



# Burden of Diabetes in California

California Department of Public Health  
Chronic Disease Control Branch  
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# Burden of Diabetes in California, 2014

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Inquiries regarding the content of this report may be directed to:

Data and Information Section  
Chronic Disease Control Branch  
California Department of Public Health  
MS 7208, PO Box 997377  
Sacramento, CA 95899-7377  
Phone: (916) 552-9900

[cddb@cdph.ca.gov](mailto:cddb@cdph.ca.gov)

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## Executive Summary

Over 2.3 million California adults report having been diagnosed with diabetes, representing one out of every 12 adult Californians. The vast majority of diabetes cases in California are type 2, representing 1.9 million adults. The prevalence increases with age—one out of every six adult Californians aged 65 and above have type 2 diabetes—and is higher among ethnic/racial minorities and Californians with low education attainment and/or family income. Compared with non-Hispanic Whites, Hispanics and African Americans have twice the prevalence of type 2 diabetes and are twice as likely to die from their disease.

Diabetes is the seventh leading cause of death in California, and determined to be the underlying cause of death in almost 8,000 people each year. As diabetes is a contributing factor to many deaths from heart disease and stroke, diabetes may be under-represented as a contributing cause of death.

Obesity and smoking are strong risk factors for type 2 diabetes. Obese adults have a four times higher risk of type 2 diabetes compared to normal weight adults in California. Adults with type 2 diabetes are also more likely to have other health problems, including cardiovascular disease and arthritis. One of every two adults with type 2 diabetes also has hypertension.

Complications among California adults with diabetes have decreased between 2001 and 2007, as indicated by the rate of hospitalizations for end-stage renal disease and lower extremity amputations; however, this decline has diminished and may even have increased in recent years.

The California Department of Public Health (CDPH) has a number of ongoing activities that support the primary prevention of diabetes through the promotion of healthy eating, increased physical activity, tobacco cessation, and the prevention and control of overweight and obesity. Secondary prevention activities focus on evidence-based strategies to prevent or delay the onset of complications among Californians diagnosed with type 2 diabetes. CDPH is establishing a statewide network of evidence-based lifestyle change programs that are designed to prevent the development of type 2 diabetes among people at highest risk and prevent or delay the onset of complications among people diagnosed with type 2 diabetes.

## I. Introduction

Diabetes is a serious health condition and a major risk factor for heart disease and stroke. Uncontrolled diabetes can lead to significant disability, including blindness, amputations, and kidney failure. The number of adults in the United States (U.S.) with diabetes has risen dramatically since 1990, and continues to increase. The recently released *National Diabetes Statistics Report, 2014* from the Centers for Disease Control and Prevention (CDC) indicates that 29.1 million people, or 9.3 percent of the U.S. population, now have diabetes<sup>1</sup>—many of whom do not know they have the disease. The estimated number of new diabetes cases in California has increased from 131,000 in 1995 to 209,000 in 2010 (age-adjusted rates) according to the CDC’s Behavioral Risk Factor Surveillance System.<sup>2</sup> If current trends continue, as many as one out of every three U.S. adults will have diabetes by the year 2050.<sup>3</sup>

Type 2 diabetes—the most common form of the disease—can be prevented through healthy eating, lowering body weight, and increasing physical activity. People who have diabetes should adopt these same measures to manage their condition, along with medications to lower blood glucose, if indicated. Another crucial part of diabetes management is lowering the risk of heart disease and stroke by managing blood pressure and lipid levels, and stopping tobacco use.

The purpose of this brief report is to describe the current burden of diabetes among adults in California, and to describe some of the current diabetes prevention and control activities being implemented by CDPH.

## II. What is diabetes?

Diabetes is a disease in which the body has a shortage of insulin, a decreased ability to use insulin, or both. Insulin is a hormone that allows glucose (sugar) to enter cells and be converted to energy. When diabetes is not controlled, glucose and fats remain in the blood and, over time, damage vital organs.

**Type 1 diabetes** usually is first diagnosed in children and young adults, although it can occur at any age. Type 1 diabetes is an autoimmune disease that may be caused by genetic, environmental, or other factors. It accounts for about 5 percent of diabetes cases. There is no known way to prevent it, and effective treatment requires the use of insulin.

**Type 2 diabetes** accounts for 90–95 percent of diabetes cases and is usually associated with older age, obesity, and physical inactivity, family history of type 2 diabetes, or a personal history of gestational diabetes. Diabetes rates vary by race and ethnicity, with American Indian, Alaska Native, African American, Hispanic/Latino, and Asian/Pacific Islander adults about twice as likely as white adults to have type 2 diabetes. Type 2 diabetes can be prevented through healthy food choices, physical activity, and weight loss. It can be controlled with these same activities, but insulin or oral medication also may be necessary.

**Gestational diabetes** is a form of glucose intolerance that is diagnosed during pregnancy. Gestational diabetes occurs more often in African-American, Hispanic/Latino, and American-Indian women, as well as in women who are obese or have a family history of type 2 diabetes. It requires treatment to bring maternal blood glucose to normal levels and avoid complications in the infant. Evidence suggests that gestational diabetes increases the risk that the mother, and the babies of mothers who have gestational diabetes, will develop type 2 diabetes later in life.

**Other types of diabetes** result from specific genetic conditions (such as maturity-onset diabetes of youth), surgery, medications, infections, pancreatic disease, and other illnesses. Other types of diabetes account for less than 5 percent of all diagnosed cases.

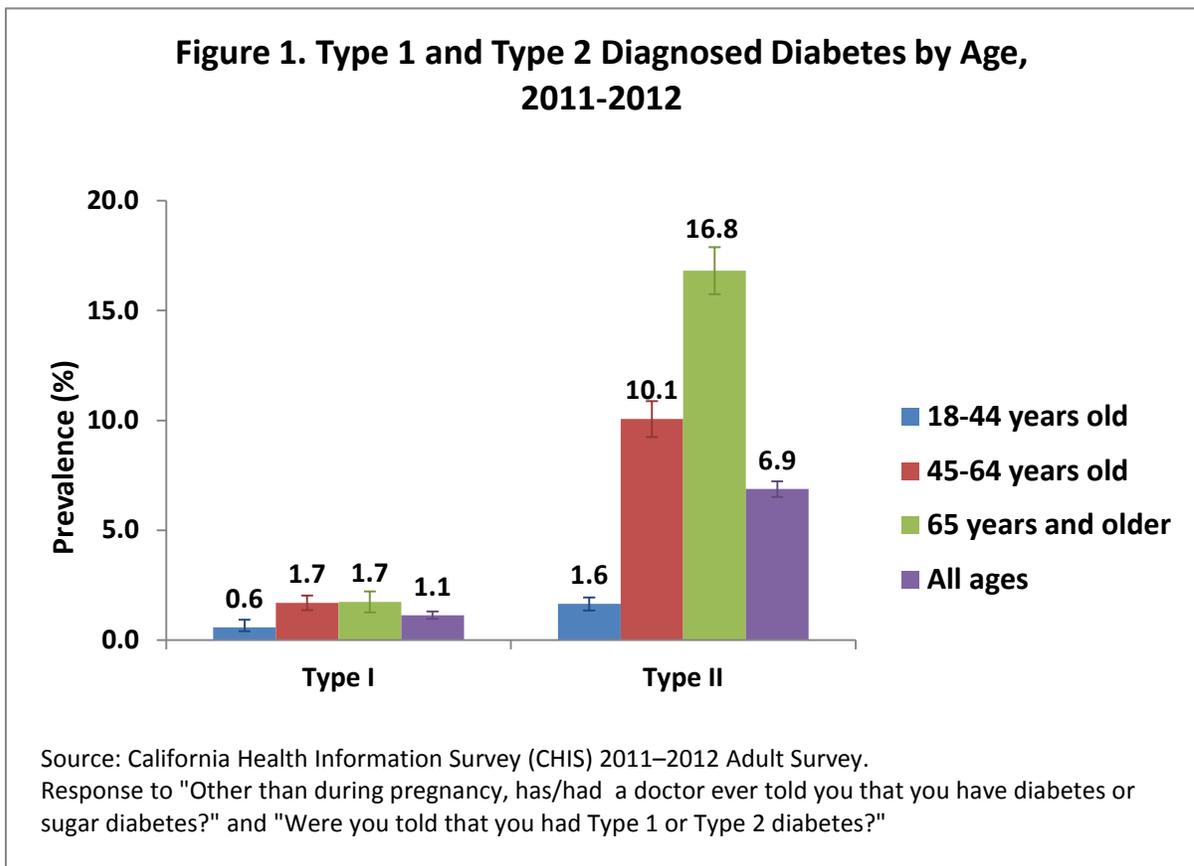
**Prediabetes (also called impaired glucose tolerance)** is a condition in which blood sugar levels are higher than normal, but not high enough to be diagnosed as diabetes. People with prediabetes are at high risk of developing type 2 diabetes, as well as heart disease and stroke. Studies have shown that people with prediabetes who lose weight and increase their physical activity can reduce their blood sugar levels back to normal and prevent diabetes from developing.

