National Diabetes Statistics Report

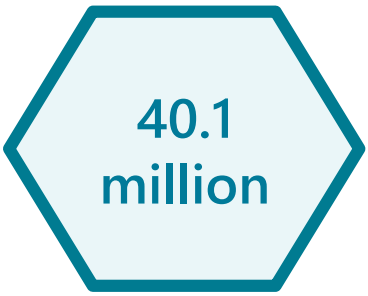
About this Report

The National Diabetes Statistics Report provides up-to-date information on the prevalence and incidence of diabetes and prediabetes, risk factors for complications, acute and long-term complications, death, and costs. This report was last updated on January 28, 2026.

Purpose & Impact

Data in the report can help focus efforts to prevent and control diabetes across the United States. This report is continually updated as data become available. This report fulfills the requirement mandated by the Catalyst to Better Diabetes Care Act of 2009 (Section 10407 of Public Law 111-148).

Fast Facts on Diabetes



Estimated number of people with diagnosed or undiagnosed diabetes in the United States, 2023

Total Diabetes

12.0%

Estimated percentage of the US population with diabetes

Prediabetes

115.2 million

Estimated number of US adults aged ≥18 years with prediabetes

Diagnosed Diabetes

29.1 million

Estimated number of people with diagnosed diabetes in the US

Including 28.8 million adults aged ≥18 years

Type 1 Diabetes

2.1 million

Estimated number of people with diagnosed type 1 diabetes in the US,

Including 1.8 million adults aged ≥20 years and 314,000 children and adolescents younger than age 20 years

Undiagnosed Diabetes

27.6%

Estimated percentage of adults aged ≥18 years with diabetes who are undiagnosed

Representing 11.0 million people

Prediabetes: ≥65 years

31.3 million

Estimated number of people aged 65 years or older (52.1%)

Diabetes Prevalence

Prevalence of Both Diagnosed and Undiagnosed Diabetes

Among the U.S. population overall, crude estimates for 2023 were:

Diagnosed and Undiagnosed Diabetes

40.1 million

People of all ages that had diabetes

12.0% of the U.S. population

39.8 million

Adults aged 18 years or older that had diabetes

14.9% of U.S. adults

11.0 million

Adults aged 18 years or older that had undiagnosed diabetes

4.0% of all U.S. adults or 27.6% of all U.S. adults with diabetes

Met laboratory criteria for diabetes were not aware or did not report having diabetes.

The percentage of adults with diabetes **increased with age**, reaching **28.8% among those aged 65 years or older**.

Age-Adjusted Prevalence of Diagnosed, Undiagnosed, and Total Diabetes Among Adults Aged 18 Years or Older, United States, 2021–2023

Characteristic	Diagnosed Diabetes Percentage (95% CI)	Undiagnosed Diabetes Percentage (95% CI)	Total Diabetes Percentage (95% CI)
Total	9.8 (8.5–11.3)	3.7 (2.9–4.7)	13.5 (12.0–15.2)

Sex			
Men	10.6 (9.4–12.0)	4.3 (3.0–6.0)	14.9 (13.2–16.8)
Women	9.1 (7.6–10.9)	3.3 (2.5–4.3)	12.4 (10.3–14.7)
Race and Ethnicity			
White, non-Hispanic	8.2 (7.0–9.6)	3.0 (2.2–4.1)	11.2 (9.4–13.2)
Black, non-Hispanic	15.6 (12.3–19.6)	5.2 (2.8–9.5)	20.7 (16.1–26.3)
Asian, non-Hispanic	7.9 (5.6–11.2)	6.6 (3.5–12.3)	14.5 (10.5–19.8)
Hispanic	12.9 (9.8–16.8)	4.2 (2.7–6.5)	17.1 (13.5–21.5)
Education			
Less than high school	16.9 (13.5–20.9)	6.3 (3.7–10.6)	23.2 (18.3–28.9)
High school	10.8 (8.6–13.5)	3.3 (2.4–4.7)	14.1 (11.6–17.2)
More than high school	8.3 (7.1–9.7)	3.7 (2.6–5.2)	12.0 (10.2–14.1)

Notes

Data Source: August 2021–August 2023 National Health and Nutrition Examination Survey.

Definitions: CI = confidence interval. Time period 2021–2023 covers August 2021 through August 2023 only.

Methodology: See detailed methods

Estimated Crude Prevalence of Diagnosed Diabetes, Undiagnosed Diabetes, and Total Diabetes Among Adults Aged 18 Years or Older, United States, 2021–2023

Characteristic	Diagnosed Diabetes Percentage (95% CI)	Undiagnosed Diabetes Percentage (95% CI)	Total Diabetes Percentage (95% CI)
Total	10.9 (9.3–12.7)	4.0 (3.3–5.0)	14.9 (13.1–16.9)
Age in Years			
18-44	2.9 (2.2–4.0)	1.7 (1.0–2.8)	4.6 (3.5–6.1)
45-64	15.5 (13.4–17.8)	5.1 (3.5–7.4)	20.6 (17.8–23.8)
≥65	21.3 (17.2–25.9)	7.5 (6.0–9.4)	28.8 (24.0–34.0)

Sex			
Men	11.4 (10.0–13.0)	4.5 (3.3–6.2)	15.9 (14.2–17.8)
Women	10.4 (8.4–12.9)	3.6 (2.8–4.5)	14.0 (11.5–16.9)
Race and Ethnicity			
White, non-Hispanic	9.8 (8.4–11.5)	3.6 (2.6–5.0)	13.4 (11.2–16.0)
Black, non-Hispanic	16.6 (12.5–21.7)	5.3 (2.8–9.8)	21.9 (16.4–28.7)
Asian, non-Hispanic	7.5 (4.7–11.7)	6.4 (3.7–10.7)	13.9 (10.6–17.9)
Hispanic	11.0 (7.2–16.6)	4.0 (2.5–6.4)	15.0 (10.2–21.5)

Notes

Data Source: August 2021–August 2023 National Health and Nutrition Examination Survey.

Definitions: CI = confidence interval. Time period 2021–2023 covers August 2021 through August 2023 only.

Footnotes: Diagnosed diabetes was based on self-report. Undiagnosed diabetes was based on fasting plasma glucose and A1C levels among people self-reporting no diabetes. Numbers for subgroups may not add up to the total because of rounding. Age-adjusted estimates are presented in Appendix Table 1.

Methodology: See detailed methods

Estimated Number of Adults Aged 18 Years or Older with Diagnosed Diabetes, Undiagnosed Diabetes, and Total Diabetes, United States, 2023

Characteristic	Diagnosed Diabetes Number in Millions (95% CI)	Undiagnosed Diabetes Number in Millions (95% CI)	Total Diabetes Number in Millions (95% CI)
Total	28.8 (24.6–32.9)	11.0 (8.8–13.1)	39.8 (35.2–44.3)
Age in Years			
18-44	3.7 (2.6–4.7)	2.1 (1.2–3.1)	5.8 (4.4–7.2)
45-64	12.6 (10.9–14.2)	4.3 (2.9–5.7)	16.9 (14.6–19.2)
≥65	12.6 (10.2–15.0)	4.5 (3.6–5.4)	17.1 (14.3–19.8)
Sex			
Men	15.0 (13.2-16.8)	6.0 (4.3–7.7)	21.0 (18.9–23.1)

Women	13.8 (11.1-16.6)	5.0 (3.9–6.0)	18.8 (15.5–22.0)
Race and Ethnicity			
White, non-Hispanic	16.2 (14.2-18.1)	6.0 (4.2–7.7)	22.2 (18.6–25.7)
Black, non-Hispanic	5.2 (3.9-6.6)	1.7 (0.7–2.7)	6.9 (5.1–8.8)
Asian, non-Hispanic	1.3 (0.8–1.8)	1.2 (0.7–1.7)	2.5 (2.0–3.1)
Hispanic	5.2 (3.2-7.2)	1.8 (1.0–2.6)	7.0 (4.7–9.4)

Notes

Data Source: August 2021–August 2023 National Health and Nutrition Examination Survey; 2023 U.S. Census Bureau data.

Definitions: CI = confidence interval. Estimated numbers for 2023 were derived from percentages for August 2021–August 2023 applied to July 1, 2023, U.S. resident population estimates from the U.S. Census Bureau.

Footnotes: Diagnosed diabetes was based on self-report. Undiagnosed diabetes was based on fasting plasma glucose and A1C levels among people self-reporting no diabetes. Numbers for subgroups may not add up to the total because of rounding.

Methodology: See detailed methods

Trends in Prevalence of Diabetes: Diagnosed, Undiagnosed, and Total

During 2001–2023, the age-adjusted prevalence of total diabetes significantly increased among U.S. adults aged 18 years or older.

- Prevalence estimates for **total diabetes were 11.2%** in 2001–2004 and **13.5%** in 2021–2023.
- **Reasons for the increase in diabetes** prevalence are likely multifaceted and **may be due in part to people living longer with diabetes** because of improvements in self-management practices, lifestyle change interventions, treatment options, and health care services.
- During this period, the **age-adjusted prevalence significantly increased for diagnosed diabetes. No significant change in undiagnosed diabetes** prevalence was found.

Trends in Age-Adjusted Prevalence of Diagnosed Diabetes, Undiagnosed Diabetes, and Total Diabetes Among Adults Aged 18 Years or Older, United States, 2001-2023

Time Period	Diagnosed Percentage (95% CI)	Undiagnosed Percentage (95% CI)	Total Percentage (95% CI)
2001-2004	7.1 (6.5–7.8)	4.1 (3.5–4.8)	11.2 (10.3–12.2)
2003-2006	7.4 (6.8–8.1)	3.8 (3.2–4.7)	11.2 (10.3–12.2)
2005-2008	7.6 (6.9–8.5)	4.2 (3.6–4.8)	11.8 (10.9–12.8)
2007-2010	7.9 (7.1–8.7)	4.4 (3.9–5.0)	12.3 (11.2–13.4)
2009-2012	8.1 (7.4–8.9)	4.0 (3.4–4.6)	12.1 (11.0–13.2)
2011-2014	8.7 (8.1–9.4)	3.7 (3.2–4.2)	12.4 (11.6–13.3)
2013-2016	9.4 (8.6–10.2)	4.1 (3.5–4.8)	13.5 (12.5–14.6)
2015-2018	9.8 (9.0–10.7)	4.3 (3.6–5.1)	14.1 (12.9–15.3)
2017-2020	10.1 (9.2–11.0)	4.0 (3.5–4.7)	14.1 (12.9–15.3)
2021-2023	9.8 (8.6–11.2)	3.7 (3.0–4.6)	13.5 (12.1–15.6)

Notes

Data Source: 2001–August 2023 National Health and Nutrition Examination Survey.

Definitions: CI = confidence interval. Diagnosed diabetes was based on self-report.

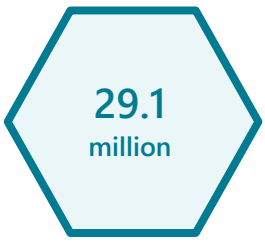
Footnotes: [a] *P* value for linear trend <0.05. Undiagnosed diabetes was based on fasting plasma glucose and A1C levels among people self-reporting no diabetes. Fasting plasma glucose values were calibrated using forward regression equations where appropriate. Overlapping, rolling estimates are presented in the table. Time period 2017-2020 covers January 2017 through March 2020 only; time period 2021-2023 covers August 2021 through August 2023 only.

Methodology: See detailed methods

Prevalence of Diagnosed Diabetes

Among the U.S. population overall, crude estimates for 2023 were:

Diagnosed Diabetes Prevalence Across Ages



People of all ages with diagnosed diabetes

8.7% of the U.S. population

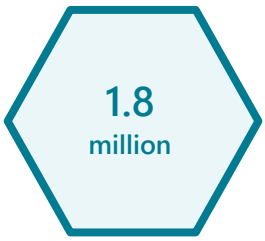


Children and adolescents younger than age 20 years with diagnosed diabetes

45 per 10,000 U.S. youths

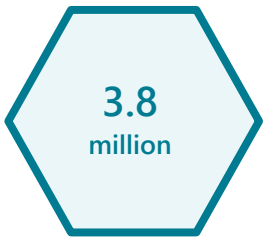
Including 314,000 with type 1 diabetes

Diagnosed Type 1 Diabetes Prevalence



Adults (20 years or older) reported having both type 1 diabetes and using insulin

6.1% of all U.S. adults with diagnosed diabetes



Adults (20 years or older) started using insulin within a year of their diagnosis

13.3% of all U.S. adults with diagnosed diabetes

Prevalence of Diagnosed Diabetes by Selected Demographics

Age-Adjusted Prevalence of Diagnosed Diabetes by Race and Ethnicity, Education Level, Family Income Level, Metropolitan Residence, and Sex Among Adults Aged 18 Years or Older, United States, 2021-2023

Characteristic	Total Percentage (95% CI)	Men Percentage (95% CI)	Women Percentage (95% CI)
Race and Ethnicity			
American Indian or Alaska Native	15.7 (12.9–18.9)	11.5 (8.2–16.0)	18.9 (15.2–23.4)
Asian, non-Hispanic, overall	9.7 (8.8–10.6)	10.8 (9.4–12.4)	8.7 (7.6–10.0)
Black, non-Hispanic	12.2 (11.5–12.9)	11.9 (10.9–12.9)	12.4 (11.5–13.4)
Hispanic, Overall	11.8 (11.1–12.5)	12.3 (11.4–13.3)	11.3 (10.4–12.3)
White, non-Hispanic	7.1 (6.9–7.4)	7.9 (7.6–8.3)	6.4 (6.1–6.7)
Education			
Less than High School	13.3 (12.5–14.1)	12.7 (11.6–13.9)	13.8 (12.6–15.0)
High School	9.9 (9.5–10.4)	10.5 (9.9–11.2)	9.5 (8.9–10.2)
More than High School	7.0 (6.8–7.2)	7.8 (7.5–8.2)	6.3 (6.0–6.6)
Family income to poverty ratio			
Less than 100% FPL	13.0 (12.1–13.8)	12.1 (10.9–13.5)	13.5 (12.4–14.7)
100%–299% FPL	10.8 (10.4–11.3)	11.8 (11.0–12.6)	10.0 (9.5–10.6)
300%–499% FPL	8.0 (7.6–8.5)	8.9 (8.2–9.6)	7.3 (6.7–7.9)
500% FPL or More	5.5 (5.2–5.8)	6.4 (6.0–6.8)	4.44 (4.1–4.9)
Metropolitan residence			
Metropolitan	8.3 (8.1–8.5)	9.0 (8.6–9.3)	7.7 (7.4–8.0)
Nonmetropolitan	10.0 (9.3–10.7)	10.2 (9.3–11.1)	9.8 (8.8–10.9)

Notes

Data Source: 2021–2023 National Health Interview Survey.

Definitions: CI = confidence interval; FPL = federal poverty level.

Methodology: See detailed methods

Prevalence of Diagnosed Diabetes by Detailed Race and Ethnicity

Among U.S. adults aged 18 years or older, crude data for 2019-2021 indicated the following:

- **Native Hawaiian or Other Pacific Islander adults** had a diagnosed diabetes prevalence of **11.7%**.
- Diagnosed diabetes prevalence estimates among **non-Hispanic Asian adults** ranged from **6.1% to 12.2%**.
- Diagnosed diabetes prevalence estimates among **Puerto Rican, Mexican or Mexican American, Dominican, and Cuban adults** ranged from **9.0% to 13.3%**. **Central American, South American, and other Hispanic, Latino, or Spanish adults** had prevalences ranging from **5.0% to 7.3%**.

Crude Prevalence of Diagnosed Diabetes by Detailed Race and Ethnicity Among Adults Aged 18 Years or Older, United States, 2019-2021

Race and Ethnicity	Total Percentage (95% CI)
American Indian or Alaska Native, non-Hispanic	16.0 (12.1–20.6)
Black, non-Hispanic	12.5 (11.6–13.4)
Native Hawaiian or Other Pacific Islander, non-Hispanic	11.7 (7.4–17.2)
Asian, non-Hispanic	9.2 (8.2–10.4)
Asian Indian, non-Hispanic	10.8 (8.3–13.7)
Chinese, non-Hispanic	7.1 (5.2–9.3)
Filipino, non-Hispanic	12.2 (9.4–15.6)
Japanese, non-Hispanic	6.8 (4.1–10.5)
Korean, non-Hispanic	6.1 (3.8–9.1)
Other Asian, non-Hispanic	8.9 (5.9–12.8)
Vietnamese, non-Hispanic	6.4 (3.7–10.0)

Hispanic	10.3 (9.4–11.1)
Central American	7.3 (5.6–9.4)
Cuban	9.0 (6.5–12.1)
Dominican	9.4 (5.9–14.2)
Mexican or Mexican American	11.1 (9.9–12.3)
Other Hispanic, Latino, or Spanish	7.2 (5.5–9.2)
Puerto Rican	13.3 (11.0–15.9)
South American	5.0 (3.3–7.1)
White, Non-Hispanic	8.5 (8.2–8.8)

Notes

Data Source: National Center for Health Statistics; 2019–2021 National Health Interview Survey.

