

TRENDS IN DIABETES: A REVERSIBLE PUBLIC HEALTH CRISIS

Introduction

Diabetes mellitus is a chronic condition characterized by high blood sugar levels (fasting blood sugar ≥ 126 mg/dL).¹ Diabetes has been increasing in prevalence globally and is now considered a worldwide pandemic. In 2006, the United Nations General Assembly passed a resolution recognizing diabetes as an international public health crisis.² In the US, 17.9 million people had diabetes in 2007, and an estimated 5.7 million more people had undiagnosed diabetes.³

There are several forms of diabetes, including type 1, in which the pancreas produces little or no insulin; type 2 that occurs when the body becomes resistant to the effects of insulin; and gestational diabetes, in which women without previously diagnosed diabetes develop high blood sugar during pregnancy. Type 2 currently accounts for over 90% of all diabetes cases, and has been rapidly increasing in prevalence primarily due to the concurrent worldwide rise in obesity.^{3,4} The primary risk factor for type 2 diabetes is obesity, and this impact on the diabetes pandemic is evident in a new term that reflects the link between these two public health problems: “diabesity.” Other important risk factors associated with type 2 diabetes are age, heredity, race/ethnicity, history of gestational diabetes, and physical inactivity.

Symptoms of diabetes can include blurry vision, unexplained weight loss, increased thirst, and/or increased urination.¹ In its early stages, people with diabetes may be asymptomatic. However, if left

untreated, diabetes can damage nerves and blood vessels, leading to heart disease, stroke, kidney disease, blindness, loss of sensation in extremities, and amputation.^{1,5-6}

The consequences of the diabetes pandemic are evident in LA County, where diabetes has been the 6th leading cause of death since 1997 and has also become an important cause of premature death (death before age 75) since 1999. In 2006, diabetes caused 25 deaths per 100,000 population and was the 9th leading cause of premature death.⁷ The risk of death among people with diabetes is about twice that of people without diabetes of similar age.³ Since the turn of the century (1999), death rates have declined 15-35% for 8 of the 10 leading causes of death in the County, yet there has been no change in the diabetes death rate. Furthermore, diabetes is underreported as a cause of death. Studies have found that diabetes is listed as a cause of death for only about 35-40% of people who die from the disease or its complications.⁷

Diabetes is one of the most costly medical conditions to treat. The annual direct medical costs for Americans with diabetes were estimated to be \$116 billion in 2007, while another \$58 billion were attributed to indirect costs including disability, loss of productivity, and premature mortality.³ In LA County alone, the direct medical costs of diabetes are estimated to be \$6.4 billion per year.⁸

A major contributor to the high medical

1. National Diabetes Information Clearinghouse (NDIC). *Diagnosis of Diabetes*. U.S. Department of Health and Human Services, National Institute of Health (NIH), October 2008. <http://diabetes.niddk.nih.gov/dm/pubs/diagnosis/>.

2. United Nations, General Assembly; 61st Session, Agenda Item 113: Resolution adoption by the General Assembly 61/225 World Diabetes Day. January, 2007.

3. Centers for Disease Control and Prevention. *National diabetes fact sheet: general information and national estimates on diabetes in the United States, 2007*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2008. http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2007.pdf.

4. Eckel RH, Kahn R, Robertson RM, Rizza RA. ADA/AHA Scientific Statement. Preventing Cardiovascular Disease and Diabetes. A Call to Action from the American Diabetes Association and the American Heart Association. *Circulation*. 2006;113:2943-2946.

5. Hu FB, Stamper MJ, Solomon CG, Liu S, Willett WC, Speizer FE, Nathan DM, Manson JE: The impact of diabetes mellitus on mortality from all causes and coronary heart disease in women: 20 years of follow-up. *Arch Intern Med*. 161: 1717-1723, 2001.

6. Engelgau MM, Geiss LS, Saaddine JB, Boyle JP, Benjamin SM, Gregg EW, Tierney EF, Rios-Burrows N, Mokdad AH, Ford ES, Imperatore G, Narayan KM: The evolving diabetes burden in the United States. *Ann Intern Med*. 140: 945-950, 2004.