### III. Diabetes in California

Over 2.3 million California adults report having been diagnosed with diabetes, according to the 2012–2011 California Health Interview Survey (CHIS).<sup>4</sup> This represents 8.4 percent of the population or one of every 12 adult Californians.<sup>1\*</sup>

#### Diabetes by age group

- The vast majority of diabetes cases in California are type 2, representing 1.9 million adults, or 6.9 percent of the population.
- The prevalence of type 1 diabetes is less than 2 percent for all age groups.
- In contrast, the prevalence of type 2 diabetes is less than 2 percent for adults under age 45, but rises sharply to 10 percent for ages 45–64 years, and 17 percent for ages 65 years and older.

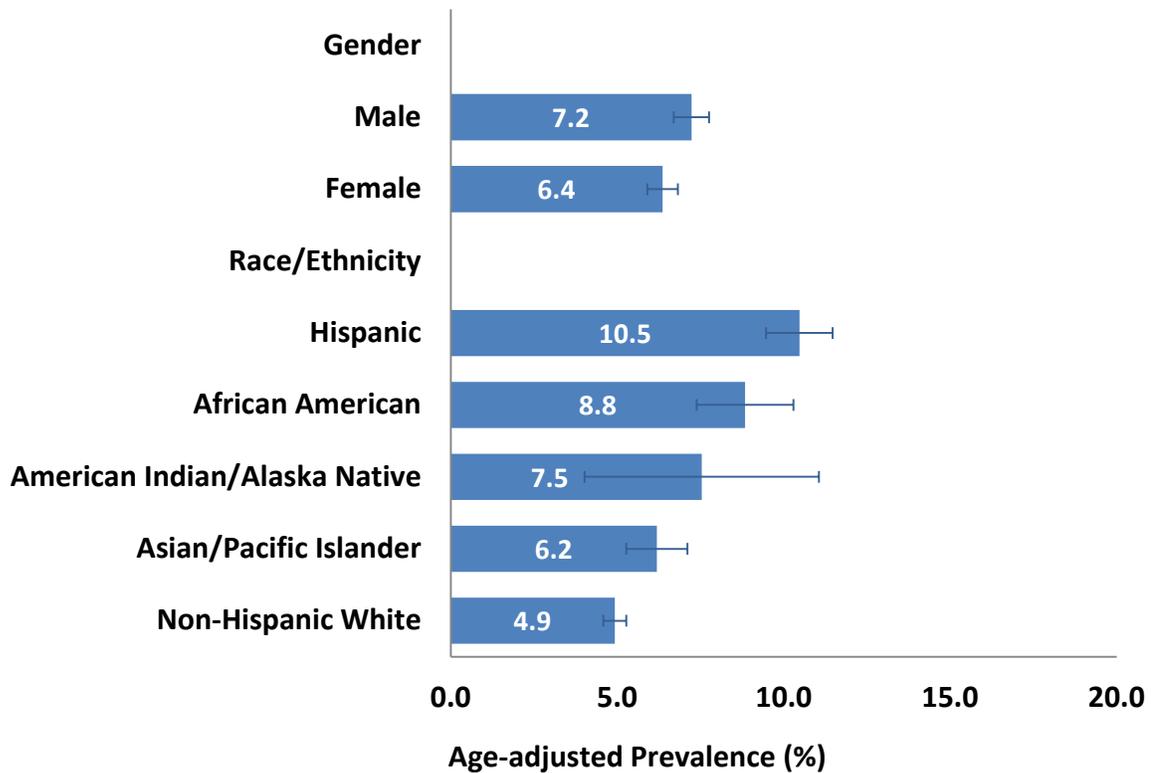


\*Note: This prevalence of 8.4 percent in California cannot be directly compared to 9.3 percent in the U.S. overall from the CDC report, *National Diabetes Statistics Report, 2014*.<sup>1</sup> The CDC figure includes data collected from people who had blood tests showing diabetes who were not previously aware they had the disease. The CHIS results only include adults who know they have been diagnosed with diabetes.

## Type 2 diabetes by gender and race/ethnicity

- The prevalence of type 2 diabetes is 13 percent higher in men than women in California.
- Hispanics, African Americans, and Asian/Pacific Islanders have higher prevalence of type 2 diabetes than non-Hispanic Whites. Hispanics and African Americans have two times higher prevalence: 1 in 20 non-Hispanic Whites have type 2 diabetes, compared with 1 in 10 Hispanics and 1 in 11 African Americans.

