NHANES to 2007 resident population estimates. The percentage of the population with diabetes aged 60 years or older is this estimated number divided by the estimated 2007 U.S. resident population aged 60 years or older.

Men and women
The 2007 estimated number of men and women aged 20 years or older with diabetes is the sum of the sex-specific numbers derived by applying age-race-sex–specific estimates of total diabetes prevalence (both diagnosed and undiagnosed diabetes) from the 2003–2006 NHANES to 2007 resident population estimates. The percentage of men and women with diabetes are these estimated numbers divided by the sex-specific estimated 2007 U.S. resident population aged 20 years or older.

Non-Hispanic whites and non-Hispanic blacks
The 2007 estimated numbers of non-Hispanic whites and the number of non-Hispanic blacks aged 20 years or older with diabetes are the sums of the non-Hispanic race-specific numbers derived by applying non-Hispanic age-race-sex–specific estimates of total diabetes prevalence (both diagnosed and undiagnosed diabetes) from the 2003–2006 NHANES to 2007 resident population estimates. The percentages of non-Hispanic whites and non-Hispanic blacks with diabetes are these estimated numbers divided by the non-Hispanic race-specific estimates of the 2007 U.S. resident population aged 20 years or older.

Graph of prevalence by age group
The age-specific prevalences of diagnosed and undiagnosed diabetes in people aged 20 years or older were obtained by applying age-race-sex–specific estimates of total diabetes prevalence (both diagnosed and undiagnosed diabetes) from the 2003–2006 NHANES to 2007 resident population estimates. The derived age-specific counts were then divided by the estimated 2007 U.S. resident population to obtain the 2007 age-specific percentages.

Prevalence of diagnosed diabetes in people younger than 20 years of age, United States, 2007

2004–2006 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention. Available at http://www.cdc.gov/nchs/nhis.htm.

U.S. Census Bureau, resident population estimates for 11/1/2007. Available at http://www.census.gov/popest/national/asrh/2006_nat_res.html.

Methods: The number of persons younger than 20 years of age with diagnosed diabetes in 2007 was estimated by applying the 2004–2006 NHIS prevalence estimate of diagnosed diabetes in the civilian, noninstitutionalized population younger than 20 years to the 2007 resident population estimate of this age group. The percentage of persons younger than 20 years of age with diagnosed diabetes in 2007 was assumed to be the same as the 2004–2006 NHIS estimate. Estimates of undiagnosed diabetes for persons younger than 20 years are not available.

Race and ethnic differences in prevalence of diagnosed diabetes

Acton KJ, Burrows NR, Geiss LS, Thompson T. Diabetes prevalence among American Indians and Alaska Natives and the overall population—United States, 1994–2002. MMWR Morb Mortal Wkly Rep 52(30);702–704, 2003.

Burrows NR, Geiss LS, Engelgau MM, Acton KJ. Prevalence of diabetes among Native Americans and Alaska Natives, 1990–1997: an increasing burden. Diabetes Care 23(12):1786–1790, 2000.

2004–2006 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention. Available at http://www.cdc.gov/nchs/nhanes.htm.
Indian Health Service (IHS), 2005 user population database.
Methods: All estimates presented are for persons aged 20 years or older. Rates were age-adjusted by the direct method based on the 2000 U.S. standard population. With the exception of the prevalence among American Indians and Alaska

Natives (AIANs), race/ethnicity-specific prevalences of diagnosed diabetes were calculated using the 2004–2006 NHIS (available at http://www.cdc.gov/nchs/nhis.htm). The estimated diagnosed diabetes prevalence for the Native Hawaiian and other Pacific Islander population was not included because the NHIS estimate for this group is considered unreliable due to a small sample size.

The prevalence of diagnosed diabetes among AIANs was derived from the 2005 user population database of the Indian Health Service (IHS). IHS operates a health-services system delivered directly through IHS facilities, purchased by IHS through contractual agreements with private providers, or delivered through tribally operated programs and urban Indian health programs. Approximately 60% of the nearly 3 million AIANs residing in the United States live in IHS health-care delivery areas, are eligible to receive IHS services, and use IHS medical facilities. Diabetes cases among AIANs aged 20 years or older were identified by using the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) diagnostic codes 250.0–250.9 from the IHS patient care computerized system for 2005. The patient care database includes unduplicated case reports for persons who attended an IHS service unit one or more times during 2005. Prevalence was calculated by using the AIAN population that received health-care services at IHS, tribal, or urban facilities at least once during the preceding 3 years.

