

Diabetes in King County

Diabetes is a chronic disease in which insulin deficiency or the body's resistance to insulin leads to a high level of sugar in the blood. Without proper treatment, diabetes can lead to serious complications such as heart attack, kidney failure, blindness, and lower extremity amputation. In the United States, diabetes is the sixth leading cause of death. During the past two decades, the diabetes prevalence rate (defined a percent of people who have been diagnosed with

diabetes at a given time) and the diabetes death rate have been increasing. Diabetes is costly. The American Diabetes Association estimates that the total direct and indirect cost of diabetes in the United States was \$132 billion in 2002, up from \$98 billion in 1997.¹

This issue of Public Health Data Watch summarizes most recent data on diabetes for King County, updating a previous Data Watch issued in November 1999.²

Highlights

- ◆ The number of people in King County with diabetes doubled in the past decade. Such a rapid increase in the occurrence of a chronic illness is very rare. Diabetes now affects 84,000 adults in King County or 5.8% of the adult population.
- ◆ In King County, the diabetes death rate increased significantly from the mid-1980s to the mid-1990s and remains at a high level. The age-adjusted death rate per 100,000 was 20.6 in 2005.
- ◆ Most cases of diabetes are potentially preventable through decreasing obesity and increasing physical activity in the population. However, obesity is becoming increasingly common, suggesting that the diabetes prevalence will continue to increase in the future.
- ◆ Diabetes complications, hospitalizations, and deaths are also potentially preventable through appropriate disease management.
- ◆ Diabetes is costly to families, businesses and the health care system. In King County, the total estimated annual cost attributable to diabetes is \$1,025 million. Total charges for hospitalizations alone are \$24.5 million.
- ◆ In King County, African Americans are 2.6 times more likely to be affected by diabetes than whites and have a death rate 3.3 times higher than whites. The gap in the diabetes death rate between African Americans and whites increased during the 1990s and remains high.
- ◆ Pacific Islanders have the highest diabetes prevalence of any racial/ethnic group in King County, 3.2 times higher than whites.
- ◆ Asians and American Indians/Alaska Natives are also more likely to have diabetes than whites.
- ◆ The age-adjusted diabetes death rate for African Americans in King County is 26% higher than the average rate for African Americans in the United States.
- ◆ Diabetes disproportionately affects low income people. People with lower incomes are more likely to have diabetes and die from it than higher income people.
- ◆ There is significant neighborhood variation in the diabetes death rate. Among the Health Planning Areas in King County, the death rate for Southeast Seattle (with the highest rate) is 4.1 times the rate for Mercer Island (with the lowest rate).
- ◆ Many people with diabetes do not receive health services that can control blood sugar levels and prevent complications.

Current Data on Prevalence, Hospitalization, and Death

In 2006, 84,000 adults, or 5.8% of the adult population in King County have been diagnosed with diabetes by a doctor. Another 0.9% (approximately 13,400) have been told they have borderline diabetes. In addition, many people who have diabetes are unaware of their condition. Nationally, 30% of persons with diabetes are undiagnosed.³

- ◆ The 2005 diabetes prevalence in the United States was 7.3%.ⁱ The King County prevalence in 2005 (5.6%) was significantly lower than the national rate and ranked 14th among the 15 largest counties in the US.
- ◆ Each year, nearly 1,500 people are hospitalized for diabetes (as primary diagnosis). The aver-

age hospital stay was 4.2 days.

- ◆ Almost all hospitalizations for diabetes in adults (95.7%) are potentially preventable.⁴ Of the 1,298 preventable diabetes hospitalizations in 2004, 35.4% were for short-term diabetes complications such as ketoacidosis and coma and 60.6% were for long-term complications such as renal, eye, neurological, or circulatory complications. The remaining 4.0% were for unspecified complications. In 2004, 278 hospitalizations were for diabetes-related lower-extremity amputation.
- ◆ Diabetes is the 7th leading cause of death in King County, with 354 deaths in 2005.ⁱ In addition, diabetes was a contributing cause in 712 additional

deaths. The 1,066 diabetes-related deaths accounted for 9.3% of the total deaths in 2005.

- The age-adjustedⁱⁱ diabetes death rate per 100,000 in 2005 was 20.6 in King County and 25.3 in WA State. The U.S. 2004 death rate was 24.4. Compared to the 15 largest counties in the U.S., the King County death rate ranked 10th. Compared to the average death rate among similar counties in the U.S. (22.1),ⁱⁱⁱ the King County death rate was slightly lower.
- The King County age-adjusted rate of diabetes-related deaths in 2005 was 62.7 per 100,000, 39% higher than the U.S. 2010 objective of 45.0 per 100,000.