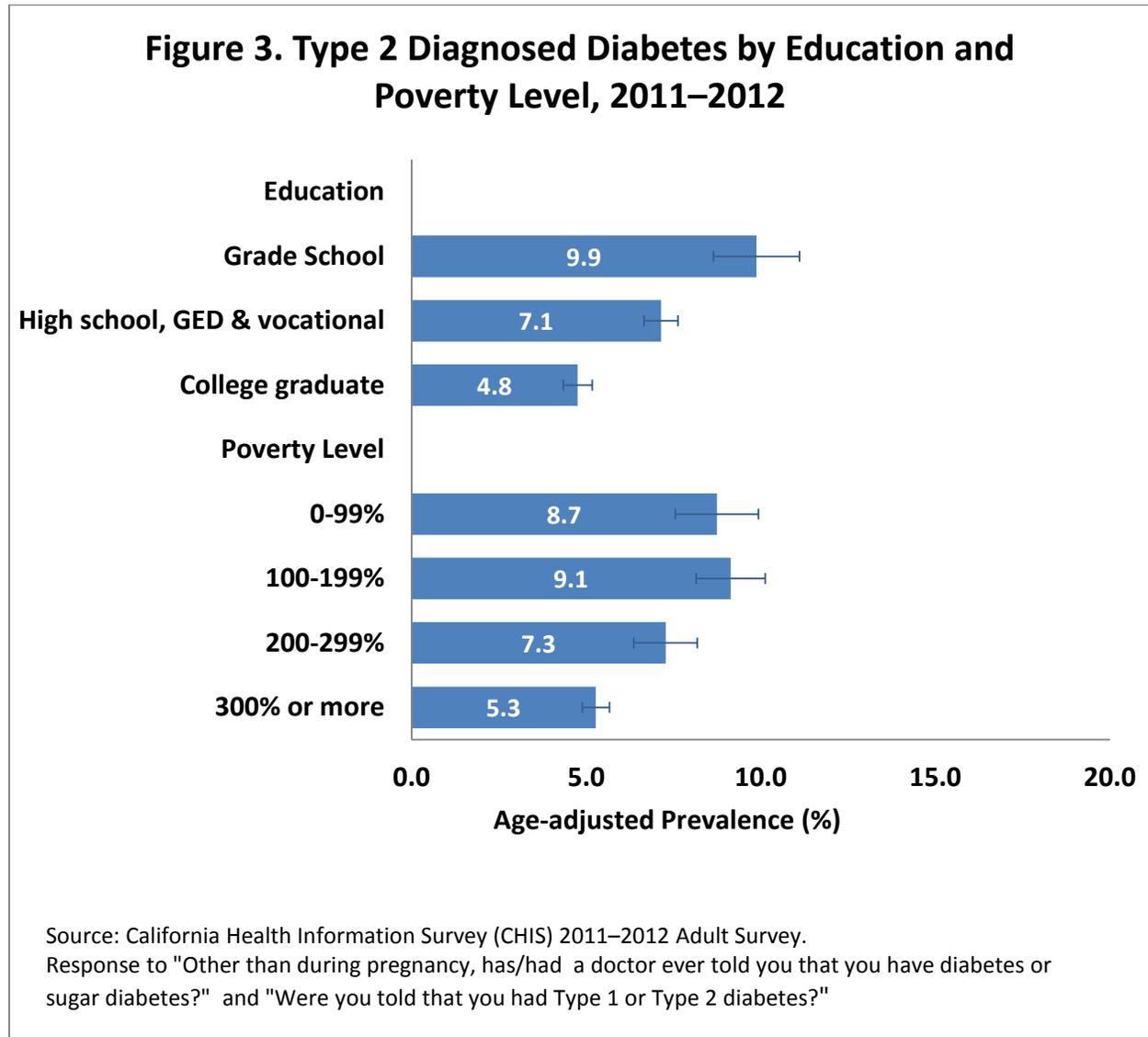
**Figure 2. Type 2 Diagnosed Diabetes by Gender and Race/Ethnicity, 2011–2012**



Source: California Health Information Survey (CHIS) 2011–2012 Adult Survey.  
Response to "Other than during pregnancy, has/had a doctor ever told you that you have diabetes or sugar diabetes?" and "Were you told that you had Type 1 or Type 2 diabetes?"  
American Indian or Alaska Native or other single and multiple race not shown due to unstable estimates.

## Type 2 diabetes by social determinants of health

- The prevalence of diagnosed type 2 diabetes is two times higher in Californian adults without a high-school diploma compared to those with a college degree.
- Similarly, the percent of adults in Californians with diabetes is almost two times higher in those with family incomes below 200 percent of the federal poverty level compared to those whose income is 300 percent above.



## Type 2 diabetes and obesity by county

| Estimated Prevalence of Type 2 Diagnosed Diabetes and Obesity (age 18 years or older) by Counties in California |                 |                |              |             |                |               |
|---|-----------------|----------------|--------------|-------------|----------------|---------------|
| County  | Type 2 Diabetes |                |              | Obesity     |                |               |
|   | Estimated N     | Prevalence (%) | 95% CI       | Estimated N | Prevalence (%) | 95% CI        |
| <i>Alameda</i>  | 62,000          | 5.3            | (3.9 - 6.8)  | 243,000     | 21.0           | (17.7 - 24.3) |
| <i>Butte</i>  | 11,000          | 6.5            | (3.9 - 9.1)  | 41,000      | 23.8           | (18.5 - 29.1) |
| <i>Contra Costa</i>   | 53,000          | 6.7            | (4.5 - 8.8)  | 193,000     | 24.0           | (19.8 - 28.2) |
| <i>Del Norte, Siskiyou, Lassen, Trinity, Modoc, Plumas, Sierra</i>  | 9,000           | 8.2            | (5.2 - 11.1) | 34,000      | 31.4           | (25.6 - 37.3) |
| <i>El Dorado</i>  | 8,000           | 5.8            | (3.1 - 8.6)  | 32,000      | 22.9           | (17.2 - 28.6) |
| <i>Fresno</i>   | 45,000          | 6.9            | (4.8 - 9.1)  | 195,000     | 30.0           | (25.3 - 34.7) |
| <i>Humboldt</i>   | 7,000           | 6.7            | (4.3 - 9.1)  | 29,000      | 27.6           | (20.7 - 34.4) |
| <i>Imperial</i>   | 5,000           | 4.0            | (2.2 - 5.7)  | 47,000      | 41.7           | (32.2 - 51.2) |
| <i>Kern</i>   | 41,000          | 7.3            | (4.8 - 9.9)  | 185,000     | 33.2           | (26.9 - 39.4) |
| <i>Kings</i>  | 9,000           | 9.4*           | (3.3 - 15.5) | 35,000      | 36.6           | (25.7 - 47.6) |
| <i>Lake</i>   | 4,000           | 8.1*           | (1.1 - 15.1) | 13,000      | 26.4           | (16.9 - 35.8) |
| <i>Los Angeles</i>  | 536,000         | 7.2            | (6.5 - 8.0)  | 1,831,000   | 24.7           | (23.3 - 26.1) |
| <i>Madera</i>   | 10,000          | 10.2           | (5.2 - 15.3) | 34,000      | 34.4           | (25.7 - 43.2) |
| <i>Marin</i>  | 5,000           | 2.7            | (0.7 - 4.7)  | 27,000      | 13.9           | (8.9 - 18.9)  |
| <i>Mendocino</i>  | 3,000           | 5.0            | (2.9 - 7.1)  | 18,000      | 26.5           | (20.0 - 33.0) |
| <i>Merced</i>   | 19,000          | 10.8           | (5.3 - 16.2) | 60,000      | 34.1           | (26.3 - 41.9) |
| <i>Monterey</i>   | 26,000          | 8.9            | (5.9 - 12.0) | 72,000      | 25.1           | (20.1 - 30.1) |
| <i>Napa</i>   | 8,000           | 7.4            | (3.1 - 11.7) | 30,000      | 28.9           | (19.7 - 38.1) |
| <i>Nevada</i>   | 3,000           | 3.9            | (2.2 - 5.6)  | 15,000      | 18.5           | (14.4 - 22.6) |
| <i>Orange</i>   | 131,000         | 5.7            | (4.6 - 6.8)  | 533,000     | 23.1           | (20.5 - 25.8) |
| <i>Placer</i>   | 20,000          | 7.2            | (4.5 - 10.0) | 49,000      | 18.1           | (13.7 - 22.5) |
| <i>Riverside</i>  | 118,000         | 7.4            | (5.4 - 9.5)  | 412,000     | 25.9           | (22.7 - 29.2) |
| <i>Sacramento</i>   | 76,000          | 7.2            | (5.1 - 9.3)  | 295,000     | 28.0           | (23.6 - 32.3) |