Sufficient data are not available to derive estimates of the total prevalence of diabetes (both diagnosed and undiagnosed diabetes) for many U.S. minority populations. However, national estimates of diagnosed diabetes are available for some but not all minority groups to allow racial and ethnic comparisons. Resources to obtain data for minority groups at the state or local level include the Behavioral Risk Factor Surveillance System http://www.cdc.gov/brfss/stateinfo.htm and the California Health Interview Survey www.chis.ucla.edu.

See the Census glossary for the definition of U.S. racial/ethnic minority groups
http://factfinder.census.gov/home/en/epss/glossary_a.html.

Incidence of diagnosed diabetes among people aged 20 years or older, United States, 2007

2004–2006 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention. Available at http://www.cdc.gov/nchs/nhis.htm.

U.S. Census Bureau, resident population estimates for 11/1/2007. Available at http://www.census.gov/popest/national/asrh/2006_nat_res.html.

Methods: Age-specific estimates of the incidence of diagnosed diabetes in the civilian, noninstitutionalized population aged 20 years or older from the 2004–2006 NHIS were applied to 2007 estimates of the U.S. resident population without diabetes diagnosed in the past year to calculate the number of new cases of diabetes. Incidence was calculated from data on respondents' age at diagnosis and age at interview. Adults who reported being diagnosed with diabetes were asked at what age they were diagnosed. We calculated the number of years each person had been diagnosed with diabetes by subtracting the age at which they were diagnosed from their current age. Adults who had a value of zero were identified as having been diagnosed with diabetes within the last year. In addition, we assumed that half of the adults who had a value of one were classified as having been diagnosed with diabetes within the last year.

Incidence of diagnosed diabetes in people younger than 20 years of age, United States, 2002–2003

SEARCH Study Group. SEARCH for Diabetes in Youth: a multicenter study of the prevalence, incidence and classification of diabetes mellitus in youth. Control Clin Trials 25(5):458–471, 2004.

Writing Group for the SEARCH for Diabetes in Youth Study Group, Dabelea D, Bell RA, D'Agostino RB Jr, Imperatore G, Johansen JM, Linder B, Liu LL, Loots B, Marcovina S, Mayer-Davis EJ, Pettitt DJ, Waitzfelder B. Incidence of diabetes in youth in the United States. JAMA 297(24):2716–2724, 2007. Available at http://jama.ama-assn.org/cgi/content/full/297/24/2716.

Methods: SEARCH for Diabetes in Youth is a multicenter observational study to examine diabetes among children and adolescents in the United States. The youth population being studied in 8 locations throughout the United States—more than 5 million, or 6 percent, of all American children younger than 20 years—is not nationally representative. However, the SEARCH sites were selected for their ability to reach minority populations, making this study group the largest and most racially and geographically diverse group ever involved in a youth diabetes study. It entails conducting population-based ascertainment of cases of physician-diagnosed diabetes in people younger than 20 years of age (see http://www.cdc.gov/diabetes/pubs/factsheets/search.htm). New diabetes cases occurring in 2002 and 2003 were identified: a) in geographically defined populations in Ohio, Washington, South Carolina and Colorado; b) among health plan enrollees in Hawaii (Hawaii Medical Service Association, Med-Quest, Kaiser Permanente Hawaii) and California (Kaiser Permanente Southern California excluding San Diego); and c) among American Indian populations in Arizona and New Mexico. The population observed included non-institutionalized, civilian youth younger than 20 years of age in the years 2002 and 2003. The population denominator included 10,031,888 persons. Race/ethnicity-specific estimates were pooled across sites using five categories: non-Hispanic white (NHW), Hispanic (H), African American (AA), Asian-Pacific Islander (API), and American Indian (AI). The annual total number of new cases of diabetes in persons younger than 20 years of age was estimated by applying the age-, sex-, and racial/ethnic group-specific incidence estimates from SEARCH to the age-, sex-, and racial/ethnic group-specific U.S. population using bridged-race postcensal population estimates of the July 1, U.S. resident population. Data used in the bullets and the figure were derived from the *JAMA* publication listed above.

