National Health and Nutrition Examination Survey

2015-2016 Data Documentation, Codebook, and Frequencies

Transferrin Receptor (TFR_I)

Data File: TFR_I.xpt

First Published: May 2019

Last Revised: NA

Note: See Analytic Note describing the change in instrumentation in the 2015-2016 survey cycle.

Component Description

The objectives of this component are: 1) to provide data for monitoring secular trends in measures of nutritional status in the U.S. population; 2) to evaluate the effects of people's habits and behaviors, such as physical activity and the use of alcohol, tobacco, and dietary supplements on nutritional status; and 3) to evaluate the effect of changes in nutrition and public health policies, including welfare reform legislation, food fortification policy, and child nutrition programs on the nutritional status of the U.S. population. These data will be used to estimate deficiencies and toxicities of specific nutrients in the population and subgroups, to provide population reference data, and to estimate the contribution of diet, supplements, and other factors to serum levels of nutrients. Data will be used for research to further define nutrient requirements as well as optimal levels for disease prevention and health promotion.

Eligible Sample

Examined participants aged 1 to 5 years were eligible, and female participants aged 12 to 49 years were eligible.

Description of Laboratory Methodology

The method principle for measurement of soluble transferrin receptor (sTfR) is a particle enhanced immunoturbidimetric assay that uses Roche kits on the Cobas® c501 clinical analyzer. Latex particles coated with anti-sTfR antibodies react with the antigen in the sample to form an antigen/antibody complex. Following agglutination, the precipitate is determined photometrically.

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

There were no changes to the lab method or lab site for this component in the NHANES

2015-2016 cycle. There were changes to the lab equipment. In 2016, the laboratory instrumentation changed from the Roche Mod P to the Roche c501 instrument.

Laboratory Method Files

Transferrin Receptor Lab Procedure Manual (May 2019)

Laboratory Quality Assurance and Monitoring

Serum samples were processed, stored, and shipped to the Division of Laboratory Sciences, National Center for Environmental Health, Centers for Disease Control and Prevention, Atlanta, GA 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 National Center for Environmental Health 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 during “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 CDC and 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.

All QC procedures recommended by the manufacturers were followed. Reported results for all assays meet the Division of Laboratory Sciences’ quality control and quality assurance performance criteria for accuracy and precision, similar to the Westgard rules (Caudill, et al.

2008).

Data Processing and Editing

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

One variable was created in this data file. The variable (LBDTFRSI) was created using the following:

LBDTFRSI: The transferrin receptor value in mg/L (LBXTFR) was converted to nmol/L (LBDTFRSI) by multiplying LBXTFR by 11.8.

Analytic Notes

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

Please refer to the NHANES Analytic Guidelines and the on-line NHANES Tutorial for 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 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.

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 limits were constant for all of the analytes in the data set. Two variables are provided for each of these analytes. The variable name ending in “LC” (ex., LBDTFRLC) indicates whether the result was below the limit of detection: the value “0” means that the result was at or above the limit of detection, “1” indicates that the result was below the limit of detection. For analytes with analytic results below the lower limit of detection (ex., LBDTFRLC = 1), an imputed fill value was placed in the analyte results field. This value is the lower limit of detection divided by the square root of 2 (LLOD/sqrt[2]). The other variable prefixed LBX (ex., LBXTFR, provides the analytic result for that analyte.

The lower limit of detection (LLOD in mg/L) for LBXTFR:

Variable Name	SAS Label	LLOD
LBXTFR	Transferrin receptor	0.500 mg/L

No Correction Need for Transferrin Results for NHANES 2015-2016

A method validation (bridging) study was performed to compare results from an instrument change in the 2015-2016 cycle with earlier data.

The Roche Mod E170 analyzer was used for most of 2015-2016 and replaced with the Roche Cobas e601 analyzer in mid-2016. Randomly selected serum samples (n=34) from previously analyzed bench and blind QC material were measured using both instruments and the results were used to conduct the analysis. On average, transferrin values measured from the Roche Mod E170 analyzer were 2.4% higher than values from the Roche e601 (p = 0.0013). Data from the bridging study indicated the correlation coefficient (*r*) between the measurements was 0.998. Regression analyses were performed using Analyse-it, v4.30.4. The weighted Deming regression equation did not show a significant slope or intercept (95% confidence interval [CI] for slope included 1 and for intercept included 0) (mg/L):

E601 = 0.02856 + 0.9685(E-170); 95% CI of slope (0.9259 to 1.011) and intercept (-0.1764 to 0.2335).

Therefore, the NHANES 2015-2016 transferrin results did not have to be adjusted.

References

- Caudill, S.P., Schleicher, R.L., Pirkle, J.L. Multi-rule quality control for the age-related eye disease study. Statist. Med. (2008) 27(20):4094-40106.
- 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 1 YEARS - 5 YEARS

LBXTFR - Transferrin receptor (mg/L)

Variable Name: LBXTFR

SAS Label: Transferrin receptor (mg/L)

English Text: Transferrin receptor (mg/L)

Target: Both males and females 1 YEARS - 5 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
1 to 34.2	Range of Values	2638	2638	
.	Missing	614	3252	

LBDTFRSI - Transferrin receptor (nmol/L)

Variable Name: LBDTFRSI

SAS Label: Transferrin receptor (nmol/L)

English Text: Transferrin receptor (nmol/L)

Target: Both males and females 1 YEARS - 5 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
11.8 to 404	Range of Values	2638	2638	
.	Missing	614	3252