**Supplementary Material**

**Urinary metal concentrations among mothers and children in a Mexico City birth cohort study**

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Table S1. Spearman correlationsa between urinary metal concentrationsb measured among ELEMENT mothers at third trimester

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Al** | **As** | **Ba** | **Cd** | **Co** | **Mn** | **Mo** | **Ni** | **Pb** | **Se** | **Zn** |
| **Al** | 1.00 | 0.21\* | 0.19\* | 0.21\* | 0.16\* | 0.40\* | -0.05 | 0.36\* | 0.13 | 0.38\* | 0.38\* |
| **As** |  | 1.00 | 0.18\* | 0.38\* | 0.35\* | 0.31\* | 0.31\* | 0.23\* | 0.28\* | 0.30\* | 0.26\* |
| **Ba** |  |  | 1.00 | 0.30\* | 0.36\* | 0.37\* | 0.42\* | 0.26\* | 0.57\* | -0.12 | -0.01 |
| **Cd** |  |  |  | 1.00 | 0.48\* | 0.50\* | 0.47\* | 0.25\* | 0.40\* | 0.22\* | 0.27\* |
| **Co** |  |  |  |  | 1.00 | 0.45\* | 0.45\* | 0.26\* | 0.33\* | 0.12 | 0.23\* |
| **Mn** |  |  |  |  |  | 1.00 | 0.22\* | 0.39\* | 0.42\* | 0.20\* | 0.24\* |
| **Mo** |  |  |  |  |  |  | 1.00 | 0.08 | 0.48\* | -0.05 | 0.04 |
| **Ni** |  |  |  |  |  |  |  | 1.00 | 0.21\* | 0.32\* | 0.29 |
| **Pb** |  |  |  |  |  |  |  |  | 1.00 | -0.01 | 0.09 |
| **Se** |  |  |  |  |  |  |  |  |  | 1.00 | 0.61\* |
| **Zn** |  |  |  |  |  |  |  |  |  |  | 1.00 |
| aCorrelations were based on data from 188 to 205 metal-metal pairs.  bUrinary concentrations were corrected for specific gravity.  \*p<0.05. | | | | | | | | | | | |

Table S2. Spearman correlationsa between urinary metal concentrationsb measured among ELEMENT children at 8-14 years of age

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Al** | **As** | **Ba** | **Cd** | **Co** | **Mn** | **Mo** | **Ni** | **Pb** | **Se** | **Zn** |
| **Al** | 1.00 | 0.25\* | 0.40\* | 0.38\* | 0.29\* | 0.19\* | 0.23\* | 0.38\* | 0.38\* | 0.25\* | 0.21\* |
| **As** |  | 1.00 | 0.05 | 0.25\* | 0.15\* | 0.09 | 0.39\* | 0.12 | 0.21\* | 0.40\* | 0.38\* |
| **Ba** |  |  | 1.00 | 0.27\* | 0.41\* | 0.15\* | 0.11\* | 0.46\* | 0.29\* | -0.01 | 0.25\* |
| **Cd** |  |  |  | 1.00 | 0.23\* | 0.16\* | 0.44\* | 0.24\* | 0.29\* | 0.38\* | 0.38\* |
| **Co** |  |  |  |  | 1.00 | 0.11 | 0.33\* | 0.32\* | 0.35\* | 0.11\* | 0.25\* |
| **Mn** |  |  |  |  |  | 1.00 | 0.34\* | 0.09 | 0.31\* | 0.25\* | 0.08 |
| **Mo** |  |  |  |  |  |  | 1.00 | 0.06 | 0.32\* | 0.50\* | 0.30\* |
| **Ni** |  |  |  |  |  |  |  | 1.00 | 0.35\* | 0.05 | 0.20\* |
| **Pb** |  |  |  |  |  |  |  |  | 1.00 | 0.18\* | 0.28\* |
| **Se** |  |  |  |  |  |  |  |  |  | 1.00 | 0.39\* |
| **Zn** |  |  |  |  |  |  |  |  |  |  | 1.00 |
| aCorrelations were based on data from 222 to 242 metal-metal pairs.  bUrinary concentrations were corrected for specific gravity.  \*p<0.05. | | | | | | | | | | | |

Table S3. Percent change (95% CI)a in urinary metal concentrations in relation to demographic variables and BMI z-score among ELEMENT children at 8-14 years of age

