

# National Health and Nutrition Examination Survey

## 2017-March 2020 Data Documentation, Codebook, and Frequencies

### Urine Flow Rate (P\_UCFLOW)

**Data File: P\_UCFLOW.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.

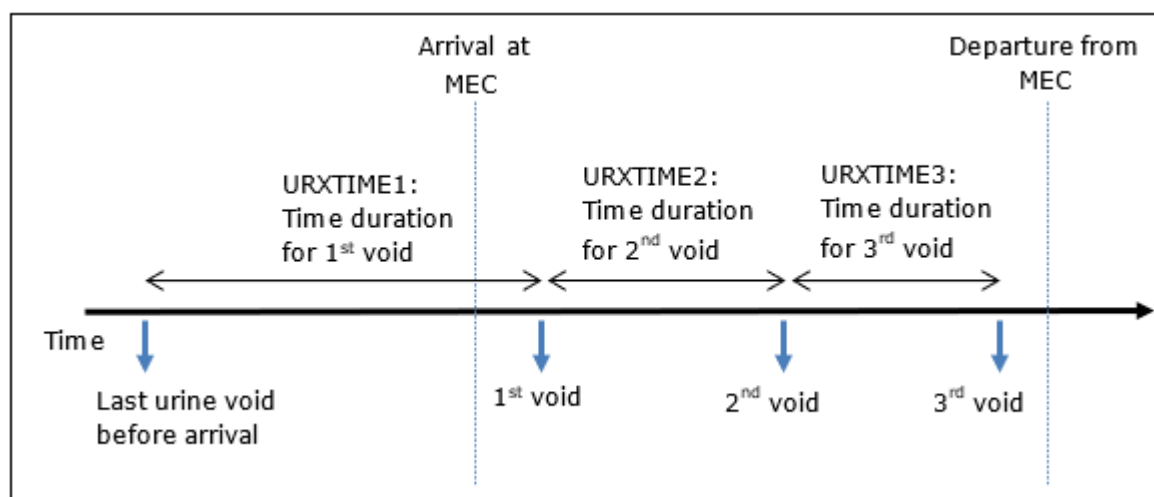
The Urine Flow Rate (or urine excretion rate) is a measurement of the quantity of urine produced in a specified period of time. Urine analyte concentrations from single determinations (spot urines) can vary depending on level of hydration. Due to this variation, the urine flow rate, when used in conjunction with analyte concentration measured on spot urine, can produce a better measure of analyte excretion rate, especially in the context of exposure to environmental chemicals. The urine excretion rate (mg/min) is the product of the urine flow rate (mL/min) and the urine analyte concentration (mg/mL).

## Eligible Sample

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

## Description of Laboratory Methodology

Participants were asked to record the time of their last void before coming to the mobile examination center (MEC). Participants were also asked to void at the MEC, and the time of collection and volume of the urine was recorded. The volume of the urine sample collected at the MEC was measured and the urine flow rate was calculated from this information. Up to three voids were collected for the purpose of ensuring sufficient total volume for various analyses, with volumes and timing recorded. Collected samples were composited then aliquoted into separate vessels such that all analyses can be conducted on the composite sample. The figure below depicts the scheme for collecting urine samples and recording time duration covered for each urine void.



The urine flow rate is calculated by dividing the volume of the urine sample collected by the time duration between the previous urine void and the urine sample collection in the MEC. There may be a maximum of 3 urine flow rates associated with each urine void for a participant, but that depends on the total number of spot urines collected in the MEC.

Since all urinary analyte concentrations are measured in the composite sample, the urinary flow rate associated with a given urinary analyte concentration is calculated using the total volume of urine collected and total time duration covered by all urine voids. How to perform this calculation is described below under "Analytic Note."

## Laboratory Quality Assurance and Monitoring

Random/spot urine samples were processed and weighed in the MEC.

Detailed instructions on specimen collection and processing are discussed in the NHANES [2017-2018](#) and [2019-2020 Laboratory Procedures Manuals](#) (LPMs).

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.

## Data Processing and Editing

The data were reviewed. Incomplete data or improbable values were identified and corrected.

## 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.

### Calculation of Urinary Flow Rate

Conceptually, urinary flow rate for the composite urine sample is calculated as:

Urinary flow rate = (total urine volume)/(total time duration)

The exact form of formula is different depending on how many spot urine samples are collected at the MEC. In general, the calculation should involve only the information on the first urine collection through the last urine collection with non-zero, non-missing volume and non-missing time duration. Three forms of formulae are described with specification of when to use.

1) Formula involving the volume and time information from the first urine collection.

Many survey participants provided sufficient volume of urine at the first collection, and there was no 2<sup>nd</sup> or 3<sup>rd</sup> urine collection. For those, urinary flowrate associated with urinary analyte concentrations is calculated as:

Urinary flowrate = URXVOL1/ URXTIME1 = URDFLOW1

This formula also is used for survey participants who: has the volume of second urine collection recorded as zero and the volume of third urine collection recorded as missing; or has the volumes of second and third urine collection recorded as zero.