Definitions: CI = confidence interval.

Methodology: See detailed methods

State-Level Diagnosed Diabetes Prevalence Among Adults

- Diagnosed diabetes is **prevalent across all 50 states**, the District of Columbia, and the two U.S. territories for which data are available (Guam and Puerto Rico).
- Data from **2000 to 2023 show variable trends of age-adjusted diagnosed diabetes prevalence** among U.S. adults aged 18 years and older by state.

Age-Adjusted Diagnosed Diabetes Prevalence Among U.S. Adults Aged 18 Years or Older, by State or U.S. Territory, 2000-2023

State or U.S. Territory	2023 Percentage (95% CI)	Trend, 2000-2023	Comparison to the U.S. Median
U.S. Median	10.3 (9.5–10.8)	N/A	N/A
Alabama	13.7 (12.5–15.0)	Increasing	▲*
Alaska	8.3 (7.4–9.2)	Increasing	▼*

Arizona	9.8 (9.1–10.6)	Increasing	▼
Arkansas	13.0 (11.8–14.2)	Increasing	▲*
California	10.5 (9.7–11.3)	Increasing	▲
Colorado	8.0 (7.3–8.7)	Increasing	▼*
Connecticut	8.3 (7.5–9.2)	Increasing	▼*
Delaware	11.1 (9.8–12.5)	Increasing	▲
District of Columbia	8.2 (7.1–9.4)	Constant	▼*
Florida	10.0 (9.0–11.0)	Increasing	▼
Georgia	11.4 (10.6–12.2)	Increasing	▲*
Guam	16.0 (13.6–18.9)	N/A	▲*
Hawaii	9.5 (8.6–10.5)	Increasing	▼
Idaho	8.7 (7.9–9.6)	Increasing	▼*
Illinois	10.8 (9.8–12.0)	Increasing	▲
Indiana	11.5 (10.9–12.2)	Increasing	▲*
Iowa	9.8 (9.1–10.5)	Increasing	▼
Kansas	10.3 (9.6–11.1)	Increasing	=
Kentucky	12.9 (11.6–14.2)	Increasing	▲*
Louisiana	14.5 (13.3–15.7)	Increasing	▲*
Maine	8.9 (8.3–9.6)	Increasing	▼*
Maryland	10.8 (10.1–11.6)	Increasing	▲
Massachusetts	8.5 (7.8–9.4)	Increasing	▼*
Michigan	10.7 (9.9–11.6)	Increasing	▲
Minnesota	9.3 (8.6–10.0)	Increasing	▼*
Mississippi	14.7 (13.4–16.2)	Increasing	▲*
Missouri	10.6 (9.8–11.6)	Increasing	▲
Montana	7.9 (7.2–8.7)	Increasing	▼*
Nebraska	9.6 (8.9–10.2)	Increasing	▼*
Nevada	10.6 (8.8–12.8)	Increasing	▲
New Hampshire	7.9 (7.1–8.8)	Increasing	▼*
New Jersey	9.1 (8.3–9.9)	Increasing	▼*
New Mexico	10.7 (9.1–12.5)	Increasing	▲

New York	9.3 (8.8–10.0)	Increasing	▼*
North Carolina	10.8 (9.6–12.1)	Increasing	▲
North Dakota	8.8 (8.0–9.6)	Increasing	▼*
Ohio	11.3 (10.7–12.0)	Increasing	▲*
Oklahoma	11.1 (10.3–11.9)	Increasing	▲
Oregon	9.5 (8.6–10.4)	Increasing	▼
Pennsylvania	10.0 (8.8–11.5)	Increasing	▼
Puerto Rico	16.0 (14.7–17.4)	N/A	▲*
Rhode Island	10.0 (9.0–10.9)	Increasing	▼
South Carolina	12.6 (11.8–13.4)	Increasing	▲*
South Dakota	10.5 (8.8–12.6)	Increasing	▲
Tennessee	12.7 (11.7–13.8)	Increasing	▲*
Texas	12.0 (10.9–13.3)	Increasing	▲*
Utah	8.0 (7.4–8.6)	Increasing	▼*
Vermont	7.7 (6.9–8.7)	Increasing	▼*
Virginia	10.3 (9.4–11.3)	Increasing	=
Washington	8.6 (8.2–9.0)	Increasing	▼*
West Virginia	15.0 (13.8–16.2)	Increasing	▲*
Wisconsin	9.4 (8.9–10.0)	Increasing	▼*
Wyoming	9.4 (8.5–10.5)	Increasing	▼

Notes

Data Source: US Diabetes Surveillance System; Behavioral Risk Factor Surveillance System

Definitions: CI = confidence interval

Methodology: See detailed methods

County-Level Prevalence of Diagnosed Diabetes Among Adults

Among U.S. adults aged 20 years or older, age-adjusted, county-level data indicated:

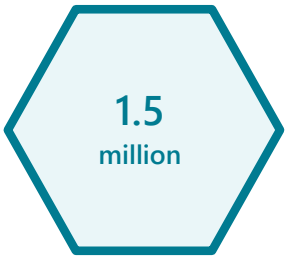
- In **2023**, estimates of **diagnosed diabetes prevalence** varied across U.S. counties, **ranging from 4.4% to 18.6%**.
- **Median county-level** prevalence of diagnosed diabetes **increased from 6.3% in 2004 to 9.3% in 2023**.

Diabetes Incidence

Incidence of Newly Diagnosed Diabetes Among Adults

Among U.S. adults aged 18 years or older, crude estimates for 2023 were:

Newly Diagnosed Diabetes



New cases of diabetes were diagnosed

6.4 per 1,000 people

Compared to adults aged 18 to 44 years, incidence rates of diagnosed diabetes were higher among adults aged 45 to 64 years and those aged 65 years and older.

Among U.S. adults aged 18 years or older, age-adjusted data for 2021-2023 indicated:

- Compared to **non-Hispanic White adults** and **Asian adults**, incidence estimates were higher for **non-Hispanic Black adults** and **Hispanic adults**.
- Incidence rates of diagnosed diabetes were higher among those with **less than high school education** and those with **high school education only** compared to adults with **more than high school education**.
- Incidence was significantly higher among adults living in **nonmetropolitan areas** compared to **metropolitan areas**.

Age-Adjusted Incidence of Diagnosed Diabetes Among Adults Aged 18 Years or Older, United States, 2021–2023

Characteristic	Rate per 1,000
Total	6.2 (5.3 – 7.3)[a]
Sex	
Men	6.0 (4.7 – 7.8)[a]
Women	6.4 (5.3 – 7.7)[a]
Metropolitan Residence	
Metropolitan	6.1 (5.5 – 6.8)[a]
Nonmetropolitan	7.6 (6.2 – 9.4)[a]
Race and Ethnicity	
Asian, non-Hispanic	8.2 (5.7 – 11.6)
Black, non-Hispanic	9.1 (7.1 – 11.5)
Hispanic	9.0 (7.3 – 11.0)
White, non-Hispanic	5.1 (4.5 – 5.7)
Education	
Less than High School	8.6 (6.7 – 11.1)
High School	7.3 (6.2 – 8.6)
More than High School	5.5 (4.9 – 6.2)

Notes

Data Source: 2021–2023 National Health Interview Survey.

Definitions: CI = confidence interval.

Footnotes: [a] Rate calculated using 2023 data only.

Methodology: See detailed methods

Estimated Crude Incidence of Diagnosed Diabetes Among Adults Aged 18 Years or Older, United States, 2021–2023

Characteristic	Incidence Estimates, 2021-2023 Rate per 1,000 (95% CI)
Total	6.4 (5.5 – 7.4)[b]
Age	
18-44	3.3 (2.4 – 4.6)[b]
45-64	10.5 (8.2 – 13.3)[b]
≥65	7.6 (5.8 – 9.8)[b]
Sex	
Men	6.2 (4.8 – 7.9)[b]
Women	6.6 (5.4 – 7.9)[b]
Race and Ethnicity	
White, non-Hispanic	5.5 (4.9 – 6.2)
Black, non-Hispanic	9.0 (7.1 – 11.6)
Asian, non-Hispanic	8.0 (5.7 – 11.4)
Hispanic	8.1 (6.7 – 10.0)

Notes

Data Source: 2021–2023 National Health Interview Survey; 2023 U.S. Census Bureau data.

Definitions: CI = confidence interval.

Footnotes: [a] Population estimates for 2023 were derived from rates for 2021–2023 applied to July 1, 2023, U.S. resident population estimates from the U.S. Census Bureau (see Detailed Methods).

[b] Rates were calculated using 2023 data only.

Methodology: See detailed methods

Estimated Number of U.S. Adults Aged 18 Years or Older with Newly Diagnosed Diabetes, United States, 2023

Characteristic	Population Estimates, 2023 Number in thousands (95% CI)
Total	1,512 (1,375 – 1,649)
Sex	
Men	748 (647 – 849)
Women	764 (672 – 856)
Race and Ethnicity	
White, non-Hispanic	794 (702 – 886)
Black, non-Hispanic	238 (178 – 298)
Asian, non-Hispanic	122 (80 – 164)
Hispanic	326 (260 – 393)
Age	
18-44	422 (342 – 503)
45-64	721 (630 – 811)
≥65	369 (306 – 432)

Notes

Data Source: 2021–2023 National Health Interview Survey; 2023 U.S. Census Bureau data.

Definitions: CI = confidence interval.

Footnotes: [a] Population estimates for 2023 were derived from rates for 2021–2023 applied to July 1, 2023, U.S. resident population estimates from the U.S. Census Bureau (see Detailed Methods).

[b] Rates were calculated using 2023 data only.

Methodology: See detailed methods

Trends in Incidence Among Adults

- Among adults aged 18 years or older, the age-adjusted incidence of diagnosed diabetes in **2000** and **2023** was **6.2 per 1,000 adults**.

- A **significant decreasing trend** in incidence was detected from 2008 until 2020.
- After 2020, there was a suggested increase in incidence that was **not statistically significant**.

Trends in Age-Adjusted Incidence of Diagnosed Diabetes Among Adults Aged 18 Years or Older, United States, 2000–2023

Year	Incidence Rate (per 1,000)	95% CI Lower	95% CI Upper
2000	6.2	5.4	7.2
2001	7.5	6.6	8.4
2002	7.5	6.6	8.6
2003	8.0	6.9	9.2
2004	7.3	6.3	8.5
2005	7.8	6.8	8.9
2006	7.7	6.6	9.0
2007	7.9	6.8	9.1
2008	8.4	7.2	9.9
2009	9.3	7.5	11.5
2010	7.7	6.6	9.0
2011	7.4	6.5	8.5
2012	6.9	6.0	7.9
2013	6.8	5.8	7.9
2014	6.4	5.6	7.4
2015	6.3	5.4	7.4
2016	6.8	5.9	7.9
2017	5.8	4.8	7.1
2018	6.7	5.7	8.0
2019	5.7	4.9	6.7
2020	5.0	4.2	5.9
2021	5.8	4.9	6.7
2022	7.1	6.0	8.2
2023	6.2	5.3	7.3

Notes

Data Source: 2000–2023 National Health Interview Survey.

Footnotes: Data shown are incidence rates (solid blue line) and 95% confidence intervals (shaded) based on single-year estimates. Joinpoints identified in 2008 and 2020. Because of changes to the survey design and survey instruments after 2018, comparisons of the 2000-2018 and 2019-2023 data should be examined with caution.

Methodology: See detailed methods

State-Level Diagnosed Diabetes Incidence Among Adults

Patterns of age-adjusted diabetes incidence over time among U.S. adults aged 18 years and older are not uniform across all U.S. states.

Age-Adjusted Incidence of Diagnosed Diabetes Among U.S. Adults Aged 18 Years or Older, by State or U.S. Territory, 2000 - 2023

State or U.S. Territory	2023 Rate per 1,000 (95% CI)	Trend, 2000-2023
Alabama	14.4 (11.0, 18.7)	Constant
Alaska	8.0 (6.2, 10.4)	Constant
Arizona	9.0 (7.1, 11.3)	Decreasing
Arkansas	10.4 (8.3, 13.1)	Decreasing
California	8.4 (6.9, 10.1)	Decreasing
Colorado	6.3 (5.0, 7.9)	Decreasing
Connecticut	5.7 (4.4, 7.4)	Constant
Delaware	7.8 (5.9, 10.2)	Constant
District of Columbia	6.4 (3.9, 10.5)	Constant
Florida	8.0 (6.2, 10.4)	Constant
Georgia	8.3 (6.9, 10.0)	Decreasing
Guam	N/A	N/A
Hawaii	9.1 (7.1, 11.7)	Constant
Idaho	8.2 (6.7, 10.2)	Constant
Illinois	10.5 (8.0, 13.6)	Increasing
Indiana	9.5 (8.2, 11.0)	Constant
Iowa	8.6 (7.1, 10.3)	Decreasing
Kansas	8.4 (6.8, 10.3)	Constant
Kentucky	N/A	Increasing

Louisiana	13.1 (10.1, 16.9)	Increasing
Maine	7.6 (6.3, 9.2)	Decreasing
Maryland	10.0 (8.2, 12.2)	Constant
Massachusetts	5.9 (4.6, 7.5)	Constant
Michigan	8.1 (6.7, 9.8)	Decreasing
Minnesota	8.3 (7.1, 9.7)	Constant
Mississippi	11.6 (9.3, 14.5)	Decreasing
Missouri	7.3 (5.6, 9.4)	Constant
Montana	6.0 (4.8, 7.6)	Decreasing
Nebraska	7.8 (6.4, 9.6)	Constant
Nevada	6.6 (4.3, 10.2)	Decreasing
New Hampshire	5.4 (4.0, 7.1)	Decreasing
New Jersey	7.9 (6.2, 10.1)	Constant
New Mexico	8.3 (5.9, 11.7)	Constant
New York	8.4 (6.9, 10.2)	Constant
North Carolina	7.0 (5.2, 9.5)	Increasing
North Dakota	6.9 (5.3, 9.0)	Decreasing
Ohio	9.3 (8.0, 10.8)	Decreasing
Oklahoma	9.2 (7.5, 11.2)	Constant
Oregon	8.2 (6.5, 10.3)	Increasing
Pennsylvania	N/A	Increasing
Puerto Rico	N/A	N/A
Rhode Island	11.0 (8.9, 13.4)	Constant
South Carolina	10.7 (8.9, 12.9)	Decreasing
South Dakota	7.3 (4.9, 10.9)	Increasing
Tennessee	11.5 (9.2, 14.3)	Constant
Texas	11.4 (9.3, 14.0)	Constant
Utah	7.2 (6.0, 8.7)	Decreasing
Vermont	6.7 (5.0, 9.1)	Constant
Virginia	9.0 (7.2, 11.3)	Decreasing
Washington	7.8 (6.9, 8.9)	Decreasing

West Virginia	12.1 (9.9, 14.8)	Decreasing
Wisconsin	7.4 (6.2, 8.8)	Decreasing
Wyoming	7.7 (5.8, 10.2)	Constant

Notes

Data Source: US Diabetes Surveillance System; Behavioral Risk Factor Surveillance System

Definitions: CI = confidence interval.

Methodology: See detailed methods

County-Level Incidence of Diagnosed Diabetes Among Adults

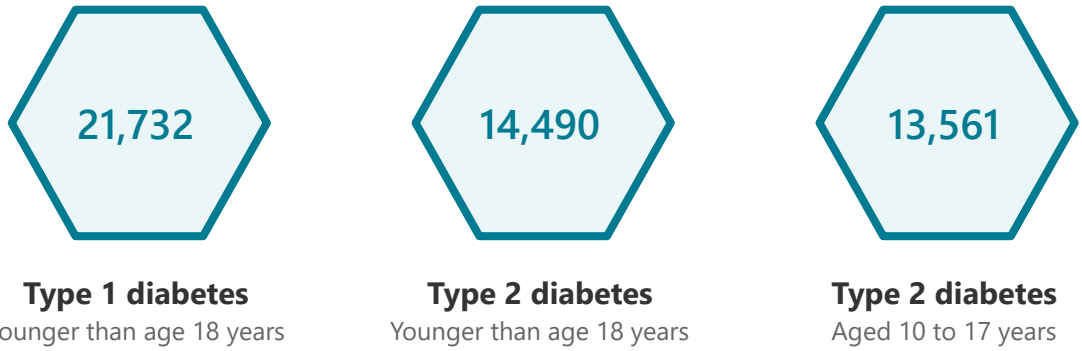
Among U.S. adults aged 20 years or older, age-adjusted, county-level data indicated:

- Estimates of diagnosed diabetes incidence varied across U.S. counties, ranging from **2.1 to 14.9 per 1,000 people** in 2023.
- Median county-level incidence of diagnosed diabetes per 1,000 people was **7.0 and 5.4** in 2004 and 2023, respectively.

