Hg-mining-induced soil pollution by potentially toxic metal(loid)s presents a potential environmental risk and threat to human health: A global meta-analysis

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Table S1. Statistical summaries of MeHg (μg kg^{-1}) and PTM concentrations (mg kg^{-1}) in soils near Hg mines in 16 countries.

No.	MeHg	Hg	Cd	As	Pb	Cu	Zn	Cr	Mn	Ni	Analytical instruments	Sample No.	Land uses	Mine name	Location	References
1		48.33	1.54	23.79	44.43		176.93	56.35			ICP-MS/AES	9	N-A	Chatian	China	Sun et al., 2009
2		25.48		34.99				82.18			ICP-MS/AFS	89	A	Gongguan	China	Zhu et al., 2021
3		18.95	1.97	13.29	31.05	43.1	143.5	20.47		31.95	ICP-MS/AFS	60	A	Tongren	China	Jia et al., 2021
4		1.16	0.44	17.13	47.11	26.21	102.68			32.13	ICP-MS/AFS/XRF	168	A	Youyang	China	Wang et al., 2021
5				20.6	53.31						ICP-MS	6	A	Wanshan	China	Qin et al., 2015
6	2.78	4.63						95.3			AFS	15	A	Wanshan	China	Pei et al., 2022
7		0.82						60			ICP-MS	315	A	Yunan	China	Wang et al., 2016
8		20.4	0.43	31.2	49.9						ICP-MS/AFS	28	A	Danzhai	China	Yu et al., 2017
9		2.14	0.27	36.7	64.5	22.4	84				ICP-MS/AES	7	A	Paiting	China	Ni et al., 2020
10		71.1	1.07	134.8	10.22	5.11	55.2				ICP-MS/AFS	9	A	Unnamed	China	Liu, 2016
11		150.4	0.22	50.7	2.43	129.4	165.3				ICP-MS/AES	12	N-A	Muyouchang	China	Chen and Zhang, 2009
12	3.67	142.3						353.2			ICP-OES	9	N-A	Wanshan	China	Qian et al., 2019
13	1.91	4.98						77.89			ICP-MS	83	A	Wanshan	China	Gao et al., 2021
14		14.15	0.87	14.24	59.3	41.45				33.58	ICP-MS	30	N-A	Wanshan	China	Hu et al., 2015
15		4.97	0.43	36.22	89.74	46.27	36.93			45.78	ICP-OES	54	A	Sikeng	China	Chen et al., 2020
16	3.65	74.8						81.7			ICP-MS/AFS	48	A	Tongren	China	Zhou et al., 2016
17		19.7	0.67	15.8	83.8		89.3				ICP-MS/AFS	24	N-A	Xunyang	China	Feng, 2019
18		10.5	0.88	19.2	45.6	36.2	125.7			39.2	ICP-MS/AFS/XRF	95	A	Youyang	China	Yu et al., 2022
19		146	23.3		58.4			69.7			XRF	30	N-A	Unnamed	China	Liu et al., 2018
20	4.67	0.5									AFS	18	A	Xunyang	China	Ao et al., 2020
21		152.3	0.99	137.7	27.7	91.9	95			41.7	ICP-MS	217	A	Lanmuchang	China	Ma et al., 2020
22		16.94	2.17	34.52	23.55	39.72	342.9				ICP-MS/AES	5	N-A	Wanshan	China	Huang et al., 2021
23	4.37	14.4									ICP-MS/AES	12	A	Wuchuan	China	Qiu et al., 2006
24	3.5	8.5									AAS	28	N-A	Gouxi	China	Li et al., 2008
25	4.88	32.1									AAS	15	N-A	Xunyang	China	Qiu et al., 2012
26	2.4	40.5									AFS	6	N-A	Yangshikeng	China	Xu et al., 2018

