

## Biomonitoring

### Phthalates

**Table B9: Phthalate metabolites in women ages 16 to 49 years: Median concentrations in urine, 1999-2008**

	Median concentration of phthalate metabolites in urine (µg/L)				
	1999-2000	2001-2002	2003-2004	2005-2006	2007-2008
<b>DEHP metabolites</b>	∅	41.9	44.5	40.6	50.6
<b>DBP metabolites<sup>1</sup></b>	32.6	26.7	32.1	32.2	36.3
<b>BBzP metabolite</b>	13.8	13.6	12.3	9.9	12.4

DATA: Centers for Disease Control and Prevention, National Center for Health Statistics and National Center for Environmental Health, National Health and Nutrition Examination Survey

NOTES:

- DEHP = di-2-ethylhexyl phthalate, DBP = dibutyl phthalate (di-n-butyl phthalate and di-isobutyl phthalate), and BBzP = butyl benzyl phthalate.
- Values below the limit of detection are assumed equal to the limit of detection divided by the square root of 2.
- To reflect exposures to women who are pregnant or may become pregnant, the estimates are adjusted for the probability (by age and race/ethnicity) that a woman gives birth. The intent of this adjustment is to approximate the distribution of exposure to pregnant women. Results will therefore differ from a characterization of exposure to adult women without consideration of birth rates.

∅ The estimate is not reported because the DEHP metabolites MEOHP and MEHHP were not measured in 1999-2000.

**Table B9a: Phthalate metabolites in women ages 16 to 49 years: 95<sup>th</sup> percentile concentrations in urine, 1999-2008**

	95th percentile concentration of phthalate metabolites in urine (µg/L)				
	1999-2000	2001-2002	2003-2004	2005-2006	2007-2008
<b>DEHP metabolites</b>	∅	577.9*	462.2	521.3*	567.2
<b>DBP metabolites</b>	NA**	128.2	139.6	144.9	160.2
<b>BBzP metabolite</b>	73.9	99.7	67.8	67.5	70.5

DATA: Centers for Disease Control and Prevention, National Center for Health Statistics and National Center for Environmental Health, National Health and Nutrition Examination Survey

NOTES:

- DEHP = di-2-ethylhexyl phthalate, DBP = dibutyl phthalate (di-n-butyl phthalate and di-isobutyl phthalate), and BBzP = butyl benzyl phthalate.
- Values below the limit of detection are assumed equal to the limit of detection divided by the square root of 2.
- To reflect exposures to women who are pregnant or may become pregnant, the estimates are adjusted for the probability (by age and race/ethnicity) that a woman gives birth. The intent of this adjustment is to approximate the distribution of exposure to pregnant women. Results will therefore differ from a characterization of exposure to adult women without consideration of birth rates.
- Phthalates do not accumulate in bodily tissues; thus, the distribution of NHANES urinary phthalate metabolite levels may overestimate high-end exposures as a result of collecting one-time urine samples rather than collecting urine for a longer time period.<sup>5-7</sup>

<sup>1</sup> The primary urinary metabolites of DBP (di-n-butyl phthalate and di-isobutyl phthalate) are mono-n-butyl phthalate (MnBP) and mono-isobutyl phthalate (MiBP). The urinary levels of MnBP and MiBP were measured together for the NHANES 1999–2000 survey cycle, but for the following years were measured separately. Indicators B9 and B10 present the combined urinary levels of MnBP and MiBP for each survey cycle.

\*The estimate should be interpreted with caution because the standard error of the estimate is relatively large: the relative standard error, RSE, is at least 30% but is less than 40% ( $RSE = \text{standard error} / \text{estimate}$ ), or the RSE may be underestimated.

\*\* Not available. The estimate is not reported because it has large uncertainty: the relative standard error, RSE, is 40% or greater ( $RSE = \text{standard error} / \text{estimate}$ ), or the RSE cannot be reliably estimated.

∅ The estimate is not reported because the DEHP metabolites MEOHP and MEHHP were not measured in 1999-2000.

