National Health and Nutrition Examination Survey

2017-March 2020 Data Documentation, Codebook, and Frequencies

Cholesterol - High - Density Lipoprotein (HDL) (P_HDL)

Data File: P_HDL.xpt

First Published: August 2021

Last Revised: NA

Component Description

The NHANES program suspended field operations in March 2020 due to the coronavirus disease 2019 (COVID-19) pandemic. As a result, data collection for the NHANES 2019-2020 cycle was not completed and the collected data are not nationally representative. Therefore, data collected from 2019 to March 2020 were combined with data from the NHANES 2017-2018 cycle to form a nationally representative sample of NHANES 2017-March 2020 pre-pandemic data. These data are available to the public. Please refer to the Analytic Notes section for more details on the use of the data.

Heart disease is the leading cause of death in the United States (Murphy, et. al., 2018). Blood lipid levels are fundamental measures included in NHANES that can be used for cardiovascular risk assessment. The goals of the NHANES blood lipid measurements include: 1) monitoring the prevalence and trends in major cardiovascular conditions and overall risk factors in the U.S.; 2) evaluating prevention and treatment programs targeting cardiovascular disease in the U.S.; and 3) monitoring the status of hyperlipidemia.

In 2018, new Blood Cholesterol Guidelines were released, by the American College of Cardiology and American Heart Association Task Force on Clinical Practice Guidelines, which aim to reduce the risk of atherosclerotic cardiovascular disease through cholesterol management (Grundy, et. al., 2018). The blood lipids measurements in NHANES include total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoproteins cholesterol (LDL-C), and triglycerides. The present file provides data on the HDL-C. Data on total cholesterol are provided in the Cholesterol - Total P_TCHOL) file, and LDL-C and triglyceride data are provided in (P_TRIGLY).

Eligible Sample

All examined participants 6 years and older in the NHANES 2017-March 2020 pre-pandemic sample were eligible.

Description of Laboratory Methodology

High-Density Lipoprotein (HDL)

This method to measure HDL-C uses a magnesium/dextran sulfate solution that is first added to the specimen to form water-soluble complexes with non-HDL cholesterol fractions. These complexes are not reactive with the measuring reagents added in the second step. With addition of reagent 2, HDL-cholesterol esters are converted to HDL-cholesterol by PEG-cholesterol esterase. The HDL-cholesterol is acted upon by PEG-cholesterol oxidase, and the hydrogen peroxide produced from this reaction combines with 4-amino-antipyrine and HSDA under the action of peroxidase to form a purple/blue pigment that is measured photometrically at 600 nm (secondary wavelength = 700 nm). When the cholesterol measuring enzymes are modified with PEG, they are preferentially more reactive with HDL-cholesterol than the other cholesterol fractions. This is an endpoint reaction that is specific for HDL-cholesterol. This 3rd generation method differs from 2nd generation assays in the type of buffer used in the reagents, and the concentration of the reagent components. The basic reaction principle is unchanged.

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

Serum HDL-C levels were calculated from directly measured values of total cholesterol, triglycerides, and LDL-C. Please see below the Data Processing and Editing section for more details. For laboratory methods

used for total cholesterol and LDL-C and triglycerides, please refer to the accompanying documentation: P_TCHOL and P_TRIGLY.

Laboratory Method Files

Direct HDL Laboratory Procedure Manual (February 2020)

Direct HDL Laboratory Procedure Manual (August 2021)

Laboratory Quality Assurance and Monitoring

Serum specimens 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 2017-2018 and 2019-2020 Laboratory Procedures Manuals (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 QC 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 during “dry run” sessions. In addition, contract laboratories randomly perform repeat testing on 2% of all specimens.

NCHS developed and distributed a QC protocol for all the contract laboratories, which outlined the use of Westgard rules (Westgard et al., 1981) when testing 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:

LBDHDDSI

HDL-cholesterol in mg/dL (LBXHDD) was converted to mmol/L (LBDHDDSI) by multiplying by 0.02586.

Analytic Notes

The COVID-19 pandemic required suspension of NHANES 2019-2020 field operations in March 2020 after data were collected in 18 of the 30 survey locations in the 2019-2020 sample. Data collection was cancelled for the remaining 12 locations. Because the collected data from 18 locations were not nationally representative, these data were combined with data from the previous cycle (2017-2018) to create a 2017-March 2020 pre-pandemic data file. A special weighting process was applied to the 2017-March 2020 pre-pandemic data file. The resulting sample weights in the demographic data file should be used to calculate estimates from the combined cycles. These sample weights are not appropriate for independent analyses of the 2019-2020 data and will not yield nationally representative results for either the 2017-2018 data alone or the 2019-March 2020 data alone. Please refer to the NHANES website for additional information for the NHANES 2017-March 2020 pre-pandemic data, and for the previous 2017-2018 public use data file with

specific weights for that 2-year cycle.

Refer to the 2017-2018 and 2019-2020 Laboratory Data Overview documents for general information on NHANES laboratory data.

There are over 800 laboratory tests performed on NHANES participants. However, not all participants provided biospecimens or enough volume for all the tests to be performed. The specimen availability can also vary by age or other population characteristics. For example, in 2017-March 2020, approximately 76% of children aged 1-17 years who were examined in the MEC provided a blood specimen through phlebotomy, while 95% of examined adults age 18 and older provided a blood specimen. Analysts should evaluate the extent of missing data in the dataset related to the outcome of interest as well as any predictor variables used in the analyses to determine whether additional re-weighting for item non-response is necessary.

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.

Demographic and Other Related Variables

The analysis of NHANES laboratory data must be conducted using the appropriate survey design and demographic variables. The NHANES 2017-March 2020 Pre-Pandemic 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.

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

Detection Limits

The detection limit was constant for the analyte in the data set.

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

Variable Name	Analyte Description	LLOD
LBXHDD	HDL Cholesterol	3

References

- Grundy SM, Stone NJ, Bailey AL, Beam C, Birtcher KK, Blumenthal RS, Braun LT, de Ferranti S, Faiella-Tommasino J, Forman DE, Goldberg R, Heidenreich PA, Hlatky MA, Jones DW, Lloyd-Jones D, Lopez-Pajares N, Ndumele CE, Orringer CE, Peralta CA, Saseen JJ, Smith SC Jr, Sperling L, Virani SS, Yeboah J., 2018. AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA guideline on the management of blood cholesterol: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Circulation. 2019;139:e1082–e1143.
- Murphy SL, Xu JQ, Kochanek KD, Arias, E. Mortality in the United States, 2017. NCHS Data Brief, no 328. Hyattsville, MD: National Center for Health Statistics. 2018. https://www.cdc.gov/nchs/data/databriefs/db328-h.pdf Accessed May, 2019.
- 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

LBDHDD - Direct HDL-Cholesterol (mg/dL)

Variable Name: LBDHDD

SAS Label: Direct HDL-Cholesterol (mg/dL)

English Text: Direct HDL-Cholesterol (mg/dL)

Target: Both males and females 6 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
5 to 189	Range of Values	10828	10828	
.	Missing	1370	12198	

LBDHDDSI - Direct HDL-Cholesterol (mmol/L)

Variable Name: LBDHDDSI

SAS Label: Direct HDL-Cholesterol (mmol/L)

English Text: Direct HDL-Cholesterol (mmol/L)

Target: Both males and females 6 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0.13 to 4.89	Range of Values	10828	10828	
.	Missing	1370	12198	