### Estimated Prevalence of Type 2 Diagnosed Diabetes and Obesity (age 18 years or older) by Counties in California

| County  | Type 2 Diabetes  |                |                    | Obesity          |                |                      |
|---|------------------|----------------|--------------------|------------------|----------------|----------------------|
|   | Estimated N      | Prevalence (%) | 95% CI             | Estimated N      | Prevalence (%) | 95% CI               |
| San Benito  | 3,000            | 7.4*           | (2.9 - 11.9)       | 17,000           | 41.2           | (29.0 - 53.4)        |
| San Bernardino  | 127,000          | 8.8            | (6.4 - 11.2)       | 478,000          | 33.2           | (29.3 - 37.0)        |
| San Diego   | 160,000          | 6.9            | (5.8 - 8.0)        | 512,000          | 22.1           | (20.1 - 24.0)        |
| San Francisco   | 24,000           | 3.6            | (2.0 - 5.2)        | 77,000           | 11.3           | (8.5 - 14.2)         |
| San Joaquin   | 37,000           | 7.6            | (4.6 - 10.6)       | 168,000          | 34.7           | (28.7 - 40.6)        |
| San Luis Obispo   | 11,000           | 5.3            | (3.0 - 7.6)        | 25,000           | 12.6           | (9.2 - 15.9)         |
| San Mateo   | 38,000           | 6.7            | (3.1 - 10.3)       | 94,000           | 16.6           | (12.1 - 21.0)        |
| Santa Barbara   | 14,000           | 4.7            | (2.4 - 6.9)        | 64,000           | 20.5           | (14.8 - 26.2)        |
| Santa Clara   | 79,000           | 5.8            | (4.0 - 7.6)        | 263,000          | 19.3           | (16.3 - 22.3)        |
| Santa Cruz  | 10,000           | 5.1            | (2.9 - 7.3)        | 54,000           | 27.1           | (20.0 - 34.3)        |
| Shasta  | 10,000           | 7.2            | (4.8 - 9.6)        | 35,000           | 25.7           | (20.1 - 31.3)        |
| Solano  | 22,000           | 7.1            | (3.8 - 10.4)       | 109,000          | 35.8           | (29.1 - 42.6)        |
| Sonoma  | 15,000           | 4.0            | (2.2 - 5.8)        | 80,000           | 21.5           | (16.7 - 26.3)        |
| Stanislaus  | 37,000           | 10.1           | (6.9 - 13.2)       | 112,000          | 30.1           | (24.0 - 36.3)        |
| Sutter  | 7,000            | 10.0           | (6.3 - 13.8)       | 21,000           | 30.1           | (24.1 - 36.1)        |
| Tehama, Glenn, Colusa                                     | 7,000            | 9.0            | (5.2 - 12.7)       | 32,000           | 38.2           | (30.2 - 46.2)        |
| Tulare  | 40,000           | 13.2           | (8.9 - 17.4)       | 115,000          | 38.0           | (31.5 - 44.5)        |
| Tuolumne, Calaveras, Amador, Inyo, Mariposa, Mono, Alpine | 9,000            | 5.9            | (2.8 - 9.0)        | 27,000           | 18.7           | (13.9 - 23.5)        |
| Ventura   | 37,000           | 6.0            | (4.0 - 7.9)        | 140,000          | 22.7           | (18.0 - 27.4)        |
| Yolo  | 10,000           | 6.5            | (3.9 - 9.0)        | 27,000           | 17.8           | (13.2 - 22.5)        |
| Yuba  | 6,000            | 11.8           | (6.7 - 16.8)       | 16,000           | 32.2           | (24.4 - 39.9)        |
| <b>California</b>   | <b>1,912,000</b> | <b>6.9</b>     | <b>(6.5 - 7.2)</b> | <b>6,892,000</b> | <b>24.8</b>    | <b>(32.2 - 51.2)</b> |

Abbreviations: CI, confidence interval.

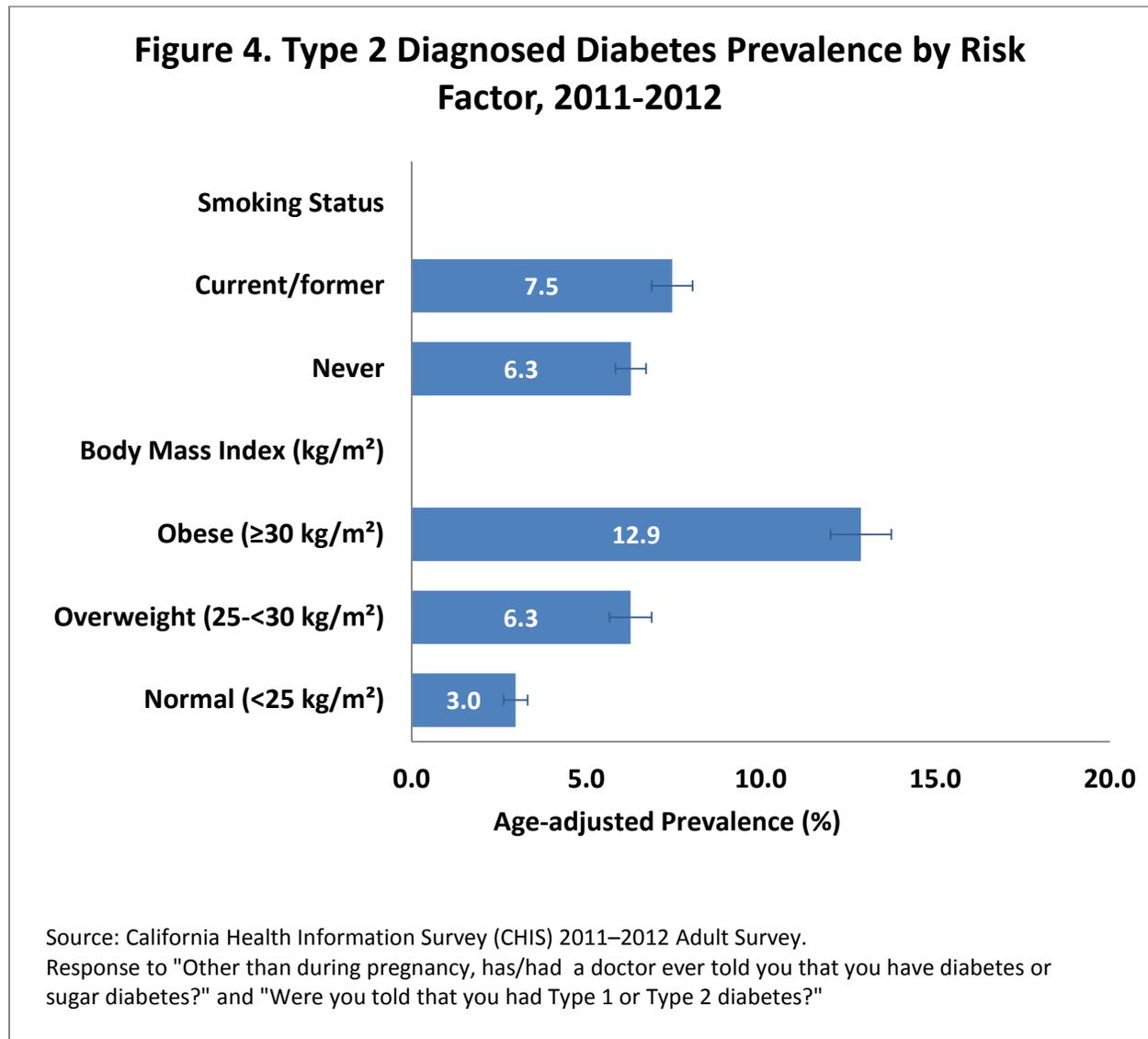
Source: California Health Information Survey (CHIS) 2011–2012 Adult Survey. Diabetes indicates response to "Other than during pregnancy, has/had a doctor ever told you that you have diabetes or sugar diabetes?" and "Were you told that you had Type 1 or Type 2 diabetes?"

