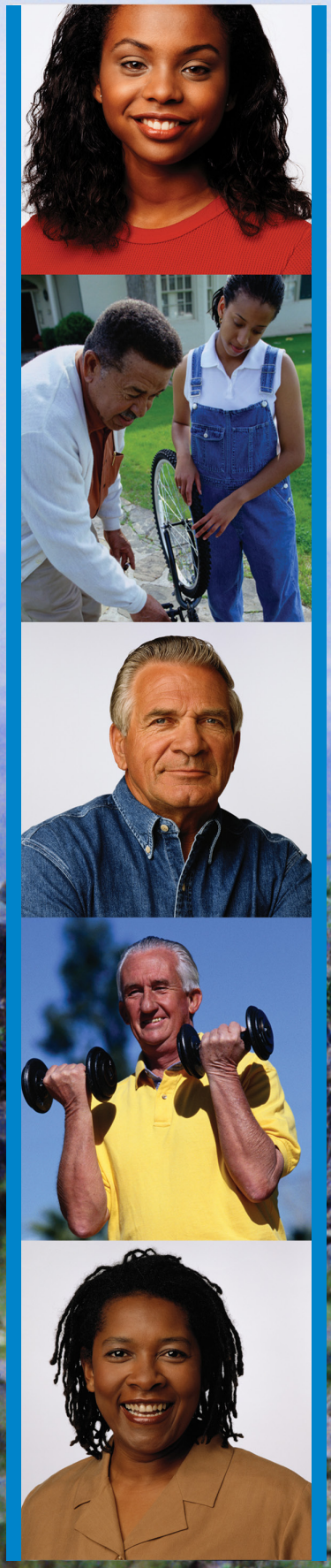

The Burden of Diabetes in Pennsylvania 2010

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I. Overview

Diabetes is a chronic disease affecting the way the body uses food for energy. It is caused by an inability of the pancreas to make enough insulin or use it properly. It is a disease that is lifelong, complicated and costly. The information and data contained within this report is provided both to educate individuals and organizations on the burden of diabetes and to provide them with the tools necessary to plan effective interventions for all those affected by diabetes. This report presents diabetes surveillance data, including measures and trends of estimated diabetes prevalence and mortality for both the general population and disparate groups in the state and at the county level. Estimated prevalence for diabetes risk factors and related health conditions are also highlighted in this burden report.

THE DIABETES BURDEN

The prevalence of diabetes continues to increase in the United States, and in 2007, diabetes affected 23.6 million individuals or 7.8 percent of the population.[1] In 2008, sample survey estimates for the Commonwealth of Pennsylvania showed that approximately 872,000 or 9 percent of its adults 18 and older had ever been diagnosed with diabetes.[2]

Diabetes is a disease that affects groups disparately. In Pennsylvania during 2006-2008, an estimated 13% of non-Hispanic African Americans and 7 percent of Hispanics are affected compared to 8 percent of non-Hispanic whites.[2] Those individuals in lower income brackets and with limited amounts of education are affected more than those in higher income brackets and with more education. Those in the older age brackets are affected more than their younger counterparts.

Diabetes is a disease that increases an individual's risk for additional illnesses and other diseases. Individuals with diabetes are more likely than those without the disease to have high blood pressure, heart disease and stroke, blindness and lower extremity amputations. Diabetes was the seventh leading major cause of death in the United States in 2006, and the risk for death for individuals with diabetes is about twice that of people without diabetes of similar age.[1] In 2007, diabetes was listed as the underlying cause of death for 3,420 residents of Pennsylvania for a death rate of 201.3 per 10,000.[3] Because diabetes is likely to be underreported as an underlying cause of death, with only about 10 to 15 percent of decedents having diabetes listed as such, this number is likely much higher[1]. In fact, diabetes was listed as a contributing cause of death for an additional 8,403 Pennsylvania residents who died in 2007.[3]

DIABETES PREVENTION AND CONTROL PROGRAM

The Pennsylvania Diabetes Prevention and Control Program (DPCP) of the Pennsylvania Department of Health receives funding from the Centers for Disease Control and Prevention, as well as supplemental funding from the Commonwealth of Pennsylvania and the Preventative Health and Health Services Block Grant. The focus of the program is on improving the lives of Pennsylvanians with diabetes; reducing disparities related to diabetes among minority and underserved populations in the commonwealth; and preventing complications of diabetes. The DPCP fulfills its program objectives by subscribing to a systems change

approach to diabetes prevention and control. Under this philosophy, efforts for prevention and control are aimed at changing the systems, such as the health care and school systems, and working with employers and communities in which individuals with diabetes live and interact.

In addition, the DPCP convenes a diverse group of stakeholders, the Pennsylvania Diabetes Action Partnership, from across the commonwealth to work on devising statewide strategies and opportunities for collaborative efforts to battle diabetes. The first major accomplishment of the Partnership has been the publication of the first Pennsylvania statewide Diabetes Action Plan, created to assist in the development of the strategies and opportunities. The Plan was released in May 2007 and is available on the DPCP's webpage at http://www.health.state.pa.us/diabetes. This Burden Report is a companion piece to the Plan, and both should be used in the fight against diabetes and its complications.

With planned, effective interventions, the burden of diabetes will be lessened for all individuals in the commonwealth.

Key Terms & Concepts

DISEASE DESCRIPTION

Diabetes is a lifelong disease that occurs when a person's pancreas does not produce or stops producing insulin (type 1 diabetes) or in cases where a person is not producing enough insulin and/or their body cannot use it (type 2 diabetes). The body needs insulin to help glucose enter cells. Glucose is the main source of fuel for the body. The body makes glucose from foods that are consumed. When people have diabetes, glucose in their bloodstream reaches above normal levels and must be controlled, or it will build up in the body and damage the heart, eyes, kidneys and blood vessels.

In addition to the two main types- type 1 and type 2 - another type, gestational diabetes, appears during pregnancy in some women. Other types of diabetes can result from specific genetic conditions, surgery, drugs, malnutrition, infections and other illnesses. The American Diabetes Association[4] as well as the Centers for Disease Control and Prevention[5] highlight the following regarding diabetes:

- Most people with diabetes -- nine out of ten or 90 to 95 percent-- have type 2 diabetes. Type 1 accounts for 5 to 10 percent of diabetes.
- Most people with type 2 find out about their diabetes after age 30 or 40.
- Most people may not know that they have diabetes or are at risk for diabetes until they experience the complications associated with it.
- Type 2 is associated with older age, obesity, family history, history of gestational diabetes, physical inactivity and race/ethnicity.
- Most children have type 1 diabetes, although type 2 in children is increasing.
- Women who have had gestational diabetes have a 40 to 60 percent chance of developing diabetes in the next 5 to 10 years.[1]

RISK FACTORS

There are both modifiable (such as diet and exercise) and non-modifiable (genetics, age, ethnicity, gender, family history) risk factors associated with diabetes. Modifiable risk factors reported to be associated with diabetes, independent of each other, include being overweight, low physical activity, high dietary fat intake and low fiber intake.

A person is at risk for diabetes if any of the following statements are true: [4,5]

- is overweight
- has an inactive lifestyle (those who get little or no exercise during the day)
- has high blood pressure (130/80 or higher)
- has a family history of diabetes (parent, brother or sister with diabetes)
- is a member of a high risk ethnic group (African American, Hispanic/Latino, American Indian, Asian American or Pacific Islander)
- is a women who has had gestational diabetes during pregnancy
- is a women who has had a baby weighing nine or more pounds at birth

POOR HEALTH OUTCOMES

It is well documented in the literature that diabetes is the leading cause of blindness, kidney failure, amputations, cardiovascular disease and stroke. From the 2007 National Diabetes Fact Sheet,[1] in the United States:

- Sixty-eight percent of diabetes-related death

certificates of those aged 65+were associated in some way to heart disease in 2004

- For those age 20 to 74, diabetes is the leading cause of blindness
- Diabetes is the leading cause of kidney failure, responsible for 44 percent of new cases in 2005
- More than 60 percent of non-traumatic lower-limb amputations occur in people with diabetes
- Young adults have twice the risk of developing periodontal (gum) disease than those without diabetes
- Diabetes that is poorly controlled before conception and during the first trimester can result in major birth defects in 5-10 percent of pregnancies and spontaneous abortions in 15-20 percent of pregnancies
- People with diabetes are more susceptible to many illnesses and, after developing those illnesses, have worse prognoses

STRATEGIES FOR DIABETES PREVENTION AND CONTROL

The recognition of the staggering cost of diabetes and its related complications should help convince those with interest in diabetes care (such as insurers, employers and local, state and federal governments) to act in both preventing diabetes and preventing complications in those who already have the disease. Fortunately, proper management of diabetes can help better ensure that those with diabetes do not suffer from the long term complications often associated with it.

The Centers for Disease Control and Prevention[1] points out the following:

- Improved glycemic control in both type 1 and type 2 diabetes reduces the risk of microvascular complications. For every one percent drop in A1C, the risk of developing these complications is reduced by up to 40 percent. Lessening the risk of diseases affecting the eyes, kidneys and nerves can help prevent renal disease, amputations and blindness.
- Hypertension and hyperlipidemia are frequent co-morbid conditions in those with diabetes. Blood pressure control can reduce cardiovascular disease by approximately 33 percent to 50 percent and also reduce the other complications by approximately 33 percent. A reduction of even 10 mm Hg in systolic blood pressure can result in a 12 percent reduction in the risk for any complication related to diabetes.
- Improved LDL Cholesterol can reduce cardiovascular complications by 20-50 percent.
- A comprehensive foot care program, including foot exams by both patient and health care provider, can reduce lower-extremity amputation rates by 45 to 85 percent.
- Detecting and treating early diabetic kidney disease through the lowering of blood pressure can reduce the decline in the function of the affected kidneys by 30 to 70 percent.

III. IMPORTANT

Data Notes

Most of the data in this report are provided by the Bureau of Health Statistics and Research, Pennsylvania Department of Health (BHSR) and can be accessed through BHSR's web page and Epidemiologic Query and Mapping System (EpiQMS): www.health.state.pa.us/stats. EpiQMS is an extensive and versatile on-line interactive system that allows users to create various state and local health statistical output on resident live births, teen pregnancy, deaths, infant deaths, cancer incidence, behavioral health risks, STDs and population in different formats (tables, charts, maps and county assessments/profiles) over time (in single and multiple-year output) for the purpose of trend analysis, public health assessment and surveillance support. Other specific data sources for the types of data provided in this burden document are listed in Table 1.

PREVALENCE DATA NOTES

Unless otherwise indicated, data and statistics on diabetes prevalence, as well as prevalence data for diabetes risk factors and behaviors and management practices, are collected through the Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS) survey, which is conducted by the Bureau of Health Statistics and Research, Pennsylvania Department of Health. It is important to note that no BRFSS data cited in the report are absolute figures due to the variability of the data, so 95 percent confidence intervals are presented for all BRFSS data in this report. A 95 percent confidence interval (CI) is composed of two figures (upper and lower limits) computed specifically for a rate. That range identifies the variability of the rate, i.e., 95 percent of the time; the true rate (unaffected by chance variation or number of events) will occur within that range.

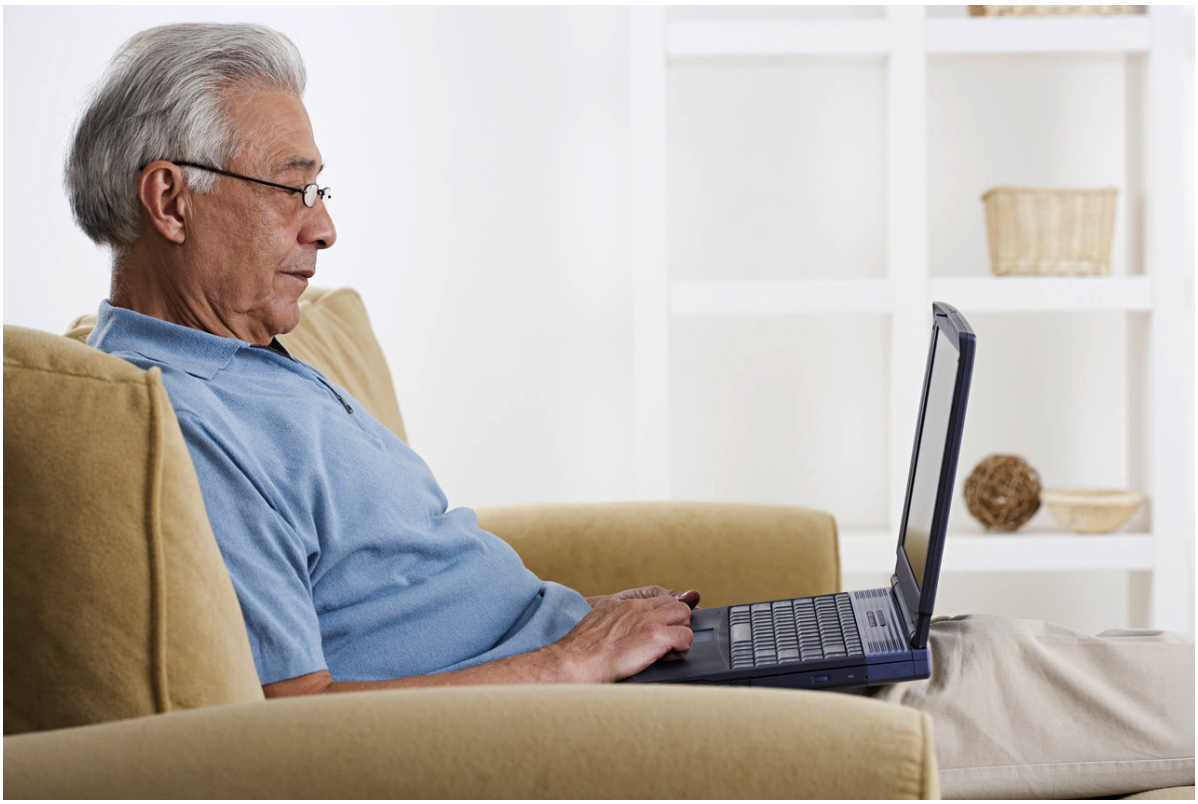
In general, Pennsylvania BRFSS sample sizes are too small to provide reliable data for some racial/ethnic groups in the state (e.g., Asians, Native Americans and Pacific Islanders). However, sample sizes are usually large enough to provide reliable data for the three largest racial/ethnic groups in Pennsylvania: non-Hispanic whites, non-Hispanic African-Americans and Hispanics.

MORTALITY DATA NOTES

Diabetes mortality statistics are obtained from Pennsylvania Certificates of Death. Unless age-specific death rates are indicated, age-adjusted death rates using the 2000 US standard population are presented consistently throughout this report. Underlying causes of death presented in this report have been classified according to the International Classification of Diseases (ICD) codes. ICD-10 codes were used to classify cause of death data since 1999, and ICD-9 codes were used between 1979 and 1998.

