Diabetes Brief

What is Diabetes?

Diabetes mellitus is a disease of abnormal carbohydrate metabolism in which the level of blood glucose, or blood sugar, is above normal. The disease occurs when the body is unable to produce or use insulin, a hormone that helps move glucose from the blood into other cells throughout the body. Untreated or uncontrolled diabetes can cause heart disease, blindness, kidney failure, and lower-extremity amputations, and can be fatal.

Diabetes was the 7th leading cause of death for all ages in 2009.[1] In 2010, approximately 26 million people in the United States had diabetes; nearly 7 million of whom were undiagnosed.[2]

There are several types of diabetes[3]:

- *Type 1 diabetes* occurs when the pancreas is completely unable to produce insulin. It occurs most often in children; in this autoimmune disease, the immune system destroys the insulin-producing cells in the pancreas. People with this type of diabetes must take insulin daily. Type 1 diabetes accounts for 5-10% of all cases of diagnosed diabetes and is not preventable.

- *Type 2 diabetes* occurs when the body cannot produce enough insulin to remove glucose from the blood, or when the body does not use its insulin properly (such as cells becoming resistant). It can occur at all ages, and is often associated with obesity. Type 2 diabetes accounts for 90-95% of all cases of diabetes and is preventable.

- *Gestational diabetes* occurs only in pregnant women and usually resolves after pregnancy. Approximately 5-10% of women with gestational diabetes remain type II diabetics post-pregnancy. Overall, women with gestational diabetes have a 35% to 60% chance of developing type II diabetes within 10-20 years of their pregnancy.

- *Pre-diabetes* occurs when glucose levels are elevated in the blood, but are not as high as someone who has diabetes.

Risk Factors for Type 2 Diabetes

Demographic Risk Factors

- *Age*
  - Type 2 diabetes is associated with older age, although it is increasingly diagnosed in children and teens.[3]
- *Family History*
  - Individuals with first degree relatives who are diabetic are at greater risk for developing diabetes. [3]

- *Race/Ethnicity*
  - Hispanic or Latino Americans, American Indians, and some Asian Americans and Native Hawaiians or Pacific Islanders are at particularly high risk for Type 2 diabetes.[3]

Social and Behavioral Risk Factors

- *Pre-diabetes*
  - Having pre-diabetes is associated with an increased risk for developing Type 2 diabetes.[3]
- *Poor Diet and Physical Inactivity*
  - Individuals with a poor diet and lack of regular physical activity are at greater risk for developing Type 2 diabetes.[3]
- *Overweight and Obesity*
  - People who are overweight and/or obese have a greater risk of developing diabetes.[3]
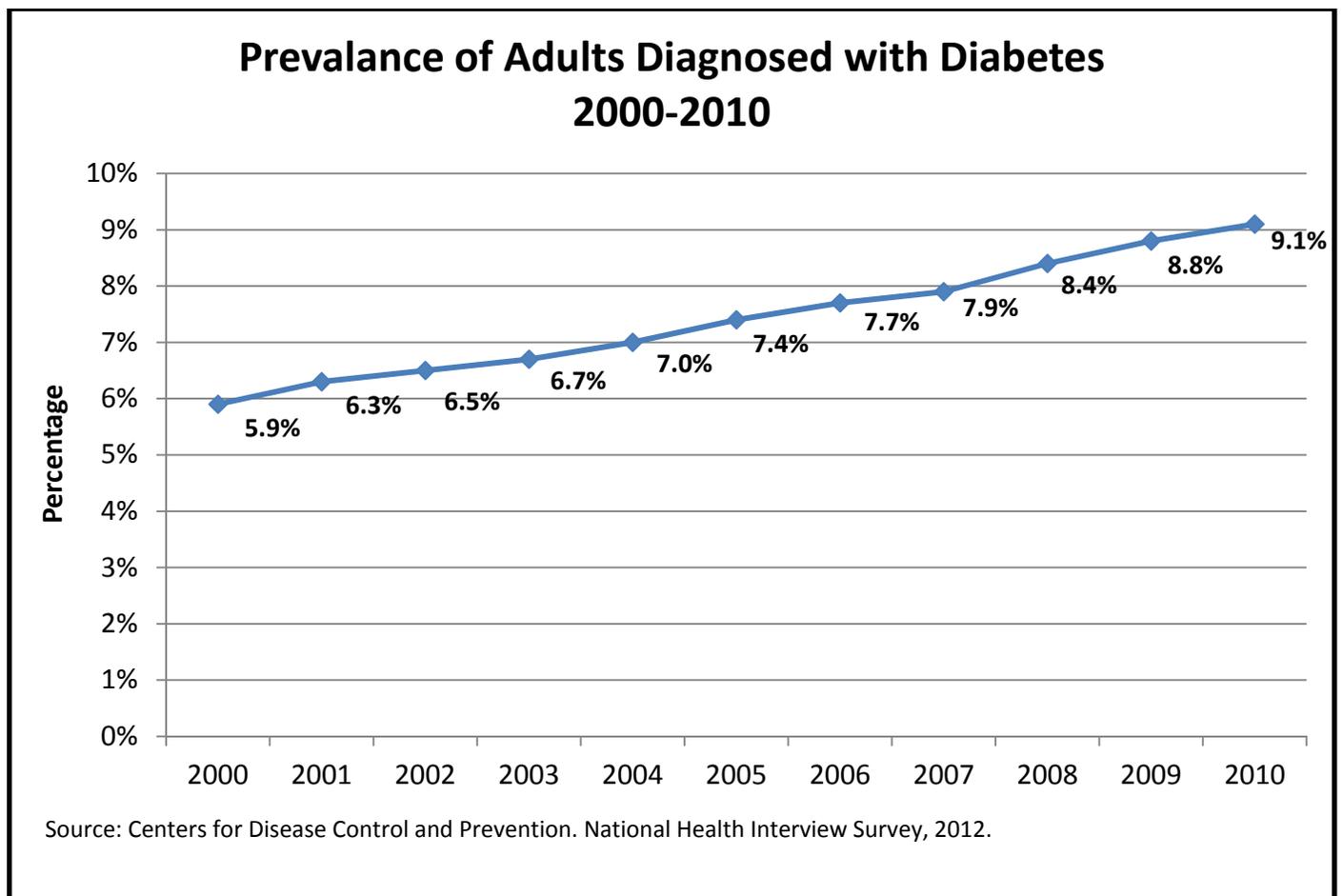
Intermediate Outcomes

