

High Serum Total Cholesterol – An Indicator for Monitoring Cholesterol Lowering Efforts: U.S. Adults, 2005–2006

Susan E. Schober, Ph.D.; Margaret D Carroll, M.S.P.H.; David A. Lacher, M.D.; and Rosemarie Hirsch, M.D., M.P.H.,
Division of Health and Nutrition Examination Surveys

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Importance

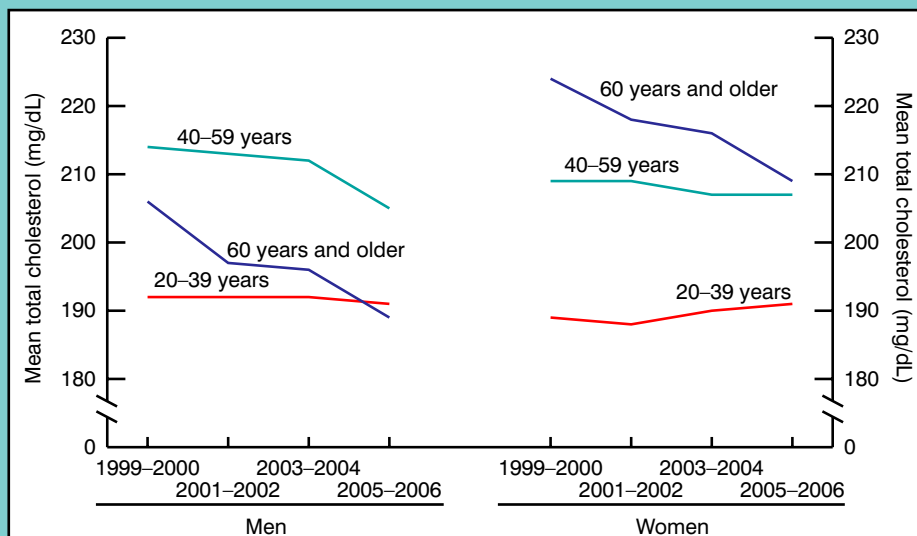
Elevated serum total cholesterol is a major and modifiable risk factor for heart disease, the leading cause of death in the United States (1,2). Reducing mean total serum cholesterol levels among adults to less than 200 mg/dL and reducing the proportion who have levels of 240 mg/dL or higher to less than 17% are national Healthy People 2010 objectives (3). Age-adjusted mean serum cholesterol levels among adults aged 20–74 years declined from 222 mg/dL in 1960–1962 to 203 mg/dL in 1999–2002 (4). Among adults aged 20 years and older, the percent of the population with high serum total cholesterol levels (240 mg/dL or higher) declined from 20% during 1988–1994 to 17% during 1999–2002 (4). In individual patients, a high serum total cholesterol level indicates a potential increased risk for heart disease, but further evaluation of other risk factors and the specific components of cholesterol provide the basis for determining the need for initiating therapeutic lifestyle changes or treatment with medication (5). Low-density-lipoprotein (LDL) is the cholesterol component associated with arterial blockage, and it is the primary clinical target for cholesterol management. High-density-lipoprotein (HDL) may help to protect individuals from developing heart disease. In populations, comparisons of total cholesterol levels over time can show if population groups are experiencing improvement in cholesterol levels, and knowledge of trends in levels of total cholesterol can help identify subgroups where additional prevention efforts may be needed.

Keywords: cholesterol • prevalence • trends

Findings

Have serum total cholesterol levels of U.S. adults declined since 1999?

Figure 1. Mean serum total cholesterol levels of adults aged 20 years and older by age and sex, United States, 1999–2006



SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2006.

No. 2

December 2007

Highlights

Data from the National Health and Nutrition Examination Survey

- ▶ Between 1999–2000 and 2005–2006, mean serum total cholesterol levels in adults 20 years and older declined from 204 mg/dL to 199 mg/dL. The decline in mean total cholesterol was observed for men aged 40 years and older and for women aged 60 years and older. There was little change over this time period for other sex-age groups.
- ▶ In 2005–2006, approximately 65% of men and 70% of women had been screened for high cholesterol within the past 5 years.
- ▶ In 2005–2006, 16% of adults had serum total cholesterol levels of 240 mg/dL or greater.
- ▶ In 2005–2006, approximately 8% of U.S. adults had serum total cholesterol levels greater than or equal to 240 mg/dL but had never been told by a health care provider that their cholesterol levels were high.



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- **Mean serum total cholesterol levels of U.S. adults aged 20 years and older declined from 204 mg/dL in 1999–2000 to 199 mg/dL in 2005–2006.**

The age-adjusted mean serum total cholesterol level was 199 mg/dL in 2005–2006. Thus, the Healthy People 2010 objective to reduce mean serum cholesterol levels among adults to less than 200 mg/dL was met.

