

Supplemental Material

**Blood Lead Concentration and Thyroid Function during
Pregnancy: Results from the Yugoslavia Prospective Study of
Environmental Lead Exposure**

Linda G. Kahn, Xinhua Liu, Biljana Rajovic, Dusan Popovac, Sharon Oberfield, Joseph H.
Graziano, and Pam Factor-Litvak

Table S1. Bivariate associations between participant characteristics and mid-pregnancy thyroid function parameters [BPb ($\mu\text{g/dL}$), FT4 (ng/dL), TSH ($\mu\text{IU/mL}$), and TPO Ab (IU/mL)] among study participants.

Characteristic	BPb n	BPb Mean \pm SD	p-value ^a	FT4 n	FT4 Mean \pm SD	p-value ^a	TSH n	TSH Mean \pm SD	p-value ^a	TPO Ab n	TPO Ab Mean \pm SD	p-value ^a
Town			<0.0001			<0.0001			0.99			0.0002
Mitrovica	144	20.00 \pm 6.99		138	0.91 \pm 0.17		136	1.46 \pm 0.91		144	15.45 \pm 33.08	
Pristina	147	5.57 \pm 2.01		141	1.03 \pm 0.16		142	1.46 \pm 0.68		147	5.12 \pm 6.38	
Ethnicity	291		0.0019	279		<0.0001	278		0.13	291		0.46
Albanian	184	11.48 \pm 8.41		178	0.99 \pm 0.17		177	1.52 \pm 0.85		184	9.06 \pm 22.74	
Serbian	71	13.86 \pm 8.97		67	0.89 \pm 0.16		68	1.38 \pm 0.75		71	13.29 \pm 29.51	
Other	36	16.77 \pm 9.55		34	1.02 \pm 0.19		33	1.26 \pm 0.53		36	10.24 \pm 19.76	
Maternal education	291		0.64	279		0.030	278		0.34	291		0.62
None	16	13.51 \pm 11.09		16	1.08 \pm 0.25		16	1.15 \pm 0.62		16	12.24 \pm 30.79	
1-8 years	113	11.88 \pm 8.26		109	0.98 \pm 0.18		108	1.53 \pm 0.75		113	8.11 \pm 13.44	
9-12 years	143	13.27 \pm 9.12		135	0.95 \pm 0.17		135	1.44 \pm 0.87		143	11.93 \pm 30.73	
\geq 13 years	19	12.79 \pm 8.44		19	0.97 \pm 0.12		19	1.43 \pm 0.63		19	8.44 \pm 5.72	
Prior live births	291		0.075	279		0.46	278		0.53	291		0.28
0	88	14.39 \pm 8.79		86	0.97 \pm 0.16		83	1.54 \pm 1.00		88	13.66 \pm 32.67	
1-2	143	11.66 \pm 8.57		139	0.96 \pm 0.16		141	1.42 \pm 0.69		143	8.50 \pm 19.99	
3 or more	60	12.75 \pm 9.34		54	1.00 \pm 0.23		54	1.44 \pm 0.73		60	9.35 \pm 17.95	
Pre-pregnancy BMI	289		0.47	277		0.0081	276		0.84	289		0.84
Normal ($<$ 25 kg/m^2)	165	12.34 \pm 8.96		156	1.00 \pm 0.18		157	1.48 \pm 0.78		165	9.54 \pm 24.39	
Overweight (25-29.9 kg/m^2)	94	12.96 \pm 8.73		92	0.94 \pm 0.16		90	1.42 \pm 0.86		94	11.13 \pm 26.67	
Obese (\geq 30 kg/m^2)	30	14.48 \pm 8.75		29	0.92 \pm 0.16		29	1.43 \pm 0.75		30	11.60 \pm 14.54	
Smoking status	291		0.84	279		0.89	278		0.18	291		0.037
Nonsmoker	215	12.65 \pm 8.75		208	0.97 \pm 0.18		206	1.42 \pm 0.66		215	8.47 \pm 13.68	
Current smoker	76	12.89 \pm 9.19		71	0.97 \pm 0.16		72	1.57 \pm 1.10		76	15.22 \pm 41.24	
Hemoglobin	290		0.12	278		0.80	278		0.19	290		0.71
Sufficient (\geq 10.5 g/dL)	275	12.88 \pm 8.88		264	0.97 \pm 0.17		265	1.44 \pm 0.80		275	10.34 \pm 24.87	
Deficient ($<$ 10.5 g/dL)	15	9.21 \pm 7.98		14	0.98 \pm 0.21		13	1.74 \pm 0.67		15	7.90 \pm 6.26	
Crowded living conditions	291		0.18	279		0.027	278		0.39	291		0.97
No (\leq 1.33 adults/room)	142	13.42 \pm 8.88		137	0.95 \pm 0.18		136	1.41 \pm 0.67		142	10.18 \pm 21.98	
Yes ($>$ 1.33 adults/room)	149	12.04 \pm 8.80		142	0.99 \pm 0.17		142	1.50 \pm 0.90		149	10.29 \pm 26.26	
Maternal age (years)	291		0.63	279		0.90	278		0.32	291		0.72
$<$ 20	16	14.13 \pm 7.99		16	0.97 \pm 0.18		15	1.51 \pm 0.61		16	5.08 \pm 3.58	
20-24	107	11.86 \pm 8.62		103	0.97 \pm 0.18		101	1.56 \pm 0.95		107	10.92 \pm 28.94	
25-29	97	13.09 \pm 9.02		92	0.98 \pm 0.18		94	1.35 \pm 0.63		97	9.14 \pm 16.85	
\geq 30	71	13.15 \pm 9.21		68	0.96 \pm 0.17		68	1.43 \pm 0.78		71	11.86 \pm 27.55	
Gestational age at blood draw (days)	291		0.022	279		0.25	278		0.71	291		0.32
$<$ 106	70	15.20 \pm 9.29		66	1.01 \pm 0.17		66	1.36 \pm 0.83		70	13.98 \pm 30.91	
106-125	66	12.93 \pm 9.22		62	0.97 \pm 0.17		64	1.52 \pm 0.77		66	9.48 \pm 17.00	
126-145	79	12.20 \pm 8.78		76	0.95 \pm 0.17		74	1.49 \pm 0.69		79	11.05 \pm 32.20	
\geq 146	76	10.76 \pm 7.72		75	0.96 \pm 0.18		74	1.46 \pm 0.90		76	6.61 \pm 5.80	
Maternal height (cm)	289		<0.0001	277		0.058	276		0.058	289		0.33
$<$ 155	34	16.26 \pm 9.67		29	0.96 \pm 0.16		30	1.31 \pm 0.56		34	9.48 \pm 17.53	
155-159	72	16.25 \pm 9.50		69	0.93 \pm 0.18		71	1.67 \pm 1.07		72	13.14 \pm 30.83	
160-164	121	10.30 \pm 7.62		119	1.00 \pm 0.18		117	1.38 \pm 0.67		121	7.39 \pm 12.49	
\geq 165	64	11.39 \pm 8.08		62	0.97 \pm 0.16		60	1.43 \pm 0.70		64	12.74 \pm 33.76	
Pre-pregnancy weight (kg)	289		0.77	277		0.076	276		0.47	289		0.66
$<$ 55	48	12.77 \pm 9.77		43	1.03 \pm 0.18		45	1.41 \pm 0.54		48	9.30 \pm 17.54	
55-64	108	13.22 \pm 9.03		103	0.98 \pm 0.18		104	1.54 \pm 0.92		108	8.85 \pm 22.76	
65-74	86	11.89 \pm 8.66		86	0.95 \pm 0.17		84	1.44 \pm 0.82		86	13.00 \pm 32.83	
\geq 74	49	12.97 \pm 7.95		47	0.95 \pm 0.16		45	1.33 \pm 0.63		49	9.34 \pm 12.68	