Diabetes increases the risk of other diseases and is accompanied by complications beyond acute glucose elevation. Some of these include:

- *Heart Disease*
  - Heart disease death rates for diabetic adults are 2 to 4 times higher than for non-diabetics.[4]
  - Nearly two-thirds of deaths among people with diabetes are due to heart disease and stroke.[1]
- *Hypertension (High Blood Pressure)*
  - In 2009, more than half (57%) of diabetic American adults reported having high blood pressure.[5]
- *High Cholesterol*
  - In 2009, more than half (58%) of diabetic American adults reported having high cholesterol.[5]
- *Stroke*
  - In 2009, nearly 1 in 10 diabetic adults had ever had a stoke.[5]
- *Eye Disease*
  - Diabetes is the leading cause of blindness in adult Americans aged 20-74 years.[6]
  - About 1 in 3 diabetics aged 40+ have diabetic retinopathy (changes in the blood vessels of the retina).[6]
- *Periodontal Disease*
  - People with diabetes are twice as likely to have gum disease as those without diabetes.[5]
- *Kidney Disease*
  - In 2007, diabetes accounted for 44% of new end stage renal disease cases in the United States.[5]

- *Lower Extremity Conditions*
  - In 2009, there were over 820,000 hospital discharges due to a lower extremity condition among diabetics.[5]
- *Infections*
  - Diabetics are more prone to infections such as influenza or pneumonia.[2]
- *Pregnancy Complications*
  - Gestational diabetes can cause complications for the infant.[3]
 - About 35% -60% of women who have had gestational diabetes develop Type 2 diabetes 10-20 years later.[3]

National Statistics and Disparities

Statistics

Prevalance of Adults Diagnosed with Diabetes 2000-2010

Percentage

5.9% 6.3% 6.5% 6.7% 7.0% 7.4% 7.7% 7.9% 8.4% 8.8% 9.1%

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Source: Centers for Disease Control and Prevention. National Health Interview Survey, 2012.

- From 2000-2010, the percentage of American adults diagnosed with diabetes had increased to 9.1%.

