Table S1. Classification of the contamination indices.

| | | |
|---|---|---|
| EF | EF < 2 | Deficiency to minimal enrichment |
| | EF= 2–5 | Moderate enrichment |
| | EF= 5–20 | Significant enrichment |
| | EF= 20–40 | Very high enrichment |
| | EF > 40 | Extremely high enrichment |
| CF | Cf < 1 | Low contamination factor |
| | 1 ≤ Cf <3 | Moderate contamination factor |
| | 3 ≤ Cf < 6 | Considerable contamination factor |
| | Cf ≥ 6 | Very high contamination factor |
| PLI | PLI > 1 | Polluted |
| | PLI = 1 | Baseline levels of pollution |
| | PLI < 1 | Not polluted |
| RI | Er < 40 | Low ecological risk |
| | 40 < Er ≤ 80 | Moderate ecological risk |
| | 80 < Er ≤ 160 | Considerable ecological risk |
| | 160 < Er ≤ 320 | High ecological risk |
| | Er > 320 | Serious ecological risk |
| | RI < 150 | Low ecological risk |
| | 150 < RI < 300 | Moderate ecological risk |
| | 300 < RI < 600 | High potential ecological risk |
| | RI ≥ 600 | Significantly high ecological risk |

Table S2. Concentration of HHMs (mg/kg) in Makkah soil with world and background comparison.

| S.N. | Cr | Cu | Fe | Pb | Zn |
|---|---|---|---|---|---|
| **1** | 63.0 | 49.00 | 43800 | 37.00 | 102.00 |
| **2** | 41.0 | 656 | 31,400 | 6.00 | 70.0 |
| **3** | 43.0 | 33.0 | 38,500 | 5.00 | 57.0 |
| **4** | 25.0 | 25.0 | 24,900 | 5.00 | 50.0 |
| **5** | 31.0 | 18.0 | 26,900 | 4.00 | 43.0 |
| **6** | 35.0 | 21.0 | 25,600 | 4.00 | 42.0 |
| **7** | 39.0 | 19.0 | 29,100 | 3.00 | 44.0 |
| **8** | 45.0 | 28.0 | 34,100 | 5.00 | 65.0 |
| **9** | 38.0 | 27.0 | 29,000 | 4.00 | 51.0 |
| **10** | 52.0 | 39.0 | 45,100 | 7.00 | 69.0 |
| **11** | 38.0 | 33.0 | 38,000 | 9.00 | 58.0 |
| **12** | 41.0 | 35.0 | 34,400 | 4.00 | 56.0 |
| **13** | 69.0 | 38.0 | 42,700 | 5.00 | 114 |
| **14** | 49.0 | 28.0 | 32,600 | 4.00 | 94.0 |
| **15** | 64.0 | 54.0 | 45,300 | 5.00 | 91.0 |
| **16** | 49.0 | 40.0 | 38,200 | 6.00 | 58.0 |
| **17** | 62.0 | 72.0 | 36,100 | 5.00 | 120 |
| **18** | 56.0 | 38.0 | 31,600 | 4.00 | 51.0 |
| **19** | 74.0 | 36.0 | 43,500 | 5.00 | 72.0 |
| **20** | 62.0 | 57.0 | 42,800 | 6.00 | 91.0 |
| **21** | 35.0 | 22.0 | 24,300 | 4.00 | 40.0 |
| **22** | 41.0 | 29.0 | 28,900 | 6.00 | 117 |
| **23** | 40.0 | 27.0 | 30,700 | 3.00 | 50.0 |
| **24** | 41.0 | 27.0 | 28,600 | 6.00 | 52.0 |
| **25** | 49.0 | 37.0 | 40,600 | 7.00 | 87.0 |
| **26** | 50.0 | 48.0 | 34,700 | 6.00 | 122 |
| **27** | 93.0 | 35.0 | 47,300 | 3.00 | 54.0 |
| **28** | 20.0 | 52.0 | 32,100 | 3.00 | 59.0 |
| **29** | 53.0 | 31.0 | 40,000 | 3.00 | 42.0 |
| **30** | 61.0 | 45.0 | 39,900 | 12.0 | 98.0 |
| **31** | 32.0 | 26.0 | 25,500 | 4.00 | 44.0 |
| **32** | 41.0 | 39.0 | 38,200 | 5.00 | 64.0 |
| **Min.** | 20.0 | 18.0 | 24,300 | 3.00 | 40.0 |
| **Max.** | 93.0 | 656 | 47,300 | 37.00 | 122 |
| **Aver.** | 47.9 | 55.13 | 35,138 | 6.09 | 69.6 |
| **St.Dev.** | 15.47 | 21.04 | 6,027 | 2.17 | 23.84 |
| **WA** | 59.5 | 38.9 | 35,000 | 27.0 | 70.0 |
| **BV** | 90.0 | 45.0 | 47200 | 20.0 | 95.0 |

