UCLA Health Policy Research Brief

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Diabetes: The Growing Epidemic

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CORRESPONDENCE 1
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The number of people diagnosed with diabetes in California continues to rise. In 2005, 1.8 million adults had been diagnosed with diabetes, up from 1.5 million in 2001 (Exhibit 1). The prevalence of diabetes has similarly increased steadily from 6.2% in 2001 to 7% in 2005.

Diabetes is a chronic medical condition in which the body either makes too little insulin or does not use it effectively. Type 1 diabetes results when the body is unable to produce insulin, and is most often diagnosed in children and adolescents. Type 2 diabetes is the result of insulin resistance, where the body cannot use insulin effectively and may gradually lose the ability to produce it. Age, obesity and a family history of diabetes are risk factors for developing type 2 diabetes. Over 1.5 million California adults with diabetes (83%) report having type 2 diabetes, and 300,000 (17%) report having type 1 diabetes. This is somewhat higher than national estimates of the percent of adults who have type 1 diabetes (5-10%).[1]

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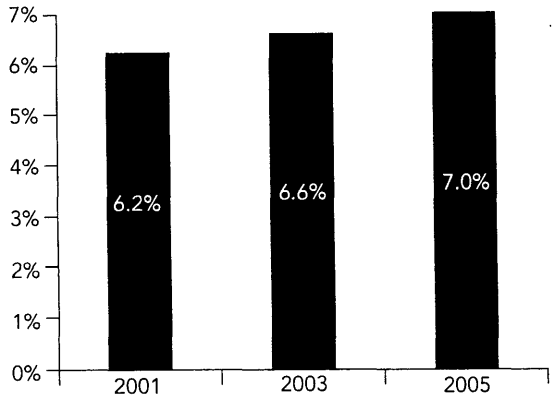
Exhibit 1

Diabetes Prevalence by Year, Adults Age 18 and Over, California, 2001-2005



Source: 2001, 2003 and 2005 California Health Interview Surveys

Diabetes, particularly type 2 diabetes, is a significant and growing health problem that affects both adults and children, causing a number of serious complications including blindness, kidney disease, cardiovascular disease, limb disease requiring amputation, and even death. Approximately 60% of people with diabetes have one or more complications from the condition. Each year these complications cost individuals with diabetes an average of $1,600, and cost insurance companies close to $10,000 per beneficiary; it is estimated that the cost of treating diabetes-related complications in the U.S. in 2006 was $22.9 billion.[2]

This policy brief examines the prevalence and management of diabetes among adults in California based on data from the 2005 California Health Interview Survey (CHIS 2005). It also describes how the prevalence and management of diabetes have changed over time, based on data from CHIS 2001 and CHIS 2003. The brief concludes with public policy recommendations intended to reduce the risk of developing diabetes and its related complications.

The California Endowment

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American Indians, Latinos and Asians Experience Greatest Increases in Diabetes Prevalence

Diabetes prevalence increased significantly from 2001 to 2005 for all racial and ethnic groups except African Americans, with the largest increase seen among American Indian/Alaska Natives (AI/ANs) followed by Asians and Latinos (Exhibit 2). The large increase in prevalence among AI/ANs is particularly troubling because this is a group that already suffers very high rates of diabetes. Although there was not a significant increase in diabetes prevalence among African Americans, this group, along with AI/ANs, continues to have one of the highest overall prevalence rates in California (10.1% and 14.9% respectively); significantly higher than Latinos (8%), Asians (6.5%) or whites (6%).

When diabetes prevalence is adjusted for age, additional racial and ethnic disparities in prevalence become apparent (Exhibit 3). Diabetes prevalence among Latino adults is 8% overall, significantly lower than African Americans (10.1%) or American Indian/Alaska Natives (14.9%). However, 21% of Latino adults ages 50-64 have diabetes, higher than any other race or ethnicity in the same age group. This indicates that Latinos face a greater burden from diabetes than their overall prevalence would suggest, mainly because on average Latino adults in California are younger than other groups. Among American Indian/Alaska Natives age 65 and over, 43% have diabetes. This is three times the diabetes prevalence of whites in the same age group (14%).

