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Supplemental Material

Serum Levels of Perfluoroalkyl Substances (PFAS) in Adolescents and Young Adults Exposed to Contaminated Drinking Water in the Veneto Region, Italy: A Cross-Sectional Study Based on a Health Surveillance Program

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Table S1. Bivariate analyses (Kruskal-Wallis test) on the association between potential predictors and serum concentrations of PFOA, PFOS, and PFHxS in the entire study population (n=18,122 subjects with complete records for all variables).

Variable	n (%)	PFOA (ng/ml)		PFOS (ng/ml)		PFHxS (ng/ml)	
		Median (5^{th}-95^{th} percentile)	p-value	Median (5^{th}-95^{th} percentile)	p-value	Median (5^{th}-95^{th} percentile)	p-value
Gender			0.0001		0.0001		0.0001
Female	8,892 (49.1)	30.2 (3.8-125.2)		3.2 (1.2-8.3)		2.6 (0.6-9.4)	
Male	9,230 (50.9)	64.1 (9.0-240.3)		4.7 (1.8-12.4)		6.1 (1.2-23.3)	
Age (years)			0.0001		0.0001		0.0001
14-19	4,478 (24.7)	52.0 (9.7-153.7)		3.8 (1.5-10.6)		3.6 (0.9-10.2)	
20-24	3,194 (17.6)	52.5 (7.8-192.7)		4.0 (1.5-10.3)		4.2 (0.8-14.4)	
25-29	3,044 (16.8)	50.9 (5.1-208.3)		4.1 (1.5-10.5)		4.8 (0.7-19.0)	
30-34	3,304 (18.2)	35.9 (3.9-205.3)		3.8 (1.3-10.8)		3.9 (0.6-21.8)	
35-39	4,102 (22.6)	28.8 (3.5-203.0)		3.7 (1.3-11.1)		3.3 (0.6-23.9)	
Country of birth			0.0001		0.0001		0.0001
Italy, HDC	16,696 (92.1)	47.0 (5.4-196.0)		3.9 (1.5-10.6)		4.0 (0.7-18.4)	
HMPC	1,426 (7.9)	22.9 (3.0-114.3)		3.1 (1.0-11.4)		2.3 (0.5-11.0)	
Educational level			0.0001		0.0002		0.0001
Primary/Middle school	5,853 (32.3)	46.3 (6.5-167.3)		3.8 (1.4-10.9)		3.6 (0.8-13.8)	
High school	9,012 (49.7)	43.8 (5.0-203.3)		3.9 (1.4-10.7)		4.0 (0.7-19.8)	
University	3,257 (18.0)	42.1 (4.2-197.0)		4.0 (1.4-10.3)		4.0 (0.6-18.8)	
Occupational sector			0.0005		0.0001		0.0001
Non-farmer	17,903 (98.8)	44.3 (5.1-187.3)		3.8 (1.4-10.5)		3.8 (0.7-17.8)	
Farmer	219 (1.2)	54.6 (6.7-300.0)		5.3 (1.6-16.4)		6.1 (1.2-36.6)	
Predominant residential area			0.0001		0.0001		0.0001
Red area A	11,102 (61.3)	54.9 (7.7-212.3)		4.3 (1.6-11.8)		4.7 (0.9-20.5)	
Red Area B	7,020 (38.7)	28.9 (3.6-145.3)		3.3 (1.3-8.5)		2.7 (0.6-13.0)	

Current municipality of residency (Red Area A or B)			0.0001		0.0001		0.0001
Terrazzo (B)	288 (1.6)	10.9 (1.8-66.9)		2.9 (1.1-7.1)		1.2 (0.4-5.2)	
Albaredo D'Adige (B)	767 (4.2)	29.0 (3.6-141.7)		3.2 (1.3-7.8)		3.0 (0.6-12.8)	
Arcole (B)	899 (5.0)	29.5 (4.1-154.0)		3.4 (1.3-9.5)		2.8 (0.6-13.6)	
Bevilacqua (B)	216 (1.2)	56.2 (7.1-209.3)		4.2 (1.6-10.6)		5.6 (0.9-20.2)	
Bonavigo (B)	279 (1.5)	29.8 (3.4-196.7)		3.2 (1.2-9.4)		3.0 (0.5-20.8)	
Boschi Sant'Anna (B)	206 (1.1)	38.4 (5.0-173.3)		3.5 (1.4-9.8)		3.7 (0.6-18.8)	
Legnago (B)	2,945 (16.3)	22.2 (2.9-110.0)		3.0 (1.2-7.4)		2.1 (0.5-8.4)	
Minerbe (B)	628 (3.5)	55.2 (7.9-219.7)		3.9 (1.6-9.0)		4.8 (1.1-19.4)	
Veronella (B)	778 (4.3)	48.2 (5.8-174.7)		3.7 (1.4-9.6)		4.3 (0.9-19.2)	
Alonte (A)	346 (1.9)	62.6 (7.7-246.7)		4.7 (1.5-11.7)		5.5 (1.0-23.1)	
Asigliano Veneto (A)	161 (0.9)	73.3 (6.2-260.0)		4.7 (1.8-12.0)		6.8 (1.1-27.6)	
Brendola (A)	1,007 (5.6)	41.0 (6.8-143.0)		4.0 (1.5-11.3)		2.5 (0.6-10.4)	
Cologna Veneta (A)	1,208 (6.7)	53.9 (6.9-194.3)		4.0 (1.4-10.9)		5.2 (0.9-23.0)	
Lonigo (A)	2,569 (14.2)	61.8 (7.5-249.3)		4.6 (1.5-13.8)		5.3 (1.0-21.0)	
Montagnana (A)	1,146 (6.3)	67.6 (9.7-213.7)		4.5 (1.8-11.1)		5.9 (1.3-23.0)	
Noventa Vicentina (A)	1,410 (7.8)	46.4 (8.2-148.3)		4.0 (1.7-9.4)		4.1 (1.1-13.6)	
Pojana Maggiore (A)	767 (4.2)	67.5 (11.6-215.3)		4.6 (1.7-11.6)		6.1 (1.3-20.0)	
Pressana (A)	365 (2.0)	58.8 (8.8-210.3)		3.9 (1.4-9.6)		5.5 (1.1-23.8)	
Roveredo Di Gua' (A)	263 (1.4)	55.8 (7.7-221.0)		3.7 (1.6-9.3)		5.1 (0.9-20.0)	
Sarego (A)	1,124 (6.2)	47.5 (5.8-259.0)		4.7 (1.3-15.2)		3.9 (0.7-23.6)	
Zimella (A)	750 (4.1)	49.9 (8.0-201.7)		4.0 (1.6-10.7)		4.7 (1.1-20.0)	
Duration of residency in the Red Area (years)			0.0001		0.0001		0.0001
<5	1,082 (6.0)	15.1 (2.5-75.6)		2.9 (1.0-8.9)		1.7 (0.4-7.7)	
5-9	1,375 (7.6)	23.9 (3.0-91.3)		3.1 (1.2-9.0)		2.3 (0.5-8.2)	
10-14	3,962 (21.9)	49.0 (8.5-151.0)		3.7 (1.5-10.6)		3.5 (0.9-10.3)	
15-19	3,380 (18.6)	55.6 (8.2-189.2)		4.0 (1.6-10.3)		4.4 (0.8-14.0)	
20-24	2,887 (15.9)	54.8 (5.5-208.3)		4.2 (1.6-10.5)		5.1 (0.8-18.7)	
25-29	2,663 (14.7)	47.3 (5.1-224.3)		4.1 (1.5-11.2)		5.1 (0.8-23.1)	

≥30	2,773 (15.3)	39.7 (4.1-242.0)		4.1 (1.3-11.7)		4.7 (0.7-27.0)	
Time-lag between the beginning of the study and blood sampling (months)			0.0001		0.0001		0.0001
<6	2,221 (12.3)	55.5 (12.2-172.0)		4.2 (1.6-12.4)		3.6 (0.9-11.1)	
6-10	5,152 (28.4)	54.4 (7.8-207.0)		4.2 (1.6-10.8)		4.5 (0.9-18.0)	
11-15	5,283 (29.2)	43.5 (5.3-193.3)		3.9 (1.5-10.8)		3.9 (0.7-18.6)	
16-20	4,156 (22.9)	29.6 (3.1-178.7)		3.4 (1.2-9.5)		3.2 (0.6-19.0)	
≥21	1,310 (7.2)	28.0 (3.3-174.7)		3.5 (1.2-10.0)		3.3 (0.6-22.6)	
BMI (kg/m^2)			0.0001		0.0001		0.0001
<18.0	1,437 (7.9)	42.4 (5.0-160.7)		3.7 (1.3-9.8)		3.0 (0.6-11.2)	
18.0-24.9	11,388 (62.9)	45.0 (5.2-187.7)		3.9 (1.4-10.8)		3.8 (0.7-17.4)	
25.0-29.9	3,895 (21.5)	44.9 (4.9-208.3)		4.0 (1.4-11.2)		4.5 (0.8-21.6)	
≥30.0	1,402 (7.7)	40.0 (4.6-182.0)		3.5 (1.2-9.5)		3.9 (0.7-19.6)	
eGFR (ml/min/1.73 m^2)			0.0095		0.0555		0.0006
≥90	15,691 (86.6)	44.9 (5.2-187.0)		3.8 (1.4-10.7)		3.8 (0.7-17.6)	
<90	2,431 (13.4)	40.1 (4.4-206.3)		3.9 (1.4-10.5)		4.1 (0.7-21.0)	
Number of deliveries			0.0001		0.0001		0.0001
0	15,490 (85.5)	51.8 (7.0-203.0)		4.1 (1.6-11.0)		4.4 (0.8-19.2)	
1	1,100 (6.1)	17.1 (2.6-85.8)		2.8 (1.1-6.9)		2.1 (0.4-8.0)	
2	1,213 (6.7)	12.5 (1.9-57.2)		2.5 (1.0-6.9)		1.6 (0.4-5.8)	
≥3	319 (1.7)	9.7 (1.4-44.6)		2.5 (1.0-7.3)		1.5 (0.5-4.8)	
Current pregnancy			0.0001		0.0001		0.0001
No	8,976 (97.3)	44.9 (5.1-191.3)		3.9 (1.4-10.7)		3.9 (0.7-18.2)	
Yes	254 (2.8)	21.0 (2.7-84.9)		3.0 (1.1-7.2)		0.6 (2.4-8.6)	
Physical activity			0.0001		0.0001		0.0001
Light	12,607 (69.6)	43.6 (4.9-191.0)		3.8 (1.4-10.6)		3.7 (0.7-17.9)	
Moderate	2,364 (13.0)	41.9 (4.6-187.3)		3.8 (1.4-10.2)		3.9 (0.7-18.9)	
Heavy	3,151 (17.4)	49.1 (6.1-188.7)		4.1 (1.6-11.0)		4.3 (0.8-18.2)	
Smoking habits			0.0001		0.0123		0.0001
Never	11,364 (62.7)	43.5 (4.8-182.7)		3.8 (1.4-10.7)		3.6 (0.7-16.6)	

