**Supplementary information**

**Supplementary table 1:** Soil and vegetable sampling details

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample ID** | **County and state** | **Study area** | **Sampling location (longitude and latitude descriptions)** | **No. of vegetable samples** |
| RS 1 | Meigs, OH | Reedsville | 39.087664, -81.803430 | 4 watermelons |
| RS 2 | 39.087731, -81.801123 | 5 squashes |
| RS 3 | 39.087572, -81.799438 | 9 zucchinis |
| RS 4 | 39.087189, -81.798441 | 9 cucumbers |
| RS 5 | 39.087989, -81.797904 | 8 pumpkins |
| RS 6 | Letart | 38.908711, -81.884892 | 5 pumpkins |
| RS 7 | Racine | 39.025204, -81.960059 | 4 pumpkins |
| NM 1 | Athens, OH | New Marshfield | 39.317767, -82.235564 | 8 squashes |
| NM 2 |  |  | 39.316522, -82.236143 | 4 pumpkins |
| MS 1 | Mason, WV | Lakin | 38.955218, -82.078761 | 6 watermelons |
| MS 2 | Mason | 38.955664, -82.015973 | 6 zucchinis |
| MS 3 | 38.953828, -82.016230 | 5 pumpkins |
| HI | Highland, OH | Hillsboro | 45.537141, -123.008823 | 6 cucumbers |