Prevalence of Diabetes (Age-Adjusted)
United States, 2000-2010
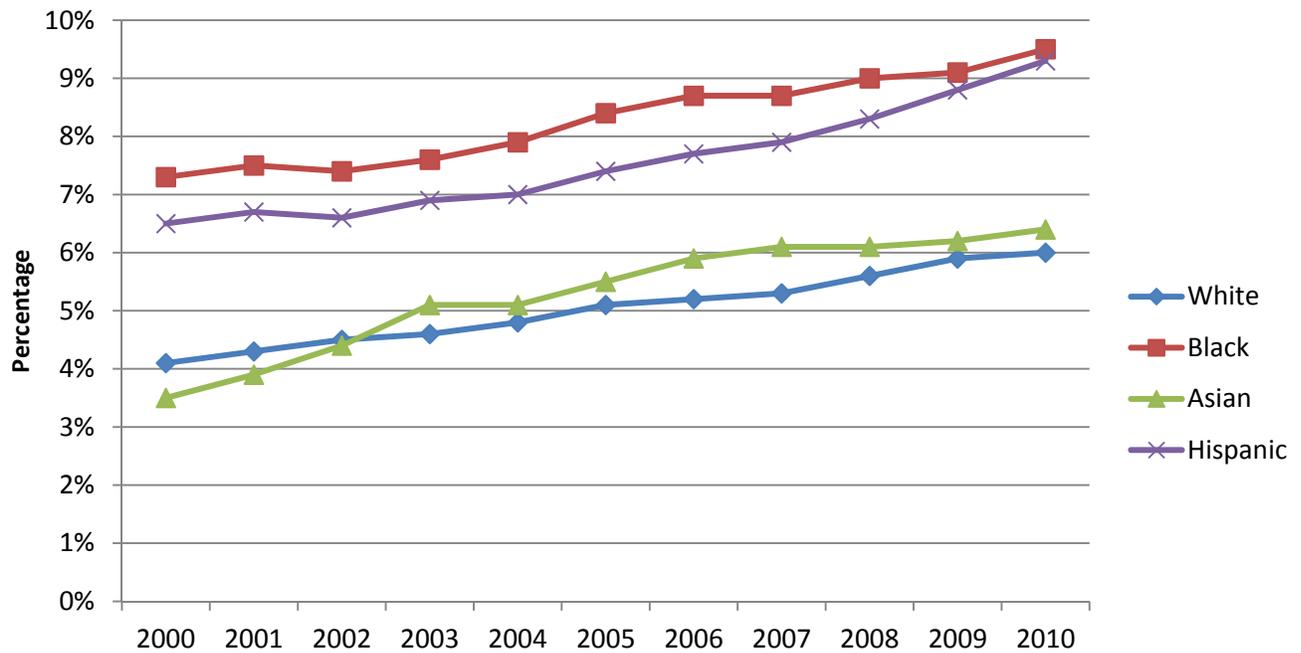
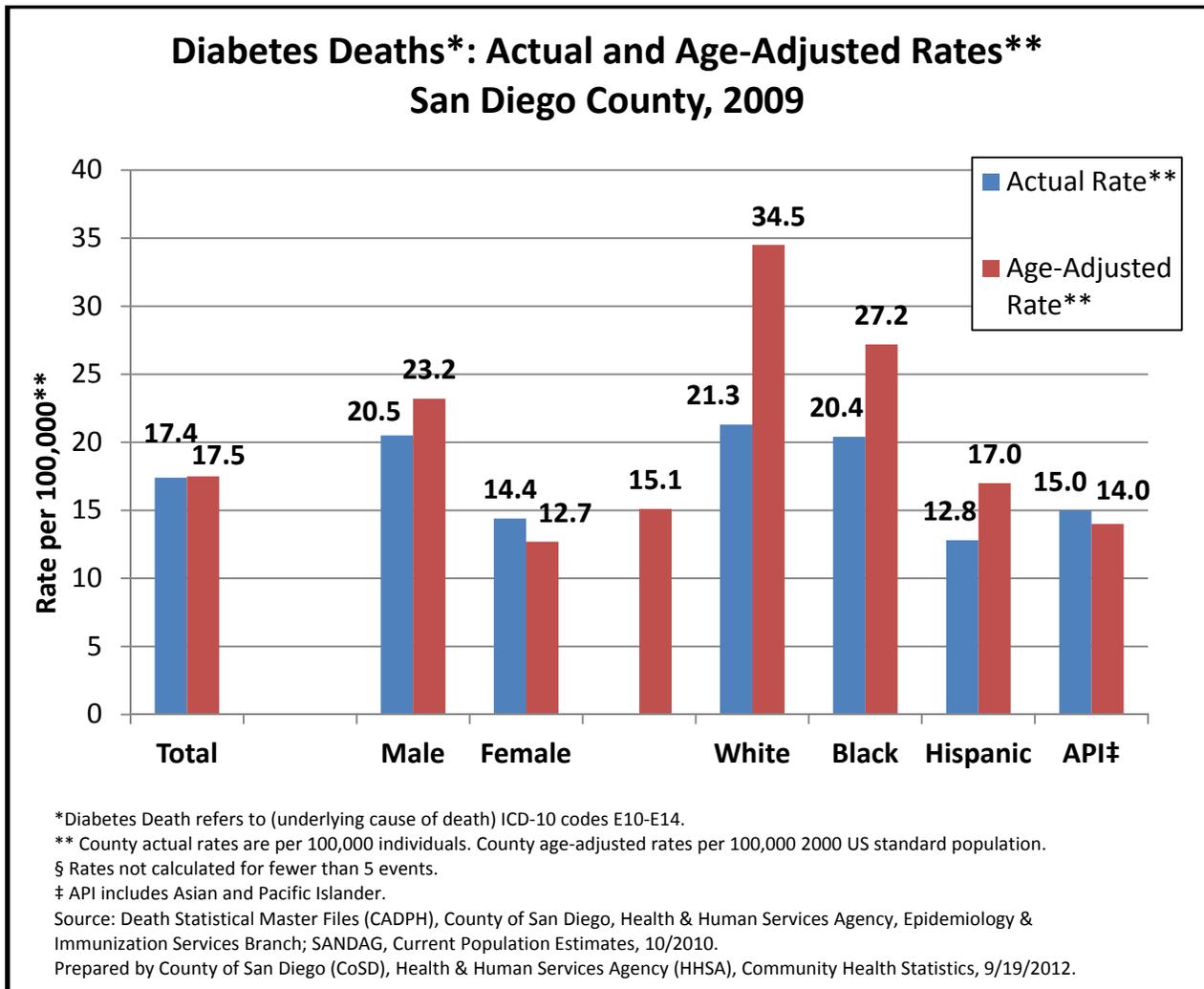Source: Centers for Disease Control and Prevention. National Health Interview Survey, 2012.