7. Los Angeles County Department of Public Health, Office of Health Assessment and Epidemiology. *Mortality in Los Angeles County 2006: Leading causes of death and premature death with trends for 1997-2006*. September 2009.

8. Costs estimates for Los Angeles County extrapolated using data reported in: Dall TM, Zhang Y, Chen YJ, Quick WW, Yang WG, Fogli J. The economic burden of diabetes. *Health Affairs* 2010;29(2):1-7.

cost of diabetes is hospital care. In LA County, hospitalizations due to complications from diabetes increased 9.0% from 2005 to 2008 (from 22,292 hospitalizations to 24,309). This increase in hospitalizations was not uniform across racial/ethnic groups: hospitalizations among Asians/Pacific Islanders, Latinos and African Americans increased 14.2%, 10.8% and 7.5%, respectively, while hospitalizations among whites decreased by 3.5%.

Fortunately, the majority of type 2 diabetes and its precursor, prediabetes (fasting blood sugar 100-125 mg/dL), are preventable. A study among high-risk individuals showed that lifestyle interventions such as improved diet and exercise, or treatment with the oral diabetes drug metformin, reduced the development of diabetes by 58% and 31%, respectively, during a 3-year period.⁹

Who has diabetes in Los Angeles County?

The Los Angeles County Health Survey (LACHS) revealed:

- The age-adjusted¹⁰ adult diabetes rate has increased over the past 10 years from 6.6% in 1997 to 9.1% in 2007 (Table 1), affecting an estimated 650,000 adults in 2007.
- Although rates of diabetes were higher in 2007 than 1997 for all racial/ethnic groups, Asians/Pacific Islanders had the largest proportionate increase over the 10 years, from 5.9% in 1997 to 9.0% in 2007.
- In 2007, diabetes rates among Latinos (12.8%) and African Americans (11.4%) were at least twice that of whites (5.7%).
- An increase in diabetes was observed among people living in households below the federal poverty level (FPL), from 9.0% in 1997 to 14.7% in 2007, while those in households at or above FPL experienced little to no increase in the prevalence of diabetes.
- In 2007, adults living in households below

1 Percent of Adults (18+ years old) Ever Diagnosed with Diabetes,[†] LACHS 1997-2007
TABLE

	1997 (%)	1999 (%)	2002 (%)	2005 (%)	2007 (%)
Los Angeles County	6.6	7.5	7.6	8.6	9.1
Gender					
Male	6.7	7.7	7.7	8.8	9.4
Female	6.6	7.4	7.6	8.4	8.8
Age Group					
18-29	0.8	1.7	0.9	1.3	1.3*
30-39	2.8	2.9	2.1	3.3	3.6
40-49	5.1	6.1	6.0	7.0	7.0
50-64	11.6	11.8	13.4	15.2	16.8
65 and over	14.3	16.8	17.8	18.3	19.2
Race/Ethnicity					
Latino	9.5	11.3	11.4	12.3	12.8
White	4.6	5.5	5.4	5.6	5.7
African-American	10.1	9.5	9.4	12.0	11.4
Asian/Pacific Islander	5.9	5.6	5.1	7.1	9.0
Federal Poverty Level[§]					
0-99% FPL	9.0	11.1	12.7	14.0	14.7
100-199% FPL	9.0	9.2	9.1	10.2	9.1
200% or above FPL	5.3	6.1	5.8	6.5	7.1
Service Planning Area					
Antelope Valley	6.7	6.6	7.1	9.0	9.3
San Fernando	5.7	6.3	6.5	6.3	7.0
San Gabriel	7.0	7.2	6.8	7.3	8.4
Metro	6.9	7.8	7.8	11.4	10.5
West	5.3	6.1	4.3	4.7	5.1
South	11.5	9.5	11.2	14.5	13.9
East	5.7	9.3	10.1	10.5	11.8
South Bay	6.0	7.1	8.2	8.3	9.1

[§] Federal Poverty Level (FPL) thresholds are based on the US Census and at the time of interview. For example, the 2007 data were based on the 2006 FPL, which for a family of four (2 adults, 2 dependents) corresponded to annual incomes of \$20,444 (100% FPL), \$40,888 (200% FPL), and \$61,332 (300% FPL).