**Table B9b. Phthalate metabolites in women ages 16 to 49 years: Median concentrations in urine by race/ethnicity and family income, 2005-2008**

		Median concentration of phthalate metabolites in urine (µg/L)		
Race / Ethnicity		All Incomes‡ (n=1,187)	< Poverty Level (n=289)	≥ Poverty Level (n=824)
DEHP metabolites	All Races/Ethnicities (n=1,187)	43.9	48.0	41.7
	White non-Hispanic (n=456)	46.5	NA**	41.7
	Black non-Hispanic (n=291)	58.0	49.8*	65.2
	Mexican-American (n=283)	35.5	44.8*	32.3
	All Other Races/Ethnicities† (n=157)	43.3	40.5*	44.6
DBP metabolites	All Races/Ethnicities (n=1,187)	33.2	37.3	31.9
	White non-Hispanic (n=456)	29.9	38.6*	27.5
	Black non-Hispanic (n=291)	48.3	41.2*	51.6
	Mexican-American (n=283)	39.9	32.0*	46.5
	All Other Races/Ethnicities† (n=157)	31.4	29.5*	31.4
BBzP metabolite	All Races/Ethnicities (n=1,187)	10.9	13.3	10.4
	White non-Hispanic (n=456)	10.7	13.4*	10.4
	Black non-Hispanic (n=291)	14.3	14.5*	14.2
	Mexican-American (n=283)	11.5	10.7*	12.0
	All Other Races/Ethnicities† (n=157)	5.8*	11.9*	5.3*

DATA: Centers for Disease Control and Prevention, National Center for Health Statistics and National Center for Environmental Health, National Health and Nutrition Examination Survey

NOTES:

- DEHP = di-2-ethylhexyl phthalate, DBP = dibutyl phthalate (di-n-butyl phthalate and di-isobutyl phthalate), and BBzP = butyl benzyl phthalate.
- Values below the limit of detection are assumed equal to the limit of detection divided by the square root of 2.
- To reflect exposures to women who are pregnant or may become pregnant, the estimates are adjusted for the probability (by age and race/ethnicity) that a woman gives birth. The intent of this adjustment is to approximate the distribution of exposure to pregnant women. Results will therefore differ from a characterization of exposure to adult women without consideration of birth rates.

† The “All Other Races/Ethnicities” category includes all other races or ethnicities not specified, together with those individuals who report more than one race.

‡ Includes sampled individuals for whom income information is missing.

\*The estimate should be interpreted with caution because the standard error of the estimate is relatively large: the relative standard error, RSE, is at least 30% but is less than 40% (RSE = standard error divided by the estimate), or the RSE may be underestimated.

\*\* Not available. The estimate is not reported because it has large uncertainty: the relative standard error, RSE, is 40% or greater (RSE = standard error divided by the estimate), or the RSE cannot be reliably estimated.

**Table B10: Phthalate metabolites in children ages 6 to 17 years: Median concentrations in urine, 1999-2008**

	Median concentration of phthalate metabolites in urine (µg/L)				
	1999-2000	2001-2002	2003-2004	2005-2006	2007-2008
<b>DEHP metabolites</b>	∅	56.9	59.5	62.4	45.2
<b>DBP metabolites</b>	37.9	36.3	39.7	41.8	41.3
<b>BBzP metabolite</b>	24.8	22.4	22.1	18.5	16.3

DATA: Centers for Disease Control and Prevention, National Center for Health Statistics and National Center for Environmental Health, National Health and Nutrition Examination Survey

## NOTES:

- DEHP = di-2-ethylhexyl phthalate, DBP = dibutyl phthalate (di-n-butyl phthalate and di-isobutyl phthalate), and BBzP = butyl benzyl phthalate.
- Values below the limit of detection are assumed equal to the limit of detection divided by the square root of 2.

∅ The estimate is not reported because the DEHP metabolites MEOHP and MEHHP were not measured in 1999-2000.

