National Health and Nutrition Examination Survey 2003-2004

Documentation, Codebook, and Frequencies

MEC Laboratory Component:
Iron, Total Iron Binding Capacity (TIBC), and Transferrin Saturation

Survey Years:
2003 to 2004

SAS Export File:
L40FE_C.XPT

January 2006

NHANES 2003–2004 Data Documentation

Laboratory Assessment: Lab 40 – Iron, Total Iron Binding Capacity (TIBC), and Transferrin Saturation

Years of Coverage: 2003–2004 **First Published:** January 2006 **Last Revised:** N/A

Component Description

The specific objective of this component is to determine the prevalence of iron deficiency anemia using iron and TIBC (transferrin saturation) in conjunction with ferritin and erythrocyte protoporphyrin. The general objectives of the nutritional biochemistry components are: 1) to provide data for monitoring secular trends in measures of nutritional status in the U.S. population; 2) to evaluate the effect of people's habits and behaviors such as physical activity and the use of alcohol, tobacco, and dietary supplements on people's 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

Participants aged 3–5 years and females aged 12–59 years who do not meet any of the exclusion criteria are eligible.

Description of Laboratory Methodology

Iron

The method used to measure the iron concentration was a timed-endpoint method. In the reaction, iron was released from transferrin by acetic acid and reduced to the ferrous state by hydroxylamine and thioglycolate. The ferrous ion was complexed with the FerroZine Iron reagent. The system monitored the change in absorbance at 560 nm at a fixed time interval. This change in absorbance was directly proportional to the concentration of iron in the sample. The iron was measured on the Beckman/Coulter LX20 analyzer.

TIBC

TIBC was calculated indirectly using the unsaturated iron binding capacity (UIBC) method.

A known ferrous iron standard of 105 µmol/L (586 µg/dL) was incubated with serum at a pH of 7.9, which saturates the available binding sites on

serum transferrin. The unbound excess iron was then complexed with ferene to form ferrous ferene, a blue complex, which was measured by the Beckman/Coulter LX 20 analyzer. The UIBC was equal to the total iron added minus the excess iron. The TIBC is the sum of iron and UIBC.

Transferrin saturation

The transferrin saturation value was calculated as (iron/TIBC) × 100%. The iron variable name is LBXIRN, the TIBC variable name is LBXTIB, and the variable name for transferrin saturation is LBDPCT.

The Division of Laboratory Sciences, National Center for Environmental Health, Centers for Disease Control and Prevention performed testing from 1999 to 2001, and Collaborative Laboratory Services at Ottumwa, Iowa performed testing from 2002 to 2004.

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

Laboratory Quality Control and Monitoring

The NHANES quality control and quality assurance protocols (QA/QC) meet the 1988 Clinical Laboratory Improvement Act mandates. Detailed quality control and quality assurance 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 website.

Data Processing and Editing

Specimens were processed, stored, and shipped to Collaborative Laboratory Services in Ottumwa, Iowa. 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 detail in the Description of the Laboratory Methodology section.

There was no top coding in this file. See the lab40 iron and TIBC Freqs link to determine “below detectable limit fill values” for this data.

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

Analytic Notes

The analysis of NHANES 2003–2004 laboratory data must be conducted with the key survey design and basic demographic variables.

The NHANES 2003–2004 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.

References

1. N/A

Locator Fields

Title: Iron, Total Iron Binding Capacity (TIBC), and Transferrin Saturation

Contact Number: 1-866-441-NCHS

Years of Content: 2003–2004

First Published: January 2006

Revised: N/A

Access Constraints: None

Use Constraints: None

Geographic Coverage: National

Subject: Iron, Total Iron Binding Capacity (TIBC), and Transferrin Saturation

Record Source: NHANES 2003–2004

Survey Methodology: NHANES 2003–2004 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 (2003-2004)

Iron, Total Iron Binding Capacity (TIBC)and Transferrin Saturation (L40FE_C)

Person Level Data

April 2006

SEQN	Target
	B(3 Yrs. to 5 Yrs.) and F(12 Yrs. to 59 Yrs.)
Hard Edits	**SAS Label**
	Respondent sequence number
English Text: Respondent sequence number.	
English Instructions:	

LBXIRN	Target
	B(3 Yrs. to 5 Yrs.) and F(12 Yrs. to 59 Yrs.)
Hard Edits	**SAS Label**
	Iron, Frozen Serum (ug/dL)
English Text: Iron, frozen (ug/dL)	
English Instructions:	

Code or Value	Description	Count	Cumulative	Skip to Item
7 to 288	Range of Values	2904	2904	
.	Missing	334	3238	

LBDIRNSI	Target
	B(3 Yrs. to 5 Yrs.) and F(12 Yrs. to 59 Yrs.)
Hard Edits	**SAS Label**
	Iron, Frozen Serum (umol/L)
English Text: Iron, frozen (umol/L)	
English Instructions:	

Code or Value	Description	Count	Cumulative	Skip to Item
1.25 to 51.55	Range of Values	2904	2904	
.	Missing	334	3238	

LBXTIB	Target
	B(3 Yrs. to 5 Yrs.) and F(12 Yrs. to 59 Yrs.)
Hard Edits	**SAS Label**
	TIBC, Frozen Serum (ug/dL)
English Text: Total iron binding capacity (ug/dL)	
English Instructions:	

Code or Value	Description	Count	Cumulative	Skip to Item
180 to 754	Range of Values	2904	2904	
.	Missing	334	3238	

LBDTIBSI	Target
	B(3 Yrs. to 5 Yrs.) and F(12 Yrs. to 59 Yrs.)
Hard Edits	**SAS Label**
	TIBC, Frozen Serum (umol/L)
English Text: Total iron binding capacity (umol/L)	
English Instructions:	

Code or Value	Description	Count	Cumulative	Skip to Item
32.22 to 134.97	Range of Values	2904	2904	
.	Missing	334	3238	

LBDPCT	Target
	B(3 Yrs. to 5 Yrs.) and F(12 Yrs. to 59 Yrs.)
Hard Edits	**SAS Label**
	Transferrin saturation (%)
English Text: Transferrin saturation (%)	
English Instructions:	

Code or Value	Description	Count	Cumulative	Skip to Item
1.6 to 86.2	Range of Values	2904	2904	
.	Missing	334	3238	