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Alb** | **Asb** | **Bab** | **Cdb** | **Cob** | **Mnb** | **Mob** | **Nib** | **Pbb** | **Znc** |
| **Boys (ref: girls)** | 11 (-7, 31) | -9 (-21, 4) | 10 (-8, 32) | 8 (-4, 22) | 2 (-9, 13) | -12 (-24, 1) | -10 (-22, 2) | -3 (-14, 10) | 5 (-10, 24) | -7 (-18, 6) |
| **Age (yr.)** | -1 (-6, 4) | 1 (-3, 6) | 2 (-3, 8) | 1 (-3, 5) | 6 (3, 9)\* | 1 (-4, 5) | -2 (-6, 1) | 1 (-2, 5) | 4 (-1, 9) | 1 (-3, 5) |
| **BMI (z-score)** | 2 (-4, 10) | 1 (-5, 6) | 4 (-3, 12) | -3 (-8, 1) | 3 (-1, 8) | -1 (-6, 5) | -5 (-9, 1) | -1 (-5, 5) | -4 (-10, 2) | 2 (-3, 8) |
| **SES scored** | -3 (-6, 1) | 2 (-1, 4) | -1 (-4, 4) | -1 (-3, 2) | -1 (-3, 2) | 1 (-2, 4) | -1 (-4, 1) | 1 (-2, 3) | -2 (-5, 1) | 1 (-2, 3) |
| **Maternal ed. (yr.)** | -1 (-4, 2) | 1 (-1, 4) | 1 (-2, 4) | 1 (-2, 2) | -1 (-2, 2) | 2 (-1, 5) | 1 (-1, 3) | 1 (-2, 3) | -1 (-4, 2) | -1 (-3, 2) |
| aResults from linear regression models using ln-transformed urinary metal concentrations, adjusted for specific gravity. Effect estimates are expressed as percent change in urinary metal concentrations relative to the reference group.  bTotal sample size for Al, As, Ba, Cd, Co, Mn, Mo, Ni, and Pb was 242 for all variables, except for family possessions and maternal education, which was 218 and 241, respectively.  cTotal sample size for Zn was 222 for all variables, except for family possessions and maternal education, which was 199 and 221, respectively.  dHigher score indicates higher household possessions.  \*p<0.05. | | | | | | | | | | |

Table S4. Distribution of personal care product use in the past 24 hours among ELEMENT children at 8-14 years of age

|  |  |  |
| --- | --- | --- |
|  | ***n* (%)** | |
| **Product** | **Yes** | **No** |
| **Bar soap** | 241 (96) | 9 (4) |
| **Boys** | 111 (94) | 7 (6) |
| **Girls** | 130 (98) | 2 (2) |
| **Cologne/perfume\*** | 118 (47) | 132 (53) |
| **Boys** | 34 (29) | 84 (71) |
| **Girls** | 84 (64) | 48 (36) |
| **Conditioner\*** | 50 (20) | 200 (80) |
| **Boys** | 6 (5) | 112 (95) |
| **Girls** | 44 (33) | 88 (67) |
| **Cosmeticsa** | 12 (9) | 120 (91) |
| **Deodorant** | 132 (53) | 118 (47) |
| **Boys** | 60 (51) | 58 (49) |
| **Girls** | 72 (55) | 60 (45) |
| **Fingernail polisha** | 41 (31) | 91 (69) |
| **Hair spray/hair gel\*** | 168 (67) | 82 (33) |
| **Boys** | 90 (76) | 28 (24) |
| **Girls** | 78 (59) | 54 (41) |
| **Hair cream\*** | 33 (13) | 217 (87) |
| **Boys** | 2 (2) | 116 (98) |
| **Girls** | 31 (23) | 101 (73) |
| **Laundry products** | 244 (98) | 6 (2) |
| **Boys** | 116 (98) | 2 (2) |
| **Girls** | 128 (97) | 4 (3) |
| **Liquid soap** | 203 (81) | 47 (19) |
| **Boys** | 98 (83) | 20 (17) |
| **Girls** | 105 (80) | 27 (20) |
| **Lotion\*** | 51 (20) | 199 (80) |
| **Boys** | 49 (42) | 69 (58) |
| **Girls** | 2 (2) | 130 (98) |
| **Mouthwash** | 75 (30) | 175 (70) |
| **Boys** | 33 (28) | 85 (72) |
| **Girls** | 42 (32) | 90 (68) |
| **Shampoo** | 241 (96) | 9 (4) |
| **Boys** | 111 (94) | 7 (6) |
| **Girls** | 130 (98) | 2 (2) |
| **Other hair products** | 8 (3) | 242 (97) |
| **Boys** | 1 (1) | 117 (99) |
| **Girls** | 7 (5) | 125 (95) |
| **Other toiletries** | 11 (4) | 239 (96) |
| **Boys** | 3 (3) | 115 (97) |
| **Girls** | 8 (6) | 124 (94) |
| aData from girls only | | |
| \*p<0.05 for comparison of product use between boys and girls. | | |

Table S5. Percent change (95% CI)a in urinary metal concentrations in relation to personal care product use in the past 24 hours among ELEMENT children at 8-14 years of age

