



Abnormal Cholesterol in Children and Adolescents: United States, August 2021–August 2023

Adi Noiman, Ph.D., Jeffery P. Hughes, M.P.H., Jacqueline Leachman, Ph.D., and Duong Nguyen, D.O.

Key findings

Data from the National Health and Nutrition Examination Surveys

- During August 2021–August 2023, 16.5% of children and adolescents had at least one abnormal cholesterol measure (high total cholesterol, low high-density lipoprotein cholesterol [HDL-C], or high non-HDL-C).
- The prevalence of at least one abnormal cholesterol measure was lower in girls (13.6%) than in boys (19.2%).
- The prevalence of at least one abnormal cholesterol measure was lower in children and adolescents with underweight or normal weight (10.3%) or overweight (11.5%) than in those with obesity (35.8%).
- The prevalence of at least one abnormal cholesterol measure in children and adolescents decreased between 2013–2014 and August 2021–August 2023.

Introduction

Cardiovascular disease (CVD) is the leading cause of adult death in the United States and costs more than \$250 billion per year in healthcare services, medications, and lost productivity (1,2). Cholesterol is essential for normal body function, but abnormal blood cholesterol levels can lead to atherosclerosis, a major contributor to CVD (3). Detecting CVD risk factors like abnormal cholesterol in childhood and adolescence is important for preventing CVD later in life (4). Abnormal cholesterol measurements include high total cholesterol, low high-density lipoprotein cholesterol (HDL-C, known as good cholesterol), and high non-HDL-C (known as bad

