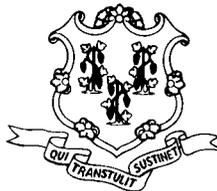




Keeping Connecticut Healthy

**THE BURDEN OF DIABETES IN CONNECTICUT
2006 Surveillance Report**

DECEMBER 2006



State of Connecticut
Department of Public Health
410 Capitol Avenue
P.O. Box 340308
Hartford, CT 06134-0308

Prepared by

Margaret M. Hynes, Ph.D., M.P.H. and Betty C. Jung, R.N., M.P.H., C.H.E.S
Connecticut Department of Public Health
Health Information Systems and Reporting Section
Surveillance and Reporting Unit

Acknowledgments

We gratefully acknowledge members of the Connecticut Diabetes Prevention and Control Program Data and Surveillance Working Group who reviewed this report, which was developed as a section of the state plan:

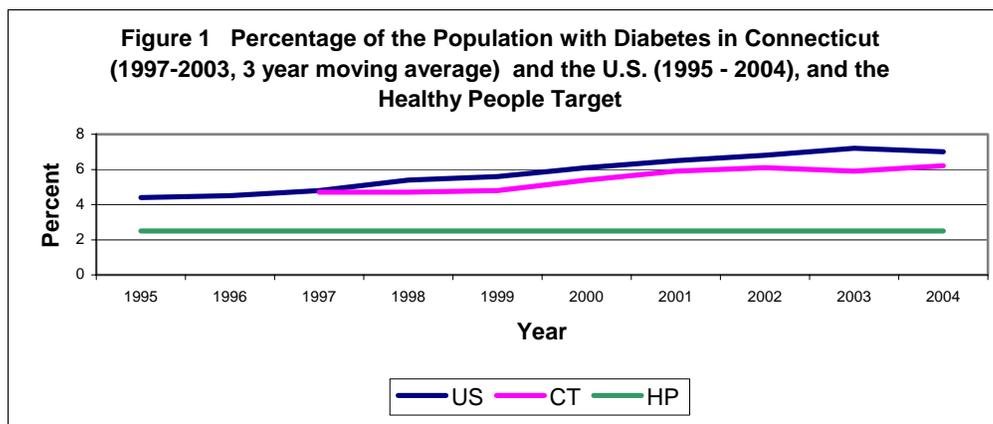
Chris Andresen, CT Department of Public Health
Stephanie Belding, Community Renewal Team, Inc.
Rosa Browne, NAACP, Connecticut
Louise Butcher, American Diabetes Association - Connecticut
Steven Delaronde, ConnectiCare, Inc. & Affiliates
Allen Frommelt, CT Hospital Association
Ana Lourdes Gómez, University of Connecticut
Shih-Yieh Ho, Qualidigm
Sheryl Horowitz, Griffin Hospital
Cindy Kozak, CT Department of Public Health
Susan McKenney, Anthem Blue Cross & Blue Shield
Gail D'Eramo Melkus, Yale University School of Nursing
Carolé Mensing, University of Connecticut
Rafael Pérez-Escamilla, University of Connecticut
James E. Rawlings, NAACP, Connecticut
Katherine Schneider, Integrated Resources Middlesex Area
Jean Zimkus, Bridgeport Hospital

THE BURDEN OF DIABETES IN CONNECTICUT

Prevalence

An estimated 6.2% of the Connecticut adult population, or approximately 163,000 adults 18 years and older, have diagnosed diabetes (2003-2005 data) compared with about 7% of the U.S. population.^{1,2} The Centers for Disease Control and Prevention (CDC) estimates that about 30% of all diabetes cases are undiagnosed, partly because symptoms develop gradually and severe symptoms may only occur after several years.³ An additional 70,000 Connecticut adults are estimated to have undiagnosed diabetes. Thus, a total of 233,000 Connecticut residents are estimated to have either diagnosed or undiagnosed diabetes. Prevalence estimates reported below refer to diagnosed cases of diabetes.

National survey data suggest that diabetes has continuously increased since the mid-1990s.⁴ The national Behavioral Risk Factor Surveillance System (BRFSS) survey estimated adult diabetes prevalence at 4.4% in 1995, 6.1% in 2000, and 7% in 2004. The prevalence of diabetes in Connecticut has gradually increased since 1999. Diabetes prevalence in the Connecticut adult population was 4.8% in 1998-2000 and 6.2% in 2003-2005.⁵ The U.S. *Healthy People 2010* target for diabetes prevalence is 2.5%.



