Supplementary materials

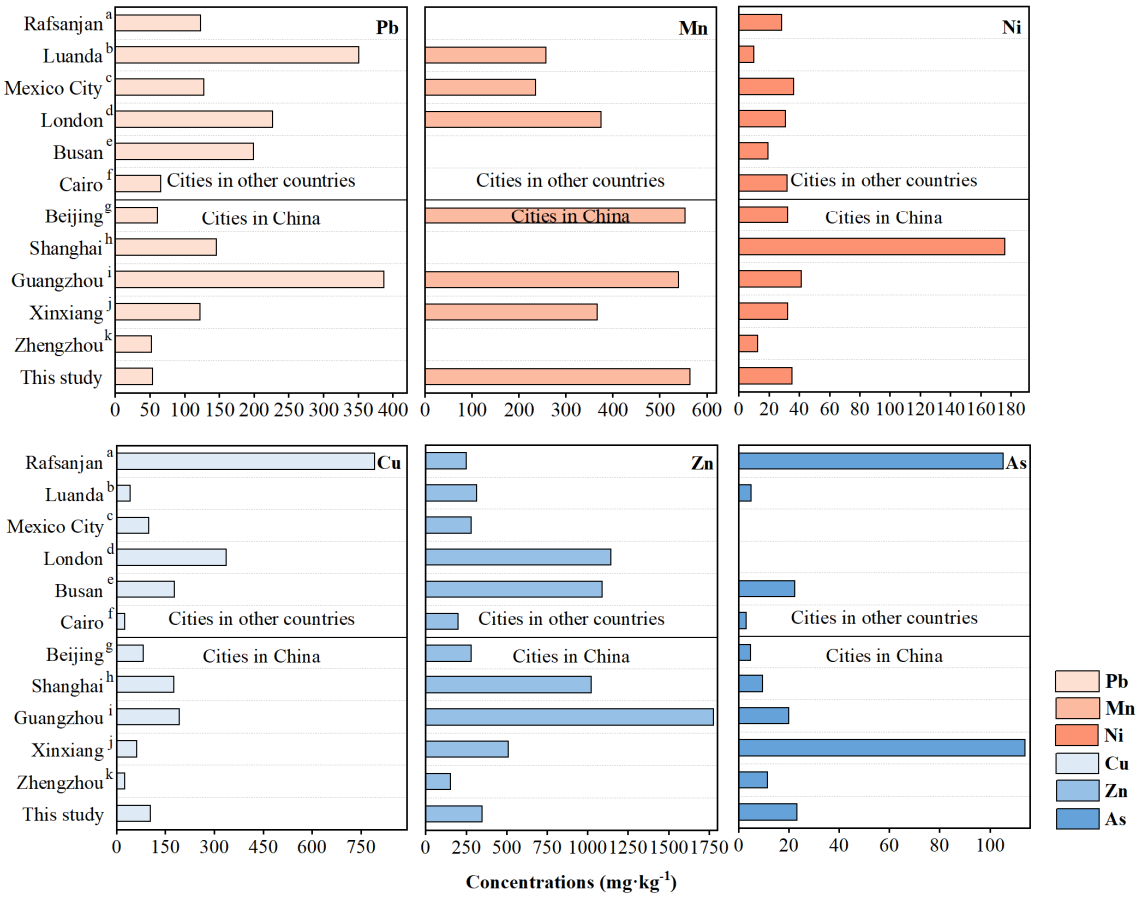

Figure S1. Comparison of the heavy metal concentrations (mg/kg) from different cities around the world.

