

Data Sources, References, and Methods

Treating diabetes

1999-2001 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

Methods: Type of treatment among persons with diagnosed diabetes was calculated using treatment questions from the 1999-2001 NHIS.

Prediabetes: Impaired glucose tolerance and impaired fasting glucose

The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care* 1997;20:1183-97.

Coutinho M, Gerstein HC, Wang Y, Yusuf S. The relationship between glucose and incident cardiovascular events. A meta-regression analysis of published data from 20 studies of 95,783 individuals followed for 12.4 years. *Diabetes Care* 1999;22:233-40.

Meigs JB, Nathan DM, D'Agostino RB Sr, Wilson PW; Framingham Offspring Study. Fasting and postchallenge glycemia and cardiovascular disease risk: the Framingham Offspring Study. *Diabetes Care* 2002;10:1845-50.

Smith NL, Barzilay JI, Shaffer D, Savage PJ, Heckbert SR, Kuller LH, Kronmal RA, Resnick HE, Psaty BM. Fasting and 2-hour postchallenge serum glucose measures and risk of incident cardiovascular events in the elderly: the Cardiovascular Health Study. *Arch Intern Med* 2002;162:209-16.

Third National Health and Nutrition Examination Survey (NHANES III), National Center for Health Statistics, Centers for Disease Control and Prevention.

U.S. Bureau of the Census, 2000 population estimates.

Methods: The prevalence of IGT, IFG, and prediabetes were estimated from NHANES III. Persons previously diagnosed with diabetes and persons with undiagnosed diabetes (i.e., persons without a history of diabetes but with a fasting plasma glucose of 126 or more) were excluded from the prevalence counts of IGT, IFG, and prediabetes. Persons were classified as having IGT if they had a 2 hour plasma glucose value of 140 to 199 mg/dL after an oral glucose tolerance test. Persons were classified as having IFG if they had a fasting plasma glucose of 100 to 125 mg/dl (regardless of their 2 hour plasma glucose value). Persons were classified as having prediabetes if they had IGT or IFG or both. To estimate the number of people in 2000 with these conditions, these prevalence estimates were applied to 2000 population estimates.

Prevention or delay of diabetes

Pan XR, Li GW, Hu YH, Wang JX, Yang WY, An ZX, Hu ZX, Lin J, Xiao JZ, Cao HB, Liu PA, Jiang XG, Jiang YY, Wang JP, Zheng H, Zhang H, Bennett PH, Howard BV. [Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance](#). The Da Qing IGT and Diabetes Study. *Diabetes Care* 1997;20:537-44.

Tuomilehto J, Lindstrom J, Eriksson JG, Valle TT, Hamalainen H, Ilanne-Parikka P, Keinanen-Kiukaanniemi S, Laakso M, Louheranta A, Rastas M, Salminen V, Uusitupa M; Finnish Diabetes Prevention Study Group. [Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance](#). *N Engl J Med* 2001;344:1343-50.

Diabetes Prevention Program Research Group. Diet and exercise dramatically delay type 2 diabetes. [Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin](#). *N Engl J Med* 2002;346:393-403.

Chiasson JL, Josse RG, Gomis R, Hanefeld M, Karasik A, Laakso M. for the STOP-NIDDM Trial Research Group. Acarbose for prevention of type 2 diabetes mellitus: the STOP-NIDDM randomised trial. *Lancet* 2002;359:2072-7.

Prevention of complications of diabetes

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*

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* 1993;329:977-86.

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* 1996;276:1886-92.

Hansson L, Zanchetti A, Carruthers SG, Dahlof B, Elmfeldt D, Julius S, Menard 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* 1998;351:1755-62.

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* 1998;317:713-20.

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 2000;321:412-9.

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 1994;344:1383-9.

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 1998;279:1615-22.

Sacks FM, Moye 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 1998;97:1446-52.

Preventive care practices for eyes, kidneys, and feet

Ferris FL 3rd. [How effective are treatments for diabetic retinopathy?](#) JAMA 1993;269:1290-1.

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

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 1993;119:36-41.

Lewis EJ, Hunsicker LG, Clarke WR, Berl T, Pohl MA, Lewis JB, Ritz E, Atkins RC, Rohde R, Raz I for the Collaborative Study Group. [Renoprotective effect of the angiotensin-receptor antagonist irbesartan in patients with nephropathy due to type 2 diabetes](#). N Engl J Med 2001;345:851-60.

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 2001;345:861-9.

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 2001;345:870-8.

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

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* 1993;329:1456-62.

Total prevalence of diabetes in the United States, all ages, 2002

1999-2001 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

U.S. Bureau of the Census, 2002 population estimates.

Cowie CC, Rust KF, Byrd-Holt D, Eberhardt MS, Saydah S, Geiss LS, Engelgau MM, Ford ES, Gregg EW. Prevalence of diabetes and impaired fasting glucose in adults – United States, 1999-2000. *MMWR* 2003;52(35):833-837.

Methods: Age-race-sex-specific diabetes prevalence estimates from the 1999-2001 NHIS were applied to 2002 population estimates to calculate the number of diagnosed cases of diabetes. The number of persons with undiagnosed diabetes was calculated by applying age-specific estimates from NHANES 1999-2000 to 2002 population estimates. It was assumed there were no undiagnosed cases under 20 years of age because most of these cases are type 1 diabetes for which the undiagnosed period is likely to be brief. Prevalence was calculated based on the total number of people with diabetes (both diagnosed and undiagnosed).