Disparities

- Compared to whites, the risk of being diagnosed with diabetes was 77% higher among blacks, 66% higher among Hispanics, and 18% higher among Asian Americans.
- In 2010, 11.3% of Americans aged 20 years and older had diabetes, and more than one-quarter (26.9%) of those aged 65 years and older had diabetes.[2]

Cost

- In 2007, the United States spent $174 billion in direct medical costs ($116 billion) and indirect costs ($58 billion) such as lost productivity and disability payments.[2]

Local Statistics and Disparities

Diabetes Deaths*: Actual and Age-Adjusted Rates**
San Diego County, 2009

*Diabetes Death refers to (underlying cause of death) ICD-10 codes E10-E14.

** County actual rates are per 100,000 individuals. County age-adjusted rates per 100,000 2000 US standard population.

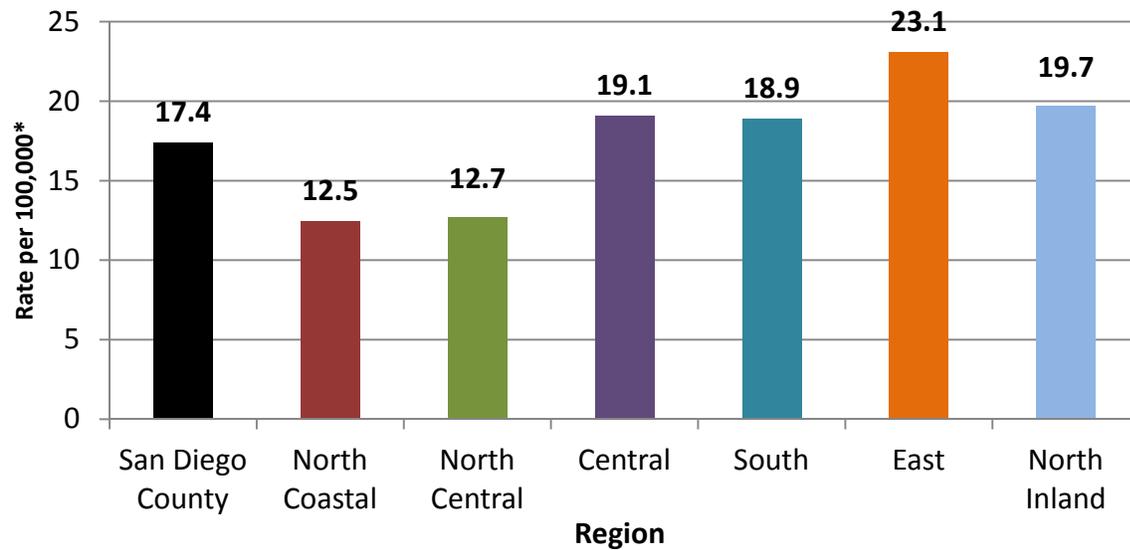§ Rates not calculated for fewer than 5 events.