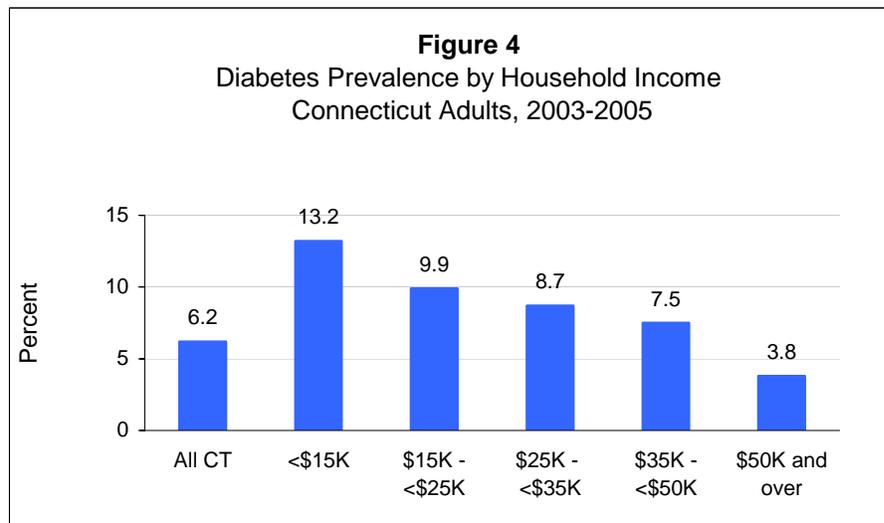
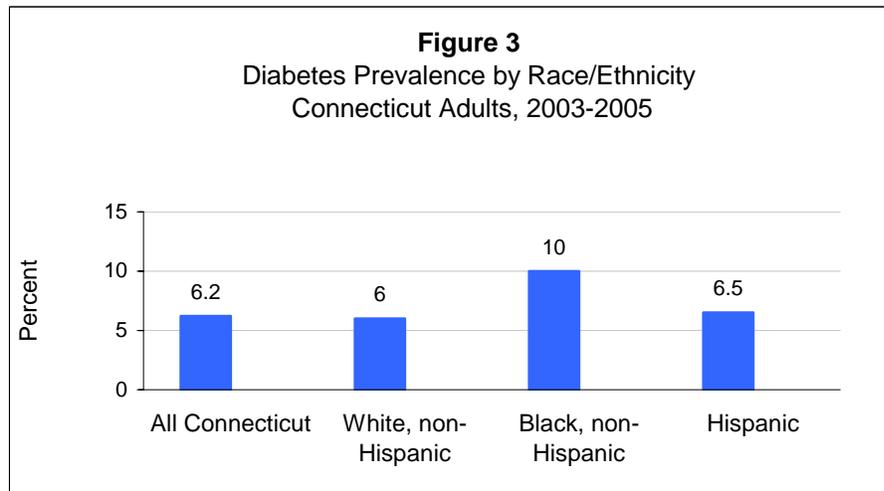
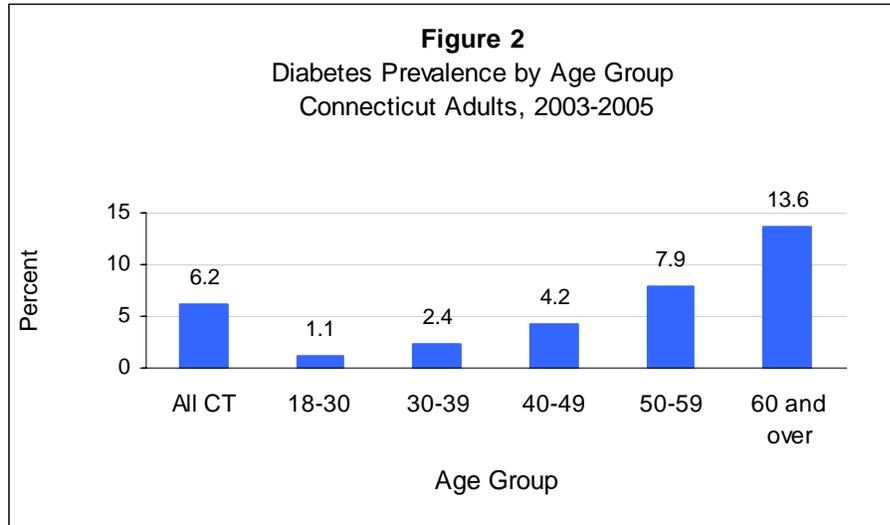
Sources: US Department of Health and Human Services, 1990; 2000; Centers for Disease Control and Prevention, 2005; Connecticut Department of Public Health, 2005.

Prevalence by Age, Race/Ethnicity and Household Income

Diabetes prevalence rates vary by age, race/ethnicity, and household income levels. Prevalence increases by age with Connecticut adults aged 60 and over having the highest rates and adults aged 18 to 29 having the lowest rates of diabetes (Figure 2). Among subpopulation groups, Black adults have significantly higher prevalence than White and Hispanic adults ($p < .05$) [Figure 3]. Lower-income adults are also more likely to have diagnosed diabetes than are higher-income adults in Connecticut (Figure 4).⁶

The prevalence of diabetes in Connecticut and the United States is likely to increase for a few reasons. First, large segments of both populations are aging. Second, the fastest-growing segment

of the U.S. and Connecticut populations include Hispanic Americans and other minority groups, who are considered at higher risk for diabetes nationwide. Finally, Americans are increasingly overweight and sedentary. According to recent estimates, the prevalence of diabetes in the United States is predicted to reach 8.9% of the population by 2025.⁷



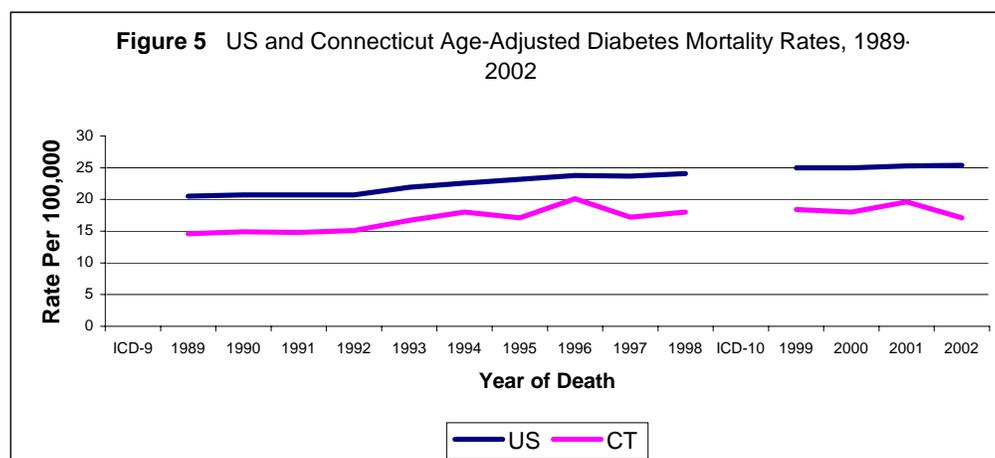
Source: Connecticut Department of Public Health. 2006. Behavioral Risk Factor Surveillance System Survey.

