

National Health and Nutrition Examination Survey 2005–2006

Documentation, Codebook, and Frequencies

Triglyceride, LDL-cholesterol and
Apolipoprotein (ApoB)

Laboratory

Survey Years:
2005 to 2006

SAS Transport File:
TRIGLY_D.XPT



First Published: February 2008
Last Revised: May 2008

NHANES 2005–2006 Data Documentation

Laboratory Assessment: Triglycerides, LDL-Cholesterol, and Apolipoprotein (ApoB)

(TRIGLY_D)

First Published: March 2008

Last Revised: May 2008

Component Description

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

The main element of the cardiovascular disease laboratory component in NHANES is blood lipid levels. 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

Participants aged 12 years and older who were examined in the morning (AM) session were tested.

Description of Laboratory Methodology

Triglycerides by Hitachi 717 and Hitachi 912

Triglycerides are measured enzymatically in serum using a series of coupled reactions. Triglycerides are hydrolyzed by lipase to produce glycerol. Glycerol is then phosphorylated using Glycerokinase (GK). Glycerol-3-phosphate is then oxidized using glycerophosphate oxidase (GPO), and the resulting H₂O₂ is combined with a phenazone using peroxidase to form a dye, whose absorbance is measured at 500 nm. High levels of serum triglycerides help mark conditions that are associated with increased risk for CHD and peripheral atherosclerosis. High triglycerides are associated with increased risk for CAD in patients with other risk factors, such as low HDL-cholesterol, some patient groups with elevated apolipoprotein B concentrations, and patients with forms of LDL that may be particularly atherogenic. Very high triglycerides can result in pancreatitis..

Triglycerides are also measured because the value is used to calculate LDL-cholesterol concentrations. In NHANES, triglycerides are only measured in specimens from the morning session. Sample persons ages 12 and older and fasting at least 8.5 hours or more but less than 24 hours have values and have non-zero fasting sample weights.

LDL-Cholesterol

Most of the circulating cholesterol is found in three major lipoprotein fractions: very low-density lipoproteins (VLDL), low-density lipoproteins (LDL), and high-density lipoproteins (HDL). LDL-cholesterol is calculated from measured values of total cholesterol, triglycerides, and HDL-cholesterol according to the Friedewald calculation:

$$[\text{LDL-cholesterol}] = [\text{total cholesterol}] - [\text{HDL-cholesterol}] - [\text{triglycerides}/5]$$

where [triglycerides/5] is an estimate of VLDL-cholesterol and all values are expressed in mg/dL. The calculation is valid for triglycerides less than equal to 400 mg/dL.

LDL carries most of the circulating cholesterol and, when elevated, contributes to the development of coronary atherosclerosis. LDL-cholesterol is measured to assess risk for CHD and to follow the progress of patients being treated to lower LDL-cholesterol concentrations. Desirable levels of LDL-cholesterol are below 100 mg/dL; borderline low from 100–129 mg/dL; borderline high is from 130–159 mg/dL; high is from 160–189 mg/dL; and very high LDL-cholesterol is greater than or equal to 190 mg/dL. LDL-cholesterol is only measured in specimens from the morning session. Participants ages 12 and older and fasting at least 8.5 hours or more but less than 24 hours have values and have non-zero fasting sample weights.

Apolipoprotein B (ApoB)

In an immunochemical reaction, Apolipoprotein B in the human serum sample form immune complexes with specific antibodies. These complexes scatter a beam of light passed through the sample. The intensity of the scattered light is proportional to the concentration of Apolipoprotein B in the sample. The result is evaluated by comparison with a standard of known concentration.

Apolipoprotein B is the main protein component of LDL and accounts for approximately 95% of the total protein content of LDL. Apo B is necessary for the reaction with LDL receptors in the liver and on cell walls, and is thus involved in transporting cholesterol from the liver to the vessel cell. Elevated levels of Apo B are frequently found in patients with atherosclerotic vascular changes and are a risk factor for atherosclerosis.

There were no changes to the lab method, or lab site from 2003-2004.

However, there were changes to the lab instrument for total cholesterol, HDL-cholesterol, and triglycerides. The Hitachi 717 and Hitachi 912 instruments were used during 2005-2006.

A detailed description of the laboratory method used can be found on the NHANES Web site.

Laboratory Quality Control and Monitoring

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 Laboratory/Medical Technologists Procedures Manual (LPM). Read the LABDOC file for detailed QA/QC protocols.

A detailed description of the quality assurance and quality control procedures can be found on the NHANES Web site.

Data Processing and Editing

Blood specimens were processed, stored and shipped to Johns Hopkins Hospital, Baltimore, Maryland for analysis. Detailed specimen collection and processing instructions are discussed in the NHANES LPM. Read the LABDOC file for detailed data processing and editing protocols. The analytical methods are described in the **Description of the Laboratory Methodology** section.

Two derived variables were created in this data file. The formula for their derivation is as follows:

LBDTRSI

The triglycerides value in mg/dL (LBXTR) was converted to mmol/L (LBDTRSI) by multiplying by 0.01129.

