

National Health and Nutrition Examination Survey 2003-2004

Documentation, Codebook, and Frequencies

Laboratory Component:
Urinary Phthalates

Survey Years:
2003 to 2004

SAS Export File:
L24PH_C.XPT



First Release: January 2008
Last Revised: N/A

NHANES 2003–2004 Data Documentation

Laboratory Assessment: Lab 24 Urinary Phthalates

Years of Coverage: 2003–2004

First Published: January 2008

Last Revised: N/A

Component Description

Urinary Phthalates

Phthalate acid esters (phthalates) are used extensively as plasticizers in a wide range of applications such as children's toys, food packaging, and medical supplies. Because some of these compounds are known to be estrogenic and have been associated with a host of health problems in rats, such as cancers and teratogenicity, governments in Europe and Japan have become increasingly concerned about levels in food packaging materials and children's toys. Biomeasures of phthalates in humans are necessary to evaluate potential human health threats from exposure to these chemicals.

Eligible Sample

Participants aged 6 years and older who met the subsample requirements.

Description of Laboratory Methodology

The test principle utilizes high performance liquid chromatography-electrospray ionization-tandem mass spectrometry (HPLC-ESI-MS/MS) for the quantitative detection in urine of the following phthalate metabolites: monomethyl phthalate (mMP), monoethyl phthalate (mEP), monobutyl phthalate (mBP), mono-isobutyl phthalate (miBP), mono (3-carboxypropyl) phthalate (mCPP), monocyclohexyl phthalate (mCHP), mono (2-ethylhexyl) phthalate (mEHP), monooctyl phthalate (mOP), monobenzyl phthalate (mBzP), monoisononyl phthalate (mNP), mono(2-ethyl-5-oxohexyl) phthalate (mEOHP), mono(2-ethyl-5-hydroxyhexyl) phthalate (mEHHP), and mono(2-ethyl-5-carboxypentyl) phthalate (mECP) [1]. Urine samples are processed using enzymatic deconjugation of the glucuronidated phthalate monoesters followed by on-line solid phase extraction (SPE) coupled with reversed phase HPLC-ESI-MS/MS. Assay precision is improved by incorporating isotopically-labeled internal standards for each of the phthalate metabolites. In addition, 4-methyl umbelliferone glucuronide is used to monitor deconjugation efficiency. This selective method allows for rapid detection of up to fifteen monoester metabolites of commonly used phthalate diesters in human urine with limits of detection in the low parts per billion (ppb) ranges.

Laboratory Quality Control and Monitoring

Urine specimens are processed, stored, and shipped to the Division of Laboratory Sciences, National Center for Environmental Health, Centers for Disease Control and Prevention for analysis.

Detailed specimen collection and processing instructions are discussed in the NHANES Laboratory/Medical Technologists Procedures Manual (LPM). Vials are stored under appropriate frozen (-20°C) conditions until they are shipped to National Center for Environmental Health for testing.

Mobile Examination Centers (MECs)

Laboratory team performance is monitored using several techniques. NCHS and contract consultants use a structured quality assurance evaluation during unscheduled visits to evaluate both the quality of the laboratory work and the quality-control procedures. Each laboratory staff person is observed for equipment operation, specimen collection and preparation; testing procedures and constructive feedback are given to each staff. Formal retraining sessions are conducted annually to ensure that required skill levels were maintained.

The NHANES QA/QC protocols meet the 1988 Clinical Laboratory Improvement Act mandates. Detailed QA/QC instructions are discussed in the NHANES LPM.

Analytical Laboratories

NHANES uses several methods to monitor the quality of the analyses performed by the 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 2.0% of all specimens.

NCEH developed and distributed a quality control protocol for all the laboratories which outlined the Westgard rules used when running NHANES specimens. Any problems encountered during shipping or receipt of specimens, instrument calibration, reagents, and any special considerations are submitted to NCHS and Westat. Summary statistics for each control pool, QC graphs, are reviewed by NCHS for trends or shifts in the data. The laboratories are required to explain any identified areas of concern.

All QC procedures recommended by the manufacturers were followed.

Reported results for all assays meet the Division of Laboratory Sciences' quality control and quality assurance performance criteria for accuracy and precision (similar to specifications outlined by Westgard (1981)).

Analytic Notes

Subsample weights

Measures of urinary environmentalals were measured in a one third subsample of persons 6 years and over. 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.

Variance estimation

The analysis of NHANES 2003-2004 laboratory data must be conducted with the key survey design and basic demographic variables. The NHANES 2003-2004 Demographic Data File contains demographic and 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.

