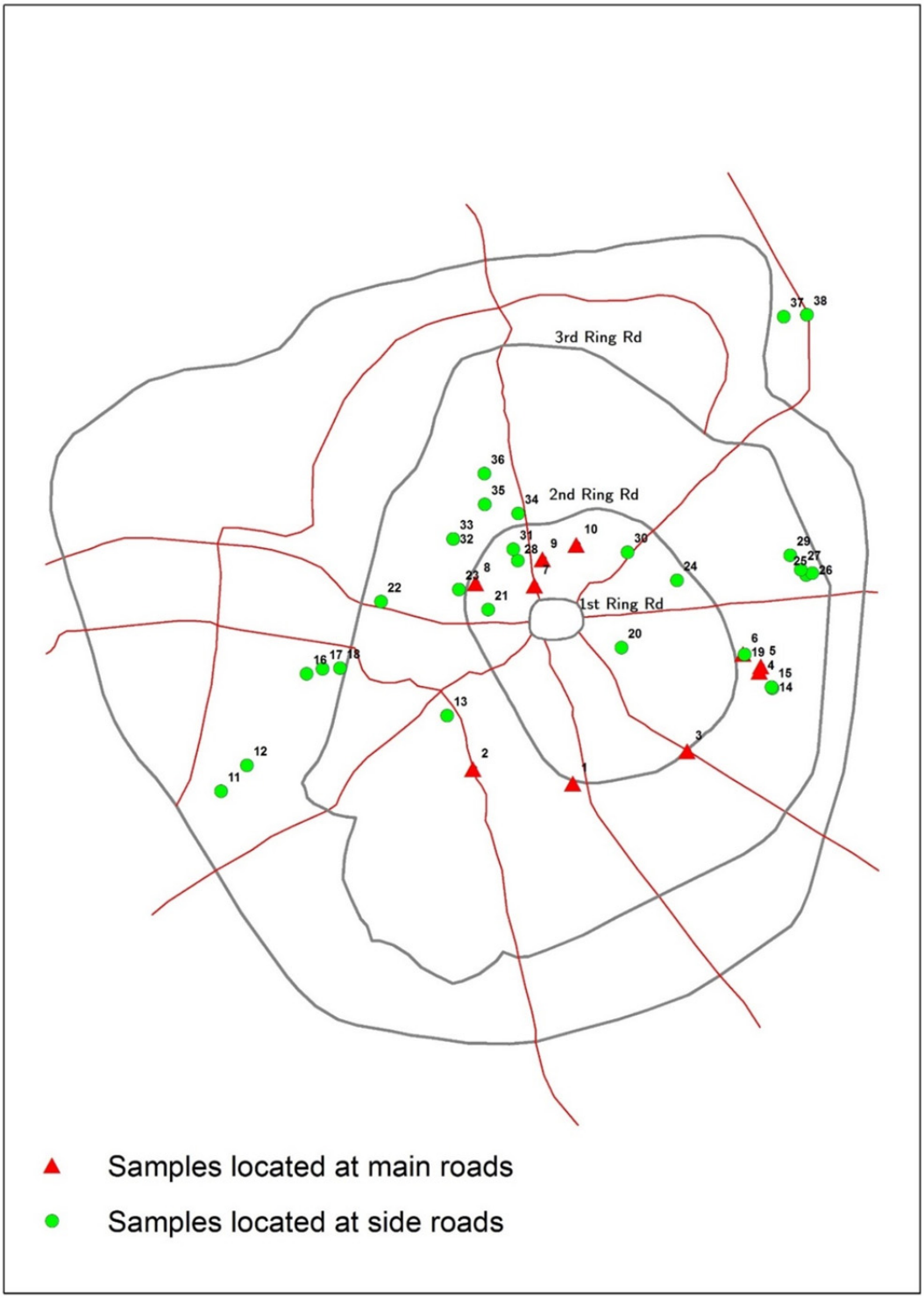
# Supplementary Information

**Content:**

## A. Supplementary map

**Map S1.** Locations of sampled houses in the city of Almadinah Almunawarah. The 1st, 2nd, and 3rd Ring Roads were labelled.



