NHANES 1999–2000 Data Documentation

Revised March 2007

Lab 13AM – Triglycerides and LDL-Cholesterol

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 and Component-Specific Exclusions:

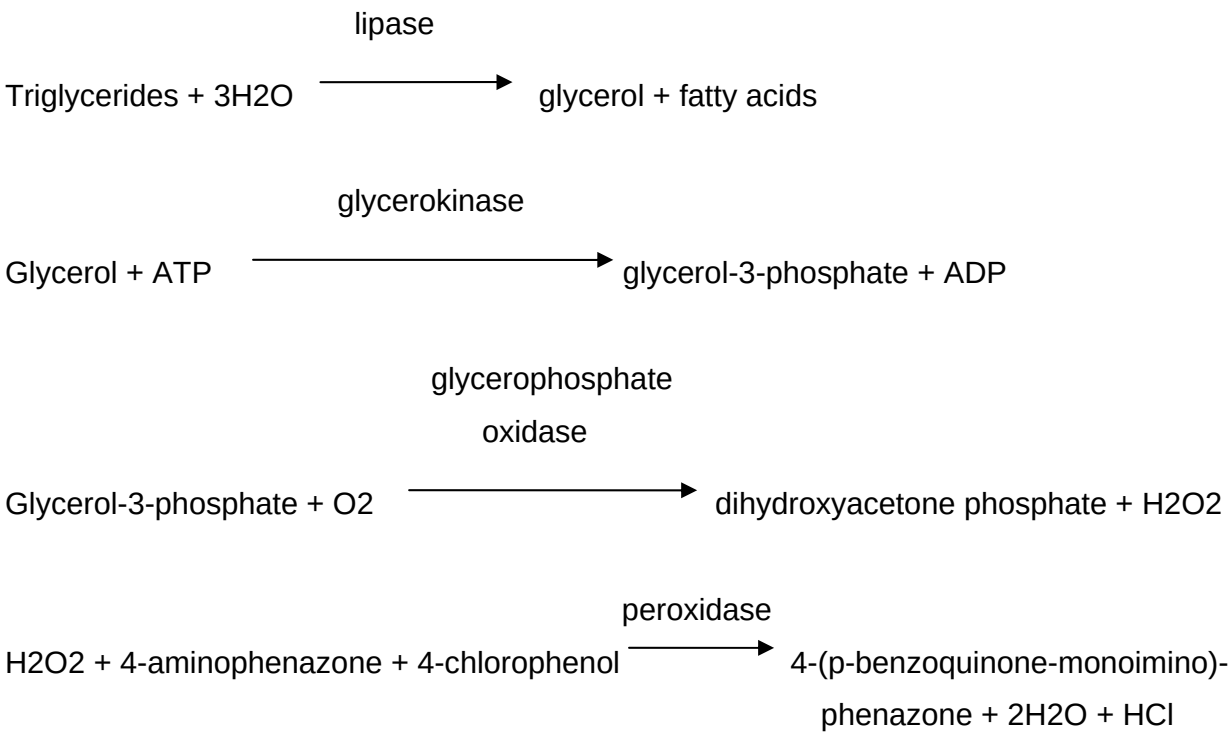
Data for participants aged 3 years and older who do not meet any of the exclusion criteria were sampled. Fasting weights are available for sample persons 12 years and older who fasted at least 8 hours or more but less than 24 hours. Morning weights are available for participant's ages 3-11 years.

Examination Protocol

Detailed specimen collection and processing instructions are discussed in the NHANES Laboratory/Medical Technologists Procedures Manual (LPM). Vials were stored under appropriate frozen (–20°C) conditions until they were shipped to the Johns Hopkins University Lipoprotein Analytical Lab for testing.

Analytic Methodology

Triglycerides are measured enzymatically in serum or plasma using a series of coupled reactions in which triglycerides are hydrolyzed to produce glycerol. Glycerol is then oxidized using glycerol oxidase, and H2O2, one of the reaction products, is converted via peroxidase to a phenazone. Absorbance is measured at 500 nm. The reaction sequence is as follows:



High levels of serum triglycerides help determine the risk for coronary heart disease (CHD) and peripheral atherosclerosis. High triglycerides are associated with increased risk for coronary artery disease (CAD) in patients with other risk factors, such as low HDL-cholesterol, some patient groups with elevated apolipoprotein-B, and patients with forms of low-density lipoprotein (LDL)-cholesterol that may be particularly atherogenic. Desirable fasting triglyceride levels are considered to be those below 150 mg/dL and are further categorized as borderline high, 150–199 mg/dL; high, 200–499 mg/dL; and very high, greater than or equal to 500 mg/dL. 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 participants examined in the morning session.