*Estimate is statistically unstable and should be viewed with caution.

[†] Age-adjusted percentage according to the 2000 U.S. standard population aged 18 years and older.

FPL were twice as likely to have diabetes compared to those living in households at or above 200% FPL.

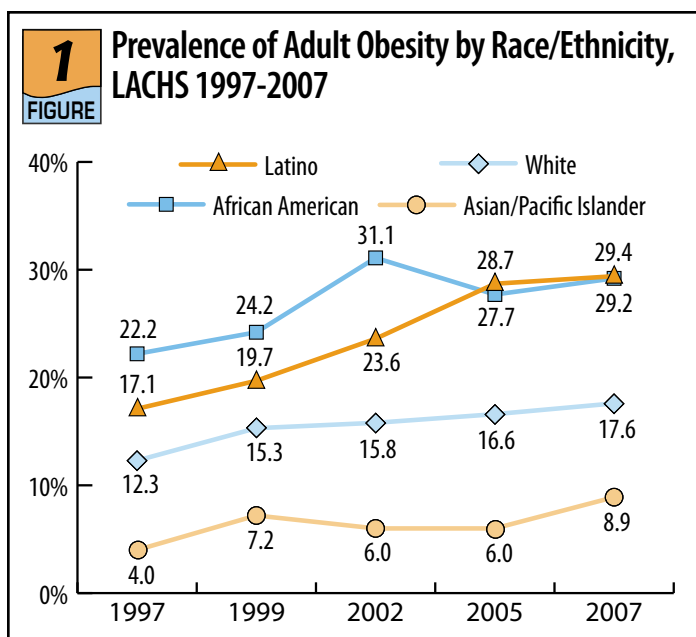
9. Knowler WC, Barrett-Conner E, Fowler SE, Hamman RF, Lachin JM, Walker EA, Nathan DM, Diabetes Prevention Program Research Group: Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002 Feb 7;346(6):393-403.

10. Certain population sub-groups can have different age distributions, so age-adjustment allows for comparisons of a condition between groups while controlling for such age differences. Results are age-adjusted and, therefore, may differ from statistics presented in other reports.

Diabetes and Obesity

Obesity is the most important modifiable risk factor for diabetes. Results from the LACHS, which calculated body-mass index (BMI)¹¹ using self-reported height and weight measurements, indicate:

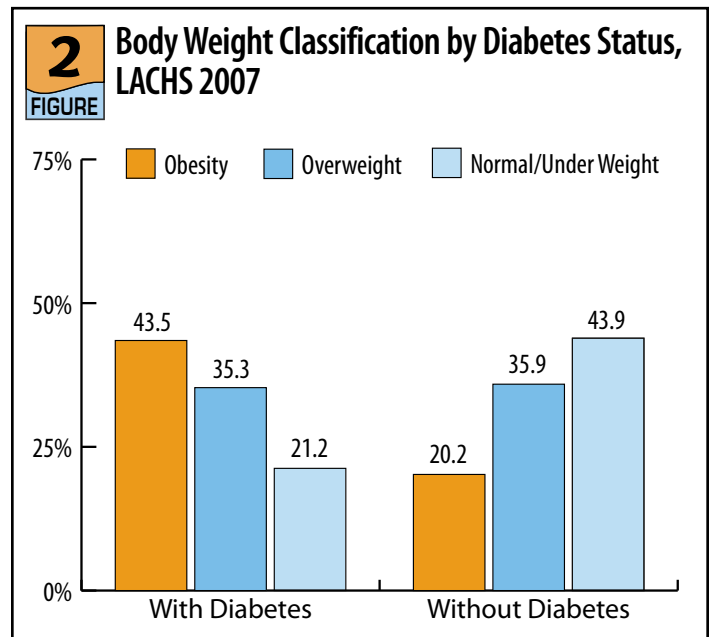
- The rate of obesity increased from 14.3% in 1997 to 22.2% in 2007, paralleling the increase in diabetes over the same time period.
- Asians/Pacific Islanders had the lowest rate of obesity in 2007, but their rate of obesity more than doubled, from 4.0% in 1997 to 8.9% in 2007 (Figure 1). When considering obesity and diabetes risk among Asians, it is important to note that increasing evidence suggests that due to differences in their body composition and fat distribution compared to other racial/ethnic groups, Asians experience increased risk for diabetes, cardiovascular disease, and death at lower BMI than do other racial/ethnic groups.^{12,13}