Obesity based on self-reported height and weight with a calculated body mass index (BMI)  $\geq 30$  kg/m<sup>2</sup>.

\*Represents unstable estimates.

## Risk factors for type 2 diabetes

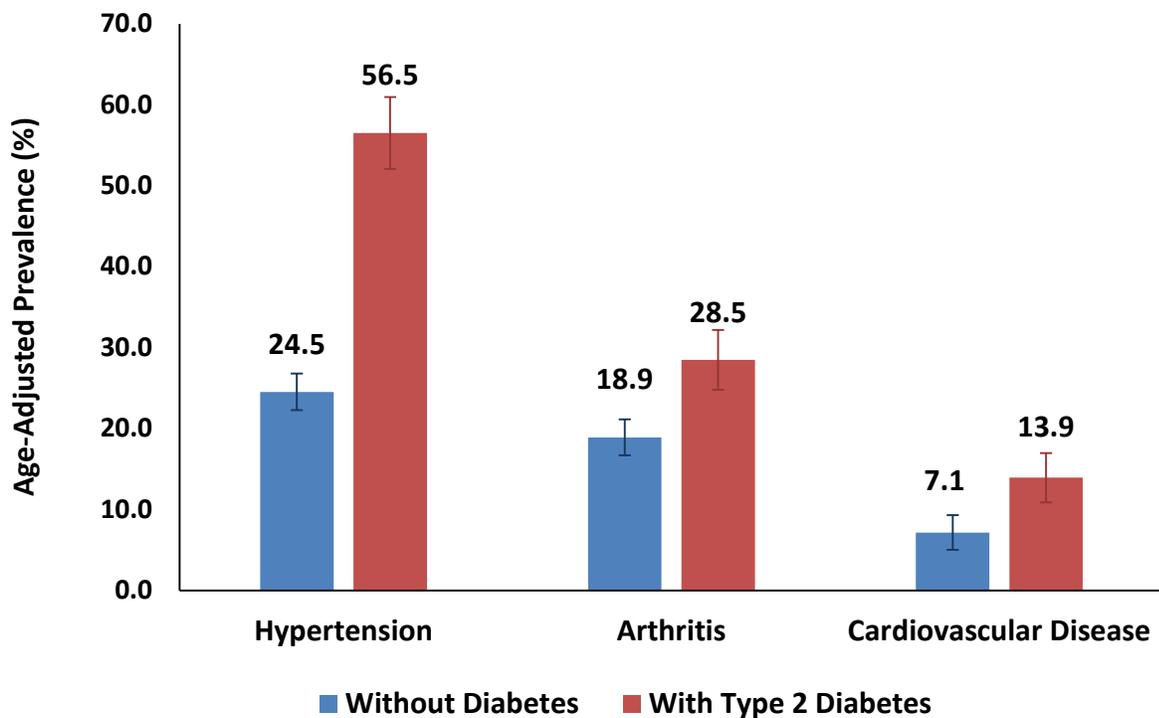
- The *Report of the Surgeon General, The Health Consequences of Smoking—50 Years of Progress*, concludes that smoking is causally linked to type 2 diabetes, and the risk of developing diabetes is 30–40 percent higher for active than nonsmokers.<sup>5</sup> In the CHIS data, current/former smokers had a slightly higher (19% higher) prevalence of diagnosed type 2 diabetes.
- Obesity is a strong risk factor for type 2 diabetes. Obese adults have a four times higher risk of type 2 diabetes compared to normal weight adults in California.



## Co-morbidities of type 2 diabetes

- Adults with type 2 diabetes more often have other health problems.
- One of every two adults with type 2 diabetes also has hypertension. This is two times higher than among those without diabetes.
- Adults with diabetes are two times more likely to have cardiovascular disease than adults without diabetes
- Adults with diabetes are 50 percent more likely to have arthritis than adults without diabetes. Arthritis may present additional barriers for adults with diabetes attempting to manage their condition through physical activity.<sup>6</sup>

**Figure 5. Prevalence of Other Health Conditions in Adults without Diabetes and with Type 2 Diabetes, 2011–2012**



Source: California Health Information Survey (CHIS) 2011–2012 Adult Survey.

Response to "Other than during pregnancy, has/had a doctor ever told you that you have diabetes or sugar diabetes?" and "Were you told that you had Type 1 or Type 2 diabetes?"

Arthritis based on "Have you ever been told by a doctor that you have some form of arthritis, gout, lupus, or fibromyalgia?"

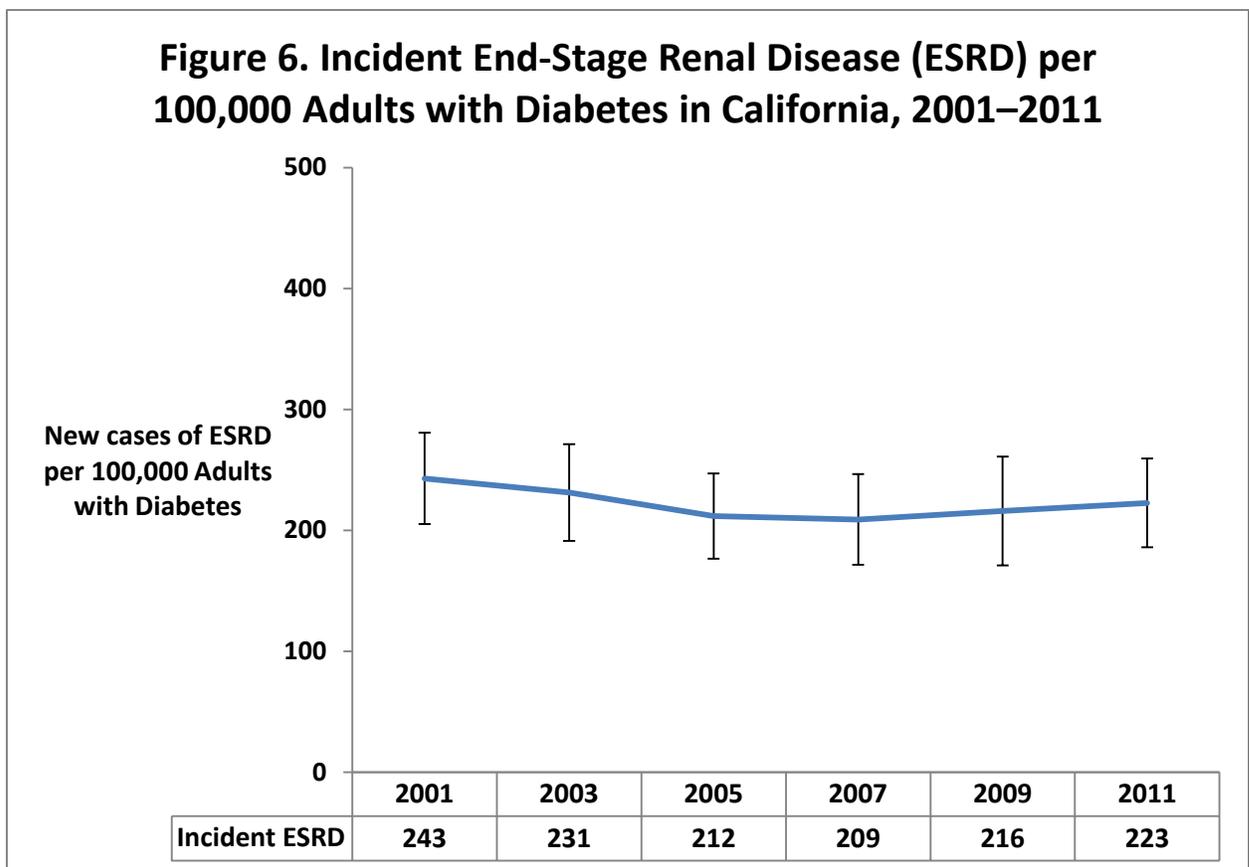
Hypertension based on "Has a doctor ever told you that you have high blood pressure?"