[a] the mean concentrations of heavy metals for Rafsanjan, SE Iran [57]

[b] the mean concentrations of heavy metals for Luanda, Angola [62]

[c] the mean concentrations of heavy metals for Mexico City, United Mexican States [80]

[d] the mean concentrations of heavy metals for London, UK [81]

[e] the mean concentrations of heavy metals for Busan, Korea [79]

[f] the mean concentrations of heavy metals for Cairo, Egypt [16]

[g] the mean concentrations of heavy metals for Beijing, China [84]

[h] the mean concentrations of heavy metals for Shanghai, China [20]

[i] the mean concentrations of heavy metals for Guangzhou, China [82]

[j] the mean concentrations of heavy metals for Xinxiang, China [83]

[k] the mean concentrations of heavy metals for Zhengzhou, China [43]

Notes: Limited research data is available for vanadium concentration, so the comparison of V content involving Zhengzhou and other cities is not presented in this figure.

Table S1. Classification criteria of geo-accumulation pollution index

Index of geo-accumulation（I_{geo}）	＜0	0~1	1~2	2~3	3~4	4~5	＞5
Category	Uncontaminated	Uncontaminated to moderately	Moderately contaminated	Moderately to strongly contaminated	Strongly contaminated	Strongly to extremely contaminated	Extremely contaminated

Table S2. Categories of single and comprehensive potential ecological risks of heavy metal pollution

Single potential ecological risk factor (Er^i)	Category	Comprehensive potential ecological risk (RI)	Category
＜40	low	≤50	low
40≤Er^i＜80	moderate	50＜RI≤100	moderate
80≤Er^i＜160	considerable	100＜RI≤200	considerable
160≤Er^i＜320	high	＞200	Very high
≥320	Significant high		

Table S3. Exposure parameters for the health risk assessment model

	Factor	Parameter	Unit	Values		References
				Children	Adults	
Parameters of exposure behaviour	C	Contaminant Concentration	mg • kg^{-1}	Mean	Mean	This study
	ED	Exposure duration	a	6	24	[103]
	EF	Exposure frequency	d • a^{-1}	350	350	[103]
	BW	Average body weight	kg	15	70	[58,103]
	AT (non-carcinogenesis)	Average time	d	365×ED	365×ED	[58]
	AT (carcinogenesis）	Average time	d	365×70	365×70	[58]
Hand-mouth ingestion	IngR	Ingestion rate	mg • d^{-1}	200	100	[60]
Inhalation	InhR	Inhalation rate	m^3 • d^{-1}	7.5	14.5	[104]
	PEF	Particle emission factor	m^3 • kg^{-1}	1.36×10^9	1.36×10^9	[60,67]
Dermal contact	SA	Exposed skin area	cm^2	2800	5700	[67]
	SL	Skin adherence factor	mg • cm^{-2} • d^{-1}	0.2	0.07	[67]
	ABS	Dermal absorption factor	-	Cu=0.01 V=0.01 Pb=0.01 Zn=0.001 As=0.03 Ni=0.01 Mn=0.01	Cu=0.01 V=0.01 Pb=0.01 Zn=0.001 As=0.03 Ni= 0.01 Mn=0.01	[75,105-106]

Table S4. Reference dose (RfD) for non-carcinogenic metals and slope factors (SF) for carcinogenic metals with different exposure pathways

	V	Mn	Cu	Zn	As	Pb	Ni
RfD_{ing}	7.00×10^{-3}	4.60×10^{-2}	4.00×10^{-2}	3.00×10^{-1}	3.00×10^{-4}	3.50×10^{-3}	2.00×10^{-2}
RfD_{inh}	7.00×10^{-3}	1.43×10^{-5}	4.00×10^{-2}	3.00×10^{-1}	1.23×10^{-4}	3.52×10^{-3}	2.06×10^{-2}
RfD_{dermal}	7.00×10^{-5}	1.84×10^{-3}	1.20×10^{-2}	6.00×10^{-2}	1.23×10^{-4}	5.25×10^{-4}	5.40×10^{-3}
SF_{ing}	-	-	-	-	1.5	-	-
SF_{inh}	-	-	-	-	15.1	-	0.84
SF_{dermal}	-	-	-	-	3.66	-	-

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