‡ API includes Asian and Pacific Islander.

Source: Death Statistical Master Files (CADPH), County of San Diego, Health & Human Services Agency, Epidemiology & Immunization Services Branch; SANDAG, Current Population Estimates, 10/2010.

Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 9/19/2012.

- The diabetes death rate was 17.4 per 100,000 in 2009.
- Males had a higher death rate than females, 20.5 per 100,000 versus 14.4 per 100,000, respectively, in 2009.
- In 2009, whites and blacks had the highest rates of death due to diabetes in San Diego County.

Diabetes Death* Rates by Age Group, San Diego County, 2009**
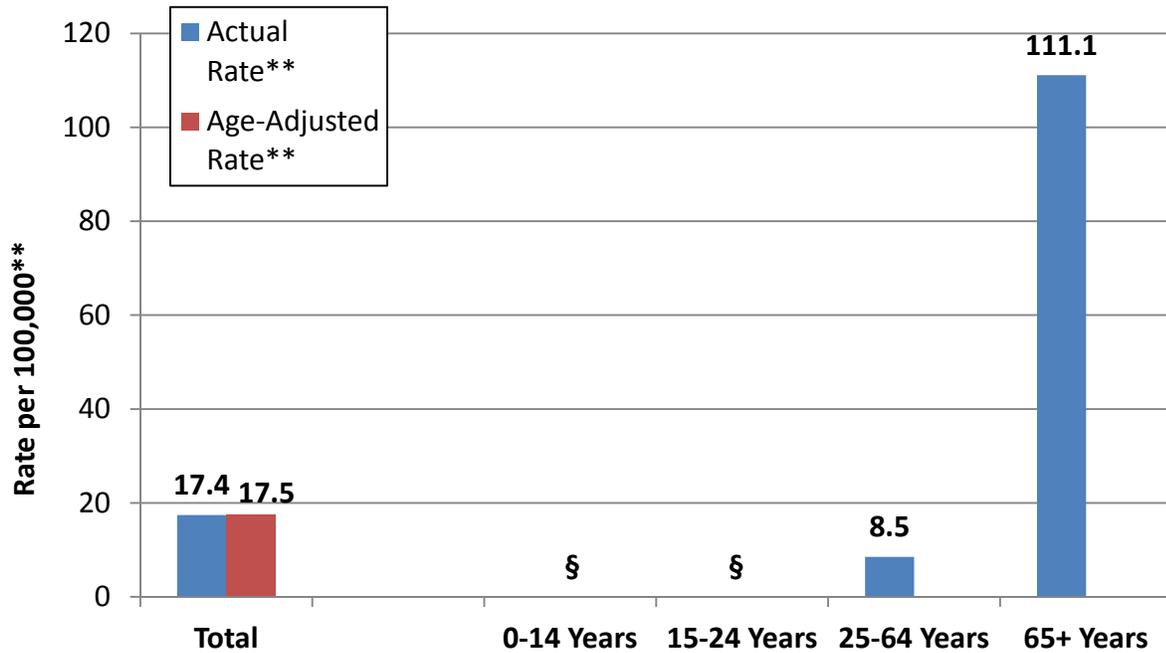
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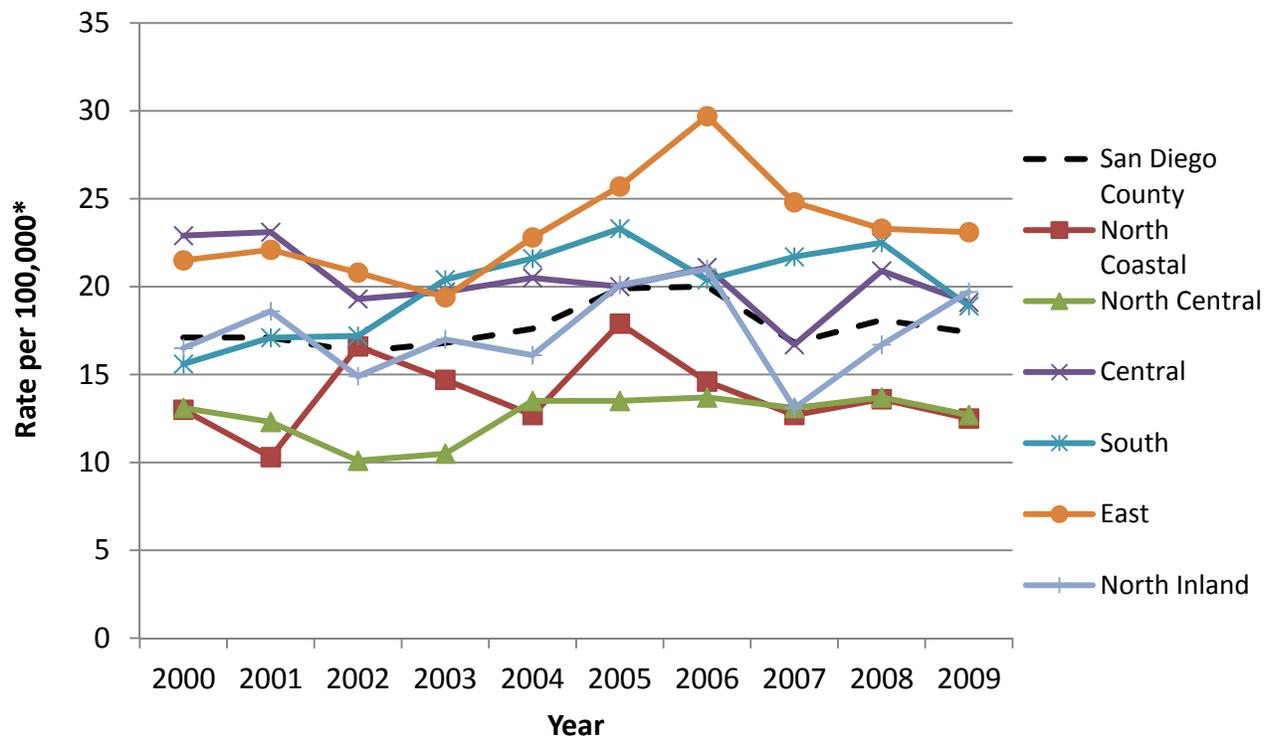** County actual rates are per 100,000 individuals. County age-adjusted rates per 100,000 2000 US standard population.
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- The diabetes death rate was highest among San Diego County residents aged 65 years and older (111.1 per 100,000), which was 13 times higher than the death rate among residents aged 25-64 years (8.5 per 100,000) in 2009.