WA, World average [41]; BV, Background value [42]

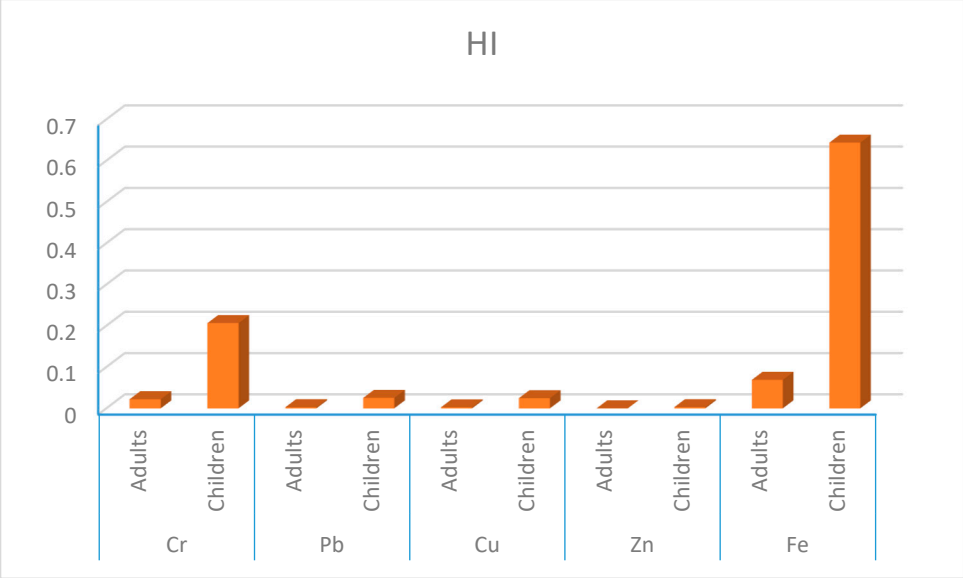



Figure S1. Average hazard index (HI) of HHMs in adults and children.

Table S3. Hazard index of HMs for non-carcinogenic risk in adults and children in the study area.

