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Supplementary Materials: Element Levels and Predictors of Exposure in the Hair of Ethiopian Children

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Section 1. Reagents, standards, and calibration

Analytical reagent grade concentrated HNO_3 (67–70%; super-pure) was obtained from Carlo Erba Reagents S.r.l. (Milan, Italy) and HCl (assay >36%; residue <3 mg L^{-1}) and H_2O_2 (assay >30%) were obtained from Promochem, LGC Standards GmbH (Wesel, Germany). The 5% HCl was used as a carrier and 0.05% $NaBH_4$ (Sigma-Aldrich Chemie GmbH, St. Louis, USA) in 0.05% NaOH (assay >98%, anhydrous pellets, RPE for analysis, ACS – ISO; Carlo Erba Reagents, Milan, Italy) as reducing agent for cold vapor atomic fluorescence spectrometry (CV-AFS). Deionized water with a resistivity ≤18.3 MΩ cm was obtained using an Arioso Power I RO-UP Scholar UV water purification system (Human Corporation, Songpa-Ku, Seoul, Korea).

All calibration standard solutions for inductively coupled mass spectrometry (ICP-MS) were prepared from a multi-element standard solution (1.000 ± 0.005 mg L^{-1} As, Al, Ba, Be, Bi, Cd, Cr, Cs, Cu, Ga, La, Li, Mn, Mo, Nb, Ni, Pb, Rb, Sb, Se, Sn, Te, Ti, Tl, U, V, W, and Zr; 5.00 ± 0.03 mg L^{-1} Ce and Co; 10.00 ± 0.05 mg L^{-1} Fe and Zn; 50.00 ± 0.25 mg L^{-1} P and Si; 55.00 ± 0.25 mg L^{-1} B and Sr; 500.0 ± 2.5 mg L^{-1} K, Mg, and Na; 1000 ± 5 mg L^{-1} Ca and S; Ultra Scientific/Agilent Technologies, North Kingstown, RI, USA) and for CV-AFS from the Hg standard solution (1002 ± 7 mg L^{-1}; SCP Science, Baie D'Urfé, Canada) by dilution with 3% (v/v) HNO_3 (same percentage of acid present in the sample) in deionized water.

^{89}Y (0.005 mg L^{-1}) and ^{45}Sc, ^{103}Rh, ^{115}In, and ^{232}Th (0.01 mg L^{-1}) were chosen as the internal standard for all the ICP-MS measurements to control the nebulizer efficiency. A multi-element internal standard solution containing 0.005 mg L^{-1} of Y and 0.010 mg L^{-1} of Sc, Rh, In, and Th was prepared from single element stock standards (1000 ± 2 mg L^{-1}; Panreac Química, Barcelona, Spain, and 1000 ± 5 mg L^{-1}; Merck KGaA, Darmstadt, Germany, respectively) in HNO_3 1% (v/v). A standard solution containing 0.005 mg L^{-1} Ba, Be, Ce, Co, In, Pb, Mg, Tl, and Th was prepared daily in HNO_3 1% (v/v) from a multi-standard stock solution (10.00 ± 0.05 mg L^{-1}; Spectro Pure, Ricca Chemical Company, Arlington, TX, USA) to select the best ICP-MS performance.

The calibration curves for the analytes by ICP-MS were prepared using seven different concentrations in the range of 0.0005–0.05 mg L^{-1} for Al, As, Ba, Be, Bi, Cd, Ce, Cr, Cs, Cu, Ga, La, Li, Mn, Mo, Nb, Ni, Pb, Rb, Sb, Se, Sn, Te, Ti, Tl, U, V, W, and Zr; 0.0025–0.25 mg L^{-1} for Co, Fe, and Zn; 0.0275–2.75 mg L^{-1} for B, P, Si, and Sr; 0.25–25 mg L^{-1} for K, Mg and Na; and 0.5–50 mg L^{-1} for Ca. Hg was determined by CV-AFS using nine different standard concentrations ranging from 0.01 to 1.5 μg L^{-1}. All measurements were performed using a full quantitative mode analysis. The correlation coefficients for all calibration curves were at least 0.999, showing good linear relationships throughout the ranges of the concentrations studied. Moreover, the linear concentration range was verified using at least five levels (including zero) by Mandel fitting test.

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Table S1. Isotopes, analysis mode, and internal standards.