		Type 1		Type 2		Other/Unknown		All Types	
	Denominator	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
Age 0 – 9 Years									
NHW	2,821,150	23.4	(21.7 – 25.3)	0.1	(0.0 – 0.3)	0.4	(0.3 – 0.8)	24.0	(22.2 – 25.9)
AA	691,390	13.0	(10.6 – 16.0)	0.8	(0.4 – 1.9)	0.3	(0.1 – 1.1)	14.1	(11.6 – 17.2)
H	829,310	12.4	(10.2 – 15.0)	0.6	(0.3 – 1.5)	0.4	(0.1 – 1.1)	13.4	(11.1 – 16.1)
API	376,650	7.1	(4.9 – 10.3)	1.1	(0.5 – 2.8)	0.0	(0.0 – 1.1)	8.3	(5.8 – 11.7)
AI	133,598	4.9	(2.3 – 10.3)	0.0	(0.0 – 2.9)	0.2	(0.0 – 3.2)	5.1	(2.4 – 10.6)
All groups	4,852,098	18.3	(17.1 – 19.5)	0.4	(0.3 – 0.6)	0.4	(0.2-0.6)	19.0	(17.8 – 20.3)
Age 10 – 19 Years									
NHW	3,107,250	24.1	(22.4 – 25.9)	4.3	(3.6 – 5.1)	1.7	(1.3 – 2.2)	30.1	(28.2 – 32.1)
AA	743,360	15.3	(12.8 – 18.4)	20.9	(17.9 – 24.5)	3.8	(2.6 – 5.5)	40.0	(35.7 – 44.8)
H	774,192	15.1	(12.6 – 18.1)	12.7	(10.4 – 15.5)	2.7	(1.8 – 4.1)	30.5	(26.8 – 34.6)
API	403,460	7.6	(5.3 – 10.8)	17.1	(13.5 – 21.6)	1.3	(0.6 – 3.0)	26.0	(21.5 – 31.5)
AI	151,528	6.0	(3.2 – 11.4)	36.7	(28.3 – 47.7)	0.2	(0.0 – 2.9)	42.9	(33.7 – 54.7)
All groups	5,179,790	19.7	(18.5 – 20.9)	9.9	(9.1 – 10.8)	2.1	(1.7– 2.5)	31.6	(30.1 – 33.2)

Deaths among people with diabetes, United States, 2006

Heron MP, Hoyert DL, Xu J, Scott C, Tejada-Vera B. Deaths: Preliminary data for 2006. National vital statistics reports; vol 56 no 16. Hyattsville, MD: National Center for Health Statistics. 2008.

McEwen LN, Kim C, Haan M, Ghosh D, Lantz PM, Mangione CM, Safford MM, Marrero D, Thompson TJ, Herman WH; TRIAD Study Group. Diabetes reporting as a cause of death: results from the Translating Research Into Action for Diabetes (TRIAD) study. Diabetes Care 29(2):247–253, 2006.

Saydah SH, Geiss LS, Tierney E, Benjamin SM, Engelgau M, Brancati F. Review of the performance of methods to identify diabetes cases among vital statistics, administrative, and survey data. Ann Epidemiol 14(7):507–516, 2004.

Gu K, Cowie CC, Harris MI. Mortality in adults with and without diabetes in a national cohort of the U.S. population, 1971–1993. Diabetes Care 21:1138–1145, 1998.

Hu FB, Stampfer 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.

Methods: The number of deaths with diabetes as any listed cause of death among U.S. residents was obtained from the multiple cause-of-death dataset, National Center for Health Statistics, Centers for Disease Control and Prevention.

Complications of diabetes in the United States

Heart disease and stroke

Gorina Y, Lentzer H. Multiple causes of death in old age. Aging Trends, No.9. Hyattsville, MD. National Center for Health Statistics, 2008. Available at http://www.cdc.gov/nchs/data/ahcd/agingtrends/09causes.pdf.

Methods: Tables 1–2 in the above reference provide the data for the bullets on heart disease and stroke. A total of 174,130 death certificates in 2004 mentioned diabetes as a cause of death among people aged 65 years or older (Table 1). Among these 174,130 deaths, 117,810 (68%) also mentioned heart disease as a cause of death and 27,874 (16%) mentioned stroke (Table 2).

High blood pressure

Ong KL, Cheung B, Wong L, Wat N, Tan K, Lam K. Prevalence, treatment, and control of diagnosed diabetes in the U.S. National Health and Nutrition Examination Survey 1999–2004. Ann Epidemiol 18:222–229, 2008.