Table 1. The Burden of Diabetes in Pennsylvania, Data Types & Sources

Data Type	Data Source
▪ Mortality	BHSR: PA Certificates of Death
▪ Hospitalizations & Cost	Pennsylvania Health Care Cost Containment Council (PHC4) http://www.phc4.org
▪ Disease Prevalence & Management ▪ Prevalence of Risk Factors & Behaviors ▪ Prevalence of Diabetes-Related Diseases	BHSR: Behavioral Risk Factor Surveillance System (BRFSS)



IV. Risk Factors and Behaviors

Diabetes is associated with a number of risk factors, both non-modifiable and modifiable. Risk factors are behaviors, traits or characteristics and conditions that increase a person's chance of developing a disease. Non-modifiable risk factors are factors that cannot be changed, such as a person's age, race, gender or genetic predisposition. However, risk factors that are modifiable, such as diet and exercise, can be controlled by individuals.

When discussing the issues of diabetes, individual characteristics such as weight status, physical activity/inactivity and smoking status should be considered, as these characteristics are known risk factors for diabetes and for complications of diabetes. Efforts to improve diabetes management and prevent diabetes complications must address key risk factors and behaviors.

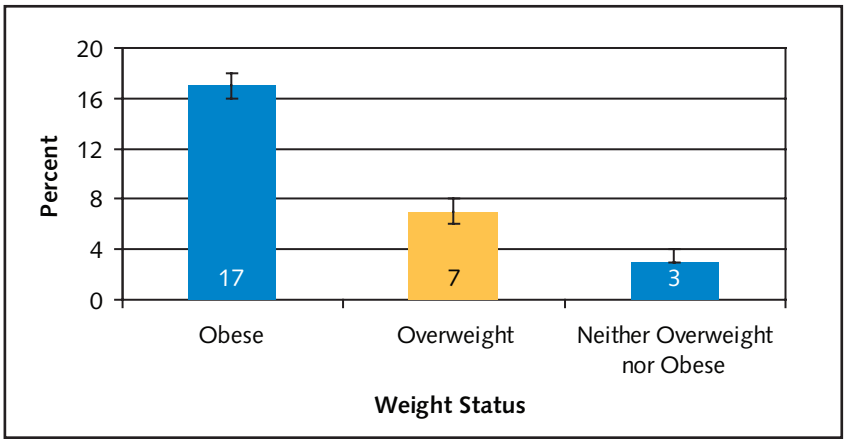
The data presented in this section are obtained from the Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS) survey.[2] Please refer to the Important Data Notes section of this report to review key points regarding Pennsylvania BRFSS sample size limitations and data variability. Confidence intervals are included in the graphs to illustrate the variability of the presented data.

OBESITY

Being overweight or obese increases one's risk of developing diabetes. The Body Mass Index (BMI), which describes relative weight for height, is used to classify individuals in this case as either overweight (BMI 25 to 29.9) or obese (BMI greater than or equal to 30). From the 2008 BRFSS, approximately 36 percent of Pennsylvania adults were considered overweight and 28 percent of Pennsylvania adults were considered obese.

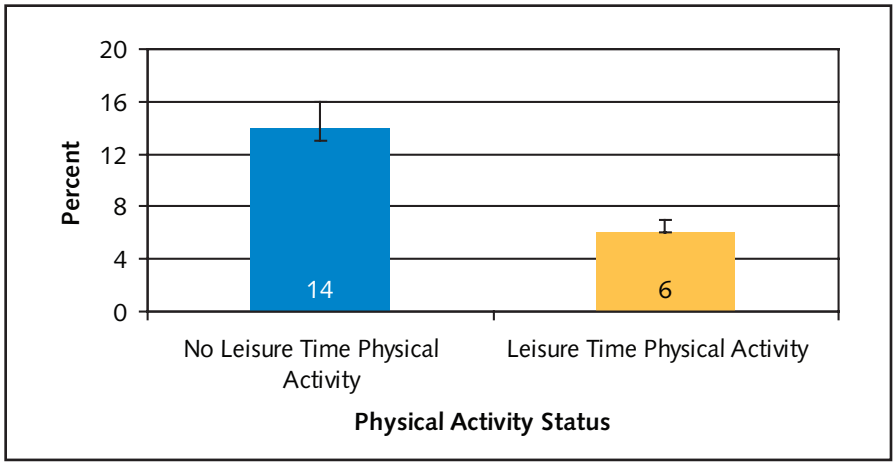
- For the period of 2006-2008, obese adults in Pennsylvania had a significantly higher diabetes prevalence compared to Pennsylvania adults who were overweight or neither overweight nor obese. Overweight adults had a significantly higher diabetes prevalence compared to Pennsylvania adults who were neither overweight nor obese.
- This data supports the claim that there is a link between obesity and diabetes prevalence.

Figure 4-1. Estimated Diabetes Prevalence by Weight Status, Pennsylvania Adults, 2006-2008



Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

Figure 4-2. Estimated Diabetes Prevalence by Physical Activity Status, Pennsylvania Adults, 2006-2008



Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

PHYSICAL INACTIVITY

In response to BRFSS survey questions, Pennsylvania adults indicated their physical activity status based on whether or not they engaged in leisure time physical activity or exercise within the past month.

- Out of everyone who responded having no leisure time physical activity in the past month, 14 percent had ever been told that they had diabetes.
- Out of everyone who responded having had leisure time physical activity in the past month, 6 percent had ever been told that they had diabetes.

- Therefore, Pennsylvania adults who had no leisure time physical activity or exercise in the past month had a significantly higher diabetes prevalence compared to adults who had leisure time physical activity in the past month.

- This data suggests that those who engage in leisure time physical activity are less likely to have diabetes than those who engage in no leisure time physical activity.

SMOKING

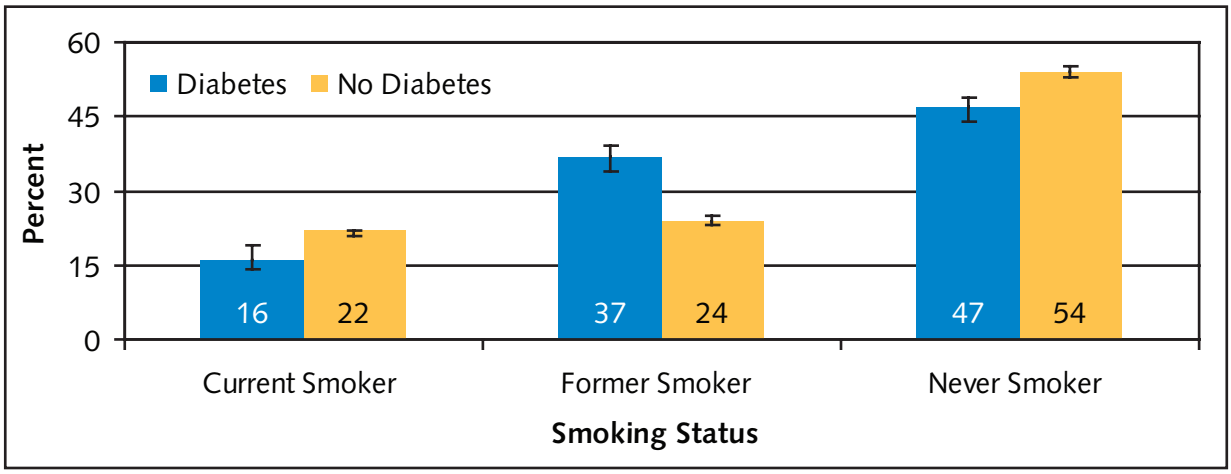
The detrimental effects of smoking on individuals' health are widely publicized. Smoking adults with diabetes face even greater health risks than both diabetics who do not smoke and adults who do not have diabetes. Smokers with diabetes are more likely to develop nerve damage and kidney disease. In response to BRFSS survey questions, Pennsylvania adults classified themselves according to the following smoking categories: never smoked, former smoker, or current smoker.

- For the period of 2006-2008, diabetic adults had a significantly lower prevalence of never smoking compared to non-diabetic adults.

- For the period of 2006-2008, diabetics had a significantly higher prevalence for being former smokers compared to non-diabetic adults.

- Diabetic adults had a significantly lower prevalence for being current smokers compared to non-diabetic adults during 2006-2008.

Figure 4-3. Estimated Percentage of Current, Former & Never Smokers by Diabetes Status, Pennsylvania Adults, 2006-2008



Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

V. Diabetes Prevalence

The burden of diabetes in Pennsylvania is great and diabetes incidence rates continue to increase. In 2008, the national BRFSS indicated that Pennsylvania ranked eighteenth in the nation (out of the 50 States) for the percent of adults who had ever been told by a doctor that they had diabetes (8.8 percent).[6] Diabetes affects people of all ages and racial and ethnic groups. However, some groups are disparately burdened by the disease. For example, Non-Hispanic blacks have higher diabetes prevalence rates than both Hispanics and non-Hispanic whites.

The data presented in this section are obtained from the Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS) survey.[2] Please refer to the Important Data Notes section of this report to review key points regarding Pennsylvania BRFSS sample size limitations and data variability. Confidence intervals are included in the graphs and tables to illustrate variability.

Table 2. Estimated Diabetes Prevalence by Demographic, Pennsylvania Adults, 2006-2008

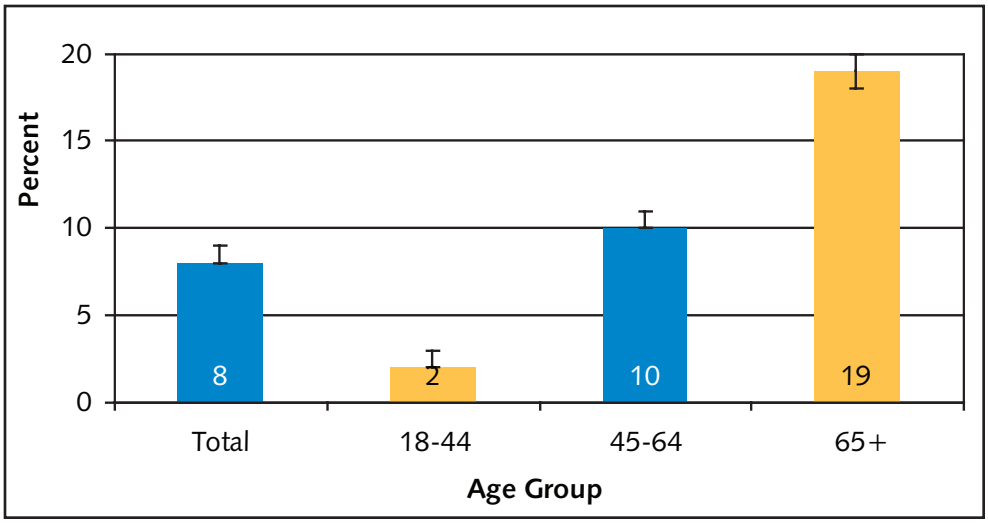
Demographic	Percent	Confidence Interval
Total	8	8-9
Gender		
Male	9	8-10
Female	8	7-8
Age		
18-44	2	2-3
45-64	10	10-11
65+	19	18-20
Education		
<High School	13	11-15
High School	10	10-11
Some College	8	7-9
College Degree	5	4-6
Income		
<$15,000	16	14-19
$15,000 to $24,999	13	12-15
$25,000 to $49,999	9	8-10
$50,000 to $74,999	6	5-7
$75,000+	4	4-5
Race/Ethnicity		
White, non-Hispanic	8	7-8
Black, non-Hispanic	13	11-16
Hispanic	7	5-11

Source: Pennsylvania BRFSS.

AGE

For the 2006-2008 period, the rate of diabetes increases dramatically with age and becomes significantly higher for older adult groups (45+) compared to their younger counterparts. Those in the 65+ age range were disparately affected and had the highest diabetes prevalence of all the age groups.

Figure 5-1. Estimated Diabetes Prevalence by Age, Pennsylvania Adults, 2006-2008



Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

STUDENTS

Each year, the Division of School Health[7] gathers information from individual school districts across the commonwealth regarding students in their districts with the medical diagnosis of diabetes, as well as other chronic diseases. The numbers reflect the total number of students, previously diagnosed or diagnosed within the current school year, identified as having a specific chronic condition(s). School districts complete the information based on their current grade configurations. Thus, the numbers could include a pre-kindergarten class if the school district provides such a class, and age ranges could be from 4 years of age up to and including age 21 for children with special needs. It is noted that some students may move from one school district to another or from one school entity to another. Therefore, there may be some duplication in count.

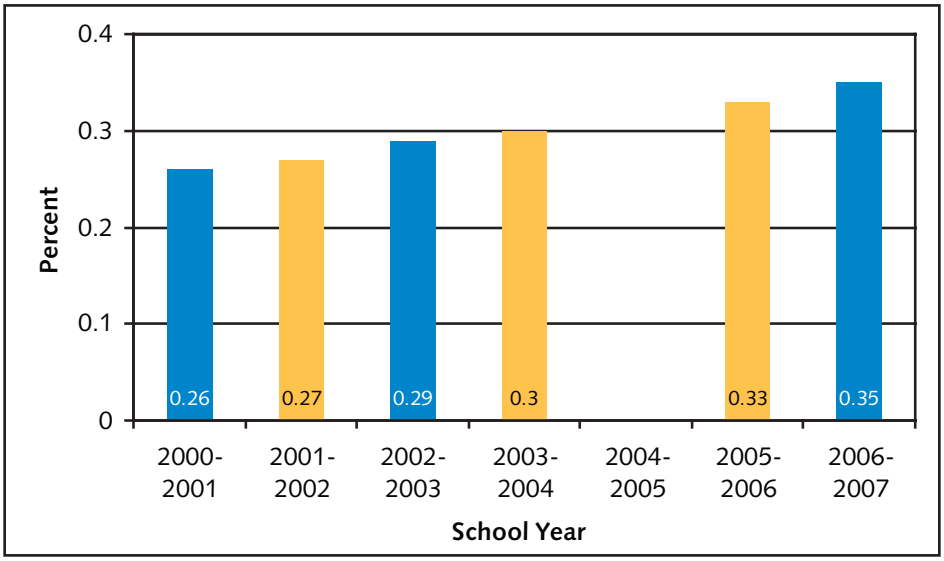
Although the Division of School Health started to request the differentiation between students with Type 1 and Type 2 for the 2005-2006 school year, past data does not include such a differentiation.

In the 2006-2007 school year, 67 counties in the state reported information, as well as independent, comprehensive area vocational-technical and charter schools. Of those responses:

- The average daily enrollment was 2,025,246
- The number of students with diabetes was 6,908
- The percent of students with diabetes was 0.35 percent

Reviewing data from the five prior school years available indicates that the rate of diabetes has increased steadily in each year. However, it is important to note that these increases may be due to better reporting—not increasing incidence.

