# PFAS Exposure Assessments Final Report

INFORMATION TO PROTECT OUR COMMUNITIES

# Findings Across Ten Exposure Assessment Sites

## Appendix A, B, and C

National Center
for Environmental Health
Agency for Toxic Substances
and Disease Registry

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# Appendix A: Additional Tables

**Table A-1. Comparison of PFAS blood geometric means (GMs) and 95th percentiles in Westfield, Massachusetts, with the U.S. population (NHANES 2015–2016) in micrograms per liter**

| PFAS | NHANES GM (CI)* | Westfield GM (CI)†: Unadjusted | Westfield GM (CI)†: Age-Adjusted to NHANES 2015-2016 | Percent of Westfield Results over NHANES GM (%) | NHANES 95th Percentile* | Westfield 95th Percentile | Percent of Westfield Results over NHANES 95th Percentile (%) |
|---|---|---|---|---|---|---|---|
| PFHxS | 1.18 (1.08–1.30) | 4.67 (4.13–5.28) *p<0.001* | 4.02 (3.58–4.52) *p<0.001* | 91.7 | 4.90 | 24.9 | 46.0 |
| PFOS | 4.72 (4.40–5.07) | 5.87 (5.40–6.38) *p<0.001* | 5.29 (4.89–5.73) *p=0.028* | 61.2 | 18.3 | 18.6 | 5.45 |
| PFOA | 1.56 (1.47–1.66) | 1.91 (1.79–2.04) *p<0.001* | 1.77 (1.66–1.89) *p=0.005* | 66.9 | 4.17 | 4.88 | 9.37 |
| PFNA | 0.577 (0.535–0.623) | 0.430 (0.403–0.459) *p<0.001* | 0.418 (0.390–0.447) *p<0.001* | 36.3 | 1.90 | 1.08 | 1.31 |
| PFDA | 0.154 (0.140–0.169) | 0.152 (0.143–0.161) *p=0.777* | 0.148 (0.139–0.158) *p=0.501* | 51.9 | 0.700 | 0.347 | 0.44 |
| PFUnA | NA‡ | NA‡ | NA‡ | NA | 0.400 | 0.348 | 2.61 |
| MeFOSAA | NA‡ | NA‡ | NA‡ | NA | 0.600 | 0.556 | 4.14 |

CI = 95% confidence interval, NA = not applicable

* Source: CDC 2019

† P-values represent a t-test comparison between Westfield GM and NHANES GM.

‡ Per the protocol, geometric means were not calculated for PFAS detected in less than 60% of samples.

**Table A-2. Comparison of PFAS blood geometric means (GMs) and 95th percentiles in Berkeley County, West Virginia, with the U.S. Population (NHANES 2015-2016) in micrograms per liter**

| PFAS | NHANES GM (CI)* | Berkeley County GM (CI)†: Unadjusted | Berkeley County GM (CI)†: Age-Adjusted to NHANES 2015-2016 | Percent of Berkeley County Results over NHANES Geometric Mean (%) | NHANES 95th Percentile* | Berkeley County 95th Percentile | Percent of Berkeley County Results over NHANES 95th Percentile (%) |
|---|---|---|---|---|---|---|---|
| PFHxS | 1.18 (1.08–1.30) | 2.94 (2.53-3.41) *p<0.001* | 2.96 (2.45-3.57) *p<0.001* | 83.3 | 4.90 | 15.2 | 31.3 |
| PFOS | 4.72 (4.40–5.07) | 5.08 (4.52-5.71) *p=0.283* | 5.06 (4.37-5.86) *p=0.394* | 56.4 | 18.3 | 16.6 | 3.27 |
| PFOA | 1.56 (1.47–1.66) | 1.46 (1.35-1.57) *p=0.152* | 1.33 (1.23-1.44) *p=0.001* | 45.5 | 4.17 | 3.22 | 2.91 |
| PFNA | 0.577 (0.535–0.623) | 0.377 (0.336-0.424) *p<0.001* | 0.347 (0.308-0.391) *p<0.001* | 32.7 | 1.90 | 1.14 | 1.09 |
| PFDA | 0.154 (0.140–0.169) | 0.149 (0.135-0.165) *p=0.643* | 0.134 (0.123-0.147) *p=0.031* | 49.1 | 0.700 | 0.481 | 1.82 |
| PFUnA | NA‡ | NA† | NA† | NA | 0.400 | 0.304 | 2.55 |
| MeFOSAA | NA‡ | NA† | NA† | NA | 0.600 | 0.456 | 2.55 |

CI = 95% confidence interval, NA = not applicable

* Source: CDC 2019

† P-values represent a t-test comparison between Berkeley County GM and NHANES GM.

‡ Per the protocol, geometric means were not calculated for PFAS detected in less than 60% of samples.

**Table A-3. Comparison of PFAS blood geometric means (GMs) and 95th percentiles in New Castle County, Delaware, with the U.S. population (NHANES 2015–2016) in micrograms per liter**

| PFAS | NHANES GM (CI)* | New Castle County GM (CI)†: Unadjusted | New Castle County GM (CI)†: Age-Adjusted to NHANES 2015-2016 | Percent of New Castle County Results over NHANES GM (%) | NHANES 95th Percentile* | New Castle County 95th Percentile | Percent of New Castle County Results over NHANES 95th Percentile (%) |
|---|---|---|---|---|---|---|---|
| PFHxS | 1.18 (1.08–1.30) | 20.1 (16.2–25.1) *p<0.001* | 11.5 (9.05–14.7) *p<0.001* | 98.6 | 4.90 | 152 | 86.0 |
| PFOS | 4.72 (4.40–5.07) | 21.5 (17.9–25.8) *p<0.001* | 13.5 (11.2–16.3) *p<0.001* | 91.1 | 18.3 | 128 | 56.5 |
| PFOA | 1.56 (1.47–1.66) | 4.92 (4.37–5.53) *p<0.001* | 3.74 (3.31–4.24) *p<0.001* | 95.3 | 4.17 | 15.7 | 57.5 |
| PFNA | 0.577 (0.535–0.623) | 1.03 (0.935–1.14) *p<0.001* | 0.903 (0.831–0.980) *p<0.001* | 86.0 | 1.90 | 2.64 | 12.1 |
| PFDA | 0.154 (0.140–0.169) | 0.271 *(*0.243–0.302*)* *p<0.001* | 0.279 (0.252–0.309) *p<0.001* | 83.6 | 0.700 | 0.708 | 5.14 |
| PFUnA | NA† | 0.210 (0.189–0.234) | 0.208 (0.184–0.235) ‡ | 100 | 0.400 | 0.558 | 12.6 |
| MeFOSAA | NA† | 0.133 (0.118–0.151) | 0.130 (0.108–0.146) ‡ | 100 | 0.600 | 0.508 | 3.27 |

µg/L = micrograms per liter, NA = not applicable

* Source: CDC 2019

† Per the protocol, geometric means were not calculated for PFAS detected in less than 60% of samples.

‡ No statistical comparison could be made with NHANES because NHANES did not calculate a geometric mean for this PFAS because this PFAS was detected in less than 60% of NHANES samples.

**Table A-4. Comparison of PFAS blood geometric means (GMs) and 95th percentiles in Airway Heights, Washington, with the U.S. population (NHANES 2015–2016) in micrograms per liter**

| PFAS | NHANES GM (CI)* | Spokane County GM (CI)†: Unadjusted | Spokane County GM (CI)†: Age-Adjusted to NHANES 2015-2016 | Percent of Spokane County Results over NHANES Geometric Mean (%) | NHANES 95th Percentile* | Spokane County 95th Percentile | Percent of Spokane County Results over NHANES 95th Percentile (%) |
|---|---|---|---|---|---|---|---|
| PFHxS | 1.18 (1.08–1.30) | 72.9 (61.8–85.9) *p<0.001* | 65.6 (55.8–77.1) *p<0.001* | 99.1 | 4.90 | 415 | 98.5 |
| PFOS | 4.72 (4.40–5.07) | 42.4 (36.6–49.1) *p<0.001* | 39.1 (33.9–45.0) *p<0.001* | 97.6 | 18.3 | 192 | 82.3 |
| PFOA | 1.56 (1.47–1.66) | 9.72 (8.57–11.0) *p<0.001* | 8.91 (7.84–10.1) *p<0.001* | 95.5 | 4.17 | 40.4 | 82.6 |
| PFNA | 0.577 (0.535–0.623) | 0.742 (0.662–0.832) *p<0.001* | 0.694 (0.615–0.783) *p=0.009* | 65.5 | 1.90 | 2.35 | 10.8 |
| PFDA | 0.154 (0.140–0.169) | 0.204 (0.185–0.224) *p<0.001* | 0.200 (0.179–0.214) *p<0.001* | 70.9 | 0.700 | 0.578 | 2.70 |
| PFUnA | NA‡ | NA† | NA† | NA | 0.400 | 0.206 | 2.70 |
| MeFOSAA | NA‡ | NA† | NA† | NA | 0.600 | 0.417 | 2.40 |

CI = 95% confidence interval, NA = not applicable

* Source: CDC 2019

† P-values represent a t-test comparison between Spokane County GM and NHANES GM.

‡ Per the protocol, geometric means were not calculated for PFAS detected in less than 60% of samples.

**Table A-5. Comparison of PFAS blood geometric means (GMs) and 95th percentiles in Lubbock County, Texas, with the U.S. population (NHANES 2015–2016) in micrograms per liter**

| PFAS | NHANES GM (CI)* | Lubbock County GM (CI)†: Unadjusted | Lubbock County GM (CI)†: Age-Adjusted to NHANES 2015-2016 | Percent of Lubbock County Results over NHANES GM (%) | NHANES 95th Percentile* | Lubbock County 95th Percentile | Percent of Lubbock County Results over NHANES 95th Percentile (%) |
|---|---|---|---|---|---|---|---|
| PFHxS | 1.18 (1.08–1.30) | 6.04 (4.30–8.49) *p<0.001* | 4.93 (3.39–7.19) *p<0.001* | 86.0 | 4.90 | 80.7 | 50.0 |
| PFOS | 4.72 (4.40–5.07) | 4.17 (3.55–4.88) *p=0.151* | 3.58 (3.10–4.14) *p<0.001* | 41.1 | 18.3 | 20.6 | 6.07 |
| PFOA | 1.56 (1.47–1.66) | 2.20 (1.82–2.66) *p<0.001* | 1.94 (1.60–2.34) *p=0.0306* | 61.7 | 4.17 | 13.2 | 23.8 |
| PFNA | 0.577 (0.535–0.623) | 0.193 (0.171–0.217) *p<0.001* | 0.169 (0.151–0.188) *p<0.001* | 8.41 | 1.90 | 0.573 | 0.935 |
| PFDA | 0.154 (0.140–0.169) | 0.134 (0.121–0.148) *p=0.0396* | 0.124 (0.114–0.135) *p<0.001* | 38.3 | 0.700 | 0.306 | 0.935 |
| PFUnA | NA‡ | NA‡ | NA‡ | NA | 0.400 | 0.121 | 0.467 |
| MeFOSAA | NA‡ | NA‡ | NA‡ | NA | 0.600 | 0.665 | 5.61 |

CI = 95% confidence interval, NA = not applicable

* Source: CDC 2019

† P-values represent a t-test comparison between Lubbock GM and NHANES GM.

‡ Per the protocol, geometric means were not calculated for PFAS detected in less than 60% of samples.

**Table A-6. Comparison of PFAS blood geometric means (GMs) and 95th percentiles in Moose Creek, Alaska, with the U.S. population (NHANES 2015–2016) in micrograms per liter**

| PFAS | NHANES GM (CI)* | Moose Creek GM (CI)†: Unadjusted | Moose Creek GM (CI)†: Age-Adjusted to NHANES 2015-2016 | Percent of Moose Creek Results over NHANES GM (%) | NHANES 95th Percentile* | Moose Creek 95th Percentile | Percent of Moose Creek Results over NHANES 95th Percentile (%) |
|---|---|---|---|---|---|---|---|
| PFHxS | 1.18 (1.08–1.30) | 11.7 (7.66–17.7) *p<0.001* | 9.13 (6.55–12.7) *p<0.001* | 95.5 | 4.90 | 115 | 72.7 |
| PFOS | 4.72 (4.40–5.07) | 18.3 (13.2–25.5) *p<0.001* | 14.6 (11.6–18.4) *p<0.001* | 86.4 | 18.3 | 146 | 50.0 |
| PFOA | 1.56 (1.47–1.66) | 2.12 (1.78–2.52) *p<0.001* | 1.75 (1.56–1.98) *p=0.077* | 69.3 | 4.17 | 8.73 | 17.1 |
| PFNA | 0.577 (0.535–0.623) | 0.321 (0.277–0.371) *p<0.001* | 0.275 (0.238–0.317) *p<0.001* | 17.1 | 1.90 | 0.780 | 1.14 |
| PFDA | 0.154 (0.140–0.169) | NA‡ | NA‡ | 23.9 | 0.700 | 0.330 | 0.00 |
| PFUnA | NA‡ | NA‡ | NA‡ | NA | 0.400 | 0.220 | 1.14 |
| MeFOSAA | NA‡ | 0.137 (0.113–0.166)§ | 0.126 (0.107–0.150)§ | NA | 0.600 | 0.580 | 4.55 |

CI = 95% confidence interval, NA = not applicable

* Source: CDC 2019

† P-values represent a t-test comparison between Fairbanks GM and NHANES GM.

‡ Per the protocol, geometric means were not calculated for PFAS detected in less than 60% of samples.

§ No statistical comparison could be made with NHANES because NHANES did not calculate a geometric mean for this PFAS because this PFAS was detected in less than 60% of NHANES samples.

**Table A-7. Comparison of PFAS blood geometric means (GMs) and 95th percentiles in Security-Widefield, Colorado, with the U.S. population (NHANES 2015–2016) in micrograms per liter**

| PFAS | NHANES GM (CI)* | Security-Widefield GM (CI)†: Unadjusted | Security-Widefield GM (CI)†: Age-Adjusted to NHANES 2015-2016 | Percent of Security-Widefield Results over NHANES GM (%) | NHANES 95th Percentile* | Security-Widefield 95th Percentile | Percent of Security-Widefield Results over NHANES 95th Percentile (%) |
|---|---|---|---|---|---|---|---|
| PFHxS | 1.18 (1.08–1.30) | 10.6 (9.19–12.3) *p<0.001* | 8.08 (6.88–9.50) *p<0.001* | 96.0 | 4.90 | 55.9 | 75.1 |
| PFOS | 4.72 (4.40–5.07) | 6.22 (5.53–6.99) *p<0.001* | 5.15 (4.48–5.91) *p=0.27* | 65.3 | 18.3 | 23.8 | 9.83 |
| PFOA | 1.56 (1.47–1.66) | 2.14 (1.96–2.34) *p<0.001* | 1.82 (1.65–2.02) *p=0.009* | 68.5 | 4.17 | 6.41 | 18.8 |
| PFNA | 0.577 (0.535–0.623) | 0.286 (0.262–0.312) *p<0.001* | 0.245 (0.223–0.270) *p<0.001* | 18.2 | 1.90 | 0.845 | 0.290 |
| PFDA | 0.154 (0.140–0.169) | 0.123 (0.113–0.133) *p<0.001* | 0.119 (0.1.08–0.131) *p<0.001* | 33.0 | 0.700 | 0.361 | 1.16 |
| PFUnA | NA‡ | NA‡ | NA‡ | NA | 0.400 | 0.183 | 1.45 |
| MeFOSAA | NA‡ | 0.134 (0.121–0.148) § | 0.122 (0.110–0.136) § | NA | 0.600 | 0.556 | 4.62 |

CI = 95% confidence interval, NA = not applicable

* Source: CDC 2019

† P-values represent a t-test comparison between Security-Widefield GM and NHANES GM.

‡ Per the protocol, geometric means were not calculated for PFAS detected in less than 60% of samples.

§ No statistical comparison could be made with NHANES because NHANES did not calculate a geometric mean for this PFAS because this PFAS was detected in less than 60% of NHANES samples.

**Table A-8. Comparison of PFAS blood geometric means (GMs) and 95th percentiles in Orange County, NY, with the U.S. population (NHANES 2015–2016) in micrograms per liter**

| PFAS | NHANES GM (CI)* | Orange County GM (CI)†: Unadjusted | Orange County GM (CI)†: Age-Adjusted to NHANES 2015-2016 | Percent of Orange County Results over NHANES GM (%) | NHANES 95th Percentile* | Orange County 95th Percentile | Percent of Orange County Results over NHANES 95th Percentile (%) |
|---|---|---|---|---|---|---|---|
| PFHxS | 1.18 (1.08–1.30) | 8.30 (6.09–11.3) *p<0.001* | 3.56 (3.00–4.22) *p<0.001* | 94.9 | 4.90 | 30.8 | 69.5 |
| PFOS | 4.72 (4.40–5.07) | 10.6 (8.01–13.9) *p<0.001* | 4.76 (4.23–5.35) *p=0.907* | 79.7 | 18.3 | 32.1 | 33.9 |
| PFOA | 1.56 (1.47–1.66) | 2.00 (1.65–2.42) *p=0.015* | 1.32 (1.17–1.49) *p=0.013* | 72.9 | 4.17 | 4.90 | 13.6 |
| PFNA | 0.577 (0.535–0.623) | 0.513 (0.399–0.658) *p=0.363* | 0.293 (0.259–0.331) *p<0.001* | 50.9 | 1.90 | 1.15 | 5.08 |
| PFDA | 0.154 (0.140–0.169) | 0.216 (0.187–0.250) *p<0.001* | 0.171 (0.158–0.186) *P=0.075* | 83.1 | 0.700 | 0.368 | 1.69 |
| PFUnA | NA‡ | 0.157 (0.133–0.184) § | 0.126 (0.113–0.141) § | NA | 0.400 | 0.305 | 3.39 |
| MeFOSAA | NA‡ | NA‡ | NA‡ | NA | 0.600 | 0.605 | 5.08 |

CI = 95% confidence interval, NA = not applicable

* Source: CDC 2019

† P-values represent a t-test comparison between Orange County GM and NHANES GM.

‡ Per the protocol, geometric means were not calculated for PFAS detected in less than 60% of samples.

§ No statistical comparison could be made with NHANES because NHANES did not calculate a geometric mean for this PFAS because this PFAS was detected in less than 60% of NHANES samples.

**Table A-9. Comparison values for PFAS measured in blood from other exposure assessments**

| PFAS/Population | Reference | Geometric Mean for Blood (µg/L) |
|---|---|---|
| PFHxS | | |
| Manufacturing Workers, Decatur, AL | Olsen et al. 2003 | 180.0 |
| Decatur, AL | ATSDR 2013 | 6.4 |
| Little Hocking Water Association, OH | Frisbee et al. 2009 | 5.7* |
| Portsmouth, NH | NH DHHS 2016 | 4.1 |
| General U.S. Population (NHANES 1999/2000) | CDC 2019 | 2.1 |
| General U.S. Population (NHANES 2015/2016) | CDC 2019 | 1.2 |
| General U.S. Population (NHANES 2017/2018) | CDC 2021 | 1.1 |
| PFOS | | |
| Manufacturing Workers, Decatur, AL | Olsen et al. 2003 | 941.0 |
| Decatur, AL | ATSDR 2013 | 39.8 |
| General U.S. Population (NHANES 1999/2000) | CDC 2019 | 30.4 |
| Little Hocking Water Association, OH | Frisbee et al. 2009 | 23.5* |
| Portsmouth, NH | NH DHHS 2016 | 8.6 |
| General U.S. Population (NHANES 2015/2016) | CDC 2019 | 4.7 |
| General U.S. Population (NHANES 2017/2018) | CDC 2021 | 4.3 |
| PFOA | | |
| Manufacturing Workers, Decatur, AL | Olsen et al. 2003 | 899.0 |
| Little Hocking Water Association, OH | Frisbee et al. 2009 | 227.6* |
| Decatur, AL | ATSDR 2013 | 16.3 |
| General U.S. Population (NHANES 1999/2000) | CDC 2019 | 5.2 |
| Portsmouth, NH | NH DHHS 2016 | 3.1 |
| General U.S. Population (NHANES 2015/2016) | CDC 2019 | 1.6 |
| General U.S. Population (NHANES 2017/2018) | CDC 2021 | 1.4 |

µg/L = micrograms per liter

* The study reported medians instead of geometric means.