Current	4,775 (26.4)	49.8 (6.4-209.3)		3.9 (1.5-10.6)		4.4 (0.8-20.1)	
Former	1,983 (10.9)	35.4 (4.0-189.0)		3.8 (1.4-10.2)		3.8 (0.7-20.6)	
Alcohol intake (AU per week)			0.0001		0.0001		0.0001
Never	5,525 (30.5)	36.9 (4.4-151.7)		3.4 (1.2-9.9)		3.2 (0.6-12.6)	
1-2	7,438 (41.1)	42.8 (5.0-178.3)		3.8 (1.5-10.2)		3.6 (0.7-16.2)	
3-6	3,232 (17.8)	55.8 (6.4-222.3)		4.3 (1.7-11.1)		5.3 (0.9-21.6)	
≥7	1,927 (10.6)	59.9 (7.0-272.7)		4.8 (1.8-13.4)		6.2 (1.0-25.2)	
Water intake (liters per day)			0.0001		0.2118		0.0001
<1.0	1,739 (9.6)	39.8 (5.3-160.7)		3.8 (1.4-11.2)		3.2 (0.6-13.9)	
1.0-1.5)	5,037 (27.8)	41.3 (4.8-179.0)		3.8 (1.4-10.9)		3.5 (0.7-16.8)	
1.5-2.0)	9,463 (52.2)	46.1 (5.2-198.0)		3.9 (1.4-10.4)		4.0 (0.7-18.6)	
≥2.0	1,883 (10.4)	49.7 (5.5-209.7)		4.0 (1.4-10.7)		4.8 (0.8-20.7)	
Milk/Yogurt intake			0.0048		0.1392		0.0001
I quartile	5,292 (29.2)	46.5 (5.3-193.7)		3.9 (1.5-10.5)		4.0 (0.7-18.8)	
II quartile	3,985 (22.0)	43.7 (5.1-187.0)		3.8 (1.4-10.9)		3.7 (0.7-17.6)	
III quartile	7,176 (39.6)	43.2 (5.0-187.3)		3.9 (1.4-10.4)		3.8 (0.7-17.9)	
IV quartile	1,669 (9.2)	44.8 (4.8-201.0)		3.8 (1.3-11.0)		3.8 (0.7-17.6)	
Cheese intake			0.0607		0.0001		0.0001
I quartile	5,433 (30.0)	44.3 (5.3- 187.7)		3.8 (1.4-10.9)		3.8 (0.7-18.2)	
II quartile	4,574 (25.2)	44.0 (5.1-194.3)		3.9 (1.4-11.0)		3.8 (0.7-18.2)	
III quartile	4,610 (25.4)	46.2 (5.2-188.7)		4.0 (1.4-10.5)		4.1 (0.7-18.7)	
IV quartile	3,505 (19.4)	43.2 (4.5-184.0)		3.8 (1.4-9.9)		3.7 (0.6-16.9)	
Meat intake			0.0001		0.0001		0.0001
I quartile	6,867 (37.9)	40.2 (4.6-185.0)		3.6 (1.3-10.3)		3.6 (0.7-18.1)	
II quartile	3,051 (16.8)	43.3 (4.8-187.3)		3.9 (1.5-10.2)		3.8 (0.7-17.6)	
III quartile	6,813 (37.6)	47.7 (5.6-196.3)		4.0 (1.5-11.1)		4.1 (0.7-18.5)	
IV quartile	1,391 (7.7)	52.3 (7.5-196.3)		4.1 (1.5-11.4)		4.1 (0.8-17.2)	
Fish intake			0.0241		0.0001		0.3954
I tertile	10,998 (60.7)	45.0 (5.2-196.7)		3.8 (1.4-10.4)		3.8 (0.7-18.3)	
II tertile	4,725 (26.1)	42.4 (4.8-185.0)		4.0 (1.5-10.9)		3.8 (0.7-18.2)	

III tertile	2,399 (13.2)	45.5 (5.2-172.0)		4.0 (1.6-11.0)		4.0 (0.7-17.2)	
Eggs intake			0.0001		0.0001		0.0001
I quartile	5,211 (28.8)	43.7 (5.0-186.7)		3.6 (1.3-9.7)		3.8 (0.7-18.0)	
II quartile	7,701 (42.5)	42.7 (5.0-191.0)		3.9 (1.4-10.4)		3.7 (0.7-17.9)	
III quartile	3,545 (19.5)	47.0 (5.3-196.7)		4.1 (1.5-11.6)		4.0 (0.7-17.9)	
IV quartile	1,665 (9.2)	49.2 (5.1-184.3)		4.4 (1.6-13.3)		4.4 (0.8-19.9)	
Sweets/snacks/ sweet beverages intake			0.0001		0.0001		0.0001
I quartile	6,340 (35.0)	47.0 (5.9-205.7)		4.1 (1.5-11.1)		4.2 (0.8-19.6)	
II quartile	4,936 (27.2)	39.7 (4.3-182.3)		3.7 (1.3-10.0)		3.6 (0.6-17.2)	
III quartile	4,555 (25.2)	46.4 (5.5-191.0)		3.9 (1.4-11.0)		3.9 (0.7-18.1)	
IV quartile	2,291 (12.6)	43.6 (4.9-162.7)		3.6 (1.4-9.9)		3.5 (0.7-15.4)	
Bread/pasta/cereals intake			0.0001		0.0001		0.0001
I tertile	7,497 (41.4)	38.5 (4.4-180.7)		3.7 (1.4-10.1)		3.5 (0.6-17.6)	
II tertile	7,880 (43.5)	48.8 (6.0-203.0)		4.1 (1.5-11.3)		4.2 (0.8-18.9)	
III tertile	2,745 (15.1)	47.2 (5.6-179.7)		3.7 (1.4-10.2)		3.9 (0.8-16.3)	
Fruit/vegetables intake			0.0001		0.0001		0.4969
I quartile	5,435 (30.0)	46.9 (5.5-185.7)		3.7 (1.4-10.1)		3.8 (0.7-17.5)	
II quartile	5,738 (31.7)	42.2 (4.7-194.0)		3.9 (1.4-10.8)		3.8 (0.7-18.5)	
III quartile	3,776 (20.8)	43.3 (5.1-194.7)		3.9 (1.4-11.0)		3.8 (0.7-18.0)	
IV quartile	3,173 (17.5)	45.4 (5.3-191.3)		4.0 (1.5-10.9)		3.9 (0.8-18.4)	
Growing one's own vegetables			0.0001		0.0001		0.0001
No	8,891 (49,1)	41.9 (5.0-167.0)		3.5 (1.3-9.1)		3.6 (0.7-15.2)	
Yes	9,231 (50.9)	47.4 (5.1-212.3)		4.3 (1.5-11.9)		4.2 (0.7-20.3)	
Raising animals for personal consumption			0.2725		0.0001		0.0001
No	14,334 (79.1)	44.4 (5.2-181.3)		3.7 (1.4-9.6)		3.8 (0.7-17.0)	
Yes	3,788 (20.9)	44.5 (4.6-230.0)		4.7 (1.7-14.1)		4.3 (0.7-22.2)	

Abbreviations: AU, Alcohol Units; BMI, Body Mass Index; eGFR, estimated glomerular filtration rate; HDC, Highly Developed Countries; HMPC, High Migratory Pressure Countries; PFOA, perfluorooctanoic acid; PFHxS, perfluorohexanesulfonic acid; PFOS, perfluorooctanesulfonic acid.
Legend

Red Area: the area of the Veneto Region including municipalities supplied by PFAS contaminated waterworks.
Red Area A: part of Red Area whose municipalities are located on the groundwater contamination plume.
Red Area B: part of Red Area whose municipalities are located outside the groundwater contamination plume.
HDC were defined as not Central-Eastern Europe, North America, Oceania, Israel and Japan. HMPC were defined as Central-Eastern Europe, North Africa, Sub-Saharan Africa, Asia except for Israel and Japan, and Central and South America countries. Duration of residency in the Red Area was calculated as the number of years spent in the Red Area between 1980 and 2013 (when granular activated carbon filters were installed). Intake of food items was categorised based on quartiles or tertiles.

Table S2. Multivariable linear regression models for the association between potential predictors and serum concentrations of PFOA, PFOS, and PFHxS in the study population stratified by predominant residential area (Red Area A: n=11,102 subjects; Red Area B: n=7,020 subjects).

			PFOA		PFOS		PFHxS	
Predictor	**Red Area A**	**Red Area B**	**Red Area A**	**Red Area B**	**Red Area A**	**Red Area B**	**Red Area A**	**Red Area B**
	n (%)	**n (%)**	**% difference (95% CI)**	**% difference (95% CI)**	**% difference (95% CI)**	**% difference (95% CI)**	**% difference (95% CI)**	**% difference (95% CI)**
Gender								
Female	5,634 (50.7)	3,596 (51.2)	Referent	Referent	Referent	Referent	Referent	Referent
Male	5,468 (49.3)	3,424 (48.8)	69 (62; 75)	64 (56; 73)	42 (39; 46)	41 (37; 46)	97 (91; 103)	88 (80; 96)
Explained variance (%)			*14,96*	*9,49*	*10,26*	*10,74*	*22,09*	*16,1*
Age (years)								
14-19	2,784 (25.1)	1,694 (24.1)	Referent	Referent	Referent	Referent	Referent	Referent
20-24	1,991 (17.9)	1,203 (17.1)	-8 (-14; -1)	-14 (-23; -3)	-3 (-7; 2)	0 (-6; 6)	-1 (-7; 5)	-3 (-12; 6)
25-29	1,867 (16.8)	1,177 (16.8)	-2 (-10; 7)	-29 (-38; -17)	5 (-1; 11)	-6 (-13; 2)	18 (10; 27)	-8 (-18; 4)
30-34	2,016 (18.2)	1,288 (18.4)	-11 (-18; -2)	-35 (-44; -23)	11 (5; 18)	-1 (-10; 7)	23 (14; 33)	-12 (-22; 0)
35-39	2,444 (22.0)	1,658 (23.6)	0 (-9; 10)	-21 (-33; -7)	24 (17; 32)	8 (-1; 18)	36 (26; 48)	5 (-8; 19)
Explained variance (%)			*2,38*	*4,16*	*0,11*	*0,56*	*1,79*	*0,34*
Country of birth								
Italy, HDC	10,135 (91.3)	6,561 (93.5)	Referent	Referent	Referent	Referent	Referent	Referent
HMPC	967 (8.7)	459 (6.5)	-9 (-14; -3)	-8 (-17; 2)	--	--	--	--
Explained variance (%)			*1,89*	*0,66*	--	--	--	--
Educational level								
Primary/Middle school	3,706 (33.4)	2,147 (30.6)	Referent	Referent	Referent	Referent	Referent	Referent
High school	5,440 (49.0)	3,572 (50.9)	-5 (-9; 0)	1 (-6; 9)	1 (-2; 4)	1 (-3; 5)	-4 (-8; -1)	0 (-6; 6)
University	1,956 (17.6)	1,301 (18.5)	-4 (-10; 2)	15 (5; 26)	4 (0; 9)	8 (3; 13)	-5 (-10; -1)	9 (2; 17)
Explained variance (%)			*0,25*	*0,52*	*0,28*	*0,42*	*0,24*	*0,37*
Occupational sector								
Non-farmer	10,959 (98.7)	6,944 (98.9)	Referent	Referent	Referent	Referent	Referent	Referent
Farmer	143 (1.3)	76 (1.1)	--	--	12 (2; 22)	-1 (-12; 11)	--	--

