

2011
Diabetes in Iowa

supplement to the

2009 Iowa Chronic Disease Report

Iowa Department of Public Health



Diabetes in Iowa on the increase

What is diabetes? How can it be managed and prevented?

Diabetes is a chronic illness that is diagnosed based on a person having elevated levels of blood sugar (blood glucose). Most people with diabetes find its management challenging and a lifelong commitment. But, people with diabetes can live normal and healthy lives and avoid many, if not all, of the complications of diabetes. To do this, they must resolve to take control of their health and have needed social and medical support in this undertaking.

In adults, most diabetes is type 2, which responds well to keeping normal body weight, being physically active, eating a balanced diet and taking medication when needed.

Type 2 diabetes is so strongly associated with choosing healthy behaviors that most persons with normal blood sugar levels or with pre-diabetes can go a long way toward keeping themselves from ever developing diabetes if they take on the tough work of managing their weight, physical activity levels and diet. Social systems and physical environmental supports are essential to the success of Iowans' individual efforts to prevent and control diabetes.

Iowa Ranking Nationally: In 2010, 8 of every 100 Iowa adults had diagnosed diabetes, while nationally the median rate was 8.7% (median= half of states had higher, half had lower rates). State rates ranged from 5.8% to 12.4%.

Diagnosed adult diabetes prevalence rates in Iowa have historically been about the same as or slightly below the U.S. median rate.

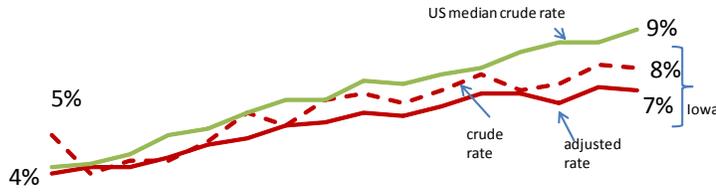
What are the implications of the increase in diabetes prevalence? Who in Iowa is working to prevent, manage and control diabetes? What are type 1 and 2 diabetes? See pages 7 and 8.

Quick Facts

- Mirroring the nation, the prevalence rate of diagnosed diabetes among Iowa adults has doubled since 1991, rising from 3.8% to 7.5% in 2010.
- 42% of adults (950,000 Iowans) now have diabetes or pre-diabetes--- 7%-8% of have diagnosed diabetes(174,000); 4%-5% have undiagnosed diabetes(120,000); and 32% have pre-diabetes (670,000) (Cowie, 2009).
- Each year, 1% of non-diabetic adults become diabetic (15,000-18,000 Iowans/year). (Boyle, 2010)
- Of persons born in 2000, one in three persons will develop diabetes during their lifetime unless current trends are reversed (Narayan, 2003).
- Most diabetes in adults is type 2 diabetes, which is strongly linked to socioeconomic, cultural and lifestyle factors (including diet, physical activity levels, and body weight). Aging and having a family history of diabetes also put one at-risk of diabetes.
- An estimated 25%-30% of the recent increase in diabetes prevalence in Iowa is due to increasing obesity (Ford, 1997). Among young adults who are obese and remain obese, 7 of every 10 will develop diabetes during their lifetime (Narayan, 2007).
- Diabetes is the leading cause of kidney failure, lower limb amputations and adult-onset blindness. Having diabetes lowers life expectancy by up to 15 years and increases risk of heart disease by two to four fold (Healthy People 2020 Web site). Diabetes is among the 10 leading causes of death in Iowa for all age groups 10-14 years and older.
- A portion of the increase in diabetes prevalence is due to persons with diabetes living longer due to better self-management and health care.
- 2,800-3,600 Iowa children and youth age 17 and younger have diabetes, most of which is type 1.

Minorities, older Iowans and men at higher risk

Diagnosed diabetes prevalence trends upward in Iowa and U.S.