**Table A-10. Geometric mean dust concentrations from U.S. studies (nanograms per gram)**

| PFAS | Fraser et al. (2013) Household Dust—MA* | | Karásková et al. (2016) Household Dust—U.S.† | | Wu et al. (2015) Household Dust—CA Homes with Young Children‡ | | Wu et al. (2015) Household Dust—CA Homes with Older Adults Only‡ | | Scher et al. (2018) Household Dust—MN§ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | GM | Range | Median | Range | GM | Range | GM | Range | Median | Range |
| PFBS | NA | 4.98–4.98 | 0.9 | <0.73¶–2.6 | — | — | — | — | <5 | <5–58 |
| PFHxS | NA | 6.05–430 | 8.7 | 1.4–84.4 | 3.47 | ND**–7,490 | 3.77 | ND**–1,050 | 18 | <5–790 |
| PFOS | 26.9 | 14.1–280 | 14.1 | 5.7–239 | 29.0 | ND**–6,670 | 34.6 | ND**–1,040 | 67 | 8.4–2000 |
| PFBA | 13.9 | 4.89–999 | — | — | — | — | — | — | 24 | <5–200 |
| PFPeA | NA | 5.39–249 | 1.7 | <0.76¶–24.8 | — | — | — | — | 6.2 | <5–66 |
| PFHxA | 8.65 | 4.85–1380 | 6.5 | 2.5–190 | — | — | — | — | 29 | 5.4–240 |
| PFHpA | 12.0 | 4.93–586 | 3.6 | 0.9–86.7 | — | — | — | — | 23 | <5–260 |
| PFOA | 23.7 | 5.71–894 | 9.0 | 2.9–318 | 41.4 | ND**–2,360 | 45.0 | ND**–728 | 51 | 9.9–970 |
| PFNA | 10.9 | 6.21–1420 | 3.9 | 1.1–62.9 | 13.3 | ND**–1,910 | 14.7 | ND**–883 | 26 | <5–450 |
| PFDA | NA | 6.97–26.8 | 1.8 | 0.4–64.0 | 8.51 | ND**–2,520 | 7.76 | ND**–355 | 13 | <5–370 |
| PFUnA | NA | 10.8–39.4 | 1.2 | <1.06¶–13.1 | — | — | — | — | 7.2 | <5–67 |
| PFDoA | NA | 5.09–13.3 | 0.6 | <0.72¶–9.0 | — | — | — | — | 8.2 | <6.5–190 |
| PFTrA | NA | 10.3–10.3 | ND¶ | ND¶–2.1 | — | — | — | — | — | — |
| PFTA | NA | 11.2–11.2 | 0.8 | <1.15¶–3.0 | — | — | — | — | — | — |
| MeFOSAA | — | — | — | — | — | — | — | — | — | — |
| N–MeFOSE | NA | 18–488 | 1.0 | <0.57¶–9.9 | — | — | — | — | — | — |
| EtFOSAA | — | — | — | — | — | — | — | — | — | — |
| FtS 6:2 | — | — | — | — | — | — | — | — | — | — |

GM = geometric mean, ng/g = nanograms per gram, NA = not applicable (i.e., too few detected results to calculate a GM), ND = not detected, — = PFAS was not measured as part of the study

* This study evaluated dust samples collected from homes, offices, and vehicles in the greater Boston, Massachusetts, area between January and March of 2009. This table presents results for dust samples collected in the main living areas of 30 homes.

† This study evaluated dust samples collected from living rooms and bedrooms from homes in Canada, the Czech Republic, and the United States during the spring and summer of 2013. The results presented in this table are from the 14 homes in the United States.

‡ As part of this study, dust samples were collected between 2007 and 2009 from carpet or area rugs in the main living areas of homes in California with and without young children residing in the home. This table presents results separately for dust samples collected in the 82 homes with young children and the 42 homes with older adults only.

§ As part of this study, dust samples were collected between July and September 2010 from 19 homes located in cities with PFAS–contaminated drinking water in Minnesota. Samples were collected at each home from an entryway to the yard as well as in an interior living space (e.g., family room, living room). The results presented in this table are for dust samples collected in interior living spaces only.

¶ Value was less than author-specified method detection limit. For this study, method detection limits varied because they were defined as mean concentration of procedural blanks plus three times the standard deviation of blank response. Values included in this table represent the upper bound of the method detection limit for a given PFAS, unless noted by "ND" (i.e., for PFTrA). For PFTrA, the upper bound method detection limit was greater than the maximum detected value. For PFTrA, the method detection limits ranged from 0.48 to 2.32 ng/g.

** Reporting limits for dust not specified in Wu et al. (2015).

# Appendix B: Additional Background Statistics

As described in the main body of this report, all statistical analyses (e.g., correlations, geometric means, univariate linear regression models, multivariate linear regression models) were completed in SAS version 9.4 (SAS Institute, Cary, NC) following the methods outlined in the study protocol. Several key details on these methods are provided below.

- Consistent with NHANES methodology and per the EA protocol, all non–detect observations were substituted with a value equal to the LOD divided by the square root of 2. Geometric means were not reported for PFAS with 40% or more non–detect observations.
    - For blood, all PFAS and all samples were reported from the laboratory with an LOD of 0.1 µg/L, and non–detect observations were therefore substituted with a value equal to 0.071 µg/L. The same method was applied to urine results (LOD=0.1 µg/L) and dust (LOD varies by PFAS and sample); no summary statistics were computed for tap water for this EA due to low detection frequency.
    - Additional information on the effect of this substitution method, including sensitivity analyses for site-specific geometric means for PFAS in blood using various other substitution methods, can be found in each site report.
- Geometric means, 95% confidence intervals around geometric means, and percentiles were calculated with the SURVEYMEANS procedure in SAS. In this procedure, percentiles are based on the population cumulative distribution function.
- Univariate and multivariate regression analyses were conducted with the SURVEYREG procedure in SAS. Multivariate regressions were conducted using a backwards stepwise approach. This approach begins with a full model containing all eligible variables and at each step gradually eliminates variables that are not significant. The result is a simplified model that only contains variables of statistical significance ($p < 0.05$). In some instances, recently removed variables are added back in to confirm that the lack of significance was not caused by correlation with other variables in the model. “Interactions” were only considered when there was a suspected relationship between two variables. Due to the skewed distribution of PFAS blood levels, log transformed ($\log_{10}$) values were used as dependent variables in all linear regression analyses. Due to skewed distributions, Maximum PFAS concentrations in drinking water (analyzed as independent variables in regression analyses) were also log transformed ($\log_{10}$).
- For each EA, either all eligible residents or a random selection of eligible residents within each sampling frame were invited to participate. This means a single household may have multiple participants. To account for the one-stage cluster sampling design used for this EA, household IDs were assigned to each participant. All statistics were calculated while accounting for clustering at the household level by including this household ID variable in a CLUSTER statement in SAS survey procedures. Additional information on the effect of clustering is provided in each site report.
- Additionally, the univariate and multivariate analyses included in this report represent data for all eight EA sites combined. All univariate and multivariate regression models were run while treating each site as one stratum by including an indicator for site in a STRATA statement.
- Due the stratified design of this study, SAS survey procedures were also run while applying weights to account for the different samples rates at each site. Specifically, weights were assigned to each site as follows and then included in SURVEYREG with a WEIGHT statement:

$$Weight = \frac{1}{(probability\ of\ selection\ x\ probabiltiy\ of\ response)}$$

Where:

probability of selection = # households invited/ # households in sampling frame

probability of response = # households participated/ # households invited

- A finite population correction was applied by including the total number of households in each sampling frame in a TOTAL statement in the SAS survey procedures. For this EA, the following totals were used in these calculations. Note that a finite population correction corrects the standard errors when sampling without replacement from a finite population and is recommended when sample size is greater than 5% of the population being sampled.
    - Westfield EA: 4,776 households
    - Berkeley County EA: 2,922 households
    - New Castle County EA: 5,998 households
    - Airway Heights EA: 2,546 households
    - Lubbock County EA: 701 households
    - Moose Creek EA: 317 households
    - Security-Widefield EA: 10,783 households
    - Orange County EA: 9,568 households
- A p–value of less than 0.05 was used to identify statistically significant associations in regression models and 95% confidence limits were provided for all estimated geometric means.
- Age–adjusted statistics were calculated using the POSTSTRATA statement in the PROC SURVEYREG procedure in SAS. For age–adjustments to the NHANES populations (2015-2016 and 2017-2017), estimates of the U.S. population in each age category starting from 12–14 years and increasing by 5–year age intervals (15–19 years, etc. through 80+) were calculated and used as poststratum totals.
- As noted in the study protocol, this investigation was designed to estimate mean concentrations of PFAS in blood for the sampling frame population, with a given level of precision. The target sample size for this EA was based on a desired precision of 15% and 5% level of significance. The target sample size needed to meet precision goals was informed by findings from the pilot EAs, specifically around PFOS. ATSDR met the precision goal for PFOS at all eight sites. Details on precision estimates for PFOS (and other PFAS) can be found in the individual site reports.

# Appendix C: PFAS Blood Levels by Demographics and Exposure Characteristics (Eight EA Sites Combined)

This appendix provides geometric mean blood PFAS concentrations and 95% confidence intervals stratified by demographic or exposure characteristics for the five PFAS with detection frequencies above 60% (i.e., PFHxS, PFOS, PFOA, PFNA, and PFDA) for all eight EA site data sets combined. Also included are univariate regressions, multivariate regressions, and boxplots for the combined data sets. For each regression, the outputs shown are coefficient estimates, p–values, and marginal effects. The coefficient represents the increase in PFAS blood levels (in units of $\log_{10}$[µg/L]) per unit increase of the independent variable shown on the left side of the table for continuous variables, or when comparing to the reference category for categorical variables. The p–value indicates the significance of the results. Generally, p–values less than 0.05 indicate significant results. The marginal effect is the percent change in PFAS blood levels (in units of µg/L) per unit increase of the continuous variables, or in comparison to the reference category for categorical variables.

**Table C-1. . Adult blood PFAS geometric means (GM), 95% lower confidence intervals (LCI), and 95% upper confidence intervals (UCI) in micrograms per liter[*,†,‡]**