California has the largest population of Asians in the country, representing many Asian ethnic groups. Although the overall prevalence of diabetes among Asians is relatively low, Asians are a heterogeneous group with significant variation in diabetes prevalence between ethnic groups. Japanese have the highest prevalence of diabetes (10.2%) followed by Filipinos (8.6%), Koreans (7.4%), Vietnamese (7%), and Chinese (4.4%), with the rates for Japanese, Filipinos and Koreans being significantly higher than for Chinese. Over time, diabetes prevalence has increased among all Asian ethnic groups, although the increases are not statistically significant.

More than three-quarters of California Latinos (77.3%) are of Mexican heritage. The prevalence of diabetes has been increasing among Californians of Mexican descent, from 7.2% in 2001 to 8.2% in 2005.[3] It has also been rising among Californians of Central American descent, from 5.2% in 2001 to 8.7% in 2005. Puerto

Exhibit 2 **Diabetes Prevalence by Race/Ethnicity, Adults Age 18 and Over, California, 2001-2005**

Race/Ethnicity	Diabetes Prevalence 2001 (%)	Diabetes Prevalence 2005 (%)	Percentage Point Change from 2001
White	5.6	6.0	+0.4***
Latino	6.8*	8.0*	+1.2**
Asian	5.0	6.5	+1.5**
African American	10.5*	10.1*	-0.4
American Indian/Alaska Native	9.0*	14.9*	+5.9***
All Adults	**6.2**	**7.0**	**+0.8****

* Indicates statistical significance of $p < 0.05$ compared to White.

** Indicates statistical significance of $p < 0.05$, 2001 vs. 2005.

*** Indicates statistical significance of $p < 0.10$, 2001 vs. 2005.

Source: 2001 and 2005 California Health Interview Surveys

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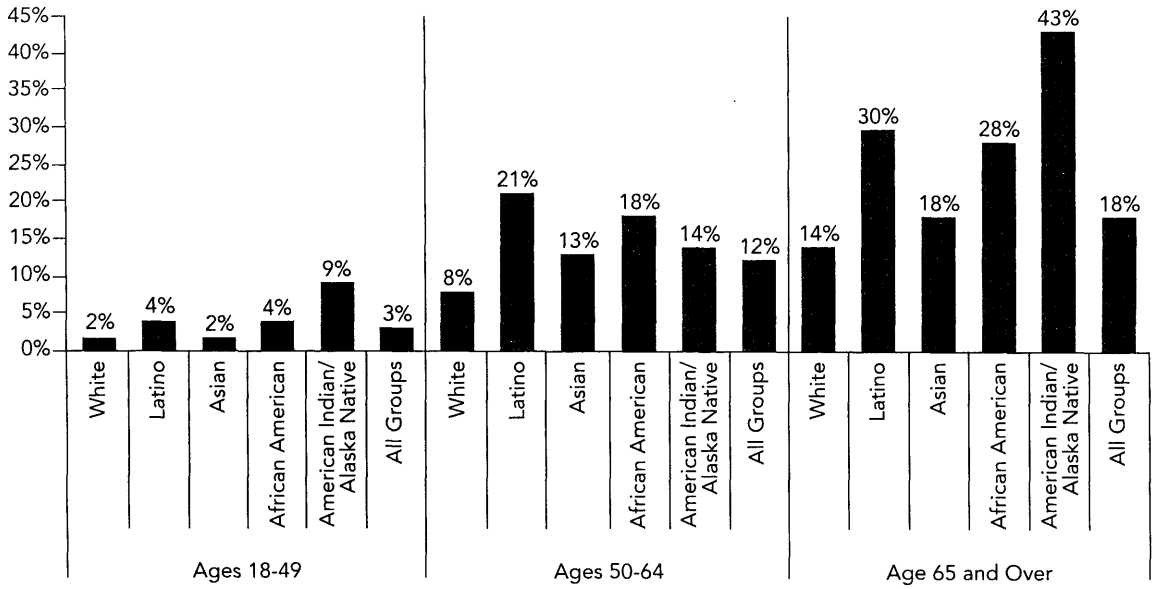
Diabetes Prevalence by Race/Ethnicity and Age, Adults Age 18 and Over, California, 2005 **Exhibit 3**



Source: 2005 California Health Interview Survey

Ricans in California have a very high prevalence of diabetes, 13.9%, similar to their rate in the rest of the U.S. mainland.[4] Puerto Ricans comprise a small proportion of Californians of Hispanic or Latino heritage (1.2%) and the small sample size does not allow for reliable statistical comparisons with other Latino groups.