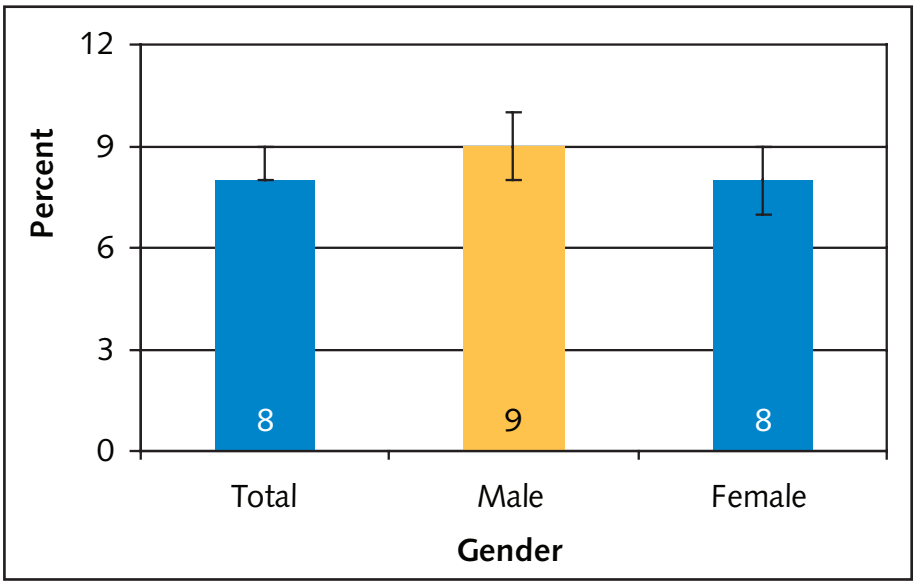
Figure 5-2. Reported Prevalence of Diabetes Among School Children, Pennsylvania, 2000-2001 to 2006-2007 School Years
*Data not available for the 2004-2005 School Year



Source: Division of School Health, Pennsylvania Department of Health.
*Data Not Available for the 2004-2005 School Year.

GENDER

Figure 5-3. Estimated Diabetes Prevalence by Gender, Pennsylvania Adults, 2006-2008



Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

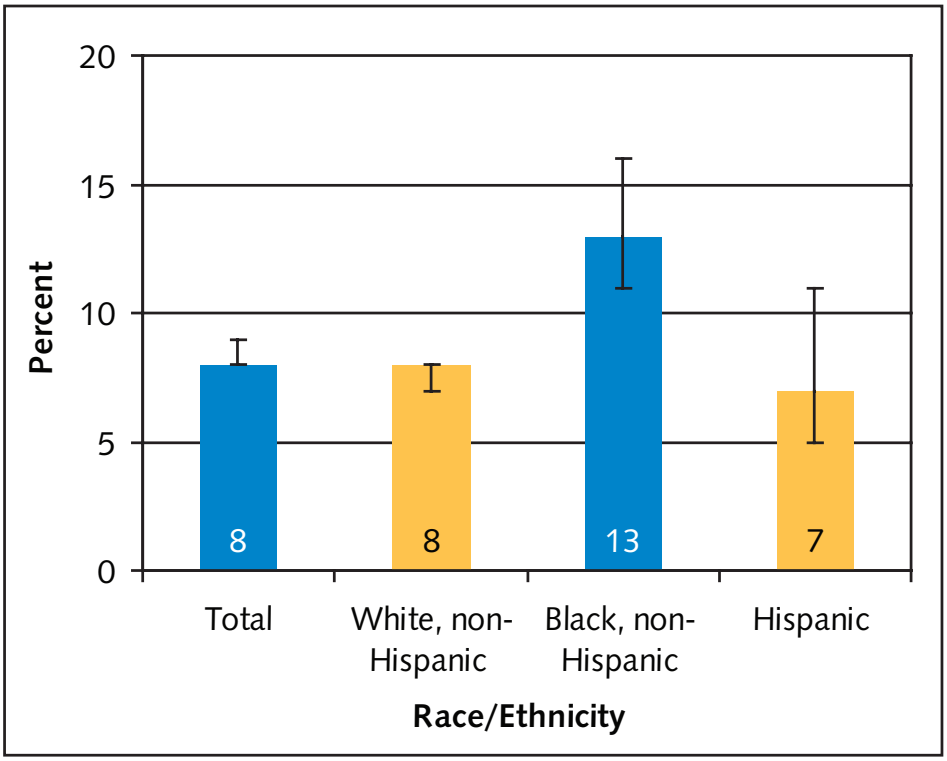
There are no significant gender differences in diabetes prevalence rates.

RACE/ETHNICITY

In 2006-2008, black, non-Hispanic Pennsylvania adults had significantly higher diabetes prevalence (13, CI 11-16) compared to white, non-Hispanic (8, CI 7-8) and Hispanic (7, CI 5-11) Pennsylvania adults.

This data supports the claim that diabetes affects racial and ethnic groups differently.

Figure 5-4. Estimated Diabetes Prevalence by Race/Ethnicity, Pennsylvania Adults, 2006-2008



Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

SOCIOECONOMIC STATUS (Education & Income)

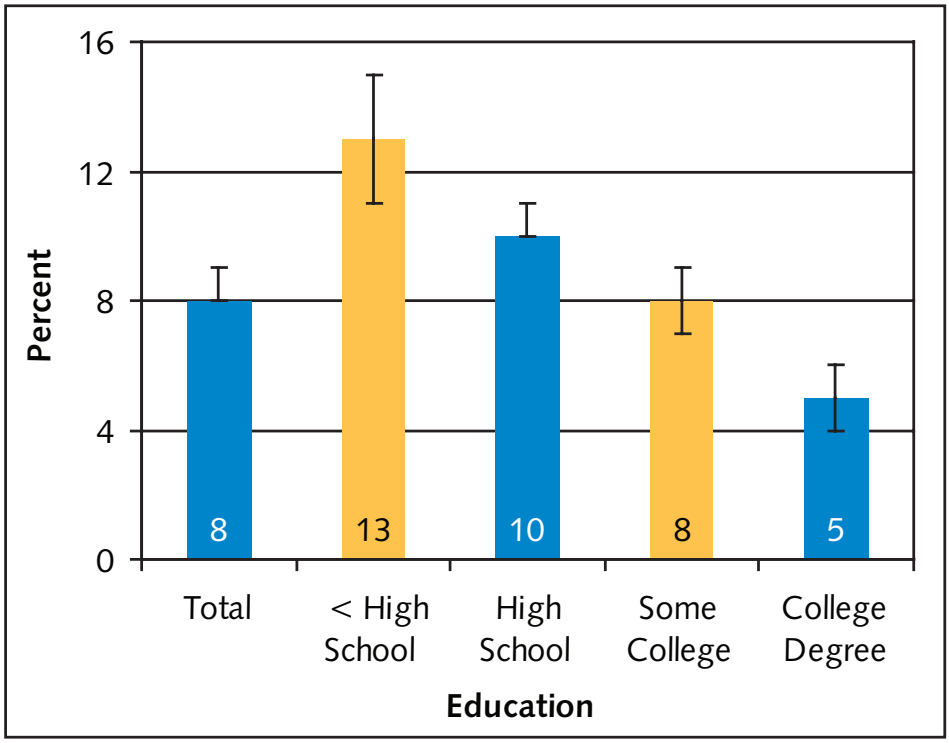
EDUCATION

- Estimated diabetes prevalence decreases with increases in education level. In 2006-2008, each education level had a significantly lower diabetes prevalence compared to each lesser education level.

INCOME

- In 2006-2008, Pennsylvania adults with annual income levels less than $25,000 had significantly higher diabetes prevalence compared to all other income groups.
- In 2006-2008, Pennsylvania adults with annual income levels greater than $50,000 had significantly lower diabetes prevalence compared to all other income groups.

Figure 5-5. Estimated Diabetes Prevalence by Education, Pennsylvania Adults, 2006-2008



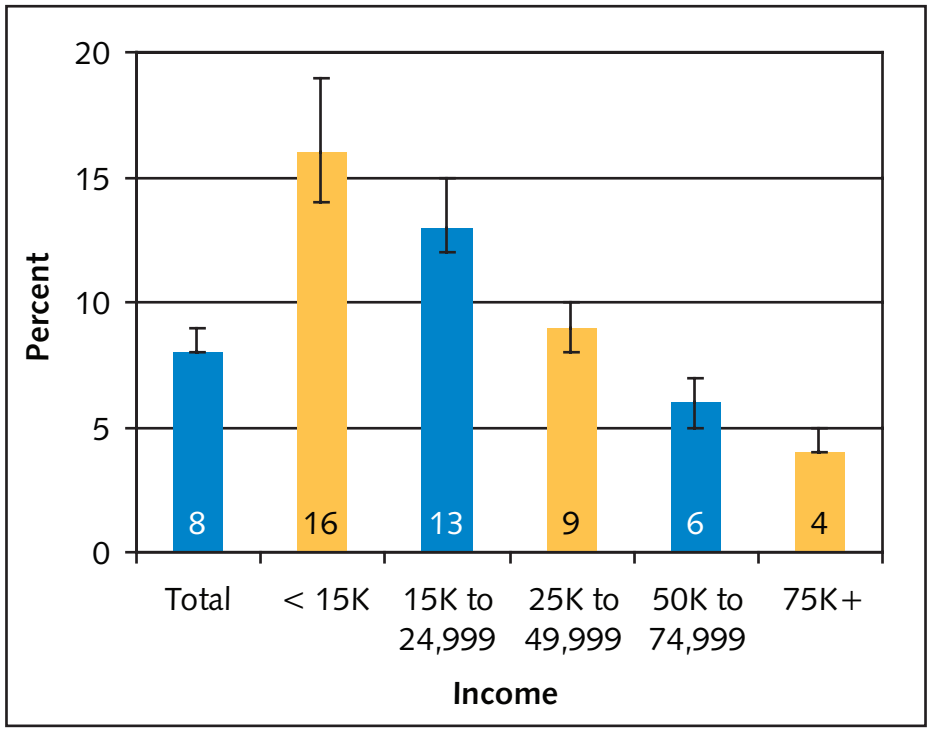
Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

Table 3. Estimated Diabetes Prevalence by Income, Pennsylvania Adults, 2006-2008

Income	Percent	Confidence Interval
<$15,000	16	14-19
$15,000 to $24,999	13	12-15
$25,000 to $49,999	9	8-10
$50,000 to $74,999	6	5-7
$75,000+	4	4-5

Source: Pennsylvania BRFSS. Note: CI = 95 percent confidence interval.

Figure 5-6. Estimated Diabetes Prevalence by Income, Pennsylvania Adults, 2006-2008



Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

VI. Gestational and Pre-Pregnancy Diabetes

According to Pennsylvania Bureau of Health Statistics and Research, in just over 4 percent of all births during 2005-2007, the mothers had gestational diabetes. Gestational diabetes is a form of diabetes that appears in pregnant women and often subsides after the birth of the child. However, gestational diabetes may increase the risk of both mother and child developing Type 2 diabetes during their life time.[8] From 2005-2007, a total of 2,775 live births occurred with women having pre-pregnancy diabetes.

Table 4. Number and Percent of Resident Live Births to Mothers with Gestational Diabetes by County, Pennsylvania, 2005-2007

County	Total Number of Live Births with Gestational Diabetes	Percent Gestational Diabetes
All Counties	18,030	4.2
Adams	114	3.7
Allegheny	1,371	3.5
Armstrong	81	3.8
Beaver	190	3.6
Bedford	52	3.6
Berks	1,059	6.9
Blair	223	5.2
Bradford	73	3.5
Bucks	562	2.9
Butler	169	2.8
Cambria	237	5.3
Cameron	12	7.8
Carbon	84	4.4
Centre	360	9.1
Chester	620	3.5
Clarion	153	12.8
Clearfield	125	5.2
Clinton	44	3.4

County	Total Number of Live Births with Gestational Diabetes	Percent Gestational Diabetes
Columbia	127	6.6
Crawford	133	4.3
Cumberland	331	4.5
Dauphin	393	3.8
Delaware	739	3.6
Elk	92	9.9
Erie	543	5.3
Fayette	267	6.7
Forest	8	-
Franklin	184	3.6
Fulton	22	4.8
Greene	38	4.3
Huntingdon	61	4.5
Indiana	96	3.7
Jefferson	71	4.7
Juniata	31	3.8
Lackawanna	304	4.4
Lancaster	1,072	5.1
Lawrence	170	6.1
Lebanon	140	2.9
Lehigh	716	5.6
Luzerne	547	5.7
Lycoming	123	3.1
McKean	45	3.2
Mercer	103	2.9
Mifflin	84	4.6
Monroe	238	5.6
Montgomery	868	3.1
Montour	33	5.1
Northampton	338	3.8
Northumberland	172	5.7
Perry	55	3.4
Philadelphia	2,032	3.0
Pike	31	5.4
Potter	27	4.9
Schuylkill	344	7.7

County	Total Number of Live Births with Gestational Diabetes	Percent Gestational Diabetes
Snyder	66	4.6
Somerset	87	4.1
Sullivan	9	-
Susquehanna	27	3.3
Tioga	31	3.1
Union	50	4.1
Venango	100	5.4
Warren	64	5.7
Washington	281	4.6
Wayne	67	5.0
Westmoreland	496	4.9
Wyoming	54	5.8
York	591	4.2

Source: Pennsylvania Certificates of Live Birth. Note: Percents not calculated for counties with <10 events.

Table 5. Number of Resident Live Births to Mothers with Pre-Pregnancy or Gestational Diabetes by County, Pennsylvania, 2005-2007

County	Number of Live Births with Pre-Pregnancy Diabetes	Number of Live Births with Gestational Diabetes
All Counties	2,775	18,030
Adams	9	114
Allegheny	291	1,371
Armstrong	27	81
Beaver	30	190
Bedford	13	52
Berks	85	1,059
Blair	28	223
Bradford	12	73
Bucks	98	562
Butler	42	169
Cambria	33	237

County	Number of Live Births with Pre-Pregnancy Diabetes	Number of Live Births with Gestational Diabetes
Cameron	2	12
Carbon	19	84
Centre	14	360
Chester	120	620
Clarion	13	153
Clearfield	26	125
Clinton	5	44
Columbia	13	127
Crawford	13	133
Cumberland	39	331
Dauphin	79	393
Delaware	126	739
Elk	9	92
Erie	38	543
Fayette	28	267
Forest	-	8
Franklin	30	184
Fulton	-	22
Greene	7	38
Huntingdon	18	61
Indiana	16	96
Jefferson	8	71
Juniata	3	31
Lackawanna	63	304
Lancaster	102	1,072
Lawrence	14	170
Lebanon	26	140
Lehigh	83	716
Luzerne	89	547
Lycoming	22	123
McKean	10	45
Mercer	17	103
Mifflin	6	84
Monroe	33	238
Montgomery	121	868
Montour	-	33

County	Number of Live Births with Pre-Pregnancy Diabetes	Number of Live Births with Gestational Diabetes
Northampton	42	338
Northumberland	20	172
Perry	17	55
Philadelphia	532	2,032
Pike	2	31
Potter	3	27
Schuylkill	21	344
Snyder	8	66
Somerset	4	87
Sullivan	1	9
Susquehanna	2	27
Tioga	3	31
Union	5	50
Venango	19	100
Warren	11	64
Washington	47	281
Wayne	4	67
Westmoreland	77	496
Wyoming	6	54
York	71	591

Source: Pennsylvania Certificates of Live Birth.