Isotope/ Element[a]	**ICP-MS** Mode	**Internal standard**
^{27}**Al**	Standard	^{45}Sc
^{75}**As**	CRI[b]	^{79}Y
^{11}**B**	Standard	^{45}Sc
^{137}**Ba**	Standard	^{115}In
^{9}**Be**	Standard	^{45}Sc
^{209}**Bi**	Standard	^{232}Th
^{44}**Ca**	Standard	^{79}Y
^{112}**Cd**	Standard	^{115}In
^{140}**Ce**	Standard	^{115}In
^{59}**Co**	Standard	^{45}Sc
^{52}**Cr**	CRI[b]	^{79}Y
^{133}**Cs**	Standard	^{115}In
^{65}**Cu**	Standard	^{79}Y
^{56}**Fe**	CRI[b]	^{79}Y
^{71}**Ga**	Standard	^{79}Y
Hg	-	-
^{39}**K**	Standard	^{45}Sc
^{139}**La**	Standard	^{115}In
^{7}**Li**	Standard	^{45}Sc
^{24}**Mg**	Standard	^{45}Sc
^{55}**Mn**	CRI[b]	^{79}Y
^{98}**Mo**	Standard	^{103}Rh
^{23}**Na**	Standard	^{45}Sc
^{93}**Nb**	Standard	^{103}Rh
^{60}**Ni**	Standard	^{45}Sc
^{31}**P**	Standard	^{45}Sc
^{208}**Pb**	Standard	^{232}Th
^{85}**Rb**	Standard	^{79}Y
^{121}**Sb**	Standard	^{115}In
^{76}**Se**	CRI[b]	^{79}Y
^{28}**Si**	Standard	^{45}Sc
^{118}**Sn**	Standard	^{115}In
^{88}**Sr**	Standard	^{79}Y
^{125}**Te**	Standard	^{115}In
^{49}**Ti**	Standard	^{45}Sc
^{205}**Tl**	Standard	^{232}Th
^{238}**U**	Standard	^{232}Th
^{51}**V**	CRI[b]	^{79}Y
^{182}**W**	Standard	^{232}Th
^{66}**Zn**	Standard	^{79}Y
^{90}**Zr**	Standard	^{79}Y

[a] A cold vapor atomic fluorescence spectrometry was used for Hg determination, while inductively coupled mass spectrometry was used for the other elements. [b] Collision-reaction interface.

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Table S2. Element concentrations (mg kg^{-1}) in children's hair by age group.