Links to NHANES Data Files

This laboratory data file can be linked to the other NHANES 2003-2004 data files using the unique survey participant identifier 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 named URD___LC indicates whether the result was below the limit of detection. There are two values: "0" and "1". "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 named URX___ provides the analytic result for that analyte.

The lower limit of detections for the environmental phthalates is

Analyte	Item Id	Limit of Detection(LLOD)
Mono-2-ethyl-5-carboxypentyl phthalate	URXECP	0.25
Mono-n-butyl phthalate (ng/mL)	URXMBP	0.40
Mono-(3-carboxypropyl) phthalate (ng/mL)	URXMC1	0.16
Mono-cyclohexyl Phthalate (ng/mL)	URXMCP	0.20
Mono-ethyl phthalate (ng/mL)	URXMEP	0.40
Mono-(2-ethyl-5-hydroxyhexyl) (ng/mL)	URXMHH	0.32
Mono-(2-ethyl)-hexyl phthalate (ng/mL)	URXMHP	0.90
Mono-isobutyl phthalate (ng/mL)	URXMIB	0.26
Mono-n-methyl phthalate (ng/mL)	URXMNM	1.0
Mono-isononyl phthalate (ng/mL)	URXMNP	1.0
Mono-(2-ethyl-5-oxohexyl) (ng/mL)	URXMOH	0.45
Mono-n-octyl phthalate (ng/mL)	URXMOP	1.0
Mono-benzyl phthalate (ng/mL)	URXMZP	0.11

Please refer to the Analytic Guidelines for further details on the use of sample weights and other analytic issues.

References

1. K. Kato, M.J. Silva, L.L. Needham, A.M. Calafat, *Anal. Chem.* 77 (2005) 2985.

Locator Fields

Title: Lab 24 Urinary Phthalates

Contact Number: 1-866-441-NCHS

Years of Content: 2003–2004

First Published: January 2008

Revised: N/A

Access Constraints: None

Use Constraints: None

Geographic Coverage: National

Subject: Urinary Phthalates

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)**

**Urinary Phthalates (L24PH_C)
Person Level Data**

First Published: January 2008

Last Revised: N/A



SEQN	Target
	B(6 Yrs. to 150 Yrs.)
Hard Edits	SAS Label
	Respondent sequence number
English Text: Respondent sequence number.	
English Instructions:	

WTSB2YR	Target
	B(6 Yrs. to 150 Yrs.)
Hard Edits	SAS Label
	Two-year MEC weights of subsample B
English Text: Two-year MEC weights of subsample B	
English Instructions:	

Code or Value	Description	Count	Cumulative	Skip to Item
0 to 435025.30254	Range of Values	2697	2697	
.	Missing	0	2697	

URXMBP	Target
	B(6 Yrs. to 150 Yrs.)
Hard Edits	SAS Label
	Mono-n-butyl phthalate
English Text: Mono-n-butyl phthalate (ng/mL)	
English Instructions:	

Code or Value	Description	Count	Cumulative	Skip to Item
0.3 to 5143.2	Range of Values	2605	2605	
.	Missing	92	2697	

URDMBPLC		Target		
		B(6 Yrs. to 150 Yrs.)		
Hard Edits		SAS Label		
		Mono-n-butyl phthalate comment code		
English Text: mono-n-butyl phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	2593	2593	
1	Below lower detection limit	12	2605	
.	Missing	92	2697	

URXMCP		Target		
		B(6 Yrs. to 150 Yrs.)		
Hard Edits		SAS Label		
		Mono-cyclohexyl phthalate		
English Text: Mono-cyclohexyl phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.1 to 31	Range of Values	2605	2605	
.	Missing	92	2697	

URDMCPLC		Target		
		B(6 Yrs. to 150 Yrs.)		
Hard Edits		SAS Label		
		Mono-cyclohexyl phthalate comment		
English Text: mono-cyclohexyl phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	281	281	
1	Below lower detection limit	2324	2605	
.	Missing	92	2697	

URXMEP		Target		
		B(6 Yrs. to 150 Yrs.)		
Hard Edits		SAS Label		
		Mono-ethyl phthalate		
English Text: Mono-ethyl phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
3.5 to 46347	Range of Values	2605	2605	
.	Missing	92	2697	

URDMEPLC	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-ethyl phthalate comment code			
English Text: mono-ethyl phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	2605	2605	
1	Below lower detection limit	0	2605	
.	Missing	92	2697	

URXMHP	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-(2-ethyl)-hexyl phthalate			
English Text: Mono-(2-ethyl)-hexyl phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.6 to 718	Range of Values	2605	2605	
.	Missing	92	2697	