Blindness

Klein R, Klein BEK. Vision disorders in diabetes. In: National Diabetes Data Group, editors, Diabetes in America, 2nd ed. Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. NIH Publication No. 95-1468:293–336, 1995.

Will JC, Geiss LS, Wetterhall SF. Diabetic retinopathy [letter]. N Engl J Med 323:613, 1990.

Kidney disease

United States Renal Data System, Standard Analysis Files, 2007 [data query online]. Available at http://www.usrds.org/odr/xrender_home.asp. Accessed October 2007.

Nervous system disease
Eastman RC. Neuropathy in diabetes. In: National Diabetes Data Group, editors. Diabetes in America, 2nd ed. Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. NIH Publication No. 95-1468:339–348, 1995.

Gregg EW, Sorlie P, Paulose-Ram R, Gu Q, Eberhardt MS, Wolz M, Burt V, Curtin L, Engelgau M, Geiss L; 1999–2000 national health and nutrition examination survey. Prevalence of lower-extremity disease in the US adult population ≥40 years of age with and without diabetes: 1999– 2000 National Health and Nutrition Examination Survey. Diabetes Care 27:1591–1597, 2004.

Amputations
Centers for Disease Control and Prevention. National Diabetes Surveillance System. Available at: http://www.cdc.gov/diabetes/statistics/index.htm.

Dental disease
Tsai C, Hayes C, Taylor GW. Glycemic control of type 2 diabetes and severe periodontal disease in the US adult population. Community Dent Oral Epidemiol 30(3):182–192**,** 2002.

Personal communication from R. H. Selwitz, DDS, National Institute of Dental and Craniofacial Research, Bethesda, MD, concerning unpublished data from the third National Health and Nutrition Examination Survey, 1988–1994.

Complications of pregnancy
Personal communication from Thomas A. Buchanan, MD, Professor, Medicine, Obstetrics and Gynecology, and Physiology and Biophysics, USC Keck School of Medicine, Los Angeles, CA.

Other complications
Fishbein H, Palumbo PJ. Acute metabolic complications in diabetes. In: National Diabetes Data Group, editors. Diabetes in America, 2nd ed. Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. NIH Publication No. 95-1468:283–291, 1995.

Valdez R, Narayan KM, Geiss LS, Engelgau MM. Impact of diabetes mellitus on mortality associated with pneumonia and influenza among non-Hispanic black and white US adults. Am J Public Health 89:1715–1721, 1999.

Gregg EW, Beckles GL, Williamson DF, Leveille SG, Langlois JA, Engelgau MM, Narayan KM. Diabetes and physical disability among older U.S. adults. Diabetes Care 23(9):1272–1277, 2000.

Sinclair AJ, Conroy SP, Bayer AJ. Impact of diabetes on physical function in older people. Diabetes Care 31(2):233–235, 2008.

Preventing diabetes complications

Glucose control
Stratton IM, Adler AI, Neil HA, Matthews DR, Manley SE, Cull CA, Hadden D, Turner RC, Holman RR. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. BMJ 321(7258):405–412, 2000.

The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. N Engl J Med 329:977–986, 1993.

Nathan DM, Cleary PA, Backlund JY, Genuth SM, Lachin JM, Orchard TJ, Raskin P, Zinman B; Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications (DCCT/EDIC) Study Research Group. Intensive diabetes treatment and cardiovascular disease in patients with type 1 diabetes. N Engl J Med 353(25):2643–2653, 2005.

Blood pressure control

Curb JD, Pressel SL, Cutler JA, Savage PJ, Applegate WB, Black H, Camel G, Davis BR, Frost PH, Gonzalez N, Guthrie G, Oberman A, Rutan GH, Stamler J. Effect of diuretic-based antihypertensive treatment on cardiovascular disease risk in older diabetic patients with isolated systolic hypertension. Systolic Hypertension in the Elderly Program Cooperative Research Group. JAMA 276:1886–1892, 1996.

Hansson L, Zanchetti A, Carruthers SG, Dahlöf B, Elmfeldt D, Julius S, Ménard J, Rahn KH, Wedel H, Westerling S. Effects of intensive blood-pressure lowering and low-dose aspirin in patients with hypertension: principal results of the Hypertension Optimal Treatment (HOT) randomised trial. HOT Study Group. Lancet 351:1755–1762, 1998.