Explained variance (%)			--	--	*0,05*	*0*	--	--
Current municipality of residency (Red Area A or B)								
Terrazzo (B)		283 (4.0)	--	Referent	--	Referent	--	Referent
Albaredo D'Adige (B)		746 (10.6)	--	152 (120; 189)	--	10 (2; 18)	--	119 (96; 144)
Arcole (B)		852 (12.1)	--	176 (142; 217)	--	20 (12; 29)	--	124 (101; 149)
Bevilacqua (B)		202 (2.9)	--	358 (285; 445)	--	41 (29; 55)	--	279 (230; 336)
Bonavigo (B)		274 (3.9)	--	172 (132; 220)	--	16 (6; 26)	--	140 (111; 172)
Boschi Sant'Anna (B)		203 (2.9)	--	210 (160; 269)	--	22 (11; 34)	--	164 (129; 203)
Legnago (B)		2,906 (41.4)	--	81 (61; 104)	--	5 (-2; 12)	--	56 (42; 72)
Minerbe (B)		609 (8.7)	--	328 (273; 390)	--	31 (22; 41)	--	247 (211; 287)
Veronella (B)		689 (9.8)	--	335 (279; 400)	--	30 (20; 40)	--	242 (206; 282)
Other (B)		256 (3.7)	--	238 (186; 300)	--	37 (26; 50)	--	173 (139; 212)
Brendola (A)	1,005 (9.0)		Referent	--	Referent	--	Referent	--
Alonte (A)	346 (3.1)		51 (37; 68)	--	14 (7; 22)	--	106 (90; 125)	--
Asigliano Veneto (A)	159 (1.4)		67 (45; 92)	--	10 (1; 21)	--	128 (102; 156)	--
Cologna Veneta (A)	1,153 (10.4)		49 (36; 63)	--	13 (6; 20)	--	107 (92; 123)	--
Lonigo (A)	2,553 (23.0)		59 (50; 69)	--	19 (14; 23)	--	112 (101; 123)	--
Montagnana (A)	1,078 (9.7)		69 (57; 82)	--	17 (11; 23)	--	126 (113; 141)	--
Noventa Vicentina (A)	1,385 (12.5)		21 (12; 29)	--	1 (-4; 6)	--	56 (47; 65)	--
Pojana Maggiore (A)	757 (6.8)		60 (48; 74)	--	9 (4; 15)	--	113 (99; 128)	--
Pressana (A)	347 (3.1)		59 (42; 78)	--	6 (-2; 14)	--	109 (90; 130)	--
Roveredo Di Gua' (A)	253 (2.3)		52 (34; 72)	--	3 (-5; 12)	--	104 (83; 127)	--
Sarego (A)	1,119 (10.1)		33 (24; 43)	--	21 (16; 27)	--	68 (58; 78)	--
Zimella (A)	705 (6.4)		45 (31; 60)	--	16 (9; 24)	--	96 (81; 113)	--
Other (A)	242 (2.2)		39 (22; 58)	--	6 (-3; 16)	--	86 (67; 108)	--
Explained variance (%)			*2,97*	*10,08*	*2,59*	*2,38*	*6,65*	*12,23*
Duration of residency in the Red Area (years)								
<5	668 (6.0)	414 (5.9)	Referent	Referent	Referent	Referent	Referent	Referent
5-9	865 (7.8)	510 (7.2)	52 (39; 65)	36 (19; 54)	10 (4; 16)	5 (-2; 13)	29 (20; 38)	25 (13; 39)
10-14	2,439 (22.0)	1,523 (21.7)	110 (93; 128)	78 (56; 103)	23 (16; 30)	9 (2; 17)	76 (64; 89)	57 (41; 74)
15-19	2,104 (19.0)	1,276 (18.2)	137 (117; 159)	96 (71; 125)	28 (21; 36)	11 (3; 19)	113 (98; 129)	78 (60; 98)

20-24	1,731 (15.6)	1,156 (16.5)	144 (123; 167)	93 (68; 121)	34 (26; 42)	14 (6; 23)	134 (117; 152)	80 (61; 101)
25-29	1,602 (14.4)	1,061 (15.1)	147 (127; 169)	114 (89; 143)	29 (22; 37)	16 (8; 24)	146 (129; 163)	100 (82; 121)
≥30	1,693 (15.2)	1,080 (15.4)	143 (123; 164)	82 (61; 106)	25 (19; 33)	6 (-1; 13)	147 (131; 165)	75 (59; 93)
Explained variance (%)			*4,92*	*2,44*	*1,45*	*0,4*	*7,81*	*3,29*
Time-lag between the beginning of the study and blood sampling (months)								
< 6	1,990 (17.9)	231 (3.3)	Referent	Referent	Referent	Referent	Referent	Referent
6-10	3,825 (34.5)	1,327 (18.9)	0 (-7; 6)	7 (-7; 23)	-5 (-9; 0)	0 (-8; 7)	7 (1; 13)	8 (-3; 21)
11-15	3,234 (29.1)	2,049 (29.2)	-2 (-9; 6)	7 (-8; 25)	-11 (-15; -6)	1 (-7; 10)	3 (-3; 10)	7 (-5; 21)
16-20	1,399 (12.6)	2,757 (39.3)	-16 (-25; -7)	1 (-15; 20)	-23 (-28; -17)	-11 (-19; -2)	-3 (-11; 6)	9 (-5; 26)
≥21	654 (5.9)	656 (9.3)	-27 (-36; -18)	-8 (-25; 13)	-31 (-36; -25)	-12 (-21; -2)	-13 (-21; -4)	4 (-11; 22)
Explained variance (%)			*0,49*	*0,13*	*0,76*	*0,4*	*0,3*	*0,09*
BMI (kg/m^2)								
<18.0	834 (7.5)	603 (8.6)	--	--	1 (-3; 5)	-1 (-5; 4)	-4 (-8; 2)	-6 (-12; 0)
18.0-24.9	7,040 (63.4)	4,348 (61.9)	Referent	Referent	Referent	Referent	Referent	Referent
25.0-29.9	2,391 (21.5)	1,504 (21.4)	--	--	-2 (-5; 0)	-5 (-8; -2)	4 (1; 8)	1 (-4; 6)
≥30.0	837 (7.6)	565 (8.1)	--	--	-11 (-15; -8)	-13 (-17; -8)	6 (0; 11)	3 (-4; 10)
Explained variance (%)			--	--	*0,42*	*0,8*	*0,15*	*0,03*
eGFR (ml/min/1.73 m^2)								
≥90	9,809 (88.4)	5,882 (83.8)	Referent	Referent	Referent	Referent	Referent	Referent
<90	1,293 (11.6)	1,138 (16.2)	8 (3; 13)	4 (-3; 10)	7 (4; 11)	4 (1; 8)	7 (2; 11)	3 (-2; 8)
Explained variance (%)			*0,18*	*0,04*	*0,18*	*0,08*	*0,18*	*0,03*
Number of deliveries								
0	9,493 (85.5)	5,997 (85.4)	Referent	Referent	Referent	Referent	Referent	Referent
1	665 (6.0)	435 (6.2)	-41 (-46; -37)	-37 (-44; -30)	-18 (-22; -14)	-14 (-19; -9)	-34 (-38; -29)	-25 (-31; -18)
2	739 (6.7)	474 (6.8)	-58 (-61; -55)	-56 (-60; -51)	-26 (-29; -22)	-24 (-28; -20)	-49 (-52; -45)	-40 (-45; -35)
≥3	205 (1.8)	114 (1.6)	-66 (-70; -62)	-57 (-64; -47)	-26 (-32; -20)	-14 (-22; -4)	-54 (-58; -49)	-34 (-43; -23)
Explained variance (%)			*4,43*	*2,82*	*1,26*	*1,13*	*3,01*	*1,53*
Smoking habit								
Never	6,929 (62.4)	4,435 (63.2)	Referent	Referent	Referent	Referent	Referent	Referent
Current	3,073 (27.7)	1,702 (24.2)	1 (-3; 5)	2 (-4; 8)	-6 (-8; -3)	-7 (-10; -4)	2 (-2; 5)	1 (-3; 6)
Former	1,100 (9.9)	883 (12.6)	-9 (-14; -3)	0 (-7; 8)	-8 (-11; -4)	-1 (-4; 3)	-6 (-10; -1)	3 (-3; 9)

Explained variance (%)			*0,14*	*0,04*	*0,13*	*0,2*	*0,1*	*0,03*
Alcohol intake (AU per week)								
Never	3,491 (31.4)	2,034 (29.0)	Referent	Referent	Referent	Referent	Referent	Referent
1-2	4,183 (37.7)	3,255 (46.3)	1 (-3; 5)	3 (-3; 9)	4 (1; 7)	7 (3; 10)	-2 (-5; 1)	2 (-3; 6)
3-6	2,076 (18.7)	1,156 (16.5)	9 (3; 15)	5 (-3; 14)	6 (2; 10)	6 (2; 11)	3 (-1; 7)	2 (-4; 9)
≥7	1,352 (12.2)	575 (8.2)	13 (6; 19)	10 (0; 21)	7 (3; 12)	16 (11; 23)	7 (2; 13)	5 (-3; 14)
Explained variance (%)			*0,74*	*0,22*	*0,39*	*0,59*	*0,46*	*0,11*
Water intake (liters per day)								
<1.0	1,236 (11.1)	503 (7.2)	Referent	Referent	Referent	Referent	Referent	Referent
1.0-1.5)	3,141 (28.3)	1,896 (27.0)	--	--	-2 (-6; 1)	-3 (-8; 2)	--	--
1.5-2)	5,625 (50.7)	3,838 (54.7)	--	--	-9 (-12; -6)	-8 (-12; -3)	--	--
≥2.0	1,100 (9.9)	783 (11.1)	--	--	-15 (-19; -11)	-13 (-18; -7)	--	--
Explained variance (%)			--	--	*0,51*	*0,3*	--	--
Milk/Yogurt intake								
I quartile	3,039 (27.4)	2,253 (32.1)	Referent	Referent	Referent	Referent	Referent	Referent
II quartile	2,500 (22.5)	1,485 (21.2)	0 (-5; 4)	-4 (-10; 2)	0 (-3; 3)	0 (-3; 4)	-2 (-6; 2)	-3 (-7; 2)
III quartile	4,401 (39.6)	2,775 (39.5)	-3 (-7; 1)	-3 (-8; 3)	-2 (-5; 0)	0 (-3; 3)	-2 (-5; 1)	0 (-4; 4)
IV quartile	1,162 (10.5)	507 (7.2)	-8 (-13; -3)	-6 (-15; 3)	-8 (-12; -4)	-5 (-9; 0)	-5 (-10; -1)	-3 (-10; 5)
Explained variance (%)			*0,2*	*0,1*	*0,27*	*0,1*	*0,14*	*0,04*
Cheese intake								
I quartile	3,541 (31.9)	1,892 (26.9)	Referent	Referent	Referent	Referent	Referent	Referent
II quartile	3,031 (27.3)	1,543 (22.0)	--	--	0 (-3; 2)	1 (-3; 4)	--	--
III quartile	2,771 (25.0)	1,839 (26.2)	--	--	-2 (-5; 0)	3 (0; 7)	--	--
IV quartile	1,759 (15.8)	1,746 (24.9)	--	--	-2 (-5; 1)	-4 (-7; 0)	--	--
Explained variance (%)			--	--	*0,03*	*0,23*	--	--
Meat intake								
I quartile	4,199 (37.8)	2,668 (38.0)	Referent	Referent	Referent	Referent	Referent	Referent
II quartile	1,880 (16.9)	1,171 (16.7)	-6 (-11; -2)	-4 (-10; 3)	0 (-3; 3)	5 (1; 9)	-6 (-9; -2)	0 (-5; 6)
III quartile	4,131 (37.2)	2,682 (38.2)	-5 (-9; -2)	-5 (-10; 1)	2 (-1; 4)	2 (-1; 5)	-3 (-6; 0)	-1 (-5; 3)
IV quartile	892 (8.1)	499 (7.1)	-11 (-17; -5)	-14 (-22; -5)	-5 (-9; -1)	-1 (-6; 5)	-9 (-14; -5)	-10 (-17; -3)
Explained variance (%)			*0,12*	*0,15*	*0,09*	*0,09*	*0,1*	*0,1*

