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# BRIEF

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## Prevalence, Health Behaviors, and Preventive Health Practices Among Adult Coloradans with Diagnosed Diabetes: Results from the Behavioral Risk Factor Surveillance System, 1997-2000

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### Introduction

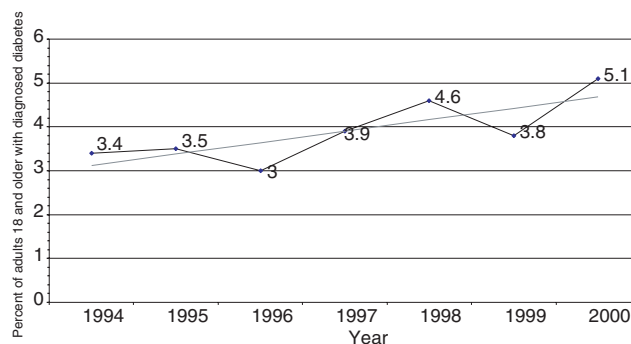
Diabetes is a major risk factor for cardiovascular disease, leg and foot amputations, blindness, kidney failure, pregnancy complications, and deaths related to flu and pneumonia. Persons with diabetes have either a shortage of insulin or a diminished response to insulin. Uncontrolled diabetes causes glucose to accumulate in the blood, which can damage vital organs over time. Diabetes disproportionately affects those age 65 and older, those with low incomes, and some racial and ethnic groups. Approximately 33 percent of persons with diabetes are undiagnosed.<sup>1,2</sup>

Diabetes is a deadly and increasingly common chronic disease in Colorado. In 1999, diabetes was the eighth leading cause of death in Colorado.<sup>3</sup> Between 1994 and 2000, the estimated prevalence of diagnosed diabetes (excluding gestational diabetes) among Colorado adults increased markedly (see Figure 1).<sup>4</sup> The increase in diagnosed diabetes can be partly explained by better detection through the use of different screening and diagnostic guidelines, increases in obesity, and decreases in diabetes deaths. In this report, diagnosed diabetes (excluding gestational diabetes) and associated health risk behaviors and preventive health practices among adult Coloradans are examined using 1997 through 2000 survey data from the Behavioral Risk Factor Surveillance System (BRFSS). Persons with diagnosed diabetes will be referred to as *persons with diabetes* throughout this report.

### Methodology

The Colorado BRFSS is an ongoing statewide telephone survey of non-institutionalized Coloradans ages 18 and older regarding their health behaviors and preventive health practices. The Survey Research Unit at the Colorado Department of Public Health and Environment conducts the survey and selects respondents using a random digit dialing sampling technique. In addition to the data

Figure 1. Diagnosed diabetes\* among Colorado adults: Colorado BRFSS 1994-2000



\* Excludes gestational diabetes

presented from the standard BRFSS surveys for 1997 through 2000, data from the 1998 statewide Disability BRFSS survey are presented. This survey used the same methodology, diabetes questions, and many other questions as the standard BRFSS. Undiagnosed persons with diabetes are not captured in the survey, as BRFSS measures are self-reported. Still, studies show data on self-reported diabetes status are moderately valid.<sup>5</sup>

## Population Characteristics

Table 1 presents the prevalence of diabetes by selected characteristics of Coloradans ages 18 and older. For years 1997 through

**Table 1. Prevalence of diagnosed diabetes by selected characteristics, Colorado BRFSS 1997-2000**

	Sample size <sup>a</sup>	Total		
		Percent estimate	95% confidence interval lower limit	upper limit
<b>Total</b>	<b>11,554</b>	4.3	3.8	4.8
<b>Age group</b>	<b>11,503</b>			
18-44		1.4	1.0	1.8
45-64		5.7	4.7	6.7
65-74		12.1	9.6	14.6
75+		13.6	10.6	16.6
<b>Sex</b>	<b>11,554</b>			
Male		4.2	3.5	4.9
Female		4.4	3.7	5.1
<b>Race/Ethnicity</b>	<b>11,493</b>			
White/non-Hispanic		3.8	3.3	4.3
Black/non-Hispanic		9.3	5.0	13.6
Other/non-Hispanic		4.5	1.5	7.5
Hispanic		6.2	4.7	7.7
<b>Region</b>	<b>11,514</b>			
Urban		4.3	3.8	4.8
Rural		4.0	3.0	5.0
<b>Annual household income</b>	<b>10,597</b>			
<\$25,000		5.9	4.9	6.9
\$25,000-\$49,999		4.0	3.2	4.8
\$50,000+		2.8	2.1	3.5
<b>Health care coverage</b>	<b>11,537</b>			
yes		4.5	4.0	5.0
no		2.9	1.7	4.1