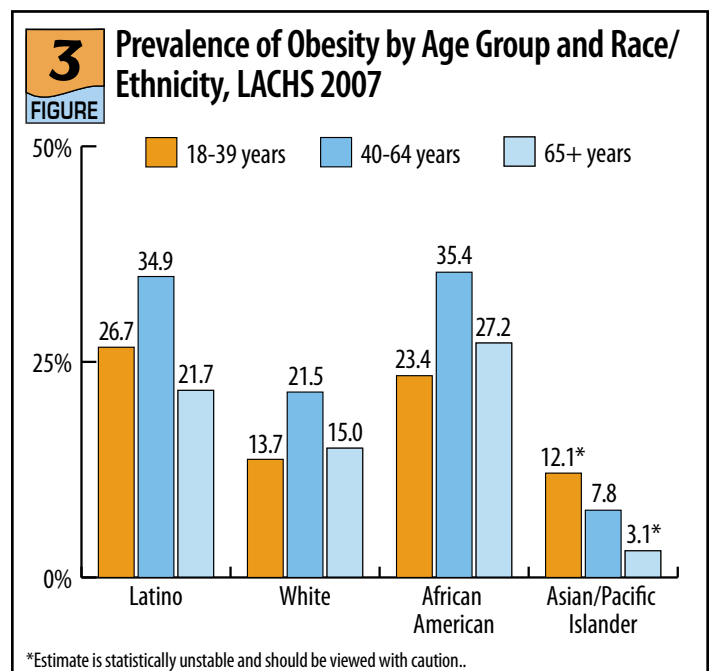
11. Weight status is based on Body Mass Index (BMI) calculated from self-reported weight and height. According to NHLBI clinical guidelines, a BMI < 18.5 is underweight, a BMI ≥ 18.5 and < 25 is normal weight, a BMI ≥ 25 and < 30 is overweight, and a BMI ≥ 30 is obese. [REFERENCE: National Heart, Lung, and Blood Institute (NHLBI) www.nhlbi.nih.gov/guidelines/obesity/ob_xsum.pdf]

12. WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet*. 2004;363:157-163.

- In 2007, the obesity rate among those with diabetes (43.5%) was more than double the obesity rate among those without diabetes (20.2%) (Figure 2).



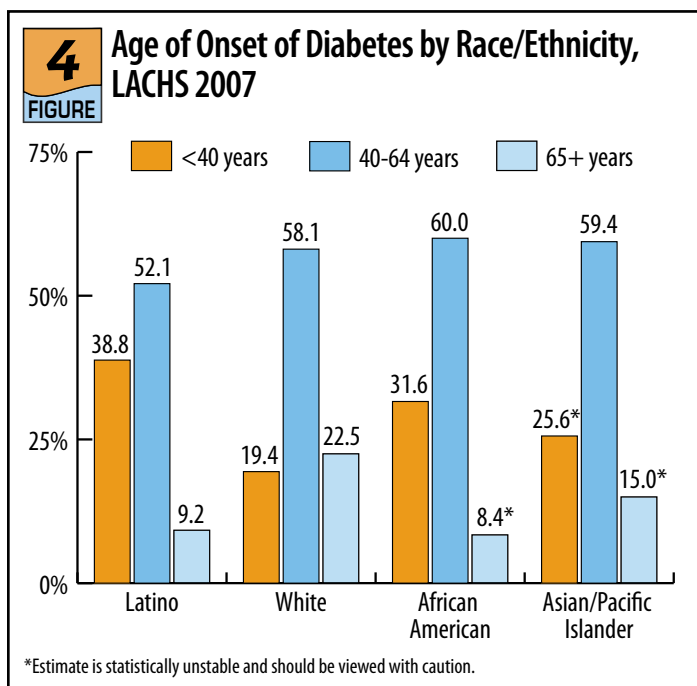
- Younger Latinos and African Americans (18-39 years) had higher rates of obesity (26.7% and 23.4%, respectively) than whites (13.7%) and Asians/Pacific Islanders (12.1%) in the same age group (Figure 3).



