

National Health and Nutrition Examination Survey

2015-2016 Data Documentation, Codebook, and Frequencies

Oral Glucose Tolerance Test (OGTT_I)

Data File: OGTT_I.xpt

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Component Description

Diabetes is a leading cause of disease and death in the United States. More than 29 million Americans are living with diabetes, and 86 million are living with prediabetes, a serious health condition that increases a person's risk of type 2 diabetes and other chronic diseases. In 2014, nearly 9.3 percent of all deaths for persons over the age of 25 were among people with diabetes. The prevalence of diabetes and overweight (one of the major risk factors for diabetes) continue to increase. Substantial new efforts to prevent or control diabetes have begun, including the Diabetes Prevention Trial and the National Diabetes Education Program.

A fasting glucose blood test was performed on all participants 12 years and older, who were examined in the morning session after a nine-hour fast (GLU_I). After the initial venipuncture, participants were asked to drink a calibrated dose (generally 75 grams of glucose) of Trutol™ and had a second venipuncture 2 hours (plus or minus 15 minutes) after drinking the Trutol™ (OGTT_I).

There are several exclusion criteria; including hemophilia and chemotherapy safety exclusions; fasting less than 9 hours; taking insulin, oral or injectable medications for diabetes; self-reported weight loss or bariatric surgery, such as total or partial gastrectomy; refusing phlebotomy; pregnancy and not drinking the entire Trutol™ solution within the allotted time.

Eligible Sample

Participants aged 12 years and older, who were examined in the morning session after a 9-hour fast, were eligible.

Description of Laboratory Methodology

Oral Glucose Tolerance Test

In this enzymatic method glucose is converted to glucose-6-phosphate (G-6-P) by hexokinase in the presence of ATP, a phosphate donor. Glucose-6-phosphate dehydrogenase then converts the G-6-P to gluconate-6-P in the presence of NADP+. As the NADP+ is reduced to NADPH during this reaction, the resulting increase in absorbance at 340 nm (secondary wavelength = 700 nm) is measured. This is an endpoint reaction that is specific for glucose.

Refer to the Laboratory Methods Files section for a detailed description of the laboratory methods

used.

There were no changes to the lab site for this component in the NHANES 2015-2016 cycle. There were changes to the lab method and lab equipment. In 2015, the laboratory instrumentation changed from the Roche C501 to the Roche C311 instrument.

Laboratory Method Files

[Oral Glucose Tolerance Test](#) (June 2018)

Laboratory Quality Assurance and Monitoring

Plasma samples are processed, stored and shipped to the University of Missouri, Columbia, MO 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 University of Missouri 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 CDC and contract laboratories. In the MEC, these methods include performing blind split samples collected on “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 the 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.

Data Processing and Editing

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

One calculated variable was created in this data file. The variable was created using the following formula:

LBXGLT and LBDGLTSI :

The two-hour (OGTT), glucose value in mg/dL (LBXGLT) was converted to mmol/L (LBDGLTSI) by multiplying by 0.05551 (rounded to 3 decimals).

Analytic Notes

Refer to the 2015-2016 [Laboratory Data Overview](#) for general information on NHANES laboratory data.

Subsample Weights

Glucose were measured in a fasting subsample of participants 12 years and older. Special sample weights are required to analyze these data properly. Specific sample weights for this subsample are included in this data file and should be used when analyzing these data.

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.

Starting in the 2015-2016 NHANES cycle, the variables PHAFSTHR (total length of "food fast", hours) and PHAFSTMN (Total length of "food fast", minutes) will not be reported in this file. PHAFSTHR and PHAFSTMN can be found in the [Fasting Questionnaire File](#) (FASTQX_I). The fasting questionnaire data file also includes additional auxiliary information such as fasting status, 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).

Variables that should help the user in the analysis of the two-hour glucose tolerance data include:

GTDSCMMN: used to define

"Glucose challenge Administer Time in minutes".

GTDDR1MN: used to define:

"Time from fast glucose & challenge (min)"

GTDBL2MN: used to define:

"Time from fasting glucose & OGTT (min)"

GTDDR2MN: used to define:

"Time from glucose challenge & OGTT (min)"

GTDXDRANK: used to define:

"Amount of glucose challenge the SP drank"

GTDCODE: used to define:

"Incomplete OGTT Comment Code"

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 "LC" (ex., LBDGLTLC) 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., LBDGLTLC=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., LBXGLT) provides the analytic result for that analyte.