Mortality

Diabetes is the seventh leading cause of death in Connecticut. Most people with diabetes die from related complications rather than directly from the disease itself; therefore, examination of diabetes as the underlying cause of death alone does not accurately represent its extensive contribution to overall mortality. While diabetes was the underlying or “primary” cause of deaths for 674 residents in 2002, it was listed as a primary or secondary (“diabetes-related”) cause of death for 2,771 Connecticut residents.⁸ National data suggest that diabetes is underreported on death certificates.⁹

Trends in Mortality

Age-adjusted death and premature mortality rates due to diabetes increased significantly in Connecticut during the 1990s ($p < .001$).¹⁰ This increase mirrors a similar trend nationwide.¹¹ Age-adjusted diabetes mortality rates for Connecticut residents have been consistently lower than comparable national rates (Figure 5). Diabetes-related mortality rates for Connecticut residents did not change significantly during the 1990s.¹²



Sources: Centers for Disease Control and Prevention; Connecticut Department of Public Health, 2005.
Note: Cause-of-death coding changed from ICD-9 to ICD-10 in 1999.

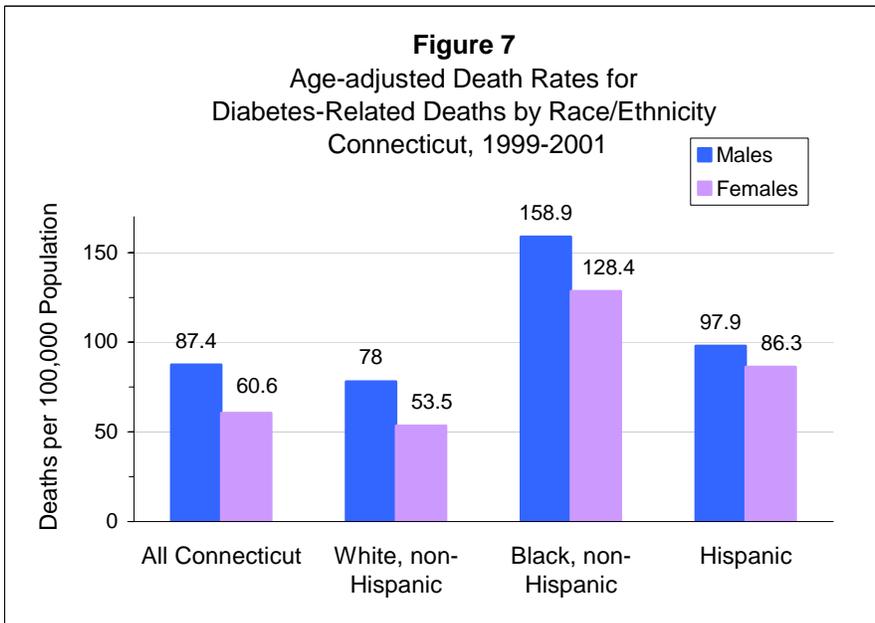
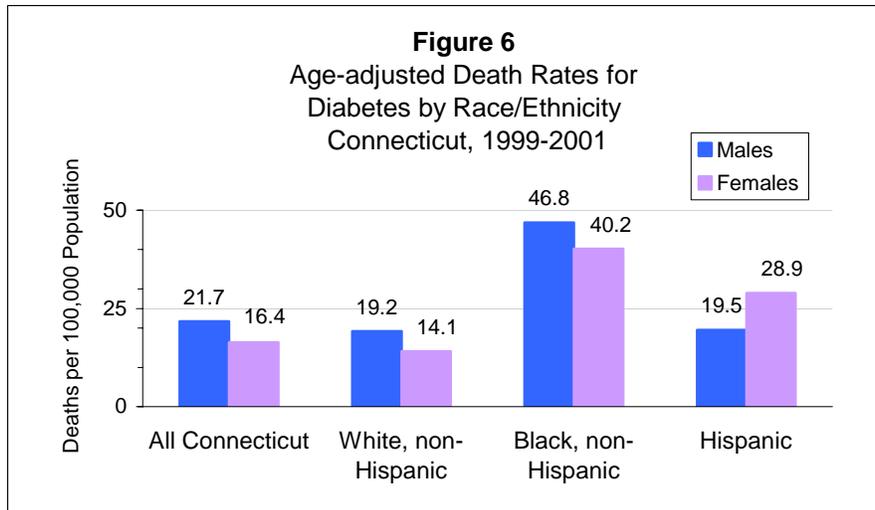
Diabetes Mortality by Gender, Race, and Ethnicity

Connecticut male residents have significantly higher mortality rates from both diabetes and diabetes-related causes than do Connecticut females ($p < .01$ for both comparisons) [Figures 6 and 7].¹³ These findings are consistent with national data showing slightly higher diabetes mortality rates among males.