Diabetes* Deaths: Actual Rates**
San Diego County, 2009

Rate per 100,000*

Region	Rate
San Diego County	17.4
North Coastal	12.5
North Central	12.7
Central	19.1
South	18.9
East	23.1
North Inland	19.7

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** County actual rates are per 100,000 individuals. County age-adjusted rates per 100,000 2000 US standard population.
Source: Death Statistical Master Files (CADPH), County of San Diego, Health & Human Services Agency, Epidemiology & Immunization Services Branch; SANDAG, Current Population Estimates, 10/2010.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 9/19/2012.

- In San Diego County, the East Region had the highest rate of death due to diabetes in 2009.

Diabetes Deaths*: Actual Rates
San Diego County Regions, 2000-2009

Rate per 100,000*

Legend:
- San Diego County
- North Coastal
- North Central
- Central
- South
- East
- North Inland

Year

*Diabetes Death refers to (underlying cause of death) ICD-10 codes E10-E14.
** County actual rates are per 100,000 individuals. County age-adjusted rates per 100,000 2000 US standard population.
Source: Death Statistical Master Files (CADPH), County of San Diego, Health & Human Services Agency, Epidemiology & Immunization Services Branch; SANDAG, Current Population Estimates, 10/2010.
Prepared by County of San Diego (CoSD), Health & Human Services Agency (HHSA), Community Health Statistics, 9/19/2012.

- The diabetes death rates over time vary for each Region. However, the East Region tended to have among the highest rates of diabetes death from 2000-2009.