The lower limit of detection (LLOD, in mg/dL) for OGTT glucose is:

Variable Name	SAS Label	LLOD
LBXGLT	OGTT glucose	2.0

Glucose regression equations to compare 2015-16 and 2013-14 data:

A method validation (bridging) study was performed to compare results from an instrument change in 2015-2016 cycle with earlier data. The Cobas C311 analyzer was used for most of 2015-2016 and the Cobas C501 analyzer was used in 2013-2014. Randomly selected plasma samples (n=165) from NHANES 2015-2016 participants were measured using both instruments and the results were used to conduct the analysis. On average, glucose values measured from the Cobas C311 analyzer were 2% higher than values from the Cobas C501 ($p < .0001$). Based on manufacture information, the two analyzers have the same variation (Roche Diagnostics, 2009), and data from the bridging study indicated the correlation coefficient (r) between the measurements was 0.999. Regression analyses were performed using Analyse-it, v4.30.4. Given that the data showed proportional differences in variability, a weighted Deming regression was chosen to adjust the plasma glucose results (mg/dL). The forward and backward equations are below:

Forward: $Y (C311) = 1.023$ (95%CI: 1.014 – 1.032) * $X (C501) - 0.5108$ (95%CI: -1.441 – 0.4197)

Backward: $Y (C501) = 0.9776$ (95%CI: 0.9692 - 0.9860) * $X (C311) + 0.4994$ (95%CI: -0.4064 - 1.405)

These regression equations should be used when examining trends of oral glucose tolerance test (OGTT) data across 2015-2016 and 2007-2014 cycles, or combining 2015-2016 data with these previous cycles. For analysis involving 2015-2016 data and OGTT data collected prior to 2007-2008 cycle, please refer to the documentation accompanying the 2007-2008 OGTT data (OGTT_E) for additional adjustments.

As mentioned above, most of the 2015-2016 samples were measured using the Cobas C311. Results in this 2015-2016 dataset from specimens analyzed using the Cobas C501 were adjusted using the above forward regression equation.

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.

References

- Roche Diagnostics Technical Publications Department (December 2009). Cobas C 501 Analyzer and Cobas C 311 Analyzer Within Run Imprecision Guidelines, Volume 6. Retrieved from: https://www.rochediagnostics.fr/Htdocs/media/pdf/actualites/2g_Specif_Repeta_c501.pdf.
- 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 12 YEARS - 150 YEARS

WTSOG2YR - OGTT Subsample MEC Weight

Variable Name: WTSOG2YR
SAS Label: OGTT Subsample MEC Weight
English Text: OGTT Subsample 2 Year MEC Weight
Target: Both males and females 12 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
14446.051556 to 565055.45969	Range of Values	2414	2414	
0 ✓	No Lab Result	299	2713	
.	Missing	0	2713	

LBXGLT - Two Hour Glucose (OGTT) (mg/dL)

Variable Name: LBXGLT**SAS Label:** Two Hour Glucose (OGTT) (mg/dL)**English Text:** Two Hour Glucose (OGTT) (mg/dL)**Target:** Both males and females 12 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
35 to 542	Range of Values	2084	2084	
.	Missing	629	2713	

LBDGLTSI - Two Hour Glucose (OGTT) (mmol/L)

Variable Name: LBDGLTSI
SAS Label: Two Hour Glucose (OGTT) (mmol/L)
English Text: Two Hour Glucose (OGTT) (mmol/L)
Target: Both males and females 12 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
1.943 to 30.086	Range of Values	2084	2084	
.	Missing	629	2713	

GTDSCMMN - Glucose challenge Administer Time in min

Variable Name: GTDSCMMN
SAS Label: Glucose challenge Administer Time in min
English Text: Glucose challenge Administer Time in minutes
Target: Both males and females 12 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0 to 11	Range of Values	2107	2107	
.	Missing	606	2713	

GTDDR1MN - Time from fast glucose & challenge(min)

Variable Name: GTDDR1MN
SAS Label: Time from fast glucose & challenge(min)
English Text: Time from fast glucose & challenge(min)
Target: Both males and females 12 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
1 to 76	Range of Values	2107	2107	
.	Missing	606	2713	

GTDBL2MN - Time from fasting glucose & OGTT (min)

Variable Name: GTDBL2MN
SAS Label: Time from fasting glucose & OGTT (min)
English Text: Time from fasting glucose & OGTT (min)
Target: Both males and females 12 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
69 to 184	Range of Values	2086	2086	
.	Missing	627	2713	

GTDDR2MN - Time from glucose challenge & OGTT(min)

Variable Name: GTDDR2MN
SAS Label: Time from glucose challenge & OGTT(min)
English Text: Time from glucose challenge & OGTT(min)
Target: Both males and females 12 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
65 to 138	Range of Values	2086	2086	
.	Missing	627	2713	

GTXDRAK - Amount of glucose challenge drank

Variable Name: GTXDRAK
SAS Label: Amount of glucose challenge drank
English Text: Amount of glucose challenge drank
Target: Both males and females 12 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	All	2099	2099	
2	Some	3	2102	
3	None	81	2183	
.	Missing	530	2713	

GTDCODE - Incomplete OGTT Comment Code

Variable Name: GTDCODE
SAS Label: Incomplete OGTT Comment Code
English Text: Incomplete OGTT Comment Code
Target: Both males and females 12 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0	OGTT complete	2084	2084	
20	Hemophiliac	0	2084	
21	Cancer chemotherapy within 4 weeks	0	2084	
22	Diabetic on medications	322	2406	
23	Refused venipuncture	0	2406	
24	Ill/faint during test	4	2410	
25	Venipuncture unsuccessful	12	2422	
26	Currently pregnant	1	2423	
27	Refused glucose challenge	85	2508	
28	Fasting less than 9 hours	7	2515	
29	Came late/left early	18	2533	
30	Other	180	2713	
.	Missing	0	2713	