	<5 years			6-11 years			12-18 years		
Element	**GM**	**Min**	**Max**	**GM**	**Min**	**Max**	**GM**	**Min**	**Max**
Al	7	<DL	78	1	<DL	233	1	<DL	58
As	0.03	<DL	0.25	0.05	<DL	0.65	0.03	<DL	0.17
B	1.2	<DL	5.1	<DL	<DL	6.2	<DL	<DL	29.2
Ba	9	0	73	12	0.2	74	13	2	45
Be	**0.004**[a]	<DL	0.173	**0.013**[b]	<DL	0.181	0.011	<DL	0.049
Bi	0.001	<DL	0.025	0.001	<DL	0.551	<DL	<DL	0.076
Ca	1990	310	17300	1230	<DL	10700	1580	451	3590
Cd	0.09	0.03	0.37	0.10	<DL	1.58	0.12	0.01	0.56
Ce	**0.6**[a]	0.03	13.4	**1.6**[b]	0.2	12.9	1.1	0.2	2.8
Co	**0.23**[a]	0.02	3.23	**0.44**[b]	0.02	3.58	0.30	0.09	0.78
Cr	0.5	<DL	6.1	0.7	0.1	5.2	0.5	0.1	6.5
Cs	0.008	<DL	0.156	0.017	<DL	0.150	0.015	0.002	0.056
Cu	10.3	6.5	17.7	12.1	4.9	32.7	11.8	8.8	17.0
Fe	**151**[a]	11	3730	**365**[b]	27	4000	239	40	717
Ga	0.05	0.005	1.00	0.10	0.01	1.07	0.07	0.01	0.19
Hg	0.056	0.012	0.483	0.066	0.017	0.367	0.047	0.013	0.249
K	636	52	5790	1280	<DL	6690	1360	155	5880
La	**0.3**[a]	0.01	7.3	**0.8**[b]	0.1	6.6	0.6	0.1	1.4
Li	**0.13**[a]	0.02	1.34	**0.26**[b]	0.04	1.60	0.21	0.04	1.43
Mg	258	44	2320	306	62	1600	284	97	649
Mn	19	1	184	35	2	167	30	7	81
Mo	**0.03**[a]	<DL	1.53	**0.09**[b]	0.001	0.89	0.12	<DL	0.68
Na	**897**[a]	160	7450	**2510**[b]	361	15000	**2200**[b]	180	7120
Nb	0.00	<DL	0.80	0.001	<DL	0.88	0.001	<DL	0.08
Ni	1.0	0.2	6.9	1.5	0.3	6.6	1.1	0.2	8.8
P	97	21	611	94	2	407	104	28	194
Pb	3.3	0.5	32.8	3.5	0.6	15.5	2.7	0.3	26.6
Rb	0.9	0.1	7.3	1.6	0.2	8.6	1.5	0.3	4.7
Sb	0.11	<DL	8.85	0.06	<DL	0.49	0.06	<DL	0.62
Se	0.23	<DL	0.67	0.17	<DL	0.59	0.19	0.10	0.40
Si	18	<DL	472	110	3	499	123	3	484
Sn	0.27	0.04	1.05	0.20	<DL	1.01	0.25	0.05	2.38
Sr	17	3	99	19	3	76	21	4	44
Te	0.0015	<DL	0.0076	0.0014	<DL	0.0148	<DL	<DL	0.0077
Ti	11	2	226	20	2	253	13	3	43
Tl	0.0044	<0.0017	0.0243	0.0064	0.0020	0.0262	0.0054	0.0023	0.0104
U	0.020	0.002	0.167	0.037	0.002	0.204	0.030	0.010	0.099
V	0.6	0.1	10.3	1.1	<DL	12.0	0.7	0.2	2.6
W	<0.0017	<DL	0.0210	<DL	<DL	0.0462	<DL	<DL	<DL
Zn	112	39	300	67	<DL	451	98	10	234
Zr	0.29	0.02	6.05	0.53	0.01	6.29	0.35	0.06	1.54

[a, b] Nonparametric Kruskal-Wallis test was applied. Dunn's multiple comparison-adjusted by Bonferroni correction was used to make pairwise comparisons; different letters "a" and "b" in the same row indicate significant differences ($p < 0.05$ for Be, Ce, Co, Fe, La, Li, and Mo, and $p < 0.01$ for Na).

Table S3. Element levels (mg kg^{-1}) in male hair according to age.