**Table B10a: Phthalate metabolites in children ages 6 to 17 years: 95<sup>th</sup> percentile concentrations in urine, 1999-2008**

	95 <sup>th</sup> percentile concentration of phthalate metabolites in urine (µg/L)				
	1999-2000	2001-2002	2003-2004	2005-2006	2007-2008
<b>DEHP metabolites</b>	∅	387.4	455.6	524.5	563.9
<b>DBP metabolites</b>	165.7	175.1	191.4	166.2	190.9
<b>BBzP metabolite</b>	122.3	143.1	151.1	104.0	107.1

DATA: Centers for Disease Control and Prevention, National Center for Health Statistics and National Center for Environmental Health, National Health and Nutrition Examination Survey

## NOTES:

- DEHP = di-2-ethylhexyl phthalate, DBP = dibutyl phthalate (di-n-butyl phthalate and di-isobutyl phthalate), and BBzP = butyl benzyl phthalate.
- Values below the limit of detection are assumed equal to the limit of detection divided by the square root of 2.
- Phthalates do not accumulate in bodily tissues; thus, the distribution of NHANES urinary phthalate metabolite levels may overestimate high-end exposures as a result of collecting one-time urine samples rather than collecting urine for a longer time period.<sup>5-7</sup>

∅ The estimate is not reported because the DEHP metabolites MEOHP and MEHHP were not measured in 1999-2000.

**Table B10b. Phthalate metabolites in children ages 6 to 17 years: Median concentrations in urine, by race/ethnicity and family income, 2005-2008**

		Median concentration of phthalate metabolites in urine (µg/L)		
Race / Ethnicity		All Incomes‡ (n=1,586)	< Poverty Level (n=453)	≥ Poverty Level (n=1,056)
DEHP metabolites	All Races/Ethnicities (n=1,586)	54.0	57.3	53.0
	White non-Hispanic (n=435)	57.9	58.9*	58.1
	Black non-Hispanic (n=465)	55.1	52.2*	56.9
	Mexican-American (n=487)	44.4	53.4	38.4
	All Other Races/Ethnicities† (n=199)	48.1	NA**	47.7
DBP metabolites	All Races/Ethnicities (n=1,586)	41.8	49.9	40.2
	White non-Hispanic (n=435)	40.9	54.1*	40.3
	Black non-Hispanic (n=465)	47.2	46.6*	48.2
	Mexican-American (n=487)	38.5	43.5	33.7
	All Other Races/Ethnicities† (n=199)	41.0	NA**	39.8
BBzP metabolite	All Races/Ethnicities (n=1,586)	17.4	18.7	17.1
	White non-Hispanic (n=435)	18.2	19.4*	18.0
	Black non-Hispanic (n=465)	19.0	23.1*	18.4
	Mexican-American (n=487)	13.7	14.1	13.3
	All Other Races/Ethnicities† (n=199)	15.2	NA**	12.7

DATA: Centers for Disease Control and Prevention, National Center for Health Statistics and National Center for Environmental Health, National Health and Nutrition Examination Survey

NOTES:

- DEHP = di-2-ethylhexyl phthalate, DBP = dibutyl phthalate (di-n-butyl phthalate and di-isobutyl phthalate), and BBzP = butyl benzyl phthalate.
- Values below the limit of detection are assumed equal to the limit of detection divided by the square root of 2.

† The “All Other Races/Ethnicities” category includes all other races or ethnicities not specified, together with those individuals who report more than one race.

‡ Includes sampled individuals for whom income information is missing.

\*The estimate should be interpreted with caution because the standard error of the estimate is relatively large: the relative standard error, RSE, is at least 30% but is less than 40% (RSE = standard error divided by the estimate), or the RSE may be underestimated.

\*\* Not available. The estimate is not reported because it has large uncertainty: the relative standard error, RSE, is 40% or greater (RSE = standard error divided by the estimate), or the RSE cannot be reliably estimated.

**Table B10c: Phthalate metabolites in children ages 6 to 17 years: Median concentrations in urine by age group, 2005-2008**

Median concentration of phthalate metabolites in urine (µg/L)				
	Ages 6 to 17 years	Ages 6 to 10 years	Ages 11 to 15 years	Ages 16 to 17 years
DEHP metabolites	54.0	57.1	53.6	51.1
DBP metabolites	41.8	41.4	43.8	38.2
BBzP metabolite	17.4	20.1	16.5	13.5

DATA: Centers for Disease Control and Prevention, National Center for Health Statistics and National Center for Environmental Health, National Health and Nutrition Examination Survey

NOTES:

- DEHP = di-2-ethylhexyl phthalate, DBP = dibutyl phthalate (di-n-butyl phthalate and di-isobutyl phthalate), and BBzP = butyl benzyl phthalate.
- Values below the limit of detection are assumed equal to the limit of detection divided by the square root of 2.