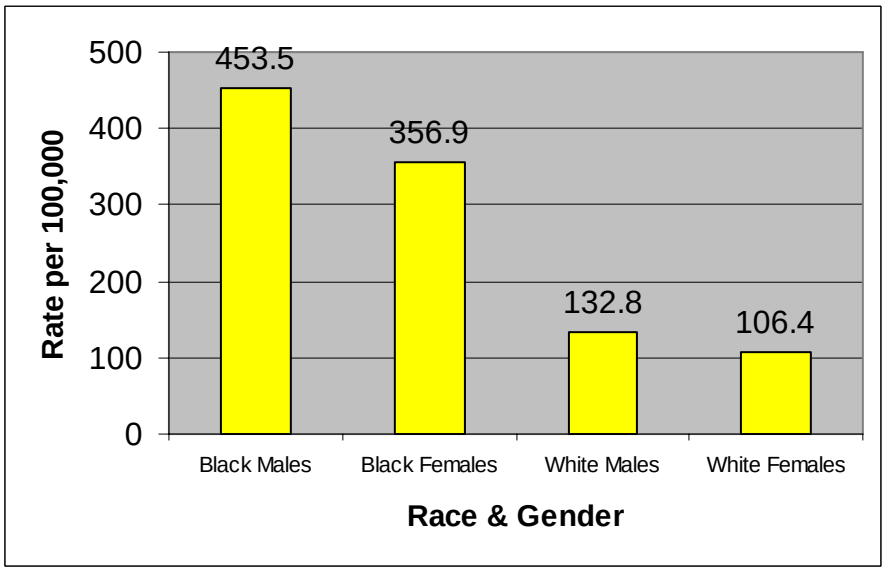
Source: Indiana Inpatient Hospital Discharge 2005 Data

Figure 49: Inpatient Hospitalization Rates where Diabetes was the Primary Cause by Race, Age-Adjusted, Indiana, 2005



Source: Indiana Inpatient Hospital Discharge 2005 Data

Figure 50: Inpatient Hospitalization Rates where Diabetes was the Primary Cause by Race and Gender, Age-Adjusted, Indiana, 2005



Source: Indiana Inpatient Hospital Discharge 2005 Data

Mortality

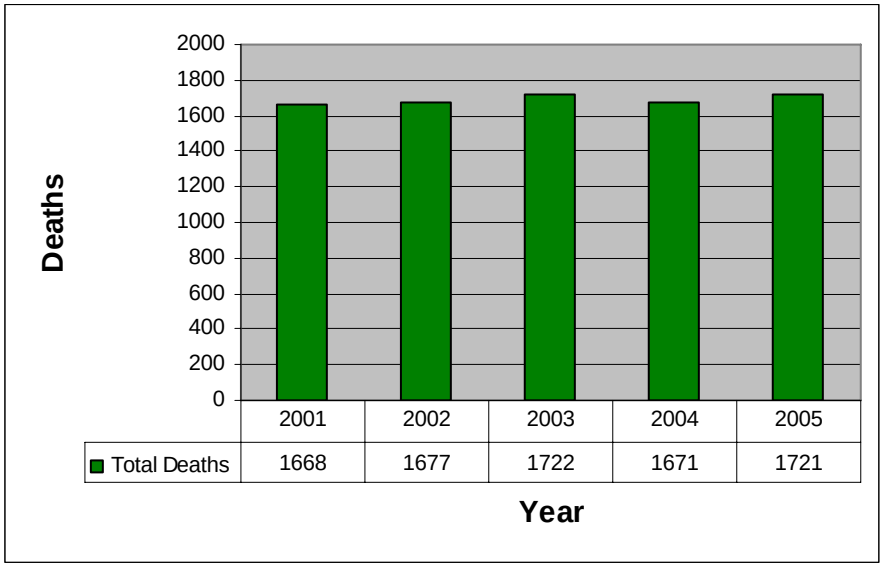
Diabetes was the sixth leading cause of death in the United States in 2004. This ranking is based on the 73,249 death certificates that identified diabetes as the underlying cause of death. According to death certificate reports, diabetes contributed to 224,092 deaths. However, this number is likely to be underreported, because studies have found that only 35-40% of decedents with diabetes had it listed anywhere on the certificate, and only 10-15% had it listed as the underlying cause of death. Those with diabetes have twice the risk for death compared to people of the same age who do not have diabetes.[2] Premature mortality caused by diabetes results in an estimated 12-14 years of life lost.[5]

In 2005, there were 1,721 Indiana residents who died due to diabetes as the underlying cause of death, making it the sixth leading cause of death (Figure 51) in Indiana. Diabetes was the 4th leading cause of death in residents aged 55 to 64 years, the 5th leading cause of death for those 65 years and older, and the 7th for those 25-34 years. The overall age-adjusted diabetes mortality rate for 2005 was 26.7 per 100,000 population which was a slight increase from 2004 but an overall decrease from prior years (Figure 52). Though number of deaths are higher in females (906) than males (815), males are more likely (30.7 per 100,000) to die due to diabetes than females (23.6 per 100,000) (Figure 53 and 54).[17]

In 2005, diabetes was the 4th leading cause of death for Blacks, 3rd for Asian/Pacific Islanders, 7th for Whites, and 6th for Hispanics/Latinos in Indiana. The number of deaths in the White population was higher than in the Black population (Figure 55). However when examining death rates, more than twice as many Blacks died because of diabetes than Whites in 2005 (Figure 56). The age-adjusted death rate for Hispanics/Latinos in 2005 was 27.25 per 100,000. White females had the highest number of deaths from diabetes in the past five years, but when comparing rates, Black males and females have the highest number of deaths per population (Figures 57 and 58).[17]

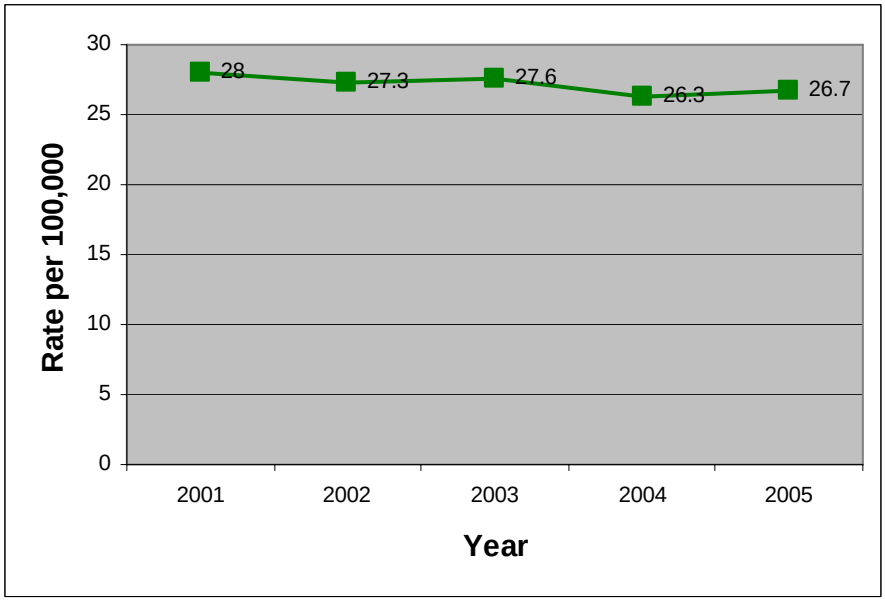
Please note that the mortality data come from death certificates that list diabetes as an underlying cause of death, meaning that diabetes was the disease which initiated the chain of morbid events leading directly to death. This is just a small portion of the number of deaths where diabetes played a role. When looking at diabetes as a contributing cause of death, the number of deaths is much larger. Diabetes as a contributing cause of death means that diabetes was listed on the death certificate and contributed to the death but was not the main (underlying) cause of death. An example of a contributing cause of death would be if an individual with diabetes died of acute renal failure, diabetes did not cause the death but was a significant disease contributing to the death. Figure 59 shows the number of deaths for the past five years in which diabetes was a contributing cause. When the contributing cause is added to the underlying cause, the mortality burden is much greater and gives a more comprehensive description of the toll of diabetes in the state.

Figure 51: Deaths due to Diabetes, Indiana, 2001-2005



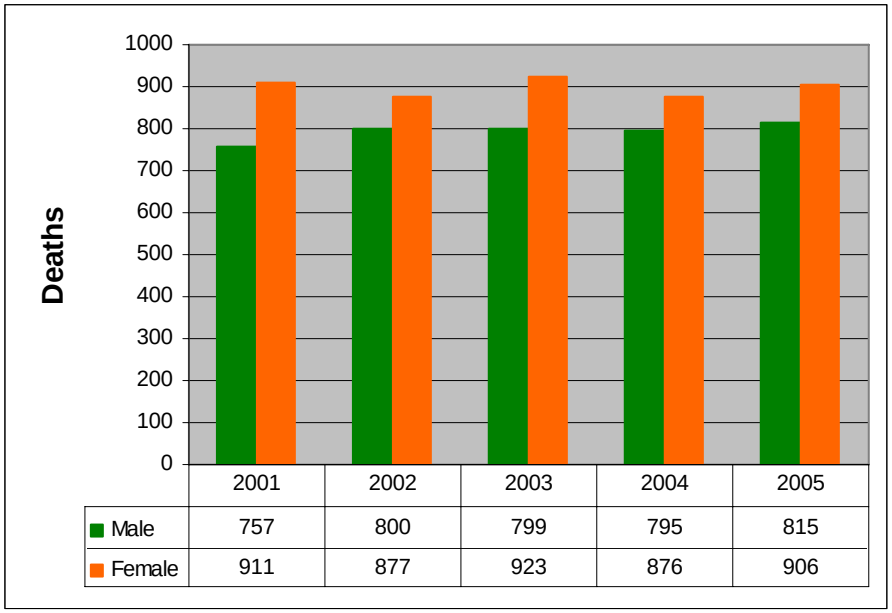
Source: Indiana State Department of Health 2001–2005 Mortality Data