Fish intake								
I tertile	6,914 (62.3)	4,084 (58.2)	Referent	Referent	Referent	Referent	Referent	Referent
II tertile	2,820 (25.4)	1,905 (27.1)	-2 (-6; 1)	-6 (-11; -1)	5 (3; 8)	2 (0; 5)	--	--
III tertile	1,368 (12.3)	1,031 (14.7)	-1 (-6; 4)	-1 (-7; 6)	11 (7; 15)	6 (2; 9)	--	--
Explained variance (%)			*0*	*0,1*	*0,34*	*0,12*	--	--
Eggs intake								
I quartile	3,109 (28.0)	2,102 (29.9)	Referent	Referent	Referent	Referent	Referent	Referent
II quartile	4,392 (39.6)	3,309 (47.2)	--	--	9 (6; 12)	9 (6; 12)	--	--
III quartile	2,408 (21.7)	1,137 (16.2)	--	--	9 (6; 13)	9 (5; 13)	--	--
IV quartile	1,193 (10.7)	472 (6.7)	--	--	15 (11; 20)	7 (1; 13)	--	--
Explained variance (%)			--	--	*0,38*	*0,38*	--	--
Sweets/snacks/sweet beverages intake								
I quartile	4,384 (39.5)	1,956 (27.9)	Referent	Referent	Referent	Referent	Referent	Referent
II quartile	2,599 (23.4)	2,337 (33.3)	-3 (-7; 2)	1 (-6; 8)	-1 (-4; 2)	-4 (-7; -1)	-1 (-5; 3)	-5 (-10; 0)
III quartile	2,981 (26.9)	1,574 (22.4)	-2 (-6; 3)	-4 (-11; 4)	-1 (-3; 2)	-3 (-6; 0)	-2 (-6; 1)	-6 (-12; 0)
IV quartile	1,138 (10.2)	1,153 (16.4)	-7 (-13; -1)	-8 (-16; 1)	-5 (-8; -1)	-5 (-9; -1)	-7 (-13; -2)	-11 (-17; -4)
Explained variance (%)			*0,03*	*0,03*	*0,07*	*0,12*	*0,05*	*0,11*
Bread/pasta/cereals intake								
I tertile	4,101 (36.9)	3,396 (48.4)	Referent	Referent	Referent	Referent	Referent	Referent
II tertile	5,596 (50.4)	2,284 (32.5)	1 (-4; 6)	5 (-3; 14)	--	--	2 (-2; 6)	1 (-5; 8)
III tertile	1,405 (12.7)	1,340 (19.1)	10 (3; 17)	7 (-1; 16)	--	--	7 (2; 13)	6 (-1; 13)
Explained variance (%)			*0,03*	*0,02*	--	--	*0,02*	*0,02*
Fruit/vegetables intake								
I quartile	2,890 (26.0)	2,545 (36.3)	Referent	Referent	Referent	Referent	Referent	Referent
II quartile	3,350 (30.2)	2,388 (34.0)	2 (-2; 6)	-2 (-7; 4)	8 (5; 11)	5 (1; 8)	6 (2; 10)	0 (-4; 4)
III quartile	2,497 (22.5)	1,279 (18.2)	3 (-2; 8)	5 (-2; 12)	7 (3; 10)	8 (4; 12)	7 (3; 11)	6 (1; 12)
IV quartile	2,365 (21.3)	808 (11.5)	4 (-1; 9)	6 (-2; 15)	8 (5; 12)	9 (5; 14)	9 (4; 13)	6 (-1; 13)
Explained variance (%)			*0,02*	*0,05*	*0,24*	*0,3*	*0,11*	*0,08*
Growing vegetables for personal consumption								
No	5,360 (48.3)	3,531 (50.3)	Referent	Referent	Referent	Referent	Referent	Referent
Yes	5,742 (51.7)	3,489 (49.7)	11 (7; 15)	-9 (-13; -4)	14 (11; 17)	6 (3; 9)	11 (8; 14)	-6 (-9; -2)

Explained variance (%)			*0,92*	*0*	*2,68*	*2,23*	*1,1*	*0,24*
Raising animals for personal consumption								
No	8,827 (79.5)	5,507 (78.5)	Referent	Referent	Referent	Referent	Referent	Referent
Yes	2,275 (20.5)	1,513 (21.5)	1 (-3; 6)	-10 (-16; -5)	24 (21; 28)	24 (19; 28)	--	--
Explained variance (%)			*0*	*0,13*	*1,21*	*1,64*	--	--
Total variance explained (%)			34,67	31,18	23,7	23,21	44,3	34,74

Abbreviations: AU, Alcohol Units; BMI, Body Mass Index; eGFR, estimated glomerular filtration rate; HDC, Highly Developed Countries; HMPC, High Migratory Pressure Countries; PFOA, perfluorooctanoic acid; PFHxS, perfluorohexanesulfonic acid; PFOS, perfluorooctanesulfonic acid.

Legend

Red Area: the area of the Veneto Region including municipalities supplied by PFAS contaminated waterworks.

Red Area A: part of Red Area whose municipalities are located on the groundwater contamination plume.

HDC were defined as not Central-Eastern Europe, North America, Oceania, Israel and Japan. HMPC were defined as Central-Eastern Europe, North Africa, Sub-Saharan Africa, Asia except for Israel and Japan, and Central and South America countries. Duration of residency in the Red Area was calculated as the number of years spent in the Red Area between 1980 and 2013 (when granular activated carbon filters were installed). Intake of food items was categorised based on quartiles or tertiles.

Predictors shown for each PFAS were selected using a stepwise approach based on the Akaike information criterion (AIC).

Values of % difference were derived from Beta coefficients.

Table S3. Multivariable linear regression models for the association between potential predictors and serum concentrations of PFOA, PFOS, and PFHxS in the subset of study population recruited after August 2018 (n=3,605 subjects with complete records for all variables).

Predictor	n (%)	PFOA	PFOS	PFHxS
		% difference (95% CI)	% difference (95% CI)	% difference (95% CI)
Gender				
Female	1,928 (53.5)	Referent	Referent	Referent
Male	1,677 (46.5)	88 (72, 106)	50 (43, 59)	148 (131, 166)
Explained variance (%)		*18,2*	*14,3*	*26,4*
Age (years)				
14-19	53 (1.5)	Referent	Referent	Referent
20-24	89 (2.5)	-9 (-38, 35)	14 (-9, 42)	-4 (-29, 31)
25-29	268 (7.4)	-8 (-34, 30)	41 (16, 71)	9 (-17, 43)
30-34	1,094 (30.3)	-7 (-32, 28)	36 (14, 63)	20 (-7, 55)
35-39	2,101 (58.3)	13 (-17, 53)	56 (31, 86)	36 (6, 74)
Explained variance (%)		*0,2*	*0,5*	*0,2*
Country of birth				
Italy, HDC	3,176 (88.1)	Referent	Referent	Referent
HMPC	429 (11.9)	--	--	19 (8, 31)
Explained variance (%)		--	--	*0,2*
Educational level				
Primary/Middle school	747 (20.7)	Referent	Referent	Referent
High school	2,005 (55.6)	0 (-8, 10)	2 (-3, 7)	4 (-3, 12)
University	853 (23.7)	10 (-1, 22)	10 (3, 17)	14 (5, 24)
Explained variance (%)		*0,6*	*0,5*	*0,5*
Occupational sector				
Non-farmer	3,534 (98.0)	Referent	Referent	Referent
Farmer	71 (2.0)	--	--	17 (-3, 41)
Explained variance (%)		--	--	*0*
Predominant residential area				

Red Area B	2,110 (58.5)	Referent	Referent	Referent
Red area A	1,495 (41.5)	21 (7, 36)	--	25 (14, 38)
Explained variance (%)		*0,2*	--	*0,4*
Current municipality of residency (Red Area A or B)				
Terrazzo (B)	54 (1.5)	Referent	Referent	Referent
Albaredo D'Adige (B)	334 (9.3)	134 (76, 211)	28 (9, 51)	107 (65, 159)
Arcole (B)	404 (11.2)	146 (86, 226)	32 (13, 55)	99 (59, 149)
Bevilacqua (B)	42 (1.2)	207 (108, 355)	33 (7, 66)	189 (111, 294)
Bonavigo (B)	74 (2.1)	114 (52, 201)	13 (-7, 37)	102 (54, 164)
Boschi Sant'Anna (B)	34 (0.9)	149 (64, 278)	34 (6, 70)	110 (51, 192)
Legnago (B)	688 (19.1)	44 (10, 89)	11 (-5, 29)	36 (9, 68)
Minerbe (B)	115 (3.2)	237 (146, 361)	34 (12, 60)	180 (118, 259)
Veronella (B)	436 (12.1)	250 (164, 363)	43 (22, 68)	184 (127, 255)
Alonte (A)	9 (0.3)	134 (16, 372)	-3 (-34, 44)	124 (28, 291)
Asigliano Veneto (A)	1 (0.0)	319 (-40, 2,804)	109 (-30, 523)	251 (-25, 1,542)
Brendola (A)	12 (0.3)	180 (50, 424)	20 (-16, 69)	65 (0, 71)
Cologna Veneta (A)	550 (15.3)	236 (150, 352)	57 (34, 84)	188 (127, 265)
Lonigo (A)	56 (1.6)	169 (81, 298)	57 (27, 95)	160 (90, 256)
Montagnana (A)	16 (0.5)	203 (73, 431)	48 (9, 103)	143 (56, 280)
Noventa Vicentina (A)	30 (0.8)	136 (49, 274)	32 (2, 70)	78 (23, 156)
Pojana Maggiore (A)	11 (0.3)	230 (72, 533)	41 (-2, 103)	192 (74, 390)
Pressana (A)	179 (5.0)	233 (142, 358)	41 (19, 68)	162 (103, 238)
Roveredo Di Gua' (A)	141 (3.9)	199 (116, 316)	44 (21, 72)	153 (95, 229)
Sarego (A)	20 (0.6)	105 (22, 246)	34 (1, 79)	71 (13, 160)
Zimella (A)	399 (11.1)	218 (135, 329)	64 (40, 93)	165 (108, 237)
Explained variance (%)		*11,1*	*4,2*	*12,4*
Duration of residency in the Red Area (years)				
<5	339 (9.4)	Referent	Referent	Referent
5-9	417 (11.6)	47 (28, 69)	10 (2, 19)	30 (16, 46)
10-14	266 (7.4)	84 (56, 117)	19 (8, 31)	57 (37, 79)
15-19	137 (3.8)	94 (53, 146)	14 (0, 30)	85 (53, 124)