LBDLDSI

The LDL-cholesterol in mg/dL (LBDLDL) was converted to mmol/L (LBDLDSI) by multiplying by 0.02586.

LBDLDL

Serum LDL-cholesterol levels were derived on examinees that were examined in the morning session only. The distribution of serum LDL-cholesterol should be estimated only on examinees aged 12 and above who fasted at least 8.5 hours or more but less than 24 hours in the morning session.. LDL-cholesterol is calculated from measured values

of total cholesterol, triglycerides, and HDL-cholesterol according to the Friedewald calculation:

$$[\text{LDL-cholesterol}] = [\text{total cholesterol}] - [\text{HDL-cholesterol}] - [\text{triglycerides}/5]$$

where all values are expressed in mg/dL. The calculation is valid for triglycerides less than 400 mg/dL.

Detailed instructions on specimen collection and processing can be found on the NHANES website.

Analytic Notes

The analysis of NHANES 2005–2006 laboratory data must be conducted with the key survey design and basic demographic variables. The NHANES 2005–2006 Household Questionnaire Data Files contain demographic data, health indicators, and other related information collected during household interviews. They also contain all survey design variables and sample weights for these age groups. The phlebotomy file includes auxiliary information such as the conditions precluding venipuncture. The household questionnaire and phlebotomy files may be linked to the laboratory data file using the unique survey participant identifier SEQN.

LBXTR

Serum triglyceride levels were measured on examinees that were examined in the morning session only. The distribution of serum triglycerides should be estimated only on examinees aged 12 and above who fasted at least 8.5 hours or more but less than 24 hours.

The Laboratory data file contains laboratory test results for triglycerides (LBXTR), which uses the reference analytic method. The NHANES Lab 40 biochemistry profiles also include measurements of triglycerides. The Lab 40 variable name is LBXSTR. The appropriate variable to use from TRIGLY_D data file is LBXTR found in these files.

Sampling Weights

The analyst should use the special sampling weights in this file to analyze 2005–2006 triglycerides, LDL-cholesterol, and Apolipoprotein B (ApoB).

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Please refer to the **Analytic Guidelines** for further details on the use of sample weights and other analytic issues.

References N/A

Locator Fields

Title: Triglycerides, LDL-Cholesterol, and Apolipoprotein B (ApoB)

Contact Number: 1-866-441-NCHS

Years of Content: 2005–2006

First Published: May 2008

Revised: N/A

Access Constraints: None

Use Constraints: None

Geographic Coverage: National

Subject: Triglycerides, LDL-Cholesterol, and Apolipoprotein B (ApoB)

Record Source: NHANES 2005–2006

Survey Methodology: NHANES 2005–2006 is a stratified multistage probability sample of the civilian non-institutionalized population of the U.S.

Medium: NHANES Web site; SAS transport files

**National Health and Nutrition Examination Survey
Codebook for Data Production (2005-2006)**

**Triglycerides, LDL-Cholesterol, and Apolipoprotein B (Apo B)
(TRIGLY_D)
Person Level Data**

March 2008



SEQN	Target
	B(12 Yrs. to 150 Yrs.)
Hard Edits	SAS Label
	Respondent sequence number
English Text: Respondent sequence number.	
English Instructions:	

WTSAF2YR	Target
	B(12 Yrs. to 150 Yrs.)
Hard Edits	SAS Label
	Fasting Subsample 2 Year MEC Weight
English Text: Fasting Subsample 2 Year MEC Weight	
English Instructions:	

Code or Value	Description	Count	Cumulative	Skip to Item
0 to 327394.027	Range of Values	3352	3352	
.	Missing	0	3352	

LBXTR	Target
	B(12 Yrs. to 150 Yrs.)
Hard Edits	SAS Label
	Triglyceride (mg/dL)
English Text: Triglyceride (mg/dL)	
English Instructions:	

Code or Value	Description	Count	Cumulative	Skip to Item
19 to 1600	Range of Values	3089	3089	
.	Missing	263	3352	

LBDTRSI	Target			
	B(12 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Triglyceride (mmol/L)			
English Text: Triglyceride (mmol/L)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.215 to 18.064	Range of Values	3089	3089	
.	Missing	263	3352	

LBDLDL	Target			
	B(12 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	LDL-cholesterol (mg/dL)			
English Text: LDL-cholesterol (mg/dL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
19 to 328	Range of Values	3026	3026	
.	Missing	326	3352	

LBDLDLSI	Target			
	B(12 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	LDL-cholesterol (mmol/L)			
English Text: LDL-cholesterol (mmol/L)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.491 to 8.482	Range of Values	3026	3026	
.	Missing	326	3352	

LBXAPB	Target			
	B(12 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Apolipoprotein (B) (mg/dL)			
English Text: Apolipoprotein (B) (mg/dL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
24 to 345	Range of Values	3106	3106	
.	Missing	246	3352	

LBDAPBSI	Target			
	B(12 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Apolipoprotein (B) (g/L)			
English Text: Apolipoprotein (B) (g/L)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.24 to 3.45	Range of Values	3106	3106	
.	Missing	246	3352	