

# THE BURDEN OF DIABETES IN RHODE ISLAND 2010



# Table of Contents

- Introduction..... 2
- Executive Summary ..... 3
- I: Diabetes is Common..... 4
- II: Diabetes is Serious ..... 10
- III: Diabetes is Costly ..... 16
- IV: Diabetes is Controllable..... 17
- V: Diabetes is Preventable ..... 21
- Summary ..... 22
- Appendices..... 23

## Introduction

The term diabetes refers to a group of diseases marked by high levels of blood sugar (also called blood glucose). These diseases arise from problems in how the body makes or uses insulin, a hormone that helps the body break down (metabolize) glucose, fats, and protein in food and use it for energy. When someone has type 1 diabetes, their body cannot produce insulin. With type 2 diabetes, the more common type, the body does not make or use insulin efficiently. Without enough insulin, glucose builds up in the blood. Over time, these high levels of blood glucose can cause serious health problems.

This report summarizes statewide data on the serious impact of diabetes in Rhode Island. These data can guide the collaborative efforts of decision makers and stakeholders—individuals, families, communities, schools, work sites, organizations, and government agencies—as they plan and implement programs and policies to improve diabetes prevention and care in our state.

The Rhode Island Department of Health (HEALTH)'s Center for Health Data and Analysis and Office of Vital Records gather surveillance data from multiple sources. Sources used in this report include the Rhode Island Behavioral Risk Factor Surveillance System (BRFSS), an annual telephone survey of a representative sample of adults; Rhode Island Hospital Discharge Data; and Rhode Island Death Records. The statistics in this report represent percentages and, in some cases, 95% confidence intervals (CI). Since percentages from survey data are estimates, the 95% CI indicate the range of values which would include the “true” value 95% of the time. When two groups have 95% CI that overlap, the “true” values may be similar in both groups. If the 95% CI do not overlap, the two groups are unlikely to have the same “true” value. This means one can infer that a difference exists between the groups. The 95% CI are represented visually through the use of vertical (Y) error bars.

---

## Diabetes Prevention and Control Program

The Rhode Island Diabetes Prevention and Control Program (DPCP), established in 1978, uses surveillance data to:

- Monitor the number of Rhode Island residents who have diabetes (its prevalence).
- Determine how different sectors of the population are impacted. This includes analyzing diabetes data by age, race, gender, and other factors. This allows the Program to learn more about factors that place people at risk for diabetes and its complications, understand why some groups of people face poorer health outcomes than others (health disparities), and target services to where they are most needed.
- Examine trends in diabetes that emerge over time to gauge the success of prevention efforts and forecast future levels of the disease.
- Assess health impacts (morbidity) among those with diabetes and factors that improve health outcomes.
- Determine the extent to which diabetes is a cause of death (mortality) in Rhode Island and the impact of healthy practices and good care in saving lives.
- Calculate the financial costs of diabetes to individuals, families, institutions, and the state and the significant savings that can result from preventing and controlling diabetes.
- Track the progress made in implementing evidence-based practices known to help prevent diabetes and/or control the disease, so that it does not result in harmful or life-threatening complications.

## Executive Summary

The prevalence of diagnosed diabetes in Rhode Island has increased over the past five decades and is projected to continue rising. Diabetes is a chronic disease with no known cure. Without effective prevention and control of diabetes, this disease has the potential to overwhelm our healthcare system. However, diabetes can be managed to improve health outcomes, and reducing known risk factors can help prevent some cases of the disease. Data in this report demonstrate that diabetes in Rhode Island is:

### Common

**The percentage of Rhode Islanders with diagnosed diabetes has increased by one third since 1993.** In 2008, an estimated 7.4% of Rhode Island adults, or 62,000 residents, had diagnosed diabetes, and another estimated 31,000 had undiagnosed diabetes. Numerous other residents have pre-diabetes and are at high risk for developing diabetes later in life.

### Serious

If not controlled, diabetes can lead to serious complications, such as blindness, kidney damage, cardiovascular disease, and lower-limb amputations, and can eventually lead to death. **The most recent data shows that diabetes is the eighth leading cause of death in Rhode Island and the sixth leading cause in the nation.** Since diabetes is likely underreported as a cause of death, experts estimate that people with diabetes have about two to four times the risk of death than people without diabetes of similar age.

### Costly

**In Rhode Island, direct healthcare costs for adults with diabetes amount to an estimated \$722 million annually.** This figure does not include children or undiagnosed adults. (Undiagnosed adults account for approximately one third of Rhode Island diabetics and often have higher health costs.) It also does not include indirect costs of diabetes, such as lost productivity and premature mortality.

### Controllable

Diabetics who take the recommended steps to manage their diabetes can greatly decrease their risk of serious complications and death. **As of 2008, Rhode Island has met or exceeded the Healthy People 2010 goals for percent of adults with diabetes who have had annual eye exams, annual influenza vaccinations, and twice-annual Hemoglobin A1c checks, and has almost met the goal for receipt of a pneumonia vaccination.** Rhode Island falls below the Healthy People 2010 goals, however, for receipt of diabetes outpatient education and annual foot exams.

### Preventable

Obesity is a major risk factor for diabetes. **According to the 2007 BRFSS, Rhode Islanders who are obese are three to four times more likely than their non-obese peers to have diabetes.** Unfortunately, in Rhode Island, 22% of adults report being obese and 32% of adults report being overweight.<sup>1</sup> Interventions that target obesity and other modifiable risk factors for diabetes may help prevent at-risk residents from developing this condition.

These basic facts underscore the urgency of dedicating appropriate efforts to reverse some of the alarming trends of diabetes in Rhode Island. The burden of diabetes affects not only the state of Rhode Island, but also each individual who lives with diabetes and their loved ones. The number of individuals with diabetes will continue to grow unless we work together to help those with this disease to live healthier lives and to prevent the onset of diabetes in those most at risk. Investing time, resources, and energy will have enormous benefits for all Rhode Island residents.

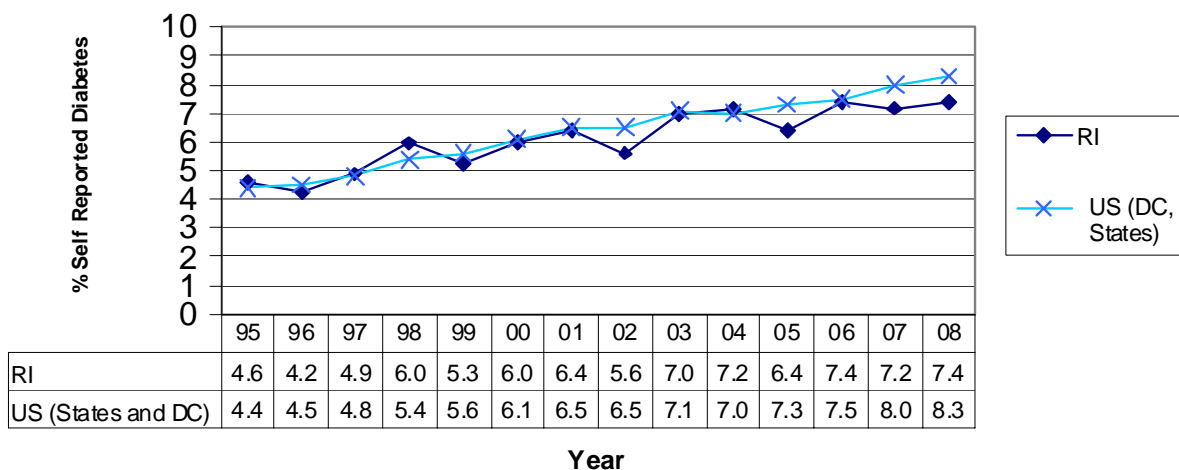
## I: Diabetes is Common

Diabetes is an increasingly common disease. Both the number and percent of Rhode Islanders with diabetes have risen over time. According to the Centers for Disease Control and Prevention (CDC)'s National Diabetes Surveillance System,<sup>2</sup> **the prevalence of diagnosed diabetes (proportion of individuals in a population who have diagnosed diabetes) increased in both Rhode Island and the United States in all age groups from 1980 to 2004.**

### Prevalence of Diabetes among Rhode Island Adults

An estimated 7.4% of Rhode Island adults age 18 years or older, or 62,000 residents, had ever been diagnosed with diabetes in 2008.<sup>3</sup> Similarly, 8.3% of the United States adult population had diagnosed diabetes during this time period. As seen in the graph below, the trend of increased adult diabetes in Rhode Island resembles national figures. Experts forecast a continued rise in diabetes across the United States due to changes in the population age and racial/ethnic composition, overall population growth, and increasing rates of overweight, obesity, and physical inactivity.<sup>4,5</sup>

**Figure 1: Prevalence of Diabetes by Year among RI and US Adults, 1996-2008**



Data Source: National and Rhode Island Behavioral Risk Factor Surveillance System, 1995-2008.