Of all subpopulation groups, Black (non-Hispanic) males and females have the highest mortality rates due to diabetes and diabetes-related causes and significantly higher mortality than the respective White (non-Hispanic) and Hispanic populations. Black males have 2.4 times the risk of death due to diabetes and twice the risk of diabetes-related deaths compared with White males ($p < .01$ for both comparisons). Black females have 2.9 times the risk of death due to

diabetes and 2.4 times the risk of diabetes-related deaths compared with White females ($p < .01$ for both comparisons) [Figures 6 and 7].¹⁴

The diabetes and diabetes-related mortality rates of Hispanic males are not significantly different than the respective rates for White males. Hispanic females have twice the risk of diabetes death ($p < .01$) and 1.6 times the risk of diabetes-related death ($p < .01$) rates compared with White females (Figures 6 and 7).¹⁵

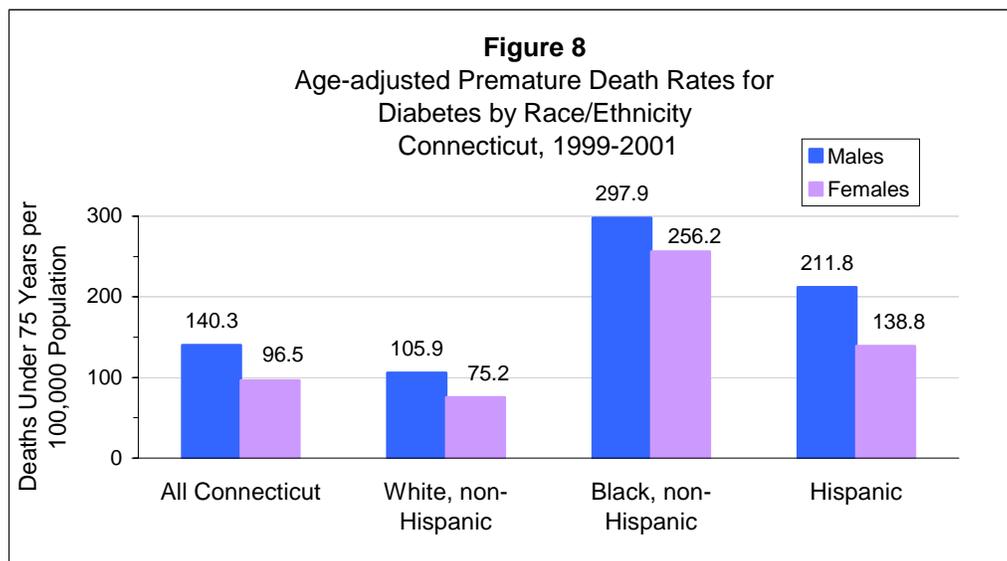


Source: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

Premature Mortality by Gender, Race, and Ethnicity

Premature mortality, defined as the “years of potential life lost before age 75,” emphasizes deaths that occur at younger ages. For example, a person who dies at age 45 is considered to have lost 30 years of life, and a person who dies at 70 is considered to have lost 5 years of life.¹⁶

Premature mortality (to age 75) due to diabetes is significantly higher among Black (non-Hispanic) males and females compared with the respective White (non-Hispanic) and Hispanic populations ($p < .01$ for both comparisons). Black males have 2.8 times the risk of premature death due to diabetes compared with White males. Black females have 3.4 times the risk of premature death due to diabetes compared with White females males (Figure 8).¹⁷



Source: Connecticut Department of Public Health, Vital Records Mortality Files, 2005.

Hispanic females have 1.8 times the risk of premature death due to diabetes compared with White females, but this difference is not statistically significant. Hispanic males have twice the risk of premature death due to diabetes compared with White males. This difference is statistically significant ($p < .01$) [Figure 8].¹⁸

Morbidity

Lack of timely, appropriate medical care may contribute to the complications of diabetes, such as lower extremity amputations, end-stage renal disease, and blindness. For people living with diabetes, the impact of this disease may extend over many years.

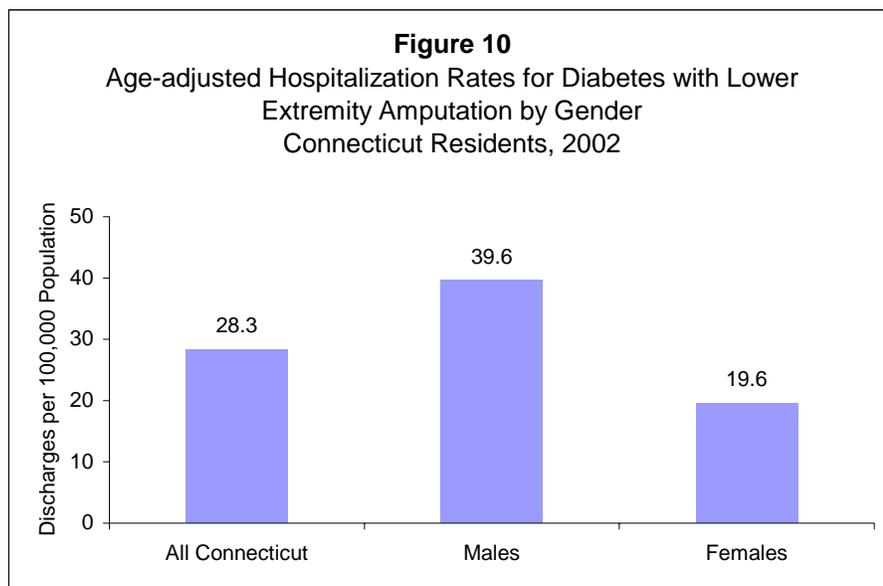
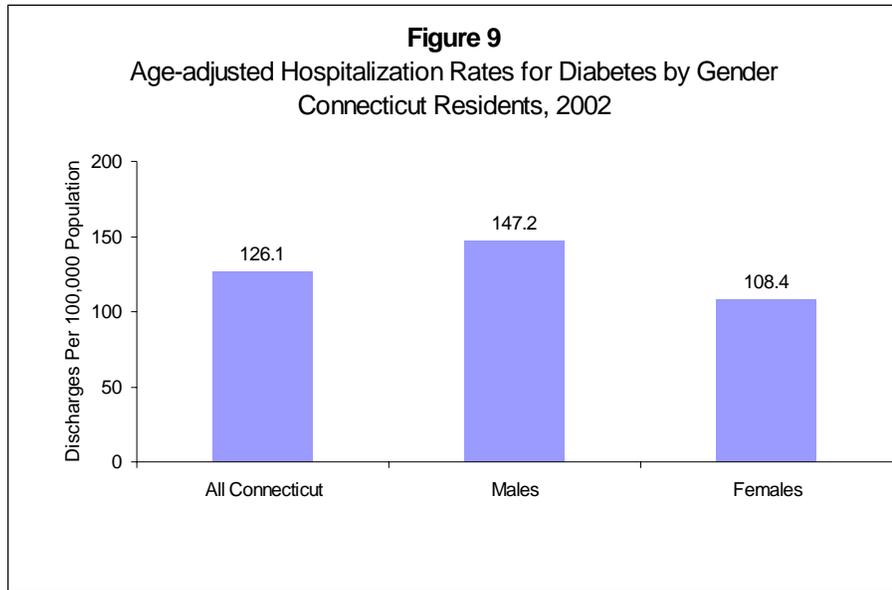
Cardiovascular disease and lower extremity amputations are significantly more likely to occur in patients with diabetes. For example, national data show that the risk of hospitalization from cardiovascular disease is two to four times higher for women with diabetes than women without the disease. Those hospitalized with diabetes are 28 times more likely to have an amputation than those without the disease.¹⁹