	1995	96	97	98	99	00	01	02	03	04	05	06	07	08	9	2010
BRFSS Iowa adjusted rate	4.2	4.4	4.4	4.7	5.1	5.3	5.7	5.8	6.1	6.0	6.3	6.7	6.7	6.4	6.9	6.8
BRFSS Iowa crude rate	5.4	4.2	4.6	4.6	5.2	6.1	5.7	6.5	6.7	6.4	6.8	7.3	6.8	7.0	7.6	7.5
BRFSS U.S. median crude rate	4.4	4.5	4.8	5.4	5.6	6.1	6.5	6.5	7.1	7.0	7.3	7.5	8.0	8.3	8.3	8.7
BRFSS U.S. adjusted rate	not available															
NHIS, US adjusted rate		5.3	5.4	5.5	6	6.4	6.5	6.5	6.9	7.3	7.6	7.5	7.8	8.5	8.6	

Percent of adults age 18 and older who self-report ever having been diagnosed with diabetes, exclusive of gestational diabetes (rate per 100 adults), Iowa 1996-2010
 Sources: Iowa BRFSS, IA Dept. of Public Health; CDC National BRFSS Web site; National Health Interview Survey (NHIS) Web site, Early Release of Selected Estimates, 6/2011.

Iowa's rate of diagnosed adult diabetes prevalence has remained about the same as or slightly below the national median rate of adult diagnosed diabetes for every year 1995 through 2010.

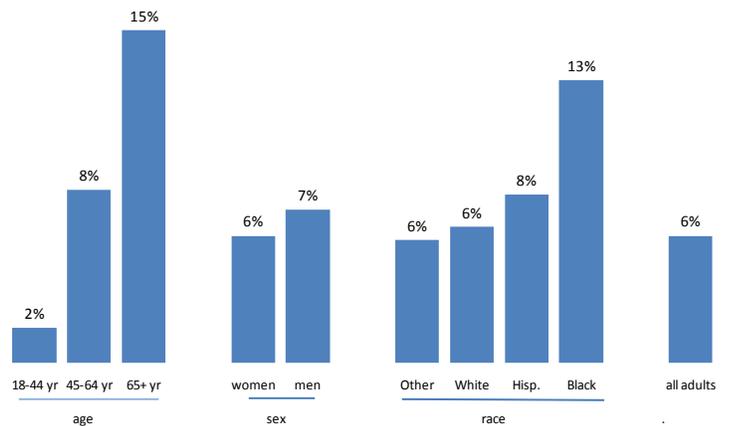
In 2010, the national median diagnosed diabetes prevalence rate was 8.7% while the Iowa rate was 7.5% (crude rates).

In 2006-08, the diabetes prevalence rate for Iowans age 65 and older (15.4%) was more than 8 times that of Iowans 18-44 years of age (1.7%). An estimated 18,000 Iowans 18-44 years of age had diagnosed diabetes, while 74,000 Iowans 65 years and older were diagnosed as diabetic.

The age-adjusted rate for men was about 20% higher than the age-adjusted rate for women (7.1% vs. 5.9%). BRFSS adjusted rates for men also show them to be at increased risk of overweight/obesity, cardiovascular disease and other chronic conditions compared to women.

Overall, minorities had age-adjusted rates of diabetes that were higher than that of Whites: the risk of having diabetes for black adults was more than double that of white adults.

Diagnosed diabetes prevalence, by age, race, sex, Iowa 2006-08



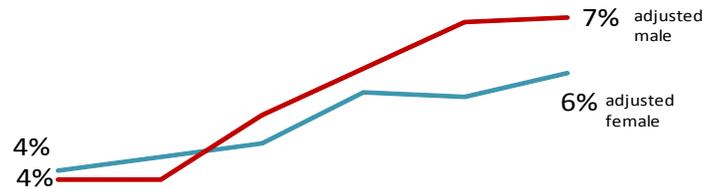
Estimated three year average annual prevalence rate of diabetes per 100 adults age 18 and older (percent of adults who self-report ever having been diagnosed with diabetes, exclusive of gestational diabetes), by age, by sex, race/ethnicity (sex and race rates are age-adjusted), Iowa, 2006-08.
 Source: Iowa BRFSS, IA Dept. of Public Health

Diabetes risk on rise for both sexes, all ages 35+

Since 1997-99, diagnosed diabetes prevalence rates among Iowa men have exceeded those of Iowa women.

In 2006-08, the diabetes prevalence rate for men in Iowa was about 20% higher than the rate for women (7.1% among Iowa men vs. 5.9% among Iowa women, 2006-08 age-adjusted rate).