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| **All Adults** | | | | | | | | | | | | | | | | | |
| Age (years) | 18 to <50 | 564 | **5.88** | 5.00 | 6.92 | **6.00** | 5.26 | 6.83 | **1.95** | 1.75 | 2.16 | **0.33** | 0.30 | 0.36 | **0.15** | 0.14 | 0.16 |
| | 50+ | 1,226 | **14.18** | 12.99 | 15.49 | **12.37** | 11.50 | 13.32 | **3.04** | 2.86 | 3.22 | **0.54** | 0.50 | 0.58 | **0.18** | 0.17 | 0.19 |
| Sex | Female | 970 | **10.61** | 9.48 | 11.87 | **9.07** | 8.21 | 10.02 | **2.56** | 2.38 | 2.77 | **0.45** | 0.41 | 0.48 | **0.17** | 0.16 | 0.18 |
| | Male | 820 | **11.63** | 10.44 | 12.95 | **11.47** | 10.55 | 12.47 | **2.82** | 2.64 | 3.02 | **0.50** | 0.47 | 0.53 | **0.17** | 0.16 | 0.18 |
| Body mass index (kilograms per square meter) | <20 | 72 | **10.14** | 7.14 | 14.42 | **8.08** | 5.96 | 10.94 | **2.24** | 1.83 | 2.73 | **0.37** | 0.30 | 0.47 | **0.14** | 0.12 | 0.17 |
| | 20 to <25 | 349 | **10.65** | 8.25 | 13.74 | **10.53** | 8.62 | 12.86 | **2.51** | 2.13 | 2.96 | **0.48** | 0.42 | 0.54 | **0.19** | 0.17 | 0.21 |
| | 25 to <30 | 608 | **11.65** | 10.39 | 13.07 | **10.57** | 9.53 | 11.72 | **2.81** | 2.60 | 3.04 | **0.48** | 0.44 | 0.53 | **0.18** | 0.17 | 0.20 |
| | 30 to <35 | 433 | **11.53** | 10.03 | 13.26 | **10.43** | 9.24 | 11.79 | **2.79** | 2.54 | 3.06 | **0.52** | 0.45 | 0.61 | **0.17** | 0.16 | 0.19 |
| | 35+ | 301 | **10.05** | 8.51 | 11.85 | **8.63** | 7.49 | 9.93 | **2.62** | 2.33 | 2.94 | **0.39** | 0.34 | 0.44 | **0.14** | 0.13 | 0.16 |
| Race and ethnicity | White, non-Hispanic | 1,438 | **11.92** | 10.95 | 12.98 | **10.73** | 9.98 | 11.54 | **2.85** | 2.70 | 3.01 | **0.48** | 0.45 | 0.52 | **0.17** | 0.16 | 0.18 |
| | Asian, non-Hispanic | 27 | **17.70** | 7.66 | 40.89 | **15.38** | 8.55 | 27.66 | **4.16** | 2.41 | 7.19 | **0.93** | 0.70 | 1.23 | **0.37** | 0.28 | 0.49 |
| | Black or African American, non-Hispanic | 75 | **9.26** | 6.48 | 13.25 | **11.59** | 8.63 | 15.57 | **2.42** | 1.91 | 3.05 | **0.58** | 0.46 | 0.72 | **0.23** | 0.19 | 0.27 |
| | American Indian or Alaskan Native | 13 | **20.11** | 7.81 | 51.82 | **10.27** | 3.86 | 27.32 | **3.73** | 1.83 | 7.60 | **0.41** | 0.23 | 0.76 | **0.14** | 0.09 | 0.23 |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| | Native Hawaiian or Other Pacific Islander | 6 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | More Than One Race, non-Hispanic | 40 | **7.25** | 4.61 | 11.42 | **6.92** | 4.30 | 11.14 | **1.77** | 1.38 | 2.28 | **0.38** | 0.28 | 0.51 | **0.16** | 0.12 | 0.20 |
| | Hispanic or Latino | 156 | **6.84** | 4.68 | 9.98 | **5.38** | 4.01 | 7.22 | **1.71** | 1.33 | 2.19 | **0.29** | 0.23 | 0.36 | **0.14** | 0.12 | 0.16 |
| Length of residence at current address (years) | <10 | 539 | **6.96** | 5.75 | 8.43 | **7.57** | 6.49 | 8.85 | **2.22** | 1.98 | 2.50 | **0.40** | 0.36 | 0.45 | **0.17** | 0.15 | 0.18 |
| | 10 to <20 | 540 | **9.77** | 8.35 | 11.42 | **8.79** | 7.72 | 10.02 | **2.44** | 2.20 | 2.71 | **0.43** | 0.38 | 0.47 | **0.17** | 0.16 | 0.18 |
| | 20 to <30 | 325 | **14.27** | 12.15 | 16.77 | **12.36** | 10.63 | 14.37 | **2.99** | 2.67 | 3.36 | **0.50** | 0.45 | 0.56 | **0.18** | 0.16 | 0.20 |
| | 30+ | 387 | **17.28** | 15.21 | 19.63 | **13.72** | 12.17 | 15.47 | **3.34** | 3.03 | 3.68 | **0.59** | 0.51 | 0.69 | **0.18** | 0.16 | 0.20 |
| Total length of residence in sampling frame over the past 20 years (years) | <10 | 329 | **5.96** | 4.69 | 7.58 | **6.70** | 5.55 | 8.10 | **2.17** | 1.86 | 2.55 | **0.39** | 0.33 | 0.45 | **0.16** | 0.15 | 0.18 |
| | 10 to <15 | 270 | **7.78** | 6.01 | 10.06 | **8.36** | 6.88 | 10.16 | **2.41** | 2.03 | 2.86 | **0.46** | 0.40 | 0.52 | **0.19** | 0.17 | 0.21 |
| | 15 to 20 | 1,192 | **13.62** | 12.50 | 14.83 | **11.47** | 10.61 | 12.39 | **2.86** | 2.69 | 3.05 | **0.49** | 0.46 | 0.53 | **0.17** | 0.16 | 0.18 |
| Current and primary source of drinking water | Public water system | 1,116 | **11.74** | 10.51 | 13.10 | **10.80** | 9.84 | 11.85 | **2.80** | 2.61 | 3.01 | **0.50** | 0.46 | 0.54 | **0.18** | 0.17 | 0.19 |
| | Private well | 130 | **8.33** | 5.78 | 12.01 | **7.36** | 5.75 | 9.40 | **2.59** | 2.09 | 3.22 | **0.25** | 0.21 | 0.30 | **0.12** | 0.11 | 0.14 |
| | Bottled water | 544 | **9.68** | 8.36 | 11.22 | **8.66** | 7.60 | 9.85 | **2.39** | 2.17 | 2.63 | **0.42** | 0.38 | 0.47 | **0.16** | 0.14 | 0.17 |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| Tap water consumption at curent home (average cups per day) | 0 | 192 | **6.51** | 5.24 | 8.07 | **6.15** | 5.02 | 7.54 | **1.81** | 1.56 | 2.11 | **0.35** | 0.29 | 0.41 | **0.13** | 0.12 | 0.15 |
| | 0< to <2 | 96 | **8.75** | 6.41 | 11.95 | **9.25** | 7.37 | 11.62 | **2.56** | 2.15 | 3.06 | **0.56** | 0.47 | 0.67 | **0.18** | 0.15 | 0.21 |
| | 2 to <4 | 287 | **10.80** | 8.29 | 14.08 | **10.29** | 8.20 | 12.91 | **2.59** | 2.19 | 3.06 | **0.47** | 0.41 | 0.55 | **0.18** | 0.16 | 0.20 |
| | 4 to <6 | 343 | **12.45** | 10.79 | 14.36 | **12.06** | 10.68 | 13.62 | **2.91** | 2.65 | 3.21 | **0.53** | 0.48 | 0.58 | **0.18** | 0.17 | 0.20 |
| | 6 to <8 | 239 | **10.58** | 8.25 | 13.57 | **9.30** | 7.69 | 11.25 | **2.74** | 2.35 | 3.19 | **0.46** | 0.40 | 0.54 | **0.17** | 0.15 | 0.20 |
| | 8+ | 627 | **12.69** | 10.94 | 14.73 | **10.70** | 9.47 | 12.08 | **2.87** | 2.60 | 3.17 | **0.47** | 0.41 | 0.53 | **0.18** | 0.17 | 0.19 |
| Current use of filter or treatment device for tap water at home | None, no filter or treatment device | 481 | **15.30** | 13.03 | 17.97 | **13.89** | 12.15 | 15.89 | **3.24** | 2.91 | 3.60 | **0.54** | 0.49 | 0.59 | **0.19** | 0.17 | 0.21 |
| | None, drink bottled water only | 221 | **7.45** | 5.96 | 9.31 | **6.48** | 5.32 | 7.90 | **2.02** | 1.75 | 2.32 | **0.35** | 0.30 | 0.42 | **0.14** | 0.12 | 0.15 |
| | Use at least one filter or treatment device | 1,084 | **10.04** | 8.94 | 11.29 | **9.25** | 8.38 | 10.21 | **2.55** | 2.37 | 2.75 | **0.46** | 0.42 | 0.51 | **0.17** | 0.16 | 0.18 |
| History of kidney disease | No | 1,659 | **10.96** | 10.02 | 11.99 | **10.03** | 9.30 | 10.83 | **2.68** | 2.53 | 2.83 | **0.47** | 0.44 | 0.50 | **0.17** | 0.16 | 0.18 |
| | Yes | 117 | **11.49** | 8.52 | 15.48 | **11.00** | 8.29 | 14.59 | **2.75** | 2.27 | 3.34 | **0.52** | 0.44 | 0.61 | **0.17** | 0.15 | 0.19 |
| Frequency of blood donation | Never/Rarely | 1,651 | **11.45** | 10.43 | 12.56 | **10.20** | 9.44 | 11.03 | **2.73** | 2.57 | 2.89 | **0.47** | 0.44 | 0.50 | **0.17** | 0.16 | 0.18 |
| | Once or more a year | 138 | **7.88** | 6.27 | 9.91 | **9.07** | 7.40 | 11.12 | **2.26** | 1.87 | 2.73 | **0.51** | 0.40 | 0.64 | **0.18** | 0.16 | 0.21 |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| Frequency of house cleaning | A few times per year or less | 44 | **10.38** | 5.68 | 18.99 | **7.19** | 4.53 | 11.40 | **2.42** | 1.65 | 3.55 | **0.34** | 0.25 | 0.45 | **0.14** | 0.11 | 0.18 |
| | A few times per month | 1,033 | **12.96** | 11.69 | 14.36 | **11.29** | 10.32 | 12.35 | **2.90** | 2.71 | 3.10 | **0.50** | 0.46 | 0.55 | **0.17** | 0.16 | 0.19 |
| | Three times per week or more | 711 | **8.68** | 7.44 | 10.13 | **8.64** | 7.59 | 9.84 | **2.38** | 2.16 | 2.63 | **0.43** | 0.39 | 0.47 | **0.17** | 0.16 | 0.19 |
| Frequency of stain-resistant product use | Never | 1,579 | **11.24** | 10.24 | 12.34 | **10.00** | 9.23 | 10.83 | **2.68** | 2.53 | 2.84 | **0.46** | 0.43 | 0.49 | **0.17** | 0.16 | 0.18 |
| | Rarely | 172 | **9.49** | 7.30 | 12.34 | **10.91** | 8.88 | 13.42 | **2.50** | 2.00 | 3.12 | **0.55** | 0.46 | 0.65 | **0.20** | 0.17 | 0.23 |
| | A few times per year or more | 37 | **10.98** | 5.85 | 20.60 | **10.28** | 6.45 | 16.39 | **3.30** | 2.44 | 4.46 | **0.72** | 0.55 | 0.94 | **0.27** | 0.21 | 0.35 |
| Frequency of direct contact with soil at locations within the sampling frame | A few times per year or less | 653 | **10.02** | 8.58 | 11.71 | **9.74** | 8.52 | 11.13 | **2.49** | 2.26 | 2.76 | **0.47** | 0.42 | 0.53 | **0.17** | 0.16 | 0.18 |
| | A few times per month | 510 | **11.31** | 9.93 | 12.89 | **9.87** | 8.85 | 11.02 | **2.67** | 2.43 | 2.93 | **0.47** | 0.43 | 0.52 | **0.17** | 0.16 | 0.19 |
| | Three times per week or more | 626 | **12.36** | 10.73 | 14.24 | **10.82** | 9.61 | 12.18 | **2.95** | 2.70 | 3.23 | **0.47** | 0.43 | 0.52 | **0.18** | 0.17 | 0.19 |
| Consumption of fruits and vegetables from locations within the sampling frame | No | 746 | **12.51** | 11.06 | 14.14 | **10.54** | 9.39 | 11.82 | **2.72** | 2.50 | 2.95 | **0.44** | 0.40 | 0.48 | **0.16** | 0.15 | 0.17 |
| | Yes | 1,021 | **10.17** | 9.00 | 11.51 | **9.86** | 8.92 | 10.91 | **2.67** | 2.47 | 2.90 | **0.50** | 0.45 | 0.55 | **0.19** | 0.17 | 0.20 |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| Frequency of consumption of fruits and vegetables from locations within the sampling frame | Never | 600 | **12.82** | 11.29 | 14.56 | **10.82** | 9.60 | 12.20 | **2.74** | 2.52 | 2.99 | **0.45** | 0.41 | 0.49 | **0.16** | 0.15 | 0.17 |
| | Rarely | 70 | **8.11** | 4.97 | 13.23 | **7.33** | 5.12 | 10.50 | **2.34** | 1.74 | 3.15 | **0.32** | 0.23 | 0.46 | **0.14** | 0.11 | 0.17 |
| | A few times per year | 171 | **7.89** | 5.35 | 11.64 | **7.65** | 5.63 | 10.39 | **2.27** | 1.76 | 2.92 | **0.44** | 0.35 | 0.54 | **0.18** | 0.16 | 0.21 |
| | A few times per month | 290 | **11.52** | 9.37 | 14.15 | **10.38** | 8.58 | 12.55 | **2.84** | 2.47 | 3.26 | **0.49** | 0.43 | 0.55 | **0.19** | 0.17 | 0.21 |
| | Three times per week or more | 490 | **10.80** | 9.26 | 12.59 | **11.16** | 10.00 | 12.45 | **2.82** | 2.53 | 3.14 | **0.58** | 0.50 | 0.67 | **0.20** | 0.18 | 0.21 |
| Consumption of local fish (i.e., fish cought within the sampling frame) | No | 1,729 | **11.15** | 10.21 | 12.18 | **10.09** | 9.37 | 10.87 | **2.68** | 2.54 | 2.84 | **0.47** | 0.44 | 0.50 | **0.17** | 0.16 | 0.18 |
| | Yes | 54 | **9.51** | 6.51 | 13.88 | **10.35** | 6.92 | 15.47 | **2.61** | 1.94 | 3.51 | **0.44** | 0.30 | 0.65 | **0.19** | 0.14 | 0.26 |
| Frequency of consumption of local fish (i.e., fish cought within the sampling frame) | Never | 1,469 | **11.28** | 10.30 | 12.36 | **10.24** | 9.48 | 11.06 | **2.70** | 2.55 | 2.86 | **0.48** | 0.45 | 0.52 | **0.17** | 0.17 | 0.18 |
| | Rarely | 19 | **12.10** | 6.33 | 23.16 | **9.75** | 6.71 | 14.19 | **2.59** | 1.81 | 3.71 | **0.44** | 0.32 | 0.61 | **0.15** | 0.11 | 0.21 |
| | A few times per year | 19 | **11.53** | 7.71 | 17.25 | **13.27** | 7.49 | 23.50 | **2.84** | 2.07 | 3.88 | **0.53** | 0.33 | 0.83 | **0.21** | 0.13 | 0.34 |
| | A few times per month | 12 | **7.25** | 3.61 | 14.53 | **8.32** | 4.42 | 15.68 | **2.51** | 1.11 | 5.67 | **0.36** | 0.15 | 0.86 | **0.20** | 0.12 | 0.34 |
| | Three times per week or more | 2 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| Frequency of local milk consumption (i.e., milk from animals within the sampling rame) | Never | 1,724 | **11.16** | 10.20 | 12.21 | **10.25** | 9.50 | 11.05 | **2.70** | 2.56 | 2.86 | **0.47** | 0.44 | 0.50 | **0.17** | 0.17 | 0.18 |
| | Rarely or more frequently | 26 | **9.60** | 6.54 | 14.08 | **7.52** | 4.58 | 12.33 | **2.26** | 1.72 | 2.97 | **0.55** | 0.24 | 1.22 | **0.19** | 0.13 | 0.28 |
| Frequency of fast food consumption | A few times per year or less | 366 | **12.39** | 10.20 | 15.04 | **12.66** | 10.73 | 14.94 | **2.91** | 2.56 | 3.31 | **0.54** | 0.49 | 0.61 | **0.20** | 0.18 | 0.21 |
| | A few times per month | 997 | **11.19** | 10.09 | 12.41 | **10.02** | 9.19 | 10.93 | **2.71** | 2.53 | 2.89 | **0.47** | 0.43 | 0.51 | **0.17** | 0.16 | 0.18 |
| | Three times per week or more | 424 | **9.54** | 7.64 | 11.91 | **8.08** | 6.65 | 9.82 | **2.39** | 2.07 | 2.76 | **0.40** | 0.34 | 0.47 | **0.15** | 0.14 | 0.18 |
| Presence of carpeting in bedroom, living room, or kitchen | No | 480 | **9.50** | 8.08 | 11.17 | **9.60** | 8.39 | 11.00 | **2.44** | 2.21 | 2.69 | **0.46** | 0.42 | 0.51 | **0.18** | 0.17 | 0.19 |
| | Yes | 1,311 | **11.85** | 10.67 | 13.15 | **10.31** | 9.42 | 11.28 | **2.79** | 2.61 | 3.00 | **0.47** | 0.44 | 0.52 | **0.17** | 0.16 | 0.18 |
| Occupational exposures (count of jobs with potential PFAS exposures) | None | 1,555 | **11.19** | 10.21 | 12.27 | **10.00** | 9.25 | 10.82 | **2.67** | 2.52 | 2.83 | **0.46** | 0.43 | 0.50 | **0.17** | 0.16 | 0.18 |
| | One or More | 198 | **10.83** | 8.43 | 13.92 | **10.85** | 8.80 | 13.38 | **2.81** | 2.36 | 3.34 | **0.52** | 0.45 | 0.59 | **0.17** | 0.15 | 0.19 |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| Maximum PFHxS detected in drinking water (µg/L) | >0 - <70 | 73 | **2.58** | 1.87 | 3.58 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 70 - <250 | 788 | **6.03** | 5.22 | 6.97 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 250 - <500 | 45 | **12.56** | 7.78 | 20.28 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 500 - <1000 | 453 | **11.23** | 9.99 | 12.63 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 1000 - <1500 | 122 | **40.95** | 32.37 | 51.81 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 1500+ | 286 | **79.03** | 66.46 | 93.97 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Maximum PFOS detected in drinking water (µg/L) | >0 - <70 | 145 | NA | NA | NA | **3.90** | 3.40 | 4.47 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 70 - <250 | 1,054 | NA | NA | NA | **7.38** | 6.77 | 8.04 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 250 - <500 | 15 | NA | NA | NA | **9.80** | 6.34 | 15.13 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 500 - <1000 | 34 | NA | NA | NA | **21.20** | 12.34 | 36.41 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 1000 - <1500 | 302 | NA | NA | NA | **45.49** | 39.07 | 52.98 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 1500+ | 217 | NA | NA | NA | **22.88** | 19.20 | 27.27 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Maximum PFOA detected in drinking water (µg/L) | >0 - <70 | 860 | NA | NA | NA | NA | NA | NA | **1.89** | 1.73 | 2.07 | NA | NA | NA | NA | NA | NA |
| | 70 - <250 | 500 | NA | NA | NA | NA | NA | NA | **2.54** | 2.35 | 2.75 | NA | NA | NA | NA | NA | NA |
| | 250+ | 407 | NA | NA | NA | NA | NA | NA | **7.59** | 6.81 | 8.47 | NA | NA | NA | NA | NA | NA |
| Time since drinking water mitigation (days) | 0 - 365 | 17 | **2.51** | 1.11 | 5.68 | **3.42** | 2.02 | 5.80 | **1.50** | 1.11 | 2.04 | **0.18** | 0.14 | 0.23 | **0.13** | 0.11 | 0.17 |
| | 366 - 730 | 75 | **12.32** | 8.32 | 18.25 | **4.78** | 3.81 | 5.99 | **2.81** | 2.22 | 3.55 | **0.19** | 0.15 | 0.23 | **0.13** | 0.11 | 0.15 |
| | 731 - 1,095 | 316 | **73.83** | 62.11 | 87.78 | **42.78** | 36.64 | 49.94 | **9.83** | 8.60 | 11.24 | **0.75** | 0.67 | 0.85 | **0.21** | 0.19 | 0.23 |
| | 1,096 - 1,460 | 1,075 | **7.91** | 7.27 | 8.60 | **6.88** | 6.41 | 7.38 | **2.23** | 2.11 | 2.36 | **0.39** | 0.36 | 0.41 | **0.15** | 0.14 | 0.16 |
| | 1,300 - 1,825 | 120 | **8.70** | 6.57 | 11.53 | **11.16** | 8.73 | 14.28 | **2.04** | 1.71 | 2.43 | **0.52** | 0.41 | 0.65 | **0.21** | 0.19 | 0.24 |
| | 1,826+ | 167 | **33.47** | 26.45 | 42.37 | **31.42** | 25.45 | 38.79 | **5.26** | 4.49 | 6.16 | **0.98** | 0.85 | 1.12 | **0.26** | 0.22 | 0.30 |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| **Females only** | | | | | | | | | | | | | | | | | |
| Biological children | No | 203 | **10.17** | 8.20 | 12.63 | **9.16** | 7.47 | 11.24 | **2.56** | 2.16 | 3.05 | **0.45** | 0.36 | 0.57 | **0.17** | 0.15 | 0.19 |
| | Yes | 764 | **10.73** | 9.40 | 12.25 | **9.04** | 8.06 | 10.15 | **2.57** | 2.35 | 2.80 | **0.45** | 0.41 | 0.48 | **0.17** | 0.16 | 0.19 |
| Number of biological children | 0 | 203 | **10.17** | 8.20 | 12.63 | **9.16** | 7.47 | 11.24 | **2.56** | 2.16 | 3.05 | **0.45** | 0.36 | 0.57 | **0.17** | 0.15 | 0.19 |
| | 1 | 177 | **8.52** | 6.21 | 11.70 | **7.88** | 5.97 | 10.40 | **2.16** | 1.74 | 2.68 | **0.43** | 0.35 | 0.52 | **0.17** | 0.15 | 0.19 |
| | 2 | 316 | **10.18** | 8.40 | 12.35 | **8.84** | 7.44 | 10.51 | **2.45** | 2.15 | 2.80 | **0.45** | 0.40 | 0.51 | **0.18** | 0.16 | 0.20 |
| | 3+ | 271 | **13.63** | 11.11 | 16.72 | **10.32** | 8.60 | 12.37 | **3.09** | 2.73 | 3.51 | **0.45** | 0.39 | 0.52 | **0.17** | 0.15 | 0.18 |
| Breastfeeding or previously breastfed children | No | 464 | **11.46** | 9.96 | 13.18 | **9.53** | 8.38 | 10.84 | **2.61** | 2.35 | 2.89 | **0.45** | 0.39 | 0.51 | **0.16** | 0.15 | 0.18 |
| | Yes | 503 | **9.84** | 8.24 | 11.76 | **8.65** | 7.39 | 10.11 | **2.52** | 2.24 | 2.85 | **0.45** | 0.40 | 0.50 | **0.18** | 0.17 | 0.20 |
| Total duration of breastfeeding for all children (months) | 0 | 470 | **11.52** | 10.02 | 13.23 | **9.58** | 8.43 | 10.89 | **2.63** | 2.37 | 2.91 | **0.45** | 0.40 | 0.51 | **0.17** | 0.15 | 0.18 |
| | 0< to <6 | 134 | **13.11** | 10.11 | 17.00 | **10.82** | 8.25 | 14.18 | **2.75** | 2.32 | 3.27 | **0.47** | 0.40 | 0.56 | **0.17** | 0.15 | 0.19 |
| | 6 to <12 | 99 | **10.25** | 7.65 | 13.72 | **9.58** | 7.20 | 12.75 | **2.85** | 2.37 | 3.44 | **0.55** | 0.42 | 0.71 | **0.21** | 0.17 | 0.27 |
| | 12 to <18 | 90 | **9.51** | 5.88 | 15.37 | **9.33** | 6.51 | 13.38 | **2.23** | 1.60 | 3.12 | **0.44** | 0.35 | 0.55 | **0.18** | 0.15 | 0.22 |
| | 18+ | 177 | **7.48** | 5.21 | 10.73 | **6.22** | 4.66 | 8.31 | **2.26** | 1.77 | 2.90 | **0.36** | 0.30 | 0.45 | **0.16** | 0.14 | 0.19 |

* Several variables that were collected in the questionnaire are not included in these tables. These variables may not be included because they did not have sufficient variability or were not associated with PFAS blood concentrations in preliminary analyses. These variables include full-time vs. part-time residence, behavior change questions, and occupational history in specific industries.

† Geometric means and confidence levels are not shown for categories with fewer than 10 responses.

‡ Detection limits for all PFAS are 0.1 micrograms per liter (µg/L).

§ Some frequency counts may not sum to the total because of missing values. Some variable categories that were presented in the questionnaire were collapsed into larger variable categories.

**Table C-2. Child blood PFAS geometric means (GM), lower confidence intervals (LCI), and upper confidence intervals (UCI) in micrograms per liter[*,†,‡]**

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| **All Children** | | | | | | | | | | | | | | | | | |
| Age (years) | 3 to <12 | 92 | **6.72** | 4.97 | 9.10 | **5.52** | 4.27 | 7.13 | **2.30** | 1.87 | 2.81 | **0.31** | 0.27 | 0.36 | **0.13** | 0.12 | 0.15 |
| | 12 to <18 | 105 | **3.84** | 2.99 | 4.92 | **3.98** | 3.41 | 4.64 | **1.49** | 1.32 | 1.67 | **0.26** | 0.23 | 0.30 | **0.12** | 0.10 | 0.14 |
| Sex | Female | 100 | **3.82** | 3.05 | 4.79 | **3.58** | 3.00 | 4.26 | **1.50** | 1.31 | 1.71 | **0.23** | 0.20 | 0.26 | **0.12** | 0.10 | 0.13 |
| | Male | 97 | **6.39** | 4.71 | 8.67 | **6.06** | 4.94 | 7.43 | **2.18** | 1.85 | 2.56 | **0.36** | 0.32 | 0.41 | **0.13** | 0.12 | 0.15 |
| Body mass index (kilograms per square meter) | <15 | 19 | **7.03** | 3.95 | 12.51 | **5.78** | 3.71 | 9.01 | **2.82** | 2.04 | 3.90 | **0.35** | 0.28 | 0.44 | **0.12** | 0.10 | 0.15 |
| | 15 to <20 | 87 | **4.74** | 3.69 | 6.11 | **4.60** | 3.80 | 5.56 | **1.74** | 1.49 | 2.03 | **0.30** | 0.26 | 0.34 | **0.14** | 0.12 | 0.17 |
| | 20 to <25 | 57 | **4.30** | 2.91 | 6.34 | **4.12** | 3.21 | 5.28 | **1.62** | 1.33 | 1.98 | **0.24** | 0.20 | 0.30 | **0.11** | 0.10 | 0.13 |
| | 25+ | 31 | **5.52** | 3.46 | 8.83 | **4.75** | 3.32 | 6.80 | **1.91** | 1.43 | 2.56 | **0.27** | 0.19 | 0.39 | **0.11** | 0.09 | 0.13 |
| Race and ethnicity | White, non-Hispanic | 130 | **5.63** | 4.36 | 7.28 | **5.34** | 4.40 | 6.49 | **2.03** | 1.73 | 2.38 | **0.32** | 0.28 | 0.36 | **0.12** | 0.11 | 0.14 |
| | Asian, non-Hispanic | 7 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Black or African American, non-Hispanic | 5 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | More than one race, non-Hispanic | 11 | **4.33** | 0.96 | 19.47 | **6.08** | 2.22 | 16.71 | **2.20** | 1.10 | 4.41 | **0.33** | 0.25 | 0.44 | **0.13** | 0.09 | 0.19 |
| | Hispanic or Latino | 38 | **3.48** | 2.51 | 4.82 | **3.03** | 2.47 | 3.72 | **1.27** | 1.13 | 1.43 | **0.19** | 0.16 | 0.22 | **0.13** | 0.10 | 0.17 |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| Birth order | First born | 85 | **4.27** | 3.45 | 5.29 | **4.34** | 3.69 | 5.10 | **1.68** | 1.48 | 1.91 | **0.29** | 0.26 | 0.32 | **0.12** | 0.11 | 0.14 |
| | Second born | 71 | **4.79** | 3.71 | 6.18 | **4.61** | 3.82 | 5.55 | **1.72** | 1.50 | 1.97 | **0.27** | 0.23 | 0.32 | **0.13** | 0.11 | 0.15 |
| | Third+ born | 38 | **6.75** | 4.70 | 9.68 | **5.03** | 3.86 | 6.56 | **2.20** | 1.77 | 2.72 | **0.28** | 0.24 | 0.33 | **0.13** | 0.11 | 0.16 |
| Water consumption at current home (average cups per day) | 0 to <2 | 57 | **4.58** | 3.24 | 6.47 | **4.46** | 3.17 | 6.29 | **1.70** | 1.30 | 2.21 | **0.31** | 0.25 | 0.39 | **0.12** | 0.10 | 0.15 |
| | 2 to <4 | 58 | **4.87** | 3.38 | 7.01 | **4.51** | 3.50 | 5.82 | **1.89** | 1.54 | 2.33 | **0.27** | 0.22 | 0.33 | **0.13** | 0.11 | 0.15 |
| | 4+ | 81 | **5.01** | 3.63 | 6.92 | **4.64** | 3.68 | 5.85 | **1.76** | 1.46 | 2.13 | **0.27** | 0.22 | 0.32 | **0.12** | 0.10 | 0.15 |
| Water consumption at school (average cups per day) | <1 | 41 | **2.26** | 1.67 | 3.07 | **2.99** | 2.38 | 3.76 | **1.27** | 1.03 | 1.57 | **0.23** | 0.17 | 0.31 | **0.11** | 0.09 | 0.13 |
| | 1 to <2 | 40 | **3.24** | 2.30 | 4.56 | **3.41** | 2.72 | 4.28 | **1.51** | 1.26 | 1.81 | **0.25** | 0.21 | 0.29 | **0.11** | 0.10 | 0.12 |
| | 2 to <3 | 55 | **7.49** | 4.91 | 11.42 | **6.39** | 4.65 | 8.79 | **2.31** | 1.79 | 2.97 | **0.34** | 0.28 | 0.41 | **0.15** | 0.12 | 0.19 |
| | 3+ | 61 | **6.43** | 4.64 | 8.93 | **5.16** | 3.89 | 6.84 | **1.90** | 1.51 | 2.39 | **0.29** | 0.24 | 0.35 | **0.13** | 0.11 | 0.15 |
| Length of residency in sampling frame (years) | <6 | 38 | **8.90** | 4.54 | 17.44 | **7.83** | 4.50 | 13.64 | **2.86** | 1.83 | 4.46 | **0.36** | 0.27 | 0.47 | **0.14** | 0.11 | 0.17 |
| | 6 to <12 | 87 | **5.00** | 3.67 | 6.81 | **4.58** | 3.68 | 5.70 | **1.84** | 1.55 | 2.19 | **0.29** | 0.25 | 0.34 | **0.12** | 0.11 | 0.14 |
| | 12 to <18 | 72 | **3.78** | 2.90 | 4.93 | **3.75** | 3.12 | 4.49 | **1.46** | 1.26 | 1.68 | **0.25** | 0.21 | 0.29 | **0.12** | 0.10 | 0.15 |
| Frequency of direct contact with soil at locations within the sampling frame | A few times per year or less | 37 | **2.49** | 1.74 | 3.57 | **3.10** | 2.45 | 3.93 | **1.24** | 1.05 | 1.46 | **0.20** | 0.16 | 0.25 | **0.10** | 0.09 | 0.12 |
| | A few times per month | 55 | **4.32** | 3.10 | 6.00 | **4.43** | 3.45 | 5.68 | **1.60** | 1.32 | 1.94 | **0.26** | 0.21 | 0.32 | **0.13** | 0.10 | 0.15 |
| | Three times per week or more | 105 | **6.80** | 5.16 | 8.94 | **5.41** | 4.20 | 6.98 | **2.20** | 1.76 | 2.74 | **0.34** | 0.29 | 0.39 | **0.14** | 0.12 | 0.16 |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| Consumption of fruits and vegetables from locations within the sampling frame | No | 72 | **5.76** | 4.15 | 8.00 | **5.39** | 4.10 | 7.10 | **1.98** | 1.60 | 2.45 | **0.26** | 0.21 | 0.32 | **0.11** | 0.09 | 0.13 |
| | Yes | 123 | **4.37** | 3.38 | 5.66 | **4.12** | 3.41 | 4.97 | **1.67** | 1.43 | 1.93 | **0.29** | 0.26 | 0.33 | **0.14** | 0.12 | 0.15 |
| Frequency of consumption of local fish (i.e., fish cought within the sampling frame) | Never | 195 | **4.91** | 4.10 | 5.89 | **4.60** | 4.03 | 5.25 | **1.79** | 1.62 | 1.98 | **0.28** | 0.26 | 0.31 | **0.13** | 0.11 | 0.14 |
| | A few times per year | 2 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Frequency of local milk consumption (i.e., milk from animals within the sampling frame) | Never | 177 | **4.90** | 4.01 | 5.98 | **4.79** | 4.19 | 5.47 | **1.88** | 1.70 | 2.09 | **0.28** | 0.25 | 0.31 | **0.12** | 0.11 | 0.13 |
| | Rarely or more frequently | 13 | **4.89** | 3.38 | 7.09 | **2.84** | 1.90 | 4.25 | **1.11** | 0.93 | 1.34 | **0.22** | 0.19 | 0.24 | **0.14** | 0.08 | 0.26 |
| Drank formula reconstituted with tap water | No | 100 | **4.33** | 3.43 | 5.47 | **4.15** | 3.53 | 4.86 | **1.65** | 1.48 | 1.84 | **0.26** | 0.22 | 0.29 | **0.13** | 0.11 | 0.15 |
| | Yes | 93 | **5.24** | 3.76 | 7.30 | **4.92** | 3.81 | 6.37 | **1.88** | 1.52 | 2.31 | **0.31** | 0.26 | 0.36 | **0.12** | 0.10 | 0.13 |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| Currently breastfeeding or previously breastfed | No | 46 | **4.73** | 3.15 | 7.11 | **4.35** | 2.76 | 6.84 | **1.62** | 1.16 | 2.26 | **0.27** | 0.21 | 0.35 | **0.10** | 0.09 | 0.12 |
| | Yes | 147 | **4.68** | 3.72 | 5.89 | **4.49** | 3.85 | 5.22 | **1.78** | 1.58 | 2.00 | **0.28** | 0.25 | 0.31 | **0.13** | 0.11 | 0.15 |
| Duration of drinking formula reconstituted with tap water duration (months) | <7 | 123 | **4.41** | 3.62 | 5.36 | **4.04** | 3.44 | 4.74 | **1.61** | 1.42 | 1.82 | **0.26** | 0.23 | 0.30 | **0.13** | 0.11 | 0.15 |
| | 7 to <13 | 42 | **4.75** | 2.37 | 9.50 | **4.95** | 3.04 | 8.06 | **1.82** | 1.23 | 2.70 | **0.31** | 0.23 | 0.40 | **0.12** | 0.10 | 0.14 |
| | 13 to <19 | 15 | **5.42** | 1.61 | 18.32 | **6.89** | 2.89 | 16.44 | **2.50** | 1.28 | 4.87 | **0.29** | 0.18 | 0.48 | **0.10** | 0.08 | 0.13 |
| | 19+ | 13 | **8.40** | 3.17 | 22.24 | **7.47** | 3.57 | 15.65 | **2.94** | 1.74 | 4.98 | **0.36** | 0.24 | 0.53 | **0.12** | 0.09 | 0.16 |
| Breastfeeding duration (months) | <7 | 111 | **3.85** | 2.92 | 5.07 | **3.84** | 3.13 | 4.71 | **1.56** | 1.33 | 1.83 | **0.26** | 0.22 | 0.29 | **0.11** | 0.10 | 0.12 |
| | 19+ | 26 | **4.77** | 2.92 | 7.80 | **5.11** | 3.49 | 7.46 | **2.19** | 1.60 | 2.99 | **0.34** | 0.28 | 0.43 | **0.13** | 0.11 | 0.17 |
| | 7 to <19 | 56 | **6.74** | 5.01 | 9.06 | **5.56** | 4.42 | 6.99 | **1.95** | 1.60 | 2.38 | **0.29** | 0.24 | 0.36 | **0.16** | 0.13 | 0.20 |
| Maximum PFHxS detected in drinking water (µg/L) | >0 - <70 | 7 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 70 - <250 | 88 | **1.92** | 1.61 | 2.30 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 250 - <500 | 12 | **7.34** | 1.94 | 27.73 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 500 - <1000 | 36 | **4.25** | 3.09 | 5.84 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 1000 - <1500 | 6 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 1500+ | 47 | **44.47** | 34.02 | 58.14 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