No.	MeHg	Hg	Cd	As	Pb	Cu	Zn	Cr	Mn	Ni	Analytical instruments	Sample No.	Land uses	Mine name	Location	References
27	14.7	83.3	0.88		38.2	49.8	153		318	29.3	AFS	24	N-A	Wanshan	China	Li et al., 2014
28	1.02	50.86						334			AFS	27	N-A	Wanshan	China	Abeysinghe et al., 2017
29	2.75	214.7									AFS	24	N-A	Wanshan	China	Xing et al., 2020
30		2	1.14	32.3	219.3	42	208.8			203.5	ICP-MS/AFS	24	N-A	Xunyang	China	Wang et al., 2019
31		85.45		43.4	80.2	35.9		565.6		13.3	ICP-AES	32	N-A	Wanshan	China	Li et al., 2009
32		6	1.39	52.3	26.3	48.5	257				ICP-MS/AFS	26	N-A	Wanshan	China	Tang et al., 2021
33		1.95	3.73	11.2	115.1	39.8	104.1	68.8		296	ICP-MS/AFS	15	A	Gongguan	China	Zhu et al., 2018
34			3.04		54.8			49.59			ICP-MS	18	A	Chatian	China	Sun et al., 2010
35		20	1.01	11.22	41.2	40.5	64.6	59.6	429.7	15.2	XRF/AFS	460	A	Wanshan	China	Liu et al., 2022
36		358.51	0.78	67.42	57.55	15.65	248.6	236.7		59.04	ICP-MS/AFS	25	N-A	Wanshan	China	Wu et al., 2020
37		4.29	0.43	117.6	48.99	43.77	29.13	14.7		18.8	ICP-MS/AFS	25	A	Wanshan	China	Wu et al., 2020
38		91.28		273	58	150.2	148			75.7	ICP-AES/AFS	81	N-A	Xingren	China	Zhang et al., 2023a
39		2.89	0.24	73.4	50.4		108.9				ICP-MS/AES	10	A	Sandu	China	Ni et al., 2022
40		0.15	0.34	9.2	41.4	27.7	102.5	74.1		35.4	ICP-MS/AES/AFS	118	A	Wuli	China	Zhang et al., 2023b
41		20.2	1.01								AFS	80	A	Aozhai	China	Li et al., 2022
42		0.45	0.3	48	46	25	107	47		21	ICP-MS/AES	135	A	Dachang	China	Yang et al., 2023
43	30.5	358.5			370	30.5	94	46	716.2	59.7	XRF/AFS	18	N-A	Nalon	Spain	Fernández-Martínez et al., 2015
44		13.1	0.1	22.9	19.7	17.3	71.3	83.9	608.3	20.7	ICP-MS	61	N-A	Almaden	Spain	Boente et al., 2019
45		759	1.1		150	35	343			35	ICP-MS	34	N-A	San Tirso	Spain	Gonzalez-Fernandez et al., 2018
46		157.8	1.2	807.9	55.8	41.9	146.3		991	43.9	ICP-AES/AAS	34	N-A	Mieres	Spain	Fernandez-Martinez et al., 2006
47		62.1		1293	47.2	68.7	116	67.24			ICP-MS/AES/AAS	58	N-A	La Soterrana	Spain	Loredo et al., 2006
48		512		58.3			71.7				ICP-AES/XRF	9	N-A	La Soterrana	Spain	Sierra et al., 2011
49		1950	0.56		70.85	41.66	137.21		2581.6	39.51	ICP-MS	30	N-A	La Soterrana	Spain	Matanzas et al., 2017
50		2376			274	53	169				AAS/XRF	887	N-A	Usagre	Spain	Higueras et al., 2014