Trends in diagnosed diabetes prevalence, by sex, Iowa



	1991-93	1994-96	1997-99	2000-02	2003-05	2006-08
crude female	4.1	4.6	5.0	6.1	6.2	6.7
crude male	3.4	3.6	5.1	6.1	7.4	7.4
adjusted female	3.8	4.1	4.4	5.5	5.4	5.9
adjusted male	3.6	3.6	5.0	6.0	7.0	7.1

Estimated average annual crude and age-adjusted, sex-specific prevalence rate of diabetes per 100 adults ages 18 years and older (percent of men and women who self-report ever having been diagnosed with diabetes, exclusive of gestational diabetes), Iowa, 1991-2008.

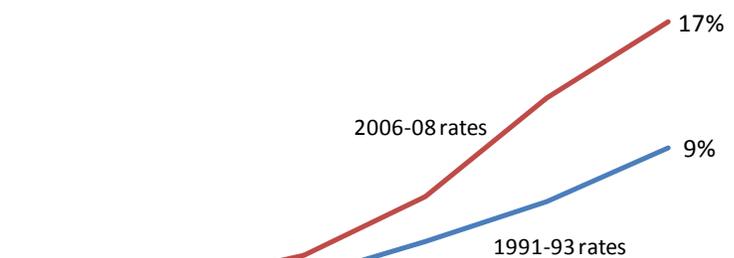
Sources: Iowa BRFSS, IA Dept. of Public Health

In 2006-08, the prevalence rate for Iowans age 65 and older (17%) was 55 times that of Iowans 18-24 years of age (0.3%).

Between 1991-93 and 2006-08, the rate of diabetes in adults 65 years and older increased 80%, going from 9% to 17% of older adults.

The diabetes prevalence rate for Iowans 55-64 years of age doubled during these 18 years, rising from 6% to 12%.

Trends in diagnosed diabetes prevalence, by age, Iowa



	18-24 years	25-34	35-44	45-54	55-64	65+ years
1991-93	0%	1%	2%	4%	6%	9%
2006-08	0%	1%	3%	6%	12%	17%

Three-year average annual percent of adults age 18 and older (prevalence rate of diabetes per 100 adults) who ever have been diagnosed with diabetes, exclusive of gestational diabetes, by age, Iowa, 1991-93 vs. 2006-2008 rates.

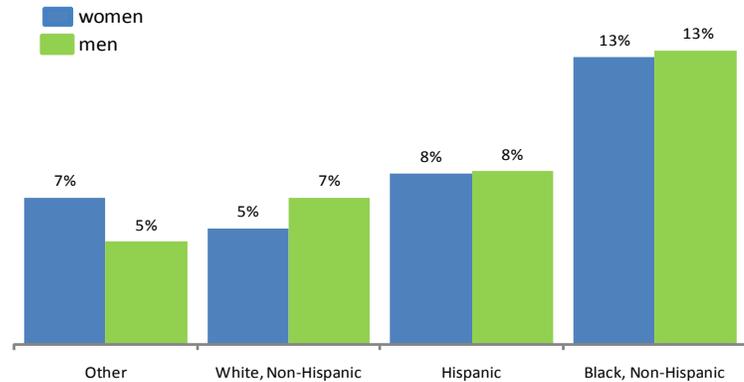
Source: Iowa BRFSS, IA Dept. of Public Health

Health Disparities: Black adults at high risk

Age-adjusted sex and race-specific diagnosed diabetes prevalence rates show that both black men and women in Iowa had rates of diabetes double or more those of same-sex white and the other minority race grouping of men and women. Rates for Hispanic men and women were also high relative to same-sex white and other race rates.

While white men and women were at lower risk of having diabetes compared to black and Hispanic men and women, white men (76,200 cases) and women (75,300 cases) account for about 95% of all cases of diabetes (151,500 of 161,700 cases of diagnosed adult diabetes) in Iowa during 2006-08.