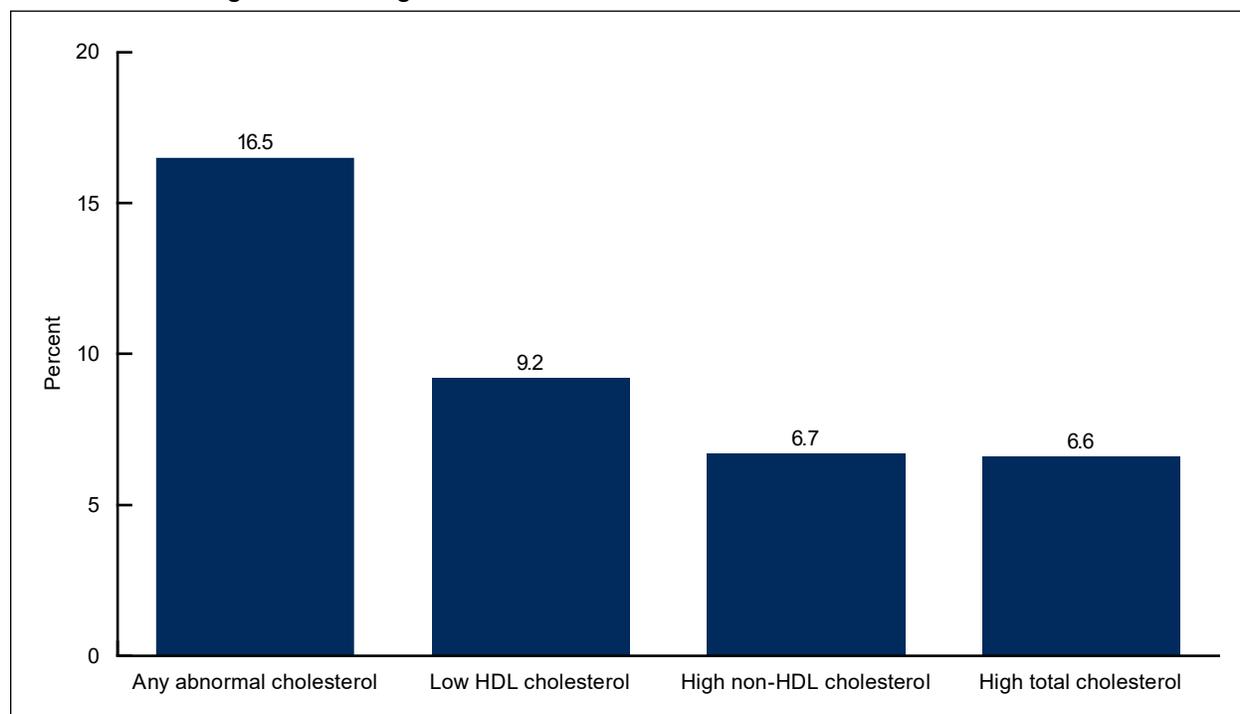


cholesterol that contributes to plaque buildup). This report presents recent prevalence estimates of abnormal cholesterol in U.S. children and adolescents ages 6–19 and describes trends over time.

Abnormal cholesterol measures

- During August 2021–August 2023, 16.5% of children and adolescents ages 6–19 had at least one abnormal cholesterol measure (high total cholesterol, low HDL-C, or high non-HDL-C) (Figure 1, Table 1).
- The prevalence of low HDL-C was 9.2% in children and adolescents.
- The prevalence of high non-HDL-C was 6.7% in children and adolescents.
- The prevalence of high total cholesterol was 6.6% in children and adolescents.

Figure 1. Prevalence of abnormal cholesterol measures in children and adolescents ages 6–19: United States, August 2021–August 2023



NOTE: Any abnormal cholesterol includes at least one measure of low high-density lipoprotein (HDL) cholesterol (less than 40 mg/dL), high non-HDL cholesterol (at or above 145 mg/dL), or high total cholesterol (at or above 200 mg/dL).

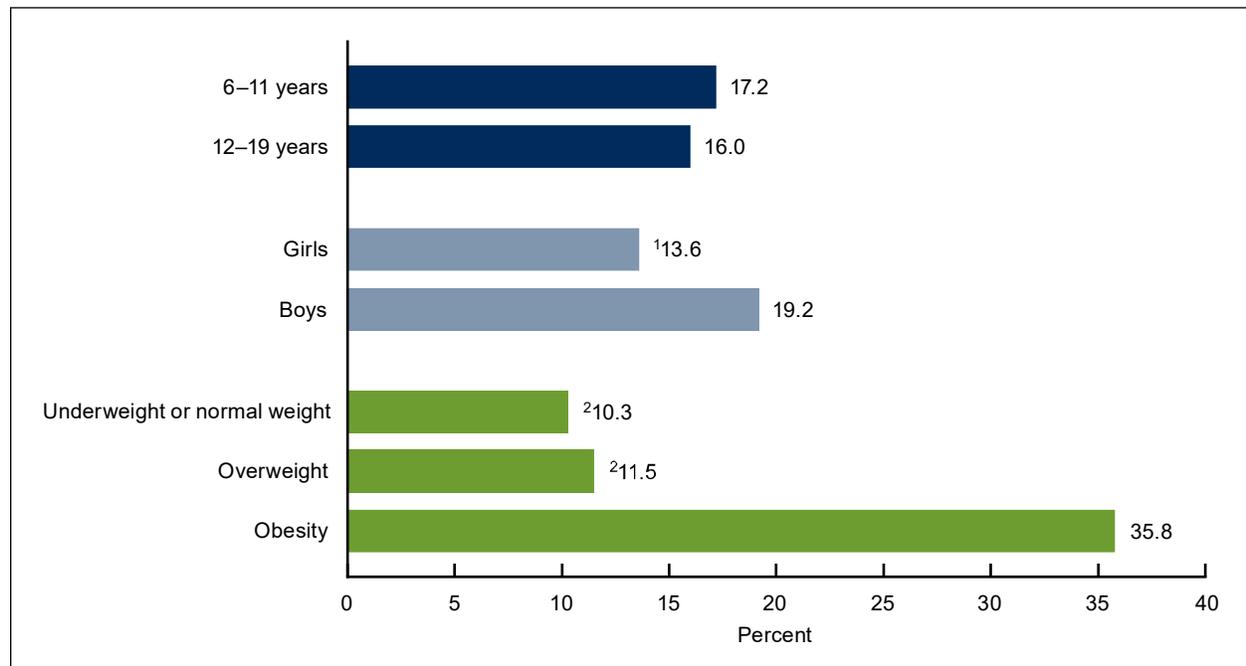
SOURCE: National Center for Health Statistics, National Health and Nutrition Examination Survey, August 2021–August 2023.