### Undiagnosed Diabetes

Significantly more Rhode Island adults have diabetes than the percent of those diagnosed with the disease reflects. Approximately one third of adults with diabetes in Rhode Island have not been diagnosed.<sup>6</sup> By combining the estimated 31,000 cases of undiagnosed cases with the 62,000 known cases, **HEALTH estimates that 12% of Rhode Island adults are living with diabetes.**

### Pre-Diabetes

Individuals with pre-diabetes add to the overall burden of diabetes in Rhode Island. People with pre-diabetes have blood glucose levels that are higher than normal, but not high enough to diagnose diabetes. Pre-diabetes raises the risk of type 2 diabetes, heart disease, and stroke.<sup>6</sup> **The CDC has reported that 40.1% of adults in the United States age 40 through 74 years have pre-diabetes.**<sup>7</sup>

## Gestational Diabetes

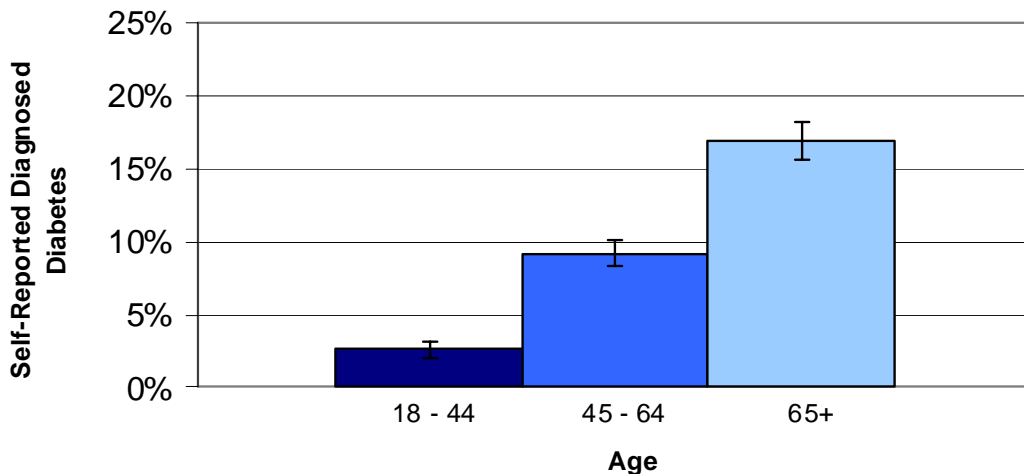
Gestational Diabetes Mellitus (GDM) is a form of glucose intolerance diagnosed during pregnancy. **GDM impacts 7% of pregnancies, yielding over 200,000 cases per year in the United States.**<sup>8</sup> Obese women and those with a family history of diabetes have a higher risk of GDM. GDM is more prevalent among women who are African American, Hispanic/Latina, and American Indian/Alaskan Native. The condition usually resolves itself following pregnancy. However, 5 to 10% of women who have GDM develop type 2 diabetes after delivery, and women who have had GDM have a 40 to 60% chance of developing diabetes in the 5 to 10 years following pregnancy.<sup>9</sup> Evidence also shows a greater risk for obesity and diabetes among children of mothers with GDM history compared to children of mothers without GDM history.<sup>10</sup>

## Disparities in Diabetes among Rhode Island Adults

### Age

In the United States, diabetes is most common among older adults. The CDC reports that 2% of adults age 20 through 39 years, 10% of adults age 40 through 59 years, and 21% of adults age 60 years or older had diagnosed diabetes in 2005 nationally.<sup>7</sup> As shown in the chart below, Rhode Island observes a similar increase in risk among older adults. Of the total estimated number of people with diabetes, 41.3% are 65 years or older.

**Figure 2: Prevalence of Diabetes by Age in Rhode Island, 2006-2008**



Data Source: Rhode Island Behavioral Risk Factor Surveillance System, 2006-2008.

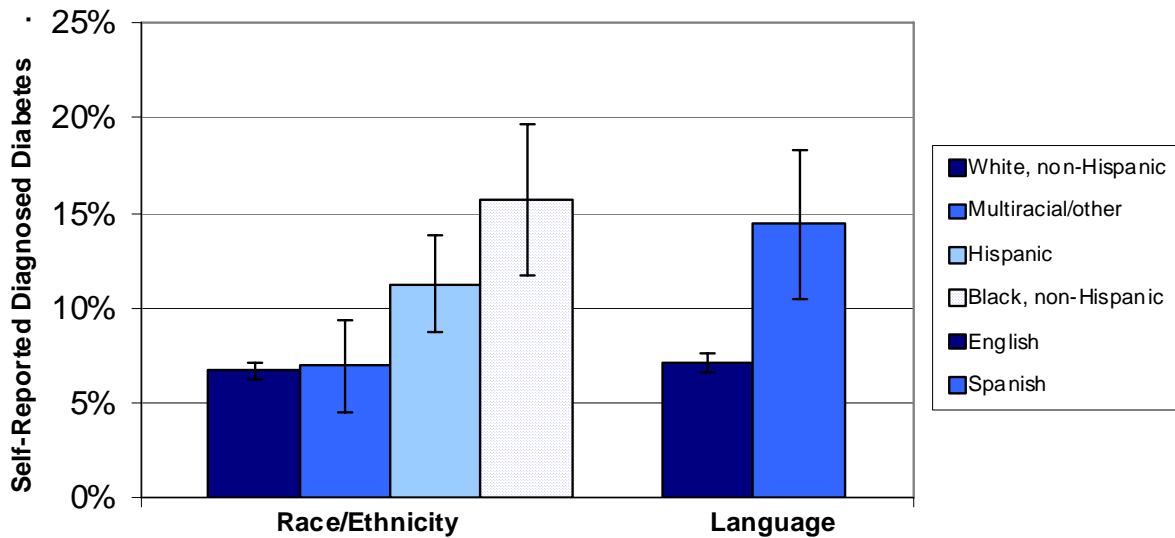
### Gender

A slightly, but statistically significant, higher percentage of males have diagnosed diabetes than females. 8.1% of adult males report diagnosed diabetes, compared to 6.5% of adult females.

### Race and Ethnicity and Language Spoken

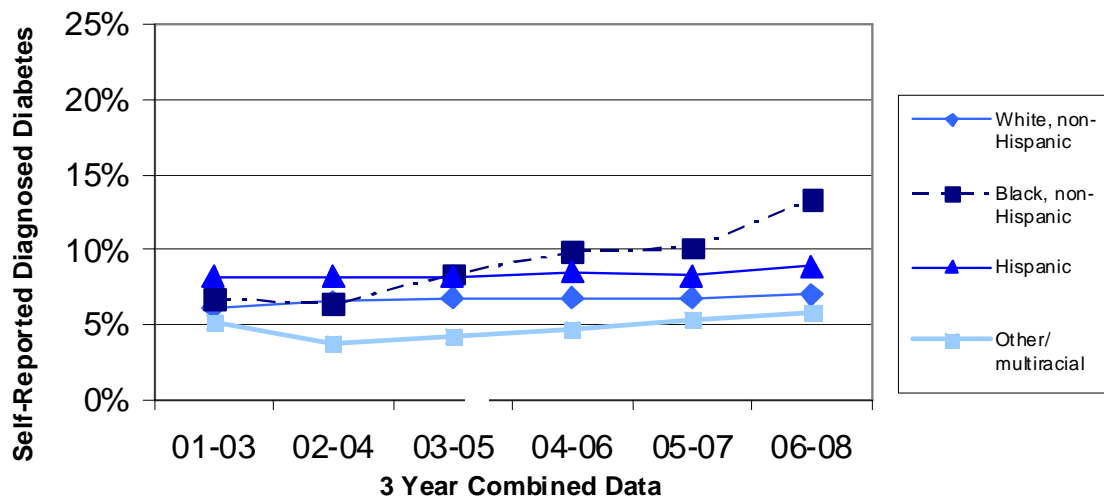
Some racial and ethnic groups have both a greater prevalence of diabetes and a greater risk of associated complications.<sup>11</sup> **In Rhode Island, the prevalence of diagnosed diabetes is highest among Black non-Hispanic adults (15.7%) and Hispanic adults (11.3%) compared to White non-Hispanic adults (6.7%).** Notably, diabetes prevalence is increasing more quickly among Black non-Hispanic adults and adults of other/multiple races than among Hispanic and White non-Hispanic adults. As seen in the chart below, Rhode Island adults who primarily speak Spanish have twice the prevalence of diagnosed diabetes of adults who primarily speak English.

**Figure 3: Prevalence of Diabetes by Race/Ethnicity and Language, 2006-2008**



Data Source: Rhode Island Behavioral Risk Factor Surveillance System, 2006-2008.

**Figure 4: Prevalence of Diabetes by Race/Ethnicity in Rhode Island, 2001-2008**

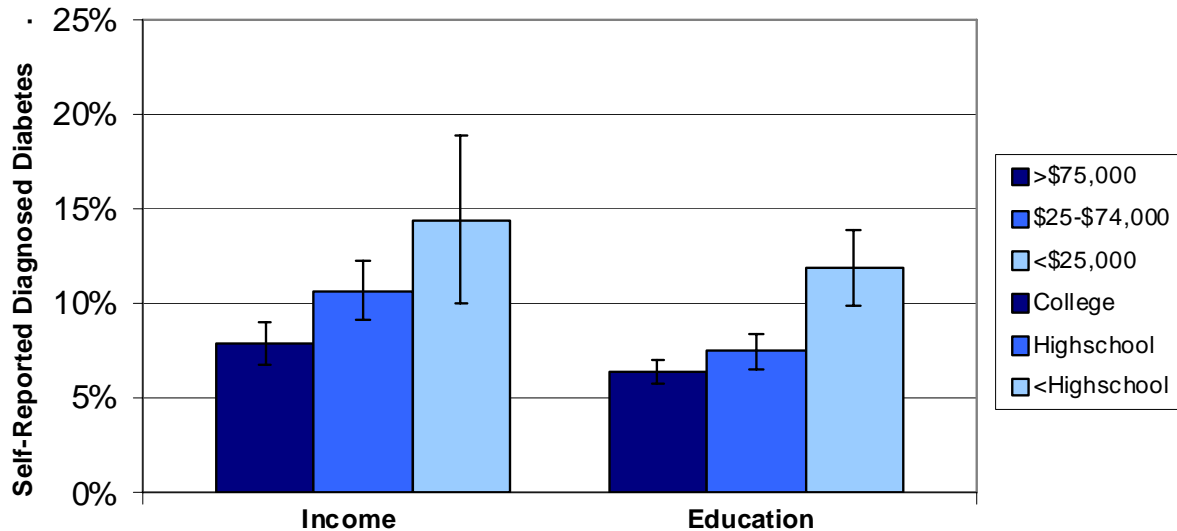


Data Source: Rhode Island Behavioral Risk Factor Surveillance System, 2001-2008.

