National Health and Nutrition Examination Survey

2015-2016 Data Documentation, Codebook, and Frequencies

Mono-2-ethyl-5-hydroxyhexyl terephthalate, mono-2-ethyl-5-carboxypentyl terephthalate, and monooxoisononyl phthalate - Urine (Surplus) (SSMHHT_I)

Data File: SSMHHT_I.xpt

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Component Description

Since 1999, CDC has measured phthalate metabolites in human urine to assess exposure to phthalates (CDC 2017). Di-2-ethylhexyl phthalate (DEHP) is a commonly used plasticizer. The use of DEHP in the U.S. market appears to be decreasing, at least in part because of legislative efforts, while the use of di-isononyl phthalate (DiNP), one of the replacements of DEHP, and other phthalate alternatives, may be rising (Calafat et al. 2011;Zota et al. 2014). Di-2-ethylhexyl terephthalate (DEHTP), a structural isomer of DEHP and one of such alternatives, has been used as a plasticizer for polymers contained in consumer products (Beeler 1976). To better understand exposure to phthalates alternatives, we quantified mono-2-ethyl-5-hydroxyhexyl terephthalate (MEHHTP), mono-2-ethyl-5-carboxypentyl terephthalate (MECPTP), two metabolites of DEHTP, and monooxoisononyl phthalate (MONP), an additional metabolite of DiNP, in one third subsample of participants 3+ years of age from NHANES 2015-2016.

Eligible Sample

All participants aged 3-5 years old and an one-third sample of participants aged 6 and older from NHANES 2015-2016 with stored urine.

Description of Laboratory Methodology

We measured urinary MEHHTP, MECPTP and MONP by an on-line solid phase extraction coupled with isotope dilution-high performance liquid chromatography tandem mass spectrometry approach previously described (Silva et al. 2013).

Refer to the Laboratory Method Files section for detailed laboratory procedure manual(s) of the methods used.

There were no changes to the lab equipment or lab site for this component compared with those used for measuring other phthalates and DINCH metabolites in the same one-third subsample of participants 3 years of age and older in NHANES 2015-2016. If the concentration of a metabolite was less than the limit of detection (LOD), then the imputed value was used. The imputed value was calculated as the LOD divided by the square root of 2 (Hornung and Reed 1990); imputed values are provided in the NHANES public release

file.

Laboratory Quality Assurance and Monitoring

The analytical measurements were conducted following strict quality control/quality assurance CLIA guidelines. Along with the study samples, each analytical run included high- and low-concentration quality control materials (QCs) and reagent blanks to assure the accuracy and reliability of the data. The concentrations of the high-concentration QCs and the low-concentration QCs, averaged to obtain one measurement of high-concentration QC and low-concentration QC for each run, were evaluated using standard statistical probability rules (Caudill et al. 2008).

Data Processing and Editing

Data were received after all analyses were complete. The data were not edited.

Data Access: All data are publicly available.

Analytic Notes

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

Subsample weights

MEHHTP, MECPTP, and MONP were measured in all persons 3-5 years of age and in a one-third subsample for persons 6 years of age and older. Special sample weights, included in this data file, are required to analyze these data properly.

Demographic and Other Related Variables

The analysis of NHANES laboratory data must be conducted with the key survey design and basic demographic variables. The NHANES 2015-2016 Demographic Data 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 other NHANES data files using the unique survey participant identifier (i.e., SEQN).

Detection Limits

Detection limits were constant for all of the analytes in the data set. Two variables are provided for each analyte.

The variable name ending in “L” (ex., SSMHHTL) 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., SSMHHTL=1), an imputed fill value was placed in the analyte results field. This value is the lower limit of detection divided by square root of 2 (LLOD/sqrt). The other variable prefixed SS (ex., SSMHHT) provides the analytic result for that analyte.