Figure 52: Diabetes Death Rates, Age-Adjusted, Indiana, 2001-2005



Source: Indiana State Department of Health 2001–2005 Mortality Data

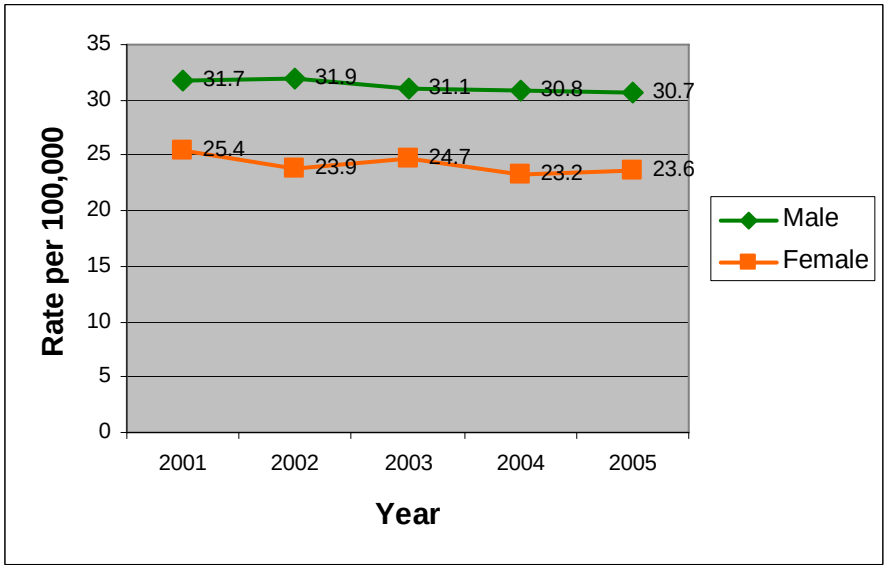
Figure 53: Deaths due to Diabetes by Gender, Indiana, 2001-2005



	2001	2002	2003	2004	2005
Male	757	800	799	795	815
Female	911	877	923	876	906

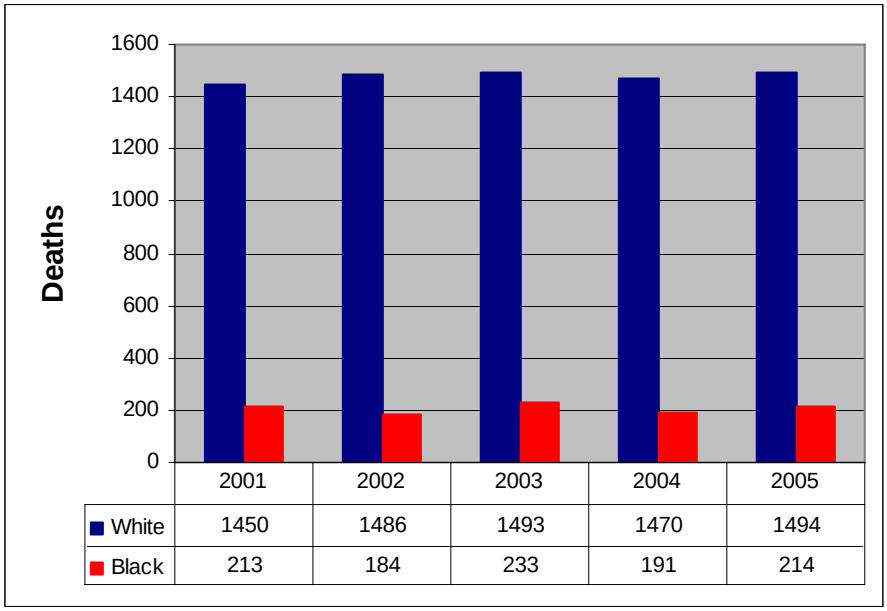
Source: Indiana State Department of Health 2001–2005 Mortality Data

Figure 54: Diabetes Death Rates by Gender, Age-Adjusted, Indiana 2001-2005



Source: Indiana State Department of Health 2001–2005 Mortality Data

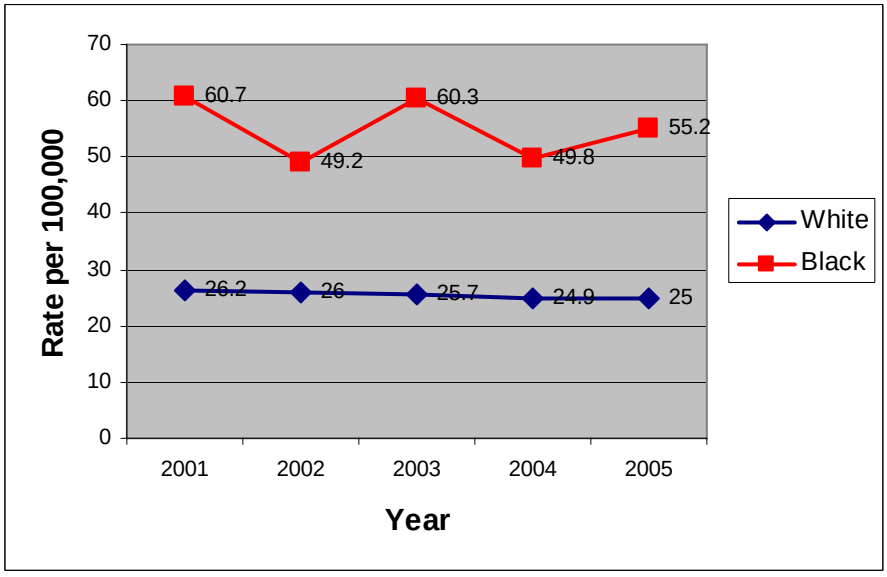
Figure 55: Deaths due to Diabetes by Race, Indiana, 2001-2005



	2001	2002	2003	2004	2005
White	1450	1486	1493	1470	1494
Black	213	184	233	191	214

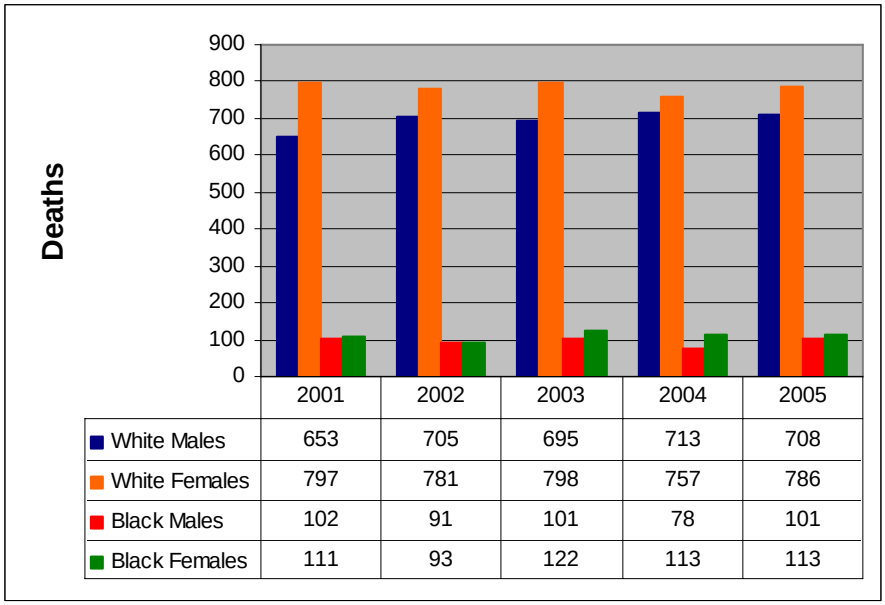
Source: Indiana State Department of Health 2001–2005 Mortality Data

Figure 56: Diabetes Death Rates by Race, Age-Adjusted, Indiana, 2001-2005



Source: Indiana State Department of Health 2001–2005 Mortality Data

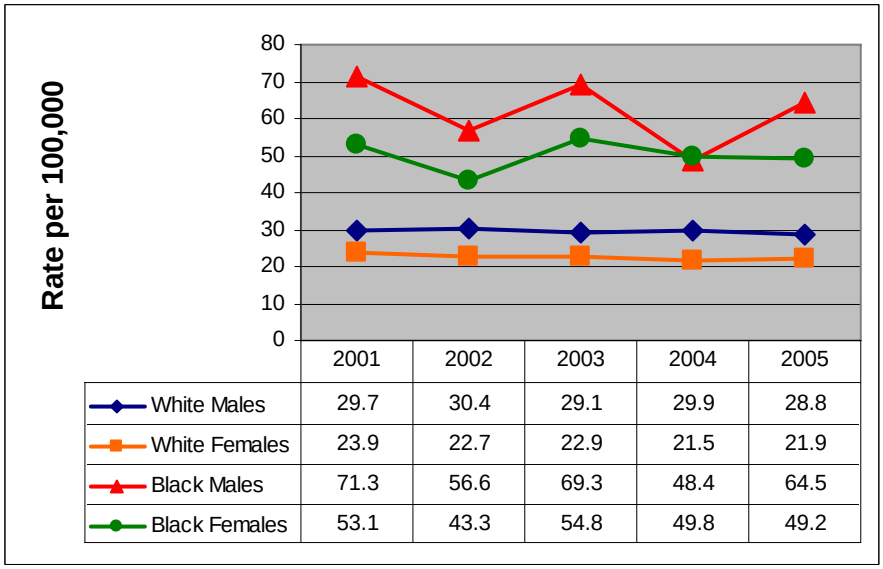
Figure 57: Deaths due to Diabetes by Race and Gender, Indiana, 2001-2005



	2001	2002	2003	2004	2005
White Males	653	705	695	713	708
White Females	797	781	798	757	786
Black Males	102	91	101	78	101
Black Females	111	93	122	113	113