Economic Costs of Diabetes

The only local data on the cost of diabetes are hospitalization charges (charges are what the hospital initially bills for its services but actual costs may be somewhat lower). Other direct costs include costs for nursing home care, outpatient care, and outpatient medications. Indirect costs attributable to diabetes include lost work days and premature mortality. To provide a

more complete picture of the local economic burden of diabetes, we estimated the total costs of diabetes for King County based on per capita costs in the United States.⁵

- ◆ The total charges for hospitalizations in 2004 with diabetes as the primary diagnosis were \$24.5 million, averaging \$16,366 per hospitalization. For the 1,298 hospitalizations

among adults that were potentially preventable, the average charge per hospitalization was \$11,746 for those with short-term complications, \$21,610 for long-term complications, and \$7,634 for unspecified complications. For hospitalizations with diabetes-related amputations, the average charge was \$34,812.

ⁱ This is the median among 51 states and Washington DC based on BRFSS data.

ⁱⁱ As the underlying cause of death, which is a disease or condition which initiated the sequence of events leading directly to death.

ⁱⁱⁱ The age-adjusted rate is a rate that mathematically removes the effect of age, by using a standard population. For this report the rate is adjusted to the age distribution of the 2000 US population.

^{iv} This is a selected group of U.S. counties that are similar to King County in population size and demographic characteristics. See King County Core Indicators for Public Health (www.metrokc.gov/health/reports/coreindicators).

Table 1. Estimated economic costs of diabetes in King County, 2006^v

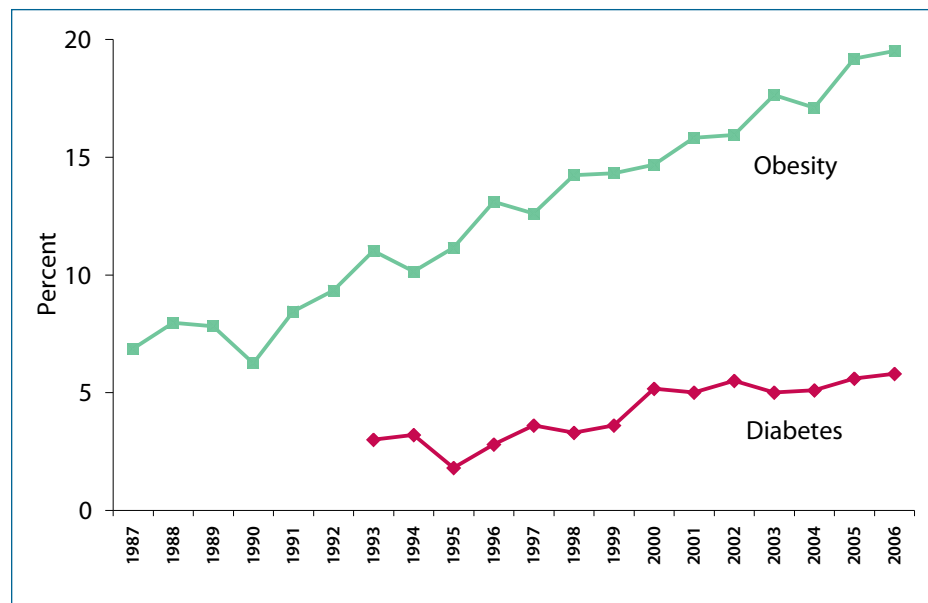
	\$ (Millions)
Total direct health care cost	715
Hospital inpatient	314
Medications	136
Nursing home/hospice	112
Physician's office	78
Hospital outpatient	26
Emergency	18
Home health	31
Total Indirect cost	310
Lost work days	35
Restricted activity days	49
Mortality	168
Permanent disability	58
Total Cost	1,025

- ◆ The total estimated direct and indirect annual cost attributable to diabetes in King County is \$1,025 million (Table 1). Hospitalizations are the largest direct cost contributor (44%), followed by medications (19%), nursing home care (16%), and physician office visits (11%).

Time Trends

- ◆ The prevalence of diabetes has been increasing locally, nationally, and worldwide. In King County, the prevalence doubled from 2.8% in 1996 to 5.8% in 2006.

The rise in diabetes prevalence occurred at a time when the prevalence of obesity also increased (Figure 1). Other factors that are associated with diabetes and obesity include unhealthy eating and physical inactivity.

Figure 1: Diabetes and obesity prevalence among adults ages 18+, King County, 1987-2006

^v Based on adults age 18+ with diabetes (N=84,000 in 2006, or 5.8% of the population). The U.S. 2002 per capita cost attributable to diabetes is from Table 10 of reference 1. The 2006 estimates are based on 2002 dollars adjusted for the 2006 U.S. city average CPI for all items.