*Estimate is statistically unstable and should be viewed with caution..

13. Wen CP, David Cheng TY, Tsai SP, et.al. Are Asians at greater mortality risks for being overweight than Caucasians? Redefining obesity for Asians. *Public Health Nutr*. 2009;12:497-506.

- Approximately 38.8% of Latinos and 31.6% of African Americans with diabetes were diagnosed before the age of 40, compared to 25.6%* of Asians/Pacific Islanders and 19.4% of whites (Figure 4).



Diabetes, Physical Activity, and Nutrition

Physical activity and good nutrition are important modifiable health behaviors that can prevent diabetes, as well as help to control or reverse diabetes. Only 40.2% of adults diagnosed with diabetes reported meeting the recommended amount of weekly physical activity, significantly less than the 54.5% of adults without diabetes. Further, only 13.6% of adults with diabetes, and 15.3% without diabetes, reported eating five or more servings of fruits and vegetables a day. Since a healthy diet must include consistent fruit and vegetable consumption, these statistics raise concern. Limited access to high quality produce may underlie the low rate of fruit and vegetable consumption in LA County; fewer than one-third of adults with diabetes (32.4%), and only 36.3% of adults without diabetes, reported that high quality fruits and vegetables were accessible to them.

*Estimate is statistically unstable and should be viewed with caution.

14. Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2010; US Department of Agriculture (USDA) and the US Department of Health and Human Services (HHS); <http://www.cnpp.usda.gov/DGAs2010-DGACReport.htm>

What Can Be Done?

What Can Individuals Do?

To Prevent Diabetes:

- Follow a healthy meal plan of whole grains, fruits, and vegetables; low-fat dairy products and lean cuts of meat, fish, or poultry; limit foods high in salt and sugar^{14,15}
- Maintain an exercise program – be physically active 30-60 minutes on most days of the week¹⁵⁻¹⁷
- If applicable, lose excess weight through a healthy diet and increased physical activity

If You Have Diabetes:

In addition to following the recommendations above “To Prevent Diabetes”:

- Participate in an educational or support group for people with diabetes to gain knowledge, problem-solving and coping skills to successfully manage your diabetes and reduce the risk of complications¹⁵
- See your health care provider regularly and ensure that your diabetes is being treated according to current recommendations¹⁵
- Get a flu shot every year^{15,17}
- Get a dilated eye exam and complete foot exam at least once a year¹⁵
- Check your feet daily for cuts, blisters or swelling¹⁵
- Brush and floss your teeth every day to prevent problems with your teeth and gums¹⁵
- If you smoke, seek help to quit¹⁵⁻¹⁷
- Women of childbearing age should consult medical care to ensure their blood sugar is tightly controlled, to avoid serious maternal

15. American Diabetes Association. Standards of Medical Care in Diabetes – 2010. *Diabetes Care* 2010;33(suppl 1):S11-S61.