Cardiovascular Disease based on multiple questions: Has a doctor ever told you that you had a stroke, have any kind of heart disease, or have heart failure or congestive heart failure?

## IV. Diabetes Complications

### End-stage renal disease (kidney failure)

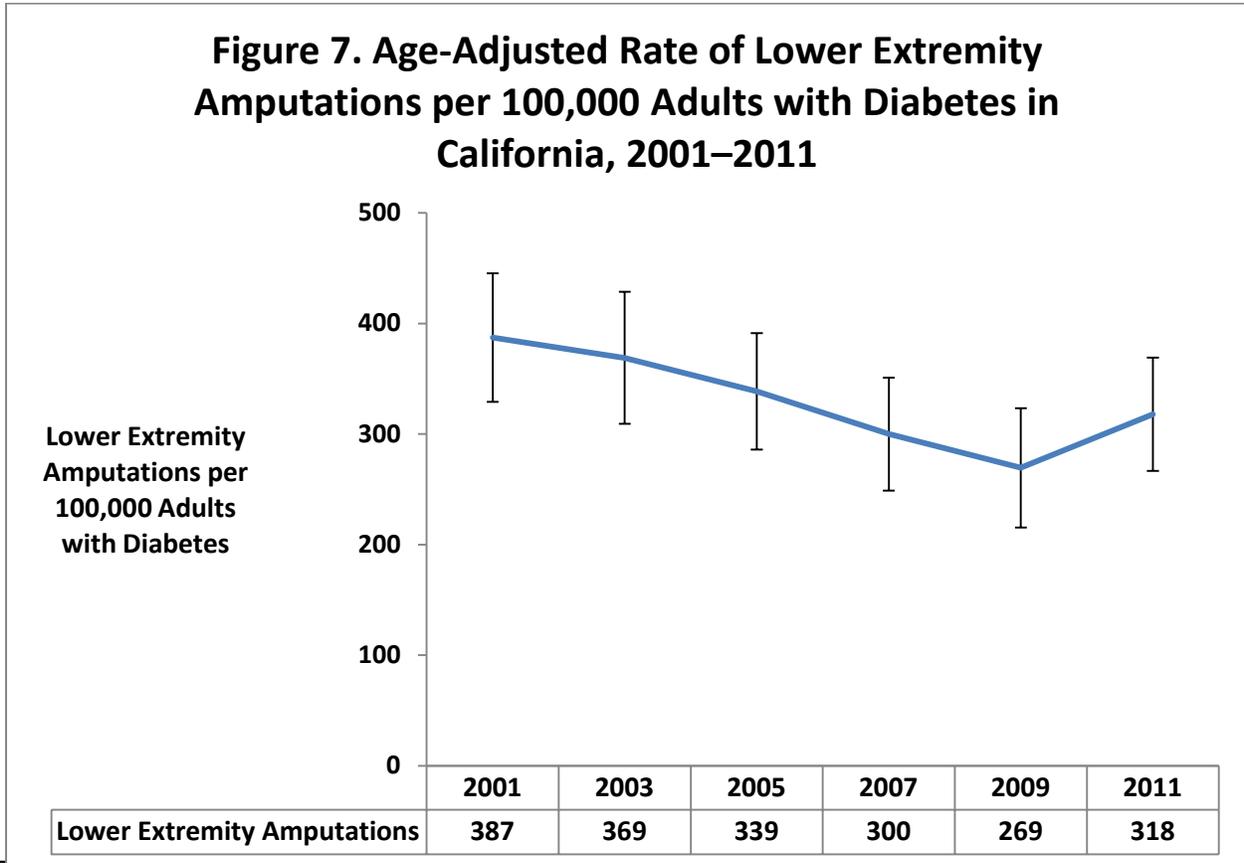
- Incident end-stage renal disease (ESRD) is when the kidneys fail. The only two treatment options are either kidney transplant or dialysis, in which a machine filters the person's blood twice each week.
- Over 40 percent of new cases of ESRD are attributed to diabetes.<sup>7</sup>
- New cases of ESRD declined slightly from 2001 to 2007, from 243 cases to 191 cases per 100,000 Californian adults with diabetes, but began to increase again after 2007.



Data source: California Office of Statewide Health Planning and Development Patient Discharge Dataset, 2001–2011.

## Amputation

- About 60 percent of all non-traumatic lower-limb amputations in adults occur in people with diabetes.<sup>1</sup>
- Lower extremity amputations declined from 2001 to 2009 among adult Californians with diabetes, similar to what is being seen in the nation overall.<sup>8</sup> This finding may suggest better medical management of diabetes and its complications.



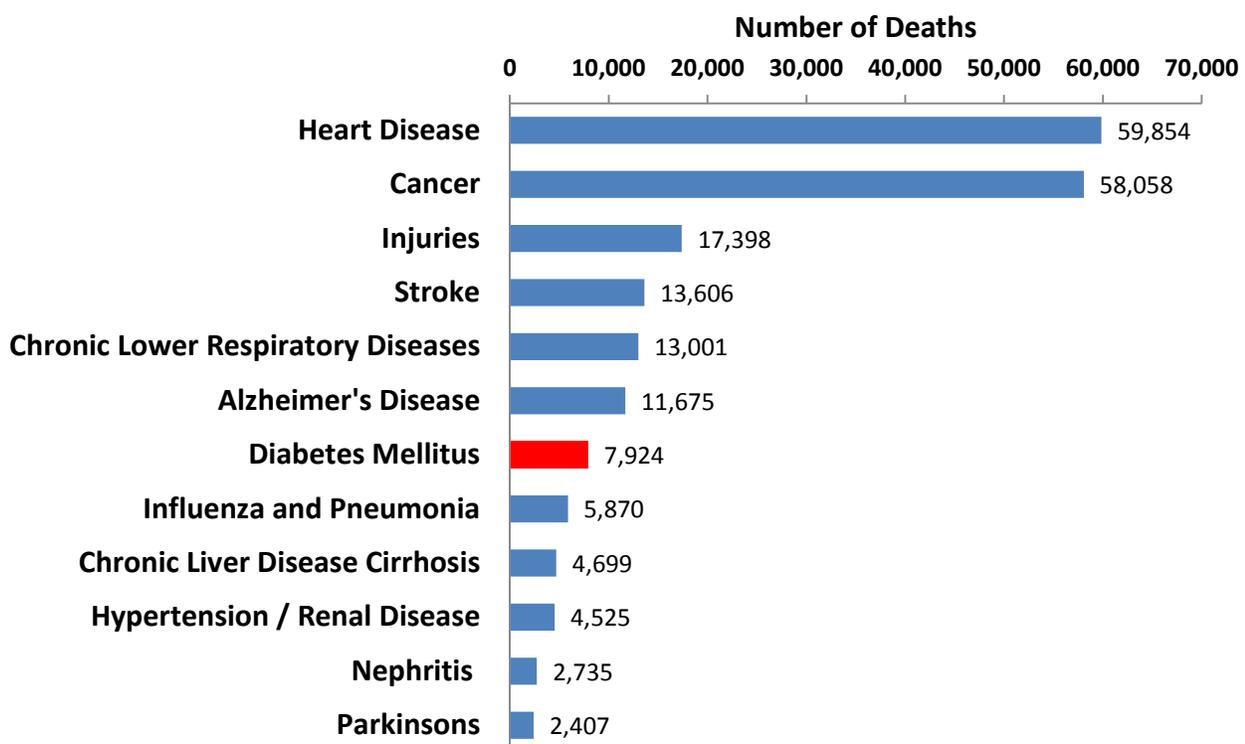
Data source: California Office of Statewide Health Planning and Development Patient Discharge Dataset, 2001–2011.