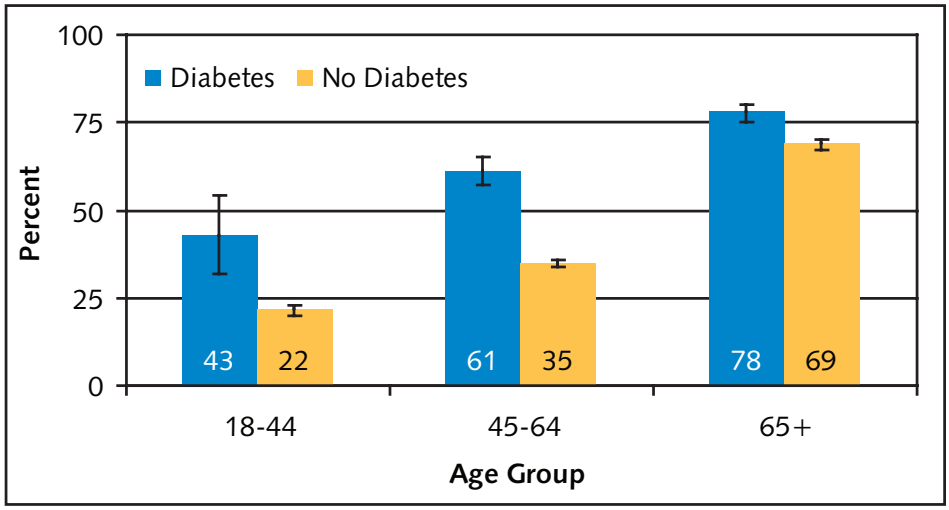
VII. Diabetes Management

INFLUENZA and PNEUMONIA IMMUNIZATIONS

Individuals with diabetes are at high risk for complications from influenza and pneumonia. In fact, diabetics are about three times more likely to die from flu and pneumonia than those without diabetes.[9] An individual with diabetes who has pneumonia is more likely to be sicker longer, go to the hospital or even die. Vaccinations against both of these illnesses can help protect individuals against getting sick in the first place as well as suffering complications after contracting the illness. The Centers for Disease Control and Prevention recommends that individuals with diabetes be vaccinated against both the flu (influenza) and pneumonia. Influenza vaccinations should be received yearly. Generally, a one time vaccination for pneumonia is sufficient, although those at high risk should discuss with their doctor the need to receive the vaccination every 5-10 years.

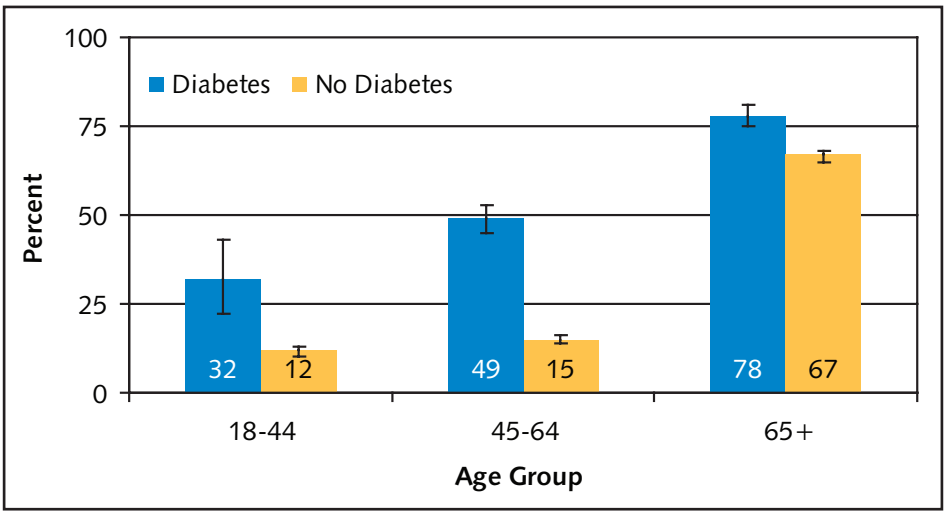
- In 2006-2008, each age group had a higher prevalence of having a flu shot within the past year compared to the younger age groups for both diabetics and non-diabetics.
- During this time period, diabetics had a significantly higher prevalence of having a flu immunization in the past year for all three listed age groups.

Figure 7-1. Estimated Percent of Pennsylvania Adults with Flu Immunization by Diabetes Status and Age Group, 2006-2008



Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

Figure 7-2. Estimated Percent of Pennsylvania Adults with Pneumonia Immunization by Diabetes Status and Age Group, 2006-2008



Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

- In 2006-2008, adults in both the 18-44 and 45-64 age groups had significantly lower prevalence rates for ever having a pneumonia shot compared to adults age 65 and older.
- During this time period, diabetics had a significantly higher prevalence of having a pneumonia immunization in the past year for all three listed age groups.

EXAMINATION by SELF and HEALTH CARE PROFESSIONALS

It is important for individuals with diabetes to check their feet daily for sores or irritations. Sores can develop on the feet, not heal properly, become infected and may ultimately result in an amputation of one or both extremities. An estimated 68 percent of adults with diabetes reported that they were checking their feet for sores or irritations daily during the 2006-2008 period.

Annual foot and dilated eye examinations by health care professionals are also essential for individuals with diabetes to help prevent complications due to the disease.

Table 6. Estimated Percentage of Pennsylvania Adults with Diabetes who Check Their Feet Daily, 2006-2008

Demographic	Percent	Confidence Interval
Total	68	65-70
Gender		
Male	65	61-69
Female	70	67-73
Age		
18-44	67	56-76
45-64	68	65-72
65+	67	64-70
Education		
<High School	69	62-75
High School	68	64-72
Some College	69	64-74
College Degree	64	58-70
Income		
<$15,000	69	63-75
$15,000 to $24,999	69	63-74
$25,000 to $49,999	66	61-70
$50,000 to $74,999	67	59-74
$75,000+	66	58-72
Race/Ethnicity		
White, non-Hispanic	67	64-70
Black, non-Hispanic	71	62-79
Hispanic	NSR	NSR

Source: Pennsylvania BRFSS. Note: NSR= not statistically reliable.

FEET CHECKED BY HEALTHCARE PROFESSIONAL

- During 2006-2008, those Pennsylvania adults who were aged 65+ were more likely to have had their feet checked one or more times in the past year than those Pennsylvania adults who were 18-44 years of age.
- During 2006-2008, there was no significant difference between gender, age, income or race/ethnicity in the prevalence of Pennsylvania adults with diabetes getting their feet checked one or more times in the past year.

Table 7. Estimated Percentage of Pennsylvania Adults with Diabetes who have had their Feet Checked by a Health Care Professional One or More Times in the Past Year, 2006-2008

Demographic	Percent	Confidence Interval
Total	76	73-78
Gender		
Male	76	72-80
Female	75	72-78
Age		
18-44	62	50-73
45-64	77	73-80
65+	79	76-82
Education		
<High School	77	70-83
High School	74	70-78
Some College	81	76-85
College Degree	74	68-79
Income		
<$15,000	76	69-81
$15,000 to $24,999	73	66-79
$25,000 to $49,999	79	75-83
$50,000 to $74,999	73	63-81
$75,000+	74	66-80
Race/Ethnicity		
White, non-Hispanic	76	73-78
Black, non-Hispanic	82	74-87
Hispanic	NSR	NSR

Source: Pennsylvania BRFSS. Note: NSR= not statistically reliable.

DILATED EYE EXAM

- In 2006-2008, diabetic Pennsylvania adults with a college degree had a significantly higher prevalence of having a dilated eye exam in the past year compared to those with less than a high school education.

Table 8. Estimated Percentage of Pennsylvania Adults with Diabetes who have had a Dilated Eye Exam in the Past Year, 2006-2008

Demographic	Percent	Confidence Interval
Total	72	70-75
Gender		
Male	71	66-75
Female	74	71-77
Age		
18-44	60	48-70
45-64	68	64-72
65+	81	78-83
Education		
<High School	65	58-72
High School	72	68-76
Some College	71	66-76
College Degree	79	73-83
Income		
<$15,000	67	60-73
$15,000 to $24,999	73	66-79
$25,000 to $49,999	70	65-75
$50,000 to $74,999	77	70-83
$75,000+	75	68-82
Race/Ethnicity		
White, non-Hispanic	73	70-75
Black, non-Hispanic	66	57-75
Hispanic	NSR	NSR

Source: Pennsylvania BRFSS. Note: NSR= not statistically reliable.

CHECKING BLOOD GLUCOSE or SUGAR LEVELS DAILY

- Another key element in proper diabetes management is controlling blood glucose levels. Establishing and controlling blood glucose levels is an individual process; what works for one person may not work for another.

Table 9. Estimated Percentage of Pennsylvania Adults with Diabetes who Check Their Blood Daily for Glucose or Sugar, 2006-2008

Demographic	Percent	Confidence Interval
Total	63	60-66
Gender		
Male	58	54-63
Female	68	65-71
Age		
18-44	57	46-68
45-64	62	58-66
65+	65	62-69
Education		
<High School	67	60-73
High School	63	59-67
Some College	63	57-68
College Degree	60	54-66
Income		
<$15,000	72	66-78
$15,000 to $24,999	59	53-66
$25,000 to $49,999	66	61-70
$50,000 to $74,999	59	50-67
$75,000+	56	48-63
Race/Ethnicity		
White, non-Hispanic	63	61-66
Black, non-Hispanic	62	53-71
Hispanic	NSR	NSR

Source: Pennsylvania BRFSS. Note: NSR= not statistically reliable.

A1C TEST

Checking blood glucose levels at home is one way to keep track of blood sugar changes, as this will inform an individual of their blood sugar level at any point in time. A way to gauge the control achieved over a longer period of time, such as a 2 to 3 month period, can be determined by having an A1C (also know as a glycated hemoglobin or HbA1c) test. Results of this test can provide indications of the success of a diabetes treatment plan.

According to Pennsylvania BRFSS results for 2006-2008, adult diabetics who were not insured had a significantly lower prevalence (59 percent, CI: 45-71) of having a hemoglobin A1C test within the past year compared to adult diabetics who were insured (86 percent, CI: 84-88).

Table 10. Estimated Percentage of Pennsylvania Adults with Diabetes who have had a A1C Test in the Past Year, 2006-2008

Demographic	Percent	Confidence Interval
Total	84	82-86
Gender		
Male	84	81-87
Female	85	82-87
Age		
18-44	83	72-90
45-64	86	82-88
65+	84	81-86
Education		
<High School	71	64-78
High School	85	82-88
Some College	85	81-89
College Degree	89	83-94
Income		
<$15,000	74	68-80
$15,000 to $24,999	84	79-88
$25,000 to $49,999	87	83-90
$50,000 to $74,999	85	75-91
$75,000+	93	89-96
Race/Ethnicity		
White, non-Hispanic	86	84-88
Black, non-Hispanic	80	72-86
Hispanic	NSR	NSR

Source: Pennsylvania BRFSS. Note: NSR= not statistically reliable.

- For 2006-2008, diabetic adults with less than a high school education had a significantly lower prevalence for having a hemoglobin A1C test in the past year compared to diabetic adults with high school, some college or a college degree.
- Diabetic adults who make less than $15,000 had a significantly lower prevalence for having hemoglobin A1C in the past year compared to those who make between $25,000 and $49,999 and those who make over $75,000.

Table 11. Estimated Percentage of Pennsylvania Adults with Diabetes who Have Never Heard of an A1C Test, 2006-2008

Demographic	Percent	Confidence Interval
Total	7	6-9
Gender		
Male	7	5-10
Female	8	6-10
Age		
18-44	5	2-12
45-64	6	4-8
65+	10	8-12
Education		
<High School	17	12-24
High School	7	5-9
Some College	7	4-10
College Degree	3	2-6
Income		
<$15,000	12	8-16
$15,000 to $24,999	10	7-14
$25,000 to $49,999	5	3-8
$50,000 to $74,999	6	3-10
$75,000+	3	2-7
Race/Ethnicity		
White, non-Hispanic	7	6-9
Black, non-Hispanic	8	4-14
Hispanic	NSR	NSR

Source: Pennsylvania BRFSS. Note: NSR= not statistically reliable.

EDUCATION and TRAINING

Education of individuals on how to manage their diabetes is an essential component of proper diabetes care. Taking a course on diabetes, whether it be at initial diagnosis (to help people learn self-care effectively) or on a long term basis (to help them continue to maintain proper self-care practices), is a powerful tool in assisting individuals in controlling blood glucose, preventing long term complications and maintaining quality of life. In 2006-2008, just over half of adults with diabetes, 53 percent, reported that they had taken a course on how to manage their diabetes.

In 2006-2008, according to Pennsylvania BRFSS results, there was no significant difference in the estimated percentage of Pennsylvania adults who took a course on diabetes by insurance status. About 54 percent (CI: 51-57) of insured and 42 percent (CI: 32-54) of uninsured Pennsylvanians took a course on how to manage diabetes themselves.

- For 2006-2008, adult diabetics with less than a high school education had a significantly lower prevalence for taking a course on how to manage diabetes themselves compared to adult diabetics having some college or a college degree.

Table 12. Estimated Percentage of Pennsylvania Adults with Diabetes who Have Taken a Course on how to Manage Diabetes Themselves, 2006-2008

Demographic	Percent	Confidence Interval
Total	53	50-56
Gender		
Male	50	46-54
Female	56	53-60
Age		
18-44	59	47-70
45-64	55	51-59
65+	50	46-53
Education		
<High School	39	33-46
High School	50	46-54
Some College	60	55-66
College Degree	60	53-65
Income		
<$15,000	48	42-55
$15,000 to $24,999	50	44-55
$25,000 to $49,999	54	49-59
$50,000 to $74,999	56	48-65
$75,000+	59	51-66
Race/Ethnicity		
White, non-Hispanic	53	51-66
Black, non-Hispanic	58	50-66
Hispanic	NSR	NSR

Source: Pennsylvania BRFSS. Note: NSR= not statistically reliable.

VIII. Diabetes Hospitalizations & Economic Impact

Discussion on the impact of diabetes has to include a discussion of the disease's significant economic burden. Individuals with diabetes access the healthcare system both for regular monitoring of their disease and, if necessary, for treatment of long-term complications.

- Nationally, diabetes has a significant economic impact. Including both direct and indirect costs related to diabetes and its associated complications, $174 billion a year is spent on diabetes and related care. [1]

- In Pennsylvania in 2007, hospitalizations for which diabetes was the principal diagnosis incurred over $833 million in hospital charges and accounted for over 132,200 hospital days.

- From 2003 to 2007, total costs for diabetes-related hospital charges in Pennsylvania have reached more than $3.6 billion and accounted for over 663,000 days in the hospital.