Source: Indiana State Department of Health 2001–2005 Mortality Data

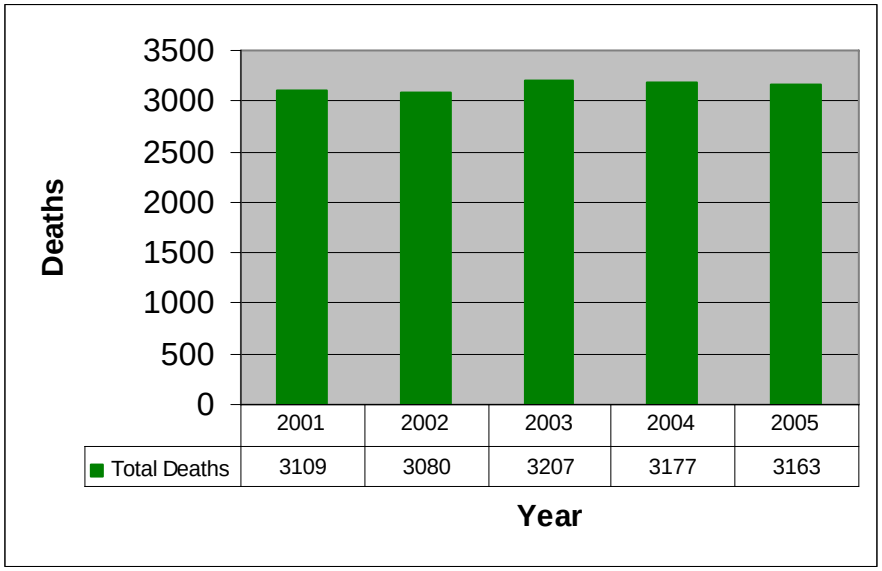
Figure 58: Diabetes Death Rates by Race and Gender, Age-Adjusted, Indiana 2001-2005



	2001	2002	2003	2004	2005
White Males	29.7	30.4	29.1	29.9	28.8
White Females	23.9	22.7	22.9	21.5	21.9
Black Males	71.3	56.6	69.3	48.4	64.5
Black Females	53.1	43.3	54.8	49.8	49.2

Source: Indiana State Department of Health 2001–2005 Mortality Data

Figure 59: Deaths where Diabetes is a Contributing Cause, Indiana, 2001-2005



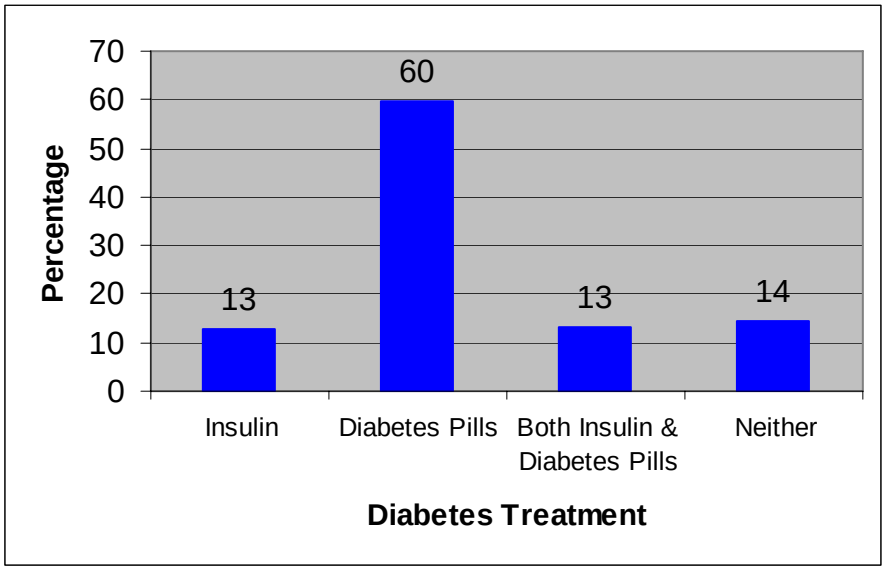
Source: Indiana State Department of Health 2001–2005 Mortality Data

Treatment

People with type 1 must take insulin via injection or insulin pump to survive. Type 2 diabetes can often be controlled by eating healthy foods, exercising, maintaining a healthy weight, and taking oral medications. Those with type 2 may also take insulin.[2]

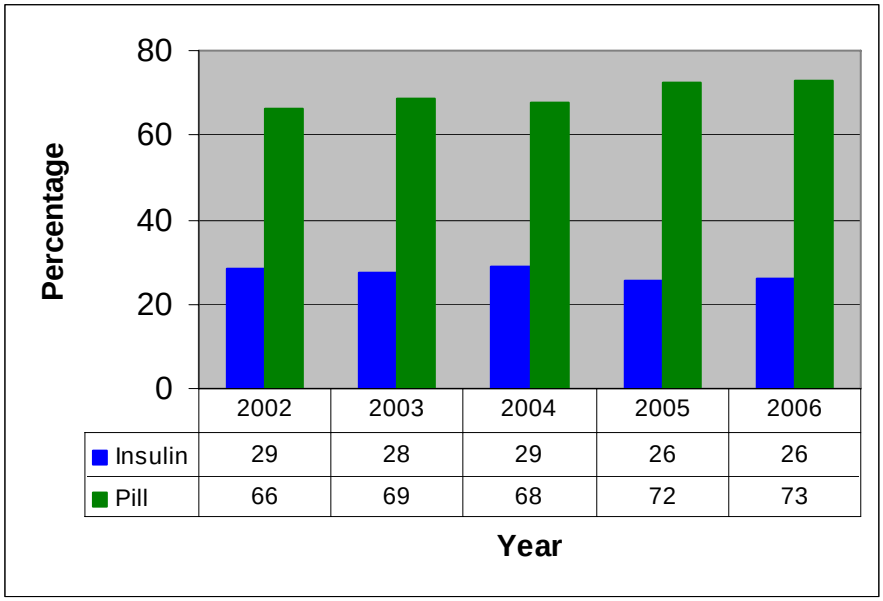
In 2006 among Indiana adults with diabetes, 13% used insulin only, 60% used oral medication only, 13% used both insulin and oral medication, and 14% did not use either insulin or oral medication (Figure 60). The type of treatment used by adults with diabetes has remained consistent over the years (Figure 61).[6] In addition, many individuals with diabetes also need to take medication to control high blood pressure and cholesterol.[2]

Figure 60: Medications Taken by Adults with Diabetes, Indiana, 2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Are you now taking insulin?" and “Are you taking diabetes pills?”
Source: Indiana 2006 BRFSS Data

Figure 61: Insulin or Diabetes Pills Use among Adults with Diabetes, Indiana, 2002-2006



Categories are not mutually exclusive. In some cases, individuals use both insulin and pills.
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Questions: "Are you now taking insulin?" and “Are you taking diabetes pills?”
Source: Indiana 2002-2006 BRFSS Data

Prevention of Complications

Diabetes can affect many parts of the body and can lead to serious complications if not managed well. A team-based health care approach for the care and treatment of individuals with diabetes is best. The individual should also take an active role in his/her self-management. It is important for individuals with diabetes to learn about their condition, treatment goals, and preventive measures. Self-management courses, regular contact with a physician, and help from diabetes educators can offer the education and guidance to manage diabetes well. Controlling blood glucose, blood pressure, and blood lipids as well as receiving regular preventive care may reduce the likelihood of developing complications.[18]

Treatment Goals

Goals for diabetes treatment focus on the ABCs (A1C, blood pressure, and cholesterol) of diabetes. An A1C (also known as glycosylated hemoglobin or HbA1c) test measures an individual's average blood glucose control for the past 2 to 3 months. The results indicate whether the diabetes treatment plan is effective. The goal for A1C tests is to be less than 7%. Blood pressure is a measurement of the force applied to the walls of the arteries as the heart pumps blood through the body and tends to be higher in those with diabetes. The goal for blood pressure (mmHg) is <130 / <80. The treatment goal for cholesterol (lipid profile) is three-prong: <100 for LDL; >40 for male HDL levels and >50 for female HDL levels; and <150 for triglycerides. Individual treatment goals include getting A1C results as close to normal (<6% in people without diabetes) as possible without significant hypoglycemia, less stringent goals for those with severe or frequent hypoglycemia or if other factors exist (e.g. limited life expectancy), and lower blood pressure goals for people with nephropathy.[19]

Individuals with diabetes should receive medical care from a physician-coordinated team of health care professionals. There are specific measures that should be taken during the individuals' lifetime in order to maintain health and avoid complications. The table below outlines these treatment measures that should be used to guide health care professionals when working with individuals with diabetes.[19]

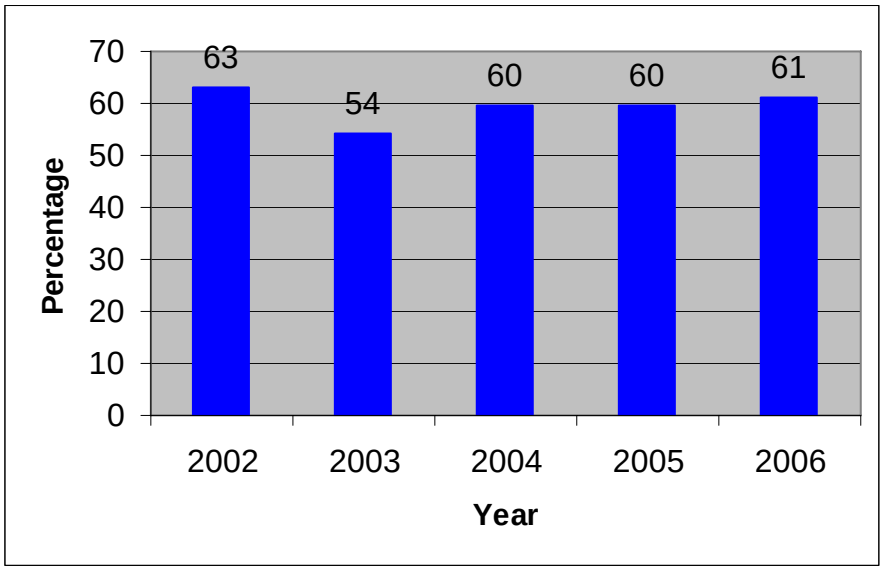
Treatment Measures	Frequency
Measure weight and blood pressure	Every regular physician visit
Inspect feet	Every regular physician visit
Review self-monitoring glucose record	Every regular physician visit
Review/adjust medications to control glucose, lipids, and blood pressure	Every regular physician visit
Review self-management skills, dietary needs, and physical activity	Every regular physician visit
Assess for depression or other mood disorders	Every regular physician visit
Counsel on smoking cessation and alcohol use	Every regular physician visit
Obtain A1C in patients whose therapy has changed or who are not meeting glycemic goals	Quarterly
Obtain fasting lipid profile (every two years if at goal)	Annually
Obtain serum creatinine and estimate glomerular filtration rate	Annually
Perform urine test for albumin-to-creatinine ratio in patients with type 1 diabetes ≥5 years and in all patients	Annually
Refer for dilated eye exam (if normal, an eye care specialist may advise an exam every 2-3 years)	Annually
Perform a comprehensive foot exam	Annually
Refer for dental/oral exam at least once a year	Annually
Administer influenza vaccination	Annually
Review need for other preventative care or treatment	Annually
Administer pneumococcal vaccination (repeat if over 64 years of age or immunocompromised and last vaccination was more than 5 years ago	Lifetime