Increases in Diabetes Prevalence Highest Among Those with Low Income and the Least Education

The prevalence of diabetes is strongly associated with social, economic and demographic factors—including education, income and number of years lived in the U.S. Although all educational groups show an increase in diabetes prevalence between 2001 and 2005, the greatest increase is among individuals with the least education. Adults with no more than an eighth-grade education experienced a 30% increase in the prevalence of diabetes between 2001 and 2005 (10.4% to 13.7%). In addition, the prevalence of diabetes is more than twice as high among these adults compared to those who graduated from college (13.7% vs. 4.7%; Exhibit 4).

Similarly, from 2001 to 2005 the prevalence of diabetes increased in all income categories, but the largest difference is seen among adults with incomes of 100-199% FPL (2.4 percentage points). There was also a significant increase in prevalence for those with incomes at 300% FPL and above. The prevalence of diabetes is highest among adults from the lowest-income households. Diabetes prevalence among adults from households with incomes below 200% of the Federal Poverty Level is almost twice that of adults from households with incomes of 300% FPL and above.

Diabetes Rates Highest Among Immigrants Living Longest in U.S.

Among adults born outside of the United States, diabetes prevalence is three times as high among those who have lived in the U.S. fifteen years or more compared to those who

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Exhibit 4

Diabetes Prevalence by Education, Income and Years Lived in the U.S., Adults Age 18 and Over, California, 2001-2005

	Diabetes Prevalence 2001 (%)	Diabetes Prevalence 2005 (%)	Percentage Point Change from 2001
Education			
Eighth Grade or Less	10.4*	13.7*	+3.3**
Some High School	8.3*	9.4*	+1.1
High School Diploma	5.8*	7.0*	+1.2**
Some College	6.3*	6.6*	+0.3
College Graduate or Higher	4.2	4.7	+0.5
Family Income as Percent of Federal Poverty Level (FPL)			
Below 100% FPL	8.5*	9.6*	+1.1
100-199% FPL	7.7*	10.1*	+2.4**
200-299% FPL	6.8*	7.7*	+0.9
300% FPL and Above	4.6	5.1	+0.5**
Years Lived in the U.S. (Adults Born Outside U.S. Only)			
Less Than 9 Years	3.1*	3.2*	+0.1
10-14 Years	4.1*	4.5*	+0.4
15 Years or More	8.0	9.8	+1.8**
All Adults	**6.2**	**7.0**	**0.8****

* Indicates statistical significance of $p < 0.05$ compared to College Graduate or Higher, 300% FPL and Above, or 15 Years or More.

** Indicates statistical significance of $p < 0.05$, 2001 vs. 2005.

Note: In 2005 the Federal Poverty Level was $12,755 for a family of two and $19,971 for a family of four; *http://www.census.gov/hhes/www/poverty/threshld/thresh05.html*. Accessed June 6, 2007.

Source: 2001 and 2005 California Health Interview Surveys

have lived here for fewer than ten years (9.8% vs. 3.2%). Diabetes also increased the most among those who have lived in the U.S. the longest (from 8% in 2001 to 9.8% in 2005). The higher prevalence of diabetes among immigrants who have lived in the U.S. the longest is consistent with findings that the longer immigrants live in the U.S., the more their health-related behaviors and their rates of chronic illnesses come to resemble those of U.S.-born adults.[5]

Diabetes Prevalence Varies from County to County

After adjusting for age, diabetes prevalence varies by county, ranging from a low of 2.6% in Nevada County to a high of 11.2% in Imperial County (Exhibit 5). California county populations vary with respect to race and ethnicity, education, income, insurance status, years lived in the U.S. and obesity; these differences likely contribute to the variation in diabetes prevalence. The number of people affected by diabetes also varies considerably by county, and is a result of diabetes prevalence and overall number of residents within a county. Los Angeles County has the greatest number of people diagnosed with diabetes (approximately 520,000) while Lake, Mendocino, Nevada and San Benito counties have the least number of people affected (approximately 3,000 each).