- **Mean serum total cholesterol levels have declined for men aged 40 years and older and for women aged 60 years and older over the time period 1999–2006.**

Among men aged 40–59 years, mean serum total cholesterol declined from 214 mg/dL in 1999–2000 to 205 mg/dL in 2005–2006, a difference of 9 mg/dL. Over the same period of time, mean serum total cholesterol levels declined from 206 mg/dL to 189 mg/dL for men aged 60 years and older, a difference of 17 mg/dL, and from 224 mg/dL to 209 mg/dL for women aged 60 years and older, a difference of 15 mg/dL. There was little change over this time period for other sex/age groups.

- **Mean serum total cholesterol levels are similar between men and women aged 20–59 years but are significantly higher in women compared with men among those aged 60 years and over.**

Serum cholesterol levels varied significantly by age among both men and women; however, the pattern of variation was different. Among men in 2005–2006, serum total cholesterol levels were highest in those aged 40–59 years and levels were similar for those aged 20–39 years and those aged 60 years and older. Among women, serum total cholesterol levels for those aged 20–39 years were significantly lower compared with older age groups and were similar for those aged 40–59 years and those aged 60 years and older. The pattern of higher total cholesterol levels in older women as compared with older men has been previously observed (4). The higher total cholesterol levels in older women may reflect hormonal changes during and after menopause. In addition, HDL levels in women tend to be higher than in men, and this also contributes to their higher total cholesterol levels.

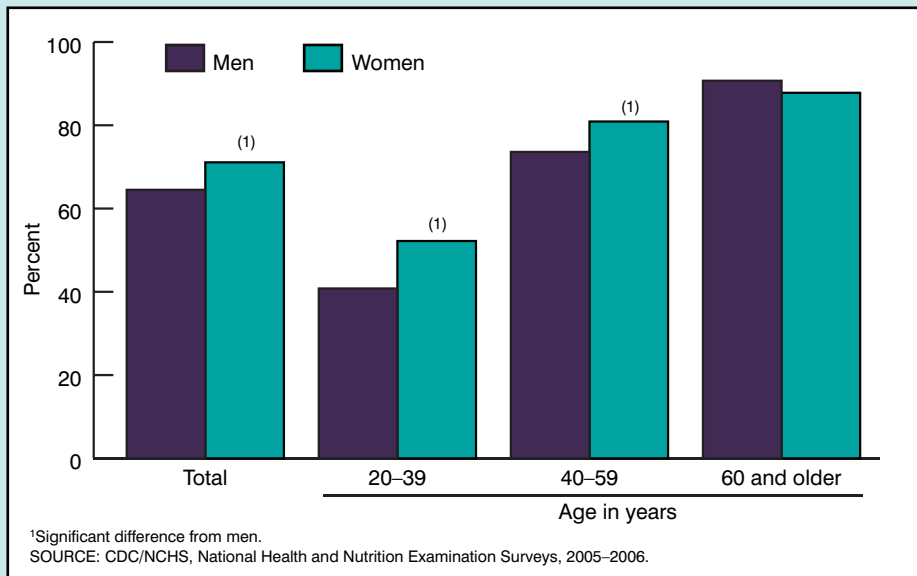
Are U.S. adults receiving recommended screening for high blood cholesterol?

- **In 2005–2006, approximately 65% of men and 70% of women had been screened for high cholesterol within the past 5 years.**

The proportion of persons who were screened for high blood cholesterol in the past 5 years increased with age for both men and women. Overall, the prevalence of this recommended screening was higher in women than in men, but among those aged 60 years and older, both men and women had similarly high rates of screening, approximately 91% and 88%, respectively. Women were more likely than men to receive the recommended screening among those aged 20–39 years (52% versus 41%, respectively) and among those aged 40–59 years (81% versus 74%, respectively).

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Figure 2. Percentage of adults aged 20 years and older who had received screening for high blood cholesterol in the past 5 years by age and sex, United States, 2005–2006