| S.N. | Cr | | Pb | | Cu | | Zn | | Fe | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Adult. | Child. | Adult. | Child. | Adult. | Child. | Adult. | Child. | Adult. | Child. |
| 1 | 0.029 | 0.269 | 0.015 | 0.135 | 0.0018 | 0.017 | 0.0005 | 0.0044 | 0.086 | 0.802 |
| 2 | 0.019 | 0.175 | 0.002 | 0.022 | 0.0243 | 0.227 | 0.0003 | 0.0030 | 0.062 | 0.575 |
| 3 | 0.020 | 0.184 | 0.002 | 0.018 | 0.0012 | 0.011 | 0.0003 | 0.0024 | 0.076 | 0.705 |
| 4 | 0.011 | 0.107 | 0.002 | 0.018 | 0.0009 | 0.009 | 0.0002 | 0.0021 | 0.049 | 0.456 |
| 5 | 0.014 | 0.132 | 0.002 | 0.015 | 0.0007 | 0.006 | 0.0002 | 0.0018 | 0.053 | 0.492 |
| 6 | 0.016 | 0.149 | 0.002 | 0.015 | 0.0008 | 0.007 | 0.0002 | 0.0018 | 0.050 | 0.469 |
| 7 | 0.018 | 0.167 | 0.001 | 0.011 | 0.0007 | 0.007 | 0.0002 | 0.0019 | 0.057 | 0.533 |
| 8 | 0.021 | 0.192 | 0.002 | 0.018 | 0.0010 | 0.010 | 0.0003 | 0.0028 | 0.067 | 0.624 |
| 9 | 0.017 | 0.162 | 0.002 | 0.015 | 0.0010 | 0.009 | 0.0002 | 0.0022 | 0.057 | 0.531 |
| 10 | 0.024 | 0.222 | 0.003 | 0.026 | 0.0014 | 0.013 | 0.0003 | 0.0029 | 0.089 | 0.825 |
| 11 | 0.017 | 0.162 | 0.004 | 0.033 | 0.0012 | 0.011 | 0.0003 | 0.0025 | 0.075 | 0.695 |
| 12 | 0.019 | 0.175 | 0.002 | 0.015 | 0.0013 | 0.012 | 0.0003 | 0.0024 | 0.068 | 0.630 |
| 13 | 0.032 | 0.295 | 0.002 | 0.018 | 0.0014 | 0.013 | 0.0005 | 0.0049 | 0.084 | 0.781 |
| 14 | 0.022 | 0.209 | 0.002 | 0.015 | 0.0010 | 0.010 | 0.0004 | 0.0040 | 0.064 | 0.597 |
| 15 | 0.029 | 0.273 | 0.002 | 0.018 | 0.0020 | 0.019 | 0.0004 | 0.0039 | 0.089 | 0.829 |
| 16 | 0.022 | 0.209 | 0.002 | 0.022 | 0.0015 | 0.014 | 0.0003 | 0.0025 | 0.075 | 0.699 |
| 17 | 0.028 | 0.265 | 0.002 | 0.018 | 0.0027 | 0.025 | 0.0006 | 0.0051 | 0.071 | 0.661 |
| 18 | 0.026 | 0.239 | 0.002 | 0.015 | 0.0014 | 0.013 | 0.0002 | 0.0022 | 0.062 | 0.578 |
| 19 | 0.034 | 0.316 | 0.002 | 0.018 | 0.0013 | 0.012 | 0.0003 | 0.0031 | 0.085 | 0.796 |
| 20 | 0.028 | 0.265 | 0.002 | 0.022 | 0.0021 | 0.020 | 0.0004 | 0.0039 | 0.084 | 0.783 |
| 21 | 0.016 | 0.149 | 0.002 | 0.015 | 0.0008 | 0.008 | 0.0002 | 0.0017 | 0.048 | 0.445 |
| 22 | 0.019 | 0.175 | 0.002 | 0.022 | 0.0011 | 0.010 | 0.0005 | 0.0050 | 0.057 | 0.529 |
| 23 | 0.018 | 0.171 | 0.001 | 0.011 | 0.0010 | 0.009 | 0.0002 | 0.0021 | 0.060 | 0.562 |
| 24 | 0.019 | 0.175 | 0.002 | 0.022 | 0.0010 | 0.009 | 0.0002 | 0.0022 | 0.056 | 0.523 |
| 25 | 0.022 | 0.209 | 0.003 | 0.026 | 0.0014 | 0.013 | 0.0004 | 0.0037 | 0.080 | 0.743 |
| 26 | 0.023 | 0.214 | 0.002 | 0.022 | 0.0018 | 0.017 | 0.0006 | 0.0052 | 0.068 | 0.635 |
| 27 | 0.043 | 0.397 | 0.001 | 0.011 | 0.0013 | 0.012 | 0.0002 | 0.0023 | 0.093 | 0.866 |
| 28 | 0.009 | 0.085 | 0.001 | 0.011 | 0.0019 | 0.018 | 0.0003 | 0.0025 | 0.063 | 0.587 |
| 29 | 0.024 | 0.226 | 0.001 | 0.011 | 0.0011 | 0.011 | 0.0002 | 0.0018 | 0.079 | 0.732 |
| 30 | 0.028 | 0.260 | 0.005 | 0.044 | 0.0017 | 0.016 | 0.0004 | 0.0042 | 0.078 | 0.730 |
| 31 | 0.015 | 0.137 | 0.002 | 0.015 | 0.0010 | 0.009 | 0.0002 | 0.0019 | 0.050 | 0.467 |
| 32 | 0.019 | 0.175 | 0.002 | 0.018 | 0.0014 | 0.013 | 0.0003 | 0.0027 | 0.075 | 0.699 |