Incidence of Diabetes Among Children and Adolescents

During 2022, the estimated annual number of newly diagnosed cases in the United States included:

Diabetes in Children and Adolescents

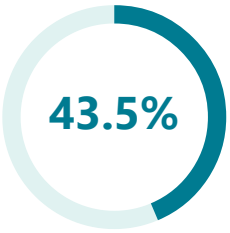


Prediabetes Prevalence

Prevalence of Prediabetes Among Adults

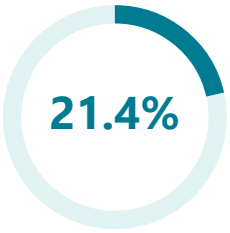
An estimated 115.2 million adults aged 18 years or older had prediabetes in 2023.

Prediabetes Among Adults Aged 18 Years or Older



Had prediabetes, based on their fasting glucose or A1C level

Crude estimates for 2021-2023



Reported being told by a health professional that they had this condition

Crude estimates for 2021-2023

Age-Adjusted Percentage of Prediabetes and Awareness Among Adults Aged 18 Years or Older, United States, 2021–2023

Characteristic	Prediabetes[a] Percentage (95% CI)	Prediabetes Awareness[b] Percentage (95% CI)
Total	42.6 (40.3–44.8)	19.8 (16.7–23.4)
Sex		
Men	47.6 (43.2–52.0)	16.9 (13.7–20.7)
Women	37.4 (34.6–40.3)	24.1 (19.3–29.8)
Race and Ethnicity		
White, non-Hispanic	41.6 (38.8–44.3)	19.4 (15.2–24.3)
Black, non-Hispanic	38.9 (32.5–45.7)	20.6 (14.0–29.3)
Asian, non-Hispanic	41.6 (35.0–48.5)	28.1 (20.3–37.5)
Hispanic	47.7 (43.3–52.0)	17.5 (11.8–25.2)

Education		
Less than High School	45.8 (36.0–55.9)	21.0 (12.2–33.7)
High School	45.4 (39.2–51.7)	20.2 (13.1–29.7)
More than High School	42.0 (39.7–44.4)	20.0 (15.9–24.8)

Notes

Data Source: August 2021-August 2023 National Health and Nutrition Examination Survey.

Definitions: CI = confidence interval. Time period 2021–2023 covers August 2021 through August 2023 only.

Footnotes: [a] Prediabetes was defined as fasting plasma glucose values of 100 to <126 mg/dL or A1C values of 5.7% to 6.4%. [b] Prediabetes awareness was based on self-report and estimated only among adults with prediabetes.

Methodology: See detailed methods

Estimated Crude Percentage of Prediabetes and Awareness Among Adults Aged 18 Years or Older, United States, 2021–2023

Characteristic	Prediabetes,[a] 2021–2023 Estimates Percentage (95% CI)	Prediabetes Awareness,[b] 2021–2023 Estimates Percentage (95% CI)
Total	43.5 (41.3–45.8)	21.4 (18.6–24.4)
Age Group		
18-44	36.1 (32.0–40.4)	15.1 (10.4–21.4)
45-64	48.6 (44.8–52.4)	24.5 (20.8–28.5)
≥65	52.1 (46.8–57.4)	26.3 (22.0–31.2)
Sex		
Men	47.9 (43.7–52.2)	18.1 (15.2–21.3)
Women	39.3 (36.7–41.9)	25.2 (21.4–29.5)
Race and Ethnicity		
White, non-Hispanic	43.7 (40.9–46.6)	21.5 (18.0–25.5)
Black, non-Hispanic	39.7 (33.1–46.6)	21.5 (14.9–30.1)

Asian, non-Hispanic	41.2 (32.9-50.1)	29.6 (20.6–40.4)
Hispanic	48.0 (43.7-52.3)	18.4 (12.2–26.7)

Notes

Data Source: August 2021–August 2023 National Health and Nutrition Examination Survey; 2023 U.S. Census Bureau data

Definitions: CI = confidence interval. Data are crude estimates (see Detailed Methods). Time period 2021–2023 covers August 2021 through August 2023 only.

Footnotes: [a] Prediabetes was defined as fasting plasma glucose values of 100 to <126 mg/dL or A1C values of 5.7% to 6.4%. [b] Prediabetes awareness was based on self-report and estimated only among adults with prediabetes.

Methodology: See detailed methods

Estimated Number of U.S. Adults Aged 18 Years or Older With Prediabetes, United States, 2023

Characteristic	Prediabetes,[a] 2023 Estimates Number in Millions (95% CI)
Total	115.2 (109.7–120.7)
Age Group	
18-44	43.6 (38.9–48.3)
45-64	40.3 (37.5–43.2)
≥65	31.3 (28.3–34.2)
Sex	
Men	62.0 (56.9–67.1)
Women	53.2 (50.0–56.4)
Race and Ethnicity	
White, non-Hispanic	70.7 (66.4–75.0)
Black, non-Hispanic	12.8 (10.7–14.8)
Asian, non-Hispanic	7.4 (6.0–8.7)
Hispanic	21.9 (19.8–23.9)

Notes

Data Source: August 2021–August 2023 National Health and Nutrition Examination Survey; 2023 U.S. Census Bureau data

Definitions: CI = confidence interval. Data are crude estimates (see Detailed Methods). Time period 2021–2023 covers August 2021 through August 2023 only.

Footnotes: [a] Prediabetes was defined as fasting plasma glucose values of 100 to <126 mg/dL or A1C values of 5.7% to 6.4%.

Methodology: See detailed methods

Among U.S. Adults Aged 18 Years or Older, Age-Adjusted Data for 2021–2023 Indicated:

- **11.5% of adults had prediabetes**, based on both elevated fasting plasma glucose and A1C levels.
- **A higher percentage of men (47.6%) than women (37.4%) had prediabetes**, based on their fsasting glucose or A1C level.
- **Prevalence** of prediabetes (based on fasting glucose 100–125 mg/dL or A1C 5.7%–6.4%) was **similar among all racial and ethnic groups and education levels**.

Age-Adjusted Prevalence of Prediabetes According to Three Different Definitions of Hyperglycemia Among Adults Aged 18 Years or Older, United States, 2021-2023

Characteristic	A1C 5.7%-6.4% or fasting plasma glucose 100-125 mg/dL Percentage (95% CI)	A1C 5.7%-6.4% or fasting plasma glucose 110-125 mg/dL Percentage (95% CI)	Both A1C 5.7%-6.4% and fasting plasma glucose 100-125 mg/dL Percentage (95% CI)
Total	42.6 (40.3–44.8)	22.6 (20.6–24.7)	11.5 (9.7–13.6)
Age, years[b]			
18-44	36.1 (32.0–40.4)	14.3 (11.3–17.9)	6.4 (4.9–8.3)
45-64	48.6 (44.8–52.4)	29.6 (27.1–32.3)	14.6 (11.8–17.8)
≥65	52.1 (46.8–57.4)	36.1 (30.8–41.8)	22.2 (18.0–27.0)
Sex			
Men	47.6 (43.2–52.0)	24.5 (21.9–27.4)	12.5 (9.7–15.9)
Women	37.4 (34.6–40.3)	20.7 (18.8–22.6)	10.7 (9.1–12.5)
Race and Ethnicity			

White, non-Hispanic	41.6 (38.8–44.3)	18.3 (16.1–20.8)	9.6 (7.6–12.0)
Black, non-Hispanic	38.9 (32.5–45.7)	29.7 (24.2–35.7)	14.7 (9.4–22.1)
Asian, non-Hispanic	41.6 (35.0–48.5)	26.3 (20.1–33.5)	13.4 (7.3–23.4)
Hispanic	47.7 (43.3–52.0)	28.6 (24.0–33.8)	14.1 (11.2–17.6)
Education			
Less than High School	45.8 (36.0–55.9)	28.1 (21.3–36.1)	14.0 (8.4–22.4)
High School	45.4 (39.2–51.7)	25.8 (22.7–29.0)	14.8 (10.5–20.5)
More than High School	42.0 (39.7–44.4)	21.1 (18.6–23.8)	9.9 (7.8–12.5)

Notes

Data Source: August 2021– August 2023 National Health and Nutrition Examination Survey.

Definitions: CI = confidence interval. Time period 2021–2023 covers August 2021 through August 2023 only.

Footnotes: [b] Estimates are crude.

Methodology: See detailed methods

Trends in Prediabetes Among Adults

- There were **no significant changes** in age-adjusted prevalence of prediabetes **from 2005–2008 to 2021–2023**.
- Among adults with prediabetes, the age-adjusted percentage aware that they had this condition **increased from 5.6% in 2005–2008 to 19.8% in 2021–2023**.

Trends in Age-Adjusted Prevalence and Awareness of Prediabetes Among Adults Aged 18 Years or Older, United States, 2005-2023

Time Period	Prediabetes,[a] Percentage (95% CI)	Prediabetes Awareness,[b,c] Percentage (95% CI)
2005–2008	44.4 (42.0–46.8)	5.6 (4.5–6.8)
2007–2010	45.9 (43.9–47.9)	7.4 (6.0–9.0)
2009–2012	44.0 (41.8–46.3)	8.6 (7.0–10.4)
2011–2014	42.3 (40.0–44.6)	8.9 (7.6–10.3)
2013–2016	43.8 (41.5–46.0)	11.1 (9.7–12.6)

2015–2018	49.0 (46.8–51.3)	13.3 (11.5–15.2)
2017–2020	49.4 (46.7–52.0)	15.4 (12.8–18.5)
2021–2023	42.6 (40.5–44.6)	19.8 (16.9–23.1)

Notes

Data Source: 2005–August 2023 National Health and Nutrition Examination Survey

Definitions: CI = confidence interval. Time period 2017–2020 covers January 2017 through March 2020 only; time period 2021–2023 covers August 2021 through August 2023 only.

Footnotes:

[a] Prediabetes was defined as fasting plasma glucose values of 100 to <126 mg/dL or A1C values of 5.7% to 6.4%. Fasting plasma glucose values were calibrated using forward regression equations where appropriate. Overlapping, rolling estimates are presented in the table.

[b] Prediabetes awareness was based on self-report and estimated only among adults with prediabetes.

[c] P value for linear trend <0.05.

Methodology: See detailed methods

Prevalence of Prediabetes Among Adolescents Aged 12-17 Years

- In 2023, an estimated **8.4 million** adolescents aged **12-17 years, or 32.7%** of the U.S. adolescent population, had prediabetes.
- During **1999-2023**, prediabetes prevalence among adolescents aged **12-17 years** was relatively stable.

Prevalence of Prediabetes Among U.S. Adolescents Aged 12–17 Years, by Time Period, 1999-2023

Time Period	Prediabetes,[a,b] Percentage (95% CI)
1999–2004	29.4 (25.5–33.6)
2005–2010	26.7 (22.7–31.1)
2011–2016	29.3 (25.6–33.2)
2017–2023	32.7 (27.3–38.6)

Notes

Data Source: August 2021–August 2023 National Health and Nutrition Examination Survey; 2023 U.S. Census Bureau data

Definitions: CI = confidence interval. Time period 2017–2020 covers January 2017 through March 2020 only; time period 2021–2023 covers August 2021 through August 2023 only.

Footnotes: [a] Prediabetes was defined as fasting plasma glucose values of 100 to <126 mg/dL or A1C values of 5.7% to 6.4%. Fasting plasma glucose values were calibrated using forward regression equations where appropriate. [b] P value for linear trend >0.05

Methodology: See detailed methods

Risk Factors for Complications

Risk Factors for Diabetes-Related Complications

Among U.S. adults aged 18 years or older with diagnosed diabetes, crude estimates for 2021–2023 were as follows:

Crude Percentage of Factors Associated with Diabetes-Related Complications Among Adults Aged 18 Years or Older With Diagnosed Diabetes, United States, 2021–2023

Risk Factors for Diabetes-Related Complications	Crude Percentage (95% CI)
No Usual Place for Health Care	4.8 (3.6-6.3)
Smoking	
Current Cigarette Smoker Based on Self-Report	15.2 (12.3-18.5)
Former Cigarette Smoker	33.1 (29.4-37.1)
Overweight and Obesity, According to Body Mass Index (BMI)	
BMI 25.0-29.9 kg/m^2	26.2 (23.3-29.4)
BMI 30.0-39.9 kg/m^2	43.3 (37.6-49.1)
BMI ≥ 25.0 kg/m^2	88.4 (85.7-90.7)
BMI ≥ 40.0 kg/m^2	18.1 (13.9-23.2)
Physical Inactivity	32.2 (27.8-37.0)
A1C	
A1C 7.0%-7.9%	23.0 (20.4-25.9)

A1C 8.0%-9.0%	10.7 (7.8-14.3)
A1C > 9.0%	19.5 (16.5-22.9)
A1C ≥ 7.0%	53.2 (48.3-58.1)
High Blood Pressure	
Blood Pressure ≥ 130/80 mmHg or Taking Antihypertensive Medication	76.4 (73.9-78.8)
Blood Pressure ≥140/90 mmHg or Taking Antihypertensive Medication	67.2 (63.6-70.6)
High Cholesterol, According to Non-HDL Cholesterol	
Non-HDL 130-159 mg/dL	19.8 (15.4-25.0)
Non-HDL 160-189 mg/dL	9.2 (6.7-12.5)
Non-HDL ≥ 130 mg/dL	38.0 (33.4-42.7)
Non-HDL ≥ 190 mg/dL	9.1 (6.7-12.2)

Notes

Data Source: August 2021–August 2023 National Health and Nutrition Examination

Definitions: CI = confidence interval

Footnotes: Former cigarette smoker was based on serum cotinine levels ≤10 ng/mL, a history of smoking at least 100 cigarettes in their lifetime, and a self-report of no current cigarette smoking.

Physical inactivity was based on self-report of less than 10 minutes per week of moderate or vigorous activity in each physical activity category of work, leisure time, and transportation.

Methodology: See detailed methods

Preventing Diabetes-Related Complications

Factors Associated with Prevention of Diabetes-Related Complications

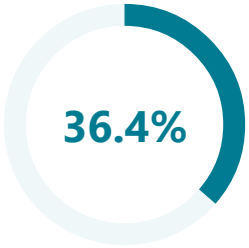
Among U.S. adults aged 18 years or older with diagnosed diabetes, crude data for 2021-2023 indicated:

Mental Health



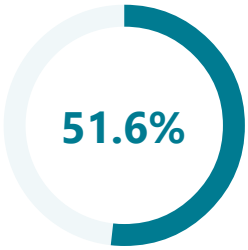
Received mental health care within the past 12 months

Physical Activity



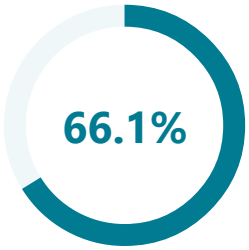
Met the recommended goal of at least 150 minutes per week of leisure-time physical activity.

Weight Management



Reported managing or losing weight to lower their risk for developing certain diseases

Cholesterol Treatment



Reported taking medication to lower blood cholesterol, including statin therapy

Adults aged 40-75 years

Crude Percentage of Factors Associated with Prevention of Diabetes-Related Complications Among Adults Aged 18 Years or Older With Diagnosed Diabetes, United States, 2021-2023

Preventive Factors	Percentage (95% CI)
Mental health care within the past 12 months	15.0 (11.2–19.8)

Managing or losing weight to lower their risk for developing certain diseases	51.6 (47.1–56.0)
At least 150 minutes per week of leisure-time physical activity	36.4 (32.2–40.8)
Among adults aged 40–75 years, % on cholesterol treatment	66.1 (63.3–68.9)

Notes

Data Source: August 2021–August 2023 National Health and Nutrition Examination Survey.

Definitions: CI = confidence interval.