The lower limit of detection (LLOD, in ng/mL) for MEHHTP, MECPTP, and MONP are:

Variable Name	SAS Label	LLOD
SSMHHT	Mono-2-ethyl-5-hydroxyhexyl terephthalate (µg/L)	0.4
SSECPT	Mono-2-ethyl-5-carboxypentyl terephthalate (µg/L)	0.2
SSMONP	Monooxoisononyl phthalate (µg/L)	0.4

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

- Beeler AD. 1976. New Terephthalate Plasticizers for PVC. Plastics Engineering 32: 40-41.
- Calafat AM, Wong LY, Silva MJ, Samandar E, Preau JL, Jia LT, et al. 2011. Selecting Adequate Exposure Biomarkers of Diisononyl and Diisodecyl Phthalates: Data from the 2005-2006 National Health and Nutrition Examination Survey. Environ Health Perspect 119: 50-55.
- Caudill SP, Schleicher RL, Pirkle JL. 2008. Multi-rule quality control for the age-related eye disease study. Statist Med 27: 4094-4106.
- CDC. 2017. Fourth National Report on Human Exposure to Environmental Chemicals, updated Tables, January, 2017 . In: Atlanta, GA:Centers for Disease Control and Prevention; National Center for Environmental Health; Division of Laboratory Sciences.
- Hornung RW, Reed LD. 1990. Estimation of average concentration in the presence of nondetectable values. Appl Occup Environ Hyg 5: 46-51.
- Silva MJ, Jia T, Samandar E, Preau JL, Calafat AM. 2013. Environmental exposure to the plasticizer 1,2-cyclohexane dicarboxylic acid, diisononyl ester (DINCH) in US adults (2000-2012). Environ Res 126: 159-163.
- Zota AR, Calafat AM, Woodruff TJ. 2014. Temporal Trends in Phthalate Exposures: Findings from the National Health and Nutrition Examination Survey, 2001-2010. Environ Health Perspect 122: 235-241.

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

WTSB2YR - Subsample B weights

Variable Name: WTSB2YR

SAS Label: Subsample B weights

English Text: Subsample B weights

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0 to 874638.01159	Range of Values	2971	2971	
.	Missing	0	2971	

SSMHHT - Mono2ethyl5hydroxyhexyl terephth (ug/L)

Variable Name: SSMHHT

SAS Label: Mono2ethyl5hydroxyhexyl terephth (ug/L)

English Text: Mono2ethyl5hydroxyhexyl terephth (ug/L)

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0.3 to 876.6	Range of Values	2971	2971	
.	Missing	0	2971	

SSMHHTL - Mono2ethy-5hydroxyhexyl terephth cmt cd

Variable Name: SSMHHTL

SAS Label: Mono2ethy-5hydroxyhexyl terephth cmt cd

English Text: Mono2ethy-5hydroxyhexyl terephth cmt cd

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	2857	2857	
1	Below lower detection limit	114	2971	
.	Missing	0	2971	

SSECPT - Mono2ethyl5carboxypentyl terephth (ug/L)

Variable Name: SSECPT

SAS Label: Mono2ethyl5carboxypentyl terephth (ug/L)

English Text: Mono2ethyl5carboxypentyl terephth (ug/L)

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0.1 to 4312	Range of Values	2971	2971	
.	Missing	0	2971	