HOSPITALIZATIONS

Proper medical care, along with proper self-management practices, can help control the disease and prevent more expensive care in hospitals and other settings. In Pennsylvania, the Pennsylvania Health Care Cost Containment Council, or PHC4, is the independent agency responsible for addressing the problem of escalating health care costs and ensuring that Pennsylvanians receive quality health care.

- The number of hospitalizations for which diabetes was the principal diagnosis rose by 11 percent between 2000 and 2007, growing from 21,842 to 234,646 hospitalizations.

- While the number and rate of hospitalizations for type 1 diabetes have decreased from 2000 to 2007, the number and rate of hospitalizations for type 2 diabetes have increased steadily during this period.

- Between 2000 and 2004, hospitalization rates for diabetes increased with age. The most pronounced increase was in the 20 to 39 age group, where admission rates jumped 26.0 percent.

- African-Americans continued to have the highest rates of hospitalization for diabetes, as well as the highest rates of lower extremity amputations and hospitalizations for end-stage renal disease.

- In 2007, Medicare was the primary payor for 48 percent of the hospitalizations for diabetes as a principal diagnosis. Private insurers had the next highest percentage at 24.3 percent.

- Multiple hospitalizations for diabetes are common and costly. Some 15.6 percent of patients with diabetes were hospitalized two or more times in 2007.

Disclaimer:
The Pennsylvania Health Care Cost Containment Council (PHC4) is an independent state agency responsible for addressing the problem of escalating health costs, ensuring the quality of health care and increasing access to health care for all citizens, regardless of ability to pay. PHC4 has provided data to this entity in an effort to further PHC4's mission of educating the public and containing health care costs in Pennsylvania.

PHC4, its agents and staff have made no representation, guarantee or warranty, express or implied, that the data--whether financial, patient, payor or physician specific information--provided to this entity, are error-free, or that the use of the data will avoid differences of opinion or interpretation.

This analysis was not prepared by PHC4. This analysis was done by the Pennsylvania Department of Health, Bureau of Health Statistics and Research. PHC4, its agents and staff bear no responsibility or liability for the results of the analysis, which are solely the opinion of this entity.

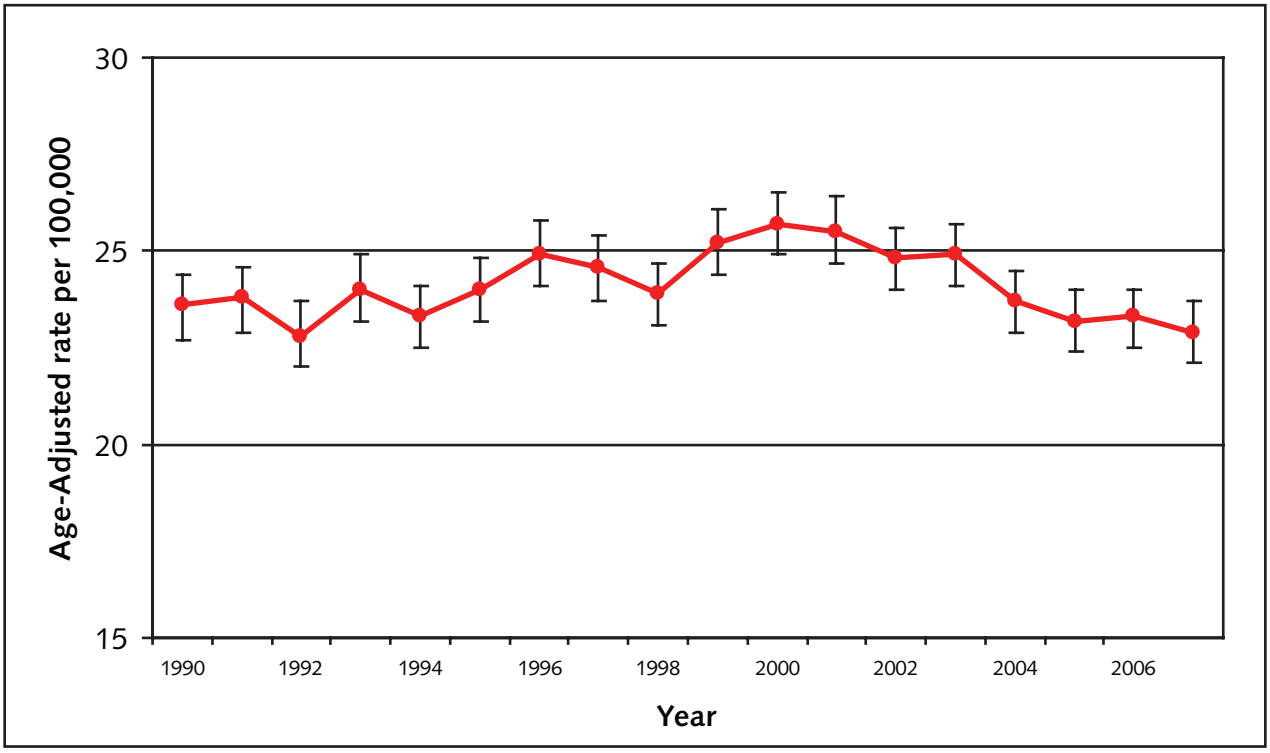
IX. Diabetes Mortality

According to the 2007 Vital Statistics Report published by the Bureau of Health Statistics and Research, Pennsylvania Department of Health, diabetes mellitus was the seventh leading cause of death in Pennsylvania, causing a total of 3,420 deaths.[4]

- While the death rate fluctuates throughout the trended period, overall, there was a general increase in the death rate for Pennsylvanians due to diabetes between 1990 and 2000. However, the rate has been on the decline since 2001.

Diabetes deaths presented are defined according tothe following International Classification of Diseases codes:
ICD-10: E10-E14/ICD-9: 250

Figure 9-1. Diabetes Age-Adjusted Mortality Rate, Pennsylvania, 1990-2007



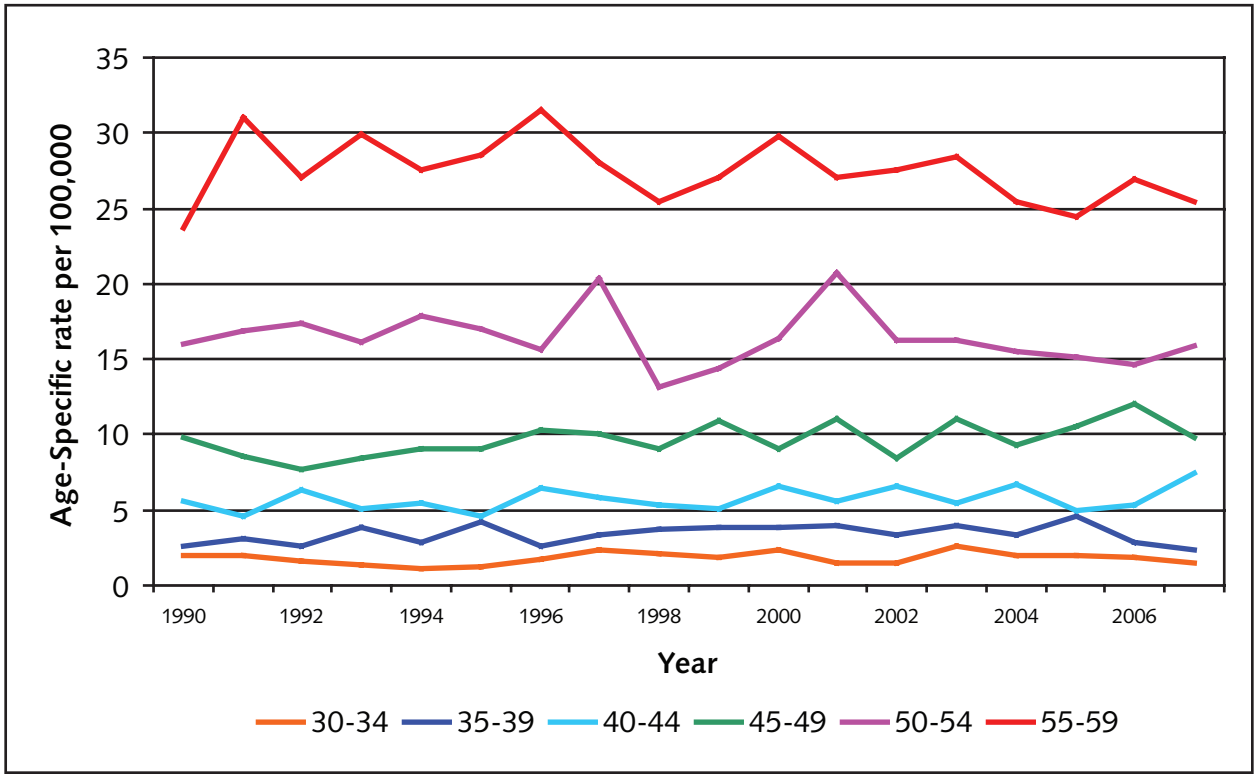
Source: Pennsylvania Certificates of Death.

AGE

The following graphs illustrate the diabetes mortality rates of Pennsylvania residents over time by age, with the first graph showing trends of ages 30 to 59 and the second graph showing trends beginning with age 60. Rates for individuals 29 years of age and younger are not displayed, as statistics were not calculated for these groups. The numbers of deaths involved are less than 10 and would result in unreliable statistics.

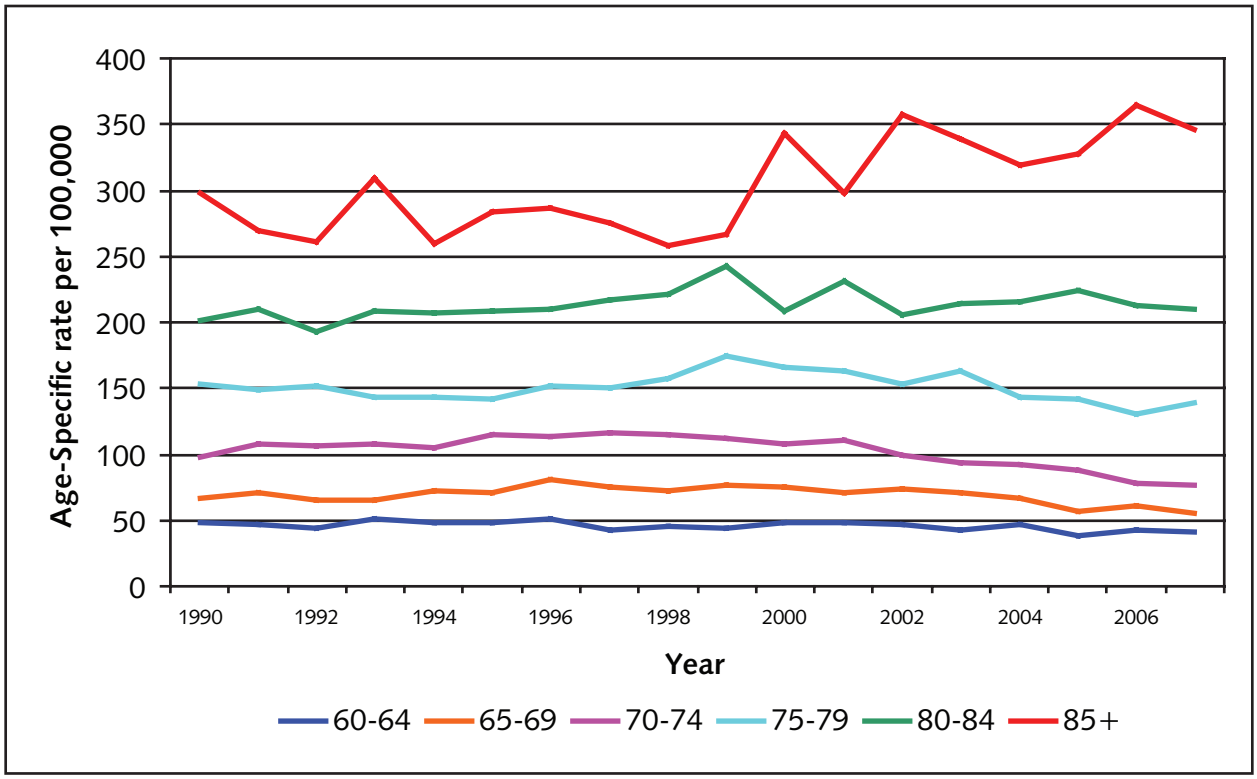
- As the population ages, increases in mortality rates from diabetes are observed.
- The burden of diabetes, along with its corresponding death rate, is greatest among the oldest residents of the commonwealth, those 85 years of age and older.

Figure 9-2. Diabetes Age-Specific Mortality Rate Trends, Pennsylvania, 1990-2007



Source: Pennsylvania Certificates of Death.

Figure 9-3. Diabetes Age-Specific Mortality Rate Trends, Pennsylvania, 1990-2007

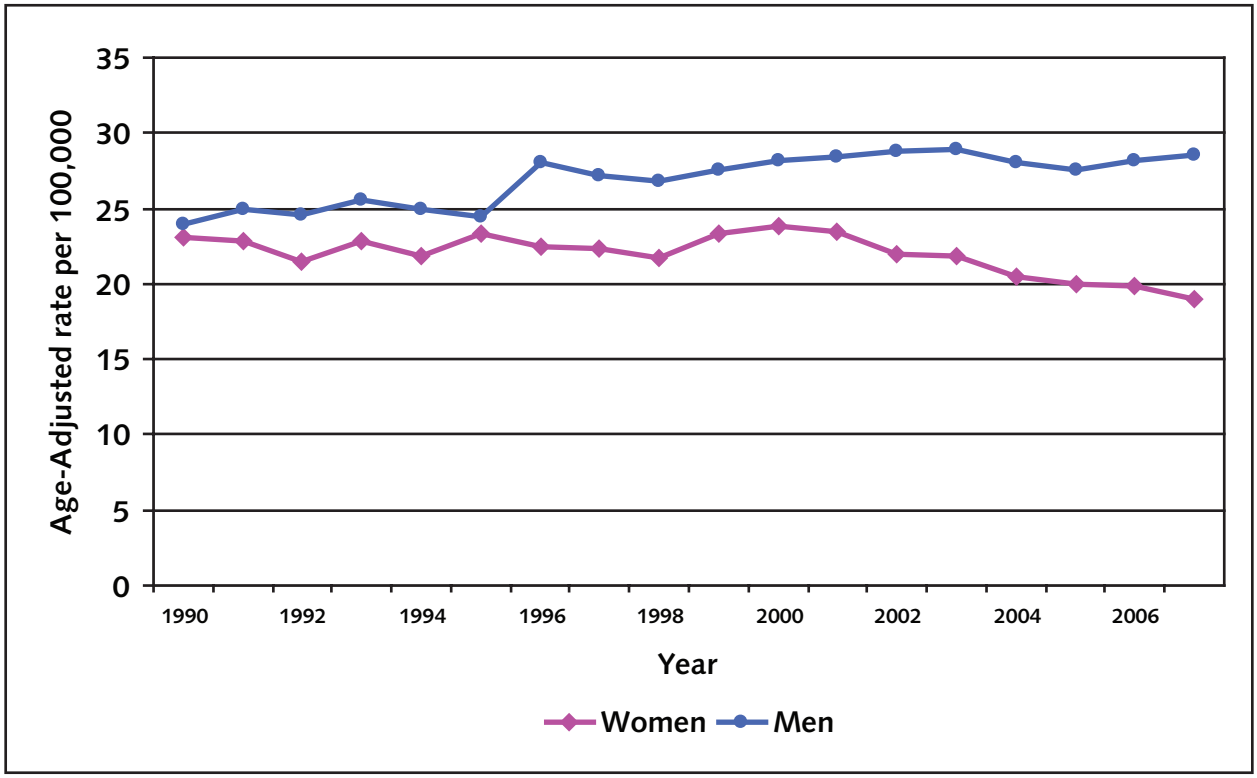


Source: Pennsylvania Certificates of Death.