## B. Supplementary tables

### Table S1. Detailed description of sampled houses

| Sample ID [a] | Road type | Smoking [b] | House age [c] | Floor no. | No. of occupants |
|---|---|---|---|---|---|
| 1MNN | main-road | no | new | 2 | 5 |
| 2MYO | main-road | yes | old | 2 | 13 |
| 3MNO | main-road | no | old | 1 | 6 |
| 4MNO | main-road | no | old | 1 | 5 |
| 5MNO | main-road | no | old | ground | 6 |
| 6MNO | main-road | no | old | 1 | 7 |
| 7MNO | main-road | no | old | 8 | 2 |
| 8MNO | main-road | no | old | 8 | 2 |
| 9MYN | main-road | yes | new | 3 | 11 |
| 10MNO | main-road | no | old | 3 | 4 |
| 11SYO | side-road | yes | old | ground | 8 |
| 12SYN | side-road | yes | new | ground | 7 |
| 13SYN | side-road | yes | new | ground | 2 |
| 14SNN | side-road | no | new | 2 | 8 |
| 15SNN | side-road | no | new | 1 | 5 |
| 16SNO | side-road | no | old | 3 | 2 |
| 17SNO | side-road | no | old | ground | 4 |
| 18SNO | side-road | no | old | 2 | 7 |
| 19SNO | side-road | no | old | 2 | 5 |
| 20SNO | side-road | no | old | 2 | 4 |
| 21SNO | side-road | no | old | 2 | 8 |
| 22SNO | side-road | no | old | ground | 6 |
| 23SNO | side-road | no | old | 2 | 12 |
| 24SNN | side-road | no | new | 1 | 6 |
| 25SYN | side-road | yes | new | ground | 2 |
| 26SNN | side-road | no | new | ground | 3 |
| 27SNN | side-road | no | new | 2 | 7 |
| 28SYO | side-road | yes | old | 2 | 4 |
| 29SNN | side-road | no | new | ground | 4 |
| 30SYO | side-road | yes | old | 2 | 5 |
| 31SNN | side-road | no | new | 1 | 5 |
| 32SNN | side-road | no | new | 1 | 6 |
| 33SNN | side-road | no | new | 2 | 6 |
| 34SNN | side-road | no | new | 2 | 5 |
| 35SNN | side-road | no | new | 1 | 5 |
| 36SNN | side-road | no | new | ground | 1 |
| 37SNN | side-road | no | new | 1 | 7 |
| 38SNN | side-road | no | new | 2 | 9 |

[a] 1st letter after the number is type of road at which the house is located (M: *main-road*, S: *side-road*), 2nd letter after the number refers to smoking habit (N: no smoking, Y: smoking), and the last letter refers to age of the house (N: house age ≤ 10 years, O: age >10 years). Example: 1MNN means that the samples was collected from house no. 1, located at a main-road (M), no smoking (N), and the house is new (N). [b] smoking habit inside the house. [c] age of the house (≤ 10 years = new, > 10 years = old).

**Table S2. Results of quality control parameters for the analytical procedure**

| | V | Cr | Mn | Co | Cu | Sr | Cd | Ba | Pb |
|---|---|---|---|---|---|---|---|---|---|
| MDL, µg $L^{-1}$ (using reagent blank, n = 9) | 0.137 | 0.382 | 0.719 | 0.301 | 0.408 | 0.265 | 0.198 | 1.18 | 0.606 |
| Wipe blanks (n = 7) | | | | | | | | | |
| Mean (µg $L^{-1}$) | 1.72 | 5.58 | 29.8 | 0.243 | 68.3 | 13.6 | 0.381 | 12.4 | 4.95 |
| %CV | 8.70 | 19.6 | 7.01 | 28.7 | 15.1 | 18.3 | 20.7 | 15.9 | 25.3 |
| Field blanks (n = 5) | | | | | | | | | |
| Mean (µg $L^{-1}$) | 1.60 | 3.755 | 23.6 | 0.313 | 50.1 | 11.8 | 0.351 | 8.62 | 3.69 |
| %CV | 21.6 | 32.0 | 7.1 | 16.8 | 34.8 | 10.4 | 32.0 | 6.9 | 22.4 |
| CVC-25 (n = 7) | | | | | | | | | |
| Mean (µg $L^{-1}$) | 24.3 | 24.2 | 25.4 | 23.9 | 24.7 | 25.6 | 24.4 | 24.7 | 25.4 |
| %CV | 4.00 | 4.95 | 3.50 | 5.30 | 4.55 | 2.60 | 4.37 | 3.36 | 3.37 |
| %Accuracy | 97.1 | 96.7 | 102 | 95.6 | 98.9 | 102 | 97.6 | 98.9 | 102 |
| CRM TM-26.3 (n = 10) | | | | | | | | | |
| Mean (µg $L^{-1}$) | 25.0 | 18.3 | 25.1 | 26.9 | 25.0 | 68.8 | 24.1 | 25.0 | 25.0 |
| %CV | 4.57 | 3.90 | 4.86 | 3.74 | 2.89 | 4.18 | 4.47 | 4.06 | 5.37 |
| %Accuracy | 95.1 | 74.8 | 98.6 | 96.0 | 90.7 | 98.5 | 100 | 93.2 | 90.1 |
| Certified value (µg $L^{-1}$) | 26.3 | 24.5 | 25.4 | 28.0 | 27.6 | 69.9 | 24.0 | 26.8 | 27.8 |
| Sample 34 (4 weeks, n = 5) | | | | | | | | | |
| Mean (µg $g^{-1}$ $week^{-1}$) | 11.3 | 11.6 | 87.1 | 1.97 | 48.9 | 47.7 | 0.0662 | 54.0 | 7.22 |
| %CV | 1.53 | 1.73 | 2.28 | 1.62 | 1.23 | 2.12 | 9.30 | 2.81 | 3.56 |
| Sample 32 (8 weeks, n = 5) | | | | | | | | | |
| Mean (µg $g^{-1}$ $week^{-1}$) | 11.2 | 9.77 | 87.4 | 1.91 | 48.5 | 44.0 | 0.0502 | 52.4 | 6.698 |
| %CV | 1.17 | 1.60 | 1.14 | 1.33 | 1.59 | 1.02 | 2.31 | 1.54 | 2.79 |