**Supplementary table 2:** Reference parameter values used for heavy metal assessment

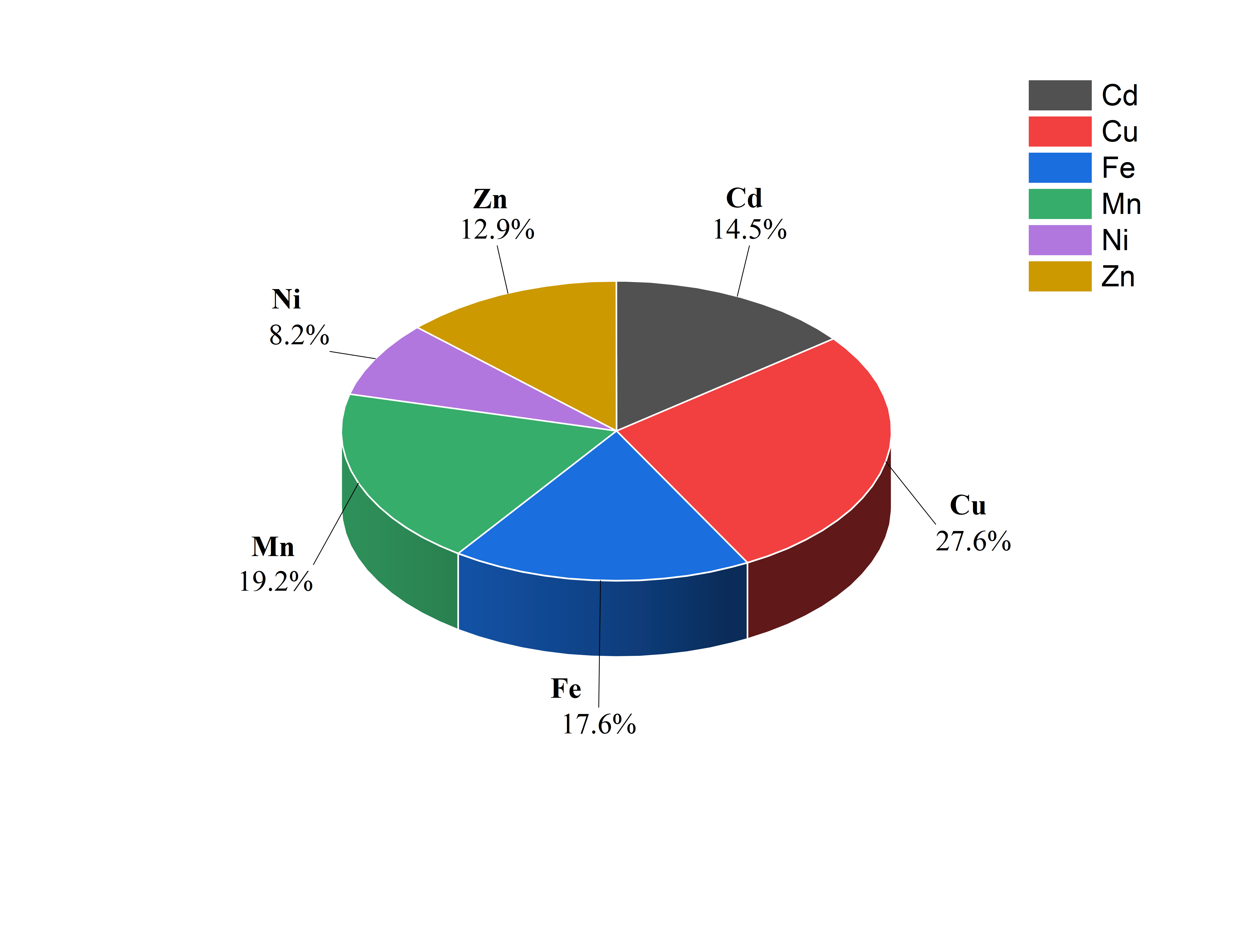
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameters** | **Definition** | | **Values** | | **Units** | **Reference** |
| **Adult** | **Children** |
| EIR | Average food consumption | | 240 | 133 | gm/person/day | [1] |
| Ef | Exposure frequency | | 365 | 365 | days/year |  |
| ED | Exposure duration | | 78.5 | 78.5 | years |  |
| CM | Metal concentration | | Table 2 | Table 2 | Table 2 |  |
| Cf | Conversion factor for fresh to dry weight of vegetables | | 0.085 | 0.085 | - | [2] |
| BW | Average weight of local residents | | 80 | 31.8 | kg |  |
| TA | Average exposure time (EF × ED) | | 26791 | 26791 | days |  |
|  | Unit conversion factor | | 0.001 | 0.001 | - |  |
| Enrichment factor reference value | | Cd | 0.091 | | µg/g | [3] |
| Cu | 30 | | µg/g | [4] |
| Fe | 5.72 | | % |
| Mn | 550 | | µg/g |
| Ni | 50 | | µg/g |
| Zn | 90 | | µg/g |
| Al | 13.4 | | % |
| Background value for Geo-accumulation Index | | Cd | 0.9 | | mg/kg | [5] |
| Cu | 39 | |  |  |
| Fe | 1% | |  |  |
| Mn | 729 | |  |  |
| Ni | 33 | |  |  |
| Zn | 158 | |  |  |
| CRef reference concentration of the metal in pre-industrial soils | | Cd | 0.12 | | mg/kg | [6, 7] |
| Cu | 18.7 | |
| Fe | 2.02 | |
| Mn | 664 | |
| Ni | 16.8 | |
| Zn | 55.2 | |
| Oral reference dose (Rfd) | | Cd | 0.001 | | mg/kg/day | [8]  [9] |
| Cu | 0.04 | |
| Fe | 0.70 | |
| Mn | 0.14 | |
| Ni | 0.02 | |
| Zn | 0.30 | |
| Oral cancer slope factor (CPSo) (mg/kg/day) | | Cd | 0.38 | | mg/kg/day | [10]  [9] |
| Ni | 1.7 | |

**Supplementary table 3**: PCA with six heavy metals from soil samples.

|  |  |  |  |
| --- | --- | --- | --- |
| **Heavy metals** | **PCA1** | **PCA2** | **PCA3** |
| Cd | 0.76 | 0.60 | -0.18 |
| Cu | 0.94 | -0.15 | -0.24 |
| Fe | 0.64 | -0.72 | -0.01 |
| Mn | 0.26 | 0.24 | 0.91 |
| Ni | 0.78 | -0.33 | 0.32 |
| Zn | 0.91 | 0.38 | -0.12 |
| Proportion of variance % | 56.62 | 20.43 | 17.58 |
| Cumulative proportion % | 56.62 | 77.06 | 94.64 |



**Supplementary Figure 1:** Noncarcinogenic and carcinogenic health risks assessment of heavy metals from the cucurbit vegetables. EDI and TEDI of A) adult and B) children, THQ and HI of C) adult and D) children.



**Supplementary Figure 2:** Contribution of each heavy metal to the total HI (%).

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