Self-Management Class

Diabetes self-management classes are essential for helping those with diabetes understand their condition and how to care for themselves. These courses are offered at health departments, clinics, and hospitals. Topics include understanding diabetes and its effects on the body; monitoring blood glucose; nutrition; understanding the role of medications, exercising and the importance of maintaining a healthy weight; preventing complications by detecting problems early; proper foot, skin, and dental care; how to work with health care providers; and other topics.[18] Of adults with diabetes in Indiana, 61% reported that they have taken a course or class to help them manage their diabetes which was a slight increase from previous years (Figure 62).[6]

There are 74 known diabetes education programs in Indiana that are recognized by the American Diabetes Association (http://www.in.gov/isdh/programs/diabetes/splash.htm).[18] ADA recognition of an education program is required before Medicaid will reimburse a patient for attending the program. There are many education programs offered at community health centers and hospitals in Indiana that are not included in these numbers.[3]

Figure 62: Adults with Diabetes who have Taken a Diabetes Self-Management Class, Indiana, 2002-2006

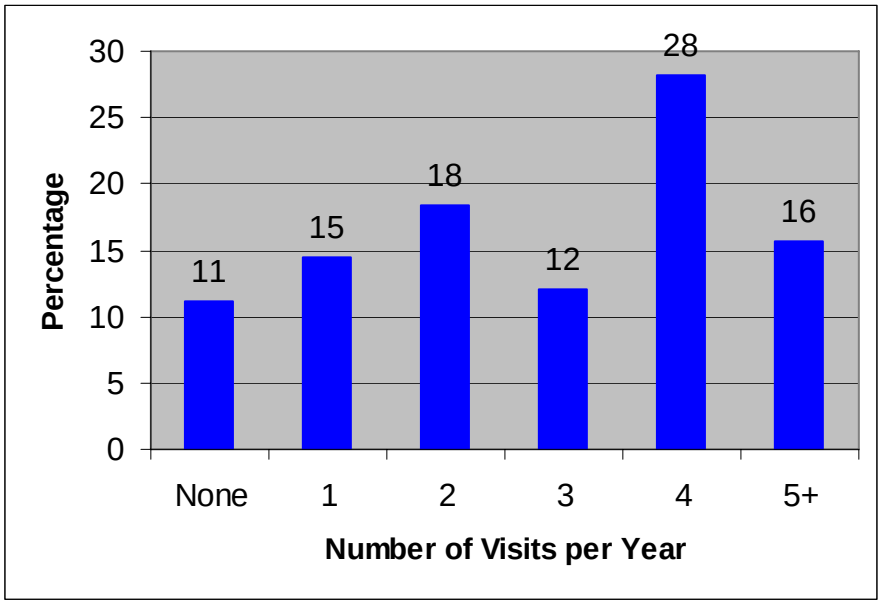


Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Have you ever taken a course or class in how to manage your diabetes yourself?"
Source: Indiana 2002-2006 BRFSS Data

Regular Visits to Health Care Providers

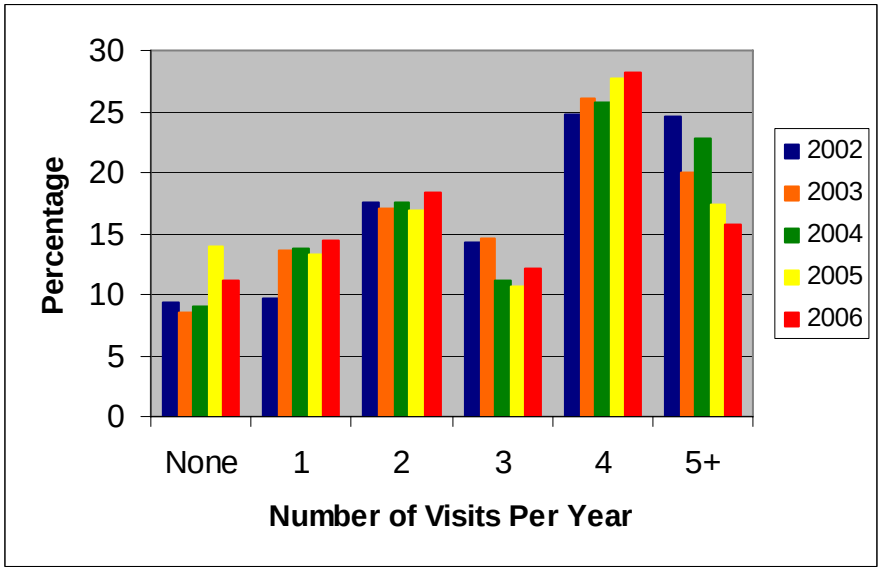
It is important for people with diabetes to see a health care provider regularly to monitor their disease and to detect and prevent complications. According to the 2006 BRFSS, 89% of Indiana adults with diabetes saw a health care professional at least once in the previous year with the most common frequency being four times (Figure 63). Unfortunately, 11% did not make a visit. The frequency of visits has remained fairly consistent in recent years (Figure 64).[6]

Figure 63: Frequency with which Adults with Diabetes saw a Health Professional about Their Diabetes in the Past Year, Indiana, 2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "About how many times in the past 12 months have you seen a doctor, nurse, or other health professional for your diabetes?"
Source: Indiana 2006 BRFSS Data

Figure 64: Frequency with which Adults with Diabetes saw a Health Professional about Their Diabetes in the Past 12 Months, Indiana, 2002-2006



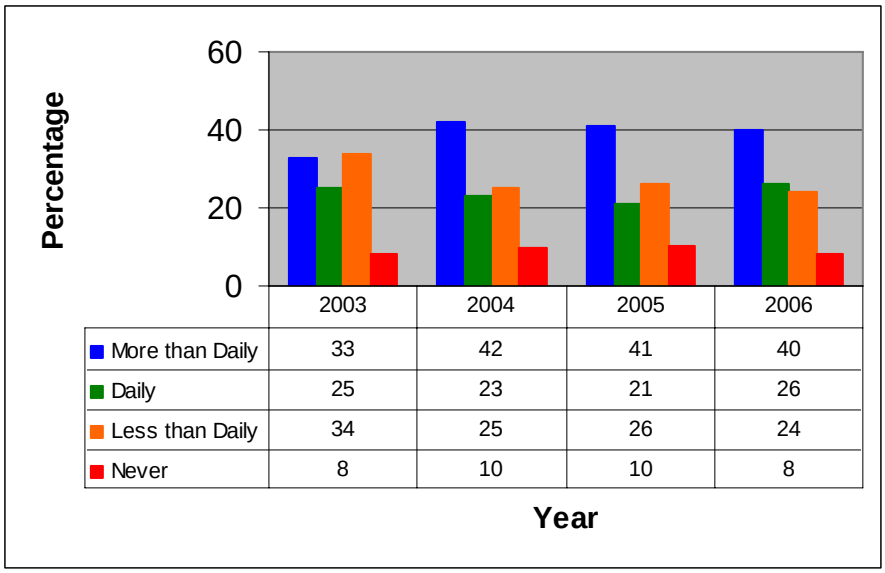
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "About how many times in the past 12 months have you seen a doctor, nurse, or other health professional for your diabetes?"
Source: Indiana 2002-2006 BRFSS Data

Glucose Control

Studies have shown that improved glucose control benefits people with type 1 and type 2 diabetes. For every percentage point drop in A1C blood test results, the risk of microvascular complications (eye, kidney, and nerve disease) is reduced by 40%.[2] Daily glucose checks and A1C testing (twice a year at least three months apart if meeting treatment goals and quarterly if not meeting goals) helps those with diabetes monitor their glucose levels so they know if and when adjustments are necessary.[18]

According to the 2006 BRFSS, 26% of Indiana adults with diabetes reported that they checked their glucose level daily; however 8% never checked their levels (Figure 64). In 2006, 72% of adults with diabetes reported getting the A1C test between one and four times and 6% reported getting the test five or more times in the previous year (Figure 65). Around 10% did not get the test at all, and 7% had never heard of the test. Test frequency has been similar in recent years (Figure 66).