20-24	232 (6.4)	108 (70, 155)	10 (-2, 24)	108 (76, 145)
25-29	892 (24.7)	119 (91, 152)	19 (9, 28)	115 (92, 141)
≥30	1,322 (36.7)	101 (78, 127)	12 (4, 20)	102 (82, 124)
Explained variance (%)		*3,5*	*0,5*	*3,6*
Time-lag between the beginning of the study and blood sampling (months)				
16-20	2,295 (63.7)	Referent	Referent	Referent
≥21	1,310 (36.3)	-13 (-20, -5)	-5 (-9, -1)	-10 (-16, -4)
Explained variance (%)		*0,3*	*0,1*	*0,2*
BMI (kg/m^2)				
<18.0	151 (4.2)	-11 (-25, 4)	-8 (-16, 1)	-15 (-25, -3)
18.0-24.9	2,088 (57.9)	Referent	Referent	Referent
25.0-29.9	992 (27.5)	-9 (-15, -2)	-4 (-8, 0)	-2 (-8, 4)
≥30.0	374 (10.4)	-7 (-16, 4)	-13 (-18, -7)	0 (-9, 9)
Explained variance (%)		*0,4*	*0,7*	*0,1*
Number of deliveries				
0	2,447 (67.9)	Referent	Referent	Referent
1	441 (12.2)	-37 (-44, -29)	-13 (-18, -7)	-20 (-27, -12)
2	556 (15.4)	-52 (-57, -47)	-21 (-26, -16)	-33 (-39, -27)
≥3	161 (4.5)	-58 (-65, -50)	-12 (-20, -3)	-34 (-43, -25)
Explained variance (%)		*3,4*	*1,1*	*1,3*
Smoking habit				
Never	2,020 (56.0)	Referent	Referent	Referent
Current	872 (24.2)	--	-5 (-10, -1)	--
Former	713 (19.8)	--	-2 (-7, 3)	--
Explained variance (%)		--	*0,1*	--
Alcohol intake (AU per week)				
Never	1,083 (30.0)	Referent	Referent	Referent
1-2	1,412 (39.2)	7 (-1, 16)	7 (3, 13)	--
3-6	654 (18.1)	15 (4, 27)	8 (2, 15)	--
≥7	456 (12.7)	15 (2, 29)	16 (8, 24)	--
Explained variance (%)		*0,6*	*0,5*	

Water intake (liters per day)				
<1.0	322 (8.9)	Referent	Referent	Referent
1.0-1.5)	1,110 (30.8)	--	-10 (-16, -4)	--
1.5-2)	1,876 (52.0)	--	-16 (-21, -10)	--
≥2.0	297 (8.3)	--	-25 (-32, -18)	--
Explained variance (%)		--	*0,8*	--
Type of drinking water source				
Mixed	1,252 (34.7)	Referent	Referent	Referent
Only public water	234 (6.5)	30 (13, 50)	10 (1, 19)	27 (13, 42)
Only bottled water	2,119 (58.8)	-21 (-27, -15)	-3 (-7, 2)	-21 (-26, -16)
Explained variance (%)		*1*	*0,2*	*1,1*
Consumption of private well water				
No	3,188 (88.4)	Referent	Referent	Referent
Yes	417 (11.6)	-47 (-53, -40)	-10 (-16, -4)	-43 (-48, -37)
Explained variance (%)		*1,9*	*0,2*	*1,9*
Cheese intake				
I quartile	945 (26.2)	Referent	Referent	Referent
II quartile	884 (24.5)	--	-2 (-7, 3)	-8 (-14, -1)
III quartile	1,058 (29.4)	--	-2 (-6, 3)	-5 (-11, 2)
IV quartile	718 (19.9)	--	-7 (-12, -2)	-9 (-16, -2)
Explained variance (%)		--	*0,2*	*0,3*
Meat intake				
I quartile	1,705 (47.3)	Referent	Referent	Referent
II quartile	591 (16.4)	--	6 (1, 12)	--
III quartile	1,202 (33.3)	--	5 (1, 10)	--
IV quartile	107 (3.0)	--	5 (-6, 17)	--
Explained variance (%)		--	*0,2*	--
Fish intake				
I tertile	2,176 (60.4)	Referent	Referent	Referent
II tertile	967 (26.8)	-8 (-14, -1)	4 (0, 9)	--
III tertile	462 (12.8)	-6 (-15, 4)	8 (2, 14)	--

Explained variance (%)		*0,1*	*0,2*	--
Eggs intake				
I quartile	1,102 (30.6)	Referent	Referent	Referent
II quartile	1,774 (49.2)	-4 (-11, 3)	7 (3, 12)	-2 (-7, 4)
III quartile	523 (14.5)	-2 (-11, 9)	8 (2, 14)	-1 (-9, 8)
IV quartile	206 (5.7)	-19 (-30, -6)	12 (3, 22)	-15 (-25, -4)
Explained variance (%)		*0,4*	*0,3*	*0,2*
Bread/pasta/cereals intake				
I tertile	1,809 (50.2)	Referent	Referent	Referent
II tertile	1,208 (33.5)	--	2 (-3, 6)	--
III tertile	588 (16.3)	--	-4 (-9, 1)	--
Explained variance (%)		--	*0,1*	--
Fruit/vegetables intake				
I quartile	948 (26.3)	Referent	Referent	Referent
II quartile	1,352 (37.5)	--	6 (2, 12)	--
III quartile	773 (21.4)	--	8 (2, 14)	--
IV quartile	532 (14.8)	--	11 (5, 19)	--
Explained variance (%)		--	*0,2*	--
Growing vegetables for personal consumption				
No	1,437 (39.9)	Referent	Referent	Referent
Yes	2,168 (60.1)	--	10 (5, 15)	7 (1, 13)
Explained variance (%)		--	*4,8*	*2,7*
Raising animals for personal consumption				
No	2,335 (64.8)	Referent	Referent	Referent
Yes	1,270 (35.2)	--	24 (18, 29)	--
Explained variance (%)		--	*2,5*	--
Total variance explained		40,80%	30,60%	50,80%

Abbreviations: AU, Alcohol Units; BMI, Body Mass Index; eGFR, estimated glomerular filtration rate; HDC, Highly Developed Countries; HMPC, High Migratory Pressure Countries; PFOA, perfluorooctanoic acid; PFHxS, perfluorohexanesulfonic acid; PFOS, perfluorooctanesulfonic acid.
Legend

Red Area: the area of the Veneto Region including municipalities supplied by PFAS contaminated waterworks.
Red Area A: part of Red Area whose municipalities are located on the groundwater contamination plume.
Red Area B: part of Red Area whose municipalities are located outside the groundwater contamination plume.
HDC were defined as not Central-Eastern Europe, North America, Oceania, Israel and Japan. HMPC were defined as Central-Eastern Europe, North Africa, Sub-Saharan Africa, Asia except for Israel and Japan, and Central and South America countries. Duration of residency in the Red Area was calculated as the number of years spent in the Red Area between 1980 and 2013 (when granular activated carbon filters were installed). Intake of food items was categorised based on quartiles or tertiles.
Predictors shown for each PFAS were selected using a stepwise approach based on the Akaike information criterion (AIC).
Values of % difference were derived from Beta coefficients.

Table S4. Multivariable linear regression models for the association between potential predictors and serum concentrations of PFOA, PFOS, and PFHxS in the subset of study population recruited after August 2018 (n=3,605 subjects) stratified by predominant residential area (Red Area A: n=1,495 subjects; Red Area B: n=2,110 subjects).

			PFOA		PFOS		PFHxS	
Predictor	**Red Area A**	**Red Area B**	**Red Area A**	**Red Area B**	**Red Area A**	**Red Area B**	**Red Area A**	**Red Area B**
	n (%)	**n (%)**	**% difference (95% CI)**	**% difference (95% CI)**	**% difference (95% CI)**	**% difference (95% CI)**	**% difference (95% CI)**	**% difference (95% CI)**
Gender								
Female	700 (46.82)	977 (46.3)	Referent	Referent	Referent	Referent	Referent	Referent
Male	795 (53.18)	1133 (53.7)	87 (64 ,114)	86 (65 ;110)	54 (42 ,67)	46 (36 ,56)	167 (140 ,197)	132 (112 ,155)
Explained variance (%)			*23,60*	*16,67*	*15,48*	*13,96*	*35,67*	*24,11*
Age (years)								
14-19	37 (2.47)	16 (0.76)	Referent	Referent	Referent	Referent	Referent	Referent
20-24	65 (4.35)	24 (1.14)	-22 (-51 ,25)	22 (-39 ;147)	16 (-12 ,53)	12 (-24 ,65)	-11 (-40 ,30)	25 (-28 ,117)
25-29	168 (11.24)	100 (4.74)	5 (-31 ,59)	-18 (-55 ;48)	58 (24 ,102)	27 (-9 ,76)	24 (-13 ,75)	10 (-31 ,76)
30-34	569 (38.06)	525 (24.88)	26 (-15 ,88)	-28 (-58 ;23)	58 (25 ,100)	21 (-10 ,62)	58 (13 ,121)	3 (-33 ,56)
35-39	656 (43.88)	1445 (68.48)	13 (-23 ,68)	3 (-38 ;72)	65 (31 ,109)	44 (9 ,92)	49 (8 ,107)	27 (-15 ,90)
Explained variance (%)			*0,46*	*0,41*	*0,74*	*0,54*	*0,60*	*0,25*
Country of birth								
Italy, HDC	1307 (87.42)	1869 (88.58)	Referent	Referent	Referent	Referent	Referent	Referent
HMPC	188 (12.58)	241 (11.42)	--	--	--	--	9 (-7 ,29)	23 (9 ,40)
Explained variance (%)			--	--	--	--	*0,54*	*0,10*
Educational level								
Primary/Middle school	305 (20.4)	442 (20.95)	Referent	Referent	Referent	Referent	Referent	Referent
High school	839 (56.12)	1166 (55.26)	2 (-11 ,17)	-1 (-12 ;11)	5 (-3 ,13)	-1 (-7 ,6)	8 (-3 ,21)	-1 (-10 ,8)
University	351 (23.48)	502 (23.79)	3 (-12 ,22)	13 (-2 ;30)	10 (0 ,22)	8 (0 ,17)	14 (-1 ,30)	10 (-1 ,23)
Explained variance (%)			*0,96*	*0,47*	*0,54*	*0,42*	*1,05*	*0,27*
Occupational sector								
Non-farmer	1452 (97.12)	2082 (98.67)	Referent	Referent	Referent	Referent	Referent	Referent