Health Insurance Coverage and Access to Health Care Improve Diabetes Care

Medical care for diabetes focuses on the management of blood glucose levels, blood pressure and cholesterol through the use of medication and promotion of health behaviors such as regular physical activity and proper nutrition. In order to minimize complications, diabetes care also includes regular foot exams, dilated eye exams,

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Exhibit 5

Diabetes Prevalence by County or County Group, Adults Age 18 and Over, California, 2005

	Diabetes Prevalence % (95% CI)	Age-Adjusted Diabetes Prevalence % (95% CI)	Number of Residents with Diabetes Estimated Number (95% CI)
Northern and Sierra Counties	**6.9 (6.0-7.8)**	**6.0 (5.1-6.8)**	**72,000 (63,000-82,000)**
Butte	9.7 (6.1-13.2)	9.1 (5.2-13.0)	16,000 (10,000-22,000)
Shasta	6.1 (3.9-8.3)	4.6 (3.0-6.2)	8,000 (5,000-11,000)
Humboldt	6.1 (4.5-7.8)	5.9 (4.4-7.5)	6,000 (4,000-8,000)
Del Norte, Siskiyou, Lassen, Trinity, Modoc, Plumas, Sierra	5.6 (3.1-8.1)	4.5 (1.9-7.2)	6,000 (4,000-9,000)
Mendocino	4.3 (2.3-6.3)	3.8 (2.0-5.6)	3,000 (2,000-4,000)
Tehama, Glenn, Colusa	9.4 (6.4-12.5)	8.5 (5.7-11.3)	8,000 (5,000-10,000)
Sutter	9.7 (6.0-13.4)	9.4 (5.8-12.9)	6,000 (4,000-9,000)
Yuba	9.7 (5.5-14.0)	10.0 (5.5-14.4)	4,000 (2,000-6,000)
Nevada	3.5 (1.9-5.1)	2.6 (1.5-3.7)	3,000 (2,000-4,000)
Lake	6.8 (4.1-9.6)	5.2 (2.9-7.6)	3,000 (2,000-5,000)
Tuolumne, Calaveras, Amador, Inyo, Mariposa, Mono, Alpine	5.9 (3.4-8.3)	4.4 (2.3-6.5)	9,000 (5,000-12,000)
Greater Bay Area	**6.5 (5.7-7.2)**	**6.2 (5.5-7.0)**	**340,000 (300,000-390,000)**
Santa Clara	7.8 (5.7-9.8)	7.8 (5.7-9.9)	100,000 (70,000-130,000)
Alameda	6.5 (5.0-8.0)	6.5 (5.1-7.9)	73,000 (57,000-89,000)
Contra Costa	5.3 (3.3-7.2)	5.1 (3.3-6.9)	40,000 (25,000-55,000)
San Francisco	6.2 (4.0-8.3)	5.7 (3.8-7.6)	41,000 (25,000-55,000)
San Mateo	5.9 (3.4-8.5)	5.5 (3.1-7.9)	33,000 (18,000-47,000)
Sonoma	4.9 (2.8-7.0)	4.7 (2.6-6.7)	18,000 (10,000-25,000)
Solano	8.5 (6.6-10.3)	8.1 (6.4-9.8)	25,000 (19,000-30,000)
Marin	3.8 (3.0-4.6)	3.0 (2.3-3.6)	7,000 (6,000-9,000)
Napa	8.3 (5.2-11.5)	7.1 (4.5-9.8)	8,000 (5,000-11,000)
Sacramento Area	**5.7 (4.6-6.7)**	**5.5 (4.5-6.5)**	**84,000 (68,000-99,000)**
Sacramento	5.8 (4.3-7.2)	5.8 (4.4-7.3)	57,000 (42,000-71,000)
Placer	4.9 (2.8-7.0)	4.1 (2.4-5.8)	11,000 (6,000-16,000)
Yolo	6.3 (4.1-8.5)	7.0 (4.6-9.3)	8,000 (6,000-11,000)
El Dorado	5.6 (3.4-7.9)	4.9 (2.8-7.0)	7,000 (4,000-10,000)
San Joaquin Valley	**9.2 (7.9-10.4)**	**9.5 (8.3-10.6)**	**230,000 (200,000-260,000)**
Fresno	7.8 (5.4-10.3)	8.4 (6.0-10.8)	48,000 (33,000-62,000)
Kern	10.4 (6.9-13.9)	10.2 (7.1-13.4)	52,000 (34,000-70,000)
San Joaquin	9.2 (6.4-12.0)	9.1 (6.5-11.7)	41,000 (29,000-53,000)
Stanislaus	9.4 (6.4-12.5)	9.8 (7.0-12.7)	33,000 (22,000-44,000)
Tulare	9.4 (6.0-12.9)	10.2 (6.6-13.7)	26,000 (16,000-36,000)
Merced	8.9 (5.8-11.6)	9.4 (6.6-12.2)	14,000 (9,000-19,000)
Kings	10.3 (6.6-14.0)	11.2 (7.5-14.8)	9,000 (6,000-13,000)
Madera	8.5 (5.2-11.8)	8.2 (5.0-11.4)	8,000 (5,000-11,000)
Central Coast	**6.7 (5.4-7.9)**	**6.4 (5.2-7.6)**	**110,000 (86,000-130,000)**
Ventura	6.6 (4.0-9.2)	6.3 (4.1-8.5)	38,000 (23,000-54,000)
Santa Barbara	8.4 (5.1-11.7)	8.0 (4.9-11.2)	25,000 (15,000-35,000)
Santa Cruz	3.5 (1.7-5.2)	3.4 (1.7-5.1)	7,000 (3,000-10,000)
San Luis Obispo	4.7 (2.9-6.5)	4.2 (2.5-6.0)	9,000 (6,000-12,000)
San Benito	8.8 (4.7-12.9)	8.7 (4.7-12.6)	3,000 (2,000-5,000)
Monterey	8.1 (5.2-10.9)	8.3 (5.5-11.2)	24,000 (16,000-33,000)
Los Angeles	**7.2 (6.4-7.9)**	**7.2 (6.5-7.9)**	**520,000 (470,000-570,000)**
Los Angeles	7.2 (6.4-7.9)	7.2 (6.5-7.9)	520,000 (470,000-570,000)
Other Southern California Counties	**6.7 (6.0-7.3)**	**6.5 (5.9-7.2)**	**480,000 (430,000-530,000)**
Orange	5.8 (4.5-7.1)	5.8 (4.6-7.1)	130,000 (100,000-160,000)
San Diego	5.8 (4.8-6.7)	5.7 (4.8-6.6)	130,000 (100,000-150,000)
San Bernardino	7.2 (5.6-8.9)	7.7 (6.1-9.4)	100,000 (75,000-120,000)
Riverside	8.5 (6.7-10.3)	7.5 (5.8-9.1)	120,000 (91,000-140,000)
Imperial	10.9 (7.7-14.2)	11.0 (7.9-14.1)	12,000 (8,000-15,000)
California	**7.0 (6.6-7.3)**	**6.8 (6.5-7.1)**	**1,800,000 (1,700,000-1,900,000)**