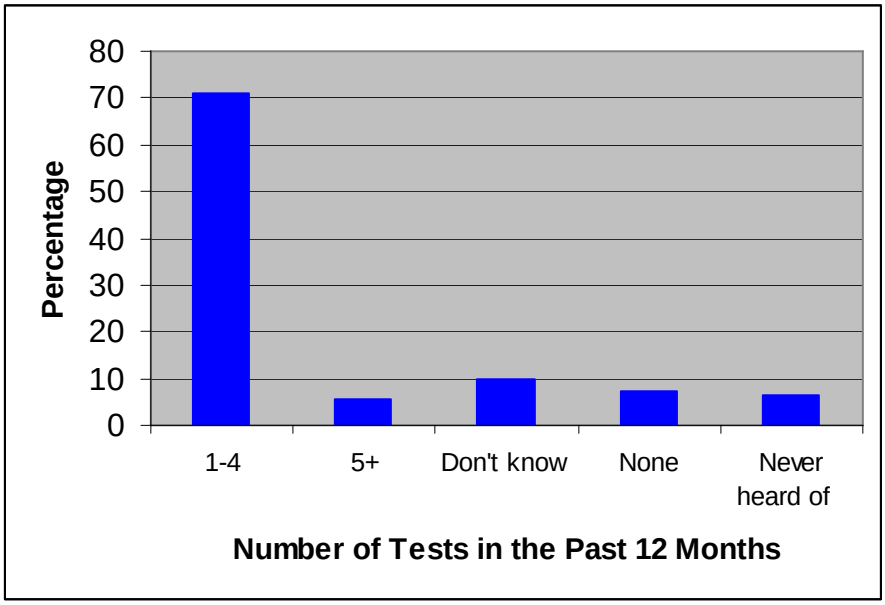
Figure 64: Frequency with which Adults with Diabetes Checked Their Blood for Glucose or Sugar, Indiana, 2003-2006



	2003	2004	2005	2006
More than Daily	33	42	41	40
Daily	25	23	21	26
Less than Daily	34	25	26	24
Never	8	10	10	8

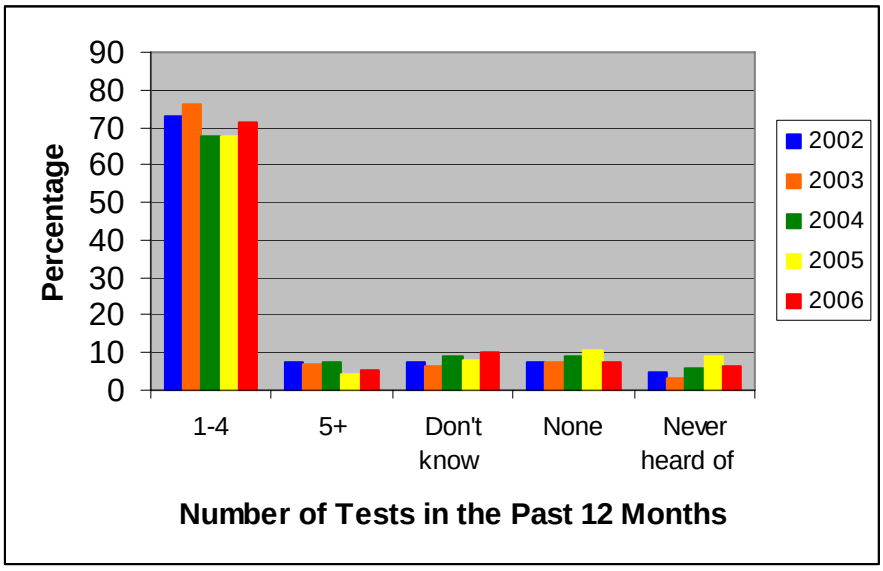
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "About how often do you check your blood for glucose or sugar? Include times when checked by family member or friend, but do not include times when checked by a health professional."
Source: Indiana 2003-2006 BRFSS Data

Figure 65: Frequency with which Adults with Diabetes had an A1C Test in the Past 12 Months, Indiana, 2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "About how many times in the past 12 months has a doctor, nurse, or other health professional checked your for hemoglobin “A one C?"
Source: Indiana 2006 BRFSS Data

Figure 66: Frequency with which Adults with Diabetes had an A1C Test in the Past 12 Months, Indiana, 2002-2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "About how many times in the past 12 months has a doctor, nurse, or other health professional checked your for hemoglobin “A one C?"
Source: Indiana 2006 BRFSS Data

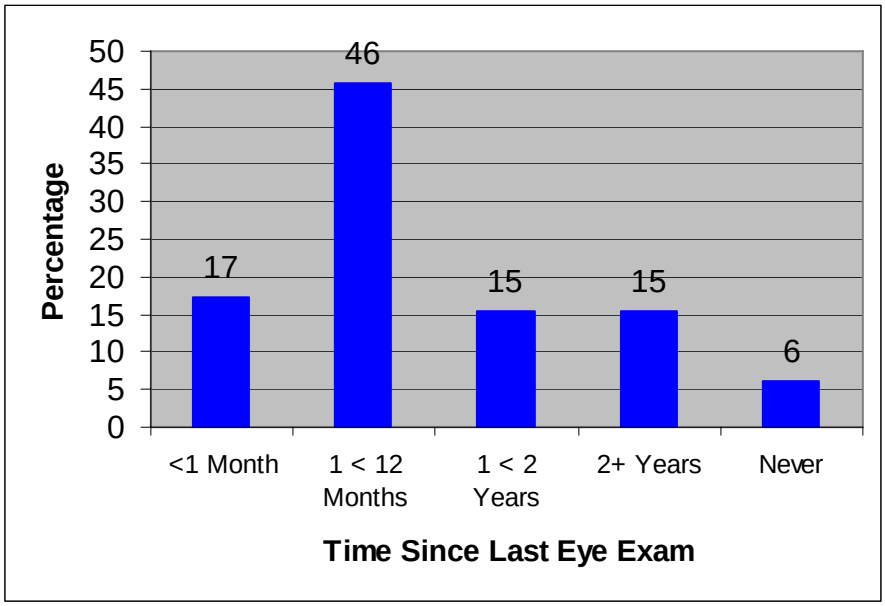
Blood Pressure and Blood Lipid Control

Controlling blood pressure among individuals with diabetes helps to reduce the risk of heart disease and stroke by 33-50%. It also reduces the risk of microvascular complications (eye, kidney, and nerve diseases) by about 33%. For every 10 mmHg reduction in systolic blood pressure, the risk of complications is reduced by 12%. Detecting and treating early diabetic kidney disease by lowering blood pressure can reduce the decline in kidney function by 30-70%. ACE inhibitors and angiotensin receptor blockers are more effective in reducing kidney function decline than other blood pressure lowering medications.[(2)] Ninety-one percent of Indiana adults with diabetes reported taking medication for high blood pressure in 2005.[(6)] Improving cholesterol or blood lipids can reduce cardiovascular complications by 20-50%[(2)] In 2005, 96% of Indiana adults with diabetes reported that they had their cholesterol checked in the previous year, and 67% reported they were told they had high cholesterol.[(6)]

Eye Exams

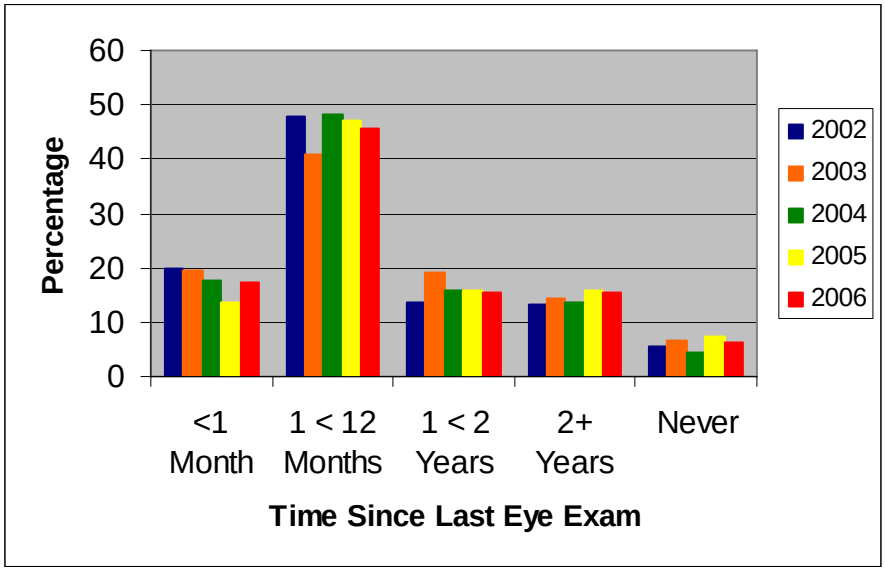
Detecting and treating diabetic eye disease with laser therapy can reduce development of severe vision loss by about 50-60%.[(2)] Of adults with diabetes in Indiana, 63% reported having a dilated eye exam in the previous year; however 6% had never had one (Figure 67). There has been little change in these percentages from prior years (Figure 68).[(6)]

Figure 67: Last Time Adults with Diabetes had an Eye Exam, Indiana, 2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "When was the last time you had an eye exam in which the pupils were dilated? This would have made you temporarily sensitive to bright light."
Source: Indiana 2006 BRFSS Data

Figure 68: Last Time Adults with Diabetes had an Eye Exam, Indiana, 2002-2006

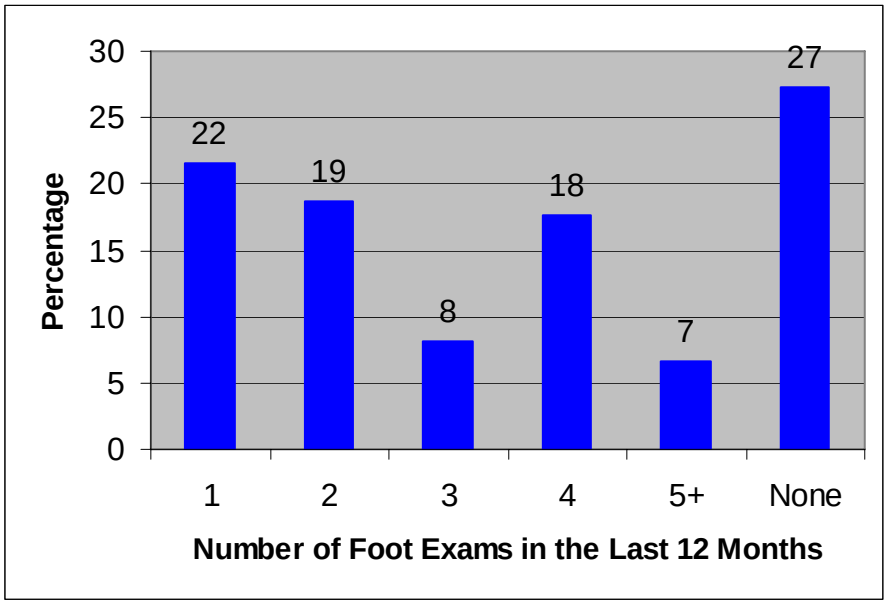


Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "When was the last time you had an eye exam in which the pupils were dilated? This would have made you temporarily sensitive to bright light."
Source: Indiana 2002-2006 BRFSS Data