Age, sex, and weight status

- The prevalence of at least one abnormal cholesterol measure did not differ significantly between children (ages 6–11) and adolescents (ages 12–19) (Figure 2, Table 2).

- The prevalence of at least one abnormal cholesterol measure in children and adolescents was lower in girls (13.6%) than in boys (19.2%).
- The prevalence of at least one abnormal cholesterol measure was lower in children and adolescents with underweight or normal weight (10.3%) or overweight (11.5%) compared with those with obesity (35.8%).

Figure 2. Prevalence of at least one abnormal cholesterol measure in children and adolescents ages 6–19, by age, sex, and weight status: United States, August 2021–August 2023



¹Significantly different from boys ($p < 0.05$).

²Significantly different from children and adolescents with obesity ($p < 0.05$).

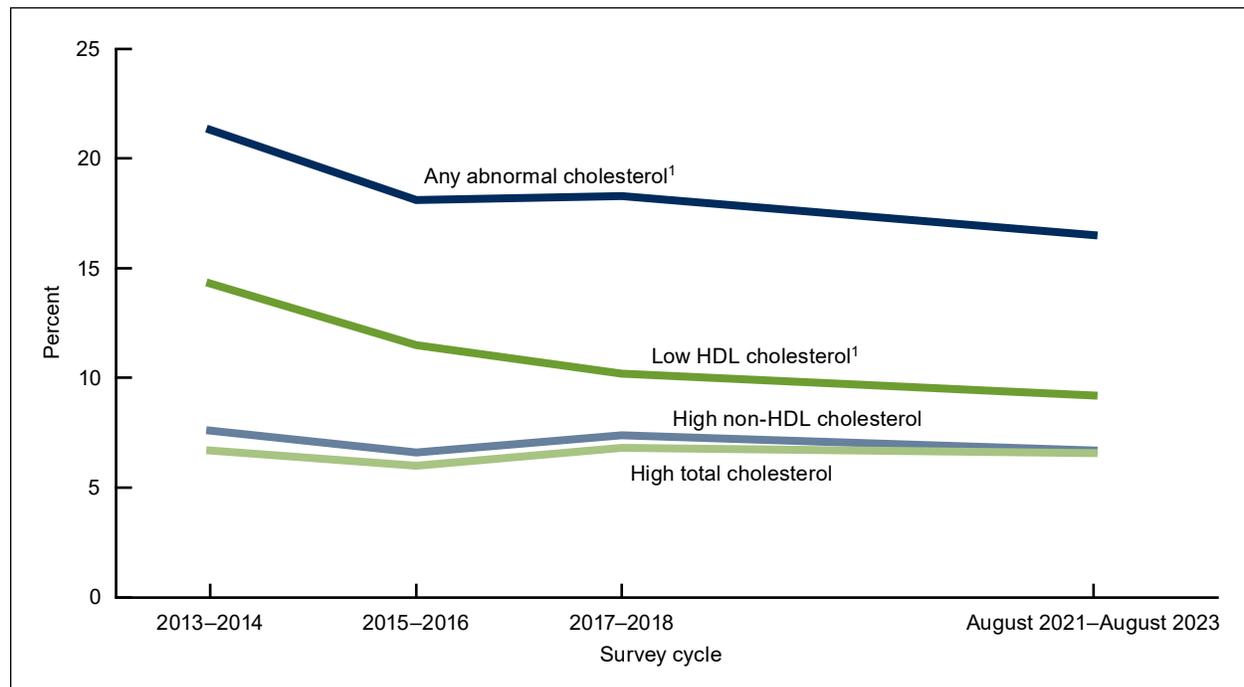
NOTE: Abnormal cholesterol includes at least one measure of low high-density lipoprotein (HDL) cholesterol (less than 40 mg/dL), high non-HDL cholesterol (at or above 145 mg/dL), or high total cholesterol (at or above 200 mg/dL).