Methodology: See detailed methods

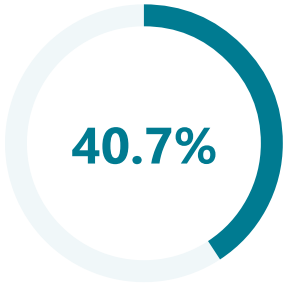
Meeting ABC Goals

A1C, Blood Pressure, Cholesterol, and Smoking (ABCs)



Met all these criteria:

- A1C value <7.0%,
- Blood pressure <130/80 mmHg
- Non-HDL cholesterol <130 mg/dL
- Being a nonsmoker



Met all these criteria:

- A1C value <8.0%,
- Blood pressure <140/90 mmHg
- Non-HDL cholesterol <160 mg/dL
- Being a nonsmoker

Crude Percentage of Adults Aged 18 Years or Older with Diagnosed Diabetes Meeting All ABCs Goals, United States, 2021-2023

Risk Factor	ABCs Goals for Many Adults	Less Stringent ABCs Goals
A1C	<7.0%	<8.0%

Blood Pressure	<130/80 mmHg	140/90 mmHg
Cholesterol, non-HDL	130 mg/dL	<160 mg/dL
Smoking, Current	Nonsmoker	Nonsmoker
Percentage Meeting All ABCs Goals	14.9 (12.0-18.5)	40.7 (36.9-44.5)

Notes

Data Source: August 2021–August 2023 National Health and Nutrition Examination Survey.

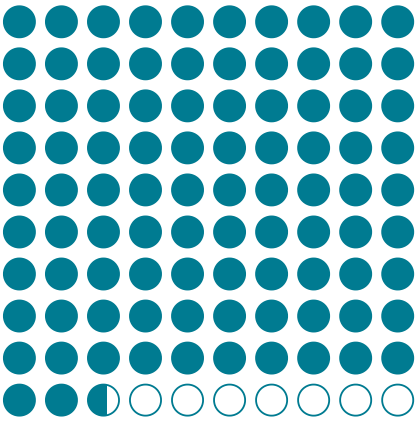
Definitions: ABCs = A1C, blood pressure, cholesterol, and smoking. Estimates are crude percentages and 95% confidence intervals.

Methodology: See detailed methods

Receipt of Recommended ABC Tests

Among U.S. adults aged 18 years or older with diagnosed diabetes, crude data for 2023 indicated:

Testing for A1C, Blood Pressure, and Cholesterol



92.6% (95% CI, 91.4–93.6) received all three recommended ABC tests by a health professional in the past year.

A1C

95.7%

Received a blood test for A1C in the past year.
(95% CI, 94.8–96.5)

Blood Pressure

98.2%

Had their blood pressure checked.
(95% CI, 97.6–98.7)

Cholesterol

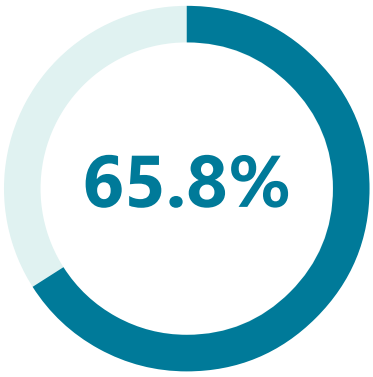
94.6%

Had their cholesterol checked.
(95% CI, 93.5–95.5)

Receipt of Recommended Vaccinations

Among U.S. adults aged 18 years or older with diagnosed diabetes, crude data for 2023 indicated:

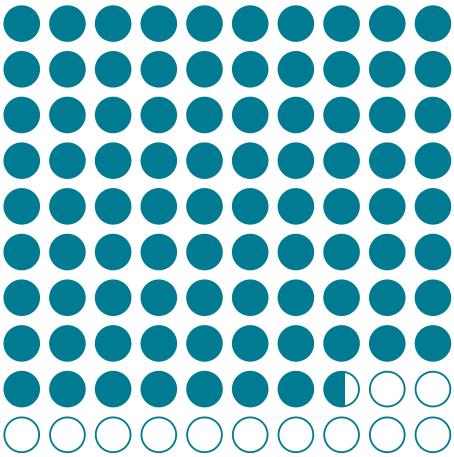
Influenza Vaccination



Had received an influenza vaccination in the past year

(95% CI, 63.8-67.8)

Covid-19 Vaccination



87.6% Had ever received a COVID-19 vaccine

(95% CI, 86.1-89.0)

4.8%

Received one COVID-19 vaccination

(95% CI, 3.8-6.0)

25.9%

Received two COVID-19 vaccinations

(95% CI, 23.9-28.0)

69.3%

Received more than two COVID-19 vaccinations

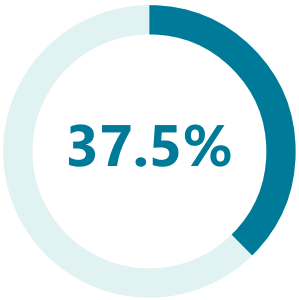
(95% CI, 67.1-71.4)

Hepatitis B Vaccination



Ever received a hepatitis B vaccination

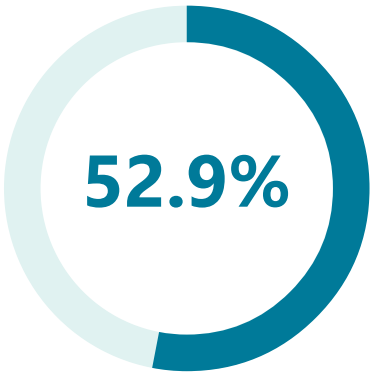
(95% CI, 28.1-32.0)



Adults aged 18-59 years had ever received a hepatitis B vaccination

(95% CI, 33.8-41.2)

Pneumococcal Vaccination



Ever received a pneumococcal vaccination

(95% CI, 50.8-55.0)

Coexisting Conditions and Complications

Emergency Department Visits

In 2021, approximately 16.5 million emergency department (ED) visits were reported with diabetes as any listed diagnosis among adults aged 18 years or older including:

ED Visits with Diabetes



Hyperglycemic Crisis

10.4 per 1,000 adults with diabetes



Hypoglycemia

7.9 per 1,000 adults with diabetes

Number of Emergency Department for Adults aged 18 years or older with Diabetes for Selected Causes, United States, 2020 and 2021

Risk Factor	2020 Number	2021 Number
Diabetes as any Listed Diagnosis	16,779,000	16,491,000
Hyperglycemic Crisis	267,000	253,000
Diabetic Ketoacidosis	240,000	227,000
Hyperosmolar Hyperglycemic Syndrome	27,000	26,000
Hypoglycemia	202,000	192,000

Notes

Data Source: 2020 and 2021 National Emergency Department Sample; 2020 and 2021 National Health Interview Survey.

Definitions: CI = confidence interval.

Methodology: See detailed methods

Rate of ED Visits per 1,000 Adults Aged 18 Years or Older With Diabetes for Selected Causes, United States, 2020 and 2021

Risk Factor	2020 Crude Rate per 1,000 (95% CI)	2021 Crude Rate per 1,000 (95% CI)
Diabetes as any Listed Diagnosis	716.0 (663.0–770.0)	677.0 (630.0–720.0)
Hyperglycemic Crisis	11.4 (10.5–12.3)	10.4 (9.6–11.1)
Diabetic Ketoacidosis	10.2 (9.4–11.0)	9.3 (8.6–10.0)
Hyperosmolar Hyperglycemic Syndrome	1.2 (1.1–1.3)	1.1 (1.0–1.2)
Hypoglycemia	8.6 (8.0–9.3)	7.9 (7.3–8.4)

Notes

Data Source: 2020 and 2021 National Emergency Department Sample; 2020 and 2021 National Health Interview Survey.

Definitions: CI = confidence interval.

Methodology: See detailed methods

In 2021, of the ED visits with diabetes as any listed diagnosis among U.S. adults aged 18 years or older, disposition data indicated:

ED Visits with Diabetes

55.2%
Treated and Released

38.3%
Admitted to Hospital

2.6%
Transferred to a Skilled Nursing Facility, an Intermediate Care Facility, or Home With Home Health Care

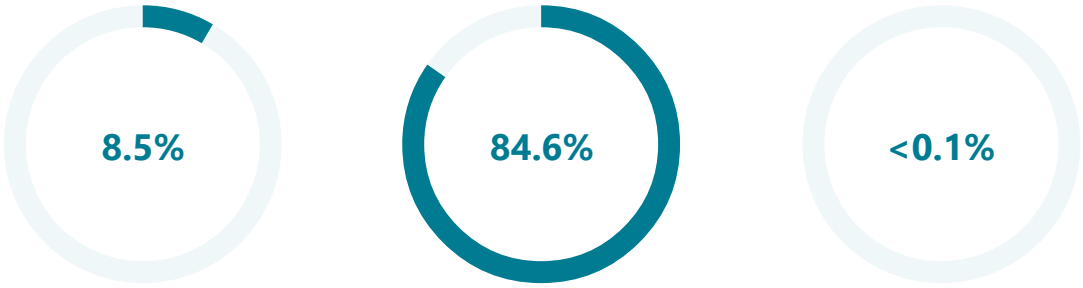
2.2%
Transferred to Another Hospital

1.4%
Left Against Medical Advice

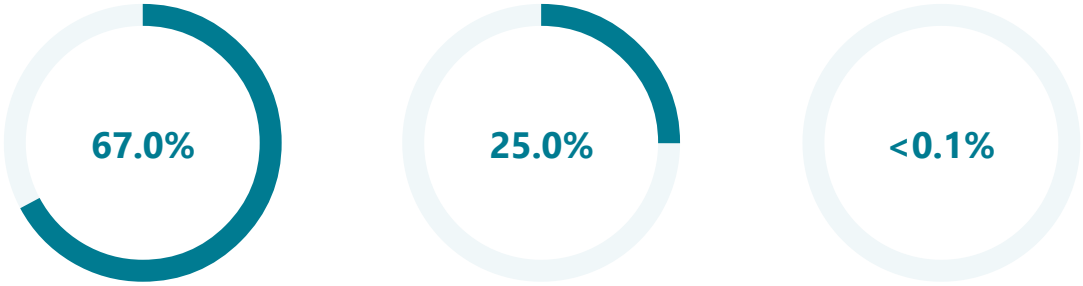
0.3%
Died

<0.1%
Had Unknown Disposition but Were Not Admitted to a Hospital

ED Visits Involving Hyperglycemic Crisis



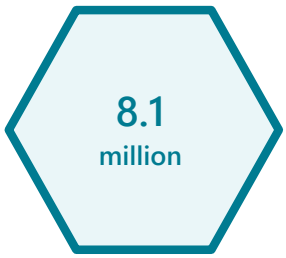
ED Visits Involving Hypoglycemia



Treated and Released | Admitted to the Hospital | Died

Hospitalizations

Hospitalizations



In 2021, a total of 8.1 million hospital discharges were reported with diabetes as any listed diagnosis among U.S. adults aged 18 years or older (332.9 per 1,000 adults with diabetes). These discharges included:

Major Cardiovascular Diseases

1.78 million

73.1 per 1,000 adults with diabetes

Including 385,000 for ischemic heart disease (15.8 per 1,000 adults with diabetes) and 337,000 for stroke (13.8 per 1,000 adults with diabetes)

Lower-Extremity Amputation

166,000

6.8 per 1,000 adults with diabetes

Hyperglycemic Crisis

230,000

9.5 per 1,000 adults with diabetes

Hypoglycemia

52,000

2.1 per 1,000 adults with diabetes

Number of Hospitalizations for Adults Aged 18 Years or Older with Diabetes For Selected Causes, United States, 2020 and 2021

Risk Factor	2020 Number	2021 Number
Diabetes as any listed diagnosis	7,856,000	8,106,000
Major cardiovascular disease	1,677,000	1,780,000
Ischemic heart disease	368,000	385,000
Stroke	321,000	337,000
Lower-extremity amputation	160,000	166,000
Hyperglycemic crisis	232,000	230,000
Diabetic ketoacidosis	206,000	207,000
Hyperosmolar hyperglycemic syndrome	26,000	23,000
Hypoglycemia	51,000	52,000

Notes

Data Source: 2020 and 2021 National Inpatient Sample; 2020 and 2021 National Health Interview Survey.

Definitions: CI = confidence interval.

Methodology: See detailed methods

Rate of Hospitalizations per 1,000 Adults Aged 18 Years or Older With Diabetes for Selected Causes, United States, 2020 and 2021

Risk Factor	2020 Crude Rate per 1,000 (95% CI)	2021 Crude Rate per 1,000 (95% CI)
Diabetes As Any Listed Diagnosis	335.4 (316.5–354.4)	332.9 (315.1–350.7)
Major Cardiovascular Disease	71.6 (67.4–75.8)	73.1 (69.1–77.2)

Ischemic Heart Disease	15.7 (14.7–16.7)	15.8 (14.8–16.7)
Stroke	13.7 (12.9–14.5)	13.8 (13.0–14.6)
Lower-Extremity Amputation	6.8 (6.4–7.2)	6.8 (6.4–7.2)
Hyperglycemic Crisis	9.9 (9.3–10.5)	9.5 (8.9–10.0)
Diabetic Ketoacidosis	8.8 (8.3–9.3)	8.5 (8.0–9.0)
Hyperosmolar Hyperglycemic Syndrome	1.1 (1.1–1.2)	0.95 (0.89–1.01)
Hypoglycemia	2.2 (2.1–2.3)	2.1 (2.0–2.2)

Notes

Data Source: 2020 and 2021 National Inpatient Sample; 2020 and 2021 National Health Interview Survey.

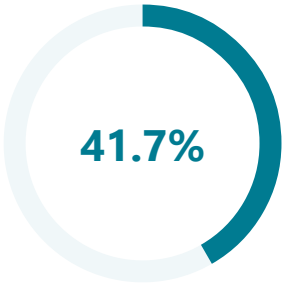
Definitions: CI = confidence interval.

Methodology: See detailed methods

Kidney Disease

Among U.S. adults aged 18 years or older with diagnosed diabetes, crude data for 2021–2023 indicated:

Kidney Disease



Had chronic kidney disease (CKD, stages 1–4), based on the updated 2021 CKD Epidemiology Collaboration (CKD-EPI) equation for estimated glomerular filtration rate (eGFR).

- **17.6% had moderate to severe CKD (stage 3 or 4).**
- **24.7% of non-Hispanic Black adults, 18.4% of non-Hispanic White adults, and 7.7% of Hispanic adults** had moderate to severe CKD (stage 3 or 4).
- **33.8%** with moderate to severe CKD (stage 3 or 4) were **aware of their kidney disease.**

Crude Prevalence of Chronic Kidney Disease Among Adults Aged 18 Years or Older, Overall and by Race and Ethnicity, United States, 2021–2023

Characteristic	CKD Stages 1–4 Percentage (95% CI)	CKD Stages 3–4 Percentage (95% CI)	CKD Awareness,[a] Percentage (95% CI)
CKD definition 1[b]			
Total	41.7 (38.0–45.6)	17.6 (15.3–20.0)	33.8 (22.9–46.8)
Race and ethnicity			
White, non-Hispanic	40.6 (34.8–46.7)	18.4 (15.3–22.1)	42.2 (26.2–60.1)
Black, non-Hispanic	44.0 (26.6–63.0)	24.7 (16.9–34.7)	–[c]
Asian, non-Hispanic	–[c]	–[c]	–[c]
Hispanic	31.0 (25.2–37.6)	7.7 (5.1–11.6)	29.5 (9.5–62.5)

Notes

Data Source: August 2021–August 2023 National Health and Nutrition Examination Survey.

Definitions: CKD = chronic kidney disease.

Footnotes:

[a] Among CKD stages 3–4 only.

[b] CKD based on 2021 CKD Epidemiology Collaboration serum creatinine-only GFR estimating equation, including age and sex only.

[c] Estimates did not meet the requirements for statistical reliability.

Methodology: See detailed methods

Kidney Disease with Diabetes as Primary Cause



In 2021, a total of 60,113 people developed end-stage kidney disease with diabetes as the primary cause.

- **Crude incidence of end-stage kidney disease with diabetes as the primary cause was 181.0 per 1 million population (60,113 new cases).** Adjusted for age group, sex, and racial or ethnic group, the rate was 151.5 per 1 million people.

- The **proportion of end-stage kidney disease with diabetes listed as the primary cause was 39.2% (307,385 out of 783,594 people).** As a result, diabetes was the leading cause of end-stage kidney disease, **followed by high blood pressure (26.7%), glomerulonephritis (14.6%), and cystic kidney disease (5.0%).**

Vision Difficulty

Diabetes is the leading cause of new cases of blindness among adults aged 18–64 years.

Reported Severe Vision Difficulty Or Blindness In 2023



U.S. adults aged 18 years or older with diagnosed diabetes

95%CI, 11.4-13.3%

Deaths

Diabetes As An Underlying Cause Of Death



- In **2023, diabetes was the seventh leading cause of death** in the United States. This finding is based on **95,190 death certificates in which diabetes was listed** as the underlying cause of death (crude rate, 28.4 per 100,000 people).
- In **2023**, there were **339,342 death certificates with diabetes listed as the underlying or contributing cause of death** (crude rate, 101.3 per 100,000 people).