GENDER

- The trend figure below shows that, from 1990 to 2007, the diabetes death rate is higher in men compared to women. In addition, while the death rate has been declining recently for women, there is a slight increasing trend for men.

Figure 9-4. Diabetes Age-Adjusted Mortality Rate Trends by Gender, Pennsylvania, 1990-2007

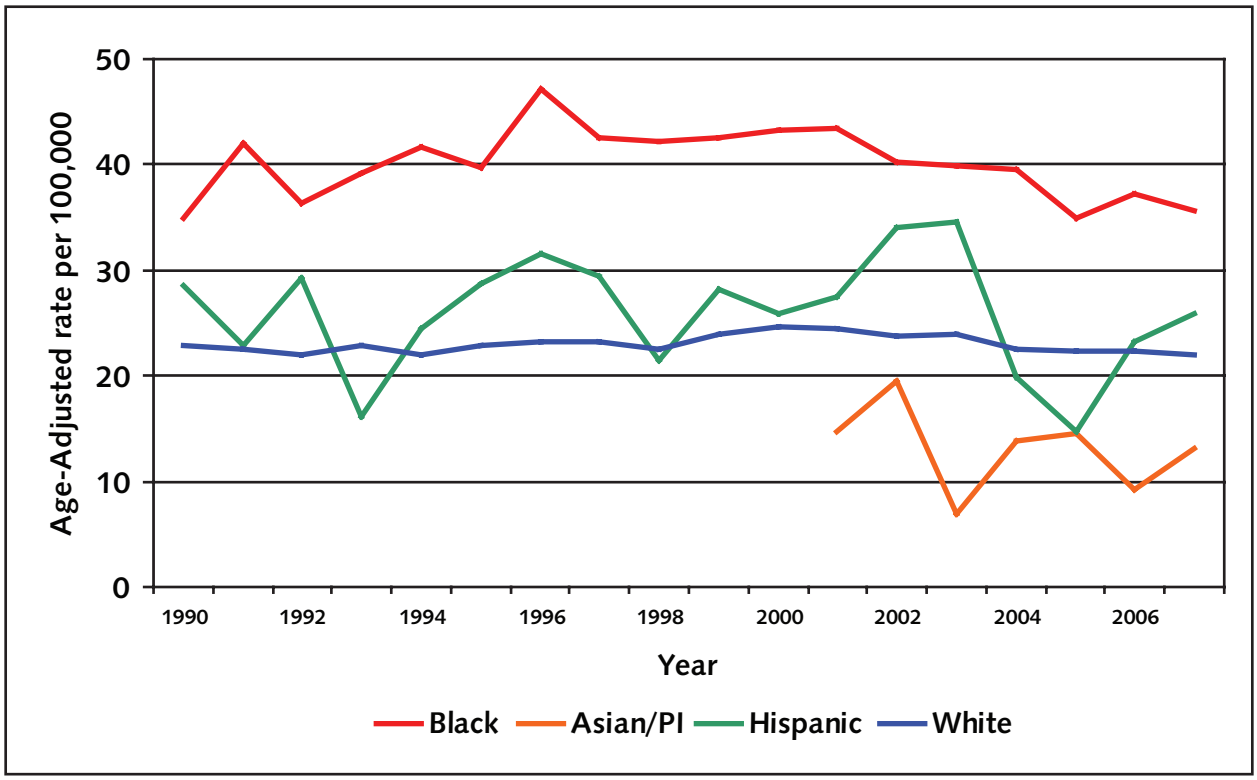


Source: Pennsylvania Certificates of Death.

RACE/ETHNICITY

- The following graph illustrates the diabetes mortality trends of Pennsylvania residents of identified races and those of Hispanic Origin. Not all races are represented for all years due to small numbers of events.

Figure 9-5. Diabetes Age-Adjusted Mortality Rate Trends by Race/Ethnicity, Pennsylvania, 1990-2007



Source: Pennsylvania Certificates of Death.
Note: Hispanics can be of any race

- Since 1990, blacks have had a higher diabetes death rate, consistently higher and almost double that of whites. The rate for Hispanics has also been higher at times than for whites. Rates for Asian/Pacific islanders tend to be lower than the other groups.

Table 13. Diabetes Age-Adjusted Death Rates per 100,000 by Gender & Race/Ethnicity, Pennsylvania, 1990-2007

Year	Total	Gender		Race/Ethnicity			
		Female	Male	Asian/PI	Black	Hispanic	White
1990	23.6	23.1	24.0	n/a	34.9	28.6	22.8
1991	23.8	22.8	24.9	n/a	42.1	22.8	22.5
1992	22.8	21.5	24.6	n/a	36.3	29.3	21.9
1993	24.0	22.8	25.6	n/a	39.1	16.2	22.9
1994	23.3	21.9	25.0	n/a	41.7	24.4	21.9
1995	24.0	23.3	24.4	n/a	39.8	28.7	22.8
1996	24.9	22.5	28.0	n/a	47.1	31.5	23.3
1997	24.6	22.4	27.2	n/a	42.6	29.5	23.2
1998	23.9	21.7	26.8	n/a	42.2	21.4	22.6
1999	25.2	23.3	27.6	n/a	42.5	28.2	24.0
2000	25.7	23.8	28.2	n/a	43.3	25.9	24.7
2001	25.5	23.5	28.4	14.8	43.4	27.4	24.5
2002	24.8	22.0	28.8	19.5	40.2	34.1	23.8
2003	24.9	21.9	28.9	7.0	39.9	34.6	23.9
2004	23.7	20.5	28.0	13.9	39.6	19.8	22.6
2005	23.2	20.0	27.6	14.5	35.0	14.8	22.4
2006	23.3	19.9	28.2	9.3	37.3	23.2	22.3
2007	22.9	19.0	28.5	13.1	35.6	25.8	22.0

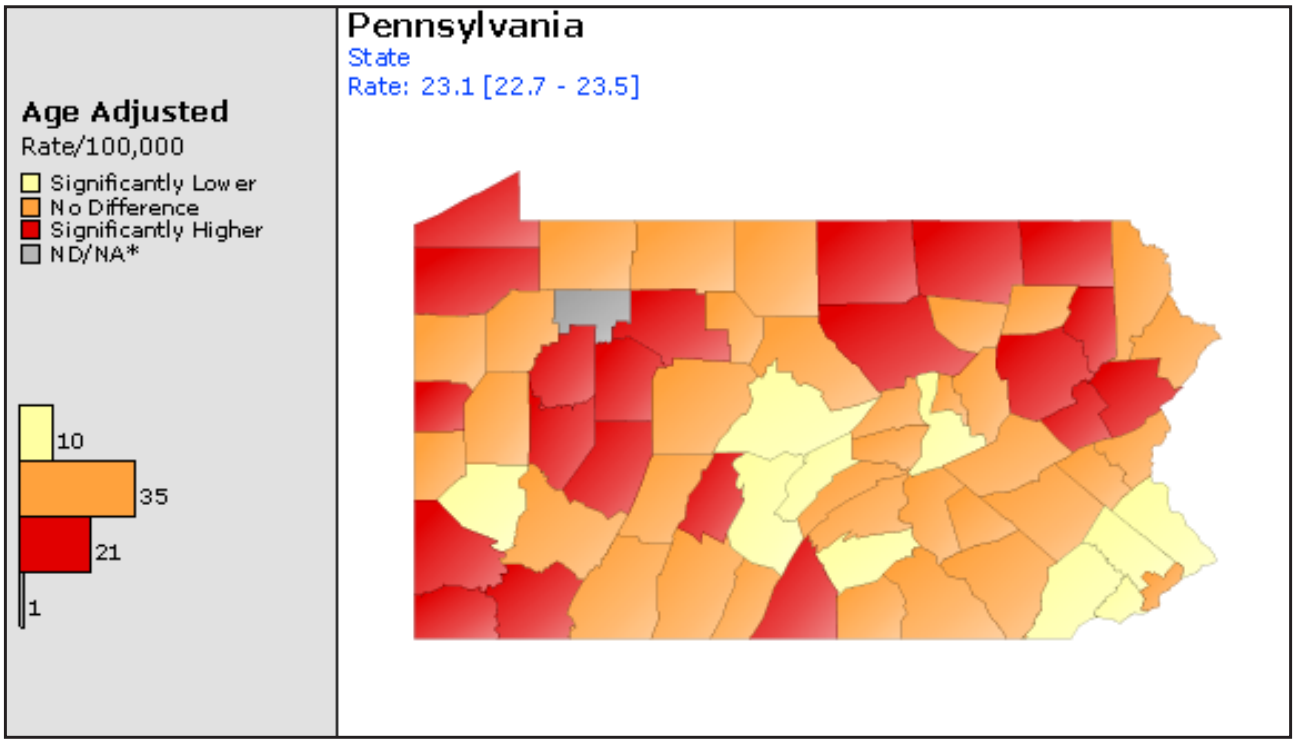
Source: Pennsylvania Certificates of Death.
Note: Hispanics can be of any race; n/a= data not available.

GEOGRAPHY

The following map provides a geographical depiction of the diabetes mortality by county in Pennsylvania. Rates are for the 2005-2007 period and are age-adjusted.

- Twenty-one counties had significantly higher diabetes mortality rates compared to the state rate: Armstrong, Blair, Bradford, Carbon, Clarion, Crawford, Elk, Erie, Fayette, Franklin, Greene, Indiana, Jefferson, Lackawanna, Lawrence, Luzerne, Lycoming, Monroe, Susquehanna, Tioga and Washington.
- Only ten counties rank as having significantly lower diabetes mortality rates compared to state rate: Allegheny, Bucks, Centre, Chester, Cumberland, Delaware, Huntingdon, Montgomery, Mifflin and Northumberland.

Figure 9-6. Total Diabetes Mortality, Age-Adjusted County Rates Compared to State Rate, Pennsylvania, 2005-2007



Source: Pennsylvania Certificates of Death. Note: ND= Not displayed if count < 10.

HEALTHY PEOPLE 2010

The national Healthy People 2010 (HP2010) goal (Objective 05-05) is to reduce the age-adjusted diabetes (underlying and contributing cause) death rate to 45 or less per 100,000 population. Some county rates are not listed in the table below. Due to the small number of deaths in some counties, data was characterized as statistically unreliable (DSU). All rates are age-adjusted to the 2000 U.S. standard million population per 100,000.

- Pennsylvania's 2007 age-adjusted death rate (78.6) is almost 75 percent higher than the goal of 45.
- County rates ranged from below the HP2010 goal to over three times higher than the goal. The county with the highest age-adjusted death rate (139.8 per 100,000) in 2007 was Fayette. This county rate was followed closely by Lycoming (133.5) and Sullivan (131.5) in 2007.

Table 14. Age-Adjusted Diabetes Death Rate by County Compared to Healthy People 2010 Goal,Pennsylvania, 2003-2007

COUNTY	2010 Goal	County 2007	County 2006	County 2005	County 2004	County 2003
All Counties	**45**	78.6	80.7	80.0	80.7	83.5
Adams	**45**	107.1	78.1	97.9	85.3	94.9
Allegheny	**45**	70.0	71.4	70.5	73.8	75.2
Armstrong	**45**	90.0	98.9	101.5	91.3	93.4
Beaver	**45**	87.3	92.2	77.1	77.3	87.2
Bedford	**45**	72.8	98.6	91.4	78.5	101.5
Berks	**45**	71.0	79.0	88.3	83.6	91.3
Blair	**45**	118.8	141.5	118.3	124.7	134.2
Bradford	**45**	77.4	106.7	112.1	138.0	112.3
Bucks	**45**	61.4	53.5	59.4	59.5	68.0
Butler	**45**	86.6	80.4	76.9	77.3	69.8
Cambria	**45**	103.9	102.6	88.4	102.1	93.8
Cameron	**45**	DSU	DSU	DSU	DSU	DSU
Carbon	**45**	100.7	105.4	117.1	86.4	99.4
Centre	**45**	90.9	91.3	68.7	89.7	108.1
Chester	**45**	48.9	54.5	52.5	46.7	52.3
Clarion	**45**	84.9	130.2	63.0	107.8	81.2
Clearfield	**45**	113.1	106.3	93.8	105.6	92.1
Clinton	**45**	104.5	97.7	122.7	118.2	135.4

COUNTY	2010 Goal	County 2007	County 2006	County 2005	County 2004	County 2003
Columbia	**45**	84.8	88.3	80.0	70.0	82.9
Crawford	**45**	117.5	106.5	100.1	98.8	97.6
Cumberland	**45**	61.6	78.1	61.6	69.2	76.9
Dauphin	**45**	75.8	74.8	76.6	71.6	77.7
Delaware	**45**	63.2	63.5	58.5	65.0	63.6
Elk	**45**	80.2	64.1	75.4	64.9	70.6
Erie	**45**	91.7	85.7	91.0	90.1	92.5
Fayette	**45**	139.8	135.8	132.5	136.8	131.4
Forest	**45**	130.0	DSU	DSU	DSU	DSU
Franklin	**45**	87.1	98.0	113.1	109.9	132.2
Fulton	**45**	78.6	81.0	87.0	DSU	130.6
Greene	**45**	87.6	74.2	89.5	74.9	95.3
Huntingdon	**45**	73.2	108.7	98.0	101.7	120.4
Indiana	**45**	88.0	106.1	93.9	83.0	88.7
Jefferson	**45**	101.3	103.2	105.2	94.1	92.1
Juniata	**45**	90.4	137.5	176.0	75.2	96.4
Lackawanna	**45**	93.5	86.0	88.3	92.0	97.2
Lancaster	**45**	65.5	77.0	79.1	75.8	78.3
Lawrence	**45**	93.4	86.3	86.4	76.9	89.2
Lebanon	**45**	81.8	80.4	91.3	80.9	92.0
Lehigh	**45**	75.9	71.1	62.7	69.9	73.0
Luzerne	**45**	117.0	119.0	103.4	123.0	118.8
Lycoming	**45**	133.5	125.5	150.2	126.9	124.8
McKean	**45**	99.1	89.7	104.2	66.4	79.4
Mercer	**45**	100.9	86.0	99.4	88.0	108.4
Mifflin	**45**	92.6	83.3	105.7	89.7	119.6
Monroe	**45**	73.6	105.5	86.9	81.2	77.6
Montgomery	**45**	52.8	59.2	59.7	60.0	56.0
Montour	**45**	47.4	56.8	119.6	DSU	DSU
Northampton	**45**	82.5	82.3	67.4	66.5	58.0
Northumberland	**45**	76.7	70.3	87.3	87.2	84.8
Perry	**45**	73.7	83.7	102.1	78.5	81.1

COUNTY	2010 Goal	County 2007	County 2006	County 2005	County 2004	County 2003
Philadelphia	**45**	70.9	71.6	73.4	75.8	77.9
Pike	**45**	68.4	62.0	67.3	37.1	DSU
Potter	**45**	109.3	77.1	101.9	DSU	119.7
Schuylkill	**45**	117.1	119.3	116.2	130.4	138.2
Snyder	**45**	58.6	61.5	47.4	76.8	69.8
Somerset	**45**	99.6	96.2	95.4	97.3	121.2
Sullivan	**45**	131.5	DSU	DSU	DSU	DSU
Susquehanna	**45**	93.1	118.3	133.2	129.6	101.6
Tioga	**45**	83.2	94.1	97.1	83.5	82.0
Union	**45**	83.6	102.5	73.2	111.0	110.5
Venango	**45**	105.4	116.2	107.0	136.7	116.7
Warren	**45**	80.0	82.4	87.7	66.1	87.2
Washington	**45**	77.6	88.0	80.3	81.7	82.1
Wayne	**45**	83.4	86.0	72.0	84.4	114.0
Westmoreland	**45**	79.8	84.1	81.8	82.3	86.7
Wyoming	**45**	94.1	120.2	93.4	73.0	80.8
York	**45**	92.4	91.0	90.7	88.6	83.8

Source: Pennsylvania Certificates of Death.
Note: Includes diabetes as an underlying & contributing cause of death.