Farmer	43 (2.88)	28 (1.33)	--	--	--	--	20 (-5 ,53)	0 (-26 ,34)
Explained variance (%)			--	--	--	--	*0,02*	*0,01*
Current municipality of residency (Red Area A or B)								
Terrazzo (B)		52 (2.46)	--	Referent	--	Referent	--	Referent
Albaredo D'Adige (B)		318 (15.07)	--	148 (84 ;236)	--	29 (9 ,53)	--	117 (71 ,175)
Arcole (B)		369 (17.49)	--	166 (97 ;258)	--	34 (14 ,58)	--	109 (65 ,164)
Bevilacqua (B)		37 (1.75)	--	260 (136 ;447)	--	41 (12 ,77)	--	217 (128 ,340)
Bonavigo (B)		72 (3.41)	--	123 (56 ;218)	--	13 (-7 ,37)	--	109 (58 ,176)
Boschi Sant'Anna (B)		31 (1.47)	--	168 (72 ;317)	--	29 (1 ,65)	--	117 (53 ,207)
Legnago (B)		671 (31.8)	--	47 (11 ;95)	--	10 (-6 ,28)	--	37 (10 ,71)
Minerbe (B)		105 (4.98)	--	245 (148 ;380)	--	35 (13 ,62)	--	186 (121 ,271)
Veronella (B)		357 (16.92)	--	280 (182 ;412)	--	41 (19 ,67)	--	195 (133 ,273)
Other (B)		98 (4.64)	--	234 (137 ;370)	--	66 (37 ,101)	--	191 (122 ,280)
Brendola (A)	12 (0.8)	--	Referent	--	Referent	--	Referent	--
Alonte (A)	9 (0.6)	--	-26 (-67 ,67)	--	-20 (-51 ,30)	--	30 (-33 ,153)	--
Asigliano Veneto (A)	1 (0.07)	--	33 (-81 ,823)	--	77 (-44 ,458)	--	125 (-53 ,983)	--
Cologna Veneta (A)	509 (34.05)	--	9 (-37 ,89)	--	23 (-11 ,71)	--	63 (4 ,155)	--
Lonigo (A)	55 (3.68)	--	-2 (-46 ,76)	--	30 (-8 ,85)	--	66 (3 ,169)	--
Montagnana (A)	15 (1)	--	-4 (-53 ,96)	--	26 (-17 ,92)	--	40 (-22 ,152)	--
Noventa Vicentina (A)	30 (2.01)	--	-18 (-57 ,55)	--	9 (-25 ,59)	--	9 (-35 ,83)	--
Pojana Maggiore (A)	11 (0.74)	--	15 (-47 ,151)	--	17 (-26 ,85)	--	76 (-7 ,231)	--
Pressana (A)	166 (11.1)	--	8 (-39 ,89)	--	9 (-22 ,52)	--	47 (-7 ,133)	--
Roveredo Di Gua' (A)	132 (8.83)	--	3 (-41 ,82)	--	12 (-20 ,57)	--	47 (-8 ,132)	--
Sarego (A)	20 (1.34)	--	-32 (-65 ,35)	--	11 (-26 ,65)	--	2 (-41 ,78)	--
Zimella (A)	366 (24.48)	--	2 (-41 ,77)	--	30 (-6 ,80)	--	51 (-4 ,135)	--
Other (A)	169 (11.3)	--	-8 (-48 ,61)	--	11 (-21 ,54)	--	37 (-13 ,117)	--
Explained variance (%)			*1,73*	*8,66*	*2,86*	*2,76*	*2,77*	*9,25*
Duration of residency in the Red Area (years)								
<5	107 (7.16)	232 (11)	Referent	Referent	Referent	Referent	Referent	Referent
5-9	124 (8.29)	293 (13.89)	43 (12 ,83)	49 (25 ;77)	11 (-4 ,29)	9 (-1 ,20)	28 (4 ,58)	32 (16 ,52)
10-14	108 (7.22)	158 (7.49)	75 (34 ,130)	88 (52 ;131)	31 (11 ,53)	14 (1 ,27)	59 (27 ,98)	57 (33 ,85)

15-19	78 (5.22)	59 (2.8)	95 (38 ,175)	88 (35 ;163)	25 (2 ,53)	7 (-11 ,28)	88 (42 ,149)	74 (34 ,126)
20-24	126 (8.43)	106 (5.02)	88 (41 ,150)	119 (61 ;197)	19 (1 ,41)	5 (-11 ,25)	92 (52 ,144)	108 (64 ,165)
25-29	484 (32.37)	408 (19.34)	84 (49 ,128)	148 (105 ;199)	22 (8 ,39)	17 (5 ,30)	89 (57 ,127)	130 (98 ,168)
≥30	468 (31.3)	854 (40.47)	102 (63 ,151)	103 (74 ;137)	29 (13 ,46)	5 (-4 ,14)	103 (69 ,144)	104 (80 ,131)
Explained variance (%)			*2,94*	*4,26*	*1,21*	*0,47*	*2,84*	*4,73*
Time-lag between the beginning of the study and blood sampling (months)								
16-20	841 (56.25)	1454 (68.91)	Referent	Referent	Referent	Referent	Referent	Referent
≥21	654 (43.75)	656 (31.09)	-4 (-15 ,8)	-16 (-25 ;-6)	-8 (-14 ,-1)	-2 (-8 ,4)	-6 (-15 ,3)	-11 (-19 ,-3)
Explained variance (%)			*0,03*	*0,41*	*0,24*	*0,04*	*0,10*	*0,30*
BMI (kg/m^2)								
<18.0	56 (3.75)	95 (4.5)	13 (-12 ,46)	-25 (-40 ;-8)	2 (-12 ,19)	-14 (-23 ,-3)	-1 (-20 ,22)	-24 (-35 ,-10)
18.0-24.9	866 (57.93)	1222 (57.91)	Referent	Referent	Referent	Referent	Referent	Referent
25.0-29.9	413 (27.63)	579 (27.44)	-5 (-16 ,6)	-11 (-19 ;-1)	0 (-6 ,7)	-6 (-11 ,0)	0 (-9 ,10)	-3 (-10 ,5)
≥30.0	160 (10.7)	214 (10.14)	1 (-14 ,19)	-13 (-25 ;1)	-11 (-19 ,-2)	-15 (-21 ,-8)	0 (-13 ,14)	-3 (-14 ,9)
Explained variance (%)			*0,24*	*0,64*	*0,43*	*1,13*	*0,04*	*0,24*
Number of deliveries								
0	1,040 (69.57)	1,407 (66.68)	Referent	Referent	Referent	Referent	Referent	Referent
1	170 (11.37)	271 (12.84)	-49 (-57 ,-39)	-29 (-39 ;-17)	-20 (-28 ,-11)	-9 (-16 ,-1)	-31 (-41 ,-21)	-13 (-23 ,-2)
2	212 (14.18)	344 (16.3)	-59 (-66 ,-52)	-48 (-55 ;-40)	-23 (-30 ,-14)	-22 (-28 ,-16)	-41 (-49 ,-32)	-29 (-37 ,-21)
≥3	73 (4.88)	88 (4.17)	-65 (-73 ,-55)	-51 (-61 ;-38)	-18 (-29 ,-4)	-9 (-20 ,4)	-45 (-55 ,-32)	-25 (-37 ,-9)
Explained variance (%)			*5,51*	*2,71*	*1,42*	*1,27*	*2,29*	*0,99*
Smoking habit								
Never	868 (58.06)	1152 (54.6)	Referent	Referent	Referent	Referent	Referent	Referent
Current	383 (25.62)	489 (23.18)	--	--	-2 (-9 ,5)	-7 (-12 ,-1)	--	--
Former	244 (16.32)	469 (22.23)	--	--	-7 (-15 ,1)	1 (-5 ,7)	--	--
Explained variance (%)			--	--	*0,10*	*0,12*	--	--
Alcohol intake (AU per week)								
Never	457 (30.57)	626 (29.67)	Referent	Referent	Referent	Referent	Referent	Referent
1-2	551 (36.86)	861 (40.81)	12 (-1 ,26)	5 (-6 ;17)	0 (-7 ,8)	13 (6 ,20)	--	--
3-6	306 (20.47)	348 (16.49)	20 (3 ,39)	13 (-2 ;30)	0 (-9 ,9)	15 (6 ,24)	--	--

≥7	181 (12.11)	275 (13.03)	17 (-2 ,39)	10 (-5 ;28)	3 (-7 ,15)	25 (15 ,36)	--	--
Explained variance (%)			*1,31*	*0,28*	*0,09*	*1,11*	--	--
Water intake (liters per day)								
<1.0	145 (9.7)	177 (8.39)	Referent	Referent	Referent	Referent	Referent	Referent
1.0-1.5)	482 (32.24)	628 (29.76)	--	--	-13 (-22 ,-4)	-9 (-17 ,0)	--	--
1.5-2)	744 (49.77)	1132 (53.65)	--	--	-21 (-29 ,-12)	-12 (-20 ,-4)	--	--
≥2.0	124 (8.29)	173 (8.2)	--	--	-27 (-36 ,-16)	-24 (-33 ,-14)	--	--
Explained variance (%)			--	--	*1,09*	*0,74*	--	--
Type of drinking water source								
Mixed	589 (39.4)	663 (31.42)	Referent	Referent	Referent	Referent	Referent	Referent
Only public water	137 (9.16)	97 (4.6)	37 (15 ,64)	23 (-1 ;54)	8 (-3 ,20)	11 (-1 ,26)	27 (10 ,47)	28 (8 ,52)
Only bottled water	769 (51.44)	1350 (63.98)	-18 (-26 ,-8)	-24 (-32 ;-15)	-6 (-12 ,1)	0 (-6 ,7)	-18 (-25 ,-10)	-23 (-29 ,-15)
Explained variance (%)			*1,43*	*0,72*	*0,35*	*0,19*	*1,35*	*1,03*
Consumption of private well water								
No	1348 (90.17)	1840 (87.2)	Referent	Referent	Referent	Referent	Referent	Referent
Yes	147 (9.83)	270 (12.8)	-43 (-52 ,-32)	-49 (-56 ;-40)	-11 (-20 ,-1)	-7 (-15 ,1)	-40 (-48 ,-31)	-44 (-50 ,-36)
Explained variance (%)			*1,75*	*2,08*	*0,24*	*0,09*	*1,69*	*2,13*
Cheese intake								
I quartile	402 (26.89)	543 (25.73)	Referent	Referent	Referent	Referent	Referent	Referent
II quartile	368 (24.62)	516 (24.45)	--	--	-6 (-13 ,2)	1 (-6 ,8)	-18 (-27 ,-9)	1 (-8 ,11)
III quartile	416 (27.83)	642 (30.43)	--	--	-8 (-15 ,-1)	3 (-3 ,10)	-12 (-21 ,-3)	2 (-7 ,11)
IV quartile	309 (20.67)	409 (19.38)	--	--	-10 (-17 ,-2)	-6 (-12 ,1)	-17 (-26 ,-7)	-3 (-12 ,7)
Explained variance (%)			--	--	*0,40*	*0,28*	*0,90*	*0,17*
Meat intake								
I quartile	719 (48.09)	986 (46.73)	Referent	Referent	Referent	Referent	Referent	Referent
II quartile	212 (14.18)	379 (17.96)	--	--	2 (-6 ,11)	9 (2 ,16)	--	--
III quartile	517 (34.58)	685 (32.46)	--	--	5 (-1 ,12)	4 (-1 ,10)	--	--
IV quartile	47 (3.14)	60 (2.84)	--	--	-3 (-18 ,14)	9 (-5 ,27)	--	--
Explained variance (%)			--	--	*0,16*	*0,22*	--	--
Fish intake								
I tertile	882 (59)	1294 (61.33)	Referent	Referent	Referent	Referent	Referent	Referent