	<5 years			6-11 years			12-18 years		
Element	**GM**	**Min**	**Max**	**GM**	**Min**	**Max**	**GM**	**Min**	**Max**
Al	16	<DL	78	1	<DL	233	1	<DL	41
As	0.03	<DL	0.21	0.05	<DL	0.65	0.04	<DL	0.17
B	1.1	<DL	5.1	1.1	<DL	2.4	1.0	<DL	1.0
Ba	6	<DL	20	8	<DL	74	12	2	39
Be	**0.001**[a]	<DL	0.054	**0.006**[b]	<DL	0.065	**0.008**[b]	<DL	0.033
Bi	0.001	<DL	0.013	<0.001	<DL	0.006	0.001	<DL	0.076
Ca	1460	345	7570	658	<DL	5710	1500	451	3600
Cd	0.08	0.03	0.22	0.04	<DL	0.34	0.08	0.01	0.26
Ce	**0.3**[a]	0.03	4.4	**1.0**[b]	0.2	6.2	0.9	0.2	2.3
Co	0.11	0.02	0.90	0.27	0.02	1.38	0.28	0.09	0.57
Cr	0.3	<DL	4.0	0.5	0.1	4.5	0.6	0.2	6.5
Cs	0.004	<DL	0.062	0.010	<DL	0.085	0.013	0.002	0.056
Cu	9.8	6.5	17.7	11.1	5.2	25.8	11.5	8.8	16.0
Fe	**66**[a]	11	1070	**221**[b]	27	1620	212	40	670
Ga	0.02	0.01	0.29	0.07	0.01	0.48	0.06	0.01	0.19
Hg	0.040	0.016	0.196	0.078	0.019	0.367	0.051	0.013	0.128
K	425	52	4420	683	<DL	3660	911	155	3170
La	**0.1**[a]	0.01	2.3	**0.5**[b]	0.1	3.3	0.5	0.1	1.2
Li	0.08	0.02	0.62	0.18	0.04	0.70	0.20	0.04	1.43
Mg	169	44	613	203	62	746	263	97	589
Mn	11	1	53	21	2	71	23	7	56
Mo	**0.02**[a]	0.01	0.22	0.05	<DL	0.22	**0.08**[b]	<DL	0.68
Na	794	160	7450	1740	361	10200	1450	180	3780
Nb	<DL	<DL	0.14	<0.0014	<DL	0.17	<0.0015	<DL	0.08
Ni	0.6	0.2	4.6	1.3	0.3	6.6	1.0	0.2	8.8
P	81	36	224	62	<DL	239	93	28	146
Pb	3.4	0.5	32.8	2.3	0.6	7.2	1.9	0.3	9.1
Rb	0.6	0.1	4.5	1.1	0.2	3.9	1.2	0.3	3.3
Sb	0.10	<DL	8.85	0.02	<DL	0.15	0.06	<DL	0.62
Se	0.21	<DL	0.52	0.16	<DL	0.59	0.22	0.16	0.40
Si	8	<DL	458	102	<DL	499	103	<DL	465
Sn	0.26	0.07	1.05	0.12	<DL	0.81	0.21	0.05	2.38
Sr	13	3	44	14	3	42	19	4	37
Te	<DL	<DL	0.0026	<DL	<DL	0.0033	<DL	<DL	0.0077
Ti	**5**[a]	2	58	**13**[b]	2	76	12	3	41
Tl	0.0037	0.0018	0.0126	0.0054	0.0028	0.0125	0.0048	0.0023	0.0092
U	**0.011**[a]	0.002	0.067	0.025	0.002	0.165	**0.030**[b]	0.010	0.099
V	0.3	0.1	2.8	0.6	<DL	4.1	0.7	0.2	1.7
W	<DL	<DL	0.0053	<0.0015	<DL	0.0128	<DL	<DL	<0.0014
Zn	137	81	300	72	<DL	451	95	10	202
Zr	0.12	0.03	0.87	0.34	0.01	1.90	0.32	0.06	1.30

[a, b] Nonparametric Kruskal-Wallis test was applied. Dunn's multiple comparison-adjusted by Bonferroni correction was used to make pairwise comparisons; different letters "a" and "b" in the same row indicate significant differences ($p < 0.05$).

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Table S4. Element levels (mg kg^{-1}) in male hair according to age.

