National Health and Nutrition Examination Survey

2015-2016 Data Documentation, Codebook, and Frequencies

Cholesterol - Total (TCHOL_I)

Data File: TCHOL_I.xpt

First Published: September 2017

Last Revised: NA

Component Description

The goals of this component are: 1) to monitor the prevalence and trends in major cardiovascular conditions, and overall risk factors in the U.S.; and 2) to evaluate prevention and treatment programs targeting cardiovascular disease in the U.S.

Blood lipid levels are the main elements of the cardiovascular disease laboratory in NHANES. Cardiovascular disease is the leading cause of death in the United States. The data will be used to monitor the status of hyperlipidemia, and the success of the National Cholesterol Education Program.

Eligible Sample

Examined participants aged 6 years and older were eligible.

Description of Laboratory Methodology

The laboratory method used for total cholesterol is an enzymatic assay. In this enzymatic assay, esterified cholesterol is converted to cholesterol by cholesterol esterase. The resulting cholesterol is then acted upon by cholesterol oxidase to produce cholest-4-en-3-one and hydrogen peroxide. The hydrogen peroxide then reacts with 4-aminophenazone in the presence of peroxidase to produce a colored product that is measured at 505 nm (secondary wavelength = 700 nm). The final step is known as the Trinder reaction. This method is a single reagent, endpoint reaction that is specific for cholesterol.

Cholesterol, a steroid molecule with a hydroxyl group in the C3 position, is synthesized in many types of tissue, but mainly in the liver and intestinal wall. About 75 percent of cholesterol is newly synthesized, with the remainder originating from dietary intake. Cholesterol measurement is performed to screen for atherosclerotic risk and in the diagnosis and treatment of disorders involving elevated cholesterol as well as lipid and lipoprotein metabolic disorders.

Refer to the Laboratory Method Files section for a detailed description of the laboratory methods used.

There were no changes to the lab method, lab equipment, or lab site for this component in the NHANES 2015-2016 cycle.

Laboratory Method Files

Total Cholesterol (September 2017)

Laboratory Quality Assurance and Monitoring

Serum samples were processed, stored, and shipped to the University of Minnesota, Minneapolis, MN for analysis.

Detailed instructions on specimen collection and processing are discussed in the NHANES Laboratory Procedures Manual (LPM). Vials are stored under appropriate frozen (–30°C) conditions until they are shipped to University of Minnesota for testing.

The NHANES quality assurance and quality control (QA/QC) protocols meet the 1988 Clinical Laboratory Improvement Act mandates. Detailed QA/QC instructions are discussed in the NHANES LPM.

Mobile Examination Centers (MECs)

Laboratory team performance is monitored using several techniques. NCHS and contract consultants use a structured competency assessment evaluation during visits to evaluate both the quality of the laboratory work and the quality-control procedures. Each laboratory staff member is observed for equipment operation, specimen collection and preparation; testing procedures and constructive feedback are given to each staff member. Formal retraining sessions are conducted annually to ensure that required skill levels were maintained.

Analytical Laboratories

NHANES uses several methods to monitor the quality of the analyses performed by the contract laboratories. In the MEC, these methods include performing blind split samples collected on “dry run” sessions. In addition, contract laboratories randomly perform repeat testing on 2% of all specimens.

NCHS developed and distributed a quality control protocol for all the contract laboratories which outlined the use of Westgard rules (Westgard et al, 1981) when running NHANES specimens. Progress reports containing any problems encountered during shipping or receipt of specimens, summary statistics for each control pool, QC graphs, instrument calibration, reagents, and any special considerations are submitted to NCHS quarterly. The reports are reviewed for trends or shifts in the data. The laboratories are required to explain any identified areas of concern.

Data Processing and Editing

The data were reviewed. Incomplete data or improbable values were sent to the performing laboratory for confirmation.

One derived variable was created in this data file. The variable was created using the following formula:

LBDTCSI

The total cholesterol in mg/dL (LBXTC) was converted to mmol/L (LBDTCSI) by multiplying by 0.02586.

Analytic Notes

Refer to the 2015-2016 Laboratory Data Overview for general information on NHANES laboratory data.

Demographic and Other Related Variables

The analysis of NHANES 2015-2016 laboratory data must be conducted using the appropriate survey design and demographic variables. The NHANES 2015-2016 Demographics File contains demographic data, health indicators, and other related information collected during household interviews as well as the sample design variables. The recommended procedure for variance estimation requires use of stratum and PSU variables (SDMVSTRA and SDMVPSU, respectively) in the demographic data file.

The Fasting Questionnaire File includes auxiliary information such as fasting status, length of fast, and the time of venipuncture.

The laboratory data file can be linked to other NHANES data file using the unique survey participant identifier (i.e., SEQN).

Detection Limits

The detection limits were constant for this analyte in the data set. The variable prefixed LBX (ex., LBXTC) provides the analytic result for that analyte.

The lower limit of detection (LLOD, in mg/dL) for total cholesterol:

Variable Name	SAS Label	LLOD
LBXTC	Serum total cholesterol	4

Exam sample weights should be used for analyses. Please refer to the NHANES Analytic Guidelines and the on-line NHANES Tutorial for further details on the use of sample weights and other analytic issues.

References

- Westgard J.O., Barry P.L., Hunt M.R., Groth T. A multi-rule Shewhart chart for quality control in clinical chemistry. Clin Chem (1981) 27:493-501.

Codebook and Frequencies

SEQN - Respondent sequence number

Variable Name:	SEQN
SAS Label:	Respondent sequence number
English Text:	Respondent sequence number
Target:	Both males and females 6 YEARS - 150 YEARS

LBXTC - Total Cholesterol (mg/dL)

Variable Name: LBXTC

SAS Label: Total Cholesterol (mg/dL)

English Text: Total Cholesterol (mg/dL)

Target: Both males and females 6 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
77 to 545	Range of Values	7256	7256	
.	Missing	765	8021	

LBDTCSI - Total Cholesterol (mmol/L)

Variable Name: LBDTCSI

SAS Label: Total Cholesterol (mmol/L)

English Text: Total Cholesterol (mmol/L)

Target: Both males and females 6 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
1.99 to 14.09	Range of Values	7256	7256	
.	Missing	765	8021	