SOURCE: National Center for Health Statistics, National Health and Nutrition Examination Survey, August 2021–August 2023.

Trends

- Between 2013–2014 and August 2021–August 2023, the prevalence of at least one abnormal cholesterol measure in children and adolescents decreased from 21.3% to 16.5% (Figure 3, Table 3).
- During the same period, the prevalence of low HDL-C decreased from 14.3% to 9.2%.
- The prevalence of high non-HDL-C and high total cholesterol did not significantly change over time.

Figure 3. Trends in prevalence of abnormal cholesterol measures in children and adolescents ages 6–19: United States, 2013–2014 to August 2021–August 2023



¹Significantly decreasing linear trend ($p < 0.05$).

NOTE: Any abnormal cholesterol includes at least one measure of low high-density lipoprotein (HDL) cholesterol (less than 40 mg/dL), high non-HDL cholesterol (at or above 145 mg/dL), or high total cholesterol (at or above 200 mg/dL).

SOURCE: National Center for Health Statistics, National Health and Nutrition Examination Survey, 2013–2014 to August 2021–August 2023.

Summary

Overall, 16.5% of children and adolescents had at least one abnormal cholesterol measure (high total cholesterol, low HDL-C, or high non-HDL-C) during August 2021–August 2023. The prevalence of any abnormal cholesterol measure significantly decreased since 2013–2014.

Differences were observed by sex and weight status during August 2021–August 2023. Boys had a higher prevalence of at least one abnormal cholesterol measure than girls. The prevalence of at least one abnormal cholesterol measure was more than three times greater in children and adolescents with obesity than in those with underweight, normal weight, or overweight, consistent with previous studies (5). The relationship between obesity and cholesterol is complex, but some evidence suggests that obesity is associated with dyslipidemia in children and adolescents (6), and both obesity and abnormal cholesterol are risk factors for CVD in adulthood (4).

Clinical practice guidelines endorsed by the American Academy of Pediatrics recommend universal cholesterol screening between the ages of 9 and 11 and again between the ages of 17 and 21 (7). Continued monitoring of cholesterol levels in the U.S. population of children and adolescents may inform public health programs and policies to improve cardiovascular health throughout their lives.

Definitions

Weight status: The age- and sex-specific percentiles from the 2000 CDC growth charts (8) were used to categorize children with underweight (body mass index [BMI] less than the 5th percentile) or normal weight (BMI at or above the 5th to less than the 85th percentile); overweight (BMI at or above the 85th to less than the 95th percentile); and obesity (at or above the 95th percentile). BMI is weight in kilograms divided by height in meters squared, rounded to one decimal place.

High non-high-density lipoprotein cholesterol (non-HDL-C): Serum non-HDL-C at or above 145 mg/dL (7).

High total cholesterol: Serum total cholesterol at or above 200 mg/dL (7).

Low high-density lipoprotein cholesterol (HDL-C): Serum HDL cholesterol less than 40 mg/dL (7).

Data source and methods

National Health and Nutrition Examination Survey (NHANES) data from 2013–2014 through August 2021–August 2023 were used for these analyses. NHANES is a cross-sectional survey conducted by the National Center for Health Statistics to monitor the health and nutritional status of the U.S. civilian noninstitutionalized population. The NHANES sample is selected through a complex multistage probability design. Data are collected during at-home interviews followed by standardized health examinations, including collection of laboratory specimens, conducted in mobile examination centers (9).