Foot Exams

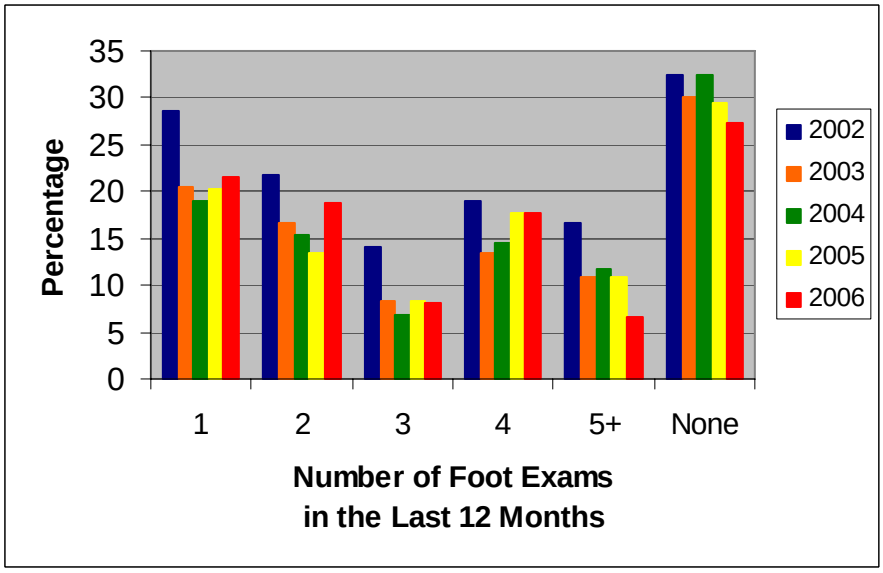
Regular comprehensive foot exams can reduce amputation rates by 45-85%.[(2)] In 2006, the majority of adults in Indiana with diabetes reported that they had at least one foot exam by a health professional in the previous year (Figure 69). However, 27% of adults with diabetes did not. Figure 70 shows the frequency for foot exams in the past five years. In addition to seeing a doctor for a yearly foot exam, individuals with diabetes need to check their own feet daily. In 2006, the majority (63%) of Indiana adults with diabetes did so (Figure 71). Unfortunately, some adults (11%) never checked their feet. Figure 72 shows the frequency of self foot exams for the past five years.[(6)]

Figure 69: Times in the Past 12 Months that Adults with Diabetes had Their Feet Checked by a Health Professional, Indiana, 2006



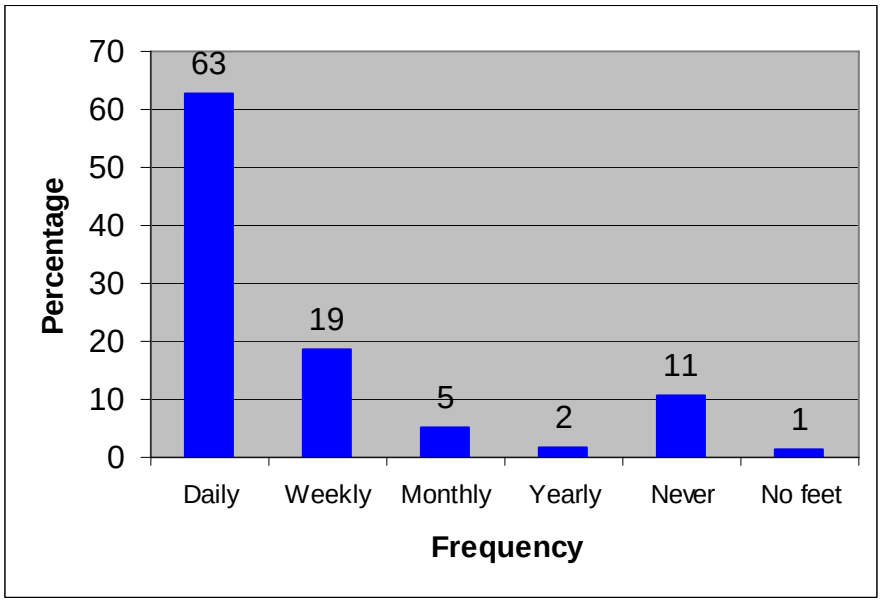
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "About how many times in the past 12 months has a health professional checked your feet for any sores or irritations?"
Source: Indiana 2006 BRFSS Data

Figure 70: Times in the Past 12 Months that Adults with Diabetes had Their Feet Checked by a Health Professional, Indiana, 2002-2006



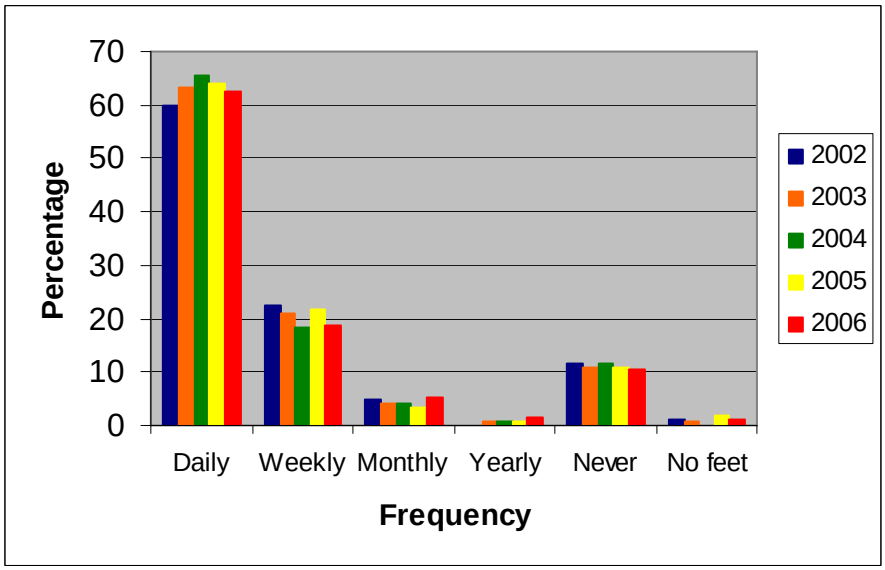
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "About how many times in the past 12 months has a health professional checked your feet for any sores or irritations?"
Source: Indiana 2002-2006 BRFSS Data

Figure 71: Frequency with which Adults with Diabetes Checked Their Feet for Sores or Irritations, Indiana, 2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "About how often do you check your feet for any sores or irritations? Include times when checked by family member or friend, but do not include times when checked by a health professional."
Source: Indiana 2006 BRFSS Data

Figure 72: Frequency with which Adults with Diabetes Checked Their Feet for Sores or Irritations, Indiana, 2002-2006

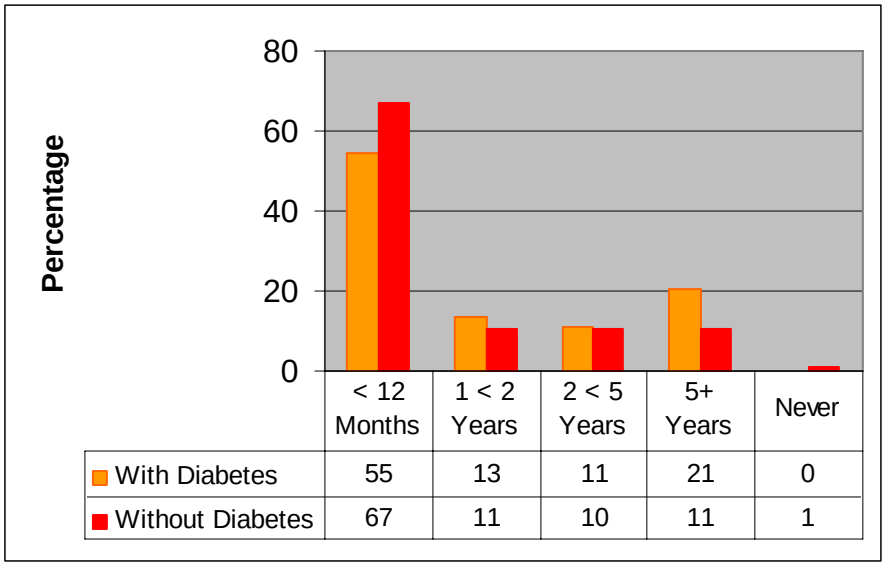


Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "About how often do you check your feet for any sores or irritations? Include times when checked by family member or friend, but do not include times when checked by a health professional"
Source: Indiana 2002-2006 BRFSS Data

Dental Exams

Regular dental exams are important to detect and prevent periodontal disease.[2] Although people with diabetes are at a higher risk of having dental disease, they are less likely to receive regular dental care. In 2006, only 55% of Indiana adults with diabetes reported that they had a dental exam in the previous year (Figure 73).[6]

Figure 73: Last Time Adults with Diabetes Visited a Dentist or Dental Clinic, Indiana, 2006



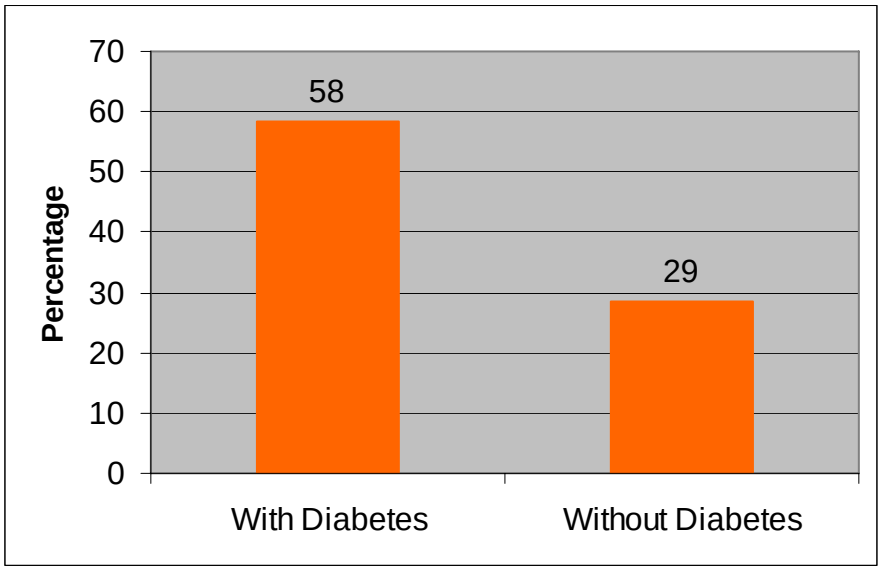
	< 12 Months	1 < 2 Years	2 < 5 Years	5+ Years	Never
With Diabetes	55	13	11	21	0
Without Diabetes	67	11	10	11	1

Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "How long has it been since you last visited a dentist or a dental clinic for any reason? Include visits to dental specialists, such as orthodontists."
Source: Indiana 2006 BRFSS Data

Other Preventive Measures

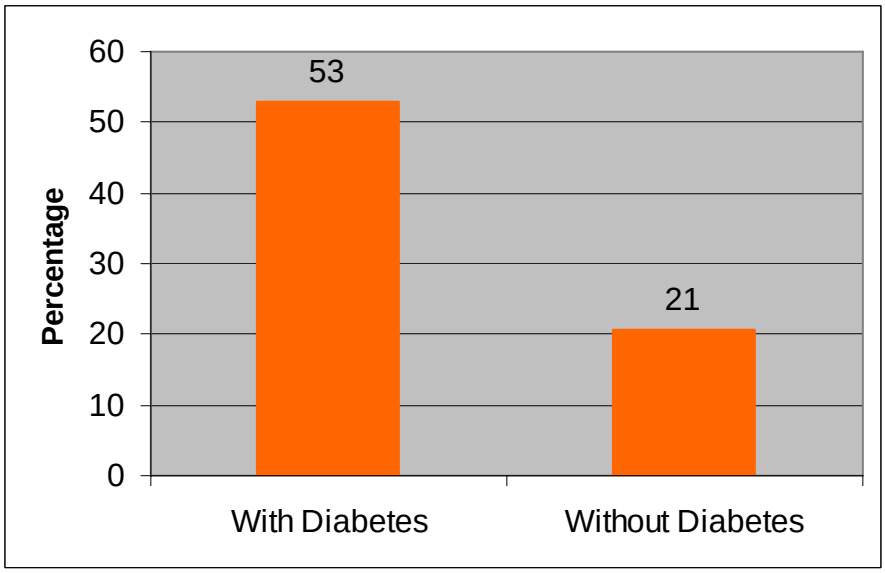
People with diabetes have worse outcomes when they become ill with influenza and/or pneumonia compared to the general population. Yearly influenza vaccinations and a pneumonia vaccination can help to prevent illness. Of adults with diabetes, 58% reported in 2006 that they had a flu vaccination in the past 12 months, and 53% have had a pneumonia vaccination at some point in their lives (Figures 74 and 75). Quitting smoking, exercising regularly, eating healthy foods, and maintaining a healthy weight are also important for reducing complications. Smoking doubles the risk for heart disease in those with diabetes.[2] In 2006, 17% of Indiana adults with diabetes were currently smoking (Figure 76). Of adults with diabetes, 31% were overweight, and 51% were obese (Figure 77). Nearly 43% of adults with diabetes reported not participating in any physical activities in the past 30 days (Figure 78).[6]

Figure 74: Adults with and without Diabetes who had a Flu Vaccination in Past 12 Months, Indiana, 2006



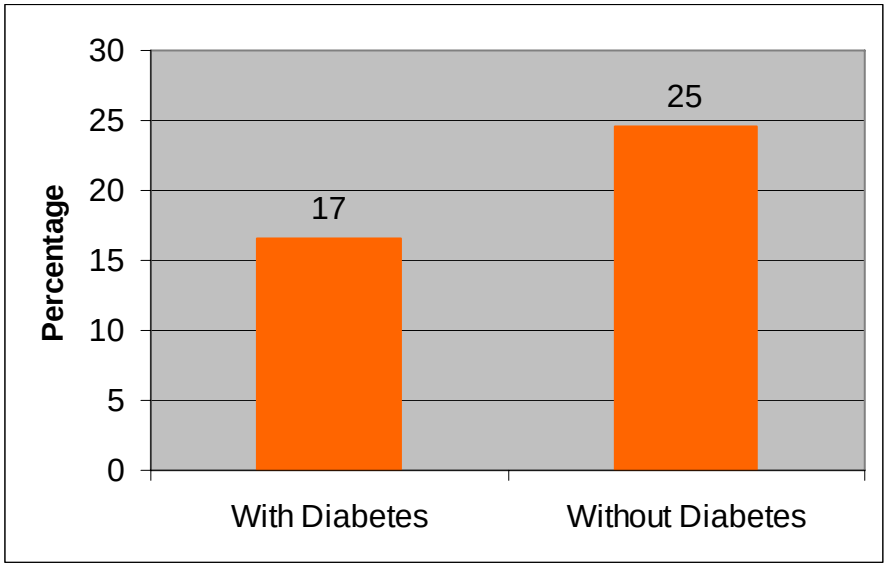
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "A flu shot is an influenza vaccine injected into your arm. During the past 12 months, have you had a flu shot?"
Source: Indiana 2006 BRFSS Data

Figure 75: Adults with and without Diabetes who have had a Pneumonia Vaccination in Their Lifetime, Indiana, 2006



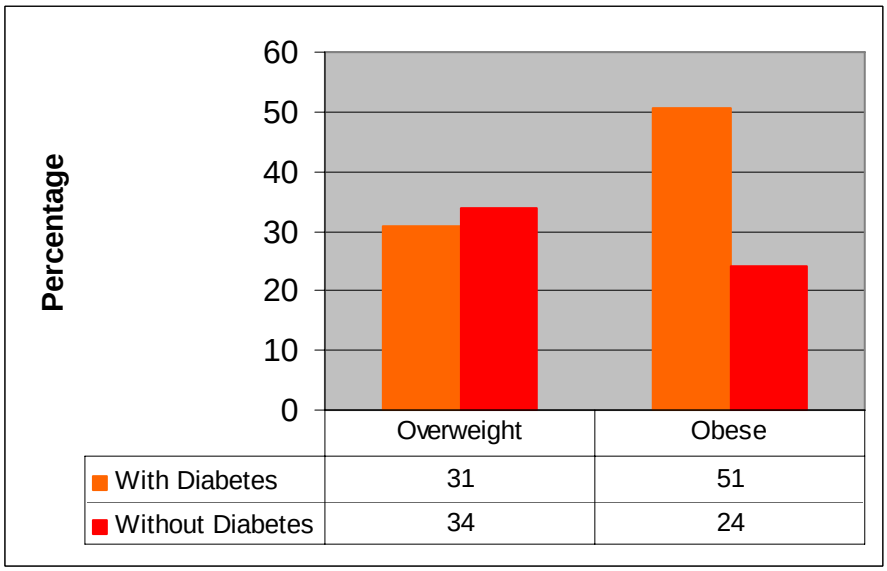
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "A pneumonia shot or pneumococcal vaccine is usually given only once or twice in a person's lifetime and is different from the flu shot. Have you ever had a pneumonia shot?"
Source: Indiana 2006 BRFSS Data

Figure 76: Adults with and without Diabetes who Currently Smoke, Indiana, 2006



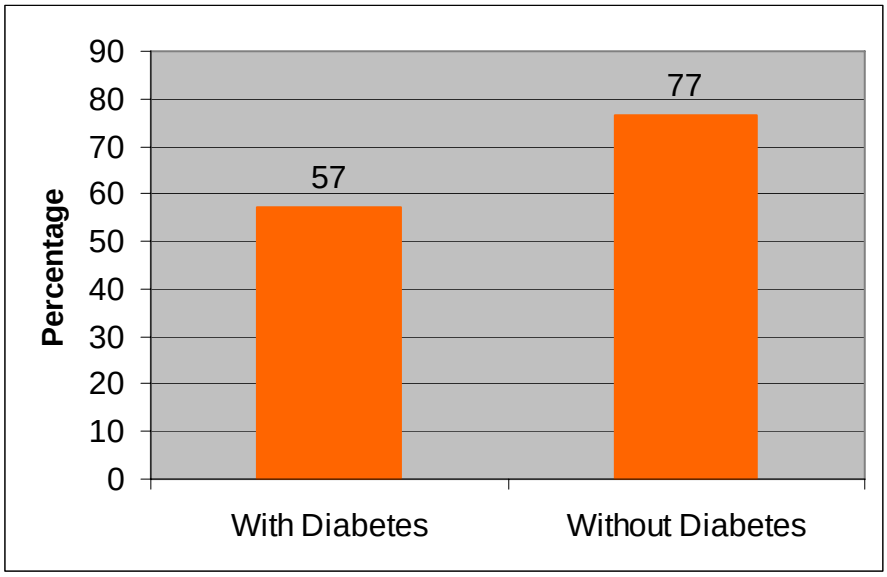
Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "Do you now smoke cigarettes every day, some days, or not at all?"
Source: Indiana 2006 BRFSS Data

Figure 77: Overweight or Obese Adults by Diabetes Status, Indiana, 2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Overweight as BMI 25 – 29.9, and obese as BMI > 30.
Question: "About how much do you weigh without shoes?" and “About how tall are you without shoes?”
BMI Formula = weight in kilograms / (height in meters)^2
Source: Indiana 2006 BRFSS Data

Figure 78: Adults with and without Diabetes who Engaged in Physical Activity in the Past Month, Indiana, 2006



Percentages are weighted to population characteristics.
Survey was asked of individuals 18 years or older.
Question: "During the past month, did you participate in any physical activities?"
Source: Indiana 2006 BRFSS Data

Gaps and Barriers to Diabetes Care

While Indiana has many resources in diabetes research and education, a gap remains between these programs and the diabetes education and management received by most patients in a clinical setting. Barriers include cost of disease management and services, geographic location, access to and quality of care, and cultural barriers such as language and lack of minority physicians.