| Variable | Category | Frequency[§] | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI | GM | LCI | UCI |
| Maximum PFOS detected in drinking water (µg/L) | >0 - <70 | 21 | NA | NA | NA | **2.89** | 2.08 | 4.00 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 70 - <250 | 111 | NA | NA | NA | **2.94** | 2.57 | 3.36 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 250 - <500 | 2 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 500 - <1000 | 3 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 1000 - <1500 | 47 | NA | NA | NA | **25.44** | 20.52 | 31.54 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 1500+ | 12 | NA | NA | NA | **7.81** | 5.10 | 11.98 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Maximum PFOA detected in drinking water (µg/L) | >0 - <70 | 94 | NA | NA | NA | NA | NA | NA | **1.23** | 1.13 | 1.34 | NA | NA | NA | NA | NA | NA |
| | 70 - <250 | 50 | NA | NA | NA | NA | NA | NA | **1.41** | 1.20 | 1.65 | NA | NA | NA | NA | NA | NA |
| | 250+ | 52 | NA | NA | NA | NA | NA | NA | **5.83** | 4.71 | 7.22 | NA | NA | NA | NA | NA | NA |
| Time since drinking water mitigation (days) | 0 - 365 | 2 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 366 - 730 | 14 | **7.16** | 2.27 | 22.59 | **2.99** | 1.97 | 4.53 | **2.62** | 1.40 | 4.91 | **0.13** | 0.07 | 0.24 | **0.12** | 0.07 | 0.19 |
| | 731 - 1,095 | 51 | **39.82** | 29.80 | 53.20 | **22.90** | 18.06 | 29.05 | **6.66** | 5.38 | 8.25 | **0.46** | 0.38 | 0.56 | **0.15** | 0.12 | 0.20 |
| | 1,096 - 1,460 | 111 | **3.08** | 2.51 | 3.79 | **3.24** | 2.82 | 3.73 | **1.34** | 1.21 | 1.48 | **0.26** | 0.23 | 0.29 | **0.12** | 0.10 | 0.13 |
| | 1,300 - 1,825 | 8 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | 1,826+ | 9 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

* Several variables that were collected in the questionnaire are not included in these tables. These variables may not be included because they did not have sufficient variability or were not associated with PFAS blood concentrations in preliminary analyses. These variables include full-time vs. part-time residence and school attendance.

† Geometric means and confidence levels are not shown for categories with fewer than 10 responses.

‡ Detection limits for all PFAS are 0.1 micrograms per liter (µg/L).

§ Some frequency counts may not sum to the total because of missing values. Some variable categories that were presented in the questionnaire were collapsed into larger variable categories.

**Table C-3. Adult univariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)***

| Variable | Category | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) |
| Age | NA—continuous variable | 0.011 | <.001 | 2.6 | 0.010 | <.001 | 2.4 | 0.006 | <.001 | 1.3 | 0.006 | <.001 | 1.5 | 0.003 | <.001 | 0.6 |
| Sex | Male | 0.040 | 0.196 | 9.6 | 0.102 | <.001 | 26.5 | 0.041 | 0.057 | 10.0 | 0.049 | 0.008 | 12.0 | 0.004 | 0.806 | 0.9 |
| | Female | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Body mass index (kilograms per square meter) | NA—continuous variable | 0.000 | 0.886 | -0.1 | -0.002 | 0.393 | -0.5 | 0.002 | 0.275 | 0.5 | -0.001 | 0.470 | -0.3 | -0.004 | 0.002 | -1.0 |
| Race and ethnicity | Asian, non-Hispanic | 0.172 | 0.358 | 48.5 | 0.156 | 0.236 | 43.3 | 0.164 | 0.179 | 46.0 | 0.285 | <.001 | 92.6 | 0.337 | <.001 | 117.3 |
| | Black or African American, non-Hispanic | -0.109 | 0.179 | -22.3 | 0.034 | 0.622 | 8.0 | -0.072 | 0.182 | -15.2 | 0.077 | 0.134 | 19.5 | 0.123 | 0.005 | 32.6 |
| | American Indian or Alaskan Native, non-Hispanic | 0.227 | 0.281 | 68.7 | -0.019 | 0.930 | -4.3 | 0.117 | 0.463 | 30.8 | -0.067 | 0.622 | -14.3 | -0.073 | 0.497 | -15.4 |
| | Native Hawaiian or Other Pacific Islander, non-Hispanic | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | More than one race, non-Hispanic | -0.216 | 0.035 | -39.1 | -0.190 | 0.074 | -35.5 | -0.206 | <.001 | -37.7 | -0.110 | 0.100 | -22.3 | -0.033 | 0.572 | -7.3 |
| | Hispanic or Latino | -0.241 | 0.004 | -42.6 | -0.300 | <.001 | -49.8 | -0.223 | <.001 | -40.1 | -0.225 | <.001 | -40.5 | -0.093 | 0.006 | -19.2 |
| | White, non-Hispanic | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| Variable | Category | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) |
| Length of residence at current address (years) | NA—continuous variable | 0.010 | <.001 | 2.3 | 0.007 | <.001 | 1.6 | 0.005 | <.001 | 1.1 | 0.004 | <.001 | 1.0 | 0.001 | 0.191 | 0.2 |
| Total length of residence in sampling frame over the past 20 years (years) | NA—continuous variable | 0.029 | <.001 | 7.0 | 0.018 | <.001 | 4.3 | 0.009 | <.001 | 2.2 | 0.008 | 0.003 | 1.8 | 0.001 | 0.564 | 0.3 |
| Current and primary source of drinking water | Private well | -0.149 | 0.079 | -29.0 | -0.167 | 0.004 | -31.9 | -0.034 | 0.500 | -7.5 | -0.301 | <.001 | -50.0 | -0.179 | <.001 | -33.7 |
| | Bottled water | -0.084 | 0.044 | -17.5 | -0.096 | 0.008 | -19.9 | -0.069 | 0.011 | -14.7 | -0.077 | 0.010 | -16.3 | -0.061 | 0.006 | -13.1 |
| | Public water system | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Tap water consumption at current home (average cups per day) | NA—continuous variable | 0.011 | 0.001 | 2.5 | 0.005 | 0.038 | 1.2 | 0.006 | 0.009 | 1.4 | 0.000 | 0.877 | -0.1 | 0.001 | 0.497 | 0.3 |
| Current use of filter or treatment device for tap water at home | None, drink bottled water only | -0.313 | <.001 | -51.3 | -0.331 | <.001 | -53.3 | -0.206 | <.001 | -37.8 | -0.183 | <.001 | -34.4 | -0.140 | <.001 | -27.5 |
| | Use at least one filter or treatment device | -0.183 | <.001 | -34.3 | -0.177 | <.001 | -33.4 | -0.104 | <.001 | -21.2 | -0.066 | 0.033 | -14.1 | -0.039 | 0.135 | -8.6 |
| | None, No filter or treatment device used | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| History of kidney disease | Yes | 0.020 | 0.770 | 4.8 | 0.040 | 0.540 | 9.6 | 0.012 | 0.797 | 2.7 | 0.047 | 0.222 | 11.4 | -0.005 | 0.878 | -1.0 |
| | No | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| Variable | Category | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) |
| Frequency of blood donation | Once or more per year | -0.162 | 0.004 | -31.2 | -0.051 | 0.289 | -11.1 | -0.082 | 0.064 | -17.3 | 0.035 | 0.510 | 8.3 | 0.020 | 0.550 | 4.8 |
| | Never or rarely | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency of house cleaning | A few times per month | 0.096 | 0.480 | 24.8 | 0.196 | 0.062 | 57.1 | 0.078 | 0.368 | 19.7 | 0.175 | 0.011 | 49.7 | 0.099 | 0.079 | 25.5 |
| | Three times per week or more | -0.078 | 0.574 | -16.4 | 0.080 | 0.452 | 20.2 | -0.008 | 0.929 | -1.8 | 0.109 | 0.112 | 28.5 | 0.092 | 0.101 | 23.7 |
| | A few times per year or less | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency of stain-resistant product use | Rarely | -0.073 | 0.240 | -15.5 | 0.038 | 0.448 | 9.1 | -0.030 | 0.555 | -6.8 | 0.078 | 0.057 | 19.8 | 0.068 | 0.038 | 17.0 |
| | A few times per year or more frequently | -0.010 | 0.942 | -2.3 | 0.012 | 0.909 | 2.8 | 0.090 | 0.193 | 22.9 | 0.194 | 0.002 | 56.4 | 0.206 | <.001 | 60.8 |
| | Never | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency of direct contact with soil at locations within the sampling frame | A few times per month | 0.053 | 0.223 | 12.9 | 0.006 | 0.872 | 1.4 | 0.030 | 0.326 | 7.1 | 0.003 | 0.927 | 0.7 | 0.017 | 0.538 | 3.9 |
| | Three times per week or more | 0.091 | 0.054 | 23.3 | 0.046 | 0.261 | 11.1 | 0.073 | 0.017 | 18.4 | 0.000 | 0.999 | 0.0 | 0.026 | 0.258 | 6.3 |
| | A few times per year or less | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Consumption of fruits and vegetables from locations within the sampling frame | Yes | -0.090 | 0.023 | -18.6 | -0.029 | 0.413 | -6.4 | -0.007 | 0.790 | -1.6 | 0.059 | 0.050 | 14.5 | 0.073 | 0.001 | 18.3 |
| | No | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| Variable | Category | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) |
| Frequency of consumption of fruits and vegetables from locations within the sampling frame | Rarely | -0.199 | 0.076 | -36.8 | -0.169 | 0.046 | -32.2 | -0.069 | 0.317 | -14.6 | -0.148 | 0.065 | -28.8 | -0.073 | 0.127 | -15.4 |
| | A few times per year | -0.211 | 0.020 | -38.5 | -0.151 | 0.038 | -29.3 | -0.083 | 0.161 | -17.3 | -0.013 | 0.809 | -2.9 | 0.055 | 0.121 | 13.6 |
| | A few times per month | -0.047 | 0.389 | -10.2 | -0.018 | 0.720 | -4.1 | 0.014 | 0.701 | 3.3 | 0.032 | 0.378 | 7.6 | 0.073 | 0.024 | 18.4 |
| | Three times per week or more | -0.074 | 0.101 | -15.7 | 0.013 | 0.721 | 3.1 | 0.011 | 0.729 | 2.6 | 0.110 | 0.005 | 28.8 | 0.090 | <.001 | 23.2 |
| | Never | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Consumption of local fish (i.e., fish caught within the sampling frame) | Yes | -0.069 | 0.421 | -14.8 | 0.011 | 0.904 | 2.5 | -0.012 | 0.861 | -2.7 | -0.025 | 0.769 | -5.6 | 0.048 | 0.459 | 11.7 |
| | No | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency of consumption of local fish (i.e., fish cought within the sampling frame) | Rarely | 0.031 | 0.830 | 7.3 | -0.021 | 0.800 | -4.7 | -0.018 | 0.813 | -4.0 | -0.040 | 0.532 | -8.9 | -0.051 | 0.463 | -11.0 |
| | A few times per year | 0.010 | 0.912 | 2.2 | 0.113 | 0.379 | 29.6 | 0.021 | 0.760 | 5.1 | 0.039 | 0.707 | 9.3 | 0.082 | 0.437 | 20.8 |
| | A few times per month | -0.192 | 0.218 | -35.8 | -0.090 | 0.524 | -18.7 | -0.031 | 0.864 | -6.9 | -0.127 | 0.511 | -25.4 | 0.064 | 0.591 | 15.8 |
| | Three times per week or more | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Never | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency of local milk consumption (i.e., milk from animals within the sampling rame) | Rarely or more frequently | -0.066 | 0.457 | -14.0 | -0.135 | 0.230 | -26.6 | -0.078 | 0.208 | -16.4 | 0.064 | 0.714 | 16.0 | 0.039 | 0.654 | 9.4 |
| | Never | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| Variable | Category | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) |
| Frequency of fast food consumption | A few times per month | -0.044 | 0.365 | -9.7 | -0.102 | 0.016 | -20.9 | -0.031 | 0.335 | -7.0 | -0.063 | 0.046 | -13.5 | -0.057 | 0.012 | -12.4 |
| | Three times per week or more | -0.113 | 0.086 | -23.0 | -0.195 | <.001 | -36.2 | -0.085 | 0.050 | -17.7 | -0.132 | 0.002 | -26.3 | -0.103 | 0.003 | -21.2 |
| | A few times per year or less | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Presence of carpeting in bedroom, living room, or kitchen | Yes | 0.096 | 0.028 | 24.7 | 0.031 | 0.407 | 7.3 | 0.059 | 0.032 | 14.6 | 0.015 | 0.620 | 3.4 | -0.025 | 0.282 | -5.6 |
| | No | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Occupational exposures (count of jobs with potential PFAS exposures) | One or more | -0.014 | 0.807 | -3.2 | 0.035 | 0.474 | 8.5 | 0.022 | 0.597 | 5.1 | 0.046 | 0.160 | 11.2 | -0.004 | 0.890 | -0.9 |
| | None | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Logarithm of the maximum PFHxS detected in drinking water (µg/L)[†] | NA—continuous variable | 0.557 | <.001 | 260.4 | 0.294 | <.001 | 96.8 | 0.342 | <.001 | 119.7 | 0.104 | 0.001 | 27.0 | -0.009 | 0.678 | -2.1 |
| Logarithm of the maximum PFOS detected in drinking water (µg/L)[†] | NA—continuous variable | 0.499 | <.001 | 215.2 | 0.458 | <.001 | 187.3 | 0.355 | <.001 | 126.6 | 0.317 | <.001 | 107.7 | 0.147 | <.001 | 40.1 |

| Variable | Category | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) |
| Logarithm of the maximum PFOA detected in drhinking water (µg/L)† | NA—continuous variable | 0.731 | <.001 | 438.0 | 0.489 | <.001 | 208.6 | 0.477 | <.001 | 200.2 | 0.242 | <.001 | 74.4 | 0.067 | 0.007 | 16.8 |
| Time since drinking water mitigation (days) | NA—continuous variable | 0.000 | 0.496 | 0.0 | 0.000 | 0.115 | -0.029 | 0.000 | <.001 | -0.051 | 0.000 | 0.026 | 0.0 | 0.000 | 0.002 | 0.021 |
| **Females only** | | | | | | | | | | | | | | | | |
| Biological children | Yes | 0.023 | 0.680 | 5.5 | -0.006 | 0.912 | -1.3 | 0.000 | 0.997 | 0.0 | -0.004 | 0.937 | -1.0 | 0.014 | 0.645 | 3.4 |
| | No | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Number of biological children | NA—continuous variable | 0.045 | 0.007 | 10.9 | 0.023 | 0.112 | 5.5 | 0.029 | 0.011 | 6.9 | 0.005 | 0.716 | 1.2 | 0.001 | 0.922 | 0.2 |
| Breastfeeding or previously breastfed children | Yes | -0.066 | 0.188 | -14.1 | -0.042 | 0.353 | -9.3 | -0.014 | 0.697 | -3.2 | 0.001 | 0.985 | 0.2 | 0.040 | 0.132 | 9.6 |
| | No | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Total duration of breastfeeding for all children (months) | NA—continuous variable | -0.005 | 0.032 | -1.1 | -0.004 | 0.022 | -1.0 | -0.002 | 0.190 | -0.5 | -0.003 | 0.031 | -0.6 | -0.001 | 0.483 | -0.1 |

* Not all categorical variables included in Table C1 are included in Table C3: variable categories that had fewer than 10 responses were not included in the regressions (Table C3). These variables include race and ethnicity and frequency of consumption of local fish.