## Income and Education

Low income populations have been reported to have up to two times the diabetes prevalence of wealthy populations.<sup>12</sup> In Rhode Island, approximately 14.5% of adults who report annual incomes of less than \$25,000 have diagnosed diabetes, compared to 10.7% of those who make between \$25,000 and \$75,000 annually and 7.9% of those who make \$75,000 or more annually. In Rhode Island, adults who have less education also have a higher prevalence of diagnosed diabetes (12.0% among adults with less than high school education, 7.5% among adults with a high school or equivalent education, and 6.4% among adults with at least some college education).

**Figure 5: Age-Adjusted Prevalence of Diabetes by Income and Education in Rhode Island, 2006-2008**



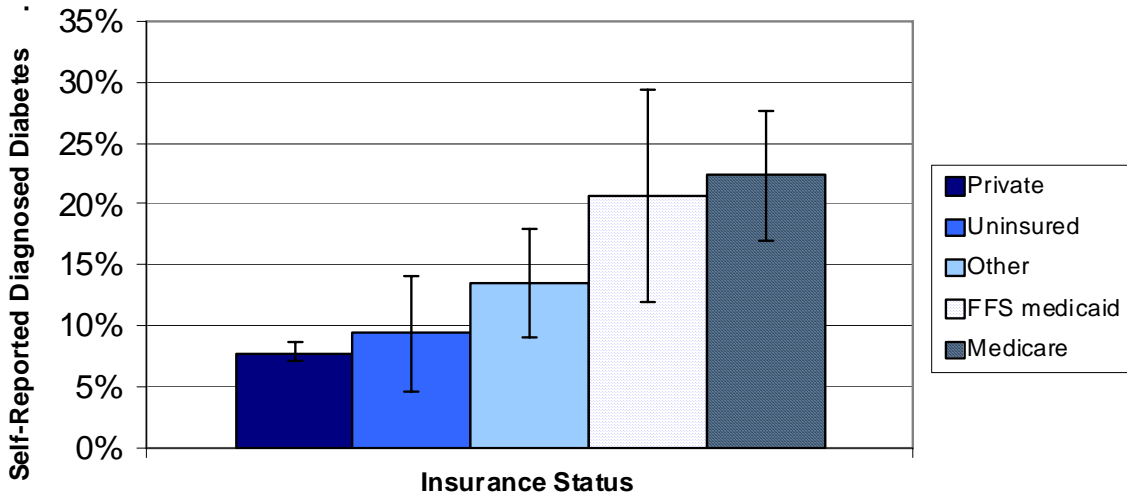
Data Source: Rhode Island Behavioral Risk Factor Surveillance System, 2006-2008.

## Insurance Status

In Rhode Island's 45 through 64 year old age group, 8% of those with private insurance have diagnosed diabetes, compared to 21% among those with fee-for-service (FFS) Medicaid and 22% among those with Medicare. Nine percent of the uninsured in this age group have diagnosed diabetes. (As shown later in this report, however, the uninsured have lower screening rates.) In the 18 through 44 and 65+ age groups, insurance status does not appear to have a significant impact on diabetes prevalence.



**Figure 6: Prevalence of Diabetes by Insurance Status among 45-64 Year Old Adults in Rhode Island, 2006-2008**

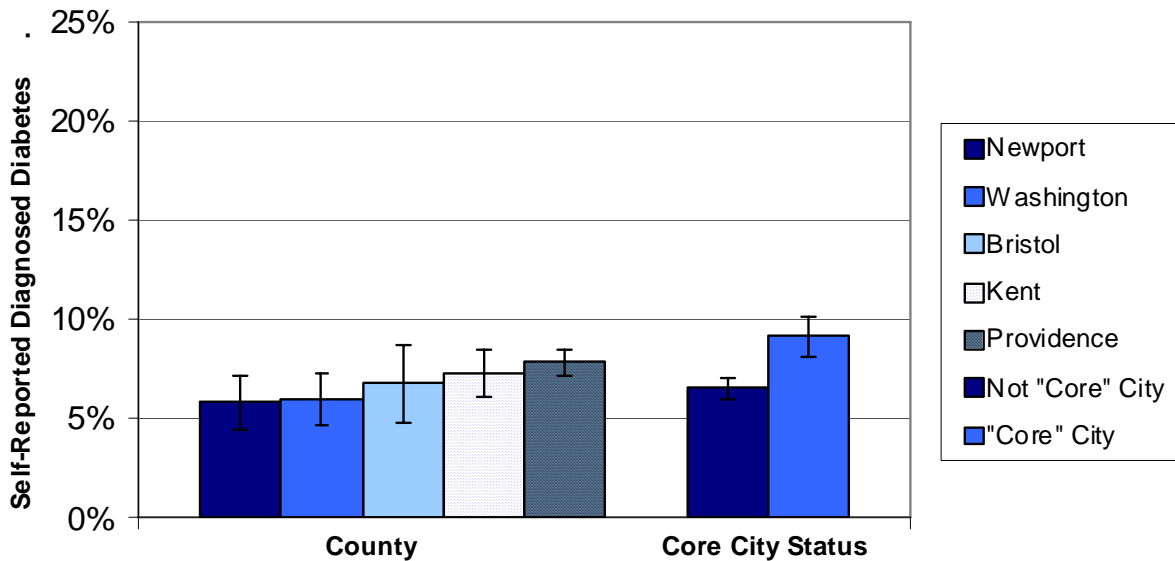


Data Source: Rhode Island Behavioral Risk Factor Surveillance System, 2006-2008.  
 Other insurance includes those reporting “other” and RIteCare insurance.

**Residence**

In Rhode Island, cities are considered urban “core” cities if 15% or more of the children live in families with incomes below the federal poverty level. These core cities currently include: Central Falls, Newport, Pawtucket, Providence, Woonsocket, and West Warwick.<sup>13</sup> 9.1% of adults living in core cities have diagnosed diabetes, compared to 6.6% of adults not living in core cities.

**Figure 7: Prevalence of Diabetes by County and Core City in Rhode Island, 2006-2008**



Data Source: Rhode Island Behavioral Risk Factor Surveillance System, 2006-2008.

## Rhode Island Adults at High Risk for Diabetes

**An estimated 23.1% of Rhode Island adults age 30 through 60 years are at high risk for developing diabetes.**<sup>14</sup> This figure is based on Rhode Island specific data on age, gender, Body Mass Index (BMI), known hypertension, leisure time physical activity, and family history of diabetes.

Obese Rhode Islanders have a high risk of developing diabetes. **The prevalence of obesity among Rhode Island adults has doubled in just two decades, from 10% in 1991 to 22% in 2007.** The number of overweight adults has also risen—a Rhode Island adult is now more likely to be overweight than normal weight. Rhode Island has more overweight adults but fewer obese adults than the national averages.<sup>3</sup> According to 2007 Rhode Island BRFSS data, 62% of Rhode Island adults (age 20 years and older) are either overweight or obese. (40% are overweight and 22% are obese.) Nationally, 63% of adults are either overweight or obese. (37% are overweight and 26% are obese.) Notably, these BMI calculations rely on self-reported height and weight. True prevalence of obesity may be even higher, as people often under report their weight.<sup>15</sup>

## Prevalence of Diabetes among Rhode Island Children

Approximately 0.2% of the US population younger than 20 years old had diagnosed diabetes in 2007.<sup>7</sup> The annual incidence rate (rate of new cases) among youth was 19 per 100,000 for type 1 diabetes and 5.3 per 100,000 for type 2 diabetes. Using 2008 US Census population estimates for Rhode Island<sup>16</sup> combined with the above information, HEALTH estimates that **approximately 530 Rhode Islanders younger than the age of 20 have diabetes** (type 1 or type 2). While the prevalence of diabetes among children remains low, evidence shows rising rates of both type 1 and type 2 diabetes in children.<sup>17</sup> Minority (Black non-Hispanic, Hispanic, Asian/Pacific Islander, and American Indian) youth age 10 through 19 years have a higher incidence of type 2 diabetes than their same aged non-Hispanic White peers. Non-Hispanic White youth have the highest rate of new cases of type 1 diabetes.<sup>7</sup>

## Rhode Island Children at High Risk for Diabetes

Young children (ages 24 through 59 months) in Rhode Island have a slightly higher prevalence of overweight or obesity than the national average, while high school students report rates of overweight consistent with the national average and rates of obesity that are slightly lower than the national average. In Rhode Island, Hispanic children and children from core cities are more likely to be overweight or obese than non-Hispanic White children and children not living in core cities.<sup>1</sup> The cause of type 1 diabetes remains unknown, preventing the identification of risk factors that can be modified to reduce a child's chance of developing type 1 diabetes.

## II: Diabetes is Serious

People with diabetes often have a worse general health status than people without diabetes. Rhode Island adults with diagnosed diabetes are significantly less likely to report excellent or very good health and more likely to report fair or poor health than people without diabetes. They are also more susceptible to many other illnesses, and upon acquiring these illnesses, often have worse prognoses. The risk for death among people with diabetes about doubles that of people without diabetes of similar age.<sup>7</sup>

### Serious Health Conditions (Morbidity)

If not controlled, diabetes can lead to serious complications, such as blindness, kidney damage, dental disease, complications of pregnancy (e.g. birth defects, excessively large babies), cardiovascular disease, and lower limb amputations. Diabetes complications can also result in disability. According to Rhode Island BRFSS data, 42% of adults in Rhode Island with diagnosed diabetes are disabled, compared to 19% of adults without diabetes. People with diabetes can lower the occurrence of complications by controlling their blood glucose, blood pressure, and blood lipid (fat) levels.