- ◆ The diabetes death rate in King County increased 47% and the number of deaths per year increased from 180 to 321 between 1987 and 1996. Since 1996, the death rate has stayed high (Figure 2).
- ◆ The largest increase in the death rate was among African Americans during the 1990s (Figure 3). The average number of deaths per year increased from 17 during 1987-1991 to 36 during 1995-1999 while the age-adjusted death rate increased 79%, twice the rate of increase observed among whites. The African American rate has remained high in recent years. For Asians, the diabetes death rate increased in the late 1990s and reached its highest level in 2002. There was no significant change in the death rate among Hispanics. Among whites, the diabetes death rate also increased significantly between the mid-1980s and the mid-1990s and stayed stable since then.

Age and Gender Distribution

- ◆ The risk of diabetes increases with age. Averaged over 2002-2006, 0.6% of 18-24 year olds, 2.2% of 25-44 year olds, 7.8% of 45-64 year olds, and 14.0% of those age 65 and older had diabetes. The rates of hospitalization and death had a similar age pattern.
- ◆ The percent of people with diabetes increased significantly during 1993 to 2006. Between 1993-1997 and 2002-2006, the prevalence increased from 1.0% to 2.2% for people ages 25-44,

Figure 2: Diabetes deaths in King County and the U.S., 1980-2005

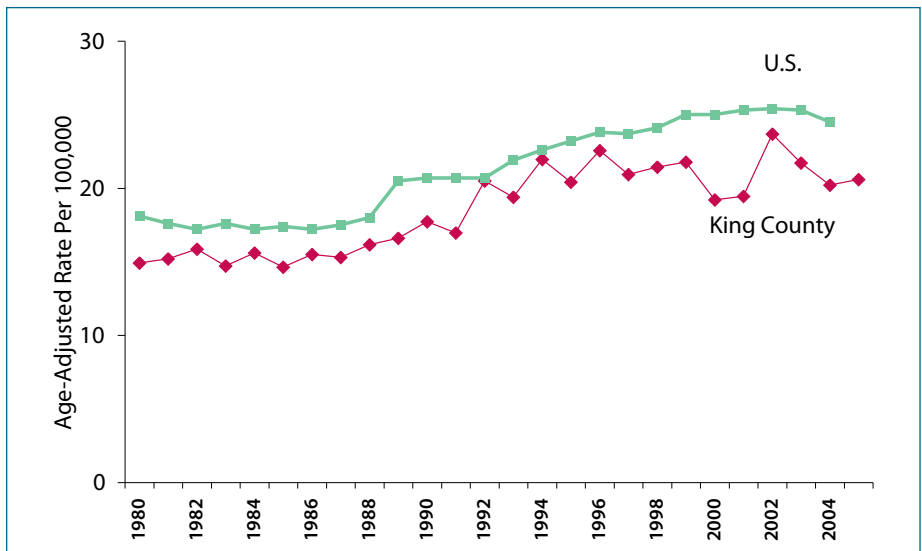
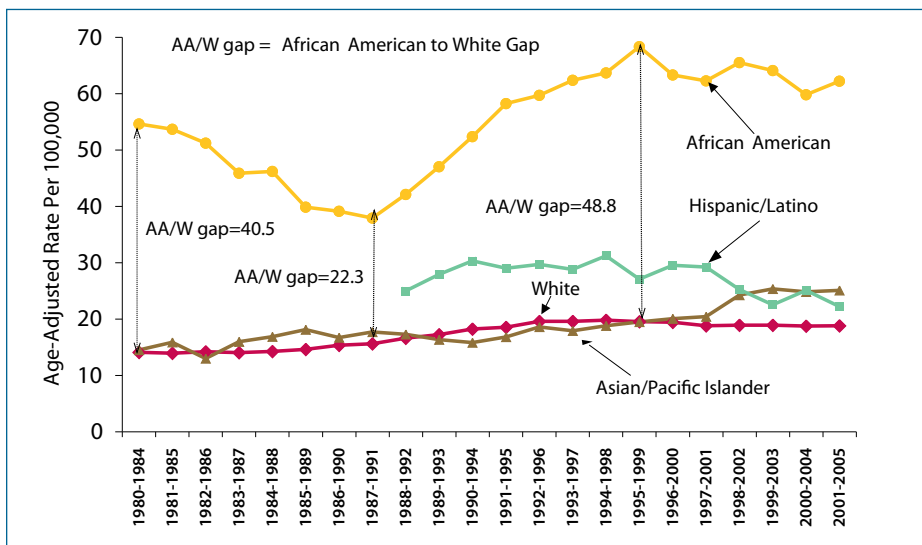


Figure 3: Diabetes death rate in King County by race/ethnicity, five year rolling averages, 1980-2005



4.4% to 7.8% among people ages 45-64, and 6.3% to 14.0% among people ages 65 and older. The number of cases is too small for a reliable trend evaluation for the 18-24 age group.

- ◆ Although most cases of diabetes are among middle aged and older adults, some studies suggest that Type 2 diabetes is increasingly being found among children and adolescents.⁵ The 2004 Healthy Youth Survey

indicates that 1.5% of the King County students in grade 8, 10, and 12 report having been diagnosed with diabetes.