Summary

Key points

- Learn about the data sources, methods, and references used in the National Diabetes Statistics Report.

Data collection

The estimates (unless otherwise noted) were derived from various data systems of the Centers for Disease Control and Prevention (CDC), Indian Health Service (IHS), Agency for Healthcare Research and Quality (AHRQ), and U.S. Census Bureau and from published research studies. Estimated percentages and total number of people with diabetes and prediabetes were derived from the National Health and Nutrition Examination Survey (NHANES), National Health Interview Survey (NHIS), Behavioral Risk Factor Surveillance System (BRFSS), United States Diabetes Surveillance System (USDSS), and U.S. resident population estimates.

Diagnosed diabetes status was determined from self-reported information provided by survey respondents. Undiagnosed diabetes was determined by measured fasting plasma glucose or A1C levels among people without self-reported diagnosed diabetes. Numbers and rates for acute and long-term complications of diabetes were derived from the National Inpatient Sample (NIS) and National Emergency Department Sample (NEDS), as well as NHIS.

For some measures, estimates were not available for certain racial and ethnic subgroups because of small sample sizes.

Diabetes and related estimates

Age-adjusted estimates were calculated among adults aged 18 years or older by the direct method to the 2000 U.S. Census standard population, using age groups 18-44, 45-64, and 65 years or older. Most estimates of diabetes in this report do not differentiate between type 1 and type 2 diabetes. However, as type 2 diabetes accounts for 90% to 95% of all diabetes cases, the data presented here are more likely to be characteristic of type 2 diabetes, except as noted.

An alpha level of 0.05 was used when determining statistically significant differences between groups.

Prevalence of Diabetes (Diagnosed and Undiagnosed) Among People of All Ages

Data Sources

- August 2021-August 2023 National Health and Nutrition Examination Survey (NHANES), National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention.
- 2021-2023 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.
- Annual Estimates of the Resident Population by Sex, Single Year of Age, Race, and Hispanic Origin for the United States: April 1, 2020, to July 1, 2023, Population Division, U.S. Census Bureau.

Methods

The total number of people with diabetes is the sum of the number of those aged 18 years or older with diagnosed or undiagnosed diabetes and the number of those younger than age 18 years with diagnosed diabetes. Undiagnosed diabetes estimates for children and adolescents younger than age 18 years were not calculated; there were no lab measures for those <12 years and estimates for participants 12-17 years were not statistically reliable. The August 2021-August 2023 NHANES was used to calculate the percentage of adults aged 18 years or older with diagnosed and undiagnosed diabetes (see next section for detail). The 2021-2023 NHIS was used to calculate the percentage of children and adolescents younger than 18 years with diagnosed diabetes. These percentages were then applied to the corresponding July 1, 2023, U.S. resident population estimates from the U.S. Census Bureau to derive the total number of people with diabetes.

Applying August 2021-August 2023 NHANES estimates to the 2023 U.S. resident population estimates has limitations. This methodology assumes that the prevalence of diabetes in 2023 was the same as it was in earlier years (2021-2022) and that the prevalence of diabetes in the resident population was identical to those in the civilian, noninstitutionalized population (from NHANES). Deviations from these assumptions may result in overestimated or underestimated numbers and rates.

Prevalence of Diabetes (Diagnosed and Undiagnosed) Among Adults Aged 18 Years or Older

Data Sources

- August 2021-August 2023 National Health and Nutrition Examination Survey (NHANES), National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention.
- Annual Estimates of the Resident Population by Sex, Single Year of Age, Race, and Hispanic Origin for the United States: April 1, 2020, to July 1, 2023, Population Division, U.S. Census Bureau.

Methods

The percentage of adults aged 18 years or older with diabetes (diagnosed or undiagnosed) was estimated using August 2021-August 2023 NHANES data. People who self-reported being told by a doctor or health professional that they had diabetes (other than during pregnancy) were classified as having diagnosed diabetes. Those not reporting a history of diagnosed diabetes but who had either a fasting plasma glucose greater than or equal to 126 mg/dl or an A1C level greater than or equal to 6.5% were classified as having undiagnosed diabetes. For consistency with other recent CDC diabetes estimates, no regression equations were applied to 2021-2023 NHANES fasting plasma glucose data. Pregnant women were excluded. People with diagnosed diabetes from the interviewed sample were combined with people with undiagnosed diabetes from the phlebotomy (or MEC in previous cycles) and fasting plasma glucose subsamples. Appropriate sampling weights were used so that estimates were representative of the total U.S. adult civilian, non-institutionalized population.

To estimate the number of adults with diagnosed and undiagnosed diabetes, the age-, sex-, race and ethnicity-specific percentages from three-way cross-tabulations were applied to the corresponding July 1, 2023, U.S. resident population estimates from the U.S. Census Bureau. These subgroup-specific numbers of adults were summed to obtain the estimated number of adults with diagnosed and undiagnosed diabetes for the following: total population; age groups 18-44, 45-64, and 65 years or older; men and women; and non-Hispanic White, non-Hispanic Black, non-Hispanic Asian, and Hispanic adults. Age-adjusted percentages of diagnosed and undiagnosed diabetes were calculated among adults aged 18 years or older by sex, race and ethnicity, and education level by the direct method to the 2000 U.S. Census standard population, using age groups 18-44, 45-64, and 65 years or older.

Additional Resource

See **Analysis Note (#)** on the Estimation of National Total Diabetes, Undiagnosed Diabetes and Prediabetes Prevalence.

References

National Health and Nutrition Examination Survey. August 2021-August 2023 Data Documentation, Codebook, and Frequencies. Available at: https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2021/DataFiles/GLU_L.htm (https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2021/DataFiles/GLU_L.htm). Accessed August 2025.

Gwira JA, Fryar CD, Gu Q. Prevalence of total, diagnosed, and undiagnosed diabetes in adults: United States, August 2021-August 2023. NCHS Data Brief, No. 516. Hyattsville, MD: National Center for Health Statistics. 2024. DOI Available at: https://dx.doi.org/10.15620/cdc/165794 (https://dx.doi.org/10.15620/cdc/165794).

Trends in Age-Adjusted Prevalence of Diagnosed Diabetes, Undiagnosed Diabetes, and Total Diabetes Among Adults Aged 18 Years or Older

Data Source

- August 2001-August 2023 National Health and Nutrition Examination Survey (NHANES), National Center for Health Statistics, Centers for Disease Control and Prevention.

Methods

Percentages of diagnosed, undiagnosed, and total diabetes using moving averages of overlapping 4-year survey periods during 2001-2023 were calculated among adults aged 18 years or older and age-adjusted by the direct method to the 2000 U.S. Census standard population, using age groups 18-44, 45-64, and 65 years or older. For consistency with other recent CDC diabetes estimates, fasting plasma glucose values were adjusted using forward regression equations provided by NCHS. Trends in non-overlapping cycles during 2001-2023 were assessed using Joinpoint regression. This analysis used age-adjusted estimates and permutation tests to identify a maximum of three points where linear trends in prevalence changed significantly in either direction or magnitude.

References

National Cancer Institute. Joinpoint Trend Analysis Software. Available at: https://surveillance.cancer.gov/joinpoint/ (https://surveillance.cancer.gov/joinpoint/). Accessed August 2025.

Gwira JA, Fryar CD, Gu Q. Prevalence of total, diagnosed, and undiagnosed diabetes in adults: United States, August 2021-August 2023. NCHS Data Brief, No. 516. Hyattsville, MD: National Center for Health Statistics. 2024. DOI Available at: https://dx.doi.org/10.15620/cdc/165794 (https://dx.doi.org/10.15620/cdc/165794).

National Center for Health Statistics. National Health and Nutrition Examination Survey: 2005-2006 data documentation, codebook, and frequencies – plasma fasting glucose & insulin (GLU_D). 2008. Available from: https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2005/DataFiles/GLU_D.htm (https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2005/DataFiles/GLU_D.htm). Accessed August 2025.

National Center for Health Statistics. National Health and Nutrition Examination Survey: 2007-2008 data documentation, codebook, and frequencies, plasma fasting glucose & insulin (GLU_E). 2010. Available from: https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2007/DataFiles/GLU_e.htm (https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2007/DataFiles/GLU_e.htm). Accessed August 2025.

National Center for Health Statistics. National Health and Nutrition Examination Survey: 2015-2016 data documentation, codebook, and frequencies, plasma fasting glucose (GLU_I). 2018. Available from: https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2015/DataFiles/GLU_i.htm (https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2015/DataFiles/GLU_i.htm). Accessed August 2025.

Prevalence of Diagnosed Diabetes

Data Sources

- August 2021-August 2023 National Health and Nutrition Examination Survey (NHANES), National Center for Health Statistics, Centers for Disease Control and Prevention.
- 2021-2023 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.
- Annual Estimates of the Resident Population by Sex, Single Year of Age, Race, and Hispanic Origin for the United States: April 1, 2020, to July 1, 2023, Population Division, U.S. Census Bureau.

Methods

The percentage of people with diagnosed diabetes was obtained from 2021-2023 NHIS data and August 2021-August 2023 NHANES data. The percentage of people aged <20 years with diagnosed diabetes was obtained from NHIS based on information reported by the respondent (18-19 years) or a knowledgeable adult family member residing in the household. The percentage of people aged 20 years or older with diagnosed diabetes was obtained from self-reported data in the August 2021-August 2023 NHANES. The combined estimate of diagnosed diabetes for all ages was applied to the July 1, 2023, U.S. resident population from the U.S. Census Bureau to derive the number of people with diagnosed diabetes for all ages and for children and adolescents younger than age 20 years.

Validated methods to distinguish between types of diabetes in surveys are not available. The percentage of adults aged 20 years or older with diagnosed diabetes who self-reported type 1 diabetes plus current insulin use and the percentage of adults aged 20 years or older with diagnosed diabetes who started using insulin within a year of their diagnosis were estimated from 2023 NHIS data. To estimate the number of adults aged 20 years or older with type 1 diabetes, these percentages were then applied to the derived number of adults aged 20 years or older with diagnosed diabetes. To estimate the number of young people with type 1 diabetes, the percentage of children and adolescents younger than age 20 years with type 1 diabetes (86.3%) calculated using prevalence data from the SEARCH for Diabetes in Youth study was applied to the derived number of children and adolescents younger than age 20 years with diagnosed diabetes.

References

National Health and Nutrition Examination Survey. 2021-2023 Data Documentation, Codebook, and Frequencies. Available from: https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2021/DataFiles/GLU_L.htm (https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2021/DataFiles/GLU_L.htm). Accessed August 2025.

Lawrence JM, Divers J, Ison S; SEARCH for Diabetes in Youth Study Group. Trends in prevalence of type 1 and type 2 diabetes in children and adolescents in the U.S., 2001-2017. JAMA. 2021;326(8):717-727.

Age-Adjusted Prevalence of Diagnosed Diabetes by Race and Ethnicity, Education Level, Family Income Level, Metropolitan Residence, and Sex Among Adults Aged 18 Years or Older

Data Source

- 2021-2023 National Health Interview Survey (NHIS), National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention.

Methods

The percentage of diagnosed diabetes was calculated overall and by race and ethnicity, education level, income level, and sex using 2021-2023 NHIS self-reported data. Three years of data were averaged to provide more statistically reliable estimates. Adults aged 18 years or older who self-reported being told by a doctor or health professional that they had diabetes were classified as having diagnosed diabetes.

Education level was classified into three categories: less than high school, high school graduate, or more than high school. Residence (e.g., metropolitan, nonmetropolitan) was based on the six-level urban-rural classification scheme for U.S. counties and county-equivalent entities developed by NCHS. Metropolitan areas included "large central metro," "large fringe metro," "medium metro," and "small metro" counties. Nonmetropolitan areas included "micropolitan" and "noncore" counties. Income level was based on the ratio of family income to the federal poverty level and classified into four categories: <100% federal poverty level (below poverty level), 100%-299% federal poverty level, 300%-499% federal poverty level, and ≥500% federal poverty level. To handle missing income data in NHIS, NCHS provides files of multiply imputed income values. Five imputation datasets were used to calculate prevalence estimates by income level.

Percentages for all subgroups were age-adjusted, using age groups 18-44, 45-64, and 65 years or older, by the direct method to the 2000 U.S. Census standard population.

References

National Center for Health Statistics. Multiple Imputation of Family Income in 2023 National Health Interview Survey: Methods. Centers for Disease Control and Prevention; 2024. Available from: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2023/NHIS2023-imputation-techdoc-508.pdf (https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2023/NHIS2023-imputation-techdoc-508.pdf). Accessed August 2025.

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Crude Prevalence of Diagnosed Diabetes by Detailed Race and Ethnicity Among Adults Aged 18 Years or Older

Data Source

- 2019-2021 National Health Interview Survey (NHIS), National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention.

Methods

Beginning with the 2019 NHIS, data used to identify survey respondents in Hispanic and Asian subgroups were no longer publicly available. Estimates of diagnosed diabetes prevalence by detailed race and ethnicity were provided by NCHS's Interactive Summary Health Statistics for Adults, by Detailed Race and Ethnicity, using 2019-2021 NHIS self-reported data. Adults aged 18 years or older who self-reported being told by a doctor or health professional that they had diabetes were classified as having diagnosed diabetes. Three years of data were averaged to provide more statistically reliable estimates. Two-sided 95% confidence intervals were calculated using the Clopper-Pearson method.

References

National Center for Health Statistics. Technical Notes for Interactive Summary Health Statistics for Adults, by Detailed Race and Ethnicity. Centers for Disease Control and Prevention. Available from: https://wwwn.cdc.gov/NHISDataQueryTool/SHS_ADULT3YR/SHS_3YR_Tech_Notes.pdf (https://wwwn.cdc.gov/NHISDataQueryTool/SHS_ADULT3YR/SHS_3YR_Tech_Notes.pdf). Accessed August 2025.

Parker JD, Talih M, Malec DJ, et al. National Center for Health rel="noopener noreferrer">https://www.cdc.gov/nchs/data/series/sr_02/sr02_175.pdf. Accessed August 2025.

State-Level Diagnosed Diabetes Prevalence and Incidence Among Adults

Data Sources

- Behavioral Risk Factor Surveillance System (BRFSS), National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention.
- United States Diabetes Surveillance System (USDSS), National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention.

Definition

Diagnosed diabetes: BRFSS respondents who answered "yes" to the question, "Has a doctor ever told you that you have diabetes?" Women who reported diabetes only during pregnancy were

excluded from this group.

Newly diagnosed diabetes: BRFSS respondents with diagnosed diabetes were asked their age at diagnosis. Those who reported diagnosed diabetes and whose age at the time of the survey minus the age they provided to the question, "How old were you when you were told you have diabetes?" was less than 1 year. If the difference was between 1 and 2 years, the person was weighted as half a newly diagnosed case.

Calculations

For each U.S. state, the District of Columbia (D.C.), and U.S. territory, the percentage of adults aged 18 years and older with diagnosed diabetes was calculated using the weighted number of respondents who reported having diagnosed diabetes divided by the weighted estimate of the state (or D.C.) population aged ≥18 years. Percentages were age-adjusted to the 2000 U.S. standard population using age groups 18-44, 45-64, 65-74, and ≥75 years. Joinpoint regression was used to evaluate varying trends in annual age-adjusted estimates.

To calculate the rate of new cases, the weighted number of respondents who were diagnosed with diabetes within the last year (numerator) was divided by the weighted estimate of the population aged 18 years and older (denominator). Adults who had been diagnosed with diabetes for more than 1 year and adults who answered "refused," or "don't know" or who had missing values on the diabetes status question were excluded from the denominator. Three year averages were used to improve the precision of the annual estimates with the exception of the last year in the trend for which a 2-year average was used. Rates were age-adjusted to the 2000 U.S. standard population using age groups 18-44, 45-64, and ≥65 years.

In the tile map, data are presented for the overall population (red trend line) and by state for each year since 2000. Each box represents a state or D.C., arranged in a grid to approximate the relative positions on the national U.S. map.

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County-Level Prevalence and Incidence of Diagnosed Diabetes Among Adults Aged 20 Years or Older

Data Sources

- Behavioral Risk Factor Surveillance System (BRFSS), National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention.
- Annual County and Puerto Rico Municipio Resident Population Estimates by Selected Age Groups and Sex, Population Division, U.S. Census Bureau.
- United States Diabetes Surveillance System (USDSS), National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention.

Definitions

Diagnosed diabetes: BRFSS respondents who answered "yes" to the question, "Has a doctor ever told you that you have diabetes?" Women who reported diabetes only during pregnancy were excluded from this group.