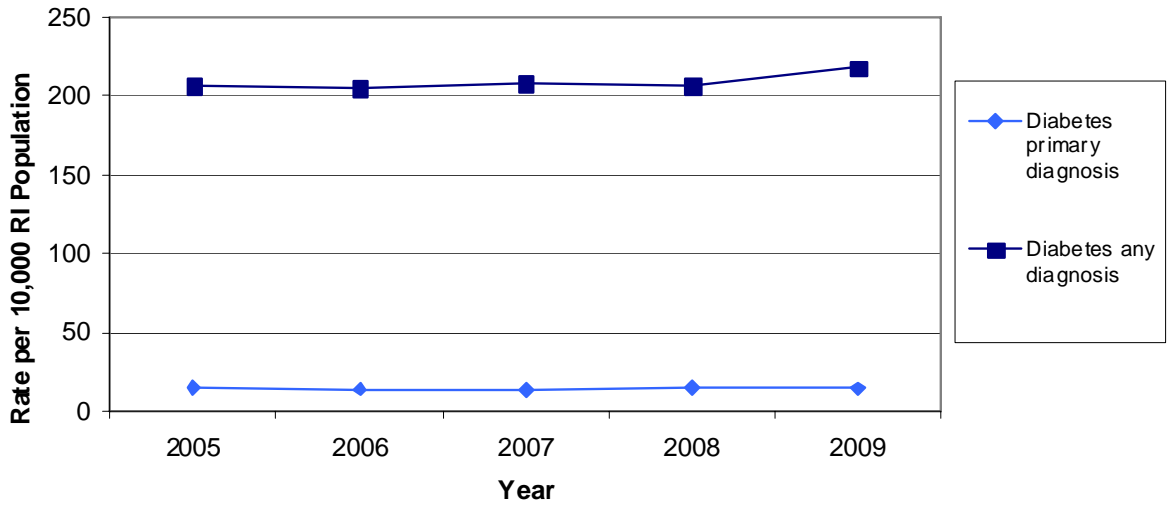
Diabetes is the most common cause of kidney failure, accounting for nearly 44% of new cases nationally.<sup>18</sup> As the number of people with diabetes grows, the number of people with kidney failure also grows. Some experts predict that diabetes soon might account for half the cases of kidney failure. To help prevent serious kidney disease and kidney failure, experts recommend that people with diabetes receive regular screenings for this disease. In Rhode Island, the incidence rate (rate of new cases) and mortality rate (death rate) of treated end stage renal (kidney) disease attributable to diabetes is slightly lower than that of the nation as a whole.<sup>19</sup>

### Hospitalizations

Hospital admissions are one indicator of the serious health consequences of diabetes in Rhode Island. Diabetes can be considered the “primary” diagnosis for a hospital admission (listed as the first diagnosis in one of twenty-five diagnosis fields) or a “contributing” diagnosis (listed in any position of the twenty-five diagnosis fields). The age-adjusted rate of diabetes hospital admissions has remained relatively stable from 2005 through 2009, with approximately 15 admissions with a primary diagnosis of diabetes and 200 admissions with a contributing diagnosis of diabetes per 10,000 Rhode Island adults.

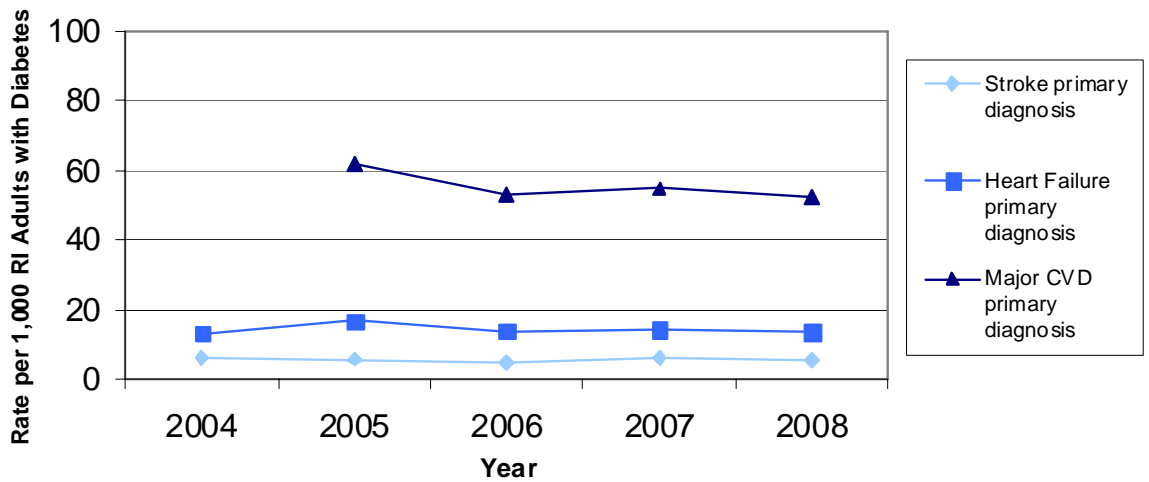
Diabetes is frequently listed as a contributing diagnosis among those hospitalized for cardiovascular disease. In Rhode Island, the rate of hospitalization for heart failure has ranged between 14 and 17 per 1,000 adults with diabetes, and the rate of hospitalization for stroke has been about 6 per 1,000 adults with diabetes. The hospital discharge rate for major cardiovascular disease was approximately 52 per 1,000 adults with diabetes in 2008. Notably, Black non-Hispanic adults and adults of other ethnicities or races had significantly higher rates of cardiovascular disease hospitalizations than Hispanic and White non-Hispanic adults.

**Figure 8: Age-Adjusted Hospital Discharge Rates for Diabetes in Rhode Island, 2005-2009**



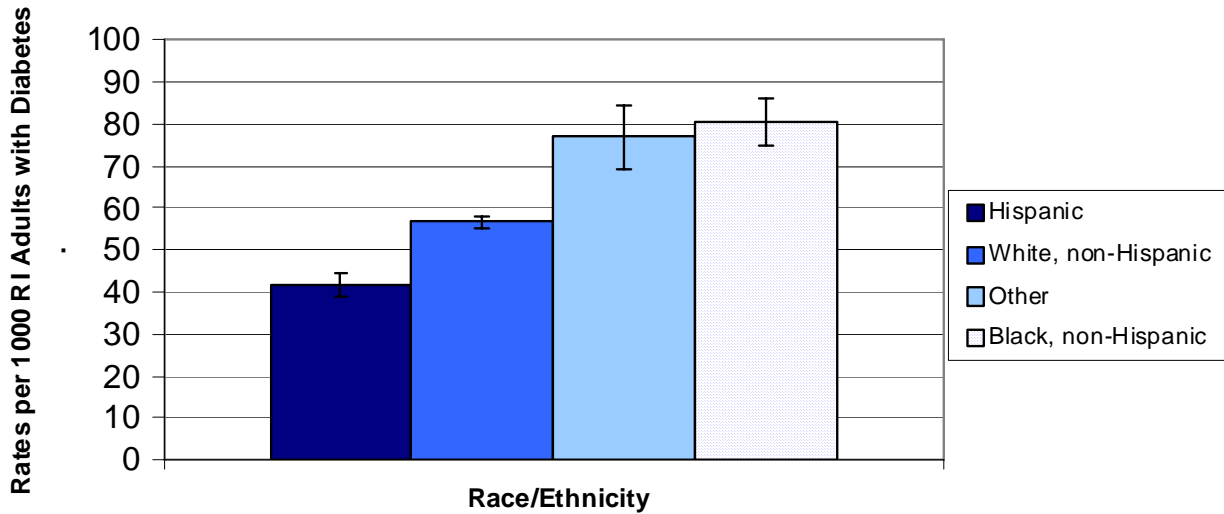
Data Source: Hospital Discharge Data, RI Department of Health, 2005-2009.

**Figure 9: Age-Adjusted Hospital Discharge Rates for Cardiovascular Disease among Adults with Diabetes in Rhode Island, 2004-2008**



Data Sources: Hospital Discharge Data, RI Department of Health, 2004-2008 and RI BRFSS, 2003-2008.

**Figure 10: Age-Adjusted Hospital Discharge Rates for Major Cardiovascular Disease among Adults with Diabetes in Rhode Island, 2006-2008**

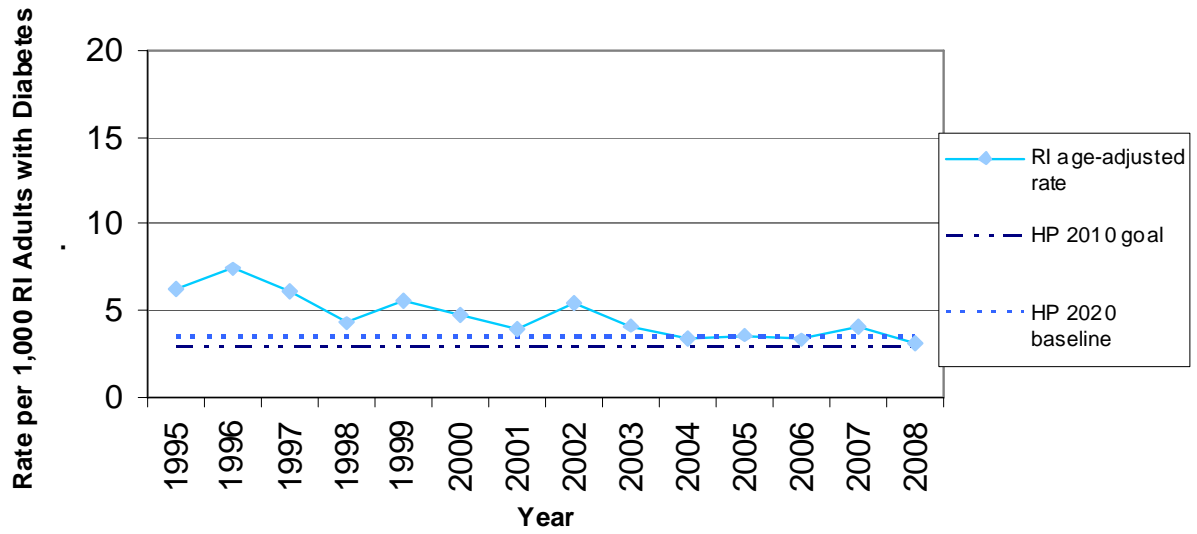


Data Sources: Hospital Discharge Data, RI Department of Health, 2006-2008 and RI BRFSS, 2006-2008.  
 “Other” includes Native American, Asian, Pacific Islander, unknown, and other.