- ◆ Men have higher diabetes prevalence and death rates than women. In King County, the age-adjusted prevalence rate was 5.1% for men and 4.2% for women (2002-2006 average). The age-adjusted death rate per 100,000 was 26.0 for men and 17.5 for women (2001-2005 average).

Disparities by Race/Ethnicity, Income, and Geographic Area

Race/Ethnicity

- ◆ African Americans have a higher percentage of people living with diabetes as well as a higher death rate. In King County, African Americans were 2.6 times more likely to have diabetes and 3.3 times more likely to die from it than whites (Table 2 and Table 3). If African Americans had the same diabetes death rate as whites, 71% of the deaths from diabetes would have been prevented. The death rates for Asians/Pacific Islanders and American Indians/Alaska Natives were also significantly higher than the white rate. The diabetes death rate for Hispanics was similar to the white rate. Reliable death rates for Pacific Islanders alone are not yet available.
- ◆ The percentages of the minority racial groups living with diabetes were all significantly higher than that for whites. Among Pacific Islanders, 13.3% were living with diabetes, followed by African Americans (10.5%), American Indians/Alaska Natives (7.2%), and Asians (6.8%). For Hispanics, the rate was also

Table 2: Diabetes prevalence by race/ethnicity among adults age 18+, King County, 2002-2006

	Percent*	95% CI	Rate Ratio	Estimated cases
White	4.1	3.9 – 4.4	1.0	61,600
African Am.	10.5	8.7 – 12.7	2.6	5,000
Asian	6.8	5.4 – 8.5	1.7	5,100
Pacific Islander	13.3	8.4 – 20.4	3.2	1,200
AI/AN	7.2	4.6 – 10.9	1.8	1,200
Hispanic	6.0	4.3 – 8.2	1.5	2,700

*The prevalence rate is age-adjusted to the 2000 US population. For calculating the rate ratio, white is the reference group.

higher than the white rate but the difference was not statistically significant (Table 2).

- ◆ The gap in diabetes death rate between African Americans and whites narrowed from 40.5 during 1980-1984 to 22.3 during 1987-1991, but increased again to 48.8 during 1995-1999, and stayed above 40.0 since then (Figure 3).
- ◆ The age-adjusted diabetes death rate for African Americans in King County (62.2 during 2001-2005) was 26% higher than the rate for African Americans in the United States (49.4 during 1999-2003). Meanwhile, the death rate from all causes for African Americans in King County (917.1) was lower than the national African American average (1100.8).
- ◆ The King County African American-to-white death rate ratio was substantially higher than the national ratio of 2.2 due to both a higher death rate among African Americans (62.2 in King County vs. 49.4 in the US) and a lower death rate among whites (18.8 in King County vs. 22.9 in the US). The lower white rate in King County may be explained by the county's higher income level. However, we have not found a convincing explanation for the higher African American death rate in King County.

Table 3: Diabetes death rate by race/ethnicity, King County

	King County, 2001-2005 Averages					U.S., 1999-2003 Averages		
	Age-Adj. Rate	95% CI	Death/Year	Rate Ratio	Excess deaths/Year*	Age-Adj. Rate	Death/Year	Rate Ratio
White	18.8	17.8, 19.8	264	1.0	0	22.9	56980	1.0
African Am.	62.2	53.7, 71.1	41	3.3	29	49.4	12366	2.2
Asian	25.1	21.3, 29.3	34	1.3	6	-	-	-
AI/AN	42.4	23.6, 72.0	4	2.3	2	-	-	-
Hispanic	22.2	14.4, 33.0	6	1.2	1	-	-	-

*For calculating rate ratio and excess deaths, white is the reference group.

◆ Many interrelated factors may have contributed to racial disparity in diabetes prevalence and death. The higher death rate among African Americans, for example, may be explained by racial discrimination, higher poverty, lower educational attainment, higher prevalence

of diabetes and other heart disease risk factors, barriers to accessing medical care, and a lower likelihood of receiving optimal diabetes management once in care. The 2004 BRFSS data, for example, indicate that African Americans, Hispanics, and American Indian/Alaska

Natives are significantly more likely than whites to experience racial discrimination overall and in the health care setting. They are also more likely to experience emotional upset and physical symptoms as a result of racial discrimination.