<sup>a</sup> Changes in sample size reflect non-response for some variables

2000, the average prevalence of diabetes is estimated at 4.3 percent. Whereas persons aged 18-44 have a prevalence of only 1.4 percent, those aged 75 and older have a prevalence of nearly 14 percent. The prevalence of diabetes by sex (4.2 percent for men and 4.4 percent for women) is similar. About 4 percent of White/non-Hispanics have diabetes, compared to 6 percent of Hispanics and 9 percent of Black/non-Hispanics. The prevalence of diabetes in Hispanics and Black/non-Hispanics is statistically significantly higher than that of White/non-Hispanics. Similar proportions of urban and rural residents (4.3 percent and 4.0 percent, respectively) have diabetes. The prevalence of diabetes increases as annual household income decreases, and the difference in prevalence between the lowest income category (less than \$25,000) is statistically significant compared to both the \$25,000 to \$49,999 category and the \$50,000 and above category. The proportion of adults with diabetes is 4.5 percent for those with health care coverage, compared to 2.9 percent for those without coverage.

## Age at Diagnosis

Among persons with diabetes in Colorado, an estimated 7 percent find out they have diabetes before the age of 19. About 28 percent are diagnosed between ages 19 and 44 and 43 percent find out they have the disease between ages 45 and 64. About 21 percent are diagnosed at age 65 or older.

## Health Risk Behaviors by Diabetes Status

Table 2 presents crude and age-adjusted prevalence estimates for several health behaviors by diabetes status. The prevalence of many of the health risk behaviors presented here is similar for those with and without diabetes. However,

**Table 2. Prevalence of selected health behaviors among adults by diabetes status, Colorado BRFSS 1997-2000**

Health behavior	Sample size	Crude prevalence				Age-adjusted prevalence <sup>a</sup>			
		with diabetes		without diabetes		with diabetes		without diabetes	
		%	95% C.I.	%	95% C.I.	%	95% C.I.	%	95% C.I.
Current smoker	11,528	11.8	7.9 - 15.7	23.0	22.0 - 24.0	17.9	10.7 - 25.1	22.4	22.0 - 24.0
Ever told blood pressure high *	4,853	57.6	48.6 - 66.6	19.8	18.4 - 21.2	48.1	36.9 - 59.3	20.9	18.4 - 21.2
Ever told blood cholesterol high	3,553	38.7	29.6 - 47.8	26.3	24.4 - 28.2	26.4	19.6 - 33.2	24.9	24.4 - 28.2
Eats 5 or more servings of fruits and vegetables daily	4,854	31.3	23.6 - 39.0	25.8	24.2 - 27.4	27.7	17.9 - 37.5	24.7	24.2 - 27.4
Leisure time physical activity <sup>b</sup>	4,855	68.9	61.0 - 76.8	80.1	78.6 - 81.6	74.9	66.8 - 83.0	79.9	78.6 - 81.6
Regular and sustained physical activity <sup>c</sup>	4,855	19.6	12.9 - 26.3	24.7	23.1 - 26.3	24.5	17.5 - 31.5	24.9	23.1 - 26.3
Obese by BMI <sup>d*</sup>	11,240	36.0	30.7 - 41.3	13.6	12.8 - 14.4	32.7	26.5 - 38.9	13.2	12.8 - 14.4

Note: CI = Confidence Interval

<sup>a</sup> Estimates are adjusted to the 2000 standard United States population

<sup>b</sup> Engaged in leisure time physical activity in past month

<sup>c</sup> Engaged in physical activity for 30 or more minutes, 5 or more times per week, regardless of intensity in past month

<sup>d</sup> Body mass index (BMI) is 30.0 or higher. BMI is defined as weight in kilograms divided by height in meters squared.