Cost

Diabetes is an expensive chronic disease to manage. Costs include regular physician visits, medications, supplies, treatment and hospitalizations for complications, and some educational programs. In 2007, the total annual economic cost of diabetes in the United States was estimated to be $174 billion, comprising $116 billion in excess medical expenditures and $58 billion in reduced national productivity. Twenty-seven billion dollars was spent on direct care, $58 billion was spent on complications due to diabetes, and $31 billion was associated with excess general medical care. The largest components were for inpatient hospital care (50% of total cost), medication and supplies (12%), retail medications to treat complications (11%), and physician office visits (9%). Individuals with diabetes incurred an average expenditure of $11,744 per year ($6,649 attributed to diabetes), which is about 2.3 times higher than what expenditures would be in the absence of diabetes**.** One out of every five health care dollars spent in the United States is spent on caring for an individual with diabetes while one in every ten dollars is attributed to diabetes. This cost data does not include social costs such as pain and suffering, care provided by nonpaid caregivers, or excess medical costs associated with undiagnosed diabetes, therefore the cost is likely to be much greater.[18]

Geographic Location

Individuals with diabetes who live in urban areas and rural areas have unique challenges. The majority of Blacks and other minorities are located in urban areas. Minorities in the urban areas often have limited access to primary care. This limited access is due to lack of health insurance as well as cities having a heavy concentration of subspecialty physicians in large, tertiary-care hospitals and centers. Many times those living in urban environments receive primary care in overcrowded, resource-consuming emergency departments.[20] Approximately one-third of Indiana's population lives in rural counties.[10] Individuals in rural areas have a poorer perception of overall health, lower income, and a higher proportion of elderly and children compared to those in urban settings. Other challenges of rural residents include access to public or reliable transportation and time away from work or family to access quality care. These issues pose serious problems for individuals with a chronic disease such as diabetes, because constant monitoring and contact with a physician or health care provider are essential.[20]

Access to and Quality of Care

Access to medical care and coverage of care is also a challenge in Indiana. In 2005, an estimated 839,702 individuals (14%) were uninsured. Another 24% of individuals (1,431,046) had either Medicaid (12%) or Medicare (12%) as their primary form of health insurance coverage.[21] In

2004, approximately 86,968 Medicaid patients had one of the following four chronic diseases: diabetes, congestive heart failure, asthma, or AIDS. Of these patients, 21% (18,030 individuals) had diabetes. Fifty-seven percent of the all Medicaid patients and 60% of the diabetes Medicaid patients with diabetes visited public health clinics for their care.[22]

Medicare and Medicaid reimbursement for diabetes have been hindered because of physicians' lack of knowledge of Centers for Medicare and Medicaid Services guidelines and because many physicians believe reimbursement levels are unrealistically low.[23] In addition, Indiana law does not require insurance plans to cover the cost of diabetes medications and supplies if the company is self-insured.[24]

Fifty-one of the 92 Indiana counties were classified as medically underserved areas and populations and 36 of the 92 counties had health professional shortages.[25, 26] Indiana has one of the lowest numbers of physicians for its population size with only 215 physicians per 100,000 resident population, ranking Indiana 38th in the nation for physician-to-population ratio.[27]

Throughout rural and urban Indiana, there are 42 community health centers (CHC) which receive funds from ISDH to provide services to uninsured and under-insured Indiana residents. Sixteen of these community health centers also receive funding from the Bureau of Primary Health Care through the Federal 330 grant program. Receiving this funding designates the centers as Federally Qualified Health Centers (FQHC). In 2006, 39 of the 42 CHCs reported they served 331,010 people with 113,046 enrolled in Medicaid and 118,017 with no insurance.[28]

The FQHCs participating in the Bureau of Primary Health Care's Health Disparities Collaborative (HDC) have begun tracking and following their diabetic population through health center registries. The HDC program encourages health centers to embed the evidence-based guidelines from the American Diabetes Association into their processes so that they can assist their partners to reach the goal of 7.0 for the average hemoglobin A1C. The August 2007 aggregate data from 14 of Indiana FQHCs participating in the HDC reported that 6,690 people with diabetes are being served and their average hemoglobin A1C is 7.8 (the national average is 7.76).[28]

Cultural Barriers

Indiana's Hispanic/Latino population has increased and is concentrated in several rural counties and in close-knit urban communities. Many rural communities have more than the state average Hispanic/Latino population with some having twice the state average.[10] In rural areas, there are few bilingual health services available with the exception of those offered by the Migrant Health Program. In Indianapolis, there is a Hispanic Center and the Wishard Hospital Hispanic Health Project with branches in other urban areas. However, the Hispanic Center and Wishard mainly serve the Indianapolis area. There are cultural barriers and some language barriers, especially with newly immigrated Hispanic/Latino residents in the rural areas where there have been few Hispanic/Latinos in the past.[29]

There are few bilingual health professionals and even fewer resources in some rural communities that are experiencing the growth. Research consistently demonstrates patients treated by a

physician of similar culture and ethnicity have better clinical outcomes and greater satisfaction. In Indiana, less than 4% of physicians are Black and less than 3% are Hispanic/Latino. At Wishard Health Services, for example, more than 46% of the patients cared for were Black and at several of Wishard's community health centers, more than 30% of patients were Hispanic/Latino.[30]

Looking to the Future

Diabetes presents a tremendous challenge in Indiana and the United States. The World Health Organization estimates that the number of adults in the United States with diabetes will double by the year 2030.[31] The rates of obesity and diabetes are on the rise in Indiana as well as the rate of persons developing complications due to diabetes. Diabetes-related mortality and morbidity, amputations, blindness, and kidney disease cause needless suffering and unnecessary financial burden on individuals and Indiana's economy. The Indiana Diabetes Prevention and Control Program (DPCP) works to overcome the various barriers where it will have an impact and to reach more individuals with diabetes and those at risk for diabetes.[3]

The DPCP's mission is to reduce the burden of diabetes in Indiana through data surveillance, health communications, health systems development, and development and implementation of community interventions and programs. To achieve its mission, the DPCP works closely with the Diabetes Advisory Council (DAC), a group of diabetes' experts and clinicians, who guide and support the activities of the DPCP. The focus of the DAC is to increase public awareness of the impact of diabetes, to improve the quality of life for those who are affected by diabetes, to improve the quality of care for patients with diabetes, and to reduce the burdens imposed by diabetes in Indiana.[3]

References

(1) American Diabetes Association 67th Annual Scientific Sessions, Chicago, June 22-26, 2007. Linda S. Geiss, MA, chief, Diabetes Surveillance, CDC, Atlanta. Ann Albright, PhD, RD, director, Division of Diabetes Translation, CDC.
(2) Centers for Disease Control and Prevention, http://www.cdc.gov.
(3) Indiana State Department of Health Diabetes Prevention and Control Program, http://www.state.in.us/isdh/programs/diabetes/resources/group_education.htm.
(4) WebMD, http://diabetes.webmd.com/tc/Prediabetes-What-Happens.
(5) K. G. M. M. Alberti, P. Zimmet, and J. Shaw. "International Diabetes Federation: A Consensus on Type 2 Diabetes Prevention." Diabetic Medicine 24: 451-463, 2007.
(6) Indiana State Department of Health. Behavior Risk Factor Surveillance Survey, 1995-2006 Data.
(7) United States. Behavior Risk Factor Surveillance Survey, 2006 Data.
(8) Cowie, Catherine C., et al. "Prevalence of Diabetes and Impaired Fasting Glucose in Adults in the United States Population." Diabetes Care 29: 1263-1268, 2006.
(9) Indiana State Department of Health. Vital Records, 1995-2005 Birth Data.
(10) U.S. Census Bureau. American Community Survey, 2006, http://quickfacts.census.gov/qfd/states/18000.html.
(11) Trust for America's Health. "F as in Fat: How Obesity Policies are Failing in America." 2004, www.healthyamericans.org.
(12) Indiana State Department of Heath, Youth Risk Behavior Survey, 2003 and 2005 Data.
(13) Indiana Blind Registry, 2000-2005 Data.
(14) The Renal Network, 1995-2005 Data, www.therenalnetwork.org.
(15) Indiana State Department of Health. Indiana Hospital Discharge, 2005 Data.
(16) Emedicine, http://emedicine.com.
(17) Indiana State Department of Health. Vital Records, 2005 Mortality Data.
(18) American Diabetes Association, http://www.diabetes.org.
(19) National Diabetes Education Program, http://ndep.nih.gov/.
(20) Zgibor JC, Songer TJ: "External Barriers to Diabetes Care: Addressing Personal and Health Systems Issues." Diabetes Spectrum 14:23-28, 2001.
(21) Kaiser Family Foundation. State Health Facts, 2004, www.statehealthfacts.org/cgi-bin/healthfacts.cgi.
(22) Indiana Family and Social Services Administration, 2005, http://www.in.gov/fssa/.
(23) Larme AC, Pugh JA. "Evidence-Based Guidelines Meet the Real World." Diabetes Care 24: 1728-1733, 2001.
(24) Indiana Code, IC 27-8-14.5.
(25) Indiana State Department of Health. Medically Underserved Areas, May 2006, http://www.in.gov/isdh/publications/llo/shortages/pdf/MUA_details_table5-06.pdf.
(26) Indiana State Department of Health. Primary Care Health Professional Shortage Areas, May 2006, http://www.in.gov/isdh/publications/llo/shortages/pdf/HPSA_PC_details_table5-06.pdf.
(27) U.S. Census Bureau. Statistical Abstract: State Rankings, 2006, http://www.census.gov/compendia/statab/rankings.html.
(28) Wishard, http://www.wishard.edu/Hispanic/.
(29) Indiana Primary Health Care Association, 2006, http://www.indianapca.org/.

(30) Inside Indiana Business. “IU Medical Group Contributes to Minority Scholarship Fund.” May 31, 2005, www.insideindianabusiness.com.
(31) World Health Organization, http://www.who.int/diabetes/en/.