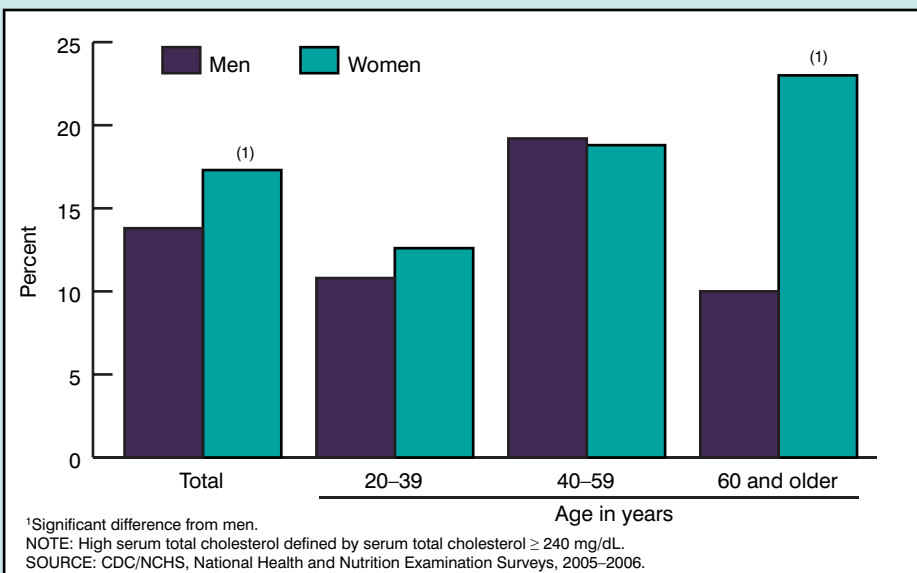


What proportion of U.S. adults has high serum total cholesterol levels?

- Approximately 16% of U.S. adults have high serum total cholesterol levels.

In 2005–2006, 15.7% of adults 20 years and older had serum cholesterol levels equal to or greater than 240 mg/dL. Individuals who take medication to lower their serum cholesterol and whose measured serum total cholesterol levels are less than 240 mg/dL are not defined as having high total cholesterol in this report.

Figure 3. Prevalence of high serum total cholesterol by age and sex, United States, 2005–2006



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- **The prevalence of high serum total cholesterol was higher for women than for men.**

In 2005–2006, 13.8% of men aged 20 years and older and 17.3% of women aged 20 years and older had serum cholesterol levels that were equal to or greater than 240 mg/dL, a difference that was statistically significant.

The difference between men and women was limited to those aged 60 years and older. In this age group, 10.0% of men and 23.0% of women had serum total cholesterol levels equal to or greater than 240 mg/dL. This difference reflects the higher levels of total cholesterol among older women as compared with older men, as noted previously.

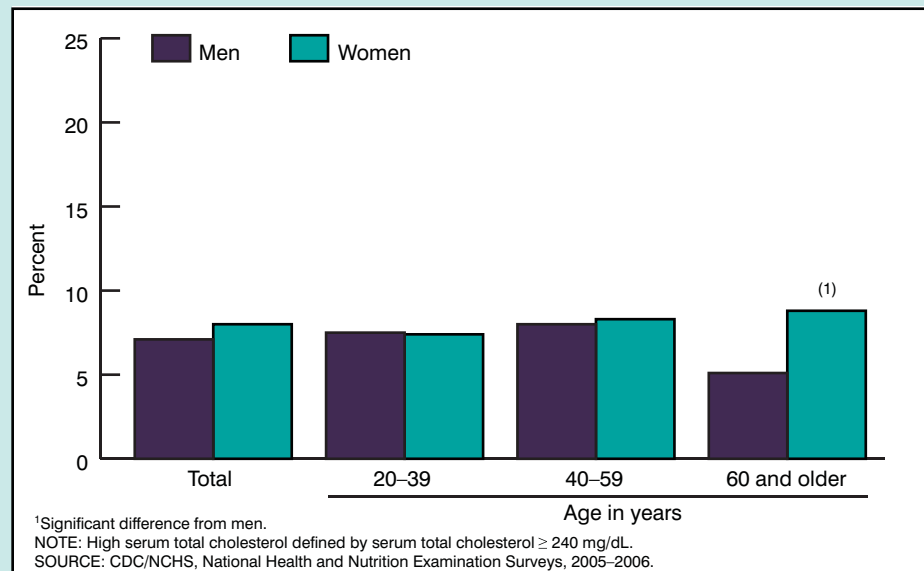
- **The Healthy People 2010 objective to reduce the proportion of U.S. adults with high serum total cholesterol levels to 17% has been met for the total population of U.S. adults but the prevalence of high total cholesterol differs across sex/age groups.**

The prevalence of high serum total cholesterol levels is below 17% for men aged 20–39 years and 60 years and older and for women aged 20–39 years. For adults aged 40–59 years, the prevalence of high serum cholesterol was approximately 19% for both men and women.

What proportion of the U.S. population has high serum total cholesterol levels but has never been told by a health care provider that they have the condition?

- **Approximately 8 percent of U.S. adults had high serum total cholesterol but had never been told previously that their cholesterol was high.**

Figure 4. Percentage of adults aged 20 years and older who had high serum total cholesterol but had never been told by a health care provider that their cholesterol was high by age and sex, United States, 2005–2006



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The proportion of U.S. adults aged 20 years and older who had serum total cholesterol levels greater than or equal to 240 mg/dL and who had never been told by a health care provider that they had high cholesterol was 7.6% in 2005–2006.