Dust loading rates, mg $m^{-2}$ $week^{-1}$

Mean (%CV) for sample 33 (4 weeks, n = 5): 219 (1.30)

Mean (%CV) for sample 31 (8 weeks, n = 5): 60.8 (2.35)

[a] no reported certified value

**Table S3. Metals concentrations (μg $g^{-1}$ in 12 week) of the entire group of samples.**

| SN | V | Cr | Mn | Co | Cu | Sr | Cd | Ba | Pb |
|---|---|---|---|---|---|---|---|---|---|
| 1MNN | 60.5 | 50.3 | 471 | 10.1 | 91.9 | 214 | 0.663 | 240 | 37.9 |
| 2MYO | 65.4 | 58.8 | 516 | 12.4 | 174 | 251 | 0.509 | 300 | 43.8 |
| 3MNO | 24.7 | 23.2 | 196 | 3.80 | 106 | 109 | 0.072 | 192 | 37.4 |
| 4MNO | 70.8 | 68.7 | 573 | 12.3 | 189 | 273 | 0.877 | 433 | 63.0 |
| 5MNO | 74.5 | 61.5 | 582 | 12.2 | 135 | 282 | 0.492 | 331 | 73.3 |
| 6MNO | 48.1 | 50.8 | 394 | 8.14 | 68.7 | 191 | 0.367 | 270 | 41.1 |
| 7MNO | 99.5 | 80.1 | 766 | 15.6 | 129 | 383 | 1.03 | 467 | 152 |
| 8MNO | 62.7 | 50.3 | 482 | 10.5 | 93.5 | 245 | 0.436 | 323 | 43.8 |
| 9MYN | 60.1 | 55.6 | 425 | 9.43 | 155 | 220 | 0.819 | 332 | 73.6 |
| 10MNO | 71.1 | 57.6 | 593 | 11.5 | 100 | 289 | 0.435 | 414 | 67.9 |
| 11SYO | 50.5 | 45.3 | 449 | 8.68 | 205 | 227 | 1.15 | 282 | 52.0 |
| 12SYN | 61.4 | 49.4 | 546 | 10.3 | 24.1 | 266 | 1.77 | 289 | 45.6 |
| 13SYN | 51.4 | 75.7 | 422 | 8.34 | 143 | 202 | 2.32 | 224 | 57.0 |
| 14SNN | 61.3 | 48.0 | 489 | 11.9 | 143 | 270 | 0.318 | 269 | 92.1 |
| 15SNN | 44.6 | 50.8 | 372 | 7.52 | 109 | 189 | 0.290 | 246 | 66.0 |
| 16SNO | 32.0 | 38.2 | 288 | 5.27 | 109 | 178 | 1.75 | 255 | 34.0 |
| 17SNO | 39.8 | 38.2 | 320 | 6.84 | 169 | 172 | 1.08 | 310 | 63.4 |
| 18SNO | 55.8 | 43.7 | 442 | 9.05 | 60.7 | 222 | 0.510 | 285 | 73.4 |
| 19SNO | 57.7 | 45.9 | 445 | 9.04 | 91.7 | 207 | 0.477 | 266 | 39.2 |
| 20SNO | 53.4 | 44.8 | 392 | 8.27 | 85.6 | 228 | 0.649 | 439 | 153 |
| 21SNO | 69.4 | 62.7 | 597 | 11.7 | 227 | 301 | 0.981 | 380 | 57.8 |
| 22SNO | 25.4 | 37.9 | 191 | 4.70 | 118 | 93 | 0.805 | 109 | 40.8 |
| 23SNO | 46.2 | 54.9 | 390 | 8.58 | 216 | 186 | 2.10 | 922 | 35.5 |
| 24SNN | 35.9 | 32.2 | 301 | 5.30 | 137 | 162 | 0.329 | 196 | 32.3 |
| 25SYN | 69.8 | 59.5 | 552 | 10.6 | 91.7 | 265 | 0.069 | 250 | 33.7 |
| 26SNN | 51.8 | 45.5 | 414 | 6.88 | 60.4 | 208 | 0.043 | 222 | 52.5 |
| 27SNN | 57.9 | 51.7 | 464 | 9.41 | 99.0 | 268 | 0.358 | 221 | 63.9 |
| 28SYO | 51.0 | 56.9 | 424 | 8.32 | 132 | 219 | 0.774 | 285 | 39.0 |
| 29SNN | 69.3 | 57.9 | 562 | 11.2 | 70.5 | 282 | 0.400 | 277 | 41.1 |
| 30SYO | 69.3 | 65.1 | 590 | 11.3 | 257 | 293 | 1.31 | 440 | 94.4 |
| 31SNN | 66.8 | 69.4 | 492 | 10.6 | 212 | 279 | 0.800 | 301 | 59.8 |
| 32SNN | 106 | 77.3 | 824 | 16.9 | 107 | 401 | 0.651 | 687 | 55.0 |
| 33SNN | 65.2 | 63.8 | 525 | 10.5 | 211 | 282 | 0.847 | 320 | 58.6 |
| 34SNN | 67.4 | 57.2 | 526 | 11.4 | 112 | 265 | 1.41 | 344 | 32.2 |
| 35SNN | 32.5 | 34.5 | 286 | 5.75 | 137 | 167 | 1.07 | 175 | 45.8 |
| 36SNN | 47.7 | 52.2 | 385 | 8.08 | 126 | 210 | 1.61 | 228 | 38.8 |
| 37SNN | 76.1 | 57.4 | 639 | 12.5 | 116 | 314 | 0.630 | 365 | 38.7 |
| 38SNN | 75.2 | 72.0 | 656 | 12.7 | 138 | 349 | 1.24 | 407 | 110 |