Tables 4: Racial discrimination experience (%) by race/ethnicity, King County, 2004 BRFSS*

	Overall		Health Care Setting		Emotional upset		Physical symptoms	
	Pct	95% CI	Pct	95% CI	Pct	95% CI	Pct	95% CI
White	3.1	2.2, 4.4	1.1	0.6, 2.2	3.0	2.1, 4.2	1.1	0.6, 2.1
African Am.	29.8	18.5, 44.4	7.0	2.6, 17.6	21.4	12.6, 34.1	15.6	8.5, 27.1
Asian/PI	8.7	4.3, 16.7	0.1	0.0, 1.0	10.4	4.0, 24.1	3.0	1.1, 7.8
AI/AN**	9.5	3.5, 23.1	8.3	2.8, 22.0	14.4	6.6, 28.8	12.6	5.0, 28.4
Hispanic	15.9	8.6, 27.4	7.7	3.0, 18.4	15.6	8.1, 27.7	16.0	8.8, 27.3

*The four racial discrimination indicators are based on the following questions in the BRFSS:

Overall – experienced being treated worse than people of other races/past 12 months;

Health Care Setting – experienced being treated worse than people of other races when seeking health care/past 12 months;

Emotional upset – felt emotionally upset as a result of how you were treated based on your race/past 30 days;

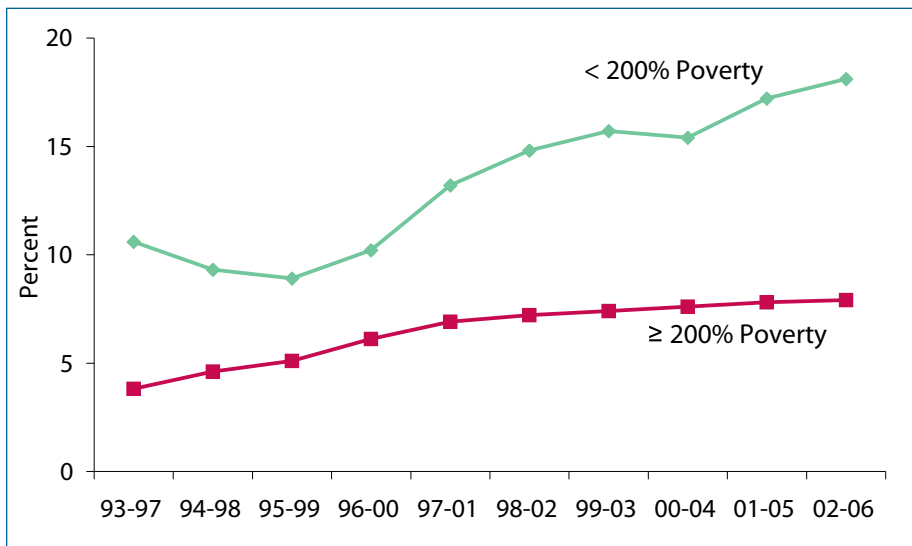
Physical symptoms – experienced physical symptoms as a result of how you were treated based on your race/past 30 days.

**Data for AI/AN are for Washington State because the sample size for King County is too small. Statewide AI/AN rates are significantly higher than statewide rates for whites.

Income

- ◆ Averaged over 2002-2006, 9.2% of adults with a household annual income less than \$20,000 had diabetes, compared to 4.9% among those with higher incomes. Among adults age 45 and older, 18.1% of those living below 200% poverty had diabetes, compared to 7.9% of those living above 200% poverty.
- ◆ The gap in diabetes prevalence between those living below and above 200% poverty more than doubled since the late 1990s (Figure 4).

Figure 4: Diabetes prevalence among adults age 45+ by household poverty level, King County five year rolling averages, 1993-2006



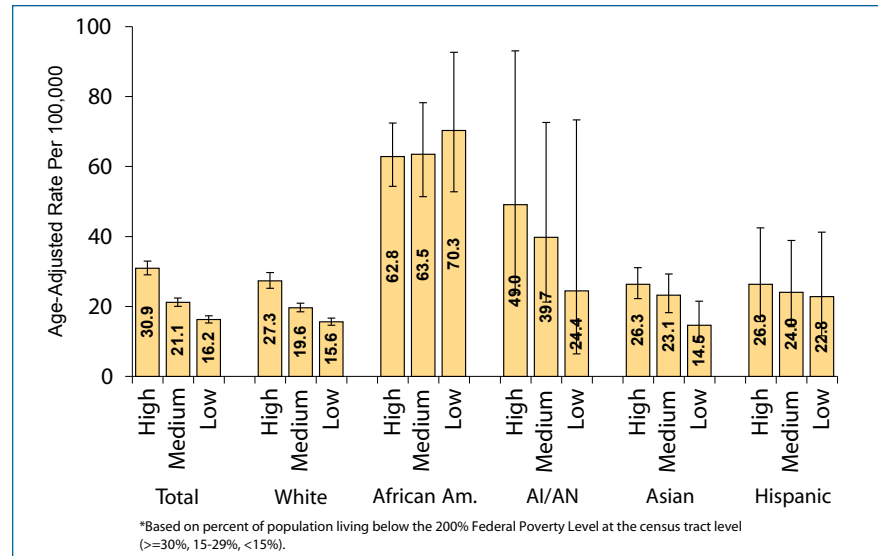
The diabetes death rate is strongly related to neighborhood poverty level.^{vi} The age-adjusted death

rates per 100,000 in high, medium, and low poverty neighborhoods, averaged over 1995-2004,

were 30.9, 21.1, and 16.2 respectively (Figure 5).