Cholesterol measures are collected for NHANES participants age 6 years and older. The laboratory method used to measure total cholesterol and HDL-C is an enzymatic assay, and non-HDL-C is calculated from directly measured values of total cholesterol and HDL-C (10).

Phlebotomy sample weights were used to estimate prevalence while accounting for differential selection probabilities and adjusting for nonresponse and noncoverage for the examination and additional nonresponse to the blood draw component. Confidence intervals were estimated using Taylor series linearization. Statistically significant differences in prevalence estimates by age, sex, and weight status were tested using a *t* statistic at the $p < 0.05$ level. Four NHANES cycles (2013–2014, 2015–2016, 2017–2018, and August 2021–August 2023) were used to examine linear trends. Trends were evaluated using linear regression models. Data management and statistical analyses were conducted using SAS version 9.4 (SAS Institute, Inc., Cary, N.C.), SUDAAN version 11.0 (RTI International, Research Triangle Park, N.C.), and R version 4.5.1, including the R survey package version 4.4–8 and the survey table package 0.9.9.

About the authors

Adi Noiman, Jeffery P. Hughes, Jacqueline Leachman, and Duong Nguyen are with the National Center for Health Statistics, Division of Health and Nutrition Examination Surveys.

References

1. National Center for Health Statistics. Mortality data on CDC WONDER: Multiple cause of death 2018–2023. Available from: <https://wonder.cdc.gov/mcd.html>.
2. Martin SS, Aday AW, Almarzooq ZI, Anderson CAM, Arora P, Avery CL, et al, 2024 heart disease and stroke statistics: A report of US and global data from the American Heart Association. *Circulation*. 2024 Feb 20;149(8):e347–e913. DOI: <https://dx.doi.org/10.1161/CIR.0000000000001209>. Erratum in: *Circulation*. 2024 May 7;149(19):e1164. DOI: <https://dx.doi.org/10.1161/CIR.0000000000001247>. Erratum in: *Circulation*. 2025 Jun 24;151(25):e1095. DOI: <https://dx.doi.org/10.1161/CIR.0000000000001344>. PMID: 38264914; PMCID: PMC12146881.
3. Williams CL, Hayman LL, Daniels SR, Robinson TN, Steinberger J, Paridon S, Bazzarre T. Cardiovascular health in childhood: A statement for health professionals from the Committee on Atherosclerosis, Hypertension, and Obesity in the Young (AHOY) of the Council on Cardiovascular Disease in the Young, American Heart Association. *Circulation*. 2002 Jul 2;106(1):143–60. DOI: <https://dx.doi.org/10.1161/01.cir.0000019555.61092.9e>. Erratum in: *Circulation* 2002 Aug 27;106(9):1178. DOI: <https://dx.doi.org/10.1161/01.CIR.0000032311.84663.5B>. PMID: 12093785.
4. Lloyd-Jones DM, Hong Y, Labarthe D, Mozaffarian D, Appel LJ, Van Horn L, et al. Defining and setting national goals for cardiovascular health promotion and disease reduction: The American Heart Association's Strategic Impact Goal through 2020 and beyond. *Circulation*. 2010 Feb 2;121(4):586–613. DOI: <https://dx.doi.org/10.1161/CIRCULATIONAHA.109.192703>. PMID: 20089546.
5. Skinner AC, Staiano AE, Armstrong SC, Barkin SL, Hassink SG, Moore JE, et al. Appraisal of clinical care practices for child obesity treatment. Part II: Comorbidities. *Pediatrics*. 2023 Feb;151(2):e2022060643. DOI: <https://dx.doi.org/10.1542/peds.2022-060643>. PMID: 36622098.
6. Kim SE. Dyslipidemia in children and adolescents: Current insights and updated treatment approaches. *Pediatr Gastroenterol Hepatol Nutr*. 2025 May;28(3):148–59. DOI: <https://dx.doi.org/10.5223/pghn.2025.28.3.148>. PMID: 40396155; PMCID: PMC12088853.
7. National Heart, Lung, and Blood Institute. Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents: Summary report. *Pediatrics*. 2011 Dec;128 (Suppl 5):S213–56. DOI: <https://dx.doi.org/10.1542/peds.2009-2107C>. PMID: 22084329; PMCID: PMC4536582.