	<5 years			6-11 years			12-18 years		
Element	**GM**	**Min**	**Max**	**GM**	**Min**	**Max**	**GM**	**Min**	**Max**
Al	3	<DL	72	1	<DL	167	<DL	<DL	58
As	0.03	<DL	0.25	0.06	<DL	0.32	<DL	<DL	0.08
B	1.4	<DL	4.6	1.3	<DL	6.2	1.6	<DL	29.2
Ba	14	1	73	17	4	68	13	4	45
Be	0.018	0.001	0.173	0.024	0.005	0.181	0.014	0.004	0.049
Bi	0.002	<DL	0.025	0.003	<DL	0.551	0.002	<DL	0.018
Ca	2870	310	17300	2070	284	10700	1660	850	3030
Cd	0.10	0.04	0.37	0.20	0.03	1.58	0.18	0.05	0.56
Ce	1.6	0.2	13.4	2.3	0.6	12.9	1.3	0.5	2.8
Co	0.57	0.10	3.23	0.67	0.18	3.58	0.32	0.17	0.78
Cr	1.2	0.1	6.1	0.8	0.3	5.2	0.5	0.1	2.6
Cs	0.016	<0.0014	0.156	0.028	0.007	0.150	0.017	0.005	0.056
Cu	10.9	7.8	13.6	13.0	4.9	32.7	12.2	9.0	17.0
Fe	413	29	3730	553	130	4000	271	106	717
Ga	0.14	0.01	1.00	0.15	0.04	1.07	0.08	0.03	0.19
Hg	0.083	0.012	0.483	0.057	0.017	0.317	0.043	0.015	0.249
K	1030	178	5790	2150	382	6690	2030	604	5880
La	0.9	0.1	7.3	1.2	0.3	6.6	0.7	0.3	1.4
Li	0.23	0.02	1.34	0.36	0.12	1.60	0.23	0.09	0.47
Mg	429	114	2320	430	163	1600	307	162	649
Mn	38	3	184	54	18	167	38	13	81
Mo	0.05	<DL	1.53	0.15	0.01	0.89	0.17	0.07	0.53
Na	**1040**[a]	247	3420	**3410**[b]	619	150000	**3350**[b]	1490	7120
Nb	0.01	<DL	0.80	0.00	<DL	0.88	<DL	<DL	0.07
Ni	1.8	0.3	6.9	1.7	0.5	5.9	1.1	0.5	4.6
P	119	21	611	135	55	407	117	75	194
Pb	3.0	0.9	15.8	5.0	1.4	15.5	4.0	1.9	26.6
Rb	1.5	0.3	7.3	2.2	0.5	8.6	1.9	0.9	4.7
Sb	0.11	0.01	0.35	**0.13**[a]	0.03	0.49	**0.07**[b]	0.03	0.14
Se	0.25	0.13	0.67	0.18	<DL	0.58	0.17	0.10	0.28
Si	49	<DL	472	117	<DL	338	147	39	484
Sn	0.28	0.04	0.98	0.31	0.11	1.01	0.30	0.09	0.78
Sr	25	5	99	25	8	76	23	10	44
Te	0.0021	<DL	0.0076	0.0017	<DL	0.0148	0.0014	<DL	0.0064
Ti	26	2	226	27	6	253	13	5	43
Tl	0.0055	<0.0017	0.0243	0.0075	0.0020	0.0262	0.0061	0.0045	0.0104
U	0.042	0.006	0.167	0.053	0.013	0.204	0.031	0.011	0.090
V	1.5	0.2	10.3	1.8	0.4	12.0	0.8	0.4	2.6
W	0.0010	<DL	0.0210	<DL	<DL	0.0462	<DL	<DL	<DL
Zn	88	39	240	62	<DL	251	100	42	234
Zr	0.89	0.02	6.05	0.77	0.16	6.29	0.39	0.16	1.54

[a, b] Nonparametric Kruskal-Wallis test was applied. Dunn's multiple comparison-adjusted by Bonferroni correction was used to make pairwise comparisons; different letters "a" and "b" in the same row indicate significant differences (for Sb: $p < 0.05$, and for Na: $p < 0.05$ between 0-5 and 12-18 years old groups and $p < 0.01$ between <5 and 6-11 years old groups).

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Table S5. Element levels (mg kg-1) in children's hair according to passive smoking.

	Non-passive smoking (n = 63)			Passive smoking (n = 14)			
Element	**GM**	**Min**	**Max**	**GM**	**Min**	**Max**	**p-value**
Al	1	<DL	233	1	<DL	73	-
As	0.04	<DL	0.65	0.04	<DL	0.26	-
B	1.3	<DL	29.2	1.1	<DL	2.5	-
Ba	11	<DL	74	14	3	55	ns
Be	0.009	<DL	0.181	0.009	<DL	0.127	ns
Bi	0.001	<DL	0.551	0.001	<DL	0.039	-
Ca	1350	<DL	17300	2560	772	8870	ns
Cd	0.10	<DL	1.58	0.10	0.03	0.51	ns
Ce	1.1	0.03	13.4	1.0	0.1	9.4	ns
Co	0.32	0.02	3.58	0.35	0.05	3.09	ns
Cr	0.6	0.1	6.5	0.5	<DL	3.1	ns
Cs	0.013	<DL	0.156	0.016	0.001	0.098	ns
Cu	**12.0**	4.9	32.7	**9.4**	5.2	16.0	*
Fe	244	11	4000	289	16	2810	ns
Ga	0.07	0.010	1.07	0.08	0.01	0.71	ns
Hg	0.054	0.013	0.367	0.073	0.012	0.483	ns
K	1100	<DL	6690	936	118	4120	ns
La	0.6	0.01	7.3	0.6	0.0	4.7	ns
Li	0.20	0.02	1.60	0.21	0.02	1.43	ns
Mg	279	60	2320	318	44	1400	ns
Mn	27	1	184	32	4	135	ns
Mo	0.08	<DL	1.53	0.06	<DL	0.39	ns
Na	1940	180	15000	1300	160	5540	ns
Nb	0.001	<DL	0.88	0.002	<DL	0.66	-
Ni	1.2	0.2	8.8	1.2	0.2	4.6	ns
P	96	<DL	611	109	47	259	ns
Pb	3.3	0.3	32.8	2.6	0.5	11.3	ns
Rb	1.4	0.1	8.6	1.2	0.2	4.9	ns
Sb	0.07	<DL	8.85	0.06	<DL	0.35	ns
Se	0.19	<DL	0.59	0.18	0.02	0.67	ns
Si	67	<DL	499	73	<DL	484	-
Sn	0.23	<DL	2.38	0.23	0.07	0.75	ns
Sr	19	3	99	22	6	65	ns
Te	<DL	<DL	0.0148	<DL	<DL	0.0085	-
Ti	14	2	253	16	2	191	ns
Tl	0.0056	<0.0017	0.0262	0.0051	0.0016	0.0154	ns
U	0.030	0.002	0.204	0.028	0.005	0.120	ns
V	0.7	<DL	12.0	1.1	0.1	7.7	ns
W	<DL	<DL	0.0462	<DL	<DL	0.0156	-
Zn	86	<DL	451	89	39	300	ns
Zr	0.39	0.01	6.29	0.43	0.02	6.05	ns