2) Formula involving the volume and time information from first and second urine collections.

For survey participants who provided two spot urine samples, urinary flow rate associated with urinary analyte concentrations is calculated as:

Urinary flow rate = (URXVOL1 + URXVOL2) / (URXTIME1 + URXTIME2)

This formula also is used for survey participants who has the volume of first urine collection recorded as zero and the volume of second urine collection recorded as > zero with missing volume of the third urine collection (i.e., no or very little urine was collected for the first attempt to collect a urine sample and there was no third urine sample).

3) Formula involving the volume and time information from the first, second, and third urine collections.

For survey participants who provided three spot urine samples, urinary flowrate associated with urinary analyte concentrations is calculated as:

Urinary flow rate= (URXVOL1 + URXVOL2 + URXVOL3)/(URXTIME1 + URXTIME2 + URXTIME3)

Please note that this formula also should be used when URXVOL1 and/or URXVOL2 is zero and URXVOL3 > 0 (i.e., no or very little urine was collected for the first and/or second urine attempt to collect urine samples).

Please note that the time of last urine void before arriving the MEC was based on self-reported information from the participant, therefore, the data may be subject to reporting error. Analysts should examine the data distribution and use their subject-matter knowledge to decide whether to include, trim, or exclude any potential outliers in their analyses.

### 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 weight 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**

Since this data is calculated, the use of lower limits of detection (LLODs) isn't applicable.

## References

- N/A

## Codebook and Frequencies

### SEQN - Respondent sequence number

<b>Variable Name:</b>	SEQN
<b>SAS Label:</b>	Respondent sequence number
<b>English Text:</b>	Respondent sequence number.
<b>Target:</b>	Both males and females 3 YEARS - 150 YEARS

**URXVOL1 - The volume of urine collection #1 (mL)**

**Variable Name:** URXVOL1  
**SAS Label:** The volume of urine collection #1 (mL)  
**English Text:** The volume of urine collection #1 (mL)  
**Target:** Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0 to 455	Range of Values	12518	12518	
.	Missing	509	13027	

## URDFLOW1 - Urine #1 Flow Rate (mL/min)

**Variable Name:** URDFLOW1  
**SAS Label:** Urine #1 Flow Rate (mL/min)  
**English Text:** Urine #1 Flow Rate (mL/min)  
**Target:** Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0 to 53	Range of Values	9593	9593	
.	Missing	3434	13027	

## URDTIME1 - Minutes b/w last urination &amp; urine # 1

**Variable Name:** URDTIME1

**SAS Label:** Minutes b/w last urination & urine # 1

**English Text:** The time between last urination and the first urine sample collection in minutes

**Target:** Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
2 to 1406	Range of Values	9593	9593	
.	Missing	3434	13027	



## URXVOL2 - The volume of urine collection #2 (mL)

**Variable Name:** URXVOL2  
**SAS Label:** The volume of urine collection #2 (mL)  
**English Text:** The volume of urine collection #2 (mL)  
**Target:** Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
1 to 444	Range of Values	1835	1835	
.	Missing	11192	13027	

## URDFLOW2 - Urine #2 Flow Rate (mL/min)

**Variable Name:** URDFLOW2  
**SAS Label:** Urine #2 Flow Rate (mL/min)  
**English Text:** Urine #2 Flow Rate (mL/min)  
**Target:** Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0.006 to 14.95	Range of Values	1835	1835	
.	Missing	11192	13027	

## URDTIME2 - Minutes b/w urine # 1 &amp; urine # 2

**Variable Name:** URDTIME2  
**SAS Label:** Minutes b/w urine # 1 & urine # 2  
**English Text:** The time between the first and second urine sample collections in minutes  
**Target:** Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
10 to 216	Range of Values	1836	1836	
.	Missing	11191	13027	

## URXVOL3 - The volume of urine collection #3 (mL)

**Variable Name:** URXVOL3  
**SAS Label:** The volume of urine collection #3 (mL)  
**English Text:** The volume of urine collection #3 (mL)  
**Target:** Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0 to 373	Range of Values	50	50	
.	Missing	12977	13027	

## URDFLOW3 - Urine #3 Flow Rate (mL/min)

**Variable Name:** URDFLOW3  
**SAS Label:** Urine #3 Flow Rate (mL/min)  
**English Text:** Urine #3 Flow Rate (mL/min)  
**Target:** Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0.097 to 5.345	Range of Values	49	49	
.	Missing	12978	13027	

## URDTIME3 - Minutes b/w urine # 2 &amp; urine # 3

**Variable Name:** URDTIME3  
**SAS Label:** Minutes b/w urine # 2 & urine # 3  
**English Text:** The time between the second and third urine sample collections in minutes  
**Target:** Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
31 to 148	Range of Values	49	49	
.	Missing	12978	13027	