8. Kuczmarski RJ, Ogden CL, Guo SS, Grummer-Strawn LM, Flegal KM, Mei Z. 2000 CDC growth charts for the United States: Methods and development. *Vital Health Stat* 11. 2002 May;(246):1–203. PMID: 12043359.
9. Terry AL, Chiappa MM, McAllister J, Woodwell DA, Graber JE. Plan and operations of the National Health and Nutrition Examination Survey, August 2021–August 2023. *Vital Health Stat* 1. 2024 May;(66):1–21. DOI: <https://dx.doi.org/10.15620/cdc/151927>.
10. National Center for Health Statistics. National Health and Nutrition Examination Survey August 2021–August 2023 data documentation, codebook, and frequencies, cholesterol–total (TCHOL_L). 2024. Available from: https://wwwn.cdc.gov/Nchs/Data/Nhanes/Public/2021/DataFiles/TCHOL_L.htm.

Figure tables

Data table for Figure 1. Prevalence of abnormal cholesterol measures in children and adolescents ages 6–19: United States, August 2021–August 2023

Cholesterol measurement	Prevalence (95% confidence interval)	Standard error
Any abnormal cholesterol	16.5 (14.5–18.5)	0.9
Low HDL cholesterol	9.2 (7.3–11.5)	1.0
High non-HDL cholesterol	6.7 (4.9–9.0)	0.9
High total cholesterol	6.6 (4.6–9.0)	1.0

NOTES: Sample size is 1,384 for all variables. Any abnormal cholesterol includes at least one measure of low high-density lipoprotein (HDL) cholesterol (less than 40 mg/dL), high non-HDL cholesterol (at or above 145 mg/dL), or high total cholesterol (at or above 200 mg/dL).
SOURCE: National Center for Health Statistics, National Health and Nutrition Examination Survey, August 2021–August 2023.

Data table for Figure 2. Prevalence of at least one abnormal cholesterol measure in children and adolescents ages 6–19, by age, sex, and weight status: United States, August 2021–August 2023

Characteristic	Sample size	Any abnormal cholesterol		Low HDL cholesterol		High non-HDL cholesterol		High total cholesterol	
		Prevalence (95% CI)	Standard error	Prevalence (95% CI)	Standard error	Prevalence (95% CI)	Standard error	Prevalence (95% CI)	Standard error
Age (years)									
6–11	491	17.2 (12.7–22.6)	2.3	8.5 (5.7–12.0)	1.4	6.0 (3.3–9.9)	1.5	7.7 (3.8–13.5)	2.1
12–19	893	16.0 (12.4–20.2)	1.8	9.7 (7.1–12.8)	1.3	7.2 (4.5–10.8)	1.4	5.8 (4.0–8.2)	1.0
Sex									
Girls	697	¹ 13.6 (10.0–17.9)	1.8	¹ 7.5 (4.9–11.0)	1.4	¹ 5.3 (3.2–8.2)	1.1	5.3 (3.1–8.5)	1.2
Boys	687	19.2 (16.3–22.4)	1.4	10.9 (8.6–13.4)	1.0	8.1 (5.9–10.8)	1.1	7.7 (4.9–11.5)	1.5
Weight status									
Underweight or normal weight ²	822	10.3 (7.9–13.1)	1.2	4.7 (2.9–7.2)	1.0	3.7 (2.4–5.4)	0.7	4.9 (3.0–7.4)	1.0
Overweight ²	214	11.5 (6.2–18.9)	2.8	[†] 5.1 (2.0–10.4)	1.8	[†] 5.8 (2.6–10.9)	1.8	[†] 5.6 (2.1–11.6)	2.0
Obesity	338	35.8 (30.6–41.2)	2.4	23.8 (18.5–29.7)	2.5	15.0 (10.8–20.2)	2.1	11.4 (7.0–17.2)	2.3

[†] Estimate does not meet National Center for Health Statistics presentation standards due to a relative confidence interval width greater than 130%.