[a] Mann-Whitney test: ns = not significant at $p > 0.05$ and significant at $p < 0.05$ (*). Elements with a detection frequency percentage >DL lower than 80% were excluded from the statistical calculation: Al, As, B, Bi, Nb, Si, Te, and W.

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Table S6. Influence of fish consumption on element levels (mg kg^{-1}) in children's hair.

Element	No fish consumption (n=33)			Fish consumption (n=47)			*p*-value
	GM	Min	Max	GM	Min	Max	
Al	2	<DL	233	1	<DL	167	-
As	0.03	<DL	0.65	0.04	<DL	0.32	-
B	1.1	<DL	5.1	1.3	<DL	29.2	-
Ba	7	<DL	73	14	<DL	74	**
Be	0.006	<DL	0.173	0.010	<DL	0.181	ns
Bi	0.001	<DL	0.551	0.001	<DL	0.076	-
Ca	1210	<DL	10700	1740	<DL	17300	ns
Cd	0.10	<DL	1.58	0.10	0.01	0.91	ns
Ce	0.8	0.1	13.4	1.2	0.03	12.9	ns
Co	0.25	0.02	3.23	0.39	0.05	3.58	ns
Cr	0.5	0.1	6.1	0.6	<DL	6.5	ns
Cs	0.011	<DL	0.156	0.015	<DL	0.150	ns
Cu	12.9	7.6	32.7	10.7	4.9	29.8	ns
Fe	192	17	3730	296	11	4000	ns
Ga	0.06	0.01	1.00	0.09	0.005	1.07	ns
Hg	0.034	0.013	0.238	0.078	0.012	0.483	***
K	833	<DL	4420	1240	<DL	6690	ns
La	0.5	0.0	7.3	0.6	0.01	6.6	ns
Li	0.17	0.02	1.34	0.22	0.02	1.60	ns
Mg	241	60	1470	316	44	2320	ns
Mn	22	1	178	33	2	184	ns
Mo	0.04	<DL	0.89	0.10	<DL	1.53	*
Na	1670	301	7450	1890	160	15000	ns
Nb	0.0005	<DL	0.80	0.0013	<DL	0.88	-
Ni	1.3	0.3	6.8	1.2	0.2	8.8	ns
P	76	<DL	455	114	21	611	*
Pb	4.0	0.7	32.8	2.8	0.3	26.6	ns
Rb	1.1	0.2	7.3	1.5	0.1	8.6	ns
Sb	0.08	<DL	8.85	0.07	<DL	0.62	ns
Se	0.21	<DL	0.67	0.18	<DL	0.58	ns
Si	39	<DL	499	94	<DL	484	-
Sn	0.22	<DL	1.05	0.24	0.04	2.38	ns
Sr	16	3	87	22	3	99	ns
Te	0.0013	<DL	0.0076	0.0014	<DL	0.0148	-
Ti	11	2	226	17	2	253	ns
Tl	0.0047	0.0018	0.0243	0.0060	0.0007	0.0262	*
U	0.024	0.002	0.167	0.033	0.005	0.204	ns
V	0.5	<DL	10.3	1.0	0.1	12.0	ns
W	0.0007	<DL	0.0462	0.0005	<DL	0.0210	-
Zn	105	<DL	451	76	<DL	300	**
Zr	0.29	0.01	4.58	0.49	0.02	6.29	ns

[a] Mann-Whitney test: ns = not significant at $p > 0.05$, and significant at $p < 0.05$ (*), $p < 0.01$ (**), and $p < 0.001$ (***). Elements with a detection frequency percentage >DL lower than 80% were excluded from the statistical calculation: Al, As, B, Bi, Nb, Si, Te, and W.