† Marginal effects are interpreted as percent increase in blood PFAS level per percent increase in PFAS drinking water concentration.

Table C-4. Child univariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)*

| Variable | Parameter | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) |
| Age | NA—continuous variable | -0.031 | 0.014 | -6.8 | -0.018 | 0.063 | -4.0 | -0.025 | 0.001 | -5.6 | -0.010 | 0.128 | -2.2 | -0.008 | 0.130 | -1.9 |
| Sex | Male | 0.223 | 0.016 | 67.2 | 0.229 | <.001 | 69.3 | 0.162 | 0.002 | 45.3 | 0.201 | <.001 | 59.0 | 0.055 | 0.072 | 13.4 |
| | Female | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Body mass index (kilograms per square meter) | NA—continuous variable | -0.005 | 0.583 | -1.1 | -0.004 | 0.559 | -0.9 | -0.005 | 0.387 | -1.0 | -0.005 | 0.350 | -1.2 | -0.006 | 0.065 | -1.4 |
| Race and ethnicity | Asian, non-Hispanic | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Black or African American, non-Hispanic | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | More than one race, non-Hispanic | -0.114 | 0.740 | -23.0 | 0.056 | 0.807 | 13.9 | 0.035 | 0.826 | 8.5 | 0.021 | 0.774 | 4.9 | 0.033 | 0.686 | 8.0 |
| | Hispanic or Latino | -0.209 | 0.073 | -38.2 | -0.246 | 0.003 | -43.2 | -0.203 | <.001 | -37.3 | -0.223 | <.001 | -40.1 | 0.018 | 0.796 | 4.2 |
| | White, non-Hispanic | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| Variable | Parameter | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) |
| Birth Order | Third+ born | 0.199 | 0.060 | 58.0 | 0.064 | 0.423 | 16.0 | 0.116 | 0.048 | 30.5 | -0.013 | 0.838 | -3.0 | 0.024 | 0.623 | 5.6 |
| | Second born | 0.050 | 0.514 | 12.2 | 0.026 | 0.686 | 6.3 | 0.009 | 0.844 | 2.2 | -0.026 | 0.689 | -5.7 | 0.005 | 0.879 | 1.1 |
| | First born | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Water consumption at current home (average cups per day) | NA—continuous variable | 0.005 | 0.653 | 1.3 | -0.004 | 0.663 | -1.0 | 0.001 | 0.930 | 0.2 | -0.012 | 0.069 | -2.8 | 0.002 | 0.615 | 0.6 |
| Water consumption at school (average cups per day) | NA—continuous variable | 0.061 | 0.003 | 15.0 | 0.036 | 0.041 | 8.5 | 0.024 | 0.101 | 5.6 | 0.010 | 0.444 | 2.4 | 0.007 | 0.369 | 1.7 |
| Length of residency in sampling frame (years) | NA—continuous variable | -0.023 | 0.072 | -5.1 | -0.020 | 0.033 | -4.6 | -0.023 | 0.004 | -5.1 | -0.014 | 0.060 | -3.2 | -0.003 | 0.667 | -0.6 |
| Frequency of direct contact with soil at locations within the sampling frame | A few times per month | 0.239 | 0.058 | 73.2 | 0.155 | 0.150 | 42.8 | 0.112 | 0.130 | 29.3 | 0.105 | 0.276 | 27.2 | 0.095 | 0.035 | 24.3 |
| | Three times per week or more | 0.436 | <.001 | 172.6 | 0.242 | 0.022 | 74.4 | 0.249 | 0.001 | 77.4 | 0.222 | 0.015 | 66.7 | 0.132 | 0.003 | 35.4 |
| | A few times per year or less | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

| Variable | Parameter | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) |
| Consumption of fruits and vegetables from locations within the sampling frame | Yes | -0.120 | 0.260 | -24.1 | -0.117 | 0.184 | -23.6 | -0.076 | 0.273 | -16.0 | 0.054 | 0.429 | 13.2 | 0.098 | 0.038 | 25.4 |
| | No | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Frequency of local milk consumption (i.e., milk from animals within the sampling frame) | Rarely or More Frequently | -0.001 | 0.995 | -0.1 | -0.226 | 0.023 | -40.6 | -0.229 | <.001 | -40.9 | -0.113 | 0.006 | -23.0 | 0.063 | 0.638 | 15.5 |
| | Never | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Drank formula reconstituted with tap water | Yes | 0.083 | 0.405 | 21.0 | 0.075 | 0.319 | 18.8 | 0.057 | 0.323 | 13.9 | 0.082 | 0.179 | 20.7 | -0.056 | 0.149 | -12.0 |
| | No | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Currently breastfeeding or previously breastfed | Yes | -0.005 | 0.966 | -1.1 | 0.014 | 0.907 | 3.2 | 0.040 | 0.644 | 9.8 | 0.015 | 0.832 | 3.5 | 0.101 | 0.025 | 26.3 |
| | No | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| Duration of drinking formula reconstituted with tap water duration (months) | NA—continuous variable | 0.009 | 0.172 | 2.0 | 0.009 | 0.053 | 2.1 | 0.008 | 0.013 | 1.9 | 0.005 | 0.098 | 1.2 | -0.002 | 0.323 | -0.5 |

| Variable | Parameter | PFHxS | | | PFOS | | | PFOA | | | PFNA | | | PFDA | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) | Coef. | p-val | ME (%) |
| Breastfeeding duration (months) | NA—continuous variable | 0.006 | 0.265 | 1.3 | 0.005 | 0.203 | 1.2 | 0.006 | 0.051 | 1.4 | 0.004 | 0.137 | 1.0 | 0.005 | 0.007 | 1.3 |
| Logarithm of the maximum PFHxS detected in drinking water (µg/L)† | NA—continuous variable | 0.887 | <.001 | 671.0 | 0.568 | <.001 | 270.1 | 0.423 | <.001 | 164.8 | 0.175 | 0.011 | 49.5 | 0.156 | <.001 | 43.3 |
| Logarithm of the maximum PFOS detected in drinking water (µg/L)† | NA—continuous variable | 0.594 | <.001 | 293.1 | 0.505 | <.001 | 220.0 | 0.348 | <.001 | 122.7 | 0.257 | <.001 | 80.6 | 0.141 | <.001 | 38.3 |
| Logarithm of the maximum PFOA detected in drinking water (µg/L)† | NA—continuous variable | 1.122 | <.001 | 1,224.5 | 0.781 | <.001 | 504.0 | 0.600 | <.001 | 298.3 | 0.283 | <.001 | 92.1 | 0.222 | <.001 | 66.6 |
| Time since drinking water mitigation (days) | NA—continuous variable | -0.001 | <.001 | -0.2 | -0.001 | <.001 | -0.1 | -0.001 | <.001 | -0.1 | -0.000 | 0.243 | -0.0 | 0.000 | 0.877 | 0.0 |

* Not all categorical variables included in Table C1 are included in Table C3: variable categories that had fewer than 10 responses were not included in the regressions (Table C4). These variables include race and ethnicity and frequency of consumption of fish.

† Marginal effects are interpreted as percent increase in blood PFAS level per percent increase in PFAS drinking water concentration.

**Table C-5. PFHxS adult multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.013 | <.0001 | 3.0 |
| Sex: male* (categorical) | 0.529 | <.0001 | 238.0 |
| Age × sex: male*,† (continuous) | -0.008 | <.0001 | -1.9 |
| Years in sampling frame in the past 20 years (continuous) | 0.025 | <.0001 | 6.0 |
| Logarithm of maximum PFHxS detected in drinking water (µg/L) (continuous) | 0.637 | <.0001 | 0.6‡ |
| Filter: use bottled water only§ (categorical) | -0.263 | <.0001 | -45.4 |
| Filter: any filter or treatment device§ (categorical) | -0.140 | 0.0002 | -27.6 |
| Tap water consumption at current home (average cups per day) (continuous) | 0.009 | 0.0192 | 2.0 |
| Frequency of local milk consumption (categorical)¶ | 0.250 | 0.0014 | 77.7 |

Model statistics: $R^2$ = 0.403, p-value = <0.0001, n =1,714, n-households = 1,048, intercept = -1.69

* Reference category is adult participants who identified as female.

† This variable is an interaction term between age and sex.

‡ This marginal effect is interpreted as percent increase in blood PFHxS level per percent increase in PFHxS drinking water concentration.

§ Reference category is adult participants who reported using no filter or treatment device.

¶ Reference category is adult participants who reported never consuming local milk (i.e., milk from animals within the sampling frame).

**Table C-6. PFHxS adult female multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.013 | <.0001 | 3.2 |
| Years in sampling frame in the past 20 years (continuous) | 0.026 | <.0001 | 6.1 |
| Logarithm of maximum PFHxS detected in drinking water (µg/L) (continuous) | 0.627 | <.0001 | 0.6* |
| Filter: use bottled water only† (categorical) | -0.284 | <.0001 | -48.0 |
| Filter: any filter or treatment device† (categorical) | -0.155 | 0.0010 | -30.0 |
| Any biological children (categorical) ‡ | -0.120 | 0.0154 | -24.1 |

Model statistics: $R^2$ = 0.4092, p-value = <0.0001, n = 949, n-households = 853, intercept = -1.546

* This marginal effect is interpreted as percent increase in blood PFHxS level per percent increase in PFHxS drinking water concentration.

† Reference category is adult female participants who reported using no filter or treatment device.

‡ Reference category is adult female participants who reported never having biological children.

**Table C-7. PFHxS adult male multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.005 | 0.0003 | 1.2 |
| Years in sampling frame in the past 20 years (continuous) | 0.026 | <.0001 | 6.3 |
| Logarithm of maximum PFHxS detected in drinking water (µg/L) (continuous) | 0.612 | <.0001 | 0.6* |
| Tap water consumption at current home (average cups per day) (continuous) | 0.010 | 0.0005 | 2.4 |

Model statistics: R2 = 0.3674, p-value = <0.0001, n = 807, n-households = 735, intercept = -1.253

* This marginal effect is interpreted as percent increase in blood PFHxS level per percent increase in PFHxS drinking water concentration.

**Table C-8. PFOS adult multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.011 | <.0001 | 2.5 |
| Sex: male* (categorical) | 0.423 | <.0001 | 164.6 |
| Age × sex: male*,† (continuous) | -0.005 | <.0001 | -1.2 |
| Years in sampling frame in the past 20 years (continuous) | 0.014 | <.0001 | 3.2 |
| Logarithm of maximum PFOS detected in drinking water (µg/L) (continuous) | 0.482 | <.0001 | 0.5‡ |
| Filter: use bottled water only§ (categorical) | -0.191 | <.0001 | -35.7 |
| Filter: any filter or treatment device§ (categorical) | -0.123 | <.0001 | -24.7 |
| Drinking water source: private well¶ (categorical) | 0.324 | 0.0007 | 111.0 |
| Drinking water source: bottled water¶ (categorical) | -0.002 | 0.9586 | -0.4 |
| Time since drinking water mitigation (days) (continuous) | 0.0001 | 0.0062 | -0.03 |

Model statistics: $R^2$ = 0.3904, p-value = <0.0001, n =1760, n-households = 1077, intercept = -0.811

* Reference category is adult participants who identified as female.

† This variable is an interaction term between age and sex.

‡ This marginal effect is interpreted as percent increase in blood PFOS level per percent increase in PFOS drinking water concentration.

§ Reference category is adult participants who reported using no filter or treatment device.

¶ Reference category is adult participants who reported mainly drinking from a public water system at home.

**Table C-9. PFOS adult female multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.011 | <.0001 | 2.5 |
| Years in sampling frame in the past 20 years (continuous) | 0.014 | <.0001 | 3.4 |
| Logarithm of maximum PFOS detected in drinking water (µg/L) (continuous) | 0.501 | <.0001 | 0.5* |
| Filter: use bottled water only† (categorical) | -0.228 | <.0001 | -40.8 |
| Filter: any filter or treatment device† (categorical) | -0.148 | 0.0006 | -28.9 |
| Drinking water source: private well‡ (categorical) | 0.266 | 0.0082 | 84.6 |
| Drinking water source: bottled water‡ (categorical) | -0.026 | 0.6111 | -5.8 |
| Time since drinking water mitigation (days) (continuous) | -0.0002 | 0.0205 | -0.04 |

Model statistics: $R^2$ = 0.4012, p-value = <0.0001, n = 952, n-households = 854, intercept = -0.795

* This marginal effect is interpreted as percent increase in blood PFOS level per percent increase in PFOS drinking water concentration.

† Reference category is adult female participants who reported using no filter or treatment device.

‡ Reference category is adult female participants who reported mainly drinking from a public water system at home.

**Table C-10. PFOS adult male multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.006 | <.0001 | 1.3 |
| Years in sampling frame in the past 20 years (continuous) | 0.012 | 0.0001 | 2.9 |
| Logarithm of maximum PFOS detected in drinking water (µg/L) (continuous) | 0.457 | <.0001 | 0.5* |
| Filter: use bottled water only† (categorical) | -0.130 | 0.0821 | -25.9 |
| Filter: any filter or treatment device† (categorical) | -0.094 | 0.0174 | -19.5 |
| Drinking water source: private well‡ (categorical) | 0.376 | 0.0004 | 137.5 |
| Drinking water source: bottled water‡ (categorical) | 0.026 | 0.4804 | 6.3 |
| Time since drinking water mitigation (days) (continuous) | -0.0001 | 0.0405 | -0.02 |

Model statistics: $R^2$ = 0.3627, p-value = <0.0001, n = 808, n-households = 737, intercept = -0.390

* This marginal effect is interpreted as percent increase in blood PFOS level per percent increase in PFOS drinking water concentration.

† Reference category is adult male participants who reported using no filter or treatment device.

‡ Reference category is adult male participants who reported mainly drinking from a public water system at home.

**Table C-11. PFOA adult multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.007 | <.0001 | 1.7 |
| Sex: male* (categorical) | 0.325 | <.0001 | 111.4 |
| Age × sex: male*,† (continuous) | -0.005 | <.0001 | -1.1 |
| Years in sampling frame in the past 20 years (continuous) | 0.010 | <.0001 | 2.3 |
| Logarithm of maximum PFOA detected in drinking water (µg/L) (continuous) | 0.496 | <.0001 | 0.5‡ |
| Filter: use bottled water only§ (categorical) | -0.184 | <.0001 | -34.6 |
| Filter: any filter or treatment device§ (categorical) | -0.093 | 0.0004 | -19.2 |
| Drinking water source: private well¶ (categorical) | 0.151 | 0.0002 | 41.7 |
| Drinking water source: bottled water¶ (categorical) | -0.036 | 0.1889 | -8.0 |
| Frequency of local milk consumption** (categorical) | 0.141 | 0.0209 | 38.4 |
| Time since drinking water mitigation (days) (continuous) | -0.0002 | <.0001 | -0.05 |

Model statistics: $R^2$ = 0.3686, p-value = <0.0001, n =1720, n-households = 1051, intercept = -0.721

* Reference category is adult participants who identified as female.

† This variable is an interaction term between age and sex.

‡ This marginal effect is interpreted as percent increase in blood PFOA level per percent increase in PFOA drinking water concentration.

§ Reference category is adult participants who reported using no filter or treatment device.

¶ Reference category is adult participants who reported mainly drinking from a public water system at home.

** Reference category is adult participants who reported never consuming local milk (i.e., milk from animals within the sampling frame).

**Table C-12. PFOA adult female multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.007 | <.0001 | 1.7 |
| Years in sampling frame in the past 20 years (continuous) | 0.010 | 0.0002 | 2.4 |
| Logarithm of maximum PFOA detected in drinking water (µg/L) (continuous) | 0.503 | <.0001 | 0.5* |
| Filter: use bottled water only† (categorical) | -0.155 | 0.0003 | -30.0 |
| Filter: any filter or treatment device† (categorical) | -0.122 | 0.0004 | -24.4 |
| Drinking water source: private well‡ (categorical) | 0.116 | 0.0495 | 30.6 |
| Drinking water source: bottled water‡ (categorical) | -0.057 | 0.1304 | -12.3 |
| Time since drinking water mitigation (days) (continuous) | -0.0003 | <.0001 | -0.1 |

Model statistics: $R^2$ = 0.3760, p-value = <0.0001, n =952, n-households = 854, intercept = -0.672

* This marginal effect is interpreted as percent increase in blood PFOA level per percent increase in PFOA drinking water concentration.

† Reference category is adult female participants who reported using no filter or treatment device.

‡ Reference category is adult female participants who reported mainly drinking from a public water system at home.

**Table C-13. PFOA adult male multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.002 | 0.004 | 0.6 |
| Years in sampling frame in the past 20 years (continuous) | 0.010 | 0.001 | 2.3 |
| Logarithm of maximum PFOA detected in drinking water (µg/L) (continuous) | 0.469 | <.0001 | 194.4* |
| Filter: use bottled water only† (categorical) | -0.165 | 0.020 | -31.6 |
| Filter: any filter or treatment device† (categorical) | -0.059 | 0.121 | -12.6 |
| Drinking water source: private well‡ (categorical) | 0.184 | <.0001 | 52.6 |
| Drinking water source: bottled water‡ (categorical) | -0.006 | 0.879 | -1.3 |
| Time since drinking water mitigation (days) (continuous) | -0.0003 | 0.0003 | -0.04 |

Model statistics: $R^2$ = 0.3331 p-value = <.0001, n = 808, n-households = 737, intercept = --0.451

* This marginal effect is interpreted as percent increase in blood PFOA level per percent increase in PFOA well water concentration.

† Reference category is adult male participants who reported using no filter or treatment device.

‡ Reference category is adult male participants who reported mainly drinking from a public water system at home.

**Table C-14. PFNA adult multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.007 | <.0001 | 1.6 |
| Sex: male* (categorical) | 0.220 | 0.0011 | 66.1 |
| Age × sex: male*,† (continuous) | -0.003 | 0.0152 | -0.6 |
| Race and ethnicity: Asian, non-Hispanic± (categorical) | 0.358 | <.0001 | 128.0 |
| Race and ethnicity: Black or African American, non-Hispanic± (categorical) | 0.075 | 0.1362 | 18.9 |
| Race and ethnicity: American Indian or Alaskan Native, non-Hispanic± (categorical) | -0.046 | 0.7312 | -10.1 |
| Race and ethnicity: more than one race, non-Hispanic± (categorical) | -0.090 | 0.0765 | -18.7 |
| Race and ethnicity: Hispanic or Latino± (categorical) | -0.148 | 0.0009 | -28.9 |
| Drinking water source: private well¶ (categorical) | -0.249 | <.0001 | -43.7 |
| Drinking water source: bottled water¶ (categorical) | -0.053 | 0.0621 | -11.5 |
| Cleaning frequency: a few times per month§ (categorical) | 0.180 | 0.0052 | 51.4 |
| Cleaning frequency: three times per week or more§ (categorical) | 0.140 | 0.0289 | 38.1 |
| Stain-resistant product use: rarely** (categorical) | 0.072 | 0.0793 | 18.1 |
| Stain-resistant product use: a few times per year or more frequently** (categorical) | 0.158 | 0.0216 | 44.0 |

Model statistics: $R^2$ = 0.1403, p-value = <0.0001, n =1,746, n-households = 1,073, intercept = -0.902

* Reference category is adult participants who identified as female.

† This variable is an interaction term between age and sex.

± Reference category is adult participants who identified as White, non-Hispanic. Native Hawaiian or other Pacific Islander, non-Hispanic not shown because N<10.

¶ Reference category is adult participants who reported mainly drinking from a public water system at home.

§ Reference category is adult participants who reported cleaning a few times per year or less.

** Reference category is adult participants who reported never using stain-resistant products.

**Table C-15. PFNA adult female multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.007 | <.0001 | 1.5 |
| Race and ethnicity: Asian, non-Hispanic* (categorical) | 0.377 | <.0001 | 138.3 |
| Race and ethnicity: Black or African American, non-Hispanic* (categorical) | 0.058 | 0.3953 | 14.3 |
| Race and ethnicity: American Indian or Alaskan Native, non-Hispanic* (categorical) | -0.111 | 0.2924 | -22.5 |
| Race and ethnicity: more than one race, non-Hispanic* (categorical) | 0.020 | 0.7493 | 4.6 |
| Race and ethnicity: Hispanic or Latino* (categorical) | -0.193 | 0.0017 | -35.9 |
| Drinking water source: private well† (categorical) | -0.254 | 0.0002 | -44.3 |
| Drinking water source: bottled water† (categorical) | -0.073 | 0.0572 | -15.6 |
| Cleaning frequency: a few times per month± (categorical) | 0.232 | 0.0016 | 70.7 |
| Cleaning frequency: three times per week or more± (categorical) | 0.179 | 0.0167 | 50.858 |

Model statistics: $R^2$ = 0.1551, p-value = <0.0001, n = 948, n-households = 846, intercept = -0.920.