SSECPTL - Mono2ethyl5carboxypentyl terephth cmt cd

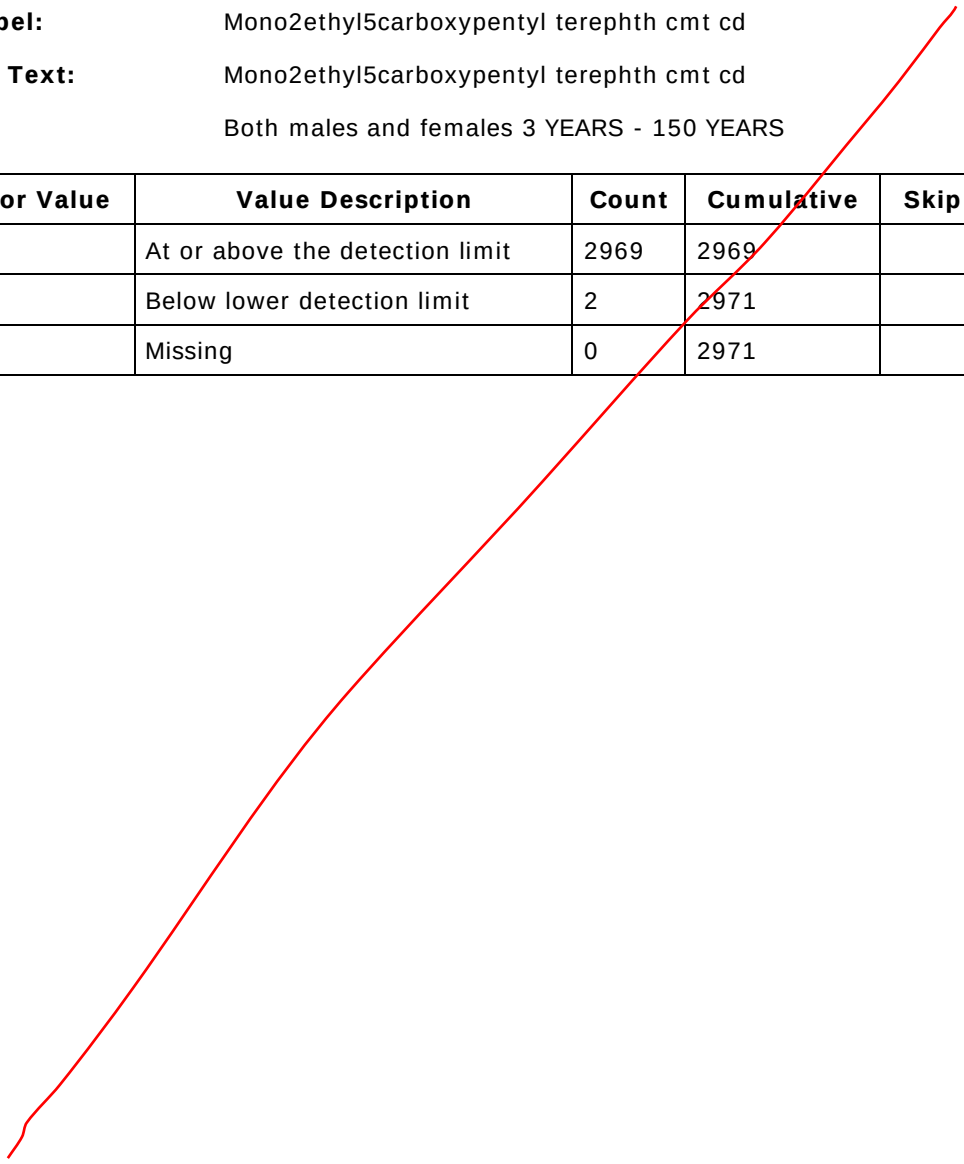
Variable Name: SSECPTL

SAS Label: Mono2ethyl5carboxypentyl terephth cmt cd

English Text: Mono2ethyl5carboxypentyl terephth cmt cd

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	2969	2969	
1	Below lower detection limit	2	2971	
.	Missing	0	2971	



SSMONP - Monooxoisononyl phthalate (ug/L)

Variable Name: SSMONP

SAS Label: Monooxoisononyl phthalate (ug/L)

English Text: Monooxoisononyl phthalate (ug/L)

Target: Both males and females 3 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
0.3 to 727.1	Range of Values	2971	2971	
.	Missing	0	2971	

SSMONPL - Monooxoisononyl phthalate cmt cd

Variable Name: SSMONPL

SAS Label: Monooxoisononyl phthalate cmt cd

English Text: Monooxoisononyl phthalate cmt cd

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	2779	2779	
1	Below lower detection limit	192	2971	
.	Missing	0	2971	