Source: 2005 California Health Interview Survey

cholesterol and urinary microalbumin checks, flu shots, blood pressure testing and control, and annual hemoglobin A1C tests. Proper control and treatment of diabetes is critical in preventing serious complications—such as blindness, kidney failure, heart attack and limb disease requiring amputation. Uninterrupted health insurance coverage, which provides financial access to health services, and having a regular health care provider, which provides a connection to sources of health care, are key factors affecting whether people receive recommended diabetes-specific care.

Diabetes Medications

Diabetes treatment is aimed at controlling blood sugar to prevent the development of diabetes-related complications. Many adults with diabetes must receive synthetic insulin. For adults with type 2 diabetes, blood sugar levels can—in some cases—be adequately controlled with dietary and physical activity interventions; however, the majority of patients eventually require diabetes medication.

In California, most adults with diabetes (82%) currently take some form of medication (insulin and/or oral medication) to control their diabetes, up from 76% in 2001 (Exhibit 6). This increase in medication use is largely accounted for by an increase in the percent of adults taking oral medication for diabetes, which rose from 65% in 2001 to 71% in 2005. Among adults with diabetes, 24% use insulin only and 71% use oral diabetes medications, either alone or in conjunction with insulin.

Access to health care affects whether people with diabetes take medications, including insulin and oral medications. In California, 83% of adults with diabetes who have a usual source of health care are on diabetes medication compared to just 53% of those with no usual source of care. Likewise, 84% of adults with diabetes who have continuous health insurance coverage are on diabetes medication compared to 71% of adults without continuous coverage (Exhibit 6).

After controlling for diabetes type, age and other demographic characteristics, adults with both a usual source of care and continuous health insurance coverage are more than twice as likely to be taking insulin or oral medication to control diabetes as adults with neither a usual source of care nor insurance coverage.[6] This finding highlights the importance of having a usual source of health care and continuous health coverage in controlling and managing chronic conditions such as diabetes.