### Non-Traumatic Amputations

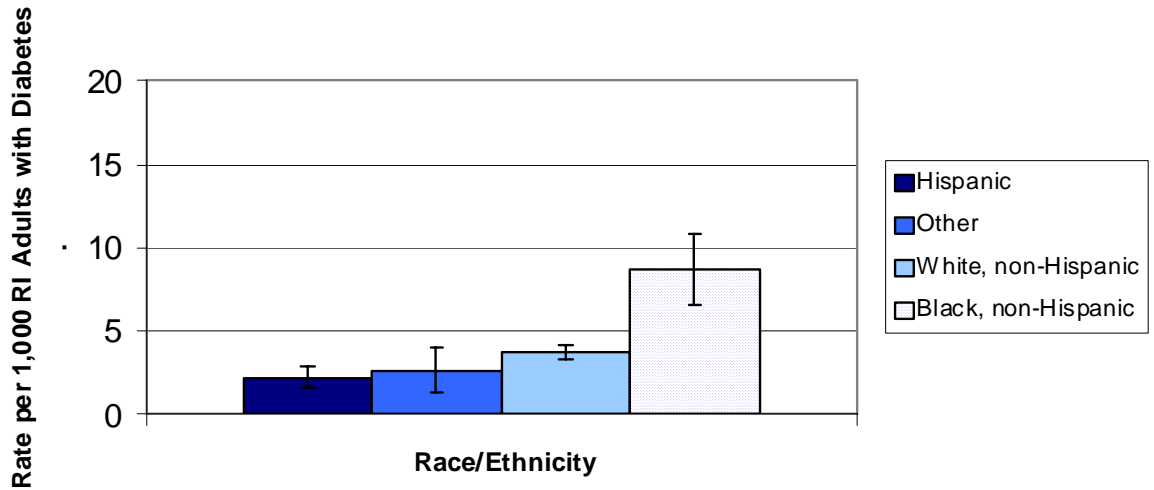
In the United States, diabetes is the leading cause of non-traumatic lower extremity amputations (NTLEA) among working-age adults (approximately 57,000 per year or 150 per day).<sup>7</sup> The Healthy People 2010 goal aims to reduce NTLEA to 2.9 for every 1,000 adults with diabetes each year, down from 6.6 in 1997 to 1999. The rate of NTLEA among adults with diabetes in Rhode Island is steadily decreasing. In 2008, Rhode Island came very close to meeting the Healthy People 2010 goal (3.1 NTLEA per 1,000 adults with diabetes). Rhode Island’s low overall rate of NTLEA, however, masks important health disparities. Black non-Hispanic adults with diabetes have more than double the rate of NTLEA of all other racial and ethnic groups.

**Figure 11: Age-Adjusted Hospital Discharge Rates for Non-Traumatic Lower Extremity Amputations among Adults with Diabetes in Rhode Island, 1995-2008**



Data Sources: Hospital Discharge Data, RI Department of Health, 1995-2008 and RI BRFSS, 1995-2008.

**Figure 12: Age-Adjusted Hospital Discharge Rates for Non-Traumatic Lower Extremity Amputations among Adults with Diabetes by Race/Ethnicity in Rhode Island, 2006-2008**



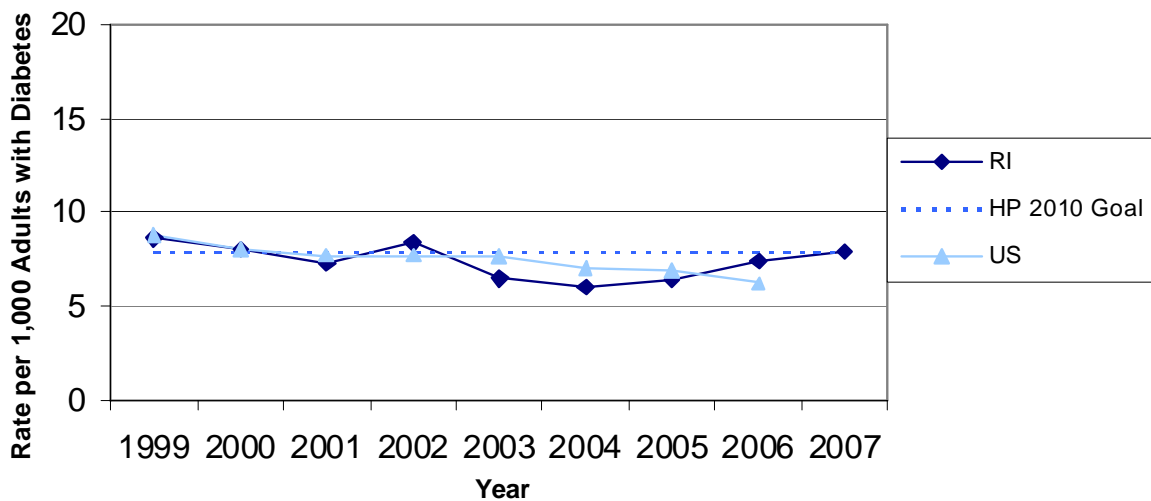
Data Sources: Hospital Discharge Data, RI Department of Health, 2006-2008 and RI BRFSS, 2006-2008. "Other" includes Native American, Asian, Pacific Islander, unknown, and other.

## Deaths (Mortality)

Over the past decade, diabetes has remained the sixth leading cause of death in the United States, primarily from diabetes-associated cardiovascular disease. People with diabetes die at two to four times the rate of non-diabetics.<sup>20</sup> In Rhode Island, diabetes is the eighth leading cause of death.<sup>21</sup> There were 7,360 diabetes-related deaths in Rhode Island during the period from 1995 to 2005.<sup>22</sup>

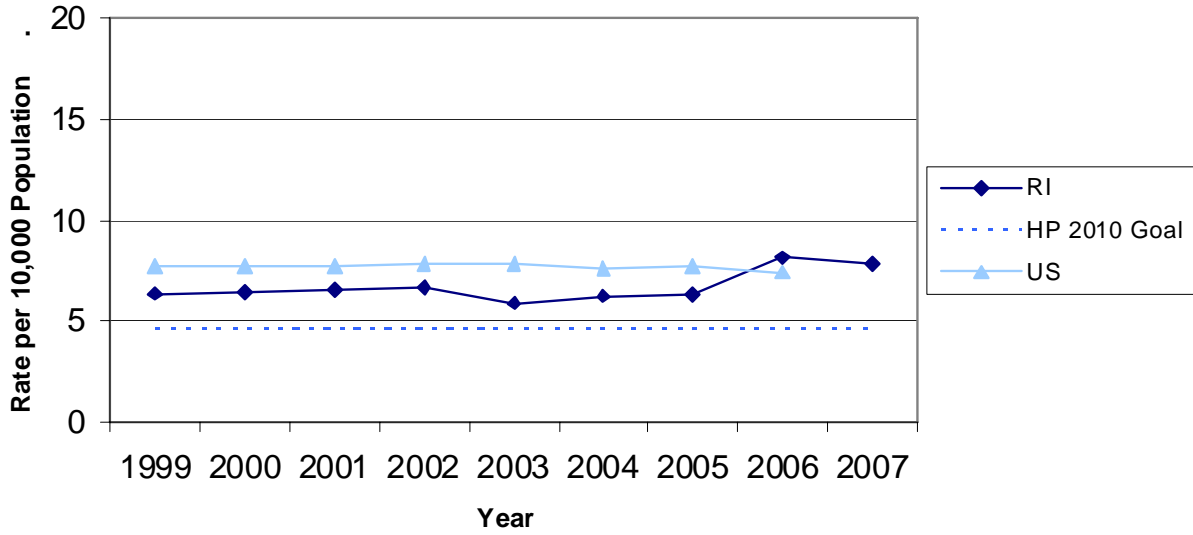
Three Healthy People 2010 (HP2010) objectives concern diabetes-related deaths. One goal is to reduce deaths due to diabetes to 7.8 deaths per 1,000 adults with diabetes. While the rate has fluctuated, Rhode Island has met this goal since 2003. The second objective aims to reduce the diabetes death rate to 4.5 deaths per 10,000 people. Rhode Island met the HP2010 goal in 2003, although more recent data may indicate a rise in the age-adjusted diabetes mortality rates among adults with diabetes. The last objective aims to reduce deaths related to cardiovascular disease to 29.9 deaths per 10,000 adults with diabetes. The rate of deaths due to cardiovascular disease among Rhode Island diabetics is high compared to national rates. It has decreased steadily, however, falling by 50% from 1996 (almost 60 per 10,000) to 2007 (less than 30 per 10,000). The figure below illustrates this steady decrease in the cardiovascular disease death rate among Rhode Island adults and shows that Rhode Island has met the HP2010 goal since 2006. (The rate is age-adjusted and includes deaths for which diabetes is listed as any cause and major cardiovascular disease is listed as the underlying cause of death.)