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Table S7. Results of the backward multiple linear regression model analysis for major and trace elements.

Elements	Factors	B[a]	SE[b]	[c]	*p*-value	95% Confidence interval for B Lower bound	Upper bound	R^2	Adjusted R^2 of the model[d]
Ca	**Constant**	8.133	0.276		<0.001	7.582	8.684	0.427	0.399
	Gender	-0.456	0.170	-0.259	0.009	-0.795	-0.116		
	Fruit and vegetables	-0.926	0.250	-0.362	<0.001	-1.426	-0.427		
	Drinking water	0.742	0.172	0.421	<0.001	0.398	1.086		
Ce	**Constant**	0.872	0.340		0.013	0.193	1.550	0.541	0.512
	Gender	-0.996	0.206	-0.420	<0.001	-1.408	-0.585		
	Fruit and vegetables	-0.857	0.304	-0.245	0.006	-1.464	-0.249		
	Drinking water	1.228	0.211	0.515	<0.001	0.807	1.649		
Co	**Constant**	-0.321	0.266		0.233	-0.852	0.211	0.618	0.600
	Gender	-0.833	0.162	-0.400	<0.001	-1.156	-0.510		
	Fruit and vegetables	-0.958	0.241	-0.312	<0.001	-1.439	-0.477		
	Drinking water	1.104	0.164	0.529	<0.001	0.776	1.433		
Cr	**Constant**	-0.496	0.180		0.008	-0.858	-0.135	0.255	0.212
	Age	-0.266	0.116	-0.284	0.026	-0.498	-0.033		
	Drinking water	0.628	0.170	0.457	0.001	0.287	0.968		
Cu	**Constant**	1.910	0.231		<0.001	1.448	2.373	0.158	0.131
	BMI	0.035	0.015	0.280	0.019	0.006	0.065		
	Passive smoking	-0.200	0.095	-0.244	0.040	-0.391	-0.009		
Fe	**Constant**	6.513	0.367		<0.001	5.780	7.247	0.593	0.567
	Gender	-0.947	0.210	-0.364	<0.001	-1.367	-0.526		
	Fruit and vegetables	-1.043	0.313	-0.272	0.001	-1.669	-0.417		
	Drinking water	1.632	0.247	0.625	<0.001	1.139	2.125		
Ga	**Constant**	-1.829	0.339		<0.001	-2.506	-1.152	0.548	0.526
	Gender	-0.883	0.206	-0.363	<0.001	-1.295	-0.472		
	Fruit and vegetables	-0.979	0.307	-0.273	0.002	-1.592	-0.366		
	Drinking water	1.270	0.209	0.520	<0.001	0.852	1.688		
K	**Constant**	7.521	0.194		<0.001	7.131	7.911	0.177	0.144
	Gender	-0.479	0.190	-0.328	0.015	-0.860	-0.097		
La	**Constant**	0.275	0.339		0.419	-0.401	0.952	0.541	0.512
	Gender	-1.008	0.205	-0.426	<0.001	-1.419	-0.598		
	Passive smoking	-0.566	0.273	-0.182	0.042	-1.112	-0.021		
	Fruit and vegetables	-0.869	0.303	-0.249	0.006	-1.474	-0.263		
	Drinking water	1.207	0.210	0.508	<0.001	0.787	1.627		
Mg	**Constant**	6.103	0.235		<0.001	5.634	6.573	0.468	0.443
	Gender	-0.615	0.143	-0.395	<0.001	-0.900	-0.330		
	Fruit and vegetables	-0.521	0.213	-0.227	0.017	-0.946	-0.095		
	Drinking water	0.705	0.145	0.451	<0.001	0.414	0.995		
Mn	**Constant**	4.325	0.287		<0.001	3.751	4.898	0.531	0.500
	Gender	-0.784	0.165	-0.415	<0.001	-1.114	-0.454		
	Fruit and vegetables	-0.819	0.245	-0.296	0.001	-1.308	-0.330		
	Drinking water	0.998	0.193	0.527	<0.001	0.613	1.383		
Mo	**Constant**	-1.981	0.253		<0.001	-2.489	-1.473	0.401	0.355
	Gender	-0.477	0.149	-0.347	0.002	-0.775	-0.178		
	Age	0.291	0.109	0.294	0.010	0.072	0.509		
	Fruit and vegetables	-0.520	0.219	-0.263	0.022	-0.960	-0.079		
	Drinking water	0.478	0.149	0.348	0.002	0.178	0.777		
Na	**Constant**	7.525	0.251		<0.001	7.025	8.026	0.172	0.146
	Gender	-0.682	0.235	-0.328	0.005	-1.151	-0.213		
	Age	0.349	0.164	0.241	0.037	0.022	0.675		
P	**Constant**	4.586	0.085		<0.001	4.416	4.755	0.278	0.254
	Gender	-0.209	0.099	-0.234	0.039	-0.407	-0.011		
	Drinking water	0.411	0.099	0.458	<0.001	0.212	0.610		
Rb	**Constant**	0.906	0.329		0.008	0.249	1.562	0.370	0.330
	Gender	-0.798	0.199	-0.407	<0.001	-1.196	-0.400		
	Drinking water	0.751	0.204	0.382	<0.001	0.344	1.159		
Se	**Constant**	-1.671	0.328		<0.001	-2.332	-1.010	0.209	0.154
	Age	-0.292	0.098	-0.459	0.005	-0.489	-0.095		
	Passive smoking	-0.455	0.185	-0.359	0.018	-0.827	-0.082		

