National Health and Nutrition Examination Survey

2017-March 2020 Data Documentation, Codebook, and Frequencies

Albumin & Creatinine - Urine (P_ALB_CR)

Data File: P_ALB_CR.xpt

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Component Description

The NHANES program suspended field operations in March 2020 due to the coronavirus disease 2019 (COVID-19) pandemic. As a result, data collection for the NHANES 2019-2020 cycle was not completed and the collected data are not nationally representative. Therefore, data collected from 2019 to March 2020 were combined with data from the NHANES 2017-2018 cycle to form a nationally representative sample of NHANES 2017-March 2020 pre-pandemic data. These data are available to the public. Please refer to the Analytic Notes section for more details on the use of the data.

Albumin measurements are used in the diagnosis and treatment of diseases involving the liver and/or kidneys. These measurements are frequently used to assess nutritional status, due to plasma levels of albumin being dependent on protein intake. Increased microalbuminuria is a sign of renal disease and may be predictive of nephropathy risk in patients with type 1 and type 2 diabetes. It is also associated with hypertension and cardiac disease.

Creatinine is produced by creatine and creatinine phosphate as a result of muscle metabolic processes. It is then excreted by glomerular filtration during normal renal function. Creatinine may be measured in both serum and urine. Creatinine measurement is useful in the diagnosis and treatment of renal diseases, in monitoring renal dialysis, and as a calculation basis for other urinary analytes (e.g., total protein and microalbumin).

Eligible Sample

All examined participants 3 years and older, in the NHANES 2017-March 2020 pre-pandemic sample, were eligible.

Description of Laboratory Methodology

Urinary Albumin

A solid-phase fluorescent immunoassay for the measurement of human urinary albumin is described by Chavers et al., 1984. The fluorescent immunoassay is a non-competitive, double-antibody method for the determination of human albumin in urine. Antibody to human albumin is covalently attached to derivatized polyacrylamide beads. The solid-phase antibody is reacted with a urine specimen, and the urine albumin-antigen complexes with the solid-phase antibody. This complex then reacts with fluorescein-labeled antibody. The unattached fluorescent antibody is then removed by washing during centrifugation. The fluorescence of the stable solid-phase antibody complex is determined with a fluorometer; the fluorescence is directly proportional to the amount of urine albumin present. The standard curve is 0.5–20 µg/mL of albumin.

Results of the fluorescent immunoassay (FIA) are reproducible, and the test is accurate and sensitive for the detection of human urinary albumin excretion. It is especially useful for the measurement of low levels of urinary albumin not detectable by dipstick methods. The FIA assay resembles the radio-immunoassay (RIA) in technique and sensitivity without the potential health hazards associated with the handling of isotopes in the laboratory (Chavers, BM et al., 1984).

Urinary Creatinine

Creatinine is produced by creatine and creatinine phosphate as a result of muscle metabolic processes. It is

then excreted by glomerular filtration during normal renal function. Creatinine may be measured in both serum and urine. Creatinine measurement is useful in the diagnosis and treatment of renal diseases, in monitoring renal dialysis, and as a calculation basis for other urinary analytes (e.g., total protein, microalbumin).

In this enzymatic method creatinine is converted to creatine under the activity of creatininase. Creatine is then acted upon by creatinase to form sarcosine and urea. Sarcosine oxidase converts sarcosine to glycine and hydrogen peroxide, and the hydrogen peroxide reacts with chromophore in the presence of peroxidase to produce a color product that is measured at 546 nm (secondary wavelength = 700 nm). This is an endpoint reaction that agrees well with recognized HPLC methods, and it has the advantage over Jaffe picric acid-based methods that are susceptible to interferences from non-creatinine chromogens.

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

Laboratory Method Files

Albumin Laboratory Procedure Manual (March 2020)

Creatinine Laboratory Procedure Manual (March 2020)

Albumin Laboratory Procedure Manual (August 2021)

Creatinine Laboratory Procedure Manual (August 2021)

Laboratory Quality Assurance and Monitoring

Urine specimens are processed, stored, and shipped to University of Minnesota, Minneapolis, MN for analysis.

Detailed instructions on specimen collection and processing are discussed in the NHANES 2017-2018 and 2019-2020 Laboratory Procedures Manuals (LPM). Vials are stored under appropriate frozen (-30°C) conditions until they are shipped to University of Minnesota 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 LPMs.

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 QC 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 on “dry run” sessions. In addition, contract laboratories randomly perform repeat testing on 2% of all specimens.

NCHS developed and distributed a QC protocol for all CDC and contract laboratories, which outlined the use of Westgard rules (Westgard et al., 1981) when testing 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.