Foot exams

People with diabetes should receive foot exams from their health care provider at least once a year to assess the extent of any nerve damage and the presence of any skin ulcerations. Foot exams are critical in preventing diabetes-related amputation. Other research has shown that comprehensive foot care significantly reduces amputation rates.[7] In California, 71% of adults with

Exhibit 6

Diabetes Medication by Usual Source of Care and Health Insurance Status, Adults Age 18 and Over Diagnosed with Diabetes, California, 2001-2005

	Using Diabetes Medication (Insulin and/or Oral Medication)	
	2001 %	2005 %
Usual Source of Care		
No Usual Source of Care	46**	56**
Usual Source of Care	79	83*
Health Insurance		
Uninsured All or Part Year	63**	71**
Insured All Year	78	84*
All Adults with Diabetes	**76**	**82***

* Indicates statistical significance of $p < 0.05$, 2001 vs. 2005.

** Indicates statistical significance of $p < 0.05$ compared to Usual Source of Care or Insured All Year.

Source: 2001 and 2005 California Health Interview Surveys

diabetes report having at least one foot exam in the past year. However, low-income adults and adults lacking access to health care are much less likely to receive annual foot exams.

Approximately three out of four individuals from the most affluent households report receiving a foot exam in the previous year compared to two out of three individuals living below 200% FPL. African Americans have the highest rate of receiving foot exams in the previous year (78%), significantly higher than Latinos (68%) and Asians (66%), but not significantly different from whites (71%; Exhibit 7).

Receipt of a foot exam also varies significantly by usual source of care and health insurance status (Exhibit 7). The percent of adults with a usual source of care receiving a foot exam in the previous year was significantly higher than for those without a usual source of care (71% vs. 54%). Likewise, 73% of adults with continuous health insurance report receiving a foot exam, compared to just 56% of those without continuous insurance coverage.

After controlling for age, gender, race and ethnicity, income and education level, adults with both a usual source of care and continuous health insurance coverage are 1.3 times as likely to get a foot exam as adults with neither a usual source of care nor insurance coverage.[8]

The higher prevalence of annual foot exams for African Americans is important because African Americans with diabetes have especially high rates of leg and foot amputation.[9] However, the fact that 22% of African Americans, and even higher percentages of other ethnic groups and those without continuous health insurance or a usual source of care, do not regularly receive these exams represents a serious gap in access and quality of care.

Eye exams

Dilated eye exams are necessary to assess vision-threatening complications in people with diabetes. Detecting and treating eye disease among people with diabetes can reduce the development of severe vision loss by 50 to 60%.[10] Over two-thirds of adults with diabetes (71%) received a dilated eye exam within the preceding year, while only 8% had never had a dilated eye exam. Rates of dilated eye exams within the preceding year vary by income, having a usual source of care and insurance status, but did not vary significantly by race and ethnicity. A greater proportion of individuals from higher-income households with a usual source of care and with continuous health insurance coverage received a dilated eye exam in the previous year compared to those with lower income, no usual source of care and without continuous insurance coverage (Exhibit 7).

After adjusting for age, gender, race and ethnicity, income and education level, adults with both a usual source of care and continuous health insurance coverage are 2.4 times as likely to get an eye exam as adults with neither a usual source of care nor insurance coverage.[11]

Cholesterol test

Diabetes is a significant risk factor for cardiovascular disease. There is extensive evidence that controlling LDL cholesterol levels among people with diabetes can reduce the risk of cardiac events.[12] In California, 90% of adults with diabetes reported having a cholesterol test within the preceding year, and 2% had never had their cholesterol tested.

Exhibit 7

Diabetes Care Measures by Race/Ethnicity, Income, Usual Source of Care and Health Insurance Status, Adults Age 18 and Over Diagnosed with Diabetes, California, 2005

	Foot Exam Within Previous Year	Dilated Eye Exam Within Previous Year	Cholesterol Test Within Previous Year
Family Income as Percent of Federal Poverty Level (FPL)			
Below 100% FPL	67	69*	83*
100-199% FPL	65	75	87*
200-299% FPL	75	80	92
300% FPL and Above	74	79	93
Usual Source of Care			
No Usual Source of Care	54*	50*	63*
Usual Source of Care	71	78	91
Health Insurance			
Uninsured All or Part Year	56*	57*	70*
Insured All Year	73	79	93
Race/Ethnicity			
White	71	76	93
Latino	68	75	85*
Asian	66	82	86
African American	78	79	**
American Indian/Alaska Native	69	91	**
All Adults with Diabetes	**71**	**71**	**90**

* Indicates statistical significance of $p < 0.05$ compared to 300% FPL and Above, Usual Source of Care, Insured All Year, or White.