Multiple hospitalizations are common among persons with diabetes. Nearly one-third are hospitalized two or more times in the same year due to complications associated with diabetes.

Low-income people with diabetes are more likely to experience multiple hospitalizations. About 30% of all diabetes patients who are hospitalized are re-hospitalized in a one-year period.²⁰

Hospitalization Rates by Gender

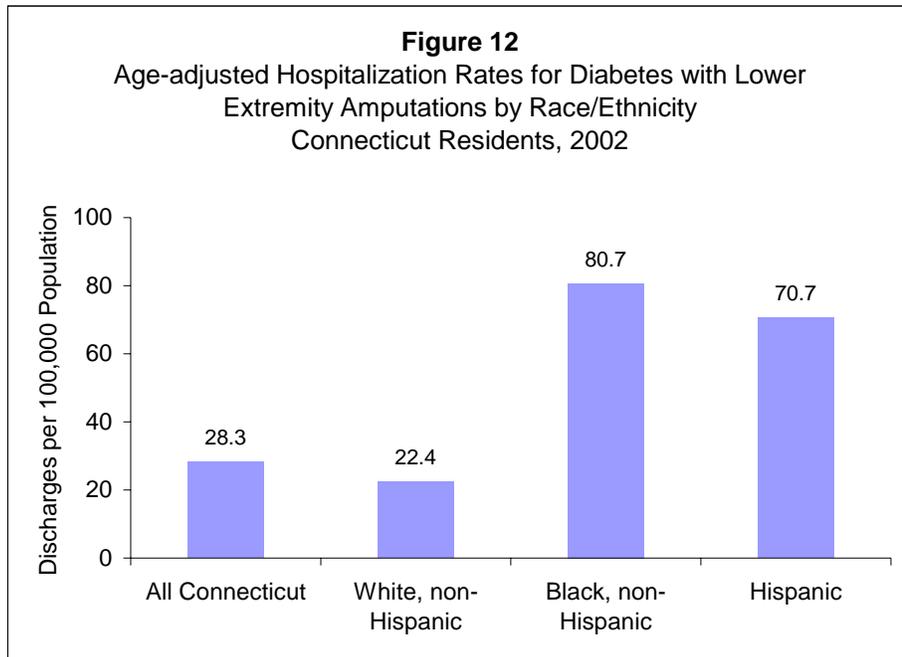
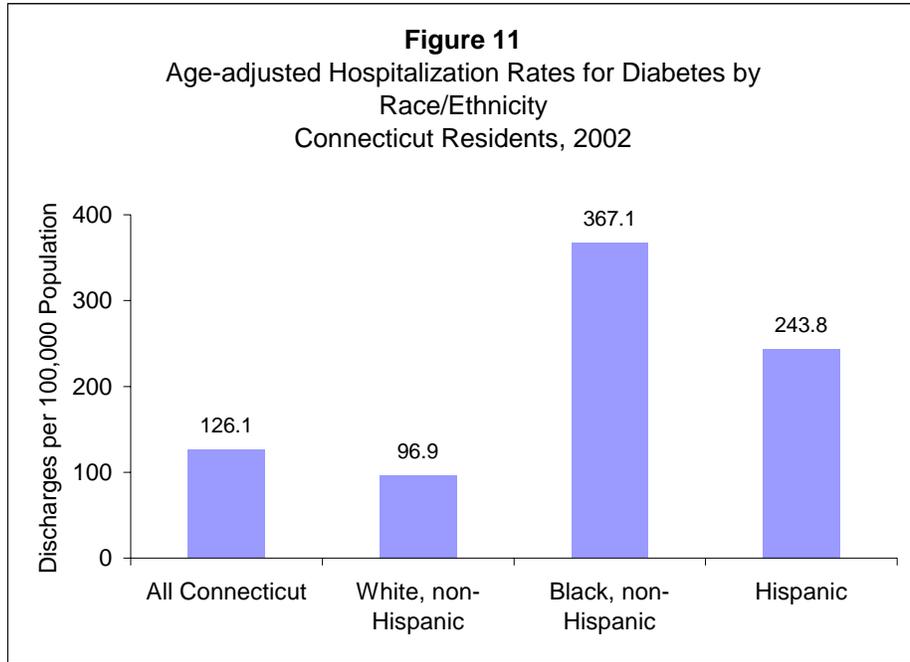
Connecticut males are significantly more likely to be hospitalized for diabetes and lower-extremity amputations compared with Connecticut females ($p < .05$ for both comparisons). Connecticut males have 1.4 times the rate of hospitalization for diabetes and twice the rate of lower-extremity amputations compared with Connecticut females (Figures 9 and 10).²¹



Source: Connecticut Department of Public Health, Hospital Discharge and Abstract Billing Data Base, 2005.