## V. Diabetes Mortality

### Overall causes of death

- Diabetes is the seventh leading cause of death in California, and determined to be the underlying cause of death in almost 8,000 people each year.
- Diabetes may be underreported as a cause of death, and is a contributing factor to many deaths from heart disease and stroke.<sup>1</sup>
- People with diabetes have shorter life expectancies: for someone age 50 or over, diabetes cuts off eight years of life.<sup>9</sup>

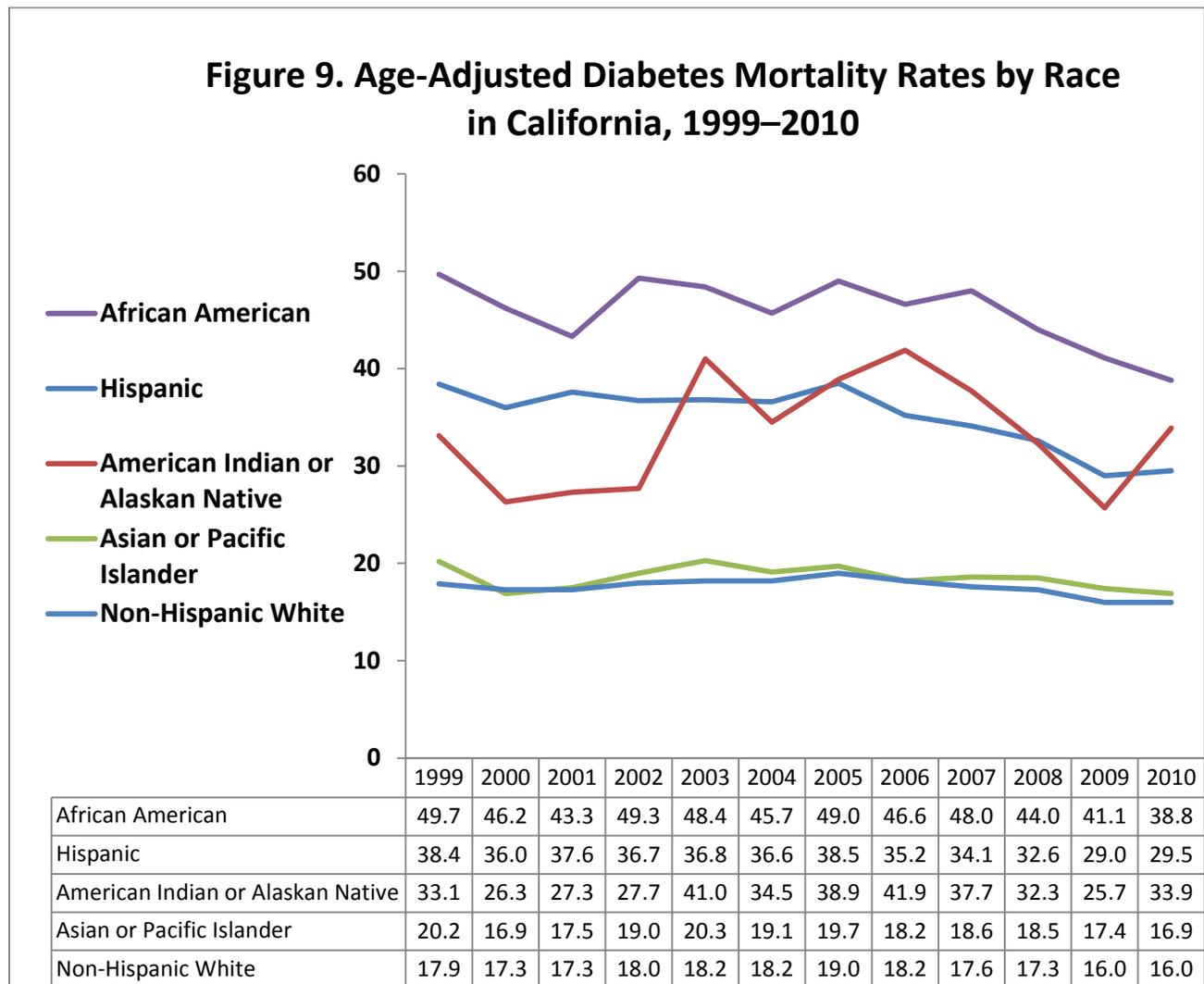
**Figure 8. Leading Causes of Death in California, 2012**



Data Source: California Death Statistical Master File.

## Diabetes mortality rates by race

- Diabetes mortality rates vary by race. In almost all years, mortality due to diabetes is two times higher among African Americans and Hispanics than among non-Hispanic Whites.
- Since 1999, diabetes mortality rates among African Americans and Hispanics have decreased significantly. In contrast, diabetes mortality rates among American Indians and Alaskan Natives have fluctuated; trends for Asian or Pacific Islander and non-Hispanic Whites have remained relatively stable over time.



Source: CDC WONDER Online Database released 2012.

## VI. Diabetes Prevention and Control Activities

### Heart Disease and Diabetes Prevention Unit

In July 2013, CDPH was awarded funding from the CDC for “State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health.” This initiative is referenced in California as “*Prevention First: Advancing Synergy for Health*” (Prevention First), and represents a new approach that promotes coordination and collaboration among state and local programs to promote health and prevent and control cardiovascular disease (CVD), diabetes, and their risk factors. CDPH has integrated these activities into the new Heart Disease and Diabetes Prevention Unit, which aims to reduce premature death and disability from CVD and diabetes. Critical to the success of these efforts are partnerships with local public health departments, voluntary associations, non-profits, health care systems, health associations and foundations, and other state agencies.

The Prevention First initiative contains a variety of activities that support the primary prevention of diabetes through the promotion of healthy eating, increased physical activity, and the prevention and control of overweight and obesity. Prevention First includes specific evidence-based strategies and goals that address diabetes prevention and management including: Prevent the onset of diabetes among those with prediabetes by:

- Promoting awareness of prediabetes among people at risk so that they may take action.
  - CDC estimates that 37 percent of adults in the U.S. have prediabetes and are at risk for developing diabetes. Most are unaware they have the condition.
- Promoting the use of, and increased access to (via reimbursement), lifestyle intervention programs in community settings modeled after CDC’s National Diabetes Prevention Program (NDPP) that can prevent or delay the onset of type 2 diabetes among people with prediabetes.
  - These programs have been shown to help people cut their risk of developing diabetes in half.<sup>10</sup>
  - Studies show that people with prediabetes who reduce their weight by 5 percent to 7 percent and do 150 minutes per week of moderate physical activity can reduce their risk of developing diabetes by 58 percent.<sup>11</sup>

Prevent or delay the onset of complications among people diagnosed with type 2 diabetes by:

- Promoting participation in and availability of American Diabetes Association (ADA)-recognized, American Association of Diabetes Educators (AADE)-accredited, state-accredited/certified, and/or Stanford licensed diabetes self-management education (DSME) programs.
- Working with health care systems to promote adoption of protocols to refer patients with diabetes to DSME programs.
- Increasing access to DSME programs via reimbursement.
- Managing the condition with healthful eating, regular physical activity, weight loss, self-management training, tobacco cessation, and medications to lower blood glucose levels.