**Table S4. Matrix of Pearson's correlation coefficients of metals concentrations in dust (values in brackets are the *2-tailed p-values*)**

| ***Entire group*** | **V** | **Cr** | **Mn** | **Co** | **Cu** | **Sr** | **Cd** | **Ba** | **Pb** |
|---|---|---|---|---|---|---|---|---|---|
| **V** | 1 | | | | | | | | |
| **Cr** | 0.832[a] (0.000) | 1 | | | | | | | |
| **Mn** | 0.983[a] (0.000) | 0.828[a] (0.000) | 1 | | | | | | |
| **Co** | 0.976[a] (0.000) | 0.825[a] (0.000) | 0.969[a] (0.000) | 1 | | | | | |
| **Cu** | 0.067 (0.690) | 0.305 (0.063) | 0.091 (0.588) | 0.139 (0.404) | 1 | | | | |
| **Sr** | 0.960[a] (0.000) | 0.809[a] (0.000) | 0.976[a] (0.000) | 0.947[a] (0.000) | 0.122 (0.467) | 1 | | | |
| **Cd** | -0.072 (0.668) | 0.251 (0.128) | -0.007 (0.966) | -0.015 (0.929) | 0.330[b] (0.043) | -0.002 (0.992) | 1 | | |
| **Ba** | 0.493[a] (0.002) | 0.476[a] (0.003) | 0.500[a] (0.001) | 0.520[a] (0.001) | 0.331[b] (0.042) | 0.472[a] (0.003) | 0.317 (0.052) | 1 | |
| **Pb** | 0.391[b] (0.015) | 0.349[b] (0.032) | 0.360[b] (0.026) | 0.371[b] (0.022) | 0.108 (0.518) | 0.441[a] (0.006) | -0.006 (0.973) | 0.253 (0.125) | 1 |

| ***main-roads*** | **V** | **Cr** | **Mn** | **Co** | **Cu** | **Sr** | **Cd** | **Ba** | **Pb** |
|---|---|---|---|---|---|---|---|---|---|
| **V** | 1 | | | | | | | | |
| **Cr** | 0.953[a] (0.000) | 1 | | | | | | | |
| **Mn** | 0.989[a] (0.000) | 0.947 (0.000) | 1 | | | | | | |
| **Co** | 0.977[a] (0.000) | 0.955[a] (0.000) | 0.977[a] (0.000) | 1 | | | | | |
| **Cu** | 0.336 (0.343) | 0.451 (0.190) | 0.305 (0.392) | 0.421 (0.226) | 1 | | | | |
| **Sr** | 0.990[a] (0.000) | 0.938[a] (0.000) | 0.992[a] (0.000) | 0.965[a] (0.000) | 0.311 (0.382) | 1 | | | |
| **Cd** | 0.789[a] (0.007) | 0.850[a] (0.002) | 0.734[b] (0.016) | 0.758[b] (0.011) | 0.515 (0.128) | 0.730[b] (0.017) | 1 | | |
| **Ba** | 0.856[a] (0.002) | 0.873[a] (0.001) | 0.871[a] (0.001) | 0.820[a] (0.004) | 0.422 (0.225) | 0.893[a] (0.001) | 0.722[b] (0.018) | 1 | |
| **Pb** | 0.793[a] (0.006) | 0.736[b] (0.015) | 0.755[a] (0.012) | 0.680[b] (0.030) | 0.237 (0.509) | 0.808[a] (0.005) | 0.695[b] (0.026) | 0.758 (0.011) | 1 |

| ***side-roads*** | **V** | **Cr** | **Mn** | **Co** | **Cu** | **Sr** | **Cd** | **Ba** | **Pb** |
|---|---|---|---|---|---|---|---|---|---|
| **V** | 1 | | | | | | | | |
| **Cr** | 0.778[a] (0.000) | 1 | | | | | | | |
| **Mn** | 0.982[a] (0.000) | 0.773 (0.000) | 1 | | | | | | |
| **Co** | 0.974[a] (0.000) | 0.767[a] (0.000) | 0.970[a] (0.000) | 1 | | | | | |
| **Cu** | 0.016 (0.937) | 0.285 (0.142) | 0.049 (0.803) | 0.090 (0.648) | 1 | | | | |
| **Sr** | 0.960[a] (0.000) | 0.752[a] (0.000) | 0.973[a] (0.000) | 0.955[a] (0.000) | 0.080 (0.686) | 1 | | | |
| **Cd** | -0.170 (0.388) | 0.205 (0.295) | -0.095 (0.631) | -0.084 (0.671) | 0.306 (0.114) | -0.114 (0.564) | 1 | | |
| **Ba** | 0.445[b] (0.018) | 0.416[b] (0.028) | 0.448[b] (0.017) | 0.489[a] (0.008) | 0.324 (0.092) | 0.407[b] (0.032) | 0.307 (0.113) | 1 | |
| **Pb** | 0.182 (0.353) | 0.143 (0.469) | 0.162 (0.409) | 0.203 (0.300) | 0.085 (0.668) | 0.265 (0.173) | -0.110 (0.578) | 0.152 (0.440) | 1 |