* Reference category is adult female participants who identified as White, non-Hispanic. Native Hawaiian or other Pacific Islander, non-Hispanic not shown because N<10.

† Reference category is adult female participants who reported mainly drinking from a public water system at home.

± Reference category is adult female participants who reported cleaning a few times per year or less.

**Table C-16. PFNA adult male multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.004 | <.0001 | 0.9 |
| Race and ethnicity: Asian, non-Hispanic* (categorical) | 0.303 | 0.0825 | 100.8 |
| Race and ethnicity: Black or African American, non-Hispanic* (categorical) | 0.114 | 0.0524 | 29.9 |
| Race and ethnicity: American Indian or Alaskan Native, non-Hispanic* (categorical) | 0.017 | 0.9333 | 4.1 |
| Race and ethnicity: more than one race, non-Hispanic* (categorical) | -0.240 | <.0001 | -42.4 |
| Race and ethnicity: Hispanic or Latino* (categorical) | -0.085 | 0.0788 | -17.8 |
| Drinking water source: private well† (categorical) | -0.261 | <.0001 | -45.2 |
| Drinking water source: bottled water† (categorical) | -0.044 | 0.1801 | -9.6 |

Model statistics: $R^2$ = 0.1062 p-value = <.0001, n = 801, n-households = 735, intercept = -0.507

* Reference category is adult male participants who identified as White, non-Hispanic. Native Hawaiian or other Pacific Islander, non-Hispanic not shown because N<10.

† Reference category is adult male participants who reported mainly drinking from a public water system at home.

**Table C-17. PFDA adult multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.002 | 0.0010 | 0.5 |
| Drinking water source: private well* (categorical) | -0.147 | 0.0002 | -28.7 |
| Drinking water source: bottled water* (categorical) | -0.037 | 0.1075 | -8.2 |
| Local fruit and vegetable consumption: rarely† (categorical) | -0.066 | 0.1515 | -14.0 |
| Local fruit and vegetable consumption: a few times per year† (categorical) | 0.063 | 0.0669 | 15.6 |
| Local fruit and vegetable consumption: a few times per month† (categorical) | 0.084 | 0.0094 | 21.3 |
| Local fruit and vegetable consumption: three times per week or more† (categorical) | 0.089 | 0.0004 | 22.6 |
| Time since drinking water mitigation (days) (continuous) | 0.00009 | 0.0181 | 0.02 |

Model statistics: $R^2$ = 0.0578, p-value = <0.0001, n =1,613, n-households = 997, intercept = -1.047

* Reference category is adult participants who reported mainly drinking from a public water system at home.

† Reference category is adult participants who reported never consuming fruits and vegetables from locations within the sampling frame.

**Table C-18. PFDA adult female multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.003 | 0.0053 | 0.6 |
| Drinking water source: private well* (categorical) | -0.182 | <.0001 | -34.3 |
| Drinking water source: bottled water* (categorical) | -0.061 | 0.0347 | -13.0 |

Model statistics: $R^2$ = 0.0319, p-value = <0.0001, n = 969, n-households = 865, intercept = -0.891

* Reference category is adult female participants who reported mainly drinking from a public water system at home.

**Table C-19. PFDA adult male multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | 0.002 | 0.005 | 0.5 |
| Drinking water source: private well* (categorical) | -0.144 | 0.0014 | -28.1 |
| Drinking water source: bottled water* (categorical) | -0.033 | 0.2692 | -7.4 |
| Local fruit and vegetable consumption: rarely† (categorical) | -0.070 | 0.2635 | -14.8 |
| Local fruit and vegetable consumption: a few times per year† (categorical) | 0.108 | 0.0108 | 28.2 |
| Local fruit and vegetable consumption: a few times per month† (categorical) | 0.116 | 0.0058 | 30.7 |
| Local fruit and vegetable consumption: three times per week or more† (categorical) | 0.094 | 0.0016 | 24.2 |
| Time since drinking water mitigation (days) (continuous) | 0.0001 | 0.0063 | 0.03 |

Model statistics: $R^2$ = 0.0799 p-value = <.0001, n = 734, n-households = 677, intercept = -1.101

* Reference category is adult male participants who reported mainly drinking from a public water system at home.

† Reference category is adult male participants who reported never consuming fruits and vegetables from locations within the sampling frame.

**Table C-20. PFHxS child multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | -0.048 | 0.0047 | -10.4 |
| Length of residency in sampling frame (years) (continuous) | 0.043 | 0.0161 | 10.4 |
| Logarithm of maximum PFHxS detected in drinking water (µg/L) (continuous) | 0.862 | <.0001 | 0.9* |
| Time since drinking water mitigation (days) (continuous) | -0.001 | 0.0002 | -0.1 |

Model statistics: $R^2$ = 0.5939, p-value = <0.0001, n =194, n-households = 126, intercept = -0.722

* This marginal effect is interpreted as percent increase in blood PFHxS level per percent increase in PFHxS drinking water concentration.

**Table C-21. PFOS child multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Sex: male* (categorical) | 0.099 | 0.0473 | 25.6 |
| Frequency of direct contact with soil at locations within the sampling frame: a few times per month† (categorical) | 0.147 | 0.0350 | 40.3 |
| Frequency of direct contact with soil at locations within the sampling frame: three times per week or more† (categorical) | 0.149 | 0.0103 | 40.9 |
| Logarithm of maximum PFOS detected in drinking water (µg/L) (continuous) | 0.478 | <.0001 | 0.5‡ |
| Time since drinking water mitigation (days) (continuous) | -0.001 | <.0001 | -0.1 |

Model statistics: $R^2$ = 0.5772, p-value = <0.0001, n =194, n-households = 126, intercept = 0.061

* Reference category is child participants who identified as female.

† Reference category is child participants who reported direct contact with soil at locations within the sampling frame a few times per year or less.

‡ This marginal effect is interpreted as percent increase in blood PFOS level per percent increase in PFOS drinking water concentration.

**Table C-22. PFOA child multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Age (continuous) | -0.026 | 0.0014 | -5.9 |
| Sex: male* (categorical) | 0.091 | 0.0213 | 23.3 |
| Length of residency in sampling frame (years) (continuous) | 0.018 | 0.038 | 4.2 |
| Logarithm of maximum PFOA detected in drinking water (µg/L) (continuous) | 0.502 | <.0001 | 0.5† |
| Time since drinking water mitigation (days) (continuous) | -0.0005 | <.0001 | -0.1 |

Model statistics: $R^2$ = 0.6189, p-value = <0.0001, n =194, n-households = 126, intercept = -0.046

* Reference category is child participants who identified as female.

† This marginal effect is interpreted as percent increase in blood PFOA level per percent increase in PFOA drinking water concentration.

**Table C-23. PFNA child multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Sex: male* (categorical) | 0.158 | 0.0003 | 44.0 |
| Race and ethnicity: more than one race, non-Hispanic† (categorical) | 0.044 | 0.6469 | 10.7 |
| Race and ethnicity: Hispanic or Latino† (categorical) | -0.152 | 0.0057 | -29.5 |
| Frequency of direct contact with soil at locations within the sampling frame: a few times per month‡ (categorical) | 0.067 | 0.2868 | 16.8 |
| Frequency of direct contact with soil at locations within the sampling frame: three times per week or more‡ (categorical) | 0.174 | 0.0052 | 49.4 |
| Duration of drinking formula reconstituted with tap water (months) (continuous) | 0.006 | 0.0412 | 1.3 |
| Water consumption at current home (average cups per day) (continuous) | -0.013 | 0.0053 | -2.9 |

Model statistics: R2 = 0.3205, p-value = <0.0001, n =186, n-households = 122, intercept = -0.685

* Reference category is child participants who identified as female.

† Reference category is child participants who identified as White, non-Hispanic. "Black or African American, non-Hispanic" and "Asian, non-Hispanic" are not shown because N<10.

‡ Reference category is child participants who reported direct contact with soil at locations within the sampling frame a few times per year or less.

**Table C-24. PFDA child multivariate regression results including coefficient estimate (Coef.), p-value (p-val), and marginal effect (ME)**

| Parameter | Coef. | p-val | ME (%) |
|---|---|---|---|
| Sex: male* (categorical) | 0.056 | 0.0474 | 13.7 |
| Frequency of direct contact with soil at locations within the sampling frame: a few times per month† (categorical) | 0.084 | 0.0382 | 21.3 |
| Frequency of direct contact with soil at locations within the sampling frame: three times per week or more† (categorical) | 0.091 | 0.0224 | 23.4 |
| Local fruit and vegetable consumption: yes‡ (categorical) | 0.107 | 0.0171 | 27.9 |
| Breastfeeding duration (months) (continuous) | 0.005 | 0.0193 | 1.1 |

Model statistics: $R^2$ = 0.1438, p-value = <0.0001, n =192, n-households = 125, intercept = -1.109

* Reference category is child participants who identified as female.

† Reference category is child participants who reported direct contact with soil at locations within the sampling frame a few times per year or less.

‡ Reference category is child participants who reported that they did not consume fruits and vegetables from locations within the sampling frame.