**Figure 13: Age-Adjusted Diabetes-Related Mortality Rate in Rhode Island, 1999-2007**



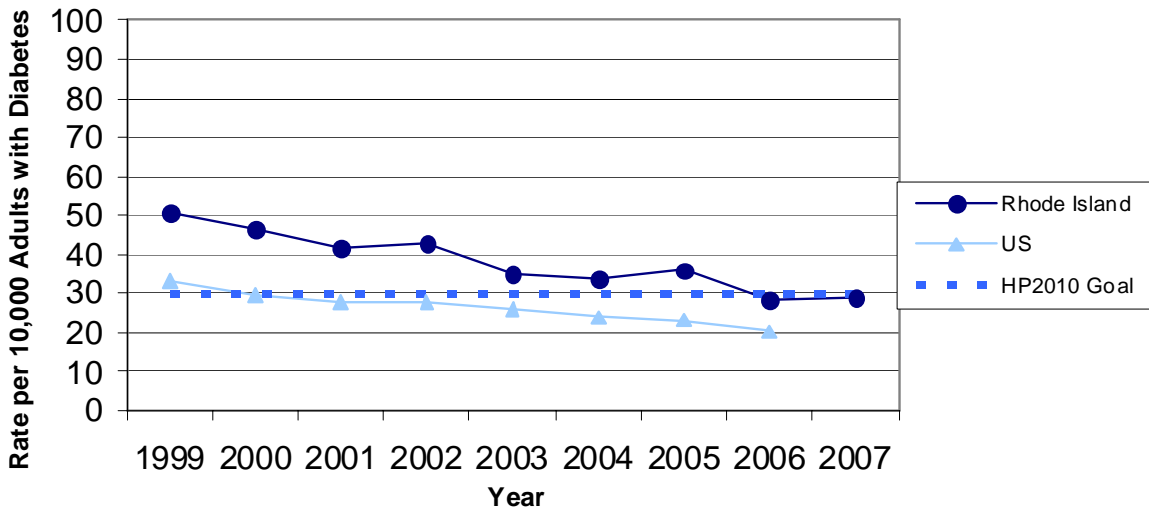
Data Sources: Hospital Discharge Data, RI Department of Health, 1999-2007, RI BRFSS, 1999-2008, and <http://wonder.cdc.gov/data2010/>

**Figure 14: Age-Adjusted Diabetes-Related Mortality Rate in Rhode Island, 1999-2007**



Data Sources: Hospital Discharge Data, RI Department of Health, 1999-2007, RI BRFSS, 1999-2008, and <http://wonder.cdc.gov/data2010/>

**Figure 15: Age-Adjusted Mortality Rate for Cardiovascular Disease Deaths among Adults with Diabetes in Rhode Island, 1999-2007**



Data Sources: Hospital Discharge Data, RI Department of Health, 1999-2007, RI BRFSS, 1999-2008, and <http://wonder.cdc.gov/data2010/>



### III: Diabetes is Costly

Diabetes has very high costs to both individuals and society. These costs include direct medical costs as well as indirect costs, such as lost productivity and premature mortality. Without effective prevention and control of diabetes, this disease has the potential to overwhelm the healthcare system.

People with diabetes have medical expenditures 2.4 times higher than they would if they did not have diabetes.<sup>23</sup> One out of every 10 healthcare dollars spent in the United States is spent on diabetes and its complications. In Rhode Island, direct healthcare costs for adults with diabetes amount to an estimated \$722 million annually.<sup>23</sup> Of these expenses, \$420 million was attributable to diabetes (versus healthcare costs that adults without diabetes would also incur). Both of these figures likely underestimate the true direct medical costs of diabetes, since they include only adults age 18 and older and do not include people with undiagnosed diabetes who may have higher healthcare costs than their non-diabetic peers.

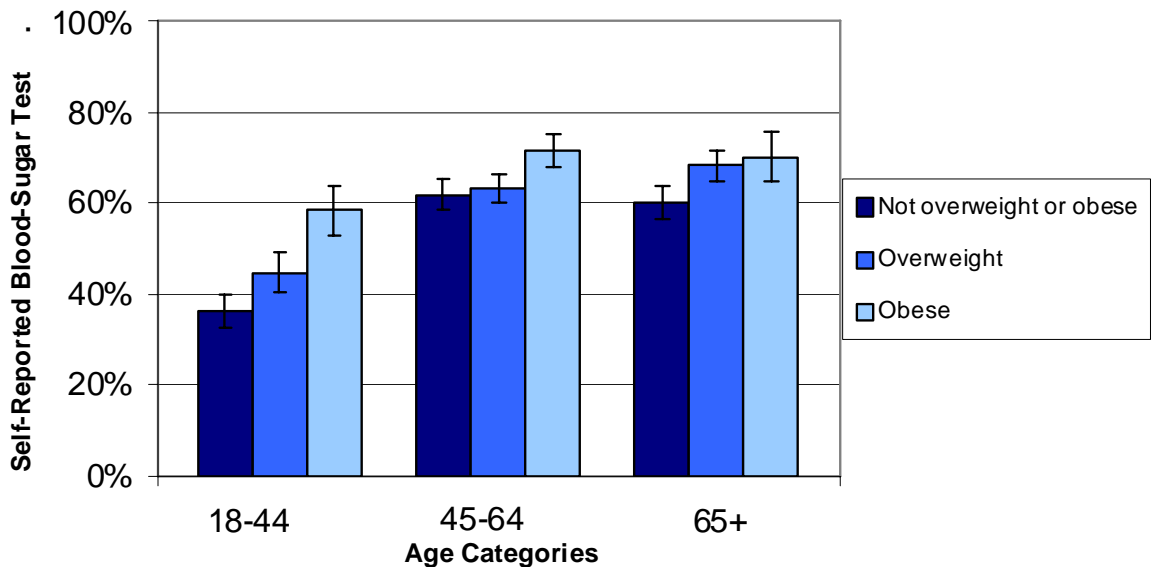
## IV: Diabetes is Controllable

Complications can significantly diminish the quality of life for individuals with diabetes. **However, research shows that through education and the development of self-management skills, people with diabetes can take steps to control the disease and minimize these health complications.** Education can help people with diabetes and their families learn how to maintain consistent, near-normal blood-sugar levels and how to increase physical activity to reduce certain health complications. Other important steps to control diabetes include receiving diagnostic screening, getting regular clinical exams and vaccinations, and managing co-existing health conditions.

### Screening for Diabetes

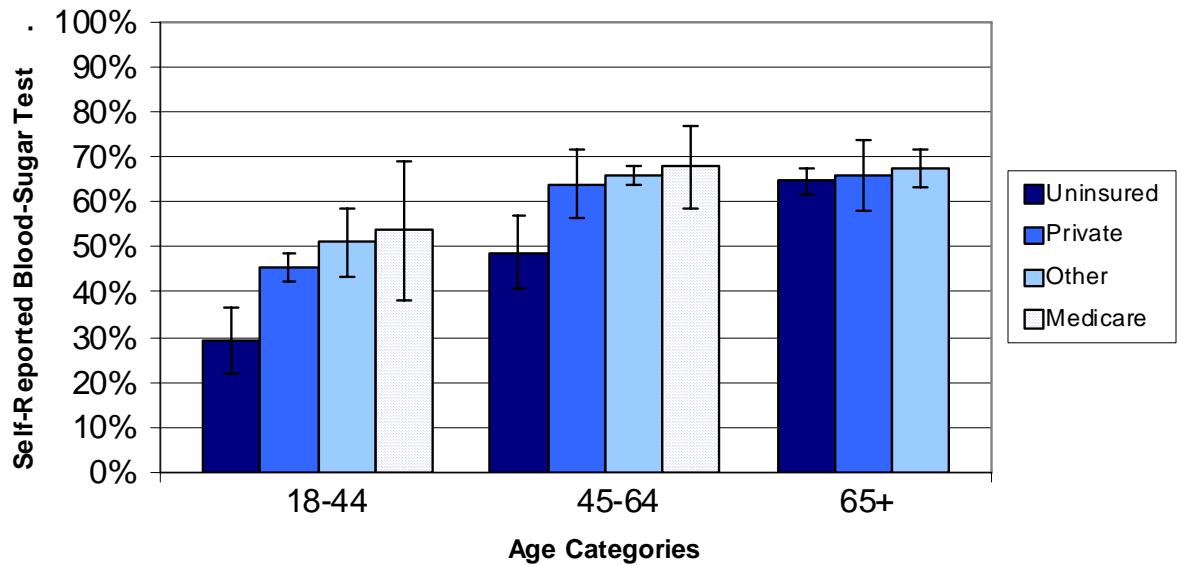
Receiving a diabetes diagnosis serves as an important first step in managing the condition. As of 2010, approximately 27% of diabetics in the US are not aware that they have the disease.<sup>7</sup> In Rhode Island, screening for diabetes does not reach all residents. Screening rates are higher for those who are older and for those who are overweight or obese (i.e., at higher risk). Among individuals younger than age 65, however, the uninsured are less likely to receive screening than the insured.

**Figure 16: Receipt of Diabetes Test in Past Three Years by Weight and Age Group in Rhode Island, 2007-2008**



Data Source: Rhode Island Behavioral Risk Factor Surveillance System, 2007-2008.

**Figure 17: Receipt of Diabetes Test in Past Three Years by Insurance Status and Age Group in Rhode Island, 2007-2008**



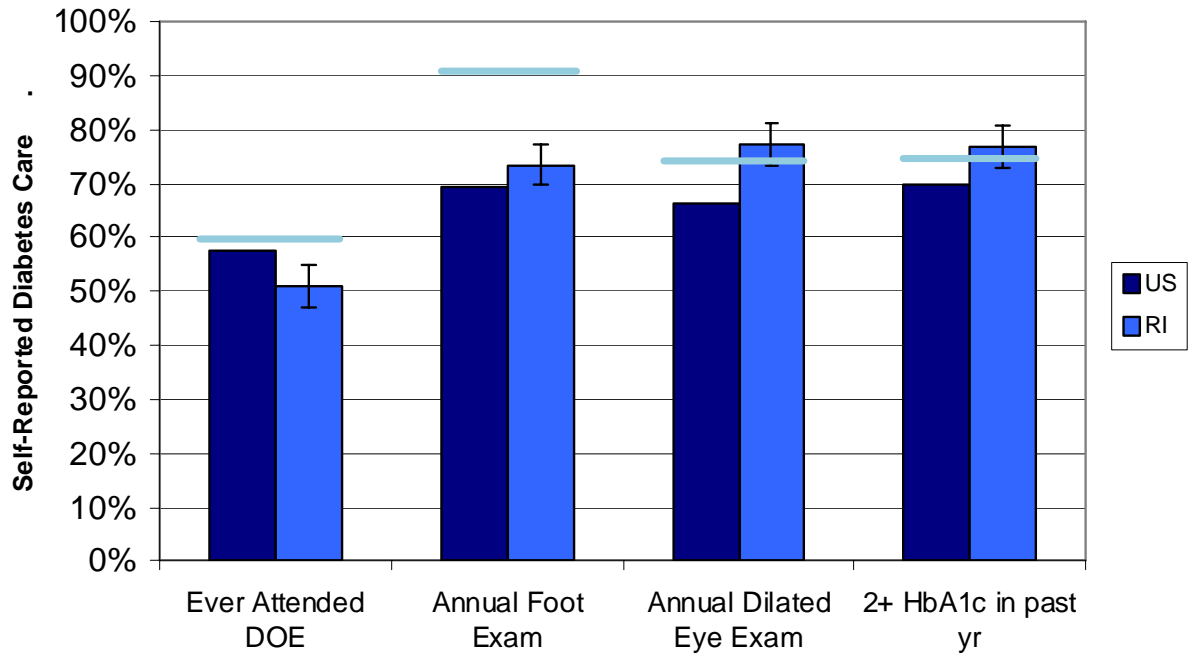
Data Source: Rhode Island Behavioral Risk Factor Surveillance System, 2007-2008.  
 Other insurance includes those reporting fee-for-service Medicaid, “other” and RItCare insurance.  
 Uninsured is not included for the 65+ age group due to small numbers.