| ***smoking*** | **V** | **Cr** | **Mn** | **Co** | **Cu** | **Sr** | **Cd** | **Ba** | **Pb** |
|---|---|---|---|---|---|---|---|---|---|
| **V** | 1 | | | | | | | | |
| **Cr** | 0.097 | 1 | | | | | | | |
| | (0.819) | | | | | | | | |
| **Mn** | 0.859[a] | -0.025 | 1 | | | | | | |
| | (0.006) | (0.952) | | | | | | | |
| **Co** | 0.867[a] | -0.006 | 0.794[b] | 1 | | | | | |
| | (0.005) | (0.988) | (0.019) | | | | | | |
| **Cu** | 0.019 | 0.209 | -0.008 | 0.122 | 1 | | | | |
| | (0.964) | (0.620) | (0.985) | (0.773) | | | | | |
| **Sr** | 0.846[a] | -0.122 | 0.980[a] | 0.774[b] | 0.071 | 1 | | | |
| | (0.008) | (0.774) | (0.000) | (0.024) | (0.867) | | | | |
| **Cd** | -0.454 | 0.339 | -0.192 | -0.397 | -0.051 | -0.246 | 1 | | |
| | (0.258) | (0.411) | (0.649) | (0.330) | (0.905) | (0.557) | | | |
| **Ba** | 0.478 | -0.039 | 0.487 | 0.452 | 0.602 | 0.620 | -0.073 | 1 | |
| | (0.231) | (0.928) | (0.221) | (0.261) | (0.115) | (0.101) | (0.863) | | |
| **Pb** | 0.211 | 0.279 | 0.170 | 0.120 | 0.664 | 0.258 | 0.327 | 0.811[b] | 1 |
| | (0.615) | (0.503) | (0.687) | (0.778) | (0.073) | (0.537) | (0.430) | (0.015) | |

| ***no-smoking*** | **V** | **Cr** | **Mn** | **Co** | **Cu** | **Sr** | **Cd** | **Ba** | **Pb** |
|---|---|---|---|---|---|---|---|---|---|
| **V** | 1 | | | | | | | | |
| **Cr** | 0.900[a] | 1 | | | | | | | |
| | (0.000) | | | | | | | | |
| **Mn** | 0.989[a] | 0.903[a] | 1 | | | | | | |
| | (0.000) | (0.000) | | | | | | | |
| **Co** | 0.982[a] | 0.904[a] | 0.979[a] | 1 | | | | | |
| | (0.000) | (0.000) | (0.000) | | | | | | |
| **Cu** | 0.075 | 0.318 | 0.104 | 0.150 | 1 | | | | |
| | (0.693) | (0.087) | (0.584) | (0.430) | | | | | |
| **Sr** | 0.966[a] | 0.894[a] | 0.977[a] | 0.956[a] | 0.143 | 1 | | | |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.451) | | | | |
| **Cd** | -0.038 | 0.198 | (0.000) | 0.033 | 0.487[a] | 0.030 | 1 | | |
| | (0.843) | (0.295) | (0.999) | (0.861) | (0.006) | (0.874) | | | |
| **Ba** | 0.499[a] | 0.544[a] | 0.510[a] | 0.530[a] | 0.358 | 0.469[a] | 0.451[b] | 1 | |
| | (0.005) | (0.002) | (0.004) | (0.003) | (0.052) | (0.009) | (0.012) | | |
| **Pb** | 0.409[b] | 0.379[b] | 0.382[b] | 0.396[b] | 0.004 | 0.458[b] | -0.058 | 0.214 | 1 |
| | (0.025) | (0.039) | (0.037) | (0.030) | (0.985) | (0.011) | (0.761) | (0.257) | |