Diagnosed diabetes prevalence, by race and sex, Iowa



Ten-year average annual age-adjusted diabetes prevalence rate per 100 adults, by race and Hispanic ethnicity, Iowa BRFSS, 1999-2008

Trends in diagnosed diabetes prevalence, by race, Iowa

	Crude rate					Adjusted rate		
	1990-94	1995-99	2000-04	2005-09	2008-10	1990-99	2000-09	2001-10
White	3.9	4.9	6.3	7.1	7.4	4.1	6.1	6.1
Black	3.3	12.2	10.1	11.2	12.6	12.4	13.1	13
Other	na	4.5	3.5	5.8	8.1	7.1	6.6	6.4
Hispanic	2.1	3.6	6.3	4.5	4.6	4.4	7.9	8.4

Five year average annual crude and 10 year-average annual age-adjusted prevalence rate of diabetes per 100 adults age 18 and older (percent of adults who self-report ever having been diagnosed with diabetes, exclusive of gestational diabetes), by race and ethnicity, Iowa, 1990-2010.

Gestational diabetes: African-American, Hispanic, Overweight Women at-risk

Gestational diabetes is a form of diabetes that occurs only during pregnancy. Like other forms of diabetes, it is found more frequently among pregnant African-Americans, Hispanic/Latino Americans, and American Indians, the obese and women with a family history of diabetes. During pregnancy, gestational diabetes requires treatment to optimize maternal blood glucose levels to lessen the risk of complications in the infant.

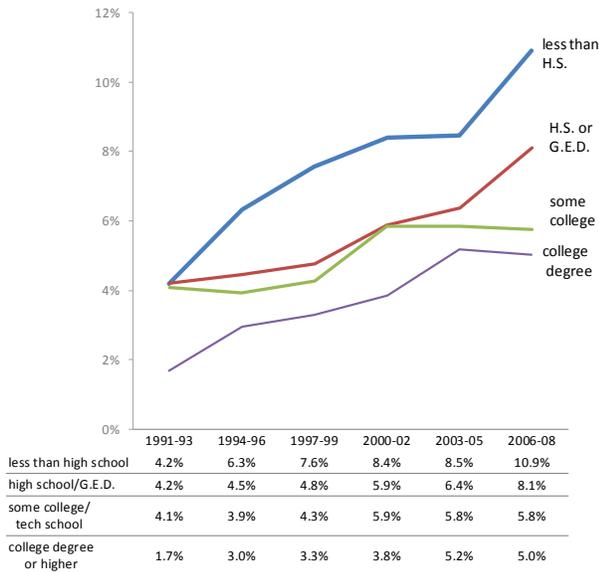
Women who have had gestational diabetes have a 35% to 60% chance of developing diabetes in the next 10–20 years.

- Reported rates of gestational diabetes range from 2% to 10% of pregnancies. However, using new diagnostic criteria being considered for use in the U.S. (and now in use in a multi-site international study) the rate of gestational diabetes would rise to 18% of all pregnancies.
- Immediately after pregnancy, 5% to 10% of women with gestational diabetes are found to have diabetes, usually type 2.

Source: CDC 2011 National Diabetes Factsheet

Health Disparities: Iowans of low income/education at-high risk

Trends in diagnosed diabetes prevalence by income and education, Iowa



Three-year average annual age-adjusted diabetes prevalence rate per 100 adults, Iowa, 1991-2008. Source: Iowa BRFSS, IA Dept. of Public Health



Three-year average annual age-adjusted diabetes prevalence rate per 100 adults Iowa, 1994-2008. Source: Iowa BRFSS, IA Dept. Public Health.

Diabetes prevalence is strongly associated not only with increasing age and being Hispanic or black, but also with being poor and having less education.

Across time, both crude (not shown in chart) and age-adjusted rates (above) demonstrate a strong association between lower educational attainment and lower income and the risk of an Iowa adult having diabetes.

Rates of diabetes for 2006-08 show that having a household income of less than \$20,000 puts one at more than double the risk of having diabetes compared to someone with a household income of \$75,000 or more (10.9% vs. 4.7%).

Likewise, having less than a high school education puts adults at 74% greater risk of having diabetes compared to adults with a college degree or higher educational attainment (5% vs. 8.7% age-adjusted rates) in 2006-08.

(For additional information about Iowa adult diabetes prevalence by income and education, see Table 3.1 of the [1991-2009 BRFSS Tables Supplement to 1991-2009 Full Report: Burden of Diabetes in Iowa](#) on the IDPH diabetes program Web site: <http://www.idph.state.ia.us/hpcdp/diabetes.asp>.)