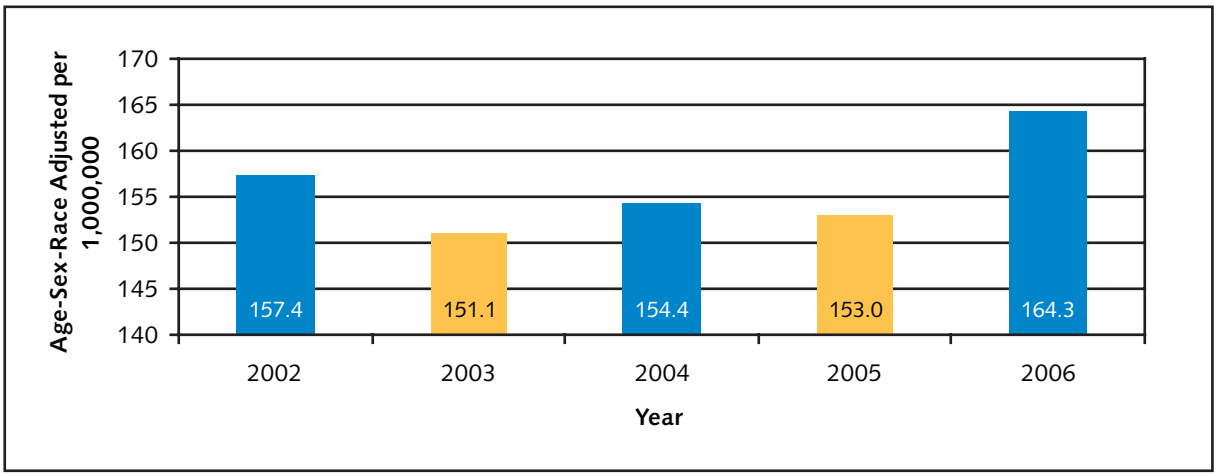
X. Diabetes-Related Diseases & Conditions

NEPHROPATHY

One of the long term complications that can result from diabetes is nephropathy, or kidney disease. Diabetes can damage the kidneys, thus reducing their ability to filter out wastes from the body. Not everyone with diabetes will develop kidney disease, and those that are able to control their diabetes and their blood pressure will lower their chance of developing kidney disease. The final stage of kidney disease, end stage renal disease (ESRD), is a condition often associated with diabetes and results in the need for life sustaining kidney dialysis or for a transplant. The American Diabetes Association (ADA) provides the following statistics on nephropathy:[10]

- Diabetes is the leading cause of kidney failure, responsible for 44 percent of the new cases in 2005
- 46,739 people with diabetes started treatment for end-stage renal disease (ESRD) in 2005
- 178,689 people with ESRD caused by diabetes were living with a kidney transplant or on chronic dialysis in 2002.
- Kidney damage can be reduced by 35 percent to 56 percent with therapy that keeps blood glucose levels in the normal range for people with type 1 diabetes. This is believed to apply to individuals with type 2 diabetes as well.

Figure 10-1. Age-Sex-Race Adjusted Incidence Rate for New Cases of End Stage Renal Disease Among Adult Diabetics, Pennsylvania, 2002-2006

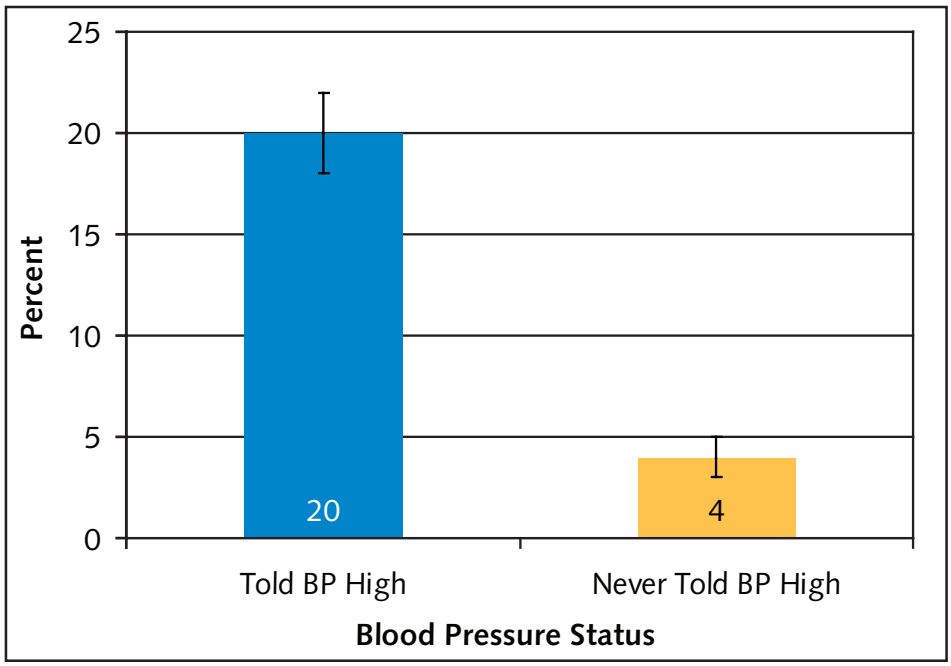


Source: Bureau of Health Statistics & Research, Pennsylvania Department of Health (Healthy People 2010). [9]

Individuals with diabetes are more likely to have high blood pressure. The combination of high blood pressure and diabetes can increase the risk for heart disease, eye disease, stroke, kidney problems and nerve disease. It is important, then, to control high blood pressure, particularly in adults with diabetes. Heart disease and stroke, the two major components of cardiovascular disease, occur more often for people with diabetes compared to non-diabetics.

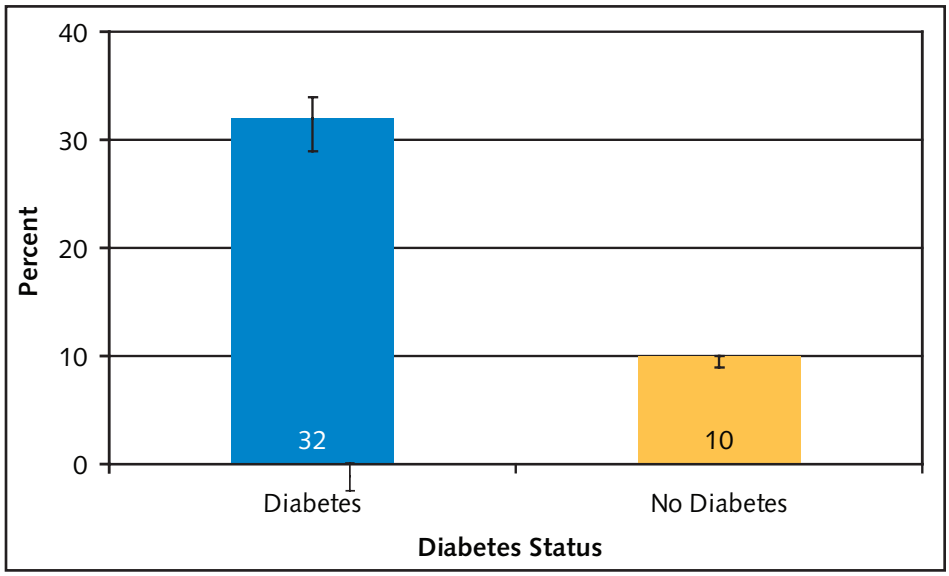
- In 2007, adults who had been told they have high blood pressure had a significantly higher diabetes prevalence compared to adults who had never been told they had high blood pressure.
- In 2006-2008, diabetic adults had a significantly higher prevalence for ever being told they had a heart attack, heart disease or a stroke when compared to non-diabetic adults.

Figure 10-2. Estimated Diabetes Prevalence by Blood Pressure Status, Pennsylvania, 2007



Source: Pennsylvania BRFSS. Note: I symbol marks lower and upper 95 percent confidence interval (CI).

Figure 10-3. Cardiovascular Disease* Prevalence by Diabetes Status, Pennsylvania, 2006-2008



Source: Pennsylvania BRFSS.
Note: I symbol marks lower and upper 95 percent confidence interval (CI).
*Percent of adults ever told they had a heart attack, heart disease or stroke

RETINOPATHY or AFFECTED EYES

Retinopathy refers to all disorders of the retina caused by diabetes. Control of blood sugar and blood pressure can influence the development of retinopathy, and heredity and the length of time with diabetes can also have an influence.

- For 2006-2008, adults with household incomes of $75,000 or more had a significantly lower prevalence of being told that diabetes has affected their eyes or that they have retinopathy compared to adults with household incomes of less than $15,000.
- For 2006-2008, adults with some college education had a significantly lower prevalence of being told that diabetes has affected their eyes or that they have retinopathy compared to adults with less than a high school education.

Table 15. Estimated Percentage of Pennsylvania Adults with Diabetes whose Doctor has Told Them That Diabetes Has Affected Their Eyes or That The have Retinopathy, 2006-2008

Demographic	Percent	Confidence Interval
Total	18	16-20
Gender		
Male	19	16-23
Female	17	15-19
Age		
18-44	17	10-26
45-64	18	15-21
65+	19	16-22
Education		
<High School	25	20-31
High School	19	16-23
Some College	15	11-18
College Degree	16	12-20
Income		
<$15,000	27	21-33
$15,000 to $24,999	20	15-25
$25,000 to $49,999	18	14-22
$50,000 to $74,999	9	6-15
$75,000+	13	9-20
Race/Ethnicity		
White, non-Hispanic	17	15-19
Black, non-Hispanic	25	17-34
Hispanic	NSR	NSR

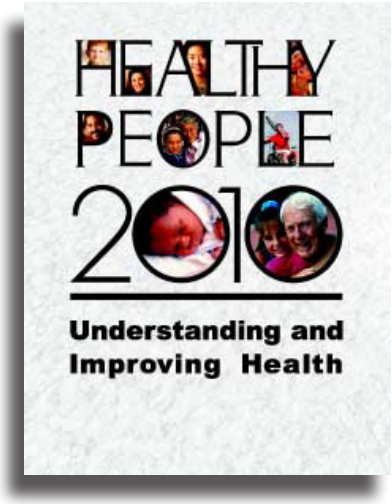
Source: Pennsylvania BRFSS. Note: NSR= not statistically reliable.

XI. Healthy People 2010

Healthy People 2010 is a set of national public health objectives established to help states, communities, professional organizations and others to gauge their efforts and to develop programs to improve the health of the nation. Starting with the 1979 Surgeon General's Report, Healthy People, and later with the publishing of Healthy People 2000: National Health Promotion and Disease Prevention Objectives, the HP2010 objectives serve as the basis for the development of State and community plans. These objectives build on efforts and initiatives pursued over the past two decades.

Healthy People 2010 is designed to achieve two overarching goals: (1) increasing the quality and years of healthy life for all ages and (2) eliminating health disparities among different segments of the population. Diabetes is one of 28 focus areas of Healthy People 2010, and each area has its own objectives and targets. The goal of the Diabetes focus area is to 'through prevention programs, reduce the disease and economic burden of diabetes, and improve the quality of life for all persons who have or are at risk for diabetes.' There are a total of 15 primary objectives within the Diabetes focus area, as well as a host of related objectives gleaned from other focus areas. The Bureau of Health Statistics & Research, Pennsylvania Department of Health currently monitors Pennsylvania's progress on seven of the fifteen Healthy People 2010 diabetes objectives.

For more information on Healthy People 2010, visit www.healthypeople.gov. For Pennsylvania data on Healthy People 2010 objectives, visit the Bureau of Health Statistics and Research, Pennsylvania Department of Health Web page at www.health.state.pa.us/stats.



Objective 5-1: Increase the proportion of persons with diabetes who receive formal diabetes education.

Diabetes education can be a powerful tool in the patient's strategy for proper diabetes management and ultimately in the prevention of long-term complications from the disease. As it is likely that individuals with diabetes have limited interactions with the health care system and are faced with daily decisions about the management of their diabetes, it is essential that they are informed and educated to make proper decisions. Individuals with diabetes in Pennsylvania are lagging behind the Healthy People 2010 target for attending a class in managing their diabetes, as is shown in the table below. This lag is represented by much of the data of the past five years.

While the reason for this lag is often to speculation, the fact that diabetes education is so integral to the management of diabetes indicates that Pennsylvania has room for improvement to provide or make diabetes education classes more accessible, as well as to encourage individuals with diabetes to participate in a class and learn the necessary tools for better self-management of their disease.

Healthy People 2010 Objective 5-1
(age-adjusted to 2000 standard population, rates per 100)

Demographic	2010 Goal	PA 2008	PA 2007	PA 2006	PA 2005	PA 2004
All Diabetics	**60**	62± 8	60± 14	50± 10	50± 7	49± 9
Gender						
Male	**60**	62± 12	DSU	DSU	43±10	50±13
Female	**60**	61± 9	66± 10	59± 13	57± 8	48± 11
Education						
Less than High School 25+	**60**	25± 7	DSU	DSU	DSU	15±12
High School Grad 25+	**60**	58± 11	62± 11	41± 12	47±11	55±12
At least some college 25+	**60**	65± 9	70± 7	65± 12	55± 9	62±12
Race/Ethnicity						
White, non-Hispanic	**60**	58± 9	63± 10	54± 12	53± 8	50± 9
Black, non-Hispanic	**60**	DSU	70± 12	DSU	DSU	DSU
Hispanic	**60**	DSU	DSU	DSU	DSU	DSU

Source: Pennsylvania BRFSS. Note: DSU= data statistically unreliable due to small numbers. Hispanics can be of any race.