| ***old*** | **V** | **Cr** | **Mn** | **Co** | **Cu** | **Sr** | **Cd** | **Ba** | **Pb** |
|---|---|---|---|---|---|---|---|---|---|
| **V** | 1 | | | | | | | | |
| **Cr** | 0.904[a] | 1 | | | | | | | |
| | (0.000) | | | | | | | | |
| **Mn** | 0.987[a] | 0.919[a] | 1 | | | | | | |
| | (0.000) | (0.000) | | | | | | | |
| **Co** | 0.983[a] | 0.926[a] | 0.977[a] | 1 | | | | | |
| | (0.000) | (0.000) | (0.000) | | | | | | |
| **Cu** | 0.203 | 0.403 | 0.301 | 0.293 | 1 | | | | |
| | (0.404) | (0.087) | (0.211) | (0.224) | | | | | |
| **Sr** | 0.972[a] | 0.889[a] | 0.984[a] | 0.949[a] | 0.278 | 1 | | | |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.250) | | | | |
| **Cd** | -0.073 | 0.178 | 0.004 | -0.027 | 0.589[a] | 0.041 | 1 | | |
| | (0.766) | (0.465) | (0.986) | (0.913) | (0.008) | (0.867) | | | |
| **Ba** | 0.336 | 0.460[b] | 0.361 | 0.376 | 0.443 | 0.349 | 0.598[a] | 1 | |
| | (0.160) | (0.047) | (0.128) | (0.112) | (0.058) | (0.144) | (0.007) | | |
| **Pb** | 0.570[a] | 0.433 | 0.508[b] | 0.483[b] | -0.031 | 0.588[a] | -0.014 | 0.232 | 1 |
| | (0.011) | (0.064) | (0.026) | (0.036) | (0.901) | (0.008) | (0.954) | (0.338) | |

| ***new*** | **V** | **Cr** | **Mn** | **Co** | **Cu** | **Sr** | **Cd** | **Ba** | **Pb** |
|---|---|---|---|---|---|---|---|---|---|
| **V** | 1 | | | | | | | | |
| **Cr** | 0.735[a] | 1 | | | | | | | |
| | (0.000) | | | | | | | | |
| **Mn** | 0.977[a] | 0.708[a] | 1 | | | | | | |
| | (0.000) | (0.001) | | | | | | | |
| **Co** | 0.968[a] | 0.701[a] | 0.960[a] | 1 | | | | | |
| | (0.000) | 0.001 | (0.000) | | | | | | |
| **Cu** | -0.051 | 0.272 | -0.134 | -0.013 | 1 | | | | |
| | (0.835) | (0.259) | (0.584) | (0.959) | | | | | |
| **Sr** | 0.946[a] | 0.698[a] | 0.967[a] | 0.949[a] | 0.006 | 1 | | | |
| | (0.000) | (0.001) | (0.000) | (0.000) | (0.980) | | | | |
| **Cd** | -0.072 | 0.329 | -0.016 | -0.003 | 0.092 | -0.038 | 1 | | |
| | (0.771) | (0.168) | (0.949) | (0.990) | (0.708) | (0.878) | | | |
| **Ba** | 0.890[a] | 0.647[a] | 0.869[a] | 0.865[a] | 0.049 | 0.848[a] | 0.024 | 1 | |
| | (0.000) | (0.003) | (0.000) | (0.000) | (0.843) | (0.000) | (0.921) | | |
| **Pb** | 0.160 | 0.317 | 0.182 | 0.251 | 0.320 | 0.314 | 0.002 | 0.220 | 1 |
| | (0.512) | (0.185) | (0.456) | (0.299) | (0.182) | (0.190) | (0.994) | (0.365) | |

[a] Correlation is significant at the 0.01 level (*2-tailed*).
[b] Correlation is significant at the 0.05 level (*2-tailed*).