Diabetes and Its Complications: Prevention for Individuals

- *Control Blood Sugar*
  - Decreasing glucose levels decreases the risk of complications. Every 1% decrease in blood A1C levels (an indicator of blood sugar control) decreases the risk for eye, nerve and kidney diseases by 40%.[2]
  - Blood sugar can be controlled by planning healthy meals, monitoring glucose levels frequently, and medication.
- *Control Blood Pressure*
  - Controlling blood pressure can reduce the risk of heart disease and stroke by up to 50% and can reduce the risk of neuropathy, kidney disease, and eye disease by one third.[2]
  - Blood pressure can be controlled by self-monitoring blood pressure levels, taking medications as recommended, managing stress, maintaining a healthy diet, and getting regular exercise.
- *Strive for a Healthy Weight*
  - Losing excess weight (even small weight losses can be beneficial).
  - For people with pre-diabetes, weight loss and regular exercise can reduce the onset of diabetes by more than 50% over a 3 year period.[2]
  - Weight loss can be achieved by maintaining a healthy diet and getting regular exercise.
- *Do Not Smoke*
  - Smoking raises blood pressure, which affects eye, kidney, and nerve disease.[2]
  - Smoking damages and constricts the blood vessels. This damage can worsen foot ulcers and lead to blood vessel disease and leg and foot infections.
  - Smokers with diabetes are more likely to get nerve damage and kidney disease.
- *See a Doctor Regularly to Monitor:*
  - Changes in blood glucose over time.
  - Kidney function.
    - Detecting and treating early diabetic kidney disease can reduce a decline in kidney function by 30-70%.[2]
  - Cholesterol & lipid levels.
- *Care for Feet*
  - Diabetes can damage nerves and blood vessels, resulting in reduced circulation and sensation necessary to identify injuries and infections. This can be prevented by:
    - Checking feet daily can help prevent the development of ulcers and possible amputation.
    - Protecting feet by wearing socks and comfortable, well-fitting shoes.
    - Avoiding the cold to prevent frostbite.
  - Comprehensive foot care programs can reduce amputation rates by 45-85%.[2]
- *Get Regular Dental Exams*
  - Maintain good oral health.
  - Brush and floss daily.
- *Get Yearly Eye Exams for Cataracts, Diabetes Retinopathy and Glaucoma*

- Laser surgery and appropriate follow-up care can reduce the risk of blindness by 50-60%.[2]
- People with proliferative retinopathy can reduce their risk of blindness with timely treatment and appropriate follow-up care.
- *Get Annual Influenza Vaccinations*
  - Diabetes can affect the immune system, slow healing, and lead to flu complications.

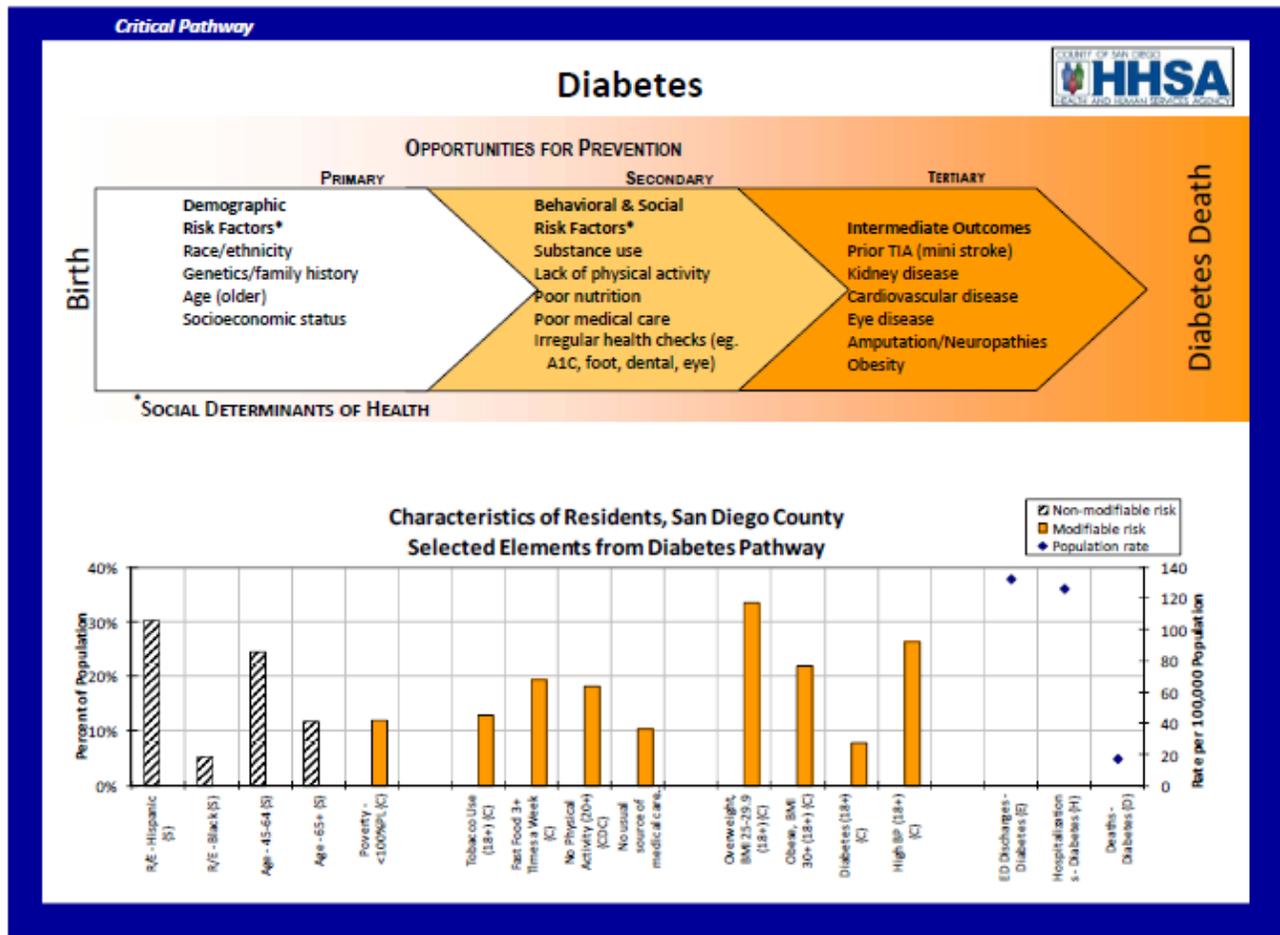**Prevention Tools for Public Health Professionals: Diabetes Critical Pathway**