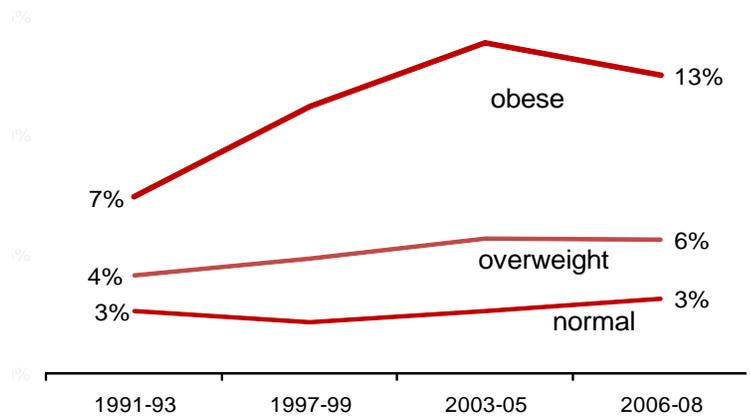


Obese have 3-4 times the risk of diabetes

Obesity is one of the most modifiable and strongly associated risk factors for type 2 diabetes. Among obese adults in Iowa, the age-adjusted rate of diabetes prevalence rose 84%, from 6.9% to 12.7% between 1991-93 and 2006-08. Among overweight adults, diabetes prevalence increased 34% (rising from 3.5% to 4.7%). Among normal weight adults, the age-adjusted rate of diabetes increased 26% (rising from 2.5% to 3.2%).

The age-adjusted rate of diabetes among the obese was more than three times that of normal weight Iowa adults in 2006-08.

Trends in diagnosed diabetes prevalence by body mass index (body weight), Iowa



Three-year average age-adjusted percent of adults age 18 years and older (prevalence rate per 100 adults who have ever been diagnosed with diabetes, exclusive of gestational diabetes, by body weight (body mass index (BMI) status), 1991-2008

Source: Iowa BRFSS, Iowa Dept. of Public Health

Cost of diabetes

Because of increases in diabetes risk factors like obesity, an aging population and less physical activity, the diabetes incidence rate (% of population that is newly diagnosed each year with diabetes) is increasing. And, because those with diabetes are living longer due to better self-management and care, the number of persons in Iowa with diabetes (diabetes prevalence) has increased dramatically in the past 20 years. With health care costs increasing along with the number of Iowans who are diabetic, based on Centers for Disease Control and Prevention (CDC) national estimates, the estimated total (direct and indirect) annual cost of diabetes in Iowa was \$1.74 billion in 2007. Direct medical costs in Iowa were estimated to be \$1.16 billion. After adjusting for population age and sex differences, average medical expenditures among people with diagnosed diabetes were 2.3 times higher than what expenditures would be in the absence of diabetes. The indirect costs of diabetes in Iowa (disability, work loss, premature mortality) were estimated to be \$580 million.

One in every ten health care dollars spent is estimated to be for diabetes-related medical treatment.

(ADA Web site)

Making Use of this Information

Future Strategies and Recommendations for Iowa

What does the Iowa Department of Public Health (IDPH) now offer and plan to offer in the future in order to halt the current diabetes epidemic?

- Close collaboration with other IDPH programs addressing tobacco, cancer, physical activity and nutrition in order to increase awareness of diabetes risk factors, effective management strategies and support for policy initiatives at the state and local level that cut across shared chronic disease risk factors.
- Planning with those in Iowa responsible for health care reform efforts in order to assure that diabetes prevention and control is fully and appropriately addressed.
- Training for health care professionals through continuing education courses on diabetes prevention and management and promotion of the Dilated Eye Exam Project with care providers and educators statewide.
- Certification and support of community-based outpatient diabetes education programs.
- Monitoring and evaluation of diabetes-related services supported by the IDPH diabetes and other IDPH chronic disease prevention programs.
- Analysis and dissemination of information on the health status of Iowans living with diabetes or at-risk of developing diabetes and of the health services used by those with diabetes.