II tertile	411 (27.49)	556 (26.35)	-2 (-12 ,10)	-11 (-19 ;-2)	10 (3 ,17)	1 (-4 ,7)	--	--
III tertile	202 (13.51)	260 (12.32)	-10 (-23 ,4)	0 (-13 ;14)	14 (4 ,24)	3 (-4 ,11)	--	--
Explained variance (%)			*0,06*	*0,23*	*0,58*	*0,02*	--	--
Eggs intake								
I quartile	435 (29.1)	667 (31.61)	Referent	Referent	Referent	Referent	Referent	Referent
II quartile	728 (48.7)	1046 (49.57)	-2 (-12 ,10)	-5 (-14 ;5)	5 (-2 ,12)	9 (4 ,15)	-2 (-10 ,8)	-2 (-9 ,6)
III quartile	229 (15.32)	294 (13.93)	-4 (-18 ,12)	1 (-12 ;16)	10 (0 ,20)	8 (0 ,17)	-4 (-15 ,9)	2 (-8 ,14)
IV quartile	103 (6.89)	103 (4.88)	-21 (-36 ,-3)	-19 (-35 ;0)	13 (0 ,28)	11 (-1 ,25)	-14 (-28 ,1)	-19 (-31 ,-4)
Explained variance (%)			*0,62*	*0,43*	*0,19*	*0,39*	*0,34*	*0,29*
Bread/pasta/cereals intake								
I tertile	598 (40)	1211 (57.39)	Referent	Referent	Referent	Referent	Referent	Referent
II tertile	593 (39.67)	615 (29.15)	--	--	4 (-3 ,11)	-1 (-6 ,5)	--	--
III tertile	304 (20.33)	284 (13.46)	--	--	-6 (-13 ,1)	-2 (-9 ,6)	--	--
Explained variance (%)			--	--	*0,26*	*0,00*	--	--
Fruit/vegetables intake								
I quartile	341 (22.81)	607 (28.77)	Referent	Referent	Referent	Referent	Referent	Referent
II quartile	551 (36.86)	801 (37.96)	--	--	5 (-2 ,14)	6 (0 ,13)	--	--
III quartile	342 (22.88)	431 (20.43)	--	--	6 (-3 ,16)	9 (1 ,17)	--	--
IV quartile	261 (17.46)	271 (12.84)	--	--	9 (0 ,20)	14 (5 ,24)	--	--
Explained variance (%)			--	--	*0,15*	*0,30*	--	--
Growing vegetables for personal consumption								
No	496 (33.18)	941 (44.6)	Referent	Referent	Referent	Referent	Referent	Referent
Yes	999 (66.82)	1169 (55.4)	--	--	14 (6 ,23)	8 (2 ,14)	10 (1 ,21)	5 (-3 ,13)
Explained variance (%)			--	--	*3,88*	*4,46*	*1,63*	*2,20*
Raising animals for personal consumption								
No	892 (59.67)	1443 (68.39)	Referent	Referent	Referent	Referent	Referent	Referent
Yes	603 (40.33)	667 (31.61)	--	--	19 (11 ,27)	26 (19 ,34)	--	--
Explained variance (%)			--	--	*2,03*	*2,65*	--	--
Total variance explained (%)			40,63	37,96	32,45	31,15	51,84	46,07

Abbreviations: AU, Alcohol Units; BMI, Body Mass Index; eGFR, estimated glomerular filtration rate; HDC, Highly Developed Countries; HMPC, High Migratory Pressure Countries; PFOA, perfluorooctanoic acid; PFHxS, perfluorohexanesulfonic acid; PFOS, perfluorooctanesulfonic acid.

Legend
Red Area: the area of the Veneto Region including municipalities supplied by PFAS contaminated waterworks.
Red Area A: part of Red Area whose municipalities are located on the groundwater contamination plume.
HDC were defined as not Central-Eastern Europe, North America, Oceania, Israel and Japan. HMPC were defined as Central-Eastern Europe, North Africa, Sub-Saharan Africa, Asia except for Israel and Japan, and Central and South America countries. Duration of residency in the Red Area was calculated as the number of years spent in the Red Area between 1980 and 2013 (when granular activated carbon filters were installed). Intake of food items was categorised based on quartiles or tertiles.
Predictors shown for each PFAS were selected using a stepwise approach based on the Akaike information criterion (AIC).
Values of % difference were derived from Beta coefficients.

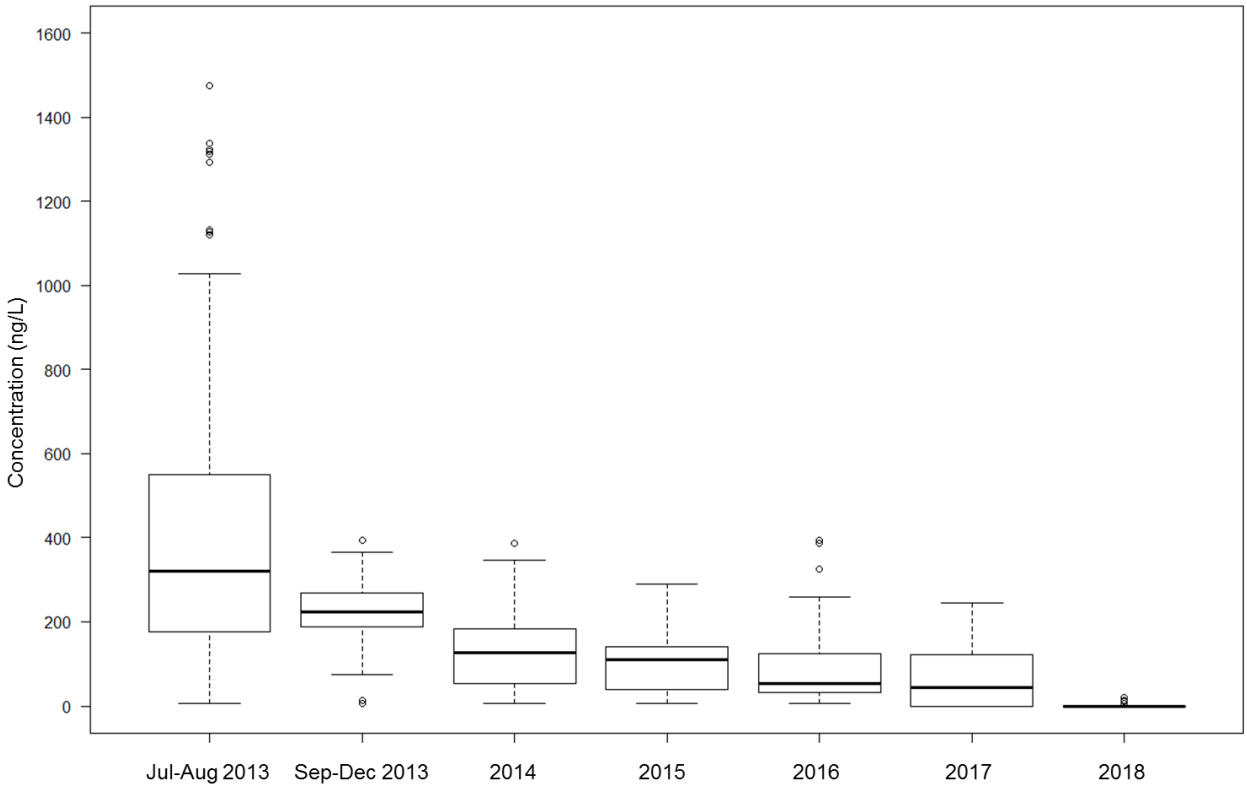

Figure S1 - Concentrations of PFOA in drinking water from waterworks of the Red Area, by time period.

PFOA, perfluorooctanoic acid.
Number of samples: Jul-Aug 2013: n=152; Sep-Dec 2013: n=115; 2014: n=359; 2015: n=317; 2016: n=272; 2017: n=340; 2018: n=228.
The Limit of Quantification (LOQ) was 10 ng/L until September 2017; thereafter it was reduced at 5 ng/L. Samples with a value <LOQ were assigned a value equal to half the LOQ.

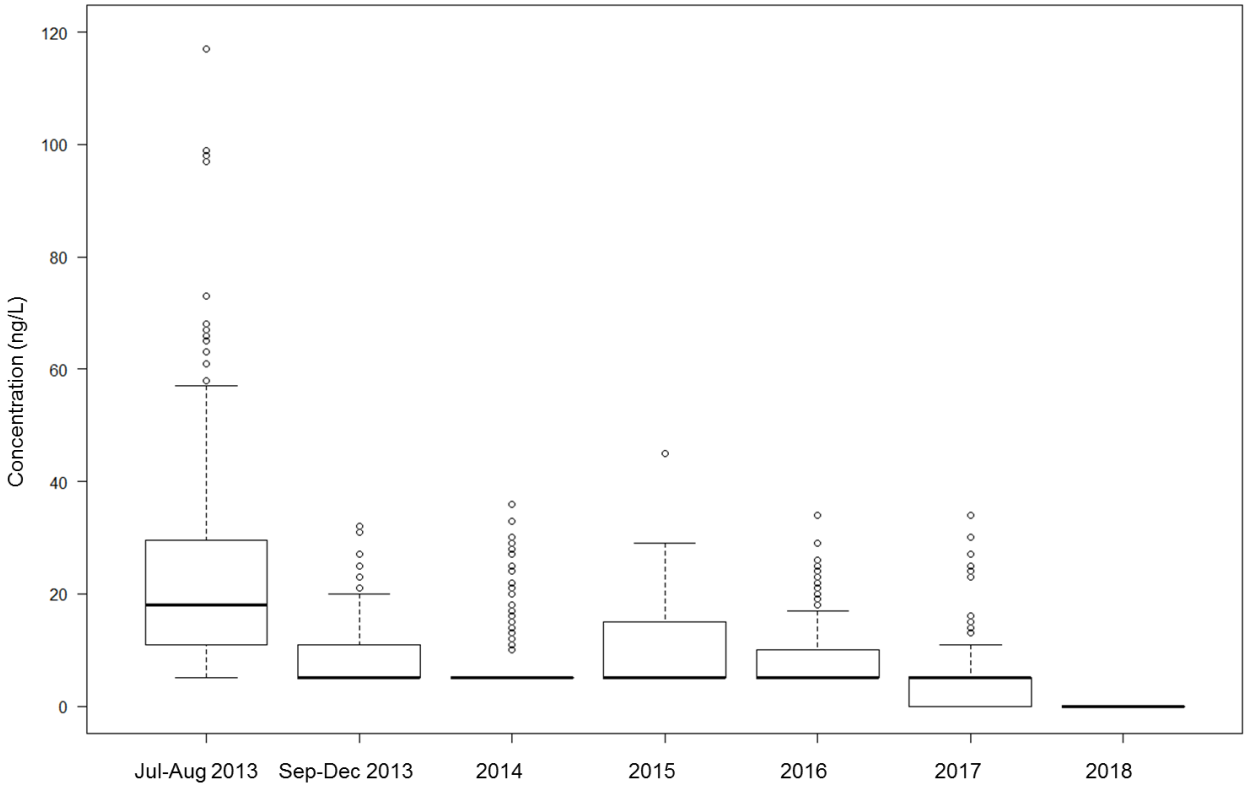

Figure S2 - Concentrations of PFOS in drinking water from waterworks of the Red Area, by time period.

PFOS, perfluorooctanesulfonic acid.
Number of samples: Jul-Aug 2013: n=152; Sep-Dec 2013: n=115; 2014: n=359; 2015: n=317; 2016: n=272; 2017: n=340; 2018: n=228.
The Limit of Quantification (LOQ) was 10 ng/L until September 2017; thereafter it was reduced at 5 ng/L. Samples with a value <LOQ were assigned a value equal to half the LOQ.