There are many opportunities for public health professionals in the community to help reduce the risk of diabetes and to improve the health outcomes of individuals who already have the disease. To assist in community health efforts, a *Diabetes Critical Pathway* was developed.

The *Diabetes Critical Pathway* is a tool to be used in health promotion and disease prevention efforts. Its purpose is to identify populations at greater risk for diabetes, and to identify prevention and early intervention opportunities. The *Diabetes Critical Pathway* displays a diagram of the major risk factors and intermediate outcomes or related diseases that have an impact on, or result from, diabetes. Risk factors are marked as non-modifiable (black striped bars) such as race/ethnicity or gender and modifiable (solid colored bars) such as physical activity or high blood pressure.

Beneath the risk factors diagram is a data grid describing the San Diego resident population in relation to selected elements of the pathway. The data grid is designed to assist in quick identification of opportunities for interventions that might have a high impact on a particular disease. The data represent all San Diegans, not only those with a particular disease. The left axis (bar) indicates the percent of the population with a known risk factor or intermediate outcome. The right axis (diamond) indicates the rate of a particular medical encounter within the population that is specified. The data are described fully in the complete version of the *Critical Pathway*s.[7]

In addition, the Community Health Statistics Unit website (www.SDHealthStatistics.com) provides detailed demographic, health and facility data including maps of geographically formatted health data. Also available are links to other County data sources, state and national sites of interest. For further assistance with data or interpretation, please contact the Community Health Statistics Unit.

Diabetes Critical Pathway to Disease

Data Sources

[1] Centers for Disease Control and Prevention. National Vital Statistics Reports, Deaths: Leading Causes for 2009. http://www.cdc.gov/nchs/data/nvsr/nvsr61/nvsr61_07.pdf . Accessed January 2, 2013.

[2] Center for Disease Control and Prevention. National Diabetes Fact Sheet, 2011. http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf. Accessed January 2, 2013.

[3] Centers for Disease Control and Prevention. Basics About Diabetes. http://www.cdc.gov/diabetes/consumer/learn.htm. Last Updated September 6, 2012. Accessed January 2, 2013.

[4] Centers for Disease Control and Prevention. (2003). Self-reported heart disease and stroke among adults with and without diabetes — United States, 1999–2001. MMWR 52:1065-1070. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5244a2.htm.

[5] Centers for Disease Control and Prevention. Diabetes Data and Trends, Risk Factors for Complications. http://www.cdc.gov/diabetes/statistics/comp/fig10.htm. Last updated April 13, 2012. Accessed January 2, 2013.

[6] Centers for Disease Control and Prevention. Vision Health Initiative: Fast Facts. http://www.cdc.gov/visionhealth/basic_information/fast_facts.htm. Last Updated November 5, 2009. Accessed January 2, 2013.

[7] County of San Diego Health and Human Services Agency, Public Health Services. Community Health Statistics Unit. (2012). Critical Pathways: the Disease Continuum, Stroke. January 2012. http://www.sdcounty.ca.gov/hhsa/programs/phs/documents/CHS-Critical_Pathways_2012.pdf. Accessed September 5, 2012.