¹Significantly different from boys ($p < 0.05$).

²Significantly different from children and adolescents with obesity ($p < 0.05$).

NOTES: CI is confidence interval. Abnormal cholesterol includes at least one measure of low high-density lipoprotein (HDL) cholesterol (less than 40 mg/dL), high non-HDL cholesterol (at or above 145 mg/dL), or high total cholesterol (at or above 200 mg/dL).

SOURCE: National Center for Health Statistics, National Health and Nutrition Examination Survey, August 2021–August 2023.

Data table for Figure 3. Trends in prevalence of abnormal cholesterol measures in children and adolescents ages 6–19: United States, 2013–2014 to August 2021–August 2023

Survey cycle	Sample size	Prevalence (95% confidence interval)	Standard error
Any abnormal cholesterol¹			
2013–2014	2,272	21.3 (19.0–23.7)	1.1
2015–2016	2,090	18.1 (15.8–20.7)	1.1
2017–2018	1,795	18.3 (16.5–20.2)	0.9
August 2021–August 2023	1,384	16.5 (14.5–18.5)	0.9
Low HDL cholesterol¹			
2013–2014	2,272	14.3 (11.8–17.0)	1.2
2015–2016	2,090	11.5 (8.9–14.5)	1.3
2017–2018	1,795	10.2 (7.7–13.1)	1.2
August 2021–August 2023	1,384	9.2 (7.3–11.5)	1.0
High non-HDL cholesterol			
2013–2014	2,272	7.6 (6.5–8.9)	0.6
2015–2016	2,090	6.6 (5.5–7.7)	0.5
2017–2018	1,795	7.4 (5.6–9.6)	0.9
August 2021–August 2023	1,384	6.7 (4.9–9.0)	0.9
High total cholesterol			
2013–2014	2,272	6.6 (5.7–7.7)	0.5
2015–2016	2,090	6.0 (4.7–7.6)	0.6
2017–2018	1,795	6.8 (5.5–8.4)	0.7
August 2021–August 2023	1,384	6.6 (4.6–9.0)	1.0

¹Significantly decreasing linear trend ($p < 0.05$).
NOTE: Any abnormal cholesterol includes at least one measure of low high-density lipoprotein (HDL) cholesterol (less than 40 mg/dL), high non-HDL cholesterol (at or above 145 mg/dL), or high total cholesterol (at or above 200 mg/dL).
SOURCE: National Center for Health Statistics, National Health and Nutrition Examination Survey, 2013–2014 to August 2021–August 2023.

Suggested citation

Noiman A, Hughes JP, Leachman J, Nguyen D. Abnormal cholesterol in children and adolescents: United States, August 2021–August 2023. NCHS Data Brief. 2026 Mar;(552):1–10. DOI: <https://dx.doi.org/10.15620/cdc/174648>.

Copyright information

All material appearing in this report is in the public domain and may be reproduced or copied without permission; citation as to source, however, is appreciated.

National Center for Health Statistics

Carolyn M. Greene, M.D., *Acting Director*
Amy M. Branum, Ph.D., *Associate Director for Science*

Division of Health and Nutrition Examination Surveys

Alan E. Simon, M.D., *Director*
Lara J. Akinbami, M.D., *Associate Director for Science*

For email updates on NCHS publication releases, subscribe online:
www.cdc.gov/nchs/updates.

For questions or general information about NCHS:
Tel: 1–800–CDC–INFO (1–800–232–4636) | TTY: 1–888–232–6348
Internet: www.cdc.gov/nchs | Online request form: www.cdc.gov/info

ISSN 1941–4927 Print ed. | ISSN 1941–4935 Online ed.

CS363544