"±" figures indicate the 95 percent confidence interval range. A 95 percent confidence interval (CI) is composed of two figures (upper and lower limits) computed specifically for a rate. That range identifies the variability of the rate. For example, 95 percent of the time, the true rate (unaffected by chance variation or number of events) will occur within that range.

Objective 5-3: Reduce the overall rate of diabetes that is clinically diagnosed.

In Pennsylvania, we see that the age-adjusted rate (per 100,000) of adults aged 18 years and older diagnosed with diabetes is three to five times higher than the Healthy People 2010 Goal. The state rate is consistently higher than the 2010 goal for all demographic groups, with the rate for African-Americans also being significantly higher than the rate for whites.

Healthy People 2010 Objective 5-3
(age-adjusted to 2000 standard population, rates per 100,000)

Demographic	2010 Goal	PA 2008	PA 2007	PA 2006	PA 2005	PA 2004
All Adults	**25**	79± 6	78± 9	77± 8	74± 6	72± 7
Gender						
Male	**25**	90± 11	92± 16	91± 14	77±10	79±12
Female	**25**	69± 7	64± 7	63± 8	72± 8	65± 9
Geography						
Urban	**25**	77± 8	74± 8	75± 9	73± 7	71± 8
Rural	**25**	84± 12	87± 25	82± 16	79±13	76±16
Race/Ethnicity						
White, non-Hispanic	**25**	72± 6	65± 6	70± 8	69± 6	69± 7
Black, non-Hispanic	**25**	148± 40	159± 47	120± 43	123±31	97± 37
Hispanic	**25**	83± 63	115± 70	144± 83	78±61	123± 87

Source: Pennsylvania BRFSS. Note: Hispanics can be of any race.

Objective 5-5: Reduce the diabetes death rate.

Pennsylvania's overall diabetes age-adjusted death rate is almost 80 percent higher than the target of 45 per 100,000 population. This rate represents the listing of diabetes as an underlying or contributing cause on an individual's death certificate.

Healthy People 2010 Objective 5-5
(age-adjusted to 2000 standard population, rates per 100,000)

Demographic	2010 Goal	PA 2006	PA 2005	PA 2004	PA 2003	PA 2002
All Persons	**45**	80.7	80.0	80.7	83.5	84.5
Gender						
Male	**45**	101.6	98.3	98.1	101.9	102.5
Female	**45**	67.6	67.5	68.5	70.8	72.4
Race/Ethnicity						
White	**45**	79.3	78.1	79.1	81.4	82.6
Black	**45**	150.9	109.4	108.2	116.5	113.6
Hispanic	**45**	61.1	63.8	60.0	84.7	92.7
Age						
Persons under 45**	n/a	2.9	3.2	3.1	3.6	3.4
Persons 45 to 64**	n/a	63.3	63.8	61.6	64.0	66.0
Persons 65 to 74**	n/a	243.9	261.0	276.1	283.4	289.2
Persons 75+**	n/a	813.2	791.9	788.6	803.6	798.6

Source: Bureau of Health Statistics & Research, Pennsylvania Department of Health.
Note: Hispanics can be of any race; **= age-specific rates are not age-adjusted.

Objective 5-12: Increase the proportion of adults with diabetes who have a glycosylated hemoglobin measurement at least twice a year.

One of the major strategies for management of diabetes is proper glycemic control. Proper control helps to protect the health of many major systems in the body and also decreases diabetes related complications. The responsibility for regular testing of glycosylated hemoglobin falls on both patients and the health care system, with each needing to ensure that appropriate measurements are taken. Available data on this objective indicate that Pennsylvania has exceeded the target for this objective.

Healthy People 2010 Objective 5-12
(age-adjusted to 2000 standard population, rates per 100)

Demographic	2010 Goal	PA 2008	PA 2007	PA 2006
Diabetic Adults	**50**	73± 8	66± 15	68± 12
Gender				
Male	**50**	75± 12	DSU	DSU
Female	**50**	71± 10	70± 11	79± 11
Education				
Less than High School 25+	**50**	86± 6	DSU	DSU
High School Grad 25+	**50**	78± 10	67± 11	56± 13
At least some college 25+	**50**	71± 9	70± 13	82± 10
Race/Ethnicity				
White, non-Hispanic	**50**	73± 9	71± 10	DSU
Black, non-Hispanic	**50**	DSU	72± 12	DSU
Hispanic	**50**	DSU	DSU	DSU
Age				
Persons 18-44**	n/a	DSU	DSU	DSU
Persons 45 to 64**	n/a	78± 6	DSU	73± 9
Persons 65 to 74**	n/a	76± 8	DSU	83± 8
Persons 75+**	n/a	81± 7	DSU	82± 9

Source: Pennsylvania BRFSS.
Note: DSU= data statistically unreliable due to small numbers; Hispanics can be of any race;
** = age-specific rates are not age-adjusted; n/a = Data not available.

Objective 5-13: Increase the proportion of adults with diabetes who have an annual dilated eye examination.

As with other tests and measures that are indicated for proper diabetes management, an annual dilated eye examination is important for early detection and prevention of long term complications resulting from diabetes, in this case, blindness. Despite the importance of annual dilated eye exams, Pennsylvanians with diabetes have been unable to meet the target of 75 percent consistently. However, certain segments of the population have exceeded the target in past years. Health education efforts directed at patients with diabetes, primary care physicians and eye care professionals may help improve compliance with this important disease management recommendation.

Healthy People 2010 Objective 5-13
(age-adjusted to 2000 standard population, rates per 100)

Demographic	2010 Goal	PA 2008	PA 2007	PA 2006	PA 2005	PA 2004
Diabetic Adults	**75**	61± 9	75± 9	68± 11	59± 7	67± 9
Gender						
Male	**75**	53± 12	76± 11	DSU	57±11	70± 13
Female	**75**	71± 10	70± 12	71± 13	61± 8	63±11
Education						
Less than High School 25+	**75**	84± 7	DSU	74± 8	DSU	DSU
High School Grad 25+	**75**	60± 12	71± 14	DSU	62±12	59±12
At least some college 25+	**75**	64± 10	77± 11	74± 13	56± 8	73± 13
Race/Ethnicity						
White, non-Hispanic	**75**	60± 9	67± 11	66± 13	59± 8	67± 9
Black, non-Hispanic	**75**	DSU	DSU	DSU	DSU	DSU
Hispanic	**75**	DSU	DSU	DSU	DSU	DSU
Age						
Persons 18-44**	n/a	DSU	DSU	DSU	48±12	DSU
Persons 45 to 64**	n/a	68± 6	68± 7	66± 8	69± 6	65± 8
Persons 65 to 74**	n/a	77± 7	DSU	76± 9	72± 7	73± 9
Persons 75+**	n/a	84± 6	DSU	85± 8	81± 7	77± 10

Source: Pennsylvania BRFSS.
Note: DSU= data statistically unreliable due to small numbers; Hispanics can be of any race;
** = age-specific rates are not age-adjusted; n/a = Data not available.

Objective 5-14: Increase the proportion of adults with diabetes who have at least an annual foot examination.

An annual foot examination is another measure of proper diabetes management. A concerted effort between an educated patient and an educated health care professional can assist in ensuring that the foot exam takes place on a regular basis. Foot exams can help ensure early identification and prevention of long-term complications. Pennsylvania has generally met or exceeded the target of 75 percent. Data are lacking in some cases (due to small sample sizes), making it difficult to identify potential racial/ethnic disparities in compliance rates.

Healthy People 2010 Objective 5-14
(age-adjusted to 2000 standard population, rates per 100)

Demographic	2010 Goal	PA 2008	PA 2007	PA 2006	PA 2005	PA 2004
Diabetic Adults	**75**	75± 8	DSU	66± 11	77± 6	79± 7
Gender						
Male	**75**	78± 12	DSU	61± 14	75±11	85± 8
Female	**75**	71± 10	DSU	75± 11	78± 7	73± 11
Education						
Less than High School 25+	**75**	90± 6	DSU	DSU	DSU	DSU
High School Grad 25+	**75**	75± 12	DSU	50± 8	83± 7	83± 8
At least some college 25+	**75**	75± 9	DSU	85± 8	76± 8	77± 11
Race/Ethnicity						
White, non-Hispanic	**75**	73± 9	DSU	63± 13	79± 6	80± 7
Black, non-Hispanic	**75**	DSU	DSU	DSU	DSU	DSU
Hispanic	**75**	DSU	DSU	DSU	DSU	DSU
Age						
Persons 18-44**	n/a	DSU	DSU	DSU	76±11	DSU
Persons 45 to 64**	n/a	82± 5	DSU	75± 7	76± 6	75± 7
Persons 65 to 74**	n/a	72± 8	DSU	84± 7	80± 7	81± 8
Persons 75+**	n/a	84± 6	DSU	76± 9	79± 7	72± 10

Source: Pennsylvania BRFSS.
Note: DSU= data statistically unreliable due to small numbers; Hispanics can be of any race;
** = age-specific rates are not age-adjusted; n/a = Data not available.

Objective 5-17: Increase the proportion of adults with diabetes who perform self-blood-glucose-monitoring at least once daily.

An important tool and measure for self-management behavior is self-blood-glucose monitoring. Monitoring is essential in the proper management of the disease and in preventing or decreasing long-term complications that can result from non-managed diabetes. In general, the percent of adults who are performing their self-blood-glucose-monitoring at least daily is at or slightly higher than the target of 60 percent.

While Pennsylvania generally meets or exceeds this goal, improvement in this objective is still needed. Diabetes education, partnerships between patients and health care systems and promoting of blood glucose monitoring could unite all interested parties to raise the percentages within this objective.

Healthy People 2010 Objective 5-17
(age-adjusted to 2000 standard population, rates per 100)

Demographic	2010 Goal	PA 2008	PA 2007	PA 2006	PA 2005	PA 2004
Diabetic Adults	**60**	55± 8	63± 14	64± 11	62± 7	60± 8
Gender						
Male	**60**	48± 12	DSU	DSU	59±11	54± 13
Female	**60**	65± 10	72± 11	71± 12	65± 8	66± 10
Education						
Less than High School 25+	**60**	85± 6	DSU	DSU	DSU	DSU
High School Grad 25+	**60**	50± 10	DSU	55± 13	58±12	52± 12
At least some college 25+	**60**	59± 10	70± 10	70± 11	59± 9	64± 11
Race/Ethnicity						
White, non-Hispanic	**60**	58± 9	70± 10	63± 13	62± 8	62± 9
Black, non-Hispanic	**60**	DSU	DSU	DSU	DSU	DSU
Hispanic	**60**	DSU	DSU	DSU	DSU	DSU
Age						
Persons 18-44**	n/a	DSU	DSU	DSU	64±12	DSU
Persons 45 to 64**	n/a	63± 6	66± 7	61± 8	57± 7	57± 8
Persons 65 to 74**	n/a	69± 7	68± 8	66± 9	65± 8	60± 9
Persons 75+**	n/a	61± 7	64± 8	65± 10	65± 8	51± 10

Source: Pennsylvania BRFSS.
Note: DSU= data statistically unreliable due to small numbers; Hispanics can be of any race;
** = age-specific rates are not age-adjusted; n/a = Data not available.

XII. BRFSS-Selected Questions

Selected Behavioral Risk Factors Surveillance System (BRFSS) Questions concerning diabetes

Have you EVER been told by a doctor that you have diabetes?

a. Yes
b. Yes, but female told only during pregnancy
c. No
d. No, pre-diabetes or borderline diabetes
e. Don't know / Not sure
f. Refused

If "Yes" and respondent is female, ask: "Was this only when you were pregnant?"

Module 1: Diabetes

How old were you when you were told you have diabetes?

a . Code age in years
b. Don't know / Not sure
c. Refused

Are you now taking insulin?

a. Yes
b. No
c. Refused

About how often do you check your blood for glucose or sugar? Include times when checked by a family member or friend, but do NOT include times when checked by a health professional.

a. Times per day
b. Times per week
c. Times per month
d. Times per year
e. Never
f. Don't know / Not sure
g. Refused

About how often do you check your feet for any sores or irritations? Include times when checked by a family member or friend, but do NOT include times when checked by a health professional.

a. Times per day
b. Times per week
c. Times per month
d. Times per year
e. Never
f. No feet
g. Don't know / Not sure
h. Refused

About how many times in the past 12 months have you seen a doctor, nurse, or other health professional for your diabetes?

a. Number of times
b. None
c. Don't know / Not sure
d. Refused

A test for "A one C" measures the average level of blood sugar over the past three months. About how many times in the past 12 months has a doctor, nurse, or other health professional checked you for "A one C"?

a. Number of times
b. None
c. Never heard of "A one C" test
d. Don't know / Not sure
e. Refused

About how many times in the past 12 months has a health professional checked your feet for any sores or irritations?

a. Number of times
b. None
c. Don't know / Not sure
d. Refused

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.

a. Within the past month (anytime less than 1 month ago)
b. Within the past year (1 month but less than 12 months ago)
c. Within the past 2 years (1 year but less than 2 years ago)
d. 2 or more years ago
e. Never
f. Don't know / Not sure
g. Refused

Has a doctor EVER told you that diabetes has affected your eyes or that you had retinopathy?

a. Yes
b. No
c. Don't know / Not sure
d. Refused

Have you EVER taken a course or class in how to manage your diabetes yourself?

a. Yes
b. No
c. Don't know / Not sure
d. Refused

XIII. References

1. Centers for Disease Control and Prevention. National diabetes fact sheet: general information and national estimates on diabetes in the United States, 2007. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2008.

2. Bureau of Health Statistics and Research, Pennsylvania Department of Health. Pennsylvania Behavioral Risk Factor Surveillance System, 2008.

3. Bureau of Vital Statistics, Pennsylvania Department of Health. Mortality Dataset, 2007.

4. American Diabetes Association. Website: http://www.diabetes.org

5. Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Diabetes Public Health Resource. Website: http://www.cdc.gov/diabetes

6. National Center for Chronic Disease Prevention and Health Promotion. Behavioral Risk Factor Surveillance System. Prevalence Data, Diabetes, 2008.

7. Bureau of Community Health Systems, Division of School Health. Diabetes. www.portal.state.pa.us/portal/server.pt?open=514&objID=556722&mode=2

8. American Diabetes Association. What is Gestational Diabetes? http://www.diabetes.org/diabetes-basics/gestational/what-is-gestational-diabetes.html

9. Centers for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. Diabetes Public Health Resource. Pamphlet: *If You Have Diabetes, A Flu Shot Could Save Your Life*.

10. American Diabetes Association. Diabetes Statistics. http://www.diabetes.org/diabetes-basics/diabetes-statistics/

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