\* Statistically significant difference for age-adjusted prevalence

## Statistics Primer

### What is age-adjustment

In this Brief, both crude and age-adjusted prevalence estimates are presented. Age-adjustment is necessary when comparing groups with different age distributions, such as those with and without diagnosed diabetes. The average age of those with diagnosed diabetes is 61, compared to 45 for those without diagnosed diabetes. Age-adjusting removes the differences between estimates that are due to age. For example, the prevalence of high blood pressure increases with age. Since the diabetic and non-diabetic groups are calibrated to the same age distribution, the association seen between high blood pressure and diabetes status in Table 2 cannot be attributed to the higher average age among diagnosed diabetics. Age-adjusted estimates are for comparison purposes only, while crude estimates present the overall prevalence of an indicator.

persons with diabetes are much more likely than those without diabetes to have high blood pressure or be designated obese based on body mass index (BMI). Both of these differences are statistically significant. Obesity predisposes individuals to both diabetes and hypertension. Also, hypertension and obesity are associated with cardiovascular disease, which is two to four times more common among persons with diabetes.

## Preventive Health Practices Among Persons with Diabetes

Note: Comparisons made by health care coverage status in this section should be viewed with caution, as the number of persons without coverage is small.

Monitoring blood glucose is an important part of preventive management of diabetes. The Healthy People 2010 Objective is for 60 percent of persons with diabetes to perform self-blood-

glucose-monitoring at least once a day. To date, adults with diabetes in Colorado fall short of the target; about half check their blood glucose every day (see Table 3). The prevalence is much lower for those without health care coverage than those with health care coverage.

Glycosylated hemoglobin (HbA1c) is a long-term measure of blood glucose levels. It indicates how well a person's diabetes is being controlled. An estimated 80 percent of persons with diabetes in Colorado had their HbA1c checked at least once in the past year, far surpassing the Healthy People 2010 goal of 50 percent. Approximately 82 percent of those with health care coverage checked their glycosylated hemoglobin in the past year, compared to about 66 percent of those without health care coverage.

Regular doctor visits are essential to preventing diabetes complications. About 86 percent of Coloradans with diabetes have seen a doctor in the past year for their diabetes. Doctor visits decrease with increasing age, and increase with increasing annual household income.

Over half of the amputations experienced by 86,000 persons with diabetes in the United States each year could be prevented through the detection of early indicators of neuropathic and vascular damage from diabetes.<sup>1,2</sup> The Healthy People 2010 Objective is for 75 percent of adult persons with diabetes to have a foot exam each year. At almost 64 percent, Colorado does not yet meet the goal. Men, urban residents, and those with health care coverage are more likely to have had a foot exam within the past year than their respective counterparts.

Persons with diabetes are approximately three times more likely to die of flu and pneumonia complications compared to those without diabetes.<sup>2</sup> In Colorado, about 60 percent of persons with diabetes had a flu shot in the past year, and an estimated 46

Table 3. Preventive health practices among adults with diabetes, Colorado BRFSS 1997-2000

	Sample size	Total	Sex		Age group				Region		Annual income			Health care coverage	
			Male	Female	18-44	45-64	65-74	75+	Urban	Rural	<\$25,000	\$25,000-\$49,999	\$50,000+	yes	no <sup>c</sup>
			Checks blood glucose daily	497	50.1	49.5	50.7	50.7	51.8	50.3	46.2	49.4	55.0	45.1	60.0
Checked hemoglobin A1C in past year <sup>a</sup>	134	79.9	82.9	75.6	-	75.0	-	-	81.8	76.3	76.9	-	-	81.5	66.0
Seen doctor in past year for diabetes	493	85.5	85.9	85.0	90.4	89.6	81.3	79.8	85.0	88.6	82.3	87.8	88.7	84.8	91.8
Foot exam in past year	437	63.8	68.9	59.0	55.9	67.9	60.4	71.0	67.0	54.2	67.8	62.4	67.3	65.1	52.7
Flu shot in past year <sup>b</sup>	191	59.9	55.7	63.5	-	50.2	-	-	59.4	61.3	63.3	60.2	-	57.9	85.6
Ever had a pneumonia vaccination <sup>b</sup>	185	46.1	50.3	42.8	-	32.2	-	-	47.5	40.5	49.0	42.7	-	48.8	17.1
Dilated eye exam in past year	496	67.3	70.3	64.4	50.5	63.4	79.7	75.5	68.8	63.8	66.4	64.6	74.8	70.0	41.4
Ever taken class to manage diabetes <sup>a</sup>	148	60.3	67.0	50.6	-	59.3	-	-	69.0	18.8	49.4	72.3	-	64.5	23.8
Dental exam in past year <sup>b</sup>	188	59.0	61.3	57.0	-	72.2	-	-	61.5	46.2	40.0	67.7	-	58.5	64.4