** Estimate is not statistically reliable.

Note: In 2005 the Federal Poverty Level was $12,755 for a family of two and $19,971 for a family of four; *http://www.census.gov/hhes/www/poverty/threshld/thresh05.html*. Accessed June 6, 2007.

Source: 2005 California Health Interview Survey

Among adults with diabetes, whites had the highest rate of receiving a cholesterol test within the previous year (93%), followed by Asians (86%) and Latinos (85%); however, only the difference between whites and Latinos is significant. Estimates for other racial and ethnic groups are not reliable. Receipt of cholesterol testing within the previous year varied significantly by income. A smaller percentage of adults with diabetes living below the Federal Poverty Level received a cholesterol test in the previous year than those from households with incomes of 200% FPL and above (Exhibit 7).

Cholesterol testing varied much more by usual source of care and health insurance coverage. Among adults with diabetes, 91% of those with a usual source of health care received a cholesterol test compared with 63% of those without a usual source of care. Additionally, 93% of those with continuous health insurance received cholesterol testing compared with 70% of those without it.

After adjusting for age, gender, race and ethnicity, income and education level, adults with both a usual source of care and continuous health insurance coverage are 1.9 times as likely to get a cholesterol test as adults with neither a usual source of care nor insurance coverage.[13]

Hemoglobin A1C test

Hemoglobin A1C is one of the recommended quality measures for assessing quality of diabetes care and glycemic control because it assesses patients' blood sugar control over

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time. Receipt of this blood test is a critical aspect of diabetes care; however, reliable and valid reporting depends upon medical record abstraction, including laboratory data, as used by the National Committee for Quality Assurance (NCQA) and the Health Employer Data and Information Set (HEDIS). Although some disease-management programs rely on patient self-report, the reliability and validity of this method in the general population of people with diabetes have not been demonstrated.[14] Although the California Health Interview Survey asks adults with diabetes about receiving an A1C test, 16.2% report that they are not sure whether they received the test or report that they have never heard of the test. Due to the questionable validity of self-report regarding receipt of this test, results for Hemoglobin A1C screening are not reported.

Conclusions and Policy Recommendations

In California, 7% of adults—more than 1.8 million total—have been diagnosed with diabetes, a significant increase from 6.2% in 2001. Diabetes prevalence is rising among most racial and ethnic groups as well as among many other sociodemographic groups who already experience relatively high rates of diabetes. With the worsening epidemic of obesity among children and adults, the risk of developing type 2 diabetes continues to increase.

Reducing Diabetes Risk Factors

Because obesity is a major risk factor for type 2 diabetes, prevention of diabetes is closely tied to reducing the prevalence of obesity among children and adults. The Diabetes Prevention Program (DPP) study found that increasing moderate physical activity by 30 minutes a day for at least five days a week coupled with a 5-7% reduction in body weight produced a 58% reduction in onset of diabetes. Efforts to promote and encourage physical activity and healthful eating are therefore important in the prevention of diabetes.

The following strategies can help encourage healthful eating and physical activity:

- *Promoting environments that encourage nutritious eating.* Policies have been adopted to limit the consumption of sodas in schools and are being expanded to mandate adherence to nutrition for competitive foods sold in California schools. Improving the food environment through expansion of access to fruits and vegetables, local area planning to increase the presence of supermarkets in inner-city areas with a paucity of consumer options, and promoting menu labeling to allow consumers to make more informed food choices can all be addressed through local and state policy initiatives.

- *Promoting environments that encourage regular physical activity.* Lack of physical activity is a significant risk factor for diabetes and obesity, and further policies should be developed to facilitate active living among children and adults, including daily physical- education activities in schools for grades K-12, safe environments for walking, access to safe parks and other places for recreation and physical activity, and worksite programs to facilitate regular physical activity for adults of all ages.