- ◆ The association between neighborhood poverty and the diabetes death rate is not the same among all racial groups. For whites, there was a strong association similar to what was observed in the total population. Among African Americans, the death rate was similar across neighborhoods regardless of neighborhood poverty level. For the other minority groups, the diabetes death rate appeared to be higher among those living in high poverty neighborhoods, although the differences were not statistically significant. (Figure 5).

Figure 5: Race-specific age-adjusted death rate by neighborhood poverty level*, King County, 1995-2004

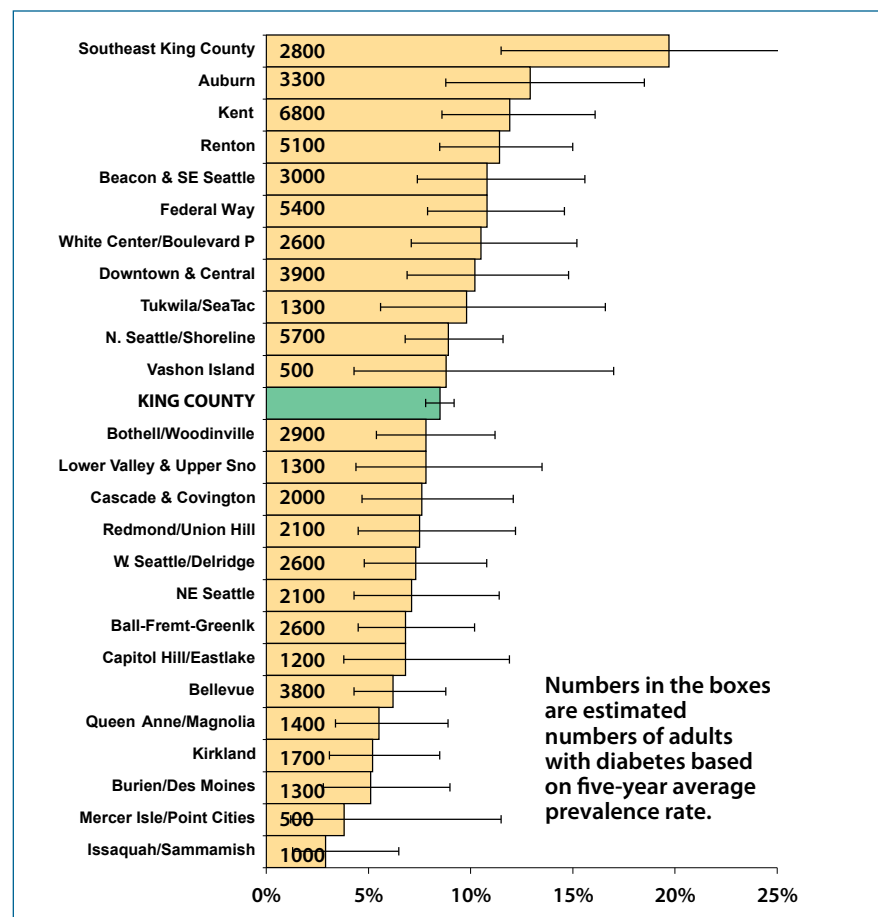


The death rate for African Americans living in low poverty areas (70.3) was 2.6 times the rate for whites living in high poverty areas (27.3).

Geographic Area

- ◆ By Health Planning Areas, among adults age 40 and older, the highest diabetes prevalence rates were in Southeast King County, Auburn, Kent, Renton, Beacon Hill/Southeast Seattle, and Federal Way while the lowest rates were in Issaquah/Sammamish, Mercer Island/Point Cities, Burien/Des Moines, Kirkland, and Queen Anne/Magnolia (Figure 6).
- ◆ The age-adjusted diabetes death rate per 100,000 had a somewhat similar pattern as the prevalence rate. The death rate was the highest in Southeast Seattle (39.7) and the lowest on Mercer Island (9.7). See a map in the age-adjusted death rate by Health Planning Area at http://www.metrokc.gov/gis/vmc/images/Mapimages/05070_DiabetesD_586.gif

Figure 6: Diabetes prevalence among adults age 40+, King County, by Health Planning Areas, 2001-2005 averages



^{vi} Poverty neighborhoods are based on percent population living below the 200% Federal Poverty Level (high poverty: $\geq 30\%$ living below 200% poverty, medium poverty: 15 – 29%, low poverty: $< 15\%$).

