

## Biomonitoring

### Perfluorochemicals (PFCs)

**Table B6. Perfluorochemicals in women ages 16 to 49 years: Median concentrations in blood serum, 1999-2016**

Year	Median concentration of PFCs in serum (ng/mL)			
	PFOS	PFOA	PFHxS	PFNA
1999-2000	23.8	4.6	1.3	0.5
2003-2004	14.6	3.0	1.4	0.8
2005-2006	11.6	2.9	1.2	0.8
2007-2008	8.7	3.2	1.1	1.0
2009-2010	5.7	2.2	0.8	1.0
2011-2012	4.2	1.5	0.8	0.7
2013-2014	3.0	1.4	0.7	0.5
2015-2016	2.6	1.1	0.6	0.4

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

NOTE: 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.

**Table B6a. Perfluorochemicals in women ages 16 to 49 years: 95<sup>th</sup> percentile concentrations in blood serum, 1999-2016**

Year	95 <sup>th</sup> percentile concentration of PFCs in serum (ng/mL)			
	PFOS	PFOA	PFHxS	PFNA
1999-2000	50.1	8.4	4.9	1.3
2003-2004	42.2	8.4	7.1*	NA**
2005-2006	27.8	6.4	5.4	2.2
2007-2008	22.8	7.9	4.9	2.6
2009-2010	16.4	5.6	3.6	2.6
2011-2012	12.5	4.2	3.7*	2.1
2013-2014	9.7	3.4	3.0	1.4
2015-2016	7.9	3.0	2.5	1.1

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:

- PFOS = perfluorooctane sulfonic acid, PFOA = perfluorooctanoic acid, PFHxS = perfluorohexane sulfonic acid, and PFNA = perfluorononanoic acid.
- 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 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 B6b. Perfluorochemicals in women ages 16 to 49 years: Median concentrations in blood serum, by race/ethnicity and family income, 2013-2016**

		Median concentration of PFCs in blood serum (ng/mL)		
		All Incomes‡ (n=1,103)	< Poverty Level (n=296)	≥ Poverty Level (n=724)
PFOS	Race / Ethnicity			
	All Races/Ethnicities (n=1,103)	2.8	2.6	2.8
	White non-Hispanic (n=346)	3.0	3.0	3.0
	Black non-Hispanic (n=254)	2.8	2.9*	2.8
	Mexican-American (n=193)	2.0	1.9*	2.2*
All Other Races/Ethnicities† (n=310)	2.8	2.8*	2.9	
PFOA	Race / Ethnicity			
	All Races/Ethnicities (n=1,103)	1.2	1.0	1.3
	White non-Hispanic (n=346)	1.4	1.2	1.5
	Black non-Hispanic (n=254)	0.9	0.9*	1.0
	Mexican-American (n=193)	0.9	0.8*	1.0*
All Other Races/Ethnicities† (n=310)	1.3	1.2*	1.3	
PFHxS	Race / Ethnicity			
	All Races/Ethnicities (n=1,105)	0.7	0.5	0.7
	White non-Hispanic (n=347)	0.8	0.7	0.8
	Black non-Hispanic (n=254)	0.6	0.6*	0.6
	Mexican-American (n=193)	0.5	0.4*	0.6*
All Other Races/Ethnicities† (n=311)	0.5	0.5*	0.6	
PFNA	Race / Ethnicity			
	All Races/Ethnicities (n=1,105)	0.4	0.4	0.5
	White non-Hispanic (n=347)	0.5	0.4	0.5
	Black non-Hispanic (n=254)	0.4	0.4*	0.4
	Mexican-American (n=193)	0.3	0.3*	0.3*
All Other Races/Ethnicities† (n=311)	0.5	0.6*	0.5	

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:

- PFOS = perfluorooctane sulfonic acid, PFOA = perfluorooctanoic acid, PFHxS = perfluorohexane sulfonic acid, and PFNA = perfluorononanoic acid.
- 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.

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**Table B6c. Perfluorochemicals in women ages 16 to 49 years: 95<sup>th</sup> percentile concentrations in blood serum, by race/ethnicity and family income, 2013-2016**

95 <sup>th</sup> percentile concentration of PFCs in blood serum (ng/mL)				
	Race / Ethnicity	All Incomes‡ (n=1,103)	< Poverty Level (n=296)	≥ Poverty Level (n=724)
PFOS	All Races/Ethnicities (n=1,103)	9.2	10.1	8.4
	White non-Hispanic (n=346)	8.4	9.9	7.9
	Black non-Hispanic (n=254)	9.7	9.7*	9.3
	Mexican-American (n=193)	5.4	5.5*	NA**
	All Other Races/Ethnicities† (n=310)	15.7	15.7*	13.2
PFOA	All Races/Ethnicities (n=1,103)	3.2	2.4	3.2
	White non-Hispanic (n=346)	3.5	2.9	3.5
	Black non-Hispanic (n=254)	2.3	1.9*	2.2
	Mexican-American (n=193)	1.6	1.6*	1.5*
	All Other Races/Ethnicities† (n=310)	4.0	2.2*	4.0
	Race / Ethnicity	All Incomes‡ (n=1,105)	< Poverty Level (n=297)	≥ Poverty Level (n=724)
PFHxS	All Races/Ethnicities (n=1,105)	3.0	2.7	3.0
	White non-Hispanic (n=347)	3.6	4.7*	3.6
	Black non-Hispanic (n=254)	2.0	NA**	NA**
	Mexican-American (n=193)	1.8*	NA**	1.6*
	All Other Races/Ethnicities† (n=311)	2.4	2.4*	2.6
PFNA	All Races/Ethnicities (n=1,105)	1.3	1.3	1.3
	White non-Hispanic (n=347)	1.3	1.3	1.2
	Black non-Hispanic (n=254)	1.1	1.0*	1.0
	Mexican-American (n=193)	0.8	0.8*	NA**
	All Other Races/Ethnicities† (n=311)	1.6	1.5*	1.6

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:

- PFOS = perfluorooctane sulfonic acid, PFOA = perfluorooctanoic acid, PFHxS = perfluorohexane sulfonic acid, and PFNA = perfluorononanoic acid.
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