## Clinical Management Services

People with diabetes can protect their health by seeing their healthcare providers regularly for care. Experts recommend that people with diabetes receive annual foot and dilated eye exams; have hemoglobin A1C (blood sugar control) tests at least twice per year; have annual influenza vaccines; and receive a pneumonia vaccine, and diabetes outpatient education. Overall, Rhode Island performs better than the US as a whole on clinical measures that can help those with diabetes to live a longer and healthier life. As of 2008, **Rhode Island had surpassed the HP2010 goals for the percentage of adults with diabetes who have had at least two A1C tests and who have had a dilated eye exam in the past year, 77% and 73% respectively.** Rhode Island has not met the HP2010 goals for diabetes outpatient education (DOE) or for having a foot exam in the past year.

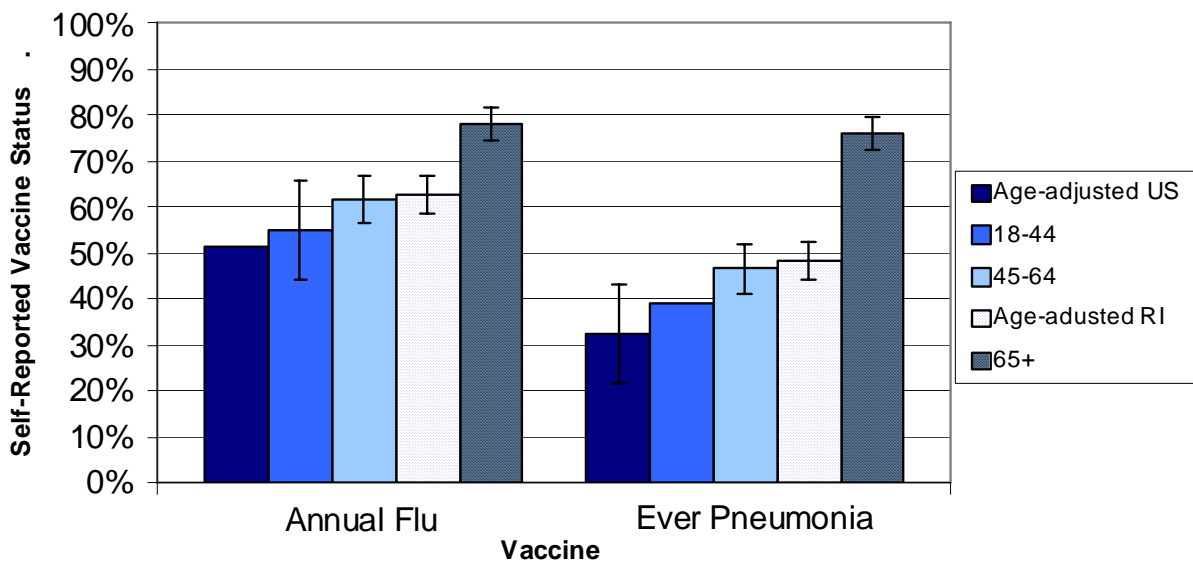
Rhode Island has higher annual influenza and lifetime pneumonia vaccination rates than the US average for adults with diabetes, but the age-adjusted percentages mask a stark difference in vaccine rates for this high-risk group. Younger adults who have diabetes are significantly less likely to have the recommended vaccinations than their older counterparts.

**Figure 18: Healthy People 2010 Diabetes Care Measures in RI, 2007-2008, and the US**



Data Sources: RI BRFSS, 2007-2008 and US Department of Health and Human Services. Healthy People 2010. Available from: <http://www.healthypeople.gov/document/HTML/tracking/OD05.htm>

**Figure 19: Vaccine Status for Adults with Diabetes in Rhode Island, 2007-2008**



Data Sources: RI BRFSS, 2007-2008 and US Department of Health and Human Services. Healthy People 2010. Available from: <http://www.healthypeople.gov/document/HTML/tracking/OD05.htm>

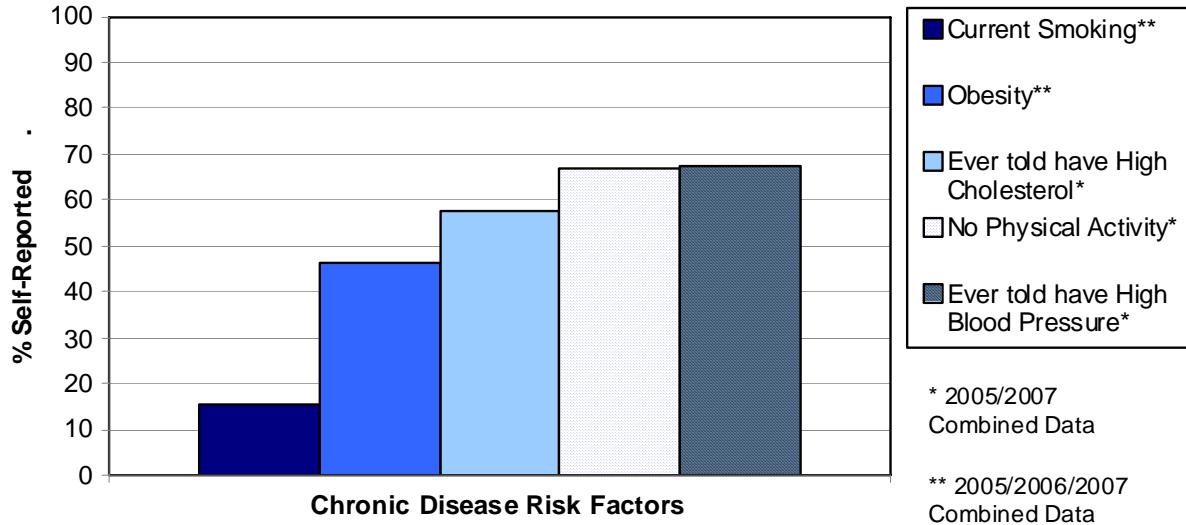
## Control of Co-morbidities

A co-morbidity is a health condition that a person has in addition to their primary condition. The term can also refer to the combined effect of additional health conditions on an individual's overall health. Co-morbidities such as cardiovascular disease and obesity can contribute to the adverse outcomes associated with diabetes. Treatment for co-morbidities and control of diabetes risk factors can help diabetics decrease adverse outcomes and increase overall health.

Smoking and exposure to cigarette smoke increase an individual's risk of various diabetes co-morbidities, including heart attack, stroke, nerve damage, and kidney disease. In fact, smokers who have diabetes are three times more likely to die of cardiovascular disease than non-smokers who have diabetes. Smokers with diabetes have worse glycemic (blood sugar) control than nonsmokers, even with optimal self-monitoring. Smoking also increases a diabetic's risk of kidney disease (nephropathy), damage to the retina (retinopathy), and nerve damage (neuropathy).<sup>24</sup> On the positive side, studies have shown that the health benefits for people with diabetes who stop smoking begin immediately. These benefits continue to increase with the length of time a person remains smoke-free. Ten years after quitting, a former smoker's risks for cardiovascular disease resemble those of a typical nonsmoker.<sup>24</sup>

In addition to quitting smoking, people living with diabetes can reduce their risk of complications and improve the quality and length of their lives by controlling their blood sugar, maintaining a healthy weight, being physically active, and managing their blood pressure and cholesterol levels.

**Figure 20: Prevalence of Chronic Disease Risk Factors among Adults with Diabetes in Rhode Island, 2005-2007**



Data Source: Rhode Island Behavioral Risk Factor Surveillance System, 2006-2008.

## V: Diabetes is Preventable

Modifiable risk factors for type 2 diabetes are things that individuals can control or change to lower their risk of developing the condition. Key modifiable risk factors for diabetes include being overweight and having a sedentary lifestyle. Those who meet the criteria for obesity have an especially high risk. Adults are defined as obese if the ratio of their weight to their squared height, called a body mass index (BMI), is 30 or greater. Obese Rhode Islanders are three to four times more likely to have diabetes than non-obese residents.