^ap-values determined by analysis of variance.

Table S2. Unadjusted and adjusted regression coefficients (for free T4, ln-transformed TSH, and ln-transformed TPO Ab) and odds ratios (for TPO Ab \geq 10 IU/mL versus $<$ 10 IU/mL) for associations with ln-transformed mid-pregnancy blood lead concentrations, Pristina and Mitrovica.

Outcome	Unadjusted R ² (n)	Unadjusted β or OR (95% CI)	p-value	Adjusted R ² (n)	Adjusted β or OR (95% CI) ^a	p-value
Pristina						
Free T4 (ng/dL)	0.0022 (141)	-0.023 (-0.11, 0.059)	0.58	0.23 (139)	-0.033 (-0.11, 0.046)	0.41
Ln-TSH (μ IU/mL)	0.0024 (142)	0.041 (-0.10, 0.18)	0.57	0.069 (140)	0.054 (-0.91, 0.20)	0.46
Ln-TPO Ab (IU/mL)	0.015 (147)	-0.22 (-0.53, 0.092)	0.17	0.070 (147)	-0.22 (-0.54, 0.087)	0.16
TPO Ab \geq vs. $<$ 10 IU/mL	0.00010 (147)	1.1 (0.17, 7.28)	0.92	0.061 (147)	1.29 (0.16, 10.52)	0.81
Mitrovica						
Free T4 (ng/dL)	0.019 (138)	-0.060 (-0.13, 0.014)	0.11	0.17 (138)	-0.053 (-0.13, 0.021)	0.16
Ln-TSH (μ IU/mL)	0.0013 (136)	0.030 (-0.11, 0.17)	0.68	0.12 (136)	0.062 (-0.080, 0.21)	0.39
Ln-TPO Ab (IU/mL)	0.00096 (144)	-0.083 (-0.53, 0.36)	0.71	0.037 (144)	-0.12 (-0.57, 0.33)	0.59
TPO Ab \geq vs. $<$ 10 IU/mL	0.012 (144)	0.54 (0.22, 1.34)	0.19	0.044 (144)	0.49 (0.19, 1.26)	0.14

^aModel covariates: Free T4 = height, ethnicity, BMI, fetal gestational age, maternal education, adults per room; TSH = hemoglobin, ethnicity, BMI, fetal gestational age, maternal age; TPO Ab (continuous and dichotomous) = ethnicity, fetal gestational age, maternal age, adults per room