Diabetes Risk Factors

Type 2 diabetes occurs more commonly among people with the following characteristics:⁶

- ◆ Age 45 or older
- ◆ Overweight (BMI \geq 25)
- ◆ Family history of diabetes
- ◆ Physical inactivity
- ◆ Race/ethnicity (African American, American Indian, Asian, Pacific Islander and Hispanic)
- ◆ Previous tests for diabetes indicating borderline abnormal result
- ◆ History of diabetes during pregnancy or delivery of a baby weighing more than 9 pounds
- ◆ Metabolic syndrome: hypertension, increased lipids, and cardiovascular disease.
- ◆ Polycystic ovary syndrome

The modifiable risk factors are overweight and physical inactivity.

Obesity^{vii}

- ◆ Overweight and obese people are more likely to have diabetes. Among adults age 18 and older during 2002-2006, 2.3% of those who were not overweight (BMI $<$ 25), 5.4% of those overweight (BMI 25-29), 10.9% of those obese (BMI 30-34), and 19.7% of those severely obese (BMI \geq 35) had diabetes (Figure 7).

Figure 7: Diabetes prevalence by weight status among King County adults. 2002-2006 average

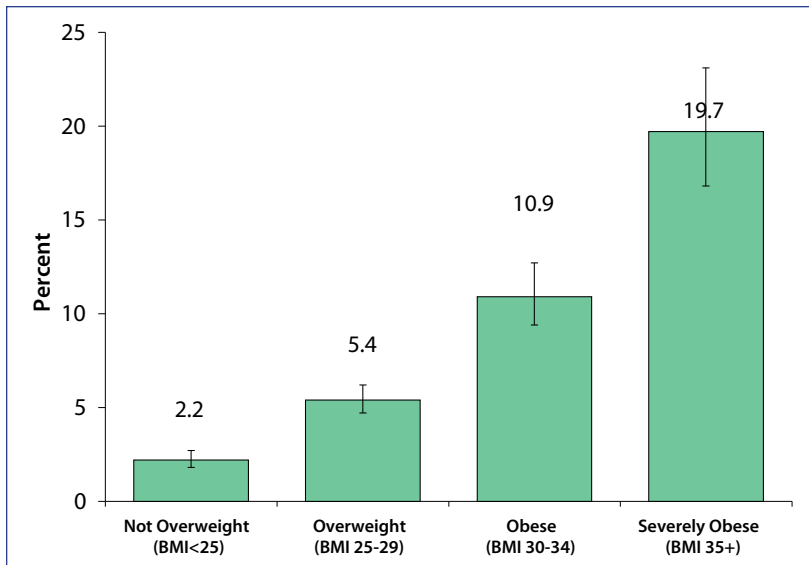
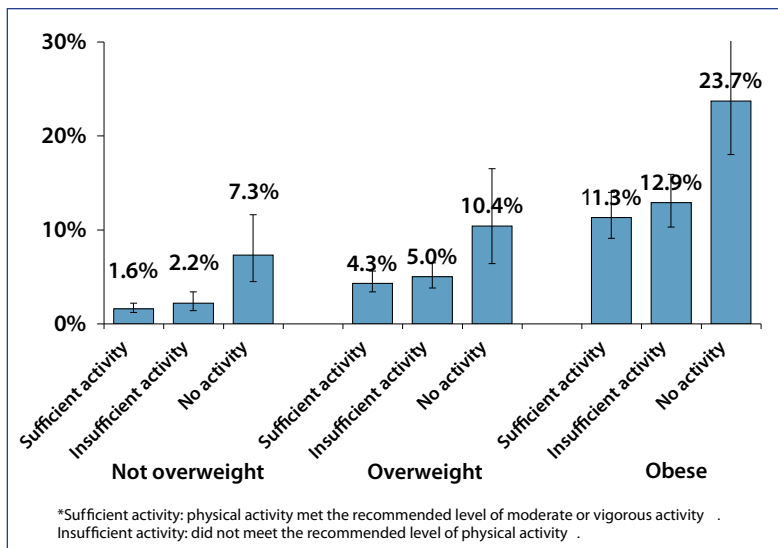


Figure 8: Diabetes prevalence by physical activity level* and weight status among King County adults. 2001, 2003, and 2005 average



- ◆ The prevalence of obesity more than doubled during the past two decades among King County adults, from 7.3% during 1988-1990 to 18.7% during 2004-2006 (Figure 1). Diabetes prevalence doubled between 1996 and 2005.

Physical inactivity

- ◆ Physical inactivity not only contributes to obesity but also independently increases the risk of diabetes. Regardless of weight, being physically active substantially reduces the risk of diabetes (Figure 8).

^{vii} Obesity can be determined by a measure called the BMI (Body Mass Index). The BMI is a ratio of weight to height (weight in kilograms / (height in meters)²). An adult who is 5'5" tall is considered overweight if he/she weighs 150 pounds or more, is considered obese if he/she weighs 180 pounds or more, and is considered severely obese if he/she weighs more than 210 pounds. For a person who is 5'10" tall, the cut-off points are 174 pounds, 209 pounds, and 244 pounds respectively.