There has been a statistically significant upward trend in obesity among Rhode Island adults from 1993 to 2007. Rhode Island adults at highest risk for overweight and obesity are men of all racial and ethnic groups, non-Hispanic Black and Hispanic women, middle income women of all races, and adults living in core cities (Pawtucket, Providence, Woonsocket, Newport, West Warwick, and Central Falls).<sup>1</sup>

### Pre-Diabetes

Individuals with pre-diabetes add to the overall burden of diabetes in Rhode Island. People with pre-diabetes have blood glucose levels that are higher than normal, but not high enough to diagnose diabetes. This condition raises the risk of type 2 diabetes, heart disease, and stroke, which both collectively and independently intensify the rising prevalence of diabetes. The Centers for Disease Control and Prevention have reported that 40.1% of adults in the United States age 40 through 74 years have pre-diabetes.<sup>7</sup> Applying the national estimates of pre-diabetes to the Rhode Island population, **HEALTH estimates that 200,000 Rhode Island adults age 40 through 74 have pre-diabetes; yet, from BRFSS data, HEALTH estimates that only 25,000 know they have this condition.**

Approximately 23 to 25% of people with pre-diabetes will continue on to the diagnosis of diabetes.<sup>25,26</sup> Intervention, however, can prevent and/or delay the onset of diabetes. The Diabetes Prevention Project, a national randomized control trial, demonstrated that intensive exercise and diet modification could prevent the onset of clinical diabetes in people diagnosed with pre-diabetes.<sup>25</sup> Indeed, some participants converted back to a non-pre-diabetes state.<sup>27</sup>

### Benefits of Physical Activity and Nutrition

Low fruit and vegetable consumption for men and frequent fast food consumption for women are associated with increased risk of obesity. In addition, men and women who watch more than two hours of television per day and those who are physically active for less than 30 minutes a day, five days a week have a higher obesity risk than those who do not watch as much television or who exercise more. All of these risk factors increase among those with diabetes.

The Rhode Island Healthy People 2000 Report notes some increase in physical exercise over time (for the period from 1988 to 1992 and for the years 1996 and 1998 combined). Non-Hispanic Black and Hispanic adults reported being less likely to exercise at recommended levels than all other respondents. Over time, all groups observed small increases in exercise rates, but non-Hispanic Black and Hispanic adults had slightly smaller increases than all other racial/ethnic groups. This indicates a trend towards increasing disparity. Rhode Islanders still have far to go to meet recommendations for fitness and nutrition. For instance, 74% of adults do not eat the recommended amount of fruits and vegetables per day, and 50% of adults do not meet physical activity recommendations.<sup>1</sup>

## Summary

Diabetes in Rhode Island is common, serious, and costly, but it is also controllable and preventable. Rhode Island has surpassed much of the country with its control and prevention efforts; however, much work remains to reverse the increasing trend and burden of diabetes in the state. Rhode Island has set an agenda to use Healthy People 2010 and 2020 goals to reduce the prevalence of diabetes and its economic burden, and to improve the quality of life for all people who have or are at risk for developing this disease. Priorities include preventing diabetes, reducing disparities, decreasing the costs of diabetes, and increasing diabetes education and community resources available to help patients control diabetes. Rhode Island's Diabetes Prevention and Control Program and its partners will use the data in this report to drive the strategic planning process and to implement evidence-based interventions to prevent and control diabetes in the Ocean State.

# Appendices

## A. References

1. Initiative for Healthy Weight. Eat Smart Move More. Rhode Island: A Plan for Action 2010-2015. Rhode Island Department of Health. 2010.
2. Centers for Disease Control and Prevention, National Diabetes Surveillance System. Available at: <http://www.cdc.gov/diabetes/statistics/prev/national/figbyage.htm>. Accessed on August 13, 2010.
3. CDC Behavioral Risk Factor Surveillance System (BRFSS). Available at: <http://apps.nccd.cdc.gov/brfss/display.asp?cat=DB&yr=2008&qkey=1363&state=UB>. Accessed on February 19, 2010.
4. Boyle JP et al. Projection of Diabetes Burden Through 2050: Impact of changing demography and disease prevalence in the U.S. *Diabetes Care* November 2001 vol. 24 no. 11
5. Venkat Narayan KM et al. Impact of Recent Increase in Incidence on Future Diabetes Burden. *Diabetes Care* September 2006 vol. 29 no. 9
6. Diabetes Prevention and Control Program. Diabetes Statistics in Rhode Island: Diabetes Fact Sheet for Rhode Island: 2010. Rhode Island Department of Health, 2010.
7. 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.
8. American Diabetes Association. Standards of Medical Care in Diabetes- 2010. *Diabetes Care* January 2010 vol. 33 no. Supplement 1 S11-S61
9. National Institute of Diabetes and Digestive and Kidney Diseases. National Diabetes Statistics, 2007 fact sheet. Bethesda, MD: U.S. Department of Health and Human Services, National Institutes of Health, 2008.
10. Clausen TD et al. High Prevalence of Type 2 Diabetes and Pre-Diabetes in Adult Offspring of Women with Gestational Diabetes Mellitus or Type 1 Diabetes: The role of intrauterine hyperglycemia. *Diabetes Care* February 2008 vol. 31 no. 2 340-346
11. Flegal K, Ezzati T, and Harris M, et al. Prevalence of diabetes in Mexican Americans, Cubans, and Puerto Ricans from the Hispanic Health and Nutrition Examination Survey, 1982-1984. *Diabetes Care*. 1991; 14: 628-638.
12. Rabi DM, et al. Association of Socio-Economic Status with Diabetes Prevalence and Utilization of Diabetes Care. *BMC Health Services Research*. 2006; 6:124.
13. RI Kids Count. Child Poverty in Rhode Island, September 2002. Issue Brief #14. Available at: <http://www.rikidscount.org/matriarch/documents/childpoverty.pdf>
14. Wojcik K, Gjelsvik A, Goldman D. Identifying populations at high risk for diabetes with the Behavioral Risk Factor Surveillance System, Rhode Island, 2003. *Prev Chronic Dis* 2010;7(4).
15. Stewart AW, et al. Underestimation of relative weight by use of self-reported height and weight. *Am. J. Epidemiol.* 1987; 125 (1): 122-126.
16. US Census population estimates by state. <http://www.census.gov/popest/states/asrh/> Accessed on February 22, 2010.
17. Ma RC, Chan JC. Diabetes: incidence of childhood type 1 diabetes: a worrying trend. *Nat Rev Endocrinol.* 2009 Oct;5(10):529-30.



18. United States Renal Data System. USRDS 2007 Annual Data Report. Bethesda, MD: National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, U.S. Department of Health and Human Services; 2007.
19. NIH National Kidney and Urological Disease Information Clearinghouse. Available at: <http://kidney.niddk.nih.gov/kudiseases/pubs/kdd/>. Accessed March 3, 2010.
20. U.S. Department of Health and Human Services. Healthy People 2010. Chapter 5: Diabetes Available from: <http://www.healthypeople.gov/document/HTML/Volumne1/05Diabetes.htm>. Accessed on May 12, 2008.
21. Leading Causes of Death, RI Department of Health. Available at [www.health.ri.gov/data/death/index.php](http://www.health.ri.gov/data/death/index.php). Accessed on February 26, 2010.
22. Wier LM, and Gjelsvik A. Diabetes mortality in Rhode Island: comparing underlying cause of death versus any listed cause of death. *Med Health R I*. March 2008 91(3):86-7.
23. American Diabetes Association. Economic Costs of Diabetes in the U.S. in 2007. *Diabetes Care*. March 2008 31:596-615; doi:10.2337/dc08-9017 Table 11.
24. Haire-Joshu D, Glasgow RE, and Tibbs TL. Smoking and diabetes. *Diabetes Care*. November 1999 vol. 22 no. 11
25. Tuomilehto J, Lindstrom J: Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med*. 344:1343-1350, 2001
26. Shaw J, Zimmet P: Impaired fasting glucose or impaired glucose tolerance. What best predicts future diabetes in Mauritius? *Diabetes Care*. 22:399-402, 1999
27. The Diabetes Prevention Program Research Group. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med*. 2002 Feb 7;346(6):393-403.

## B. Data Sources and Limitations

This report uses surveillance data gathered by the HEALTH's Center for Health Data and Analysis and Office of Vital Records. Data sources include:

### The Rhode Island Behavioral Risk Factor Surveillance System (BRFSS)

The report relies on BRFSS data to estimate the prevalence of diabetes in adults, analyze many of the risk factors, and assess diabetes management. This annual telephone survey collects self-reported information on the health status, demographic characteristics, and health behaviors of more than 4,000 randomly selected adult residents. The Rhode Island BRFSS is funded in part by the CDC Chronic Disease Prevention and Health Promotion Programs Cooperative Agreement 1U58DP001988-01.

### Rhode Island Hospital Discharge Data

Data on inpatient discharges come from the eleven acute care hospitals, two psychiatric hospitals, and one inpatient rehabilitation facility in Rhode Island. The data include patient demographics, clinical items, and hospital charges. Hospitals report inpatient discharge data to HEALTH's Center for Health Data and Analysis within 90 days after the end of each calendar quarter. HEALTH uses the data to measure health outcomes and healthcare utilization, morbidity, and disease prevalence.

### Rhode Island Vital Records (Death Records)

The report uses Rhode Island death data to estimate rates of death due to diabetes and related causes among Rhode Island residents. HEALTH collects death data from funeral directors, who are responsible for obtaining the cause of death from physicians. Rhode Island Death Records include both individuals who died in Rhode Island and Rhode Island residents who died out of state.

The Rhode Island diabetes surveillance system is modeled after the National Center for Chronic Disease Prevention and Health Promotion's national chronic disease surveillance system. Historically, infectious disease surveillance has relied on the reporting of individual cases by physicians, hospitals, and laboratories. Other than cancer, however, no single chronic disease relies on a comprehensive, diagnosis-based reporting system. Thus, tracking new cases of diabetes in Rhode Island is not presently possible.

### **C. Acknowledgements**

This report was prepared as a collaborative project between JSI Research & Training Institute, Inc. and HEALTH, including Annie Gjelsvik, PhD and Harman Dhatt from HEALTH and Jennifer Kawatu, RN, MPH and Terry Greene, MPH from JSI. This report uses data gathered by HEALTH's Center for Health Data and Analysis and Office of Vital Records. US Centers for Disease Control and Prevention Cooperative Agreement Number 3U32DP122687-05W1 supported the report.

## **Suggested Citation**

Rhode Island Diabetes Prevention and Control Program. *The Burden of Diabetes in Rhode Island: 2010*. Providence, RI: Rhode Island Department of Health, 2010.

**Diabetes Prevention and Control Program**  
**HEALTH Information Line 401-222-5913 / RI Relay 711 - [www.health.ri.gov](http://www.health.ri.gov)**