Sr	**Constant**	3.562	0.219		<0.001	3.125	4.000	0.436	0.409
	Gender	-0.392	0.135	-0.278	0.005	-0.662	-0.123		
	Fruit and vegetables	-0.735	0.198	-0.358	<0.001	-1.132	-0.338		
	Drinking water	0.598	0.137	0.424	<0.001	0.325	0.870		
Ti	**Constant**	3.266	0.317		<0.001	2.632	3.900	0.567	0.547
	Gender	-0.722	0.193	-0.310	<0.001	-1.107	-0.337		
	Fruit and vegetables	-0.943	0.287	-0.274	0.002	-1.517	-0.369		
	Drinking water	1.327	0.196	0.567	<0.001	0.935	1.719		
V	**Constant**	0.643	0.273		0.022	0.097	1.189	0.641	0.624
	Gender	-0.855	0.167	-0.388	<0.001	-1.189	-0.521		
	Fruit and vegetables	-1.015	0.248	-0.314	<0.001	-1.510	-0.521		
	Drinking water	1.237	0.170	0.560	<0.001	0.899	1.576		
Zn	**Constant**	4.503	0.175		<0.001	4.154	4.852	0.398	0.369
	Gender	0.284	0.108	0.264	0.011	0.069	0.499		
	Drinking water	-0.529	0.109	-0.491	<0.001	-0.748	-0.311		
Zr	**Constant**	-0.050	0.385		0.898	-0.818	0.719	0.519	0.497
	Gender	-0.900	0.234	-0.335	<0.001	-1.367	-0.433		
	Fruit and vegetables	-1.152	0.348	-0.291	0.002	-1.848	-0.456		
	Drinking water	1.352	0.238	0.502	0.005	-0.872	-0.165		

No variable entered in the models run for Al, As, B, Bi, Nb, Pb, Sb, Si, Te, and W. [a] B, non-standardized regression coefficients. [b] SE, standard error. [c] β, standardized regression coefficients. [d] Constant, estimated intercept value. Variables considered: gender (female = 0, male = 1), age categorized as <5 years old (=0), 6-11 years old (=1) or 12-18 years old (=2), body mass index (BMI) categorized as underweight (=0), normal weight (=1) or overweight/obesity (=2), drinking water (bottle and/or improved water = 0, Blue Nile river water = 1), fish consumption (no = 0, yes = 1), fruit and vegetables consumption (no = 0, yes = 1), and cereals consumption (g month^{-1}, continuous variable).

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Figure S1. Landscapes of the studied area (Bameza in the Benishangul-Gumuz region along the Blue Nile in north-western Ethiopia, Africa).

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Figure S2. Sampling site of the Blue Nile river water (Bameza, Ethiopia).

Figure S3. Sampling site of the treated water of the Blue Nile river (Bameza, Ethiopia).