Newly diagnosed diabetes: BRFSS respondents with diagnosed diabetes were asked their age at diagnosis. Those who reported diagnosed diabetes and whose age at the time of the survey minus the age they provided to the question, "How old were you when you were told you have diabetes?" was less than 1 year. If the difference was between 1 and 2 years, the person was weighted as half a newly diagnosed case.

Calculations

To produce incidence rates of newly diagnosed diabetes, adults who were diagnosed more than 3 years ago were excluded from the denominator. To be consistent with U.S. Census Bureau population estimates, estimates were restricted to adults aged 20 years or older. The U.S. Census Bureau provides county-level population estimates by demographic characteristics, including age, sex, race, and Hispanic origin, for each year.

County-level estimates for the over 3,100 counties or county equivalents (e.g., parish, borough, municipality) in the 50 U.S. states and the District of Columbia were based on indirect model-dependent estimates using Small Area Estimation (SAE) techniques. SAE uses statistical models to "borrow strength" from related areas—such as other counties or states—and auxiliary data sources to generate reliable estimates, particularly when county-level sample sizes are too small or nonexistent.

In 2020 and 2023, the Division of Diabetes Translation published updated SAE methodologies known as PLOW (psuedo log weights) and BBZ (Bayesian binomial zero-inflated) model for county-level prevalence and incidence estimates, respectively. County-level prevalence was based on design-assisted model-based estimation using the PLOW-PLCM ensemble technique. It uses single-year BRFSS data rather than combining years, j2 resampled weights and census data by center information, proxy power proxy, 3 the integration of both sample weight to accept BFG0.5 samples, toy larger and, etc. more time estimates with similar variance. In 2025, all county-level prevalence estimates were recalculated using an enhanced version of the PLOW method (i.e., PLOW+) incorporating a nearest neighbor machine-learning approach to improve estimates. The BBZ method further enhances the accuracy of incidence estimates by efficiently handling case event counts of newly diagnosed cases at the county level.

Estimates were age-adjusted to the 2000 U.S. standard population using age groups 20-44, 45-64, and 65 years or older. County estimates were not available for U.S. territories. Data were classified according to natural breaks using the Jenks optimization method. Classes are created based on natural groupings inherent in the data that maximize within-class differences and maximize

between-class differences. When using this method, five distinct classes were pre-specified and data from all years were aggregated so the classes were the same across all years.

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Incidence of Diagnosed Diabetes Among Adults Aged 18 Years or Older

Data Sources

- 2021-2023 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.
- August 2021-August 2023 National Health and Nutrition Examination Survey (NHANES), National Center for Health Statistics, Centers for Disease Control and Prevention.
- Annual Estimates of the Resident Population by Sex, Single Year of Age, Race, and Hispanic Origin for the United States: April 1, 2020, to July 1, 2023, Population Division, U.S. Census Bureau.

Methods

The rate of new cases of diabetes was calculated using 2023 NHIS data on respondents' age at diagnosis and age at interview. Three-year averages of 2021-2023 NHIS were used to improve the precision of estimates by race and ethnicity and education level. Adults who reported being diagnosed with diabetes were asked at what age they were diagnosed. The number of years since diagnosis was calculated by subtracting the person's age at diagnosis from the person's current age. Adults who had a value of zero were identified as having been diagnosed with diabetes within the last year. In addition, half of the adults who had a value of one were classified as having been diagnosed within the last year. To calculate the incidence, the numerator included the number of adults who were diagnosed with diabetes within the last year. The denominator was the estimate of the adult population, excluding those who had been diagnosed for more than 1 year and those who were categorized on the NHIS as "refused" or "don't know" or who had missing values on the diabetes status question.

To estimate the number of newly diagnosed cases of diabetes for adults in 2023, the age-, sex-, and race and ethnicity-specific rates of new cases from three-way cross-tabulations of 2021-2023 NHIS data were applied to the corresponding July 1, 2023, U.S. resident population estimates from the U.S. Census Bureau after excluding the number of adults who had been diagnosed with diabetes for more than 1 year, estimated from NHANES. These subgroup-specific numbers of adults were summed to obtain the estimated number of adults with newly diagnosed diabetes for the following groups: total population; age groups 18-44, 45-64, and 65 years or older; men and women; non-Hispanic White, non-Hispanic Black, non-Hispanic Asian, and Hispanic adults; and metropolitan and method to the 2000 U.S. Census standard population, using age groups 18-44, 45-64, and 65 years or older.

Trends in Age-Adjusted Incidence of Diagnosed Diabetes Among Adults Aged 18 Years or Older

Data Source

- 2000-2023 National Health Interview Survey (NHIS), National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention.

Methods

The same method used to calculate 2023 incidence was also applied to 2000-2023 NHIS data. For every year from 2000 to 2023, age-adjusted incidence of diagnosed diabetes was calculated among adults aged 18 years or older by the direct age standardization to the 2000 U.S. Census standard population, using age groups 18-44, 45-64, and 65 years or older. NCHS redesigned the NHIS in 2019, which may have affected estimates. Joinpoint regression was used to evaluate varying trends in annual age-adjusted incidence estimates. This trend analysis used the age-adjusted estimates and permutation tests to identify a maximum of three points where linear trends in incidence changed significantly in either direction or magnitude.

Reference

National Cancer Institute. Joinpoint Trend Analysis Software. Available at: https://surveillance.cancer.gov/joinpoint/ (https://surveillance.cancer.gov/joinpoint/). Accessed August 2025.

Incidence of Diabetes Among Children and Adolescents

Data Sources

- 2020-2022 Diabetes in Children, Adolescents, and Young Adults (DiCAYA) Network, the DiCAYA Study Group.
- Annual Estimates of the Resident Population by Age, Sex, Race, and Hispanic Origin for the United States: April 1, 2020, to July 1, 2023, Population Division, U.S. Census Bureau.
- Data from the DiCAYA Network were used to estimate the incidence of diabetes in youth aged less than 18 years. Five clinical centers provided electronic health record (EHR) data for children and adolescents in the DiCAYA Network. Two of these centers were geographically based and ascertained data from multiple health systems, provider networks, and data warehouses within a geographically defined population. The other three were health system centers that either leveraged data exclusively from their own EHR systems or some combination of EHR systems that comprise a clinical research network or research consortium.
- Diabetes cases were identified using a validated EHR-based computable phenotype: having at least one diabetes diagnosis from clinical encounters. Diabetes type was based on the ratio of type-specific diagnosis codes in the EHR. Children and adolescents who had residential addresses within each center's catchment area and met the computable phenotype for the first time in the index year were considered incident diabetes cases. Health system centers limited determination of incident cases to children and adolescents with at least one medical encounter at least 2 years prior to the first diabetes diagnosis code in the index year. Geographic centers applied census-based denominators representative of their predefined administrative catchment areas (state level), and health system centers relied on utilization denominators. Incidence was estimated according to diabetes type across the network by aggregating the center-specific incident cases and denominators. The incidence rates derived from the network were then attributed to the 2022 age-eligible census population for the nation to estimate the annual number of newly diagnosed diabetes cases in the United States.

References

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Prevalence and Awareness of Prediabetes Among People Aged 18 Years or Older

Data Sources

- August 2021-August 2023 National Health and Nutrition Examination Survey (NHANES), National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention.
- Annual Estimates of the Resident Population by Single Year of Age and Sex for the United States: April 1, 2020, to July 1, 2023, Population Division, U.S. Census Bureau.

Methods

The percentage of adults aged 18 years or older with prediabetes was estimated using August 2021-August 2023 NHANES data. People without diabetes were classified as having prediabetes if they had fasting plasma glucose (FPG) values of 100 to <126 mg/dL or A1C values of 5.7% to 6.4%. In addition to this definition, prediabetes estimates according to other definitions were calculated using more stringent glycemic criteria.

A1C was measured and standardized to the Diabetes Control and Complications Trial method. FPG was measured among a subset of participants who fasted 8 or less than 24 hours. Where applicable, FPG data were calibrated using the forward regression method provided by NCHS. This calibration included adjustments to the FPG measurements in the 1999-2014 cycles to account for changes to the laboratory method, equipment, or site. People with missing values for either FPG or A1C and pregnant women were excluded.

To estimate the number of adults with prediabetes, the age-, sex-, and race and ethnicity-specific percentages from three-way cross-tabulations were applied to the corresponding July 1, 2023, U.S. resident population estimates from the U.S. Census Bureau. These subgroup-specific numbers of adults were summed to obtain the estimated number of adults with prediabetes for the following: total population; age groups 18-44, 45-64, and 65 years or older and above; and race/ethnicity: Non-Hispanic White, non-Hispanic Black, non-Hispanic Asian, and Hispanic.

Among those who tested positive for prediabetes, awareness was defined as (1) answered "yes" to the question, "Have you ever been told by a doctor or other health professional that you have any of the following: prediabetes, impaired fasting glucose, impaired glucose tolerance, borderline diabetes or that your blood sugar is higher than normal but not high enough to be called diabetes or sugar diabetes?" or (2) reported having prediabetes or borderline diabetes when asked whether they had diabetes and did not report "yes" to ever having been diagnosed with diabetes.

Age-adjusted prevalence of prediabetes was calculated among adults aged 18 years or older by sex, race and ethnicity, and education level by the direct age standardization to the 2000 U.S. Census standard population, using age groups 18-44, 45-64, and 65 years or older. Joinpoint regression was used to analyze varying trends in annual age-adjusted prevalence estimates. This analysis used the age-adjusted estimates and permutation tests to identify a maximum of three points where linear trends in prediabetes prevalence changed significantly in either direction or magnitude.

Additional Resource

See **Analysis Note (#)** on the Estimation of National Total Diabetes, Undiagnosed Diabetes and Prediabetes Prevalence.

References

American Diabetes Association. Standards of medical care in diabetes—2025. Diabetes Care. 2024:48(suppl 1).

National Health and Nutrition Examination Survey. 2021-2023 Data Documentation, Codebook, and Frequencies. Available at: https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2021/DataFiles/GLU_L.htm (https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2021/DataFiles/GLU_L.htm). Accessed August 2025.

Prevalence of Prediabetes Among Adolescents Aged 12-17 Years

Data Sources

- 1999-August 2023 National Health and Nutrition Examination Survey (NHANES), National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention.
- Annual Estimates of the Resident Population by Single Year of Age and Sex for the United States: April 1, 2020, to July 1, 2023, Population Division, U.S. Census Bureau.

Methods

The percentage of adolescents aged 12-17 years with prediabetes was estimated using 1999-August 2023 NHANES data. Adolescents without diabetes were classified as having prediabetes if they had fasting plasma glucose (FPG) values of 100 to <126 mg/dL or A1C values of 5.7% to 6.4%. Those with missing values for either FPG or A1C values were excluded. FPG data were calibrated using the forward regression method provided by NCHS. This calibration included adjustments to the FPG measurements in the 1999-2014 cycles to account for changes to the laboratory method, equipment, or site. Previously published prediabetes estimates among U.S. adolescents (Andes et al. 2020) used the backward glucose data adjustment method and combined several years of data for sex-variable estimates.

To obtain reliable sample for the estimation of prediabetes prevalence among U.S. adolescents, NHANES cycles were combined (1999-2006, 2005-2010, 2011-2016, 2017-August 2023). NCHS recommends comparison across combined cycle periods when making August 2021-August 2023 and earlier cycles; however, 2 and 3-year estimates of prediabetes prevalence among adolescents are highly variable. Prevalence differences between cycles were found for 2017-March 2020 and August 2021-August 2023 that were statistically significant, yet implausible, especially given changes in some health-related behaviors and disruptions in healthcare utilization and education during the COVID-19 pandemic. Data were suppressed from appropriate using the NCHS data presentation standards for proportions. Estimates are shown when they meet the requirements for

statistical reliability. Otherwise, the data are suppressed. Prevalence estimates for 2017-August 2023 were applied to the July 1, 2023, U.S. Census to obtain population estimates.

Additional Resource

See **Analysis Note (#)** on the Estimation of National Total Diabetes, Undiagnosed Diabetes and Prediabetes Prevalence.

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Risk Factors for Diabetes-Related Complications

Data Source

- August 2021-August 2023 National Health and Nutrition Examination Survey (NHANES), National Center for Health Statistics, Centers for Disease Control and Prevention.

Methods

The percentages of adults aged 18 years or older with diagnosed diabetes who had selected risk factors were estimated using the following definitions:

Smoking

Current cigarette smoking status was based on self-report. Former cigarette smoker was based on both (1) no current tobacco use and (2) a history of smoking at least 100 cigarettes in a lifetime. At the time of analysis, cotinine data was not available.

Overweight and Obesity

Overweight and obesity were classified according to body mass index of 25.0-29.9 kg/m^2 (overweight), 30.0-39.9 kg/m^2 (obesity), or 40.0 kg/m^2 or higher (extreme obesity) calculated from measured values of height and weight.

Physical Inactivity

Physical inactivity was based on self-report of less than 10 minutes per week of moderate or vigorous activity in each of the physical activity categories of work, leisure time, and transportation.

High Blood Pressure

High blood pressure was based on average measured systolic blood pressure of 130 mmHg or higher or the average diastolic blood pressure of 80 mmHg or higher or self-reported current use of prescription medication for high blood pressure.

High non-HDL Cholesterol

Non-high-density lipoprotein cholesterol (non-HDL) contains all the atherogenic lipoproteins, including low-density lipoprotein cholesterol (LDL), very-low-density lipoprotein, lipoprotein(a), and others. Growing evidence supports non-HDL as a better predictor of cardiovascular disease risk than LDL. Non-HDL was calculated as measured total cholesterol level minus HDL cholesterol level. A non-HDL cholesterol value of 130 mg/dL is roughly equivalent to an LDL level of >100 mg/dL, which indicates an increased risk of diabetes-related complications and eligibility for statin therapy.

Poor Glycemic Control

Poor glycemic control of a person with diabetes was defined as a person with A1C values higher than 9%.

References

American Diabetes Association. Standards of medical care in diabetes—2025. Diabetes Care. 2024;48(suppl 1).

Handelsman Y, Jellinger PS, Guerin CK, Bloomgarden ZT, Brinton EA, et al. Consensus Statement by the American Association of Clinical Endocrinologists and American College of Endocrinology on the Management of Dyslipidemia and Prevention of Cardiovascular Disease Algorithm—2020 Executive Summary. Endocr Pract. 2020 Oct;26(10):1196-1224.

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Preventing Diabetes-Related Complications

Data Sources

- August 2021-August 2023 National Health and Nutrition Examination Survey (NHANES), National Center for Health Statistics, Centers for Disease Control and Prevention.
- 2023 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.

Methods

The percentages of adults aged 18 years or older with diagnosed diabetes who had selected protective factors were estimated using NHANES data unless otherwise specified using the following definitions:

Usual Source for Health Care

Self-report of having no usual care place to go for health care.

Physical Activity

Self-report of meeting the recommended physical activity goal was based on having at least 150 minutes per week of leisure-time physical activity.

Weight Management

Self-report of trying to lose weight in the past 12 months.

Cholesterol Treatment

Self-report of taking any medication prescribed by a doctor to lower blood cholesterol among adults aged 40-75 years with diagnosed diabetes.

A1C, Blood Pressure, Cholesterol, and Smoking (ABCs)

The ABCs definition was based on meeting all the following criteria: A1C value <7.0%; blood pressure <130/80 mmHg; non-HDL cholesterol <130 mg/dL; and being a nonsmoker. A less stringent ABCs definition was based on meeting all the following criteria: A1C value <8.0%; blood pressure <140/90 mmHg; non-HDL cholesterol <160 mg/dL; and being a nonsmoker.

ABC tests

Receipt of a blood test for A1C, a blood pressure examination, or a blood test for cholesterol or receipt of all three recommended ABC tests by a health professional in the past year was based on self-reported data from NHIS.

Vaccinations

Receipt of an influenza vaccination in the past year and receipt of a COVID-19 (including number of COVID-19 vaccinations), hepatitis B, or pneumococcal vaccination ever was based on self-reported data from NHIS.

References

American Diabetes Association. Standards of medical care in diabetes—2025. Diabetes Care. 2024;48(suppl 1).

Handelsman Y, Jellinger PS, Guerin CK, Bloomgarden ZT, Brinton EA, et al. Consensus Statement by the American Association of Clinical Endocrinologists and American College of Endocrinology on the Management of Dyslipidemia and Prevention of Cardiovascular Disease Algorithm—2020 Executive Summary. Endocr Pract. 2020 Oct;26(10):1196-1224.

American Association of Clinical Endocrinologists and American College of Endocrinology guidelines for the management of dyslipidemia and prevention of cardiovascular disease. Endocr Pract. 2017;23(suppl 2).