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Product** | **Alb** | **Asb** | **Bab** | **Cdb** | **Cob** | **Mnb** | **Mob** | **Nib** | **Pbb** | **Znc** |
| **Bar soap** | -4 (-39, 50) | 9 (-23, 56) | -4 (-40, 54) | -4 (-27, 27) | 3 (-25, 42) | -9 (-37, 33) | -6 (-34, 32) | -17 (-40, 13) | 14 (-25, 74) | -3 (-31, 34) |
| **Cologne/perfume** | 22 (3, 44)\* | 12 (-2, 28) | 9 (-8, 31) | 2 (-9, 13) | -1 (-12, 12) | 4 (-10, 20) | 2 (-11, 16) | -7 (-17, 5) | 18 (1, 38)\* | 14 (1, 30)\* |
| **Conditioner** | 9 (-12, 35) | -4 (-18, 14) | 1 (-20, 26) | 11 (-3, 26) | 8 (-7, 25) | -6 (-21, 13) | -7(-21, 9) | -4 (-18, 11) | 7 (-12, 31) | -4 (-18, 13) |
| **Cosmetics** | 2 (-30, 50) | 34 (-1, 81)\* | -8 (-40, 41) | 14 (-15, 51) | 15 (-16, 57) | -10 (-36, 26) | 34 (-1, 80) | -6 (-30, 25) | 1 (-32, 50) | 28 (-7, 75) |
| **Deodorant** | 10 (-7, 31) | 3 (-10, 17) | 23 (3, 47)\* | 12 (1, 25)\* | -4 (-15, 8) | 7 (-7, 23) | -11 (-22, 1) | 3 (-9, 16) | 7 (-8, 26) | 7 (-6, 22) |
| **Fingernail polish** | 13 (-11, 43) | 13 (-6, 37) | -10 (-31, 18) | 23 (3, 47)\* | -13 (-29, 5) | 11 (-10, 37) | 16 (-4, 40) | -3 (-19, 16) | 17 (-9, 49) | 5 (-13, 27) |
| **Hair spray/hair gel** | -1 (-17, 19) | 14 (-1, 32) | -17 (-31, 1) | -5 (-15, 6) | -7 (-18, 6) | 21 (4, 40)\* | 15 (1, 32)\* | -6 (-17, 6) | 9 (-8, 30) | 18 (3, 36)\* |
| **Hair cream** | -2 (-24, 25) | -11 (-27, 8) | -1 (-23, 30) | 1 (-13, 18) | 8 (-10, 29) | -2 (-20, 21) | -8 (-24, 11) | -9 (-24, 8) | 7 (-15, 35) | -15 (-29, 3) |
| **Laundry products** | 11 (-36, 93) | -2 (-36, 51) | 19 (-33, 111) | 5 (-25, 48) | 2 (-31, 51) | 14 (-27, 80) | 11 (-27, 69) | 11 (-24, 63) | 59 (-4, 165) | -19 (-46, 21) |
| **Liquid soap** | -3 (-22, 21) | 14 (-4, 35) | -11 (-29, 12) | -5 (-17, 9) | -15 (-27, -1)\* | -7 (-23, 11) | -1 (-16, 17) | 4 (-11, 21) | 1 (-18, 24) | -7 (-21, 9) |
| **Lotion** | -5 (-23, 17) | 25 (6, 47)\* | -7 (-25, 16) | -2 (-15, 11) | 2 (-12, 19) | -1 (-17, 18) | 7 (-9, 26) | -1 (-15, 14) | -3 (-20, 19) | 16 (-1, 36) |
| **Mouthwash** | -7 (-23, 12) | 11 (-4, 28) | 9 (-10, 33) | -2 (-12, 10) | 4 (-9, 19) | -10 (-23, 5) | -10 (-22, 3) | -9 (-20, 4) | 6 (-11, 27) | 7 (-7, 23) |
| **Shampoo** | -20 (-49, 26) | 17 (-18, 67) | 3 (-36, 66) | -9 (-31, 21) | -23 (-44, 7) | -5 (-35, 38) | -11 (-37, 26) | -3 (-30, 33) | -33 (-56, 2) | -9 (-35, 26) |
| **Other hair products** | -5 (-43, 57) | 44 (-3, 114) | -2 (-43, 66) | 21 (-12, 66) | 13 (-21, 62) | -7 (-39, 42) | 32 (-10, 95) | -2 (-31, 40) | -39 (-62, -2)\* | 14 (-21, 66) |
| **Other toiletries** | -6 (-38, 42) | 63 (19, 125)\* | -10 (-41, 39) | -4 (-26, 24) | 10 (-18, 48) | -27 (-48, 3) | -1 (-28, 35) | 18 (-11, 57) | -11 (-40, 30) | -2 (-28, 33) |
| **Total # of products** | 2 (-2, 7) | 6 (2, 10)\* | 1 (-4, 6) | 2 (-1, 5) | -1 (-4, 3) | 1 (-4, 4) | -1 (-4, 3) | -2 (-5, 1) | 4 (-1, 8) | 3 (-1, 7) |
| aResults from linear regression models using ln-transformed urinary metal concentrations, adjusted for specific gravity. Effect estimates are expressed as percent change in urinary metal concentrations relative to the reference group.  bTotal sample size for Al, As, Ba, Cd, Co, Mn, Mo, Ni, and Pb was 242 for all personal care products, except for cosmetics (girls only) and fingernail polish (girls only), which were 129.  cTotal sample size for Zn was 222 for all personal care products, except for cosmetics (girls only) and fingernail polish (girls only), which were 121.  \*p<0.05. | | | | | | | | | | | |