## Box and Whisker Plots (or Boxplots)

**Figure C-1. Boxplot of adult blood (serum) PFAS concentrations by age**

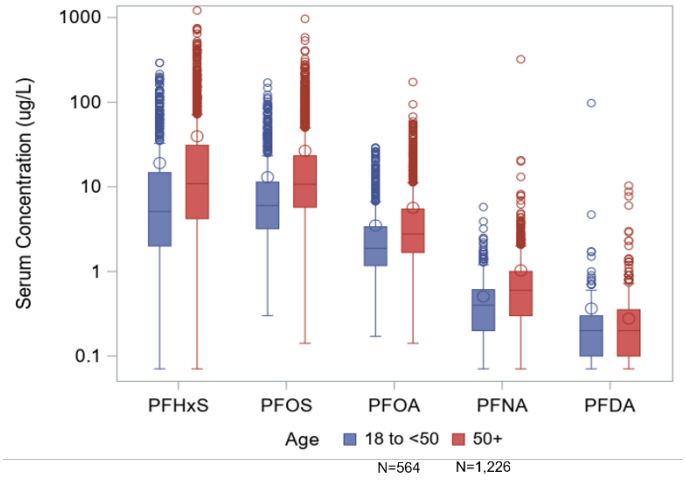



**Figure C-2. Boxplot of adult blood (serum) PFAS concentrations by sex**

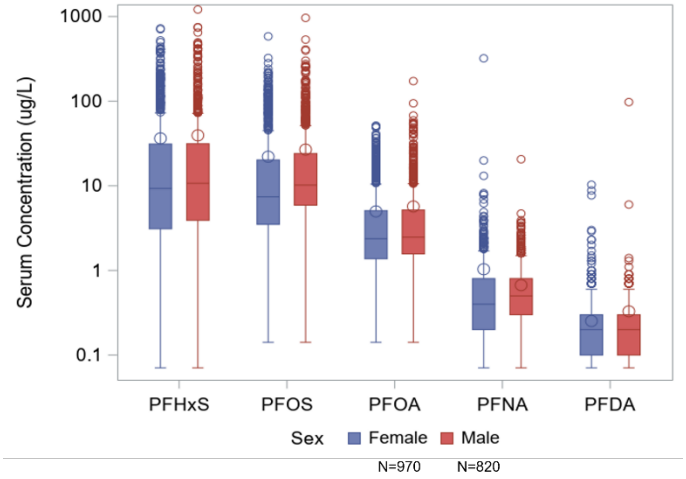


**Figure C-3. Boxplot of adult blood (serum) PFAS concentrations by body mass index (BMI)**

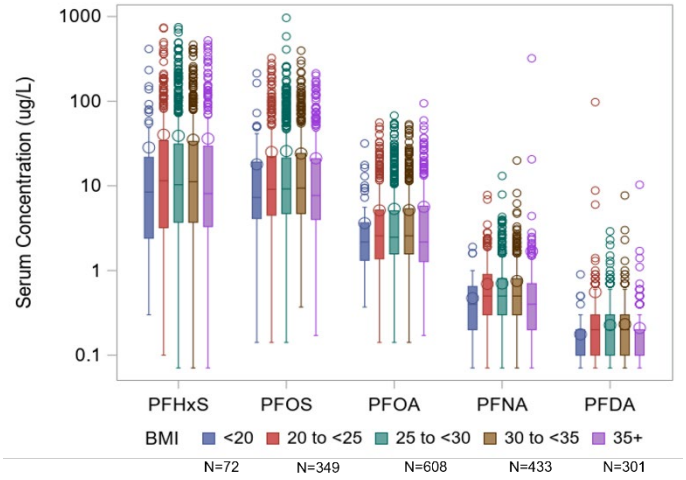



**Figure C-4. Boxplot of adult blood (serum) PFAS concentrations by race and ethnicity**

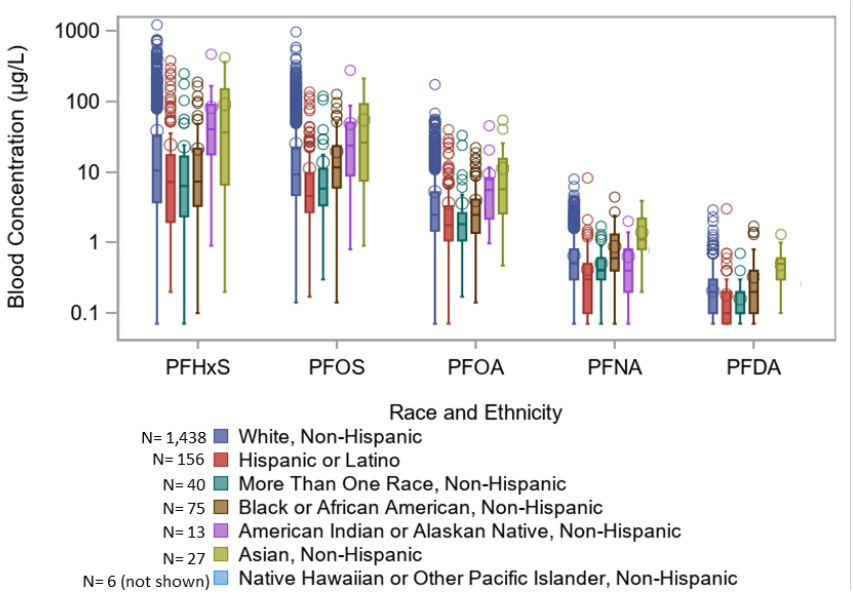


**Figure C-5. Boxplot of adult blood (serum) PFAS concentrations by years in current home**

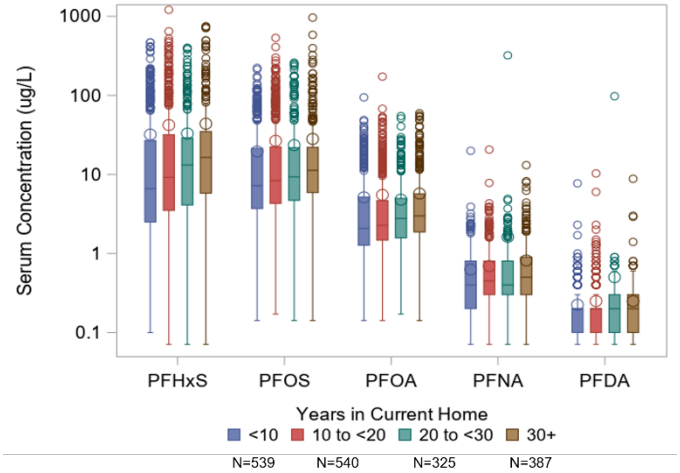



**Figure C-6. Boxplot of adult blood (serum) PFAS concentrations by years in sampling frame (past 20 years)**

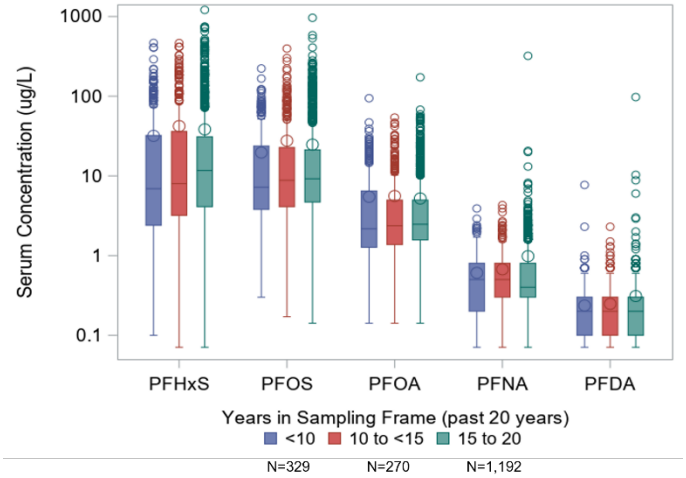



**Figure C-7. Boxplot of adult blood (serum) PFAS concentrations by drinking water source**

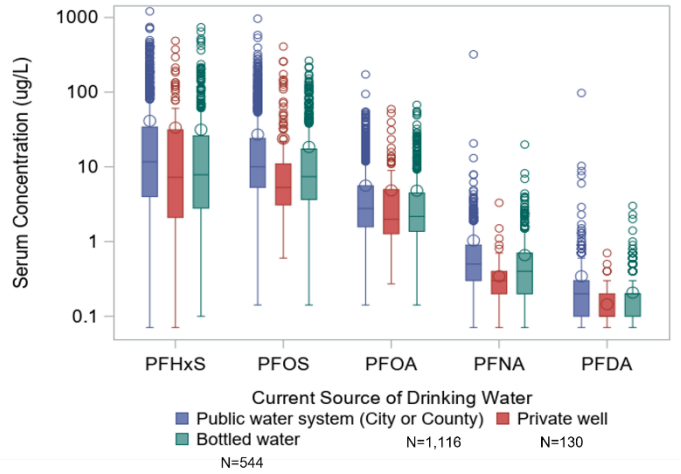


**Figure C-8. Boxplot of adult blood (serum) PFAS concentrations by cups of tap water drank at home**

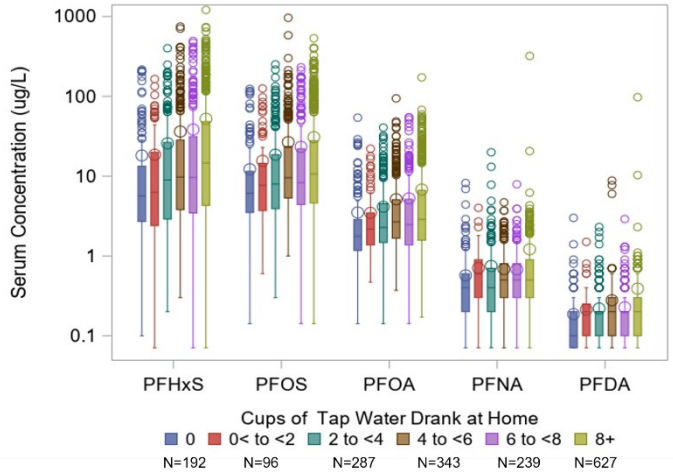



**Figure C-9. Boxplot of adult blood (serum) PFAS concentrations by water filter type**

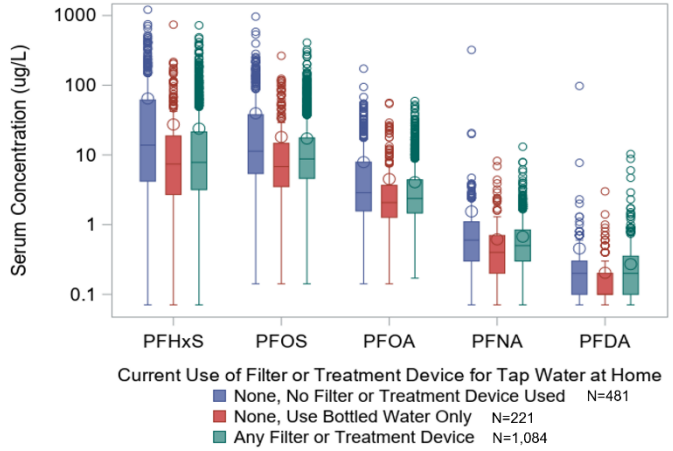



**Figure C-10. Boxplot of adult blood (serum) PFAS concentrations by kidney disease history**

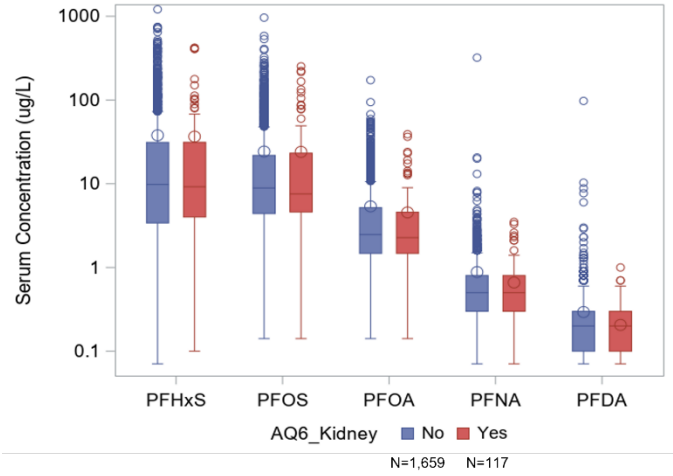


**Figure C-11. Boxplot of adult blood (serum) PFAS concentrations by blood donation frequency**

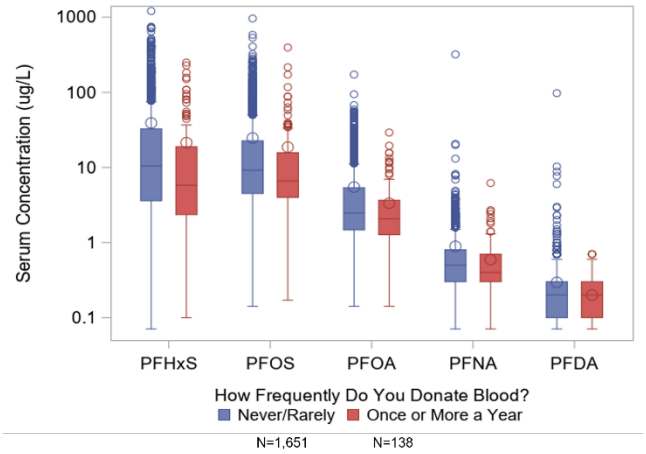



**Figure C-12. Boxplot of adult blood (serum) PFAS concentrations by home cleaning frequency**

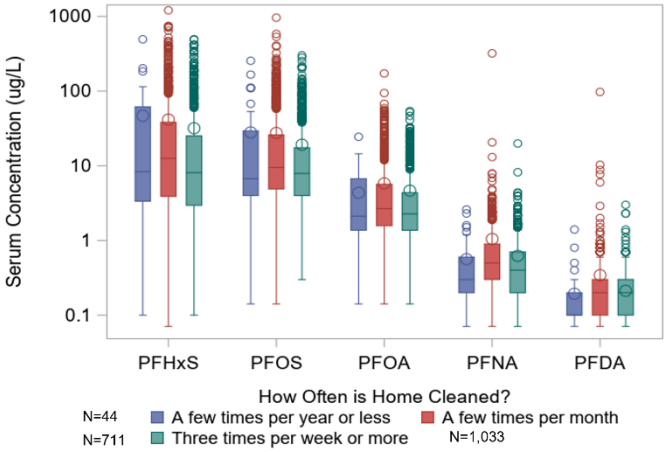



**Figure C-13. Boxplot of adult blood (serum) PFAS concentrations by stain–resistant product use**

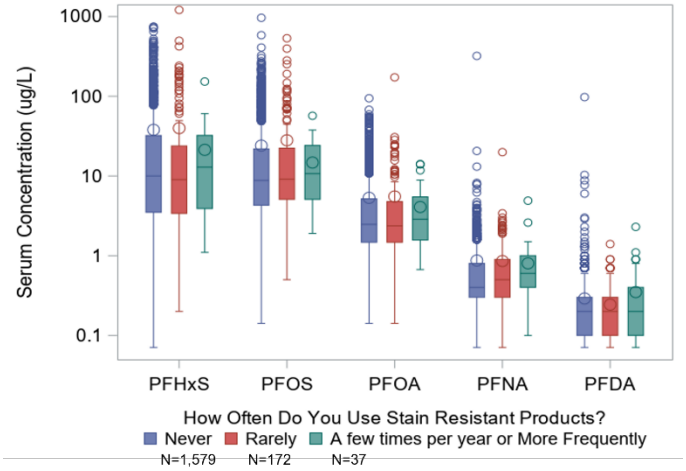


**Figure C-14. Boxplot of adult blood (serum) PFAS concentrations by frequency of contact with soil**

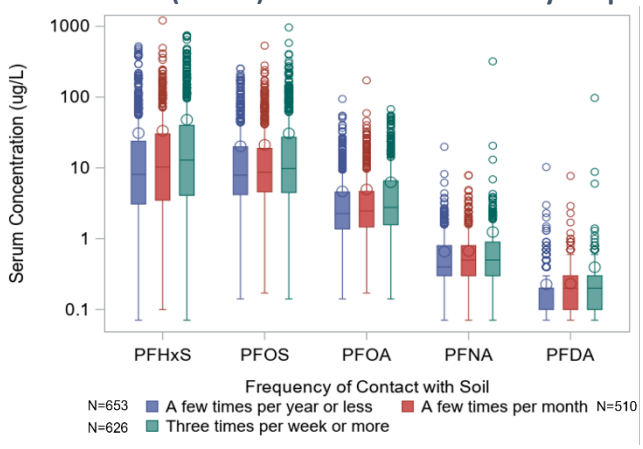



**Figure C-15. Boxplot of adult blood (serum) PFAS concentrations by local fruit and vegetable consumption**

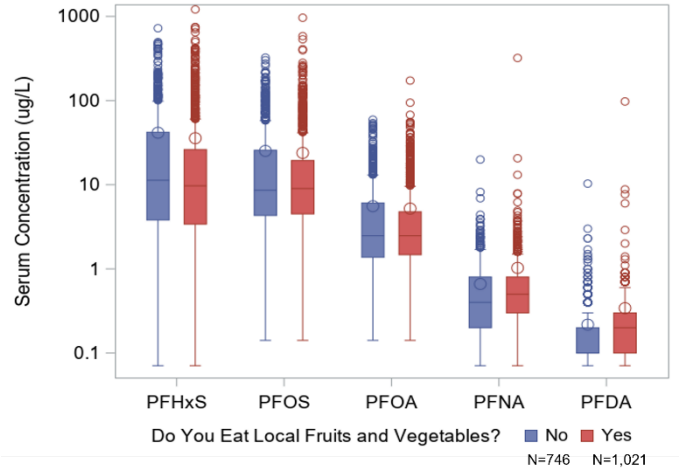



**Figure C-16. Boxplot of adult blood (serum) PFAS concentrations by frequency of local fruit and vegetable consumption**