LDL-Cholesterol

Most of the circulating cholesterol is found in three major lipoprotein fractions: Very low-density lipoproteins (VLDL), LDL, and HDL. LDL-cholesterol is calculated from measured values of total cholesterol, triglycerides, and HDL-cholesterol according to the Friedewald calculation:
[LDL-cholesterol] = [total cholesterol] – [HDL-cholesterol] – [triglycerides/5]
where [triglycerides/5] is an estimate of VLDL-cholesterol and all values are expressed in mg/dL. The calculation is valid only for triglycerides less than or 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 130 mg/dL, borderline high is from 130–159 mg/dL, high is 160–189 mg/dL and very high LDL-cholesterol is greater than or equal to 190 mg/dL. LDL-cholesterol is reported only for participants ages 12 and above who fasted at least 8 hours or more but less than 24 hours and who were examined in the morning examination session.

Analytic Notes

LBXTR

Serum triglyceride levels were measured on NHANES examinees who were examined in the morning session only. Eligible NHANES examinees were randomly assigned to the morning fasting sample.

The Laboratory 13AM data file contains laboratory test results for triglycerides (LBXTR), which uses the reference analytic method. However, the NHANES Laboratory 18 biochemistry profiles also include measurements of triglycerides (Laboratory 18 variable name: LBXSTR). The appropriate triglyceride variable to use is LBXTR from Lab 13AM.

LBDTRSI

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

Serum LDL-cholesterol levels were measured on examinees who were examined in the morning session. The distribution of serum LDL-cholesterol should be estimated on examinees ages 12 and above who fasted at least 8 hours or more but less than 24 hours. LDL-cholesterol is calculated from measured values of total cholesterol, triglycerides, and HDL-cholesterol according to the Friedewald calculation:

[LDL-cholesterol] = [total cholesterol] – [HDL-cholesterol] – [triglycerides/5]

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

LBDLDLSI

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

SAMPLING WEIGHTS

WTSAF4YR and WTSAF2YR (4-year and 2-year fasting weights for participants 12+ years and morning weights for 3-11 years):
One-half of the participants were sampled to attend the morning session. Those participants ages 12 and older appointed to attend the morning session were instructed to fast at least 9 hours prior to their appointment time. Participants ages 3-11 years were not required to fast.

Subsample weights were required for analysis since the analysis of interest involves only those sampled persons ages 12 and older examined in the morning. Because fasting is a key characteristic of this subsample, this data item is called “fasting” weight. Fasting weights were generated for the diabetes laboratory testing (Laboratory 10AM) and were also used for triglycerides and LDL cholesterol (Laboratory 13AM) because multiple sets of fasting weights were not desirable. Non-zero fasting weights were generated for sample persons 12 years and older who fasted 8 to 24 hours and had plasma glucose values and diabetics who fasted but had missing plasma glucose values. Diabetics who did not fast have zero weights.

Subsample weights are also provided for participants aged 3–11 years. The analyst should use these weights for 3-11 years with great caution. Many of these participants were not fasting and these weights were not adjusted for nonresponse in this age group. Weights (WTSAF4YR or WTSAF2YR) for ages 3-11 are referred to as “morning” weights because they were not adjusted for nonresponse or non-fasting. The analyst may wish to consider the issue of re-weighting the data for 3-11 years. Therefore, when considering the analysis of data for ages 3 and over, the analyst should analyze the data with great caution because of the different weighting methodology and fasting protocols for the participants between ages 3-11 and ages 12 and over.

The analyst is strongly encouraged to use the 4-year fasting weights (WTSAF4YR) to analyze 1999-2002 data for participants 12 years and older. The 2-year fasting weights (WTSAF2YR) should be used when analyzing NHANES 1999-2000. The use of the full sample MEC examined weights (WTMEC4YR or WTMEC2YR) should not be used to analyze the data if the outcome of interest is only measured on the morning fasting sample.

See the Analytic Guidelines regarding applying weights for analysis of data.

Please Note:
The morning fasting sample weights (WTSAM2YR) and the jackknife replicate morning fasting sample weights (WTSAM01-WTSAM52) for triglycerides and LDL-cholesterol were withdrawn in January 2005.

Special Notes about this Dataset

The analysis of NHANES 1999–2000 laboratory data must be conducted with the key survey design and basic demographic variables. The NHANES 1999–2000 Household Questionnaire data files contain demographic data, health indicators, and other related information collected during the household components. The Household Questionnaire data files include all of the survey design variables and sample weights required to analyze these data. The Phlebotomy Examination file includes auxiliary information on duration of fasting, the time of day of the venipuncture, and the conditions precluding venipuncture. The Household Questionnaire and Phlebotomy Exam files may be linked to the laboratory data file using the unique survey participant identifier SEQN.

References

N/A