In California, many adults with diabetes are receiving recommended care—with 71% receiving a foot exam, 71% receiving a dilated eye exam and 90% receiving a cholesterol test in the previous year. Unfortunately this still leaves 540,000 people with diabetes who did not have a foot exam in the previous year, 540,000 who did not have an eye exam in the previous year and 190,000 who did not have a cholesterol test in the previous year. These adults face significantly increased risk of serious complications, such as vascular disease requiring amputation, blindness, heart attack and stroke.

Adults who lack continuity of health care—who have no usual source of health care and/or lack continuous health insurance coverage—are much less likely to receive recommended diabetes care. In California, 86% of adults with diabetes have continuous health insurance coverage and 95% have a usual source of health care. Although these rates are higher than in the general population, this still leaves 276,000 adults with diabetes in California who lack continuous health insurance coverage and/or a usual source of health care, including over 51,000 who have neither continuous health insurance coverage nor a usual source of care. In addition, 27% of adults with diabetes who have a usual source of care use a community or government clinic, suggesting that these providers are extremely important for the care of many adults with diabetes. The probability of adults who lack a usual source of health care or health insurance coverage taking medication for diabetes, receiving an eye exam or having their cholesterol tested is half that of adults with adequate access to health care.

Reducing Complications of Diabetes

Health care reform policies and improvements in quality of care are needed to reduce the complications related to diabetes among those who have developed the disease. Effective management of diabetes is essential to reduce the risk of disability and death, and to avoid the high medical and social costs and lost earnings that result from these complications.

The following policies are extremely important in reducing the complications of diabetes:

- *Promoting adequate access to care.* Policies are needed to facilitate early detection of diabetes, especially for those at increased diabetes risk. At-risk individuals need to have adequate and sufficient access to quality health care services. Lack of continuous health insurance coverage creates significant financial barriers to accessing primary care services, having a usual source of care where a relationship with a provider and continuity can be established, and being able to afford insulin or other medications that may be essential to managing diabetes. The data presented here strongly suggest that continuity of health care (having a usual source of care and continuous health insurance coverage) improves the likelihood of receiving appropriate diabetes care, such as foot exams, eye exams, cholesterol tests, and taking insulin or other medication; care that significantly reduces the risk of complications. Even after adjusting for important demographic factors such as age, race and income, adults with both a usual source of care and continuous health insurance coverage are approximately twice as likely to receive the recommended diabetes care.

- *Promoting appropriate management of diabetes.* Diabetes care guidelines, incentives and oversight can help health care providers to better manage and control diabetes through better control of blood sugar, blood pressure and cholesterol, regular foot exams, dilated eye exams, smoking cessation and weight loss, thus preventing the onset of costly complications.

Data Source

All statements in this report that compare rates for one group with another group reflect statistically significant differences ($p<0.05$) unless otherwise noted. The findings in this brief are based on data from the 2001, 2003 and 2005 California Health Interview Surveys (CHIS 2001, CHIS 2003 and CHIS 2005). CHIS 2005 completed interviews with over 43,000 adults, drawn from every county in the state, in English, Spanish, Chinese (both Mandarin and Cantonese), Vietnamese and Korean. CHIS 2001 data were re-weighted to be consistent with

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the weighting methodology adopted for CHIS 2003 and CHIS 2005. As a result, CHIS 2001 estimates presented here may differ from some previously published estimates. The California Health Interview Survey is a collaboration of the UCLA Center for Health Policy Research, the California Department of Health Services and the Public Health Institute. Funding for the CHIS 2005 statewide survey was provided by the California Department of Health Services, The California Endowment, the National Cancer Institute, the Robert Wood Johnson Foundation, the California Children and Families Commission, the California Office of the Patient Advocate, the California Department of Mental Health, the Centers for Disease Control and Prevention (CDC), and Kaiser Permanente. For local funders and other information on CHIS, visit *www.chis.ucla.edu.*

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Notes

1 Centers for Disease Control and Prevention. National diabetes fact sheet, 2005. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. The higher proportion of adults reporting they have type 1 diabetes may represent over-reporting of type 1 diabetes due, in part, to adults with type 2 diabetes taking insulin reporting that they have type 1.

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6 Based on the predicted probability of taking insulin and/or oral medication for diabetes computed from a logistic regression model adjusting for age, gender, race, income, education, usual source of health care, continuity of health insurance coverage, nativity and type of diabetes.

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