Three variables were created in this data file. The variables were created using the following formulas:

URXUMA and URXUMS:

The urine albumin value in µg/mL (URXUMA) was converted to mg/L (URXUMS) by multiplying by 1.00 (rounded 2 decimals).

URXUCR and URXCRS:

The urine creatinine value in mg/dL (URXUCR) was converted to µmol/L (URXCRS) by multiplying by 88.4 (rounded 1 decimal).

URDACT:

The urine albumin/creatinine ratio in mg/g (URDACT) was calculated by dividing URXUMA by URXUCR and multiplying by 100 (rounded 2 decimal places).

Analytic Notes

The COVID-19 pandemic required suspension of NHANES 2019-2020 field operations in March 2020 after data were collected in 18 of the 30 survey locations in the 2019-2020 sample. Data collection was cancelled for the remaining 12 locations. Because the collected data from 18 locations were not nationally representative, these data were combined with data from the previous cycle (2017-2018) to create a 2017-March 2020 pre-pandemic data file. A special weighting process was applied to the 2017-March 2020 pre-pandemic data file. The resulting sample weights in the present file should be used to calculate estimates from the combined cycles. These sample weights are not appropriate for independent analyses of the 2019-2020 data and will not yield nationally representative results for either the 2017-2018 data alone or the 2019-March 2020 data alone. Please refer to the NHANES website for additional information for the NHANES 2017-March 2020 pre-pandemic data, and for the previous 2017-2018 public use data file with specific weights for that 2-year cycle.

Refer to the 2017-2018 and 2019 - 2020 Laboratory Data Overview documents for general information on NHANES laboratory data.

There are over 800 laboratory tests performed on NHANES participants. However, not all participants provided biospecimens or enough volume for all the tests to be performed. The specimen availability can also vary by age or other population characteristics. Analysts should evaluate the extent of missing data in the dataset related to the outcome of interest as well as any predictor variables used in the analyses to determine whether additional re-weighting for item non-response is necessary.

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.

Demographic and Other Related Variables

The analysis of NHANES laboratory data must be conducted using the appropriate survey design and demographic variables. The NHANES 2017-March 2020 Pre-pandemic 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.

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., URXUMALC) 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. The other variable prefixed URX (ex., URXUMA) provides the analytic result for that analyte. For analytes with analytic results below the lower limit of detection (ex., URXUMALC=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 lower limit of detection (LLOD) in ug/ml for URXUMA and in mg/dL for URXUCR:

Variable Name	Analyte description	LLOD
URXUMA	Albumin, Urine	0.30 µg/mL
URXUCR	Creatinine, urine (mg/dL)	5.00 mg/dL

References

- Chavers BM, Simonson J, Michael AF. A solid-phase fluorescent immunoassay for the measurement of human urinary albumin. Kidney Int. 1984;25:576–578.
- 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 3 YEARS - 150 YEARS

URXUMA - Albumin, urine (ug/mL)

Variable Name: URXUMA

SAS Label: Albumin, urine (ug/mL)

English Text: Albumin, urine (ug/mL)

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0.21 to 16070	Range of Values	12510	12510	
.	Missing	517	13027	

URXUMS - Albumin, urine (mg/L)

Variable Name: URXUMS

SAS Label: Albumin, urine (mg/L)

English Text: Albumin, urine (mg/L)

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0.21 to 16070	Range of Values	12510	12510	
.	Missing	517	13027	

URDUMALC - Albumin, urine comment code

Variable Name: URDUMALC

SAS Label: Albumin, urine comment code

English Text: Albumin, urine comment code

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	12508	12508	
1	Below lower detection limit	2	12510	
.	Missing	517	13027	

URXUCR - Creatinine, urine (mg/dL)

Variable Name: URXUCR

SAS Label: Creatinine, urine (mg/dL)

English Text: Creatinine, urine (mg/dL)

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
3.54 to 739	Range of Values	12509	12509	
.	Missing	518	13027	

URXCRS - Creatinine, urine (umol/L)

Variable Name: URXCRS

SAS Label: Creatinine, urine (umol/L)

English Text: Creatinine, urine (umol/L)

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
312.9 to 65327.6	Range of Values	12509	12509	
.	Missing	518	13027	

URDUCRLC - Creatinine, urine comment code

Variable Name: URDUCRLC

SAS Label: Creatinine, urine comment code

English Text: Creatinine, urine comment code

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	12507	12507	
1	Below lower detection limit	2	12509	
.	Missing	518	13027	

URDACT - Albumin creatinine ratio (mg/g)

Variable Name: URDACT

SAS Label: Albumin creatinine ratio (mg/g)

English Text: Albumin creatinine ratio (mg/g)

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0.27 to 11676.92	Range of Values	12509	12509	
.	Missing	518	13027	