**Table S5. Metals loading rates (µg $m^{-2}$ $week^{-1}$).**

| SN | V | Cr | Mn | Co | Cu | Sr | Cd | Ba | Pb |
|---|---|---|---|---|---|---|---|---|---|
| 1MNN | 6.64 | 5.52 | 51.7 | 1.11 | 10.1 | 23.5 | 0.073 | 26.3 | 4.16 |
| 2MYO | 4.75 | 4.27 | 37.5 | 0.904 | 12.6 | 18.3 | 0.037 | 21.8 | 3.18 |
| 3MNO | 1.22 | 1.15 | 9.71 | 0.188 | 5.23 | 5.38 | 0.004 | 9.49 | 1.85 |
| 4MNO | 5.03 | 4.87 | 40.6 | 0.874 | 13.4 | 19.4 | 0.062 | 30.7 | 4.47 |
| 5MNO | 4.08 | 3.36 | 31.9 | 0.665 | 7.37 | 15.4 | 0.027 | 18.1 | 4.01 |
| 6MNO | 2.99 | 3.15 | 24.4 | 0.506 | 4.27 | 11.9 | 0.023 | 16.8 | 2.55 |
| 7MNO | 8.62 | 6.94 | 66.3 | 1.35 | 11.2 | 33.2 | 0.089 | 40.5 | 13.2 |
| 8MNO | 4.10 | 3.28 | 31.5 | 0.686 | 6.11 | 16.0 | 0.029 | 21.1 | 2.86 |
| 9MYN | 8.01 | 7.41 | 56.5 | 1.26 | 20.7 | 29.3 | 0.109 | 44.2 | 9.80 |
| 10MNO | 3.90 | 2.95 | 30.3 | 0.588 | 5.13 | 14.8 | 0.022 | 21.2 | 3.47 |
| 11SYO | 2.21 | 1.98 | 19.6 | 0.379 | 8.96 | 9.91 | 0.050 | 12.4 | 2.27 |
| 12SYN | 2.08 | 1.67 | 18.5 | 0.350 | 0.815 | 8.99 | 0.060 | 9.77 | 1.54 |
| 13SYN | 2.39 | 3.52 | 19.6 | 0.388 | 6.647 | 9.39 | 0.108 | 10.4 | 2.65 |
| 14SNN | 5.31 | 4.16 | 42.3 | 1.03 | 12.4 | 23.4 | 0.028 | 23.3 | 7.98 |
| 15SNN | 2.28 | 2.60 | 19.0 | 0.385 | 5.58 | 9.68 | 0.015 | 12.6 | 3.38 |
| 16SNO | 0.888 | 1.06 | 8.00 | 0.146 | 3.03 | 4.94 | 0.049 | 7.09 | 0.944 |
| 17SNO | 2.17 | 2.08 | 17.5 | 0.372 | 9.22 | 9.34 | 0.059 | 16.9 | 3.45 |
| 18SNO | 4.24 | 3.32 | 33.6 | 0.688 | 4.61 | 16.8 | 0.039 | 21.7 | 5.58 |
| 19SNO | 7.69 | 6.11 | 59.3 | 1.20 | 12.2 | 27.6 | 0.064 | 35.4 | 5.23 |
| 20SNO | 3.36 | 2.82 | 24.6 | 0.520 | 5.38 | 14.4 | 0.041 | 27.6 | 9.60 |
| 21SNO | 3.32 | 3.00 | 28.6 | 0.560 | 10.9 | 14.4 | 0.047 | 18.2 | 2.77 |
| 22SNO | 2.05 | 3.07 | 15.4 | 0.380 | 9.52 | 7.56 | 0.065 | 8.79 | 3.30 |
| 23SNO | 1.37 | 1.63 | 11.6 | 0.255 | 6.42 | 5.53 | 0.062 | 27.4 | 1.05 |
| 24SNN | 1.01 | 0.903 | 8.45 | 0.149 | 3.84 | 4.56 | 0.009 | 5.49 | 0.907 |
| 25SYN | 2.34 | 1.99 | 18.5 | 0.354 | 3.07 | 8.87 | 0.002 | 8.39 | 1.13 |
| 26SNN | 0.898 | 0.789 | 7.17 | 0.119 | 1.05 | 3.60 | 0.001 | 3.84 | 0.909 |
| 27SNN | 5.07 | 4.53 | 40.6 | 0.823 | 8.66 | 23.5 | 0.031 | 19.3 | 5.59 |
| 28SYO | 1.71 | 1.91 | 14.2 | 0.279 | 4.41 | 7.34 | 0.026 | 9.54 | 1.30 |
| 29SNN | 5.77 | 4.82 | 46.8 | 0.937 | 5.88 | 23.5 | 0.033 | 23.0 | 3.43 |
| 30SYO | 2.38 | 2.23 | 20.3 | 0.388 | 8.81 | 10.0 | 0.045 | 15.1 | 3.24 |
| 31SNN | 6.83 | 7.09 | 50.2 | 1.08 | 21.6 | 28.5 | 0.082 | 30.8 | 6.10 |
| 32SNN | 9.89 | 7.20 | 76.8 | 1.57 | 9.93 | 37.4 | 0.061 | 64.0 | 5.12 |
| 33SNN | 7.73 | 7.55 | 62.1 | 1.24 | 25.0 | 33.4 | 0.100 | 37.9 | 6.94 |
| 34SNN | 3.25 | 2.76 | 25.3 | 0.549 | 5.39 | 12.8 | 0.068 | 16.6 | 1.55 |
| 35SNN | 1.18 | 1.26 | 10.4 | 0.209 | 4.99 | 6.07 | 0.039 | 6.37 | 1.67 |
| 36SNN | 5.09 | 5.57 | 41.1 | 0.862 | 13.5 | 22.4 | 0.171 | 24.3 | 4.14 |
| 37SNN | 6.65 | 5.02 | 55.9 | 1.09 | 10.1 | 27.4 | 0.055 | 32.0 | 3.38 |
| 38SNN | 4.16 | 3.98 | 36.3 | 0.704 | 7.60 | 19.3 | 0.068 | 22.5 | 6.07 |

## C. Supplementary method

**Method S1. Details of chemicals and reagents used in the analysis of samples**

*GhostWipes* were purchased from Environmental Express (Charleston, South Carolina, USA). Ultrapure water of 18.2 MΩ cm resistance produced by a Gradient Milli-Q system with Elix10 unit (Millipore, Billerica, MA, USA) was used in all preparations and dilutions. Nitric acid (90% fuming) was obtained from Fisher Scientific (Bridgewater, New Jersey, USA). Hydrogen peroxide (33%) was purchased from Panreac Quimica (Castellar del Vallès, Barcelona, Spain). Hydrofluoric acid (ACS reagent, 48%) was purchased from Sigma-Aldrich. A water analytical reference material (TM-26.3) was purchased from National Water Research Institute (Environment Canada, Ontario, Canada). Multi-element calibration standards from Agilent Technologies (10 μg mL-1 each) were used for calibrating the Inductively Coupled Plasma Mass Spectrometer (ICP-MS).