- **The proportion of U.S. adults who had high serum total cholesterol but had never been told their cholesterol was high did not differ remarkably by sex or age.**

The proportion of U.S. adults who had serum cholesterol levels greater than or equal to 240 mg/dL and who had never been told by a health care provider that they had high blood cholesterol was similar for men and women (7.1% and 8.0%, respectively). There was no significant variation by age for women, ranging from 7.4% in the youngest age group to 8.8% in those 60 years and older. Among men, there were also no large differences in prevalence by age. Prevalence was 7.5%, 8.0%, and 5.1% in those aged 20–39, 40–59, and 60 years and older, respectively.

Summary

High cholesterol is a significant public health problem. Reduction of mean serum total cholesterol levels among adults has met the Healthy People 2010 objective of 199 mg/dL, but mean total cholesterol levels differ by age groups and sex. Similarly, the Healthy People 2010 objective to reduce the proportion of adults who have high serum total cholesterol levels to 17% has been met but the proportion with high total cholesterol levels differs across age and sex groups. Almost 70% of the adult population has obtained recommended screening for high cholesterol, yet 8% of the adult population had high serum total cholesterol, but had never been told by a health care provider that they had high cholesterol.

Despite recent advances in medical treatment and public health campaigns to lower dietary intake of saturated fat and cholesterol and increase physical activity, high total cholesterol remains a significant public health problem in the United States.

Other fractions of total cholesterol, specifically LDL and HDL, are needed to assess the clinical risk of high total serum cholesterol in individuals (5). These components of cholesterol were not addressed in this analysis.

Definitions

Healthy People 2010 Objective (12-13): Reduce the total blood cholesterol levels among adults. Target: 199 mg/dL (mean) (3).

Healthy People 2010 Objective (12-14): Reduce the proportion of adults with high total blood cholesterol levels. Target: 17% (3).

High serum total cholesterol: total serum cholesterol greater than or equal to 240 mg/dL.

Never been told by health care provider that cholesterol was high: Based on a negative response to the question “Have you ever been told by a doctor or other health care professional that your blood cholesterol is high?”

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Screened for high cholesterol in the past 5 years: Defined by an affirmative response to the question “Have you ever had your blood cholesterol checked?” and response indicating less than 5 years ago to the question “About how long has it been since you last had your blood cholesterol level checked?”.

Data source

The National Health and Nutrition Examination Survey (NHANES) data were used for these analyses. NHANES is a cross-sectional survey designed to monitor the health and nutritional status of the civilian, noninstitutionalized U.S. population (6). The survey consists of interviews conducted in participants’ homes, standardized physical examinations conducted in mobile examination centers, and laboratory tests utilizing blood and urine specimens provided by participants during the physical examination.

The NHANES sample is selected through a complex, multistage design that includes selection of primary sampling units (counties), household segments within the counties, and finally sample persons from selected households. In 1999–2006, non-Hispanic black persons, Mexican American persons, persons with low-income, persons 12–19 years of age, and persons 60 years and older were oversampled in order to obtain reliable estimates of health and nutritional measures for these population subgroups. In 1999, NHANES became a continuous survey fielded on an ongoing basis. Each year of data collection is based on a representative sample covering all ages of the civilian, noninstitutionalized population. Public-use data files are released in 2-year cycles.

Sample weights, which account for the differential probabilities of selection, nonresponse and non-coverage, are incorporated into the estimation process. All variance estimates accounted for the complex survey design using Taylor series linearization (7). Estimates for the total population and for the total population by sex were age-adjusted to the 2000 U.S. standard population using three age groups, 20–39, 40–59, and 60 years and over (8). Differences between groups were evaluated using a univariate t-statistic. Trend tests were done to evaluate changes in estimates over time. All significance tests were two-sided using $p < 0.05$ as the level of statistical significance. For comparison of estimates by age, adjustments for multiple comparisons were made using the Bonferroni method by dividing 0.05 by the number of comparisons (9). All differences reported are statistically significant unless otherwise indicated.

Statistical analyses were conducted using the SAS System for Windows (release 9.1; SAS Institute Inc, Cary NC) and SUDAAN (release 9.0; Research Triangle Institute, Research Triangle Park, NC).

Acknowledgments

Data files for this report were prepared by the Division of Health and Nutrition Examination Surveys, Informatics Branch. This report was edited by Gail V. Johnson, CDC/CCHIS/NCHM/ Division of Creative Services, Writer-Editor Services Branch; and layout and graphic production by Michael W. Jones, CDC/CCHIS/NCHM/Division of Creative Services, NOVA contractor.

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Suggested citation

Schober SE, Carroll MD, Lacher DA, Hirsch R. High serum total cholesterol—an indicator for monitoring cholesterol lowering efforts; U.S. adults, 2005–2006. NCHS data brief no 2, Hyattsville, MD: National Center for Health Statistics. 2007.

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