Coexisting Conditions and Complications Among Adults Aged 18 Years or Older with Diabetes

Data Sources

- 2020-2021 National Inpatient Sample (NIS), Agency for Healthcare Research and Quality.
- 2020-2021 Nationwide Emergency Department Sample (NEDS), Agency for Healthcare Research and Quality.
- 2020-2021 National Health Interview Survey (NHIS), National Center for Health Statistics, Centers for Disease Control and Prevention.
- 2017-March 2020 National Health and Nutrition Examination Survey (NHANES), National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention.
- 2021 United States Renal Data System (USRDS) Annual Report, National Institute of Diabetes and Digestive and Kidney Diseases.
- 2023 Behavioral Risk Factor Surveillance System (BRFSS), National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention.

Methods

The number of emergency department (ED) visits for hypoglycemia (blood glucose <70 mg/dL) and hyperglycemic crisis in 2020 and 2021 were calculated using NEDS. Hyperglycemic crisis includes diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar syndrome (HHS). DKA is characterized by hyperglycemia (blood glucose >250 mg/dL), metabolic acidosis, and increased blood ketone concentration. HHS is characterized by severe hyperglycemia (blood glucose >600 mg/dL), hyperosmolarity, and dehydration without ketoacidosis.

The types of discharge dispositions for a patient visiting ED included the proportion of patients who visited the ED and were treated and released; were admitted to a hospital; were transferred to another hospital; were transferred to a skilled nursing facility, an intermediate care facility, or home with home health care; left against medical advice; died; or had an unknown disposition but were not admitted to a hospital. The number of hospitalizations for major cardiovascular diseases, lower-extremity amputation, hyperglycemic crisis and hypoglycemia in 2020 and 2021 were calculated

using the NIS data. Crude rates were calculated using the proportion of the population with diabetes using the NHIS data.

Prevalence of chronic kidney disease (CKD) stages 1 to 4 among U.S. adults aged 18 years or older with diagnosed diabetes was calculated using laboratory data from the August 2021 to August 2023 NHANES and the 2021 CKD Epidemiology Collaboration (CKD-EPI) equations for estimated glomerular filtration rate (eGFR). The updated 2021 equation was based on serum creatinine, age, and sex only. People with missing values for serum creatinine and pregnant women were excluded.

CKD awareness was based on self-report among adults with eGFR levels 15 to <60 mL/min/1.73 m^2 (i.e., moderate to severe CKD stages 3-4). Data on the numbers of people with end-stage kidney disease by primary cause (diabetes, high blood pressure, and glomerulonephritis) were obtained from the USRDS Annual Report Reference Tables.

Prevalence of vision disability, defined as severe vision difficulty or blindness, was calculated using self-reported data from the 2023 BRFSS.

Data were suppressed when appropriate using the NCHS data presentation standards for proportions. Estimates are shown when they meet the requirements for statistical reliability.

References

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Inker LA, Eneanya ND, Coresh J, et al., Chronic Kidney Disease Epidemiology Collaboration. New creatinine- and cystatin C-based equations to estimate GFR without race. N Engl J Med. 2021;385(19):1737-1749. doi: 10.1056/NEJMoa2102953 (https://doi.org/10.1056/NEJMoa2102953)

Levey AS, Stevens LA, Schmid CH, et al; Chronic Kidney Disease Epidemiology Collaboration. A new equation to estimate glomerular filtration rate. Ann Intern Med. 2009;150(9):604-12.

Johansen KL, Chertow GM, Foley RN, et al. U.S. Renal Data System 2020 annual data report: epidemiology of kidney disease in the United States. Am J Kidney Dis. 2021;77(4)(suppl 1):Svii-Sviii, S1-S597.

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Analysis Note

Estimation of National Total Diabetes, Undiagnosed Diabetes and Prediabetes

Prevalence

This Analysis Note outlines the key definitions, data sources, and analytic procedures used to generate national estimates of prediabetes and diabetes. Limitations such as survey design changes and potential misclassification are noted. Key parameters, assumptions, and references are provided so others can replicate estimates and compare results across populations and time periods.

Overview of the NHANES Database and Analytic Considerations

The **National Health and Nutrition Examination Survey (NHANES)** is a nationally representative, cross-sectional survey administered by the National Center for Health Statistics (NCHS). Data are released in 2-year cycles and include information on the health and nutritional status of the U.S. civilian noninstitutionalized population. Participants are interviewed at home and subsequently receive a physical examination and laboratory testing in a mobile examination center.

NHANES employs a complex, multistage probability sampling design that includes stratification, clustering, and unequal probabilities of selection. To produce nationally representative estimates and valid standard errors, analysts must apply **sampling weights** and account for the survey design using **strata** and **primary sampling units (PSUs)**. Each survey cycle page contains documentation and links to each of the primary component pages (i.e., Demographics, Dietary, Examination, Laboratory, Questionnaire). Each component has different data collection methods and corresponding weight requirements.

More details are available on NCHS's website: https://wwwn.cdc.gov/nchs/nhanes/Default.aspx (https://wwwn.cdc.gov/nchs/nhanes/Default.aspx).

Key Considerations for Estimates of Diabetes Prevalence

Below are key considerations and decisions for estimating U.S. diabetes prevalence and related outcomes using NHANES data:

Data exclusions

- **Fasting status:** Reasonable fasting hours for lab measures are defined as 8 or more hours and less than 24 hours. Cases outside of these values or with missing fasting time data are excluded from analyses.
- **Pregnancy status:** NHANES determines current pregnancy status using self-report and/or urine pregnancy testing. Pregnant females are excluded from analyses. Beginning with the 2007-2008 cycle, pregnancy-based exclusions were limited to females aged 20-44 years, as NHANES publicly releases pregnancy status data only for this age group.
- **Undetermined diabetes status:** Individuals without self-reported diagnosed diabetes were excluded if both A1C and FPG were missing, or if one lab value was in the normal range and the other was missing, such that diabetes or prediabetes could not be ruled out.

Lab correction for fasting plasma glucose (FPG) values

- **FPG data needs adjustment when combining data cycles prior to 2017** due to variations in lab methods, equipment, and calibration procedures across survey periods. CDC's National Diabetes Statistics Report now applies **forward bridging equations** provided by NCHS,

whereas previous estimates applied backward bridging equations. This change is for consistency with other estimates released by different centers within CDC and specifically with NCHS. Therefore, current estimates should not be compared to those from previous reports. The latest National Diabetes Statistics Report will provide trends using the updated method. Table 1 shows standardization across cycles using forward bridging equations.

Table 1. NHANES Fasting Plasma Glucose Methods and Comparability to Latest Continuous NHANES Cycles (Forward Bridging Equations)

NHANES Cycle	Method/Kit	Equations and Assumptions About Comparability of Methods
1999-2000	Roche Cobas Mira /Hexokinase/Missouri	$FPG_{1999\text{-}2000\ Method} = FPG_{2001\text{-}2002\ Method} = FPG_{2003\text{-}2004\ Method}$ $FPG_{2021\text{-}2023\ Method} = 1.023*((0.9815*FPG_{1999\text{-}2000} + 3.5707) + 1.148) - 0.5108$
2001-2002	Roche Cobas Mira /Hexokinase/Missouri	$FPG_{2001\text{-}2002\ Method} = FPG_{2003\text{-}2004\ Method}$ $FPG_{2021\text{-}2023\ Method} = 1.023*((0.9815*FPG_{2001\text{-}2002} + 3.5707) + 1.148) - 0.5108$
2003-2004	Roche Cobas Mira /Hexokinase/Missouri	$FPG_{2021\text{-}2023\ Method} = 1.023*((0.9815*FPG_{2003\text{-}2004} + 3.5707) + 1.148) - 0.5108$
2005-2006	Roche/Hitachi 911 /Hexokinase/Minnesota	$FPG_{2021\text{-}2023\ Method} = 1.023*(FPG_{2005\text{-}2006} + 1.148) - 0.5108$
2007-2008	Roche Modular P /Hexokinase/Minnesota	$FPG_{2007\text{-}2008\ Method} = FPG_{2009\text{-}2010\ Method} = FPG_{2011\text{-}2012\ Method} = FPG_{2013\text{-}2014\ Method}$ $FPG_{2021\text{-}2023\ Method} = 1.023*FPG_{2007\text{-}2008} - 0.5108$
2009-2010	Roche Modular P /Hexokinase/Minnesota	$FPG_{2009\text{-}2010\ Method} = FPG_{2011\text{-}2012\ Method} = FPG_{2013\text{-}2014\ Method}$ $FPG_{2021\text{-}2023\ Method} = 1.023*FPG_{2009\text{-}2010} - 0.5108$
2011-2012	Roche Modular P /Hexokinase/Minnesota	$FPG_{2011\text{-}2012\ Method} = FPG_{2013\text{-}2014\ Method}$ $FPG_{2021\text{-}2023\ Method} = 1.023*FPG_{2011\text{-}2012} - 0.5108$
2013-2014	Roche Cobas C501 /Hexokinase/Missouri	$FPG_{2021\text{-}2023\ Method} = 1.023*FPG_{2013\text{-}2014} - 0.5108$
2015-2016	Roche Cobas C311 /Hexokinase/Missouri	$FPG_{2021\text{-}2023\ Method} = FPG_{2017\text{-}2020\ Method} = FPG_{2015\text{-}2016\ Method}$
2017-2020	Roche Cobas C311 /Hexokinase/Missouri	$FPG_{2021\text{-}2023\ Method} = FPG_{2017\text{-}2020\ Method}$
2021-2023	Roche Cobas C311 /Hexokinase/Missouri	$FPG_{2021\text{-}2023\ Method}$ = Reference

SAS code for standardizing FPG data across cycles

```
/*************************************************************************************
* When combining data cycles, including data prior to 2017, include the
following  *
* program in the data step to calibrate fasting plasma glucose data (FPG)
across   *
```

```
* combined data cycles using forward bridging
equations.                          *
*********************************************************************************/
/* Forward regression method (FPG)*/
if SDDSRVYR in (1,2,3) then FPG=1.023*((0.9815*LBXGLU + 3.5707) + 1.148) - 0.5108;
    else if SDDSRVYR in (4) then FPG=1.023*(LBXGLU + 1.148) - 0.5108;
    else if SDDSRVYR in (5,6,7,8) then FPG=1.023*LBXGLU - 0.5108;
    else if SDDSRVYR ge 9 then FPG=LBXGLU;
run;
```

Defining diabetes and prediabetes status

Diabetes status was classified using a hierarchical algorithm consistent with American Diabetes Association diagnostic criteria.6 Classification proceeded sequentially, with individuals assigned to the first applicable category:

1. Diagnosed diabetes
    - Individuals with self-reported diagnosed diabetes, independent of lab values
2. Undiagnosed diabetes
    - Among individuals without self-reported diagnosed diabetes (including responses of "no," "borderline," "don't know/refused,'Section" or missing), those with either A1C≥6.5 or FPG≥126.
    - Classification was based on any available lab value; both measures were not required.
3. Prediabetes
    - Among individuals without self-reported diagnosed diabetes and without lab evidence of diabetes, those with either 5.7≤A1C<6.5 or 100≤FPG<126. Either lab value was sufficient for classification.
4. Normal glycemic status
    - Among individuals without self-reported diagnosed diabetes and without lab evidence of diabetes or prediabetes, those with both 0<A1C<5.7 and 0<FPG<100. Both values were required to confirm normal glycemic status.

Exclusions: Individuals without self-reported diagnosed diabetes were excluded if both A1C and FPG were missing, or if one lab value was in the normal range and the other was missing, such that diabetes or prediabetes could not be ruled out.

SAS Code for defining diabetes status

```
/*********************************************************************************
* Include the following program in the data step to code diabetes status
(DM4_FPGA1C)  *
* based on self-reported diagnosed diabetes, then A1C and FPG lab values. Status
codes *
* are 1: diagnosed diabetes, 2: undiagnosed diabetes, 3: prediabetes, 4: non-
diabetes, *
* and .
(missing).                                                                    *
*********************************************************************************/
*Self-reported diabetes (DM2);
IF DIQ010 IN (1,2,3) THEN DM2=(DIQ010=1);

*Diabetes status based on A1C;
if DM2=1 then DM4_A1C=1;
    else if FAST=1 and 6.5<=A1C then DM4_A1C=2;
    else if FAST=1 and 5.7<=A1C<6.5 then DM4_A1C=3;
```

```
    else if FAST=1 and 0<A1C<5.7 then DM4_A1C=4;

*Diabetes status based on FPG;
if DM2=1 then DM4_FPG=1;
    else if FAST=1 and 126<=FPG then DM4_FPG=2;
    else if FAST=1 and 100<=FPG<126 then DM4_FPG=3;
    else if FAST=1 and 0<FPG<100 then DM4_FPG=4;

*Diabetes status based on A1C or FPG;
if DM2=1 then DM4_FPGA1C=1;
    else if DM4_A1C=2 or DM4_FPG=2 then DM4_FPGA1C=2;
    else if DM4_A1C=3 or DM4_FPG=3 then DM4_FPGA1C=3;
    else if DM4_A1C=4 and DM4_FPG=4 then DM4_FPGA1C=4;
run;
```

Prediabetes status and prediabetes awareness

1. **Prediabetes** is defined based on lab values only.
2. **Prediabetes awareness** is based on self-reported prediabetes among those with lab-defined prediabetes.

Sampling weights

Diabetes prevalence estimates integrate information from different NHANES components: diagnosed diabetes is identified from questionnaire data collected in the full interview sample, while undiagnosed diabetes and prediabetes are identified from laboratory measures collected in the examination and fasting subsamples. Accordingly, component-specific prevalence estimates were calculated using the appropriate NHANES sample weights for each data source (interview weights for diagnosed diabetes; MEC, phlebotomy, or fasting subsample weights for laboratory-defined diabetes). These component-specific estimates were then combined analytically to derive total diabetes prevalence, rather than by pooling participants with different weights into a single analytic sample. This approach is consistent with CDC methodological evaluations of combined weight estimation strategies for diabetes surveillance (see FAQ for additional detail). As noted in prior evaluations, this approach may result in modestly larger variance than replicate-weight methods but preserves information from all relevant NHANES components.

Prevalence and population estimates using pooled data

When pooling data across multiple NHANES release cycles to generate **prevalence estimates**, prevalence is assumed to be constant over the pooled survey period. For each pooled prevalence estimate, a **single annual population estimate** is calculated by applying that prevalence (i.e., the percentage from a single or combined set of NHANES cycles) to the U.S. resident population estimate from the U.S. Census Bureau for the **one selected year of estimation** (typically the most recent year available). Population estimates are not generated for multiple years from the same pooled prevalence estimate.

Analysis Examples

This section shows selected analysis examples. Table 2 provides information on NHANES variables used in selected examples.

Table 2: NHANES Variables Used in Analysis Examples

NHANES Variable	Variable Type and Definition	Code Values	NHANES Data Component
SDDSRVYR	Numeric; data release cycle	1-9: NHANES 1999-2000 to 2015-2016 66: NHANES 2017-2020 12: NHANES August 2021-August 2023	(Demographics; all data cycles)
SDMVSTRA	Numeric; masked variance pseudo-stratum	Range of Values	(Demographics; all data cycles)
SDMVPSU	Numeric; masked variance pseudo-PSU	Range of Values	(Demographics; all data cycles)
WTINTPRP	Numeric; full sample interview weight	Range of Values	(Demographics; 2017-2020)
WTSAFPRP	Numeric; fasting subsample weight	Range of Values	(Laboratory; 2017-2020)
WTINT2YR	Numeric; full sample 2-year interview weight	Range of Values	(Demographics; all data cycles, excluding 2017-2020)
WTSAF2YR	Numeric; fasting subsample 2-year MEC weight	Range of Values	(Laboratory; all data cycles, excluding 2017-2020)
WTMEC2YR	Numeric; MEC 2-year weight	Range of Values	(Laboratory; all data cycles, excluding 2021-2023)
WTPH2YR	Numeric; Phlebotomy 2-year weight	Range of Values	(Laboratory; 2021-2023)
RIDAGEYR	Numeric; age in years at screening	0 to 79: Range of Integer Values 80: 80 years of age and over . : Missing	(Demographics; all data cycles)
RIDEXPRG	Categorical; pregnancy status for females aged 20-44 years at time of MEC exam	1: Yes, positive lab pregnancy test or self-reported pregnant at exam 2: Not pregnant at exam 3: Cannot ascertain if pregnant at exam . : Missing	(Demographics; all data cycles)
PHAFSTHR	Numeric; total length of “food fast” (hours)	Range of Values . : Missing	(Laboratory; all data cycles)
DIQ010	Categorical; doctor told you have diabetes	1: Yes; 2: No; 3: Borderline >3: Refused or don’t know . : Missing	(Questionnaire; all data cycles)

LBXGLU	Numeric; glucose, plasma (mg/dL)	Range of Values > 0 0: No lab result or PHAFSTHR < 8 or ≥ 24 . : Missing	(Laboratory; all data cycles)
LBXGH	Numeric; glycohemoglobin (%)	Range of Values > 0 0: No lab result or PHAFSTHR < 8 or ≥ 24 . : Missing	(Laboratory; all data cycles)

Example 1: Prediabetes in Youth (Crude Prevalence)

The estimated crude prevalence of prediabetes among U.S. adolescents (12- to 17-year-olds) in 2023 was 8.4 million or 32.7% of the U.S. adolescent population. This estimate was based on data from two cycles: 2017-2020 (January 2017 through March 2020) and 2021-2023 (August 2021 through August 2023).