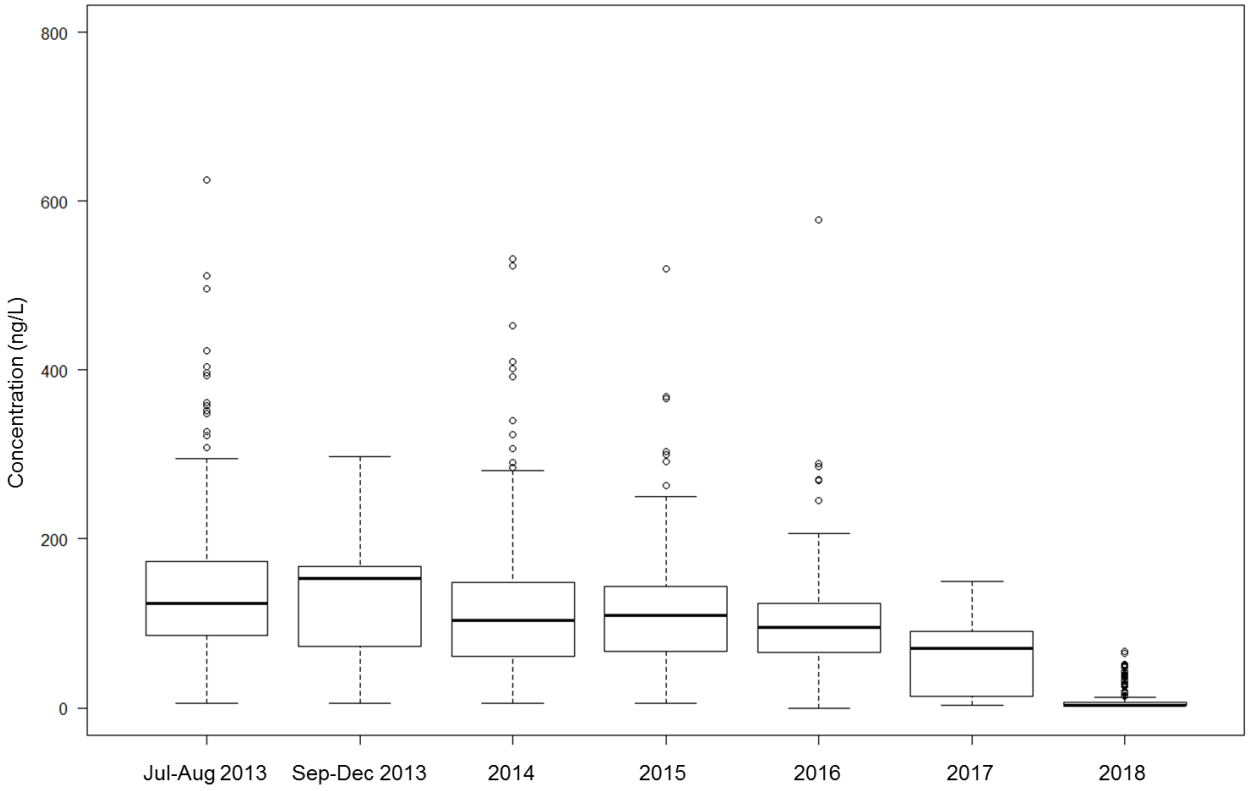

Figure S3 - Concentrations of PFBA in drinking water from waterworks of the Red Area, by time period.

PFBA, perfluorobutanoic acid.
Number of samples: Jul-Aug 2013: n=152; Sep-Dec 2013: n=115; 2014: n=359; 2015: n=317; 2016: n=272; 2017: n=340; 2018: n=228.
The Limit of Quantification (LOQ) was 10 ng/L until September 2017; thereafter it was reduced at 5 ng/L. Samples with a value <LOQ were assigned a value equal to half the LOQ.

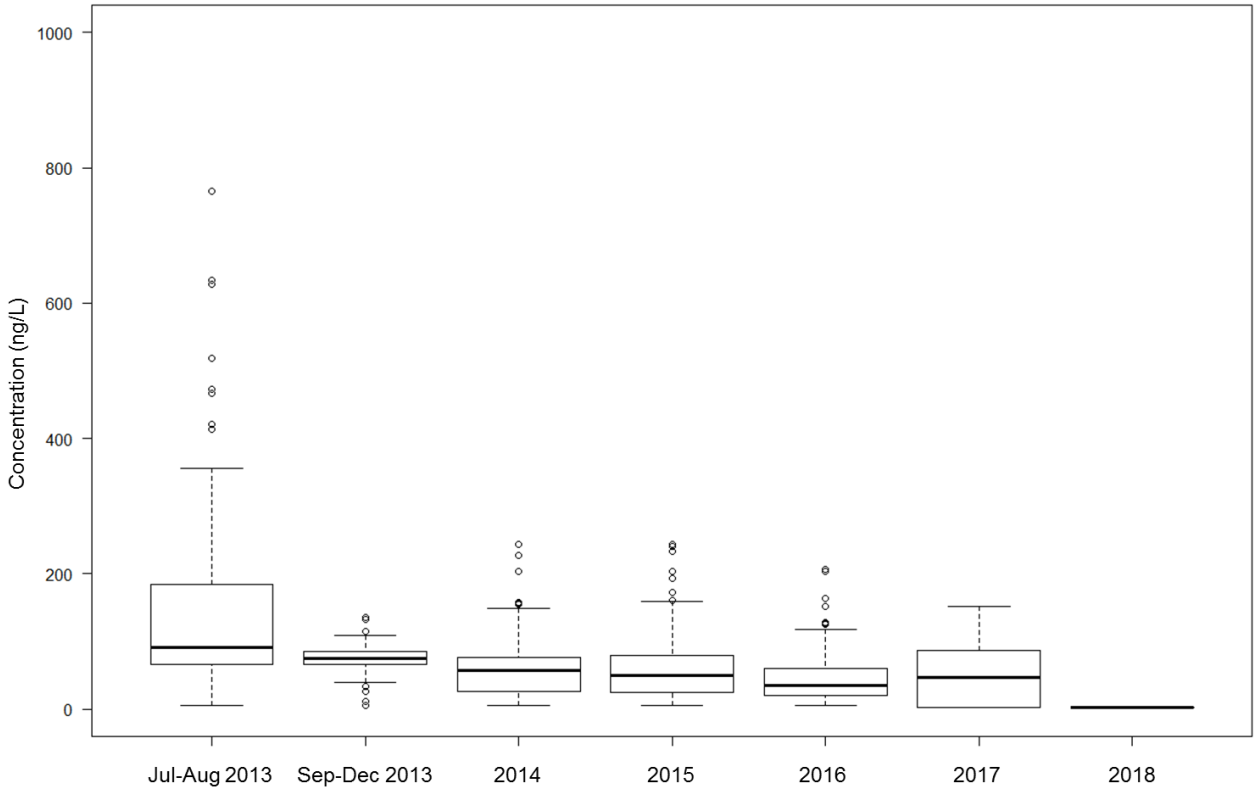

Figure S4 - Concentrations of PFBS in drinking water from waterworks of the Red Area, by time period.

PFBS, perfluorobutanesulfonic acid.
Number of samples: Jul-Aug 2013: n=152; Sep-Dec 2013: n=115; 2014: n=359; 2015: n=317; 2016: n=272; 2017: n=340; 2018: n=228.
The Limit of Quantification (LOQ) was 10 ng/L until September 2017; thereafter it was reduced at 5 ng/L. Samples with a value <LOQ were assigned a value equal to half the LOQ.

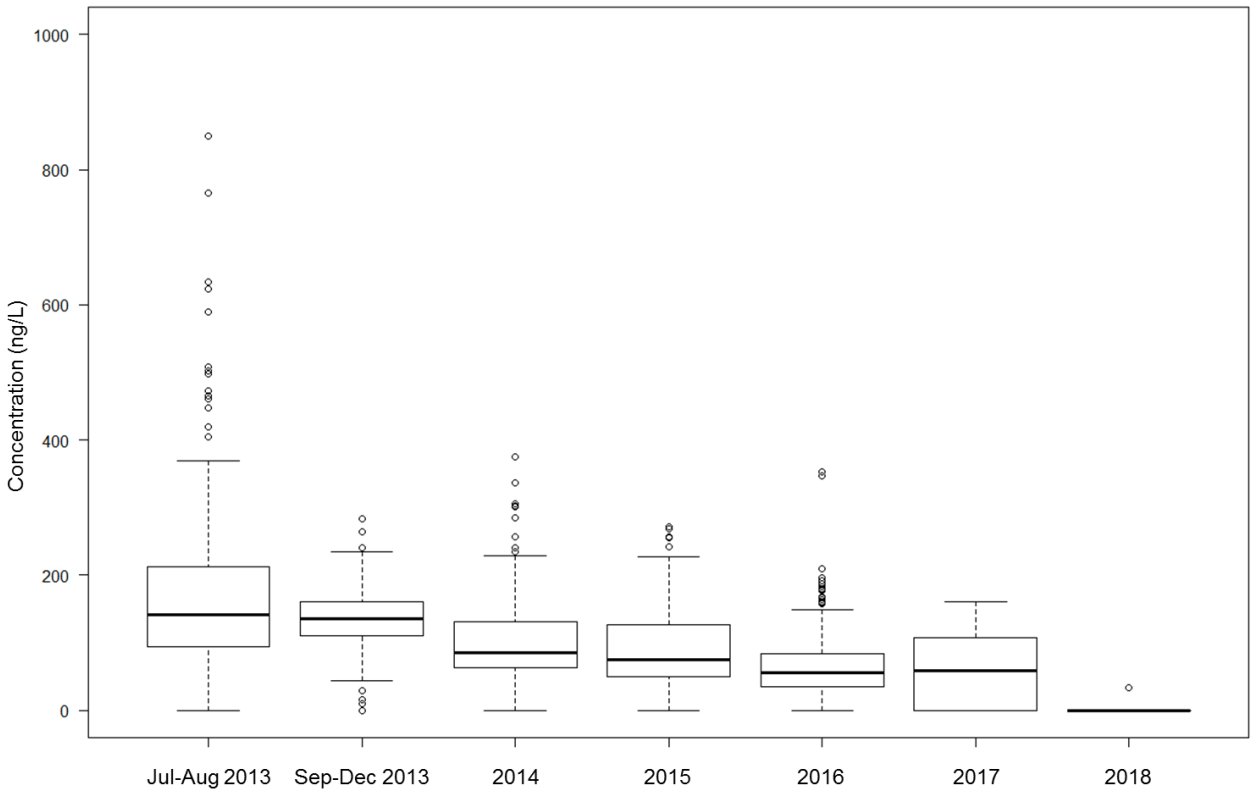

Figure S5 - Sum of the concentrations of other PFAS in drinking water from waterworks of the Red Area, by time period.

Other PFAS: PFPeA (perfluoropentanoic acid), PFHxA (perfluorohexanoic acid), PFHpA (perfluoroheptanoic acid), PFNA (perfluorononanoic acid), PFDeA (perfluorodecanoic acid), PFUnA (perfluoroundecanoic acid), PFDoA (perfluorododecanoic acid), PFHxS (perfluorohexanesulfonic acid).
Number of samples: Jul-Aug 2013: n=152; Sep-Dec 2013: n=115; 2014: n=359; 2015: n=317; 2016: n=272; 2017: n=340; 2018: n=228.
The Limit of Quantification (LOQ) for each compound was 10 ng/L until September 2017; thereafter it was reduced at 5 ng/L. Samples with a value <LOQ were assigned a value equal to half the LOQ.