16. Guide to Community Preventive Services. www.thecommunityguide.org. Last updated: 05/24/2010.

17. Guide to Clinical Preventive Services, 2009. AHRQ Publication No. 09-IP006, September 2009. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.ahrq.gov/clinic/pocketgd.htm>.



on the web



The **American Diabetes Association (ADA)** leads the fight against the deadly consequences of diabetes and fights for those affected by diabetes, in part by funding research to prevent, cure, and manage diabetes, as well as deliver services throughout the US. www.diabetes.org

National Diabetes Information Clearinghouse (NDIC) established in 1978 to increase knowledge and understanding about diabetes among patients, health care professionals, and the general public. <http://diabetes.niddk.nih.gov>

National Diabetes Education Program (NDEP) is sponsored by the National Institute of Health (NIH) and the Centers for Disease Control and Prevention (CDC). NDEP includes over 200 partners at the federal, state, and local levels working together to improve the treatment and outcomes for people with diabetes, promote early diagnosis, and prevent or delay the onset of type 2 diabetes. www.ndep.nih.gov

The **California Diabetes Program**, funded by the Centers for Disease Control and Prevention, is a partnership between the University of California, San Francisco and the California Department of Public Health. It is a coordinating leader for stakeholders from the community, health care, policy, and environmental sectors. www.caldiabetes.org

and fetal complications in the event of a pregnancy; until then, they should employ an effective form of contraception

What Can Communities, Businesses, Schools, and Policymakers Do?

Take steps toward ensuring healthy places for physical activity. Make the easy choice the right choice:

- Incorporate health into local planning decisions
- Increase access to parks and green spaces and ensure safety in recreation areas

- Offer incentives for employers to provide, and for employees to participate in, workplace wellness programs¹⁸

Improve access to nutritious produce and products to make it easier for the public to find and choose healthier foods:

- Increase the availability of affordable, nourishing food choices at corner stores and supermarkets, especially in low-income neighborhoods¹⁶
- Promote policies that improve food quality (e.g., age-appropriate portion sizes, minimize sodium content)
- Encourage and enforce local and national menu labeling laws that require restaurants to provide nutrition information on their menus and menu boards^{16,19}

Involve schools in creating models of healthy behavior for the community:

- Implement and enforce California's state physical education requirements in K-12 instruction as part of a comprehensive school health curriculum that helps students adopt lifelong healthy lifestyle practices¹⁶
- Develop collaborations with schools (e.g., joint use arrangements) so that community members may use recreational facilities
- Implement national nutrition standards, created by the United States Department of Agriculture and the School Lunch Act, that would apply to all food sold in relation to school activities (e.g., after school programs, school fundraisers, etc.)²⁰
- Establish safe routes so that children can walk, skateboard, or bicycle to school

18. American Diabetes Association. *Health Reform Task Force Recommendations*. Alexandria, VA; 2008.

19. American Diabetes Association. *Recommendation on Menu Labeling*. American Diabetes Association Legislative Subcommittee, Alexandria, VA; 2008.

20. American Diabetes Association. *Board Approved Principles on Obesity, Physical Activity, and Nutrition in Schools*. Alexandria, VA; 2007.



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What's New in LA County?

Recently, the Los Angeles County Department of Public Health (LAC-DPH) was awarded a grant of \$15.9 million, over a two-year period, by the Centers for Disease Control and Prevention as part of the national Communities Putting Prevention to Work initiative. The project, Renew Environments for Nutrition, Exercise, and Wellness in Los Angeles County (RENEW LA County) aims to implement policy, systems, and environmental changes to improve nutrition, increase physical activity, and reduce risk factors leading to obesity. LAC-DPH will work with a broad range of communities, cities, and school partners to achieve these goals.



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For additional information about the L.A. County Health Survey, visit: www.publichealth.lacounty.gov/ha

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The Los Angeles County Health Survey is a periodic, population-based telephone survey that collects information on sociodemographic characteristics, health status, health behaviors, and access to health services among adults and children in the county. The 2007 survey collected information on a random sample of 7,200 adults and 5,728 children. The survey was conducted for the Los Angeles County Department of Public Health by Field Research Corporation and was supported by grants from First 5 LA, the Tobacco Control and Prevention Program, the Emergency Preparedness and Response Program and various Department of Public Health programs.