Hospitalization Rates by Race and Ethnicity

Black (non-Hispanic) and Hispanic Connecticut residents have significantly higher rates of hospitalizations for diabetes and for lower-extremity amputations than do White (non-Hispanic) residents ($p < .05$ for both comparisons). Black residents have 3.8 times the rate of diabetes hospitalizations and 3.6 times the rate of lower extremity amputations due to diabetes compared with White residents. Hispanics have 2.5 times the rate of diabetes hospitalizations and 3.2 times the rate of lower-extremity amputations due to diabetes compared with White (non-Hispanic) residents ($p < .05$ for both comparisons) [Figures 11 and 12].²²



Source: Connecticut Department of Public Health, Hospital Discharge and Abstract Billing Data Base, 2005.

Economic Costs

The direct (medical care) and indirect costs (lost productivity and premature mortality) of diabetes in Connecticut were estimated at \$1.7 billion in 2003.²³ This estimate includes direct medical costs and indirect costs associated with lost productivity from illness and death. Diabetes can accrue enormous indirect costs. It is a major cause of disability and the ability to live independently, and they can severely impact the quality of life for individuals and families.

Approximately \$77 million was billed for hospitalizations in Connecticut due to diabetes as a principal diagnosis in 2002. Almost \$39 million was billed for hospitalizations related to diabetes with a lower extremity amputation.²⁴

Risk Factors for Diabetes

Risk factors for diabetes are classified as non-modifiable and modifiable factors. Non-modifiable risk factors include increasing age over 45 years; having a parent, brother or sister with diabetes; having a family background that is African American/Black, American Indian, Asian American, Pacific Islander, or Hispanic/Latino; and having had gestational diabetes, or giving birth to at least one baby weighing more than nine pounds. Modifiable risk factors include overweight or obesity; a blood pressure of 140/90 or higher; HDL cholesterol of 35 mg/dL or lower; triglyceride levels of 250 mg/dL or higher; and lack of physical activity.²⁵ Obesity is considered the chief modifiable risk factor for diabetes. People who are 20% or more above their desired weight have four times the risk of developing diabetes compared with those of normal weight.²⁶

Lower socioeconomic status has been consistently linked to higher prevalence of type 2 diabetes.^{27, 28, 29} Low-income persons are less likely than higher-income persons to have an adequate diet, sufficient physical activity, and access to medical care, factors known to affect progression of the disease.

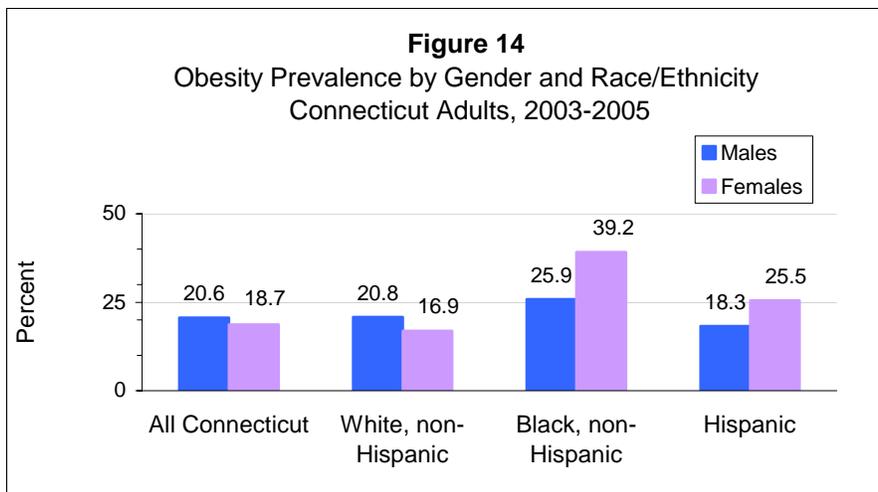
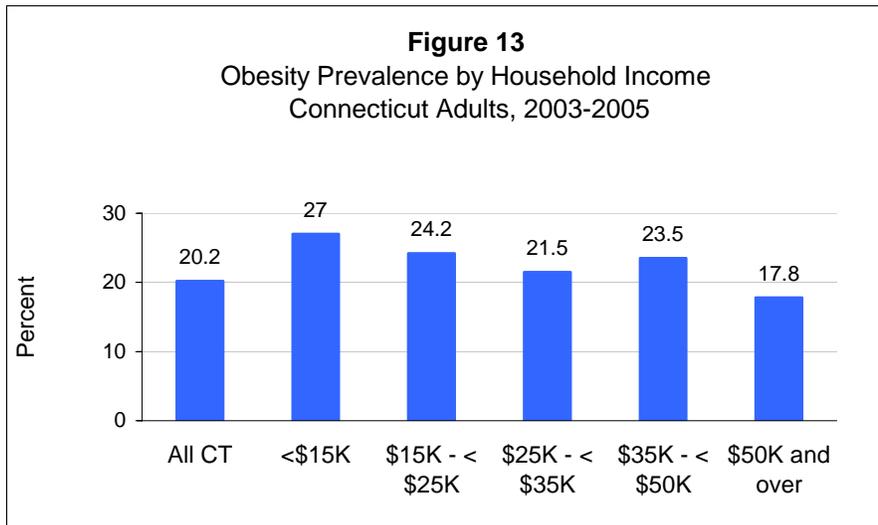
| Table 1. Modifiable and Non-modifiable Risk Factors for Diabetes | |
|---|--|
| Modifiable | Non-Modifiable |
| <ul style="list-style-type: none"> • Overweight or obesity • Blood pressure of \geq 140/90 mmHg • HDL cholesterol \leq 35 mg/dL • Triglyceride levels of \geq 250 mg/dL • Lack of physical activity | <ul style="list-style-type: none"> • Increasing age over 45 years • Family history • Black, Hispanic, Asian, Pacific Islander, American Indian family background • History of gestational diabetes • Having given birth to a baby > 9 lbs. |