Table S4. Total lifetime cancer risk for Cr and Pb in the study area.

| S.N. | Cr | | Pb | |
|---|---|---|---|---|
| | Adults | Children | Adults | Children |
| 1 | 4.33E-05 | 0.000404 | 4.33E-07 | 4.03E-06 |
| 2 | 2.82E-05 | 0.000263 | 7.01E-08 | 6.53E-07 |
| 3 | 2.96E-05 | 0.000275 | 5.85E-08 | 5.44E-07 |
| 4 | 1.72E-05 | 0.00016 | 5.85E-08 | 5.44E-07 |
| 5 | 2.13E-05 | 0.000199 | 4.68E-08 | 4.36E-07 |
| 6 | 2.41E-05 | 0.000224 | 4.68E-08 | 4.36E-07 |
| 7 | 2.68E-05 | 0.00025 | 3.51E-08 | 3.27E-07 |
| 8 | 3.09E-05 | 0.000288 | 5.85E-08 | 5.44E-07 |
| 9 | 2.61E-05 | 0.000243 | 4.68E-08 | 4.36E-07 |
| 10 | 3.58E-05 | 0.000333 | 8.18E-08 | 7.62E-07 |
| 11 | 2.61E-05 | 0.000243 | 1.05E-07 | 9.8E-07 |
| 12 | 2.82E-05 | 0.000263 | 4.68E-08 | 4.36E-07 |
| 13 | 4.74E-05 | 0.000442 | 5.85E-08 | 5.44E-07 |
| 14 | 3.37E-05 | 0.000314 | 4.68E-08 | 4.36E-07 |
| 15 | 4.4E-05 | 0.00041 | 5.85E-08 | 5.44E-07 |
| 16 | 3.37E-05 | 0.000314 | 7.01E-08 | 6.53E-07 |
| 17 | 4.26E-05 | 0.000397 | 5.85E-08 | 5.44E-07 |
| 18 | 3.85E-05 | 0.000359 | 4.68E-08 | 4.36E-07 |
| 19 | 5.09E-05 | 0.000474 | 5.85E-08 | 5.44E-07 |
| 20 | 4.26E-05 | 0.000397 | 7.01E-08 | 6.53E-07 |
| 21 | 2.41E-05 | 0.000224 | 4.68E-08 | 4.36E-07 |
| 22 | 2.82E-05 | 0.000263 | 7.01E-08 | 6.53E-07 |
| 23 | 2.75E-05 | 0.000256 | 3.51E-08 | 3.27E-07 |
| 24 | 2.82E-05 | 0.000263 | 7.01E-08 | 6.53E-07 |
| 25 | 3.37E-05 | 0.000314 | 8.18E-08 | 7.62E-07 |
| 26 | 3.44E-05 | 0.00032 | 7.01E-08 | 6.53E-07 |
| 27 | 6.4E-05 | 0.000596 | 3.51E-08 | 3.27E-07 |
| 28 | 1.38E-05 | 0.000128 | 3.51E-08 | 3.27E-07 |
| 29 | 3.64E-05 | 0.000339 | 3.51E-08 | 3.27E-07 |
| 30 | 4.19E-05 | 0.000391 | 1.4E-07 | 1.31E-06 |
| 31 | 2.2E-05 | 0.000205 | 4.68E-08 | 4.36E-07 |
| 32 | 2.82E-05 | 0.000263 | 5.85E-08 | 5.44E-07 |