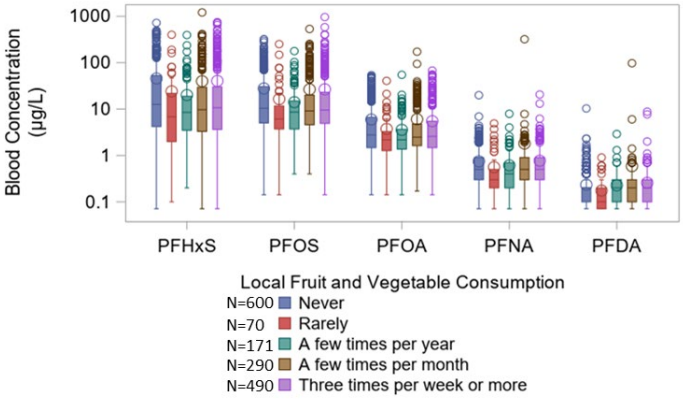


**Figure C-17. Boxplot of adult blood (serum) PFAS concentrations by local fish consumption**

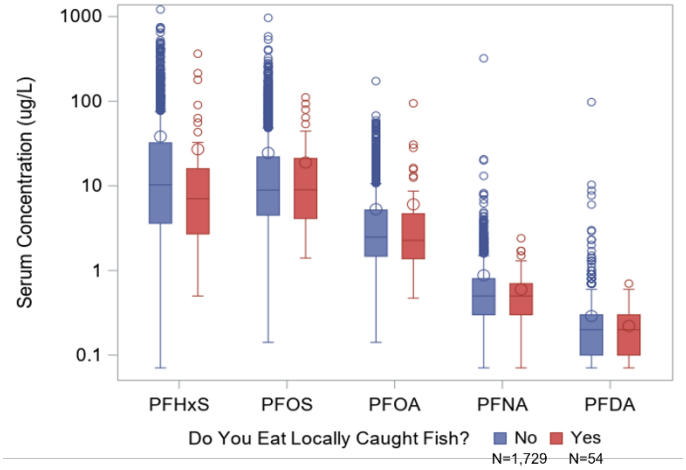



**Figure C-18. Boxplot of adult blood (serum) PFAS concentrations by frequency of local fish consumption**

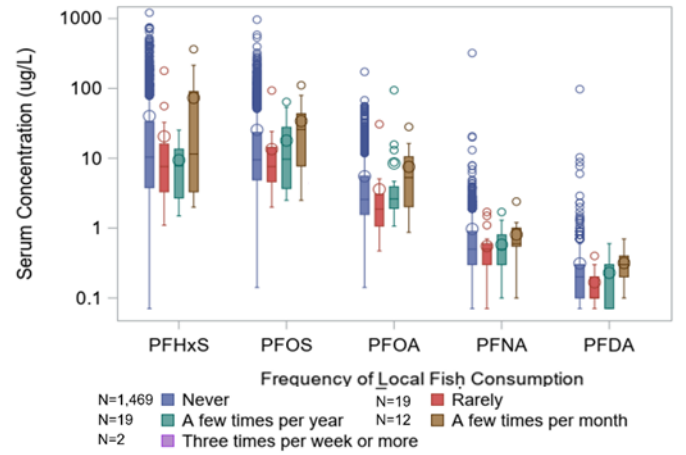


**Figure C-19. Boxplot of adult blood (serum) PFAS concentrations by local milk consumption**

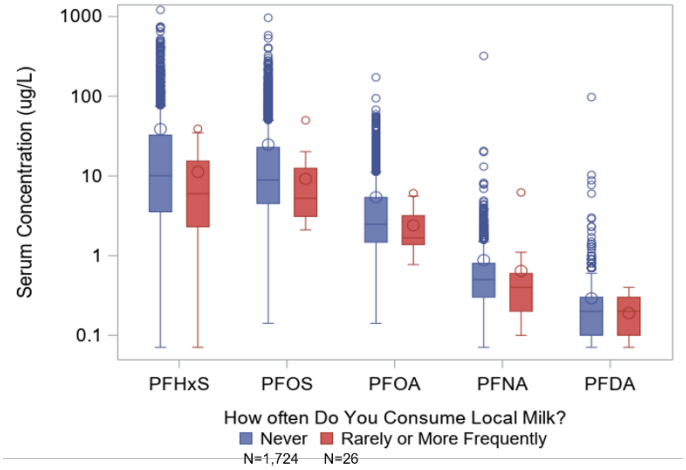



**Figure C-20. Boxplot of adult blood (serum) PFAS concentrations by fast food consumption frequency**

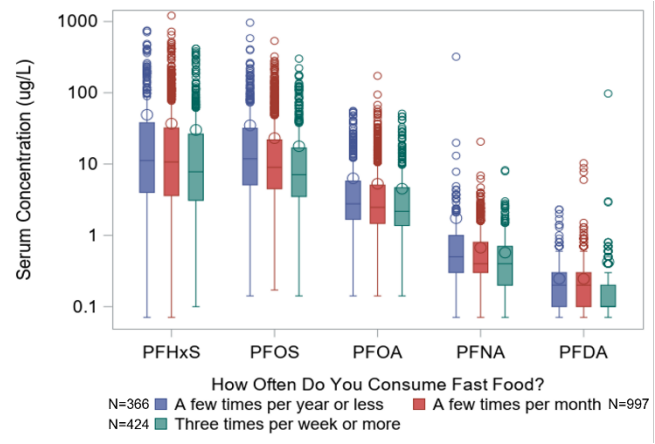



**Figure C-21. Boxplot of adult blood (serum) PFAS concentrations by presence of carpet in home**

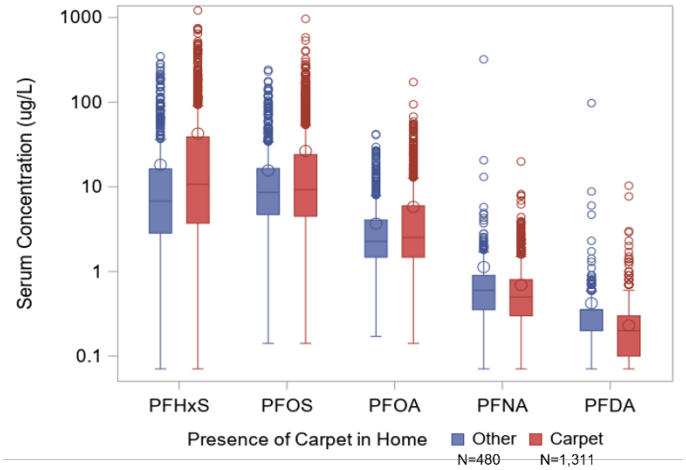


**Figure C-22. Boxplot of adult blood (serum) PFAS concentrations by occupational exposure**

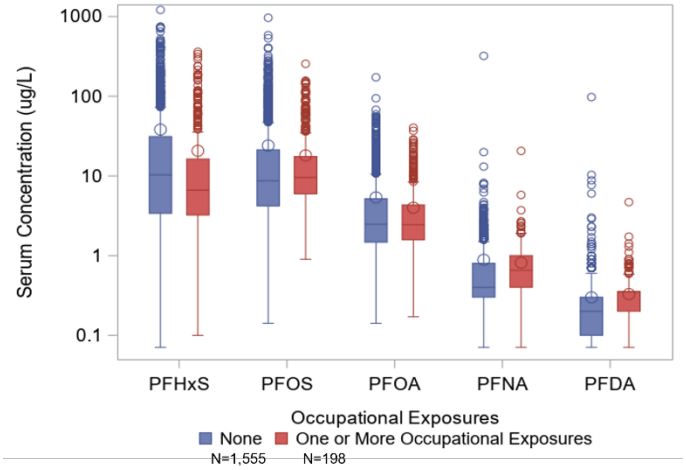



**Figure C-23. Boxplot of adult blood (serum) PFAS concentrations by maximum PFHxS detected in water system**

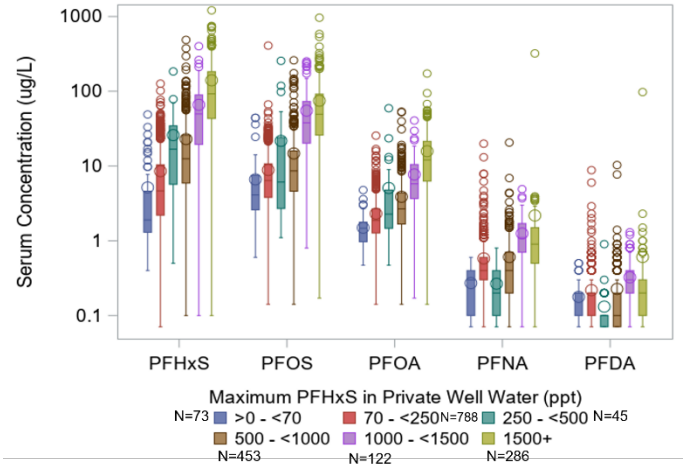


**Figure C-24. Boxplot of adult blood (serum) PFAS concentrations by maximum PFOS detected in water system**

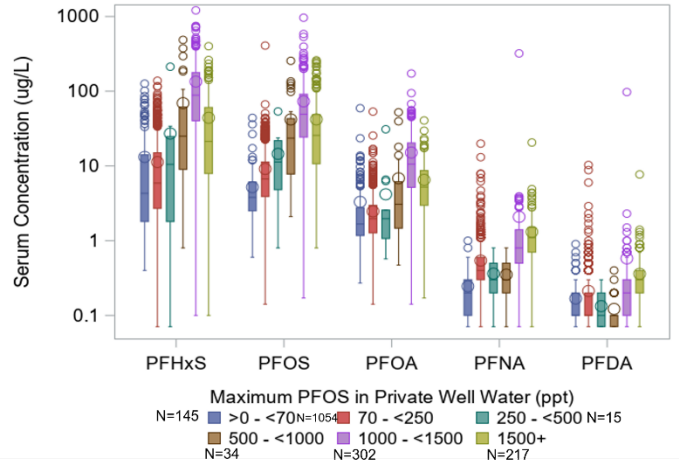



**Figure C-25. Boxplot of adult blood (serum) PFAS concentrations by maximum PFOA detected in water system**

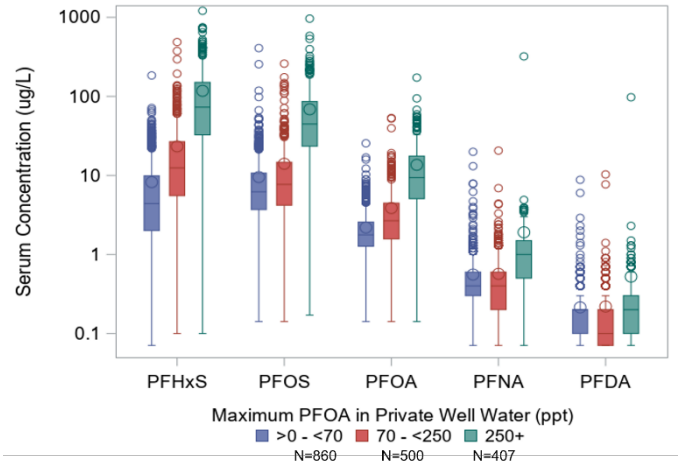


**Figure C-26. Boxplot of adult blood (serum) PFAS concentrations by time since drinking water mitigation**

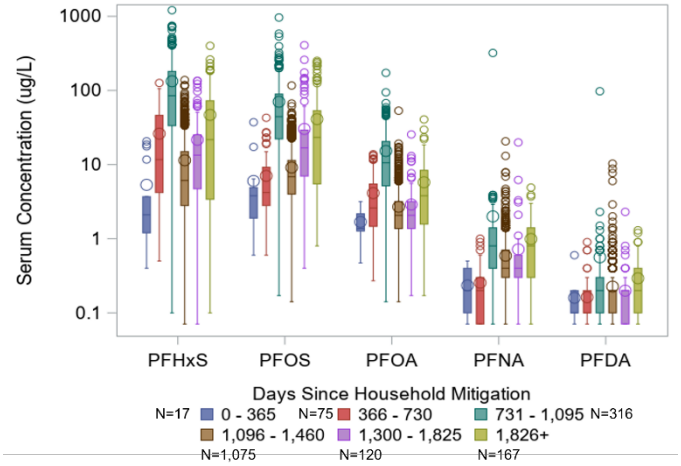



**Figure C-27. Boxplot of adult female blood (serum) PFAS concentrations by biological children variable**

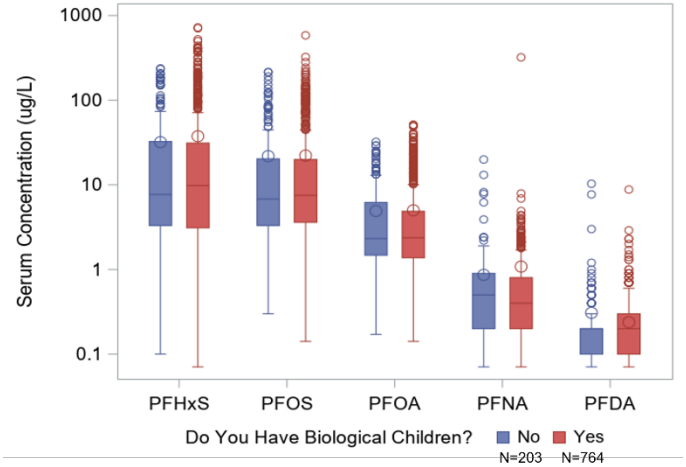



**Figure C-28. Boxplot of adult female blood (serum) PFAS concentrations by number of biological children**

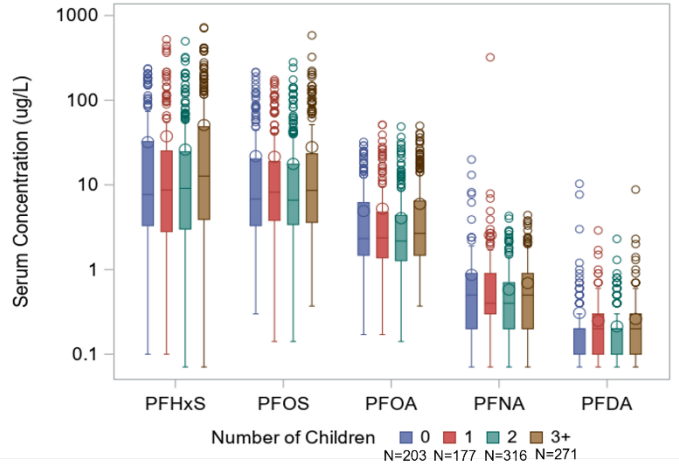


**Figure C-29. Boxplot of adult female blood (serum) PFAS concentrations by breastfeeding history**

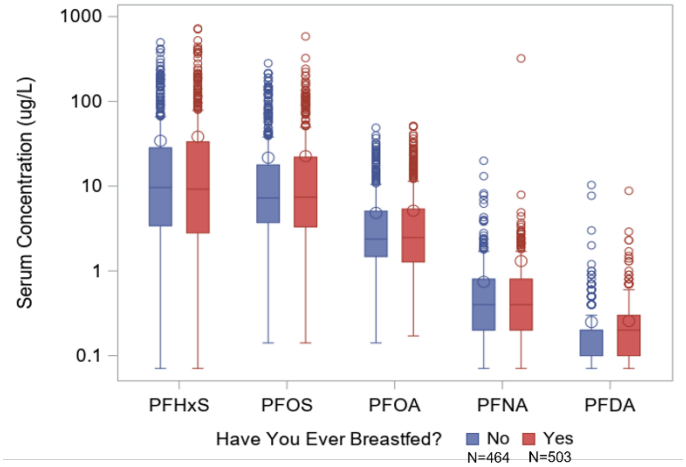



**Figure C-30. Boxplot of adult female blood (serum) PFAS concentrations by breastfeeding duration**

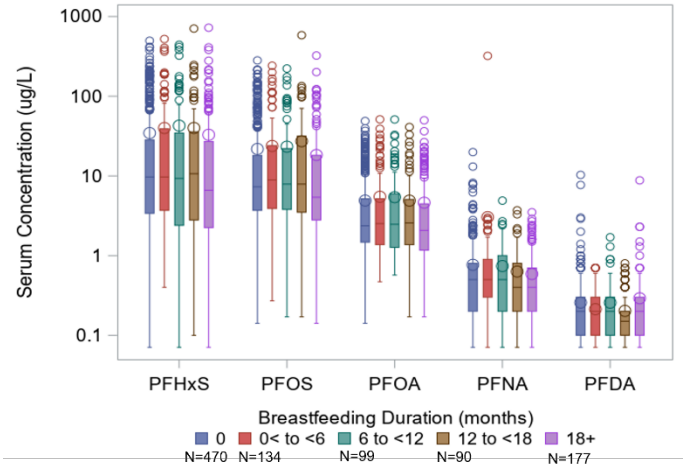



**Figure C-31. Boxplot of child blood (serum) PFAS concentrations by age**

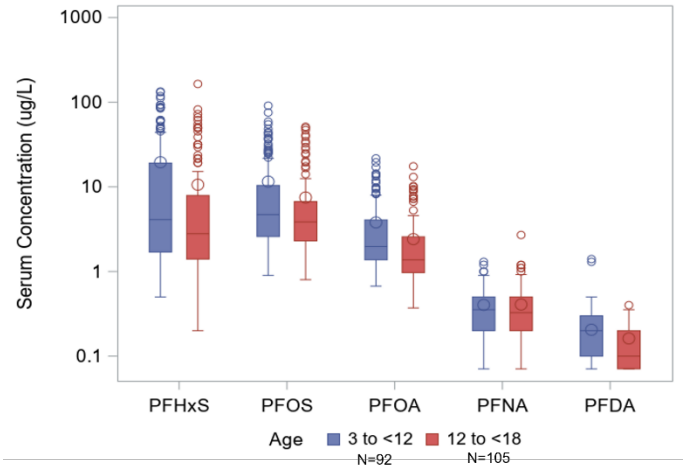


**Figure C-32. Boxplot of child blood (serum) PFAS concentrations by sex**

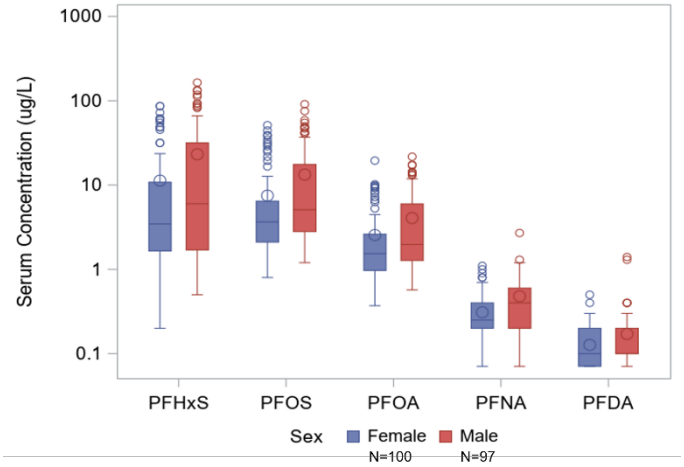



**Figure C-33. Boxplot of child blood (serum) PFAS concentrations by body mass index**

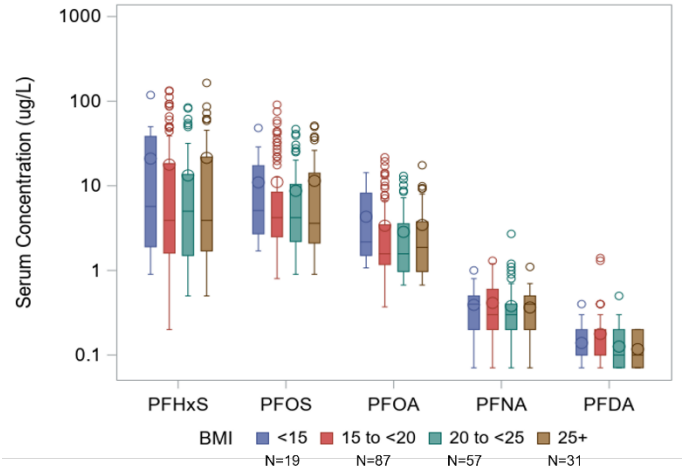



**Figure C-34. Boxplot of child blood (serum) PFAS concentrations by birth order**

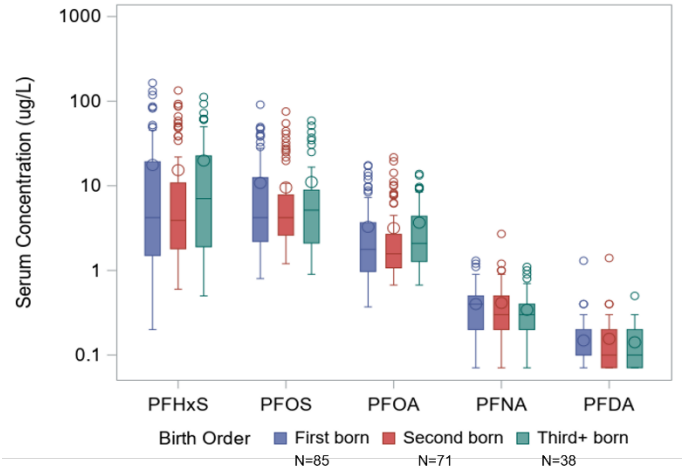
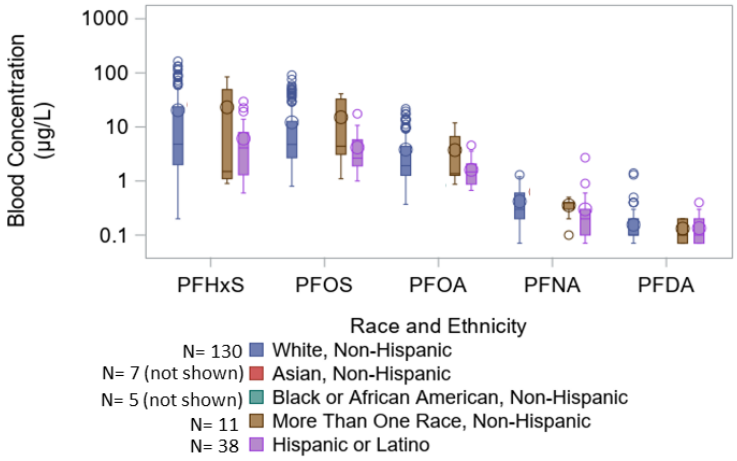


**Figure C-35. Boxplot of child blood (serum) PFAS concentrations by race and ethnicity**




*See 'How to read a box and whisker plot' earlier in the PFAS in Blood section.*
*A log10 scale is used to allow easier visualization of the wide range of measured blood levels, as it uses equal spacing for each factor of 10 increase.*
**Statistically significant difference (p<0.05)*

**Figure C-36. Boxplot of child blood (serum) PFAS concentrations water consumption at current home**

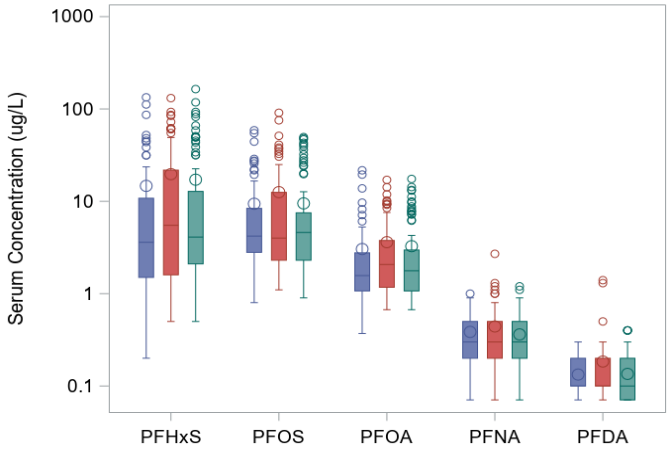


**Figure C-37. Boxplot of child blood (serum) PFAS concentrations by water consumption at school**

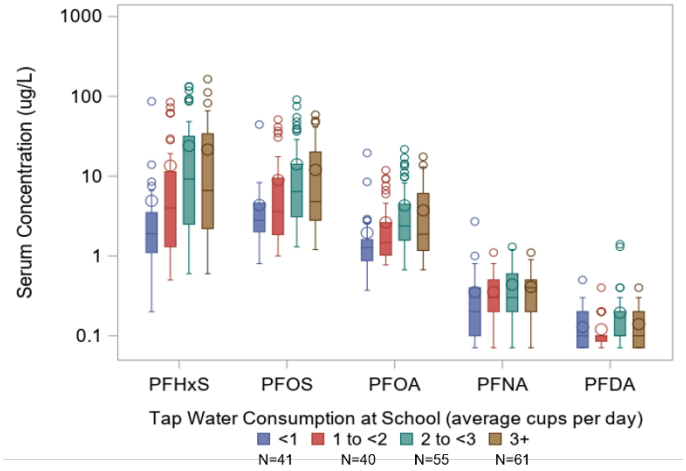



**Figure C-38. Boxplot of child blood (serum) PFAS concentrations by length of residency in sampling frame**

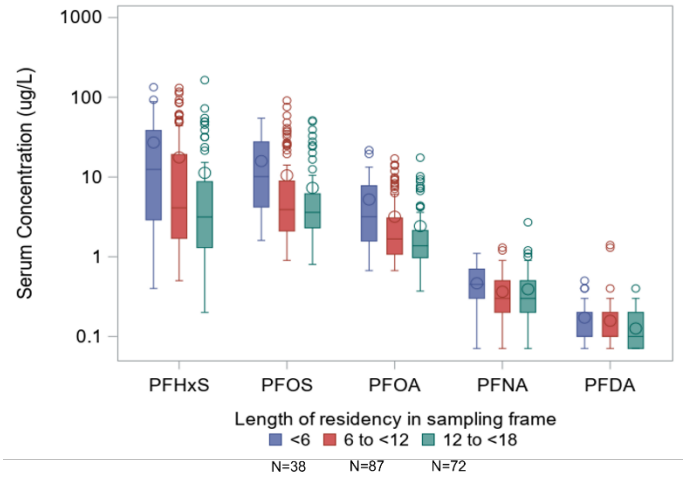


**Figure C-39. Boxplot of child blood (serum) PFAS concentrations by frequency of contact with soil**

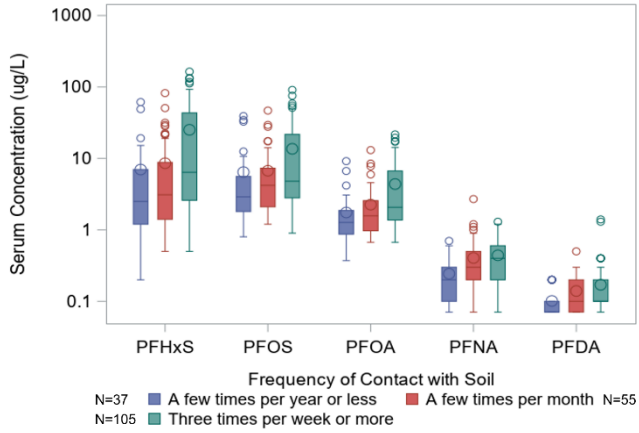



**Figure C-40. Boxplot of child blood (serum) PFAS concentrations by local fruit and vegetable consumption**

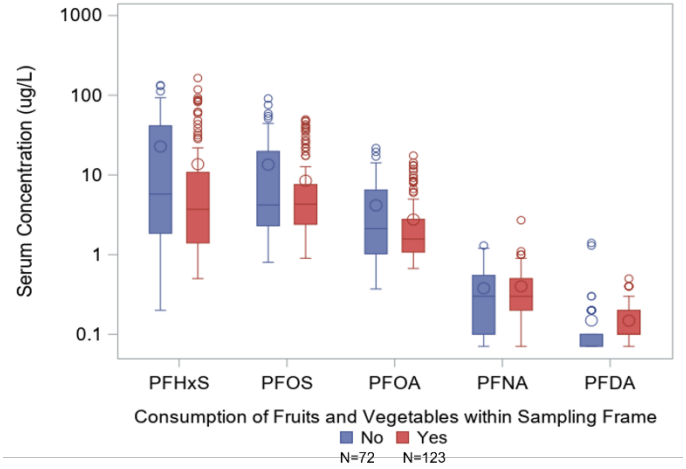



**Figure C-41. Boxplot of child blood (serum) PFAS concentrations by local fish consumption**

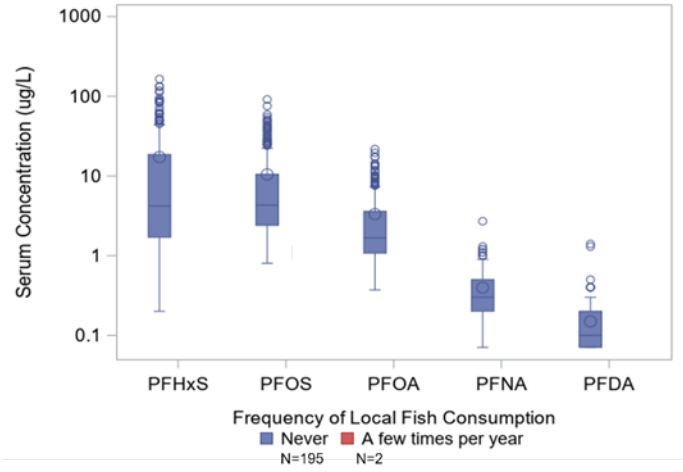


**Figure C-42. Boxplot of child blood (serum) PFAS concentrations by local milk consumption**

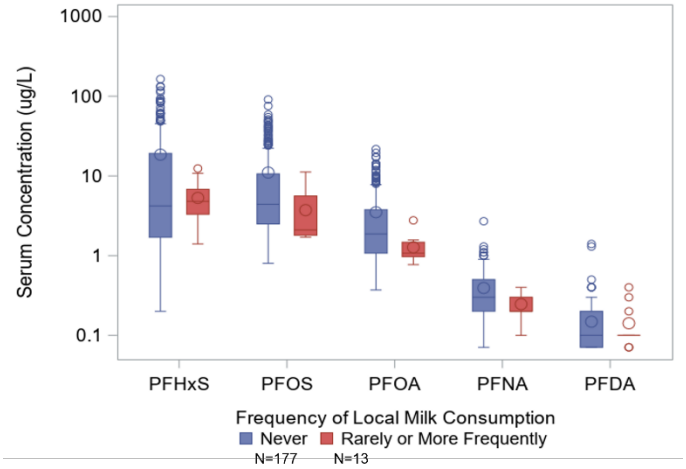



**Figure C-43. Boxplot of child blood (serum) PFAS concentrations by drinking formula reconstituted with tap water**

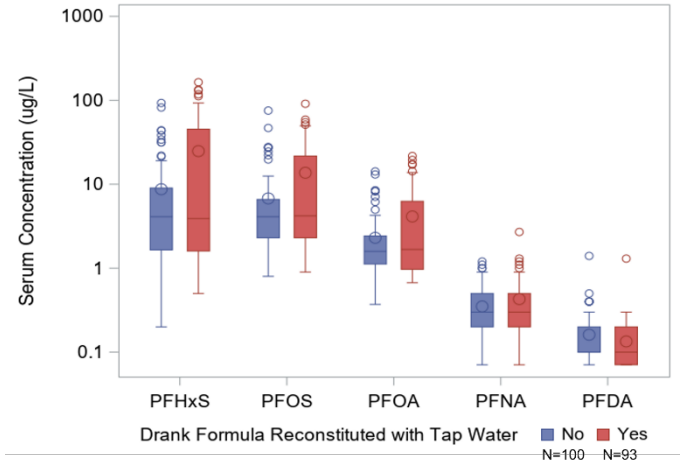



**Figure C-44. Boxplot of child blood (serum) PFAS concentrations by history of breastfeeding**

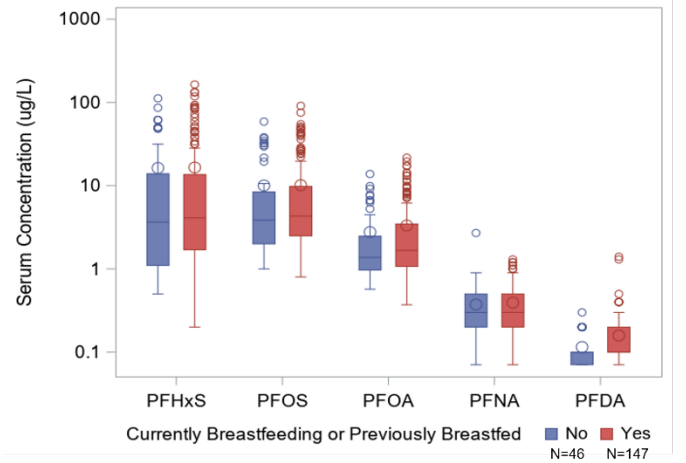


**Figure C-45. Boxplot of child blood (serum) PFAS concentrations by duration of drinking formula reconstituted with tap water**

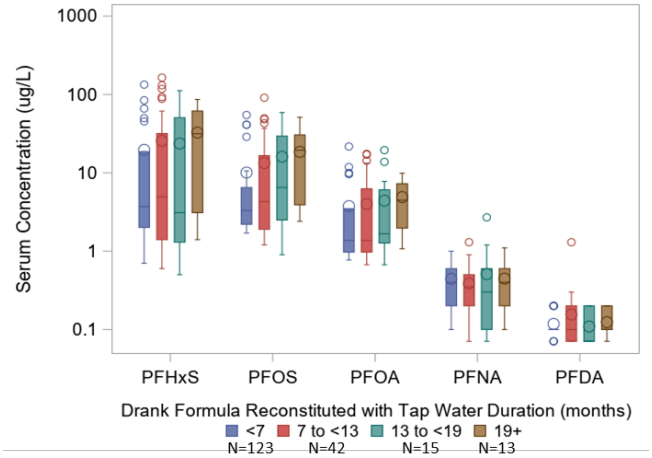



**Figure C-46. Boxplot of child blood (serum) PFAS concentrations by breastfeeding duration**

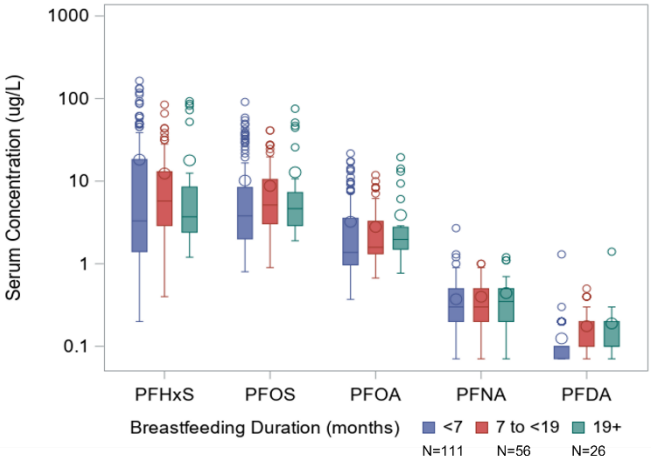



**Figure C-47. Boxplot of child blood (serum) PFAS concentrations by time since drinking water mitigation**