Prevalence of diagnosed diabetes among people under 20 years of age, United States, 2002

1999-2001 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

U.S. Bureau of the Census, 2002 population estimates.

Fagot-Campagna A, Pettitt DJ, Engelgau MM, Burrows NR, Geiss LS, Valdez R, Beckles GL, Saaddine J, Gregg EW, Williamson DF, Narayan KM. [Type 2 diabetes among North American children and adolescents: an epidemiologic review and a public health perspective](#). *J Pediatr* 2000;136:664-72.

Ludwig DS, Ebbeling CB. [Type 2 diabetes mellitus in children: primary care and public health considerations](#). *JAMA* 2001;286:1427-30.

Methods: The prevalence of diagnosed diabetes was estimated by applying prevalence estimates of diabetes from the 1999-2001 NHIS to 2002 population estimates.

Total prevalence of diabetes among people aged 20 years or older, United States, 2002

1999-2001 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

U.S. Bureau of the Census, 2002 population estimates.

Cowie CC, Rust KF, Byrd-Holt D, Eberhardt MS, Saydah S, Geiss LS, Engelgau MM, Ford ES, Gregg EW. Prevalence of diabetes and impaired fasting glucose in adults – United States, 1999-2000. *MMWR* 2003;52(35):833-837.

Methods: Age-race-sex-specific diabetes prevalence estimates from the 1999-2001 NHIS were applied to 2002 population estimates to calculate the number of diagnosed cases of diabetes. The number of persons with undiagnosed diabetes was calculated by applying age-specific estimates of undiagnosed diabetes from NHANES 1999-2000 to 2002 population estimates. Prevalence was calculated based on the total number of people with diabetes (both diagnosed and undiagnosed).

Total prevalence of diabetes by race/ethnicity among people aged 20 years or older, United States, 2002

1999-2001 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

Indian Health Service (IHS), 2002 outpatient database.

2000-2002 data from the Behavioral Risk Factor Surveillance System (BRFSS), National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention.

Personal communication with Florentina R. Salvail, BRFSS coordinator, state of Hawaii.

U.S. Bureau of the Census, 2002 population estimates.

Cowie CC, Rust KF, Byrd-Holt D, Eberhardt MS, Saydah S, Geiss LS, Engelgau MM, Ford ES, Gregg EW. Prevalence of diabetes and impaired fasting glucose in adults – United States, 1999-2000. *MMWR* 2003;52(35):833-837.

Methods: Data on non-Hispanic whites, non-Hispanic blacks, and Hispanic/Latino Americans were from the NHIS. Average age-race-sex specific estimates of the prevalence of diabetes from the 1999-2001 NHIS were applied to 2002 population estimates to calculate the number of diagnosed cases of diabetes. Estimates of diagnosed diabetes among American Indians and Alaska Natives receiving care from the IHS were calculated from the 2002 IHS outpatient database. Data on residents of Hawaii and Puerto Rico were calculated from the BRFSS. For each race and ethnic group, the number of persons with undiagnosed diabetes was calculated by applying age-specific estimates from NHANES 1999-2000 to 2002 population estimates. It was assumed that rates of undiagnosed diabetes did not vary by race. Prevalence was calculated based on the total number of people with diabetes (both diagnosed and undiagnosed).

Incidence of diabetes, United States, 2002

1999-2001 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

U.S. Bureau of the Census, 2002 population estimates.

Methods: Average age-specific estimates of the incidence of self-reported diabetes among persons 20 years of age or older from the 1999-2001 NHIS were applied to 2002 estimates of the population without diagnosed diabetes to calculate the number of new cases of diabetes. Incidence was calculated from data on respondents' age at diagnosis and age at interview.

Deaths among people with diabetes, United States, 2000

Multiple cause-of-death data, National Center for Health Statistics, Centers for Disease Control and Prevention.

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 1998;21:1138-45.

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 2001;161:1717-23.

Anderson RN. Deaths: leading causes for 2000. National Vital Stat Report 2002;50(16):1-85.

Complications of diabetes in the United States

Heart disease and stroke

Geiss LS, Herman WH, Smith PJ. Mortality in non-insulin-dependent 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, 1995. NIH Publication No. 95-1468. p. 233-57.

Kuller LH. Stroke and 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, 1995. NIH Publication No. 95-1468. p. 449-56.

High blood pressure

Geiss LS, Rolka DB, Engelgau MM. Elevated blood pressure among U.S. adults with diabetes, 1988-1994. Am J Prev Med 2002;22:43-9.

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, 1995. NIH Publication No. 95-1468. p. 293-336.

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

Kidney disease

U.S. Renal Data System. USRDS 2003 Annual Data Report: Atlas of End-Stage Renal Disease in the United States. Bethesda, MD: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, 2003

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, 1995. NIH Publication No. 95-1468. p. 339-48.

Amputations

Unpublished data from the 2000-2001 National Hospital Discharge Survey, National Center for Health Statistics, Centers for Disease Control and Prevention.

Dental disease

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, 1995. NIH Publication No. 95-1468. p. 283-91.

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 1999;89:1715-21.

Cost of diabetes in the United States, 2002

Hogan P, Dall T, Nikolov P; American Diabetes Association. Economic costs of diabetes mellitus in the US in 2002. Diabetes Care 2003;26:917-32.