**Method S2. Digestion of samples and ICP-MS operating parameters**

A *54-well HotBlock Pro* digestion system (model SC181) with a temperature controller (model SC180; Environmental Express Charleston, South Carolina, USA) was used for digesting the dust samples. Dust containing wipes were acid digested as follows: 3.0 mL of diluted $HNO_3$ (1+1 in water) was added to each sample tube (same polypropylene tubes used for storing dust-containing wipes). Each tube was covered by a ribbed watch glass (purchased from Environmental Express Charleston, South Carolina, USA) and then heated inside the *HotBlock* at 95℃ for 15 minutes. After cooling, 3.0 mL of concentrated $HNO_3$ and 1.0 mL of hydrofluoric acid (HF) were added to each tube and the mixture was refluxed at 95℃ for 30 minutes. The tubes were then cooled again and another 3.0 mL concentrated $HNO_3$ was added and the tubes were again refluxed as before. A total of 2 reflux steps with 3.0 mL concentrated $HNO_3$ additions were found to be enough to stop the production of brown fumes in all determinations. Heating was continued, with the ribbed watch glass on, for an additional 1.5 hours. The tubes were then allowed to cool to room temperature before adding slowly 0.50 mL $H_2O_2$. The samples were heated covered with ribbed watch glass for an additional 30 minute then additional 0.5 mL increments of $H_2O_2$ were added until no further colour change in the solution was observed (a total of 1.0 mL $H_2O_2$ was found to be enough). Heating was then continued for a total of 2 hours. The samples were allowed to cool to room temperature and the solution in each tube was diluted to 20 mL with pure water. Sample solutions were then passed through 0.45 mm micro-filters directly before analysis. An ICP-MS (7500cx, Agilent Technologies, Tokyo, Japan) was employed for the quantitative analysis of elements in the samples. The ICP-MS operational parameters used for the analysis are listed below table.

## Operating parameters of the ICP-MS

| | |
|---|---|
| Sampler | Ni, standard |
| Skimmer | Ni, standard |
| Nebulizer | Micromist, standard |
| Plasma torch | Quartz, 2.5 mm, standard |

Integration time (s × points)

| | |
|---|---|
| He mode: | |
| $^{63}$Cu | 0.50 × 3 |
| $^{51}$V, $^{52}$Cr, $^{78}$Se | 1.0 × 3 |
| $^{55}$Mn, $^{59}$Co, | 0.10 × 3 |
| No gas mode: | |
| $^{111}$Cd | 1.0 × 3 |
| $^{88}$Sr, $^{137}$Ba, $^{208}$Pb | 0.10 × 3 |

Tune Parameters

| | |
|---|---|
| RF power (W) | 1550 |
| Sample depth (mm) | 8.4 |
| Carrier gas (L min$^{-1}$) | 0.95 |
| Makeup gas (L min$^{-1}$) | 0.2 |
| Extract 1 (V) | 1.0 (2.8 for He gas reaction mode) |
| Extract 2 (V) | -139.5 |
| Discriminator (mV) | 8.0 |
| Reaction gas when used (He, mL min$^{-1}$) | 4.0 |
| CeO/Ce (156/140, %oxide ratio) | 1.62 |
| $Ce^{++}$/Ce (70/140, %doubly charged ratio) | 2.70 |
| %RSD for m/z: 7, 59, 89, 205 | < 2 |
| Spray chamber temperature (°C) | 2.0 |
| Nebulizer Pump (rps) | 0.1 |

## D. Supplementary discussion

**Discussions S1. Control measures undertook to ensure the quality of the results.**

In order to assess any contamination to samples during their collection, handling, or following the experimental procedures during analysis, field blanks were performed in the same way as for the samples. Field blanks were collected at different houses at the time of samples collection using *GhostWipes* removed from their packing onsite, inserted in test tubes, went through all the experimental steps done for the samples, and analyzed in the same way as the samples. Wipe blanks were obtained by utilizing fresh *GhostWipes* removed from their packs inside the lab just before the analysis and treated in the same way as the samples. The accuracy of calibration curves was assessed using calibration verification check (CVC) solutions originated from the stock standard solutions and prepared in batches different to those used for calibration curves. Due to the lack of a suitable house dust certified reference material, the precision of the analytical procedure was assessed by replicate analysis of real house dust samples. Additionally, a reference water sample certified for trace elements (TM 26.3) was frequently analyzed during the run. The method detection limit (MDL) for each element was calculated as three standard deviations of the concentration of an element in the reagent blank. The results of these quality control parameters are listed in Appendix 2.

The MDL for all elements was ≤1 μg L-1. The accuracy of calibration curves for all elements was found to be within acceptable limits (96-104% when using CVC solution and 75-116% when utilizing the water CRM). Wipe and field blanks showed comparable results, indicating positive but small contribution to the results from one or more of the following source: the reagents used, the experimental procedures followed, and the lab environment. However, minimal or no input was noticed from the field settings. Results of all reported samples were corrected by subtracting the field blank values. The precision of the analytical procedures was also found to be within acceptable limits as reflected by the results of the replicate analysis of

samples, where the coefficient of variation (CV) was 1.02 to 9.44%. Replicate analysis for dust loading rates were also produced results of high precision (i.e. CV of 1.30 to 2.35%). Based on such quality control outcome, it can be said that the reported data are of good accuracy and precision.