UK Prospective Diabetes Study Group. Efficacy of atenolol and captopril in reducing risk of macrovascular and microvascular complications in type 2 diabetes (UKPDS 39). BMJ 317:713–720, 1998.

Adler AI, Stratton IM, Neil HA, Yudkin JS, Matthews DR, Cull CA, Wright AD, Turner RC, Holman RR. Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes (UKPDS 36): prospective observational study. BMJ 321:412–419, 2000.

Control of blood lipids

Scandinavian Simvastatin Survival Study Group. Randomised trial of cholesterol lowering in 4444 patients with coronary heart disease: the Scandinavian Simvastatin Survival Study (4S). Lancet 344:1383–1389, 1994.

Downs JR, Clearfield M, Weis S, Whitney E, Shapiro DR, Beere PA, Langendorfer A, Stein EA, Kruyer W, Gotto AM Jr. Primary prevention of acute coronary events with lovastatin in men and women with average cholesterol levels: results of the AFCAPS/TexCAPS. Air Force/Texas Coronary Atherosclerosis Prevention Study. JAMA 279:1615–1622, 1998.

Sacks FM, Moyé LA, Davis BR, Cole TG, Rouleau JL, Nash DT, Pfeffer MA, Braunwald E.
Relationship between plasma LDL concentrations during treatment with pravastatin and recurrent coronary events in the Cholesterol and Recurrent Events trial. Circulation 97:1446–1452, 1998.

Preventive care practices for eyes, feet, and kidneys

Ferris FL 3rd. How effective are treatments for diabetic retinopathy? JAMA 269:1290–1291, 1993.

Bild DE, Selby JV, Sinnock P, Browner WS, Braveman P, Showstack JA. Lower-extremity amputation in people with diabetes. Epidemiology and prevention. Diabetes Care 12:24–31, 1989.

Litzelman DK, Slemenda CW, Langefeld CD, Hays LM, Welch MA, Bild DE, Ford ES, Vinicor F. Reduction of lower extremity clinical abnormalities in patients with non-insulin-dependent diabetes mellitus. A randomized, controlled trial. Ann Intern Med 119:36–41, 1993.

Lewis EJ, Hunsicker LG, Clarke WR, Berl T, Pohl MA, Lewis JB, Ritz E, Atkins RC, Rohde R, Raz I; Collaborative Study Group. Renoprotective effect of the angiotensin-receptor antagonist irbesartan in patients with nephropathy due to type 2 diabetes. N Engl J Med 345:851–860, 2001.

Brenner BM, Cooper ME, de Zeeuw D, Keane WF, Mitch WE, Parving HH, Remuzzi G, Snapinn SM, Zhang Z, Shahinfar S; RENAAL Study Investigators. Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy. N Engl J Med 345:861–869, 2001.

Parving HH, Lehnert H, Brochner-Mortensen J, Gomis R, Andersen S, Arner P; Irbesartan in Patients with Type 2 Diabetes and Microalbuminuria Study Group. The effect of irbesartan on the development of diabetic nephropathy in patients with type 2 diabetes. N Engl J Med 345:870–878, 2001.

Hostetter TH. Prevention of end-stage renal disease due to type 2 diabetes. N Engl J Med 345:910–912, 2001.

Lewis EJ, Hunsicker LG, Bain RP, Rohde RD. The effect of angiotensin-converting-enzyme inhibition on diabetic nephropathy. The Collaborative Study Group. N Engl J Med 329:1456–1462, 1993.

Kunz R, Friedrich C, Wolbers M, Mann JF. Meta-analysis: effect of monotherapy and combination therapy with inhibitors of the renin angiotensin system on proteinuria in renal disease. Ann Intern Med 148(1):30–48, 2008.

Estimated diabetes costs in the United States in 2007

American Diabetes Association. Economic Costs of Diabetes in the U.S. in 2007. Diabetes Care 31(3):596–615, 2008.

The estimated costs of diabetes in the United States were based on a study by the Lewin Group, Inc., for the American Diabetes Association and are 2007 estimates of both the direct (cost of medical care and services) and indirect costs (costs of short-term and permanent disability and of premature death) attributable to diabetes. This study used a specific cost-of-disease methodology to estimate the health care costs due to diabetes.