<sup>a</sup> Asked in 2000

<sup>b</sup> Asked in 1997 and 1999

<sup>c</sup> Because the number of persons without health care coverage is small, these estimates should be viewed with caution

- Unable to estimate due to small number of respondents

percent have ever had a pneumonia vaccination. Men are less likely than women to have had a flu shot, but more likely to have had a pneumonia vaccination. Those with health care coverage are less likely than those without coverage to have had a flu shot, but are much more likely to have had a pneumonia vaccination.

Between 12,000 and 24,000 persons with diabetes go blind each year in the United States from diabetic eye disease. The vast majority of these occurrences could be prevented with regular screening.<sup>2</sup> Therefore, the Healthy People 2010 Objective is for 75 percent of persons with diabetes to have an annual dilated eye exam. Colorado has not yet met that goal as about 67 percent of persons with diabetes had a dilated eye exam in the past year. Approximately 70 percent of persons with diabetes with health care coverage have had a dilated eye exam in the past year, compared to 41 percent without coverage. This difference is statistically significant.

Public health professionals view diabetes patient education as an effective and economical way of preventing long-term diabetes complications. The Healthy People 2010 Objective is for 60 percent of persons with diabetes to receive formal diabetes education. In Colorado, that target is matched exactly. Diabetes education is the only preventive practice examined here with a prevalence that is significantly lower in rural areas compared to urban areas. Compared to almost 69 percent in the urban region, only about 19 percent of rural Coloradans with diabetes have ever taken a class on managing diabetes. In addition, those with health care coverage are significantly more likely than those without to have had diabetes education (65 percent vs. 24 percent respectively).

## Additional Information

For more information about diabetes, contact the Diabetes Control Program, Colorado Department of Public Health and Environment at 303-692-2580, or [www.cdph.state.co.us/pp/diabetes](http://www.cdph.state.co.us/pp/diabetes).

For more information about the Behavioral Risk Factor Surveillance System (BRFSS), visit the national BRFSS Web site at [www.cdc.gov/nccdphp/brfss](http://www.cdc.gov/nccdphp/brfss), or contact the Health Statistics Section at the Colorado Department of Public Health and Environment, 303-692-2160.

Data from the Colorado Behavioral Risk Factor Surveillance System can also be queried using the Colorado Health Information Dataset (CoHID) at [www.cdph.state.co.us/sascohidweb/cohids.html](http://www.cdph.state.co.us/sascohidweb/cohids.html)

This Brief is available on our Web site at [www.cdph.state.co.us/hs/pubs.html](http://www.cdph.state.co.us/hs/pubs.html)

Persons with diabetes are at increased risk for periodontitis, which can lead to tooth loss, as well as complicate glycemic control.<sup>1</sup> The Healthy People 2010 Objective is for 75 percent of persons with diabetes to have an annual dental exam. In Colorado, 59 percent of adults with diabetes had a dental exam in the past year. Further, persons with diabetes with annual household incomes \$25,000 - \$49,999 are substantially more likely than persons with diabetes with incomes below \$25,000 to have had a dental exam in the past year. The estimate is substantially higher for urban compared to rural residents as well (62 percent vs. 46 percent respectively).

## Summary

The prevalence of diabetes among Colorado adults is increasing. As the Colorado population continues to age and the prevalence of obesity continues to increase, it is reasonable to expect this increase to continue. This brief reveals several areas of concern among persons with diabetes in Colorado. The prevalence of high blood pressure and obesity is extremely high in this population. Several disparities exist in the preventive health practices of those with and without health care coverage, and between residents of urban and rural regions. These results can be used to design programs that focus efforts on areas where Healthy People 2010 Objectives have not been met. Focusing on subgroups within the population of those with diabetes that are less likely to perform preventive care practices would likely reduce the morbidity and mortality associated with the disease.



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