Diabetes Prevention and Control

Preventing the development of diabetes

For Type 2 diabetes,^{viii} effective strategies for preventing or delaying the onset of diabetes among high risk adults include weight reduction, dietary changes, and increased physical activity.^{7,8}

Screening and early detection

Type 2 diabetes usually has no obvious symptoms in its early stages. About 30% of the individuals who have diabetes are undiagnosed. Some of these individuals may have already developed diabetic complications at the time of diagnosis. However, there is no consensus about who to screen for diabetes. The US Preventive Services Task Force states that the evidence is insufficient to recommend for or against routinely screening all asymptomatic adults for type 2 diabetes, impaired glucose tolerance, or impaired fasting glucose and screening should be limited to high-risk individuals such as those with hypertension and hyperlipidemia.⁹ The American Diabetes Association recommends that screening should be considered in individuals ≥ 45 years of age at three year intervals, particularly in those with a BMI ≥ 25 .¹⁰ The Centers for Disease Control and Prevention (CDC) concluded that

“population-based and selective screening programs in community settings, such as outreach programs, health fairs, and shopping malls,

have uniformly demonstrated low yield and poor follow-up. Such screening usually does not represent a good use of resources. Periodic screening of high-risk individuals as part of ongoing medical care may be warranted, understanding that evidence in support of this is incomplete. Questions remain about the optimal screening methods, best cutpoint measurements for a positive test to use to identify those with diabetes, and how often to screen people not at high risk for diabetes.”¹¹

Preventing diabetic complications among persons with diabetes

Diabetes is a chronic disease that requires lifelong medical care and active patient involvement. In addition to prescribing medication and proper counseling on nutrition, weight reduction, physical activity, and tobacco cessation, health providers can reduce the risk of diabetes complications by improving self-management skills of those with diabetes (such as self-monitoring of blood sugar levels), checking their blood pressure at every visit and controlling high blood pressure, conducting annual eye exams to detect diabetic eye damage, treating early signs of diabetic kidney damage, conducting foot exams, prescribing a low dose of aspirin, and checking cholesterol annually and treating elevated cholesterol aggressively.

Improving patient care can be best accomplished by setting up diabetes management systems at sources of medical care and integrating these with community resources. These systems can track patient care to assure that all components of a comprehensive care plan are provided for each individual. Recent studies show that good control of blood sugar can prevent many of the diabetes complications.¹⁰

- ◆ Averaged over 2002-2006, among adult diabetics in King County, the frequency of checking blood sugar was associated with insulin use. Among current insulin users, 93% checked their blood sugar daily, 5% weekly, 1% less than weekly, and 1% never. Among patients who were not using insulin, the percentages were 58%, 20%, 8%, and 14% respectively.
- ◆ Also, 8% of the diabetics had not seen a health professional for their diabetes during the previous year.
- ◆ Among diabetics who had seen a health care professional at least once during the previous year, 19% did not receive a foot exam and 28% did not receive an eye exam. Among all people with diabetes, the proportions were 22% and 29% respectively.

^{viii} There are two types of diabetes. Type 2 diabetes is caused by resistance to insulin often develops during middle age and it accounts for 90-95% of all cases. Type 1 diabetes is caused by lack of insulin and usually develops during childhood.

Public Health-Community partnerships that address diabetes

The REACH (Racial and Ethnic Approaches to Community Health) Project

The REACH Coalition is a partnership of community based agencies, community groups, educational and research institutions, public health agencies, hospitals and health care providers, and people living with diabetes working together to reduce diabetes-related health disparities in King County. The coalition partners provide culturally tailored diabetes education and self management classes, along with support groups to African Americans, Asian/Pacific Islanders, and Latinos/Hispanics. For more details, please visit <http://www.metrokc.gov/health/reach/index.htm>

Steps to a Healthier U.S.

Steps to a Healthier US in Seattle and King County is a federally-funded program lead by community partners and Public Health - Seattle & King County that focuses on asthma, diabetes, obesity, nutrition, physical activity and tobacco. Steps supports activities and policy changes in schools, health care settings, and communities to prevent obesity and improve the care of diabetes. Steps emphasizes reducing diabetes disparities. The intervention area includes South Seattle and adjacent South King County. See <http://www.metrokc.gov/health/steps/> for more details.

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Public Health Data Watch

Public Health Data Watch monitors trends in key health indicators for King County. It is produced several times a year by the Epidemiology, Planning, and Evaluation Unit (EPE) of Public Health - Seattle & King County with assistance from other staff of Public Health. This issue is prepared by Lin Song, James Krieger, and David Solet. For additional copies of this *Data Watch* please contact or visit:



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