Links to Programs in Iowa Addressing Diabetes and Chronic Disease Interventions and data:

Iowa Diabetes Prevention & Control Program, IDPH:
<http://www.idph.state.ia.us/hpcdp/diabetes.asp>

Iowans Fit for Life, IDPH (physical activity/nutrition/obesity prevention):
<http://www.idph.state.ia.us/iowansfitforlife/default.asp>

Heart Disease & Stroke Prevention program, IDPH:
http://www.idph.state.ia.us/hpcdp/hdsp_home.asp

American Diabetes Association, Iowa Chapter:
<http://www.diabetes.org/advocate/take-action/states/iowa.html>

CDC, National Diabetes Prevention Program:
<http://www.cdc.gov/diabetes/>

Healthy People 2020 Goals: Health People 2020 has 20 national diabetes goals that seek to:

- reduce new cases of diabetes;
- reduce diabetes-related deaths overall and cardiovascular deaths that are diabetes-related;
- improve blood pressure, cholesterol and blood sugar control in diabetics; increase foot, dental exams among diabetics and improve glucose and A1c monitoring and control;
- improve diabetes self-management; and
- improve diabetes prevention among those with those with pre-diabetes through improving nutrition, physical activity levels and body weight and self-empowerment.

(www.healthypeople.gov/2020/topicsobjectives2020/default.asp)

Definitions

Diabetes: The body produces insulin to help move blood sugar from the blood and into the body's cells where the cells use sugar for energy. Blood sugar levels become too high either when the pancreas (an organ near the stomach) stops making insulin altogether (type 1 diabetes) or when the body becomes unable to use the often more-than-adequate amounts of insulin that it makes (type 2 diabetes). In type 2 diabetes, the ability to produce but not to use insulin is called 'insulin resistance'. (Becker, 2004)

Gestational diabetes is a form of diabetes that occurs only during pregnancy.

Pre-diabetes is a condition in which blood glucose levels are higher than normal but are not high enough for a diagnosis of diabetes. About half of people with pre-diabetes go on to develop diabetes within 10 years of first developing pre-diabetes

The eight-hour fasting plasma glucose (FPG) test is the preferred test for diagnosing both diabetes and pre-diabetes. However, the two-hour oral glucose tolerance test (OGTT or GT) in which people drink a sugary beverage is also frequently used to diagnosis diabetes. Recently plasma A1c levels have also come to be used. A diagnosis of diabetes can be made if one has an: FPG level of 126 mg glucose/dL or above, confirmed by repeat testing; an OGGT level of 200 mg glucose/dL or higher 2 hours after drinking the sugary beverage; or an A1c level of 6.5% or higher

Pre-diabetes is diagnosed based on blood glucose or A1c levels that are below those needed for a diagnosis of diabetes, but above normal levels. For people without diabetes, normal, non-fasting blood sugar levels usually range between 70 and 120 mg/dL (NIH, 2010).

Prevalence rates: The *crude* diabetes prevalence rates found in this supplement were calculated by simply dividing the annual number of Iowans in a subpopulation who have diagnosed diabetes by the total number of people in that subpopulation. Crude prevalence rates were graphed in this report to compare Iowa adults to the U.S., as U.S. age-adjusted rates were not available from BRFSS. Age-adjusted prevalence rates are preferable to crude when comparing differences between populations across time and to one another. Age-adjusted rates were calculated by weighting age-specific prevalence rates in Iowa to a standard 2000 U.S. population distribution and summing those weighted age-specific rates. (Also see age-adjusted definitions at: (<http://wonder.cdc.gov/wonder/help/mcd.html>.)

Iowa BRFSS

The Iowa Behavioral Risk Factor Surveillance System (BRFSS), a household interview survey of adults that began to include a core question covering diagnosed diabetes prevalence in 1988, is the primary source of data in this *Iowa Chronic Disease Report* supplemental update on diabetes. Most rates in this supplement are age-adjusted, rather than crude rates. Age-adjusting eliminates differences in rates that are attributable to populations being compared having difference age distributions. More detailed reports on the burden of diabetes in Iowa can be found at the Iowa Dept. of Public Health's, diabetes program Web site: <http://www.idph.state.ia.us/hpcdp/diabetes.asp>

Other References:

American Diabetes Association, *Economic Costs of Diabetes in the U.S., 2007*, *Diabetes Care*, 32(3), pp. 596-615, 2008.

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