Overweight and Obesity as Modifiable Risk Factors

Body mass index (BMI), or weight adjusted for height, is a widely used screening method for obesity. Medical guidelines identify normal/desirable weight as a BMI under 25, overweight as a BMI of 25 to 29.9, and obese as a BMI of 30 or more.³⁰ People who are overweight are at much greater risk of developing type 2 diabetes than are normal weight individuals. Being overweight puts added pressure on the body's ability to properly control blood sugar, therefore making it much more likely for diabetes to develop. Almost 90% of people with type 2 diabetes are

overweight.³¹ Obesity is a metabolic disorder, which can be explained by a combination of hereditary and environmental factors. High calorie diets along with less physical activity have contributed to the obesity epidemic.³² Abdominal obesity has been found to place individuals at higher risk for health problems, including high blood pressure, high blood cholesterol, high triglycerides, diabetes, and heart disease.³³

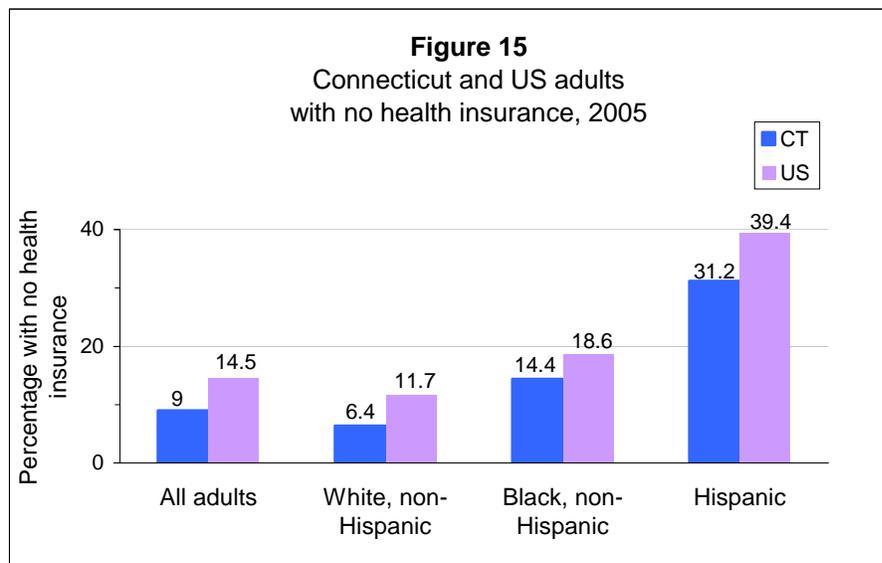
Approximately 20% of Connecticut adults are obese, about 37% are overweight, and 43% are normal or desired weight.³⁴ Lower-income adults are more likely to be obese than higher-income adults (Figure 13).³⁵ Black females are more likely to be obese compared with White and Hispanic females ($p < .05$ for both comparisons). There are no significant differences in obesity among Connecticut adult males by race or Hispanic ethnicity (Figure 14).³⁶



Source: Connecticut Department of Public Health, Behavioral Risk Factor Surveillance System Survey, 2006.

Access to Health Care

Access to health care is key to the prevention, treatment, and management of diabetes. People without health insurance are less likely than others to have a usual source of care, to receive preventive health care services, and appropriate medical management of chronic conditions. About 9% of Connecticut adults aged 18 and over do not have health insurance compared with almost 15% of adults nationwide. Hispanic adults in Connecticut are least likely to report having health insurance (about 31%), followed by Black adults (14%), and White adults (6%). Comparable national figures show that about 31% of Hispanic adults, 19% of Black adults, and 12% of White adults nationwide reported having no health insurance (Figure 15).³⁷ The health status of the entire Connecticut population is compromised when large numbers of residents are uninsured, and it imposes a significant additional financial burden on our state.



Source: Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System Survey, 2006.

Targeting High-Risk Populations

Black and lower-income adults in Connecticut have higher prevalence rates of diagnosed diabetes compared with non-Black and higher-income adults, respectively. Black and Hispanic Connecticut residents experience higher rates of premature mortality due to diabetes and higher rates of hospitalization due to diabetes and lower-extremity amputations. They are significantly less likely than White residents to have health insurance, and thus access to preventive health care services. Targeted public health interventions that address the risk factors for the development of diabetes, timely diagnosis of the disease, as well as appropriate preventive care for those with diagnosed diabetes are warranted for the Connecticut Black, Hispanic, and low-income populations.