SAS Code for Data Step

```
/** Combine cycles of data (1999-2000 through 2015-2016, 2017-2020 and 2021-2023)
**/
data data_all;
set data_9900 data_0102 data_0304
    data_0506 data_0708 data_0910
    data_1112 data_1314 data_1516
    data_1720 data_2123;

/** Set variable (PERIOD) for pooled data cycles 1: 1999-2000 through 2003-2004,
    2: 2005-2006 through 2009-2010, 3: 2011-2012 through 2015-2016, 4: 2017-2020
and 2021-2023; **/
if SDDSRVYR in (1,2,3) then PERIOD=1;
else if SDDSRVYR in (4,5,6) then PERIOD=2;
else if SDDSRVYR in (7,8,9) then PERIOD=3;
else if SDDSRVYR in (12,66) then PERIOD=4;

/** Domain variable for ages 12-17 (DOMAIN_12_17) **/
if 12 <= RIDAGEYR <= 17 then DOMAIN_12_17 = 1;
    else DOMAIN_12_17 = 0;

/** Define binary variable FAST for exclusion criteria based on fasting status
(reasonable fasting hours); **/
FAST=(8 LE PHAFSTHR LT 24);

/** A1C variable **/
A1C=LBXGH;

/** Include code for calibrating fasting plasma glucose (FPG) data across combined
data cycles, provided above **/

/** Include code for defining diabetes status (DM4_FPGA1C), provided above **/

/** Create new sample weight (WT6YR) for pooled survey cycles using [full sample
    interview weight] for cases where diabetes status was coded based on self-
reported
```

```
    diabetes diagnosis during interview. Using MEC, phlebotomy, or fasting
subsample
    weights for remainingcases where diabetes status was coded based on lab values.
**/
if SDDSRVYR in (1,2) then do;
    MORN6YR=WTSAF4YR*(2/3);
    MEC6YR=WTMEC4YR*(2/3);
    INT6YR=WTINT4YR* (2/3);
end;
if SDDSRVYR in (3,4,5,6,7,8,9) then do;
    MORN6YR=WTSAF2YR/3;
    MEC6YR=WTMEC2YR/3;
    INT6YR=WTINT2YR/3;
end;
if SDDSRVYR=66 then do;
    MORN6YR=WTSAFPRP*3.2/5.2;
    MEC6YR=WTMECPRP*3.2/5.2;
    INT6YR=WTINTPRP*3.2/5.2;
end;
if SDDSRVYR=12 then do;
    MORN6YR=WTSAF2YR*2/5.2;
    INT6YR=WTINT2YR*2/5.2;
    PH6YR=WTPH2YR*2/5.2;
end;

if SDDSRVYR in (1,2,3,4,5,6,7,8,9,66) then LAB6YR=MEC6YR;
if SDDSRVYR in (12) then LAB6YR=PH6YR;

/** --------- Composite weight For 6-year periods; --------- **/
if DM4_FPGA1C=1 then WT6YR=INT6YR;
    else if DM4_FPGA1C ne 1 and DM4_A1C=2 then WT6YR=LAB6YR;
    else if DM4_FPGA1C ne 1 and MORN6YR>=0 then WT6YR=MORN6YR;
    else if DM4_FPGA1C ne 1 and MORN6YR=. then WT6YR=0;

/** Define Prediabetes (PREDM) **/
if DM4_FPGA1C ne . then PREDM=(DM4_FPGA1C in (3));
run;
```

SUDAAN code for prevalence analysis

```
/*****************************************************************************
* The following program produces a table with weighted proportions (95%
confidence  *
* intervals) of estimated number of adolescents (age 12-17) with prediabetes
across *
* the pooled period 2017-2020 and 2021-
2023.                                          *
*****************************************************************************/
/** For Table_12-17 prediabetes prevalence crude, 4 time periods **/
proc sort data=data_all;
    by PERIOD SDMVSTRA SDMVPSU;
run;

proc descript data=data_all;
nest PERIOD SDMVSTRA SDMVPSU/psulev=3 missunit;
    weight WT6YR;
    subpopn DOMAIN_12_17=1;
```

```
class PERIOD PREDM;
tables PERIOD;
var PREDM PREDM;
catlevel 1 0;
run;
```

Calculating estimated number of adolescents with prediabetes

To calculate the crude estimated prevalence of adolescents age 12-17 with prediabetes in 2023, multiply the resulting estimated prevalence (32.7%) by the July 1, 2023, U.S. resident population estimate for 12- to 17-year-olds (25,676,894) from the U.S. Census Bureau.

$$0.327 \times 25{,}676{,}894 = 8{,}396{,}344$$

For reporting, this is rounded to 8.4 million.

Example 2: Diabetes in Adults (Age-Standardized Prevalence)

The estimated age-adjusted prevalence of diabetes among U.S. adults (aged 18+) was 13.8% of the U.S. adult population. This estimate was based on data from the 2021-2023 cycle (August 2021 through August 2023).

SAS Code for Data Step

```
data data2_2123;
set data_2123;

/** Domain for adults 18+ (ADULT) **/
if RIDAGEYR > 17 then ADULT = 1;
    else ADULT = 0;

/** Define 3 age category variable for standardized age proportions (AGE3CAT) **/
AGE3CAT=1+(RIDAGEYR GE 18)+(RIDAGEYR GE 45)+(RIDAGEYR GE 65);

/** A1C and FPG variables; **/
A1C=LBXGH;
FPG=LBXGLU;

/** Define binary variable NOTPREG for exclusion criteria based on fasting status
**/
NOTPREG=(RIDEXPRG ne 1);

/** Define binary variable FAST for exclusion criteria based on fasting status
(reasonable fasting hours) **/
FAST=(8 LE PHAFSTHR LT 24);

/** Include code for defining diabetes status, provided above **/

/** Create new sample weight (WT2YR) using the full sample interview weight for
cases where diabetes status was
    coded based on self-reported diabetes diagnosis during interview and using
phlebotomy or fasting subsample
    weights for remaining cases where diabetes status was coded based on lab
values.                          **/
if DM4_FPGA1C=1 then WT2YR=WTINT2YR;
    else if DM4_FPGA1C ne 1 and DM4_A1C=2 then WT2YR=WTPH2YR;
```

```
    else if DM4_FPGA1C ne 1 and WTSAF2YR>=0 then WT2YR=WTSAF2YR;
    else if DM4_FPGA1C ne 1 and WTSAF2YR=. then WT2YR=0;

/** Define Total Diabetes status (TOTAL_DM). Status codes are 1: Diabetes
(diagnosed or undiagnosed);
    2: no diabetes; and . (missing): due to missing
DM4_FPGA1C.                                          **/
if DM4_FPGA1C NE . then TOTAL_DM=(DM4_FPGA1C in (1,2));
run;
```

SUDAAN Code for Analysis

```
/*****************************************************************************************
* The following program produces a table with weighted proportions (95%
confidence  *
* intervals) of *age-standardized* estimates of adults (18+) with diabetes
(diagnosed or *
* undiagnosed) during the period 2021-
2023.                                                 *
*****************************************************************************************/
/** Estimated age-adjusted prevalence of adults (18+) with diabetes (diagnosed or
undiagnosed) - 2021-2023 data **/

proc sort data2_2123;     by SDMVSTRA SDMVPSU;
run;

proc descript data=data2_2123;
    nest SDMVSTRA SDMVPSU;
    weight WT2YR;
    subpopn ADULT=1 and NOTPREG=1;
    class _one_ TOTAL_DM AGE3CAT;
    tables _one_;
    var TOTAL_DM TOTAL_DM;
    catlevel 1 0;
    stdvar AGE3CAT;
    stdwgt 0.530535 0.299194 0.170271; /* Weights for adjusting to 2000 US stand
pop */
run;
```

Frequently Asked Questions

Why do you provide prevalence estimates over a range of years, but provide population estimates for a single year?

Prevalence estimates are provided over a range of years because NHANES data is released in 2-year cycles, plus multiple cycles of survey data are sometimes pooled to ensure that the estimates are more statistically reliable and valid. Pooling data helps to provide more stable estimates, especially for smaller population groups. In contrast, population estimates from a single year are provided because the intent is to apply these pooled prevalence estimates to the most current population count available from the U.S. Census. This approach ensures that the numbers reflect how diabetes prevalence translates into the actual population today, rather than averaging across outdated population counts.

Why did you combine data cycles for the 2023 prediabetes prevalence estimate in adolescents, but use only one data cycle for the prevalence estimate in adults?

For the estimation of prediabetes prevalence among U.S. adolescents, NHANES cycles were combined into four periods (1999-2004, 2005-2010, 2011-2016, and 2017-August 2023). NCHS does recommend caution when combining the August 2021-August 2023 data cycle with earlier cycles due to substantial interruption in data collection during April 2020-July 2021, along with pandemic-related changes in survey operations and sample composition, such that pooling requires assuming continuity across an unobserved and atypical period. However, estimates of prediabetes prevalence among adolescents from the two most recent irregularly timed cycles (2017-March 2020 [3.2 years] and August 2021-August 2023 [2 years]) were highly variable and showed an implausible decline between cycles. This conflicts with independent surveillance reports that show a consistent rise in prevalence of both type 1 and type 2 diabetes among U.S. youths since the 2000s, with steeper rises in several racial/ethnic minority groups. Pooling across multiple NHANES cycles helps reduce cycle-specific volatility that may have been introduced by disruptions from the COVID-19 pandemic, changes in survey design, and shifting nonresponse patterns—yielding estimates that better align with external epidemiological reports and meet NCHS presentation standards.

Adult estimates, by contrast, showed greater cycle-to-cycle stability over the same period and were less sensitive to pandemic disruptions, survey design changes, or nonresponse shifts. Therefore, the most recent single cycle provides a reliable and timely estimate for adults.

As with all estimates, data were suppressed when appropriate according to the NCHS data presentation standards for proportions. Prevalence estimates for 2017-August 2023 were applied to the July 1, 2023, U.S. Census population to obtain up-to-date population estimates.

The prediabetes definition you used is typically applied to adult populations. Is it also appropriate for youth?

Published ADA recommendations for defining prediabetes specify ranges for "people," and there is currently no pediatric-specific definition. For population surveillance, national estimates commonly apply adult diagnostic thresholds to youth to maintain consistency and comparability across years. We acknowledge that additional research may be needed for specific pediatric populations and that these thresholds may differ from how pediatric clinicians interpret glycemic measures in practice. Results should be interpreted with this context in mind.

Why do you use a combination of sampling weights to calculate diabetes and prediabetes prevalence from NHANES?

Diagnosed diabetes and laboratory-defined diabetes are ascertained from different survey components. Diagnosed diabetes is identified from questionnaire data collected in the full interview sample, whereas undiagnosed diabetes and prediabetes are identified using laboratory measures collected in the examination and fasting subsamples. Because these measures are collected on different analytic samples, no single NHANES sample weight applies to all diabetes definitions.

Consistent with CDC methodological evaluations of diabetes surveillance, we calculate component-specific prevalence estimates using the appropriate sample weights for each data source (interview weights for diagnosed diabetes; MEC, phlebotomy, or fasting subsample weights for laboratory-defined diabetes) and then combine these estimates analytically to derive total diabetes prevalence. This approach preserves information from all relevant NHANES components, avoids differential inclusion by diabetes status, and produces estimates comparable to replicate-weight methods used in CDC surveillance. This is consistent with longstanding practices used by CDC in the National Diabetes Statistics Report and has precedent in other epidemiological publications.

Why did you change the methods used to adjust FPG data from older data cycles?

CDC's National Diabetes Statistics Report now applies forward bridging equations provided by NCHS to adjust older FPG data (prior to 2017), whereas previous estimates applied backward bridging equations. This major change is for consistency with other estimates released by federal partners and different centers within CDC—most notably NCHS, which conducts NHANES. NCHS applies forward bridging equations and has published its methods in its data brief.

Does the change in FPG adjustment methods mean we can't compare current estimates to previously released estimates?

Correct. Current estimates should not be compared to those from previous versions of the CDC National Diabetes Statistics Report. While absolute numbers may appear higher than in past reports, differences are likely due to methodological refinements, not true population-level increases. The latest National Diabetes Statistics Report will provide trends over time using the updated method. Moving forward, trend estimates will be recalculated using the updated harmonization method, providing consistent comparisons over time.

Are the apparent increases in diabetes and prediabetes prevalence due to actual increases or a result of the change in methods?

Apparent increases in diabetes and prediabetes prevalence largely reflect methodological refinements, rather than true population-level changes. In prior CDC reports, backward bridging equations were used to harmonize older FPG data, whereas the current analyses now apply forward bridging equations. For the most accurate and consistent comparisons over time, the latest National Diabetes Statistics Report will provide trends using the most up-to-date methods and adjusting for differences in age structure over time.

The estimated prevalence of prediabetes among U.S. adults seems to have notably increased since the last report. Why did the update in methodology make this increase so much?

In prior CDC reports, backward bridging equations were used to harmonize older FPG data, whereas the current analyses now apply forward bridging equations. Because the threshold for prediabetes using FPG occurs in the middle of the distribution (where most of the population's values lie), even a small shift in the adjusted lab values can yield substantial numbers of people newly classified as having prediabetes. So, while a large increase in prediabetes prevalence may seem apparent, this is still largely a reflection of methodological refinements, rather than true

population-level changes. Conversely, because undiagnosed diabetes thresholds are closer to the right tail of the distribution, the methods change had a smaller impact on those estimates. For the most accurate and consistent comparisons of prediabetes or diabetes prevalence over time, the latest National Diabetes Statistics Report will provide trends using the most up-to-date methods and adjusting for differences in age structure over time.

Why do your estimates differ in some places from current estimates released by NCHS?

Differences between our estimates and those released by NCHS are expected and reflect differences in analytic methods. For example, NCHS typically reports adult estimates for persons aged ≥20 years, whereas our analyses are based on adults aged ≥18 years. In addition, NCHS may apply stricter exclusion criteria, while the National Diabetes Statistic Report retains all participants who self-report a diabetes diagnosis. Weighting procedures also vary as NCHS generally applies a single weight, while we employ a composite weight to account for multiple data sources.

For a more complete understanding of methodological differences that may explain variations in estimates, please refer to the Key Considerations section above, detailed methods outlined in the National Diabetes Statistics Report, and descriptions of analytic methods provided by NCHS.

Did all estimates meet NCHS data presentation standards?

Yes. All reported estimates met NCHS data presentation standards and are considered statistically reliable. Any deviation from this would be noted in footnotes.

Where statements of difference are made between groups, are these based on statistical testing?

Yes. All statements of difference are based on formal statistical tests, with an alpha level of 0.05 used to determine statistical significance. The specific tests applied are described in context.

What assumptions or methodological choices in estimating diabetes and prediabetes prevalence might affect how these results should be interpreted?

Constant prevalence assumption

This approach assumes that the prevalence of diabetes or prediabetes did not change substantially between the NHANES survey years and the census year. In reality, prevalence may rise or fall gradually over time due to demographic shifts, behavioral changes, or health system factors.

Survey representativeness

NHANES uses a complex sampling design that is nationally representative of the noninstitutionalized U.S. population. While weights and design adjustments are applied, institutionalized groups (e.g., long-term care residents, incarcerated individuals) are not directly surveyed, even though they may have higher disease burden.

Population growth and demographic change

By applying prevalence from earlier survey years to a later census population, we implicitly assume that prevalence rates apply uniformly to the larger, possibly more diverse population. This could

understate or overstate the true current burden if prevalence differs meaningfully by subgroup or those subgroups are growing or shrinking at different rates.

Cycle-to-cycle variation

Pooling cycles stabilize estimates but also averages over any short-term changes that may have occurred during the pooled period. This limits our ability to detect recent shifts in prevalence. However, this smoothing is especially beneficial for estimates of prediabetes in adolescents, where recent cycle-to-cycle declines appeared statistically significant but were likely implausible given increasing incidence and prevalence trends observed in other youth diabetes surveillance studies.

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