## The California Wellness Plan

CDPH, CDCB recently released the California Wellness Plan (Plan) in February 2014. This Plan is the result of a statewide process to develop a roadmap for CDPH and its partners to promote health and eliminate preventable chronic disease in California. The overarching goal of the Plan is **Equity in Health and Wellbeing**. Its focus areas are to: (1) create communities where people can be healthy, (2) improve the quality of clinical and community care, (3) increase access to usable health information, (4) assure continued public health capacity to achieve health equity, and (5) empower communities to create healthier environments. The Plan aligns with the *Let's Get Healthy California Taskforce* (LGHCTF) priorities and includes 26 priorities and performance measures developed in 2012 that are based upon evidence-based strategies to prevent chronic disease and promote equity. The Plan contains 15 objectives specific to diabetes, including objectives to increase utilization of diabetes prevention and self-management programs, as well as broad objectives to reduce the prevalence of obesity and diabetes among children and adults. The Plan may be found on the CDPH, CDCB website at <http://www.cdph.ca.gov/programs/cdcb/>.

### Data Sources

#### California Health Interview Survey

The California Health Interview Survey (CHIS) is a representative population-based, random-digit dial, cross-sectional health survey of non-institutionalized individuals in California and covers a wide range of health topics. The survey provides statewide information on the health and health needs of the overall population in California, including many racial and ethnic groups. For the 2011–2012 CHIS, a total of 42,935 adults were surveyed. CHIS is designed to meet two sampling objectives: (1) provide estimates for 41 large and medium-size counties in California, and for groups of counties with the smallest populations; and (2) provide estimates for California’s overall population, major racial and ethnic groups, and for several smaller ethnic subgroups. Sampling weights are applied to the data files and are based on the State of California’s Department of Finance population estimates and projections, with adjustment for populations not eligible to participate in CHIS (e.g., nursing homes, prisons). The resulting weighted estimates represent one year of California’s residential population.<sup>12</sup>

Trends over time or comparisons with previous CHIS data (2001, 2003, 2005, 2007, or 2009) are not presented in this report. There are a number of cycle-specific methodological changes implemented in the 2011–2012 CHIS cycle that may impact the validity in comparing estimates over time.<sup>13</sup> Briefly, CHIS data collection was biennial from 2001 to 2009, with data collected during a 7–9 month period every other year. In 2011, CHIS changed to a continuous data collection cycle across a two-year period. The CHIS 2011–2012 data were collected between June 15, 2011, and January 14, 2013. Approximately half of the interviews were conducted during the 2011 calendar year and half during the 2012 calendar year. CHIS also updated their weighting, based on the 2010 Census; previous CHIS cycles were based on projections based on the 2000 Census. Furthermore, a larger percentage of adult interviews (22%) were collected via cell phone than in previous years. Further information on the design and methodology of CHIS may be found on their website (<http://healthpolicy.ucla.edu/chis/>).

#### California Death Statistical Master File

The California Death Statistical Master File was used for the leading causes of death analysis. The Center for Health Statistics and Informatics in CDPH compiles the Death Statistical Master File annually from death certificates of California residents. The death certificates contain the cause of death, coded using the International Classification of Diseases (ICD-10). The table below details the ICD-10 codes used.

| <b>Cause of Death</b>                   | <b>ICD-10 codes</b>                    |
|---|--|
| Heart Disease                           | I00-I09, I11, I13, I20-I51             |
| Cancer                                  | C00-C97                                |
| Injuries (Accidents, Suicide, Homicide) | U01-03, V01-Y09, Y85-Y86, Y87.0, Y87.1 |
| Stroke                                  | I60-I69                                |
| Chronic Lower Respiratory Disease       | J40-J47                                |
| Alzheimer's Disease                     | G30                                    |
| Diabetes                                | E10-E14                                |
| Influenza and Pneumonia                 | J09-J18                                |
| Chronic Liver Disease                   | K70, K73-K74                           |
| Essential Hypertension/Renal Disease    | I10, I12, I15                          |
| Nephritis                               | N00-N07, N17-N19, N25-N27              |
| Parkinson's Disease                     | G20-G21                                |

### **CDC WONDER Online Database**

The Center for Disease Control and Prevention's Wide-ranging Online Data for Epidemiologic Research (CDC WONDER) system was used to generate the age-adjusted diabetes mortality rates. The mortality data was published by the National Center for Health Statistics and CDC from the Multiple Cause of Death Files, 1999–2010, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Accessed at <http://wonder.cdc.gov/mcd-icd10.html> on June 23, 2014.

### **California Office of Statewide Health Planning and Development Patient Discharge Data**

The California Office of Statewide Health Planning and Development compiles administrative data on all patients discharged from non-Federal hospitals in California (Patient Discharge Data). Lower extremity amputations were identified with the following coding algorithm: any of the ICD-9-CM procedure codes 84.10-84.19 and no traumatic procedure codes 895.0-897.7. An ICD-9-CM diagnosis code of 250.x had to be present in any position for the amputation to be counted in the numerator of the rate for adults with diabetes.

### **United States Renal Data System**

The United States Renal Data System (USRDS) is a national data collection system that monitors individuals with end-stage renal disease (ESRD) in the United States. This system is funded by the National Institute of Diabetes, Digestive, and Kidney Diseases (NIDDK). The online application on the USRDS website, Renal Data Extraction and Referencing (RenDER) system ([http://www.usrds.org/render/xrender\\_home.asp](http://www.usrds.org/render/xrender_home.asp)), was used to determine the number of individuals in California who had incident ESRD, and how many of these individuals also had diabetes.

## California Department of Finance Population Data

Population data are from the California Department of Finance’s Demographic Research Unit. The data files are: “Total Population Only by Age and Race/Ethnicity” that provides intercensal population estimates of single years in California for the years 2000–2009;<sup>14</sup> and “Total Population Only by Race/Hispanic and Age” that provides the 2010 Census population for year 2010 and population projections in California for year 2011.<sup>15</sup>

## Statistical Methods

### Age adjustment

In this report, we age-adjusted using the direct method and the 2000 U.S. Standard Population.<sup>16</sup> Age adjustment is a calculation that allows different populations to be directly compared. Age adjustment is necessary because diabetes prevalence and mortality rates increase with age. Without age adjustment, if you compare a population with mostly young people to a population with mostly old people, the diabetes rates would be much higher in the population with mostly old people. However, it would be impossible to tell if the diabetes rate was higher because of the age of the population or due to another factor. Age adjustment essentially *adjusts* the rates so that both populations have the same distribution of old and young people, making it easier to tell if there is another factor affecting the diabetes rates aside from age.

### Confidence intervals

Confidence intervals represent the precision of an estimate. Wide confidence intervals indicate that the true parameter could fall anywhere in a wide range, and the measured value is subject to a large degree of random error. In contrast, narrow confidence intervals tell us that the true estimate falls inside a small range, and random error is less-likely to have affected the measured value. The number of individuals with the condition used to calculate the estimate directly correlates with the precision. If the estimate is based on a small number of individuals, the confidence interval will be wide. This report uses the 95-percent confidence interval indicating our level of certainty. We are 95 percent confident that the true estimate falls within the given range.

### Unstable estimates

Estimates with a coefficient of variation ( $[\text{standard error of the estimate}/\text{estimate}] * 100$ )  $\geq 30\%$  are considered unstable and should be interpreted as unreliable. An estimate is unstable if only a few respondents are represented with the specific characteristics and/or disease and (small numerator), thus, represented by a large standard error relative to the estimate.

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