REFERENCES

- ¹ Connecticut Department of Public Health. 2006. *Trends in Diabetes Prevalence in Connecticut, 1996-2005*. Unpublished tables.
- ² Centers for Disease Control and Prevention. 2005. *National Diabetes Fact Sheet - United States, 2003*. Retrieved December 20, 2005, from http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2005.pdf
- ³ *Ibid.*
- ⁴ National Health Interview Survey. 2005. Preliminary Results. Retrieved December 21, 2005, from http://www.cdc.gov/nchs/data/nhis/earlyrelease/200512_14.pdf
- ⁵ Connecticut Department of Public Health. 2006. *Op cit.*
- ⁶ Connecticut Department of Public Health. 2005. *Diabetes Prevalence in Connecticut, 2002-2004*. Retrieved March 7, 2006 http://www.dph.state.ct.us/PB/HISR/BRFSS_Diabetes_prev.pdf
- ⁷ National Diabetes Information Clearinghouse. (January, 2005). *Who Gets Diabetes?* Retrieved December 20, 2005, from: <http://diabetes.niddk.nih.gov/dm/pubs/overview/>
- ⁸ Connecticut Department of Public Health, Vital Records Mortality Files. 2005. *Connecticut Resident Deaths, 2002*. Hartford, CT: Connecticut Department of Public Health. Retrieved December 21, 2005 from http://www.dph.state.ct.us/PB/HISR/CT_resident_deaths_2002.pdf
- ⁹ CDC Diabetes. (2005). *National Diabetes Fact Sheet - United States 2005*. Retrieved December 20, 2005, from http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2005.pdf
- ¹⁰ Hynes, M.M., L.M. Mueller, H. Li, and F. Amadeo. 2005. *Mortality and its Risk Factors in Connecticut, 1989-1998*. Hartford, CT: Connecticut Department of Public Health. <http://www.dph.state.ct.us/OPPE/Mortality/mortalityriskfactors.htm>
- ¹¹ Centers for Disease Control and Prevention. 2001. 1999 Diabetes Surveillance Report. Retrieved May 1, 2001. <http://www.cdc.gov/diabetes/statistics>
- ¹² Hynes, Mueller, Li, and Amadeo. *Op. cit.*
- ¹³ Hynes, M.M., F.A. Amadeo, and L.M. Mueller. 2005. *Connecticut Resident Mortality Summary Tables by Gender, Race, & Hispanic Ethnicity, 1999-2001*. Hartford, CT: Connecticut Department of Public Health. http://www.dph.state.ct.us/PB/HISR/CT_death_summary_1999-2001.pdf. Retrieved January 24, 2006.
- ¹⁴ *Ibid.*
- ¹⁵ *Ibid.*
- ¹⁶ National Center for Health Statistics. 2004. *Health, United States with Chartbook on Trends in the Health of Americans*. Hyattsville, MD: NCHS. <http://www.cdc.gov/nchs/data/abus/abus04acc.pdf>. Retrieved January 5, 2006.
- ¹⁷ Hynes, Amadeo, and Mueller. *Op. cit.*
- ¹⁸ Hynes, Amadeo, and Mueller. *Op. cit.*
- ¹⁹ Agency for Healthcare Research and Quality. 2005. *HCUP Highlight Issue 1: Economic and Health Costs of Diabetes*. Retrieved December 21, 2005 from: <http://www.ahrq.gov/data/hcup/highlight1/high1.htm>
- ²⁰ *Ibid.*
- ²¹ Connecticut Department of Public Health. 2005 a. *Connecticut Resident Hospitalizations, 2002*. Retrieved March 21, 2006 from: http://www.dph.state.ct.us/PB/HISR/CDI_Tables.pdf
- ²² *Ibid.*
- ²³ Department of Health and Human Services, Centers for Disease Control and Prevention, 2005. *The Burden of Diabetes in Connecticut*. Unpublished document.
- ²⁴ Connecticut Department of Public Health. 2005 a. *Op cit.*
- ²⁵ National Diabetes Information Clearinghouse. (January, 2005). *What Factors Increase my Risk for Diabetes?* Retrieved December 14, 2005, from: <http://www.diabetes.niddk.nih.gov/dm/pubs/diagnosis/index.htm>
- ²⁶ Bishop, D.B., B.R. Zimmerman, and J.S. Roesler. 1998. Chapter 14 in Brownson, R.C., P.L. Remington, and J.R. Davis, eds., *Chronic Disease Epidemiology and Control, 2nd Edition* Washington, DC: American Public Health Association.
- ²⁷ Brancati, F.L., P.K. Whelton, L.H. Kuller, and M.J. Klag. 1996. Diabetes mellitus, race, and socioeconomic status. A population-based study. *Annals of Epidemiology* 6(1): 67-73.

-
- ²⁸ Robbins, J.M., V. Vaccarino, H. Zhang, and S.V. Kasl. 2000. Excess type 2 diabetes in African American women and men aged 40-74 and socioeconomic status: Evidence from the Third National Health and Nutrition Examination Survey. *Journal of Epidemiology and Community Health* 54(11): 839-845.
- ²⁹ Connolly, V., N. Unwin, P. Sherriff, R. Bilous, and W. Kelly. 2000. Diabetes prevalence and socioeconomic status: A population based study showing increased prevalence of type 2 diabetes mellitus in deprived areas. *Journal of Epidemiology and Community Health* 54(3): 173-177.
- ³⁰ U.S. Preventive Services Task Force. 2005. *The Guide to Clinical Preventive Services, Recommendations of the U.S. Preventive Services Task Force*. Washington, DC: US Department of Health and Human Services, Agency for Healthcare, Research and Quality.
- ³¹ NAASO, The Obesity Society. 2005. *Your Weight and Diabetes*. Retrieved December 22, 2005 from: http://www.naaso.org/information/diabetes_obesity.asp
- ³² Eckel, R.H. 1997. Obesity and Heart Disease. *Circulation*. 96:3248-3250. Retrieved September 8, 2005, from: <http://circ.ahajournals.org/cgi/content/full/96/9/3248>
- ³³ American Heart Association. Women, Heart Disease and Stroke. Retrieved September 8, 2005, from: <http://www.americanheart.org/presenter.jhtml?identifier=4786>
- ³⁴ Connecticut Department of Public Health, Behavioral Risk Factor Surveillance System (BRFSS) Program. 2006. 2003-2005 BRFSS Survey data. Unpublished tables.
- ³⁵ Connecticut Department of Public Health, Behavioral Risk Factor Surveillance System (BRFSS) Program. 2006. 2003-2005 BRFSS Survey data. Unpublished tables.
- ³⁶ *Ibid.*
- ³⁷ Centers for Disease Control and Prevention. 2005 Connecticut and US BRFSS data. Retrieved December 13, 2006. <http://apps.nccd.cdc.gov/brfss/>