URDMHPLC	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-(2-ethyl)-hexyl phthalate comment			
English Text: Mono-(2-ethyl)-hexyl phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	1826	1826	
1	Below lower detection limit	779	2605	
.	Missing	92	2697	

URXMNP	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-isononyl phthalate			
English Text: Mono-isononyl phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.7 to 29.1	Range of Values	2605	2605	
.	Missing	92	2697	

URDMNPLC	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-isononyl phthalate comment code			
English Text: Mono-isononyl phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	152	152	
1	Below lower detection limit	2453	2605	
.	Missing	92	2697	

URXMOP	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-n-octyl phthalate			
English Text: Mono-n-octyl phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.7 to 16.2	Range of Values	2605	2605	
.	Missing	92	2697	

URDMOPLC	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-n-octyl phthalate comment code			
English Text: Mono-n-octyl phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	27	27	
1	Below lower detection limit	2578	2605	
.	Missing	92	2697	

URXMZP	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-benzyl phthalate			
English Text: Mono-benzyl phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.1 to 1197.6	Range of Values	2605	2605	
.	Missing	92	2697	

URDMZPLC	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-benzyl phthalate comment code			
English Text: Mono-benzyl phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	2596	2596	
1	Below lower detection limit	9	2605	
.	Missing	92	2697	

URXMNM	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-n-methyl phthalate			
English Text: Mono-n-methyl phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.7 to 1170.3	Range of Values	2605	2605	
.	Missing	92	2697	

URDMNMLC		Target		
		B(6 Yrs. to 150 Yrs.)		
Hard Edits		SAS Label		
		Mono-n-methyl phthalate comment code		
English Text: Mono-n-methyl phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	1497	1497	
1	Below lower detection limit	1108	2605	
.	Missing	92	2697	

URXMC1		Target		
		B(6 Yrs. to 150 Yrs.)		
Hard Edits		SAS Label		
		Mono-(3-carboxypropyl) phthalate		
English Text: Mono-(3-carboxypropyl) phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.1 to 389.1	Range of Values	2605	2605	
.	Missing	92	2697	

URDMC1LC	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-(3-carboxypropyl) phthalate cmt			
English Text: Mono-(3-carboxypropyl) phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	2569	2569	
1	Below lower detection limit	36	2605	
.	Missing	92	2697	

URXMHH	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-(2-ethyl-5-hydroxyhexyl) phthalate			
English Text: Mono-(2-ethyl-5-hydroxyhexyl) phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.2 to 3141.4	Range of Values	2605	2605	
.	Missing	92	2697	

URDMHHL C	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono(2ethyl5hydroxyhexyl) phthalate cmt			
English Text: Mono-(2-ethyl-5-hydroxyhexyl) phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	2598	2598	
1	Below lower detection limit	7	2605	
.	Missing	92	2697	

URXMOH	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-(2-ethyl-5-oxohexl) phthalate			
English Text: Mono-(2-ethyl-5-oxohexl) phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.4 to 1953.5	Range of Values	2605	2605	
.	Missing	92	2697	

URDMOHL	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-(2-ethyl-5-oxohexyl) phthalate comnt			
English Text: Mono-(2-ethyl-5-oxohexyl) phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	2583	2583	
1	Below lower detection limit	22	2605	
.	Missing	92	2697	

URXMIB	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-isobutyl phthalate			
English Text: Mono-isobutyl phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.2 to 359.1	Range of Values	2605	2605	
.	Missing	92	2697	

URDMIBLC	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-isobutyl phthalate comment code			
English Text: Mono-isobutyl phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	2539	2539	
1	Below lower detection limit	66	2605	
.	Missing	92	2697	

URXECP	Target			
	B(6 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Mono-2-ethyl-5-carboxypentyl phthalate			
English Text: mono-2-ethyl-5-carboxypentyl phthalate (ng/mL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.2 to 2886.9	Range of Values	2605	2605	
.	Missing	92	2697	

URDECPLC		Target		
		B(6 Yrs. to 150 Yrs.)		
Hard Edits		SAS Label		
		Mono-2-ethyl-5carboxypentyl phthalate cm		
English Text: mono-2-ethyl-5-carboxypentyl phthalate comment code				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	At or above the detection limit	2604	2604	
1	Below lower detection limit	1	2605	
.	Missing	92	2697	

URXUCR		Target		
		B(6 Yrs. to 150 Yrs.)		
Hard Edits		SAS Label		
		Creatinine, urine (mg/dL)		
English Text: Creatinine, urine (mg/dL)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
9 to 882	Range of Values	2623	2623	
.	Missing	74	2697	