No.	MeHg	Hg	Cd	As	Pb	Cu	Zn	Cr	Mn	Ni	Analytical instruments	Sample No.	Land uses	Mine name	Location	References
51		484.4			46.46	25.04	90.99	16.3			EDXRF/ICP-AES	21	N-A	Almaden	Spain	Amoros et al., 2014
52		188		98	71.52		492.9	81			ICP-MS/AES	14	N-A	Caunedo	Spain	Bori et al., 2016
53		70.4	0.38	435	33.7	22	93.9		685	27.8	ICP-MS	107	N-A	Branalamosa	Spain	Ordonez et al., 2011
54		241.5	0.35	158.4	351.5	24.5	326	27		22.5	ICP-AES	12	N-A	Azogue	Spain	Navarro et al., 2012
55		80	0.25	823.5	41.5		207	93.3			ICP-MS	9045	N-A	Maramuniz	Spain	Ordonez et al., 2014
56		46	0.4	429	42	22	228		554	23	ICP-MS	92	A	La Soterrana	Spain	Boente et al., 2022
57		59.8		20.2	52.7	25.3				37.4	XRF/AFS	9	N-A	Almaden	Spain	Bueno et al., 2009
58		54		506							ICP-AES/AAS	52	N-A	Mieres	Spain	Loredo et al., 1999
59		1086		318	141		32		460	979	ICP-AES/XRF	30	N-A	Almaden	Spain	Bernaus et al., 2005
60		46.5					118.5	198	806.5		ICP-AES/DMA-80	6	N-A	Almaden	Spain	Fernandez-Martinez and Rucandio, 2014
61		51.1		570.8				12.69			ICP-MS	21	N-A	La Soterrana	Spain	Gonzalez et al., 2022
62				10.8	56.1	42.9	121	36.4		112.8	AAS	12	N-A	Almaden	Spain	Higueras et al., 2012
63		81.38	0.37	110.6	26.85	21.65	86.31	41	574.8	24.35	ICP-AES/AFS	136	N-A	Branalamosa	Spain	Loredo et al., 2003
64		78.75	2	9.3	44.8		88.5				ICP-MS/AAS	27	N-A	Baca pri Modreju	Slovenia	Kocman et al., 2006
65		3.7	1	17	61	21	129	388.1	531	17	ICP-MS/AAS	182	N-A	Podljubelj	Slovenia	Tersic et al., 2009
66		27.7			38.13	294.8	194.9				AAS	24	N-A	Rudnany	Slovenia	Angelovicova and Fazekasova, 2014
67		23.9								502.3	ICP-AES/AAS	30	N-A	Mernik	Slovenia	Hiller et al., 2021
68	4.46	111.7									AAS	20	N-A	Idrija	Slovenia	Tomiyasu et al., 2012
69		95		27	46			24.5		130	ICP-AES/XRF	10	N-A	Idrija	Slovenia	Esbri et al., 2010
70		32.8	2.97		60.8	109	191	29.13			AAS	45	A	Volovske	Slovenia	Musilova et al., 2016
71		176	0.7	26.2	59.4	171	133	240		20.9	ICP-MS/AES	45	N-A	Idrija	Slovenia	Bavec et al., 2015
72		8.57		16.43	48.63		63.63			12.38	AAS	30	N-A	Malachov	Slovenia	Dadová et al., 2016
73		59.7		8.29	29	20.7	58.1		845	154	AAS/ICP-OES	30	N-A	Mernik	Slovenia	Kulikova et al., 2019
74		2.91	1.62		37.6	37.8	108	69			AAS	28	A	Markusovce	Slovenia	Tomas et al., 2015

No.	MeHg	Hg	Cd	As	Pb	Cu	Zn	Cr	Mn	Ni	Analytical instruments	Sample No.	Land uses	Mine name	Location	References
75		68									AAS	20	N-A	Jedova Hora	Czech Republic	Hojdova et al., 2008
76		11.25			258	353.5	406.5		574	26.5	ICP-AES/AAS	48	N-A	Vallalta	Italy	Wahsha et al., 2019
77		88.1		107.2							ICP-MS/DMA-80	54	N-A	Donets	Ukraine	Conko et al., 2015
78		56.8		33.3	71.5		102.5	731.67			AAS/AFS	11	N-A	Azzaba	Algeria	Seklaoui et al., 2016
79		33.77						867.24			DMA-80	31	N-A	Palawan	Philippines	Samaniego et al., 2020
80		5.04	0.16	5.75	11.95	50.72	63.33		1571	1375	ICP-MS/DMA-80	33	N-A	Palawan	Philippines	Samaniego et al., 2021
81		87.03	0.21	9.22	18.73	61.57	105.55		1488.2	1723	ICP-MS/DMA-80	33	N-A	Palawan	Philippines	Samaniego et al., 2022
82		7.4	0.16	5.75	12	50.7	63.3	732	1751	1375	ICP-MS/DMA-80	18	N-A	Palawan	Philippines	Diwa et al., 2023
83		96									AAS	22	N-A	Cahill	USA	Gray et al., 2002
84		129.2									ICP-MS/AAS	15	N-A	Davis Creek	USA	Holloway et al., 2009
85	2.2	210									AAS	12	N-A	Alaska	USA	Bailey et al., 2002
86	0.34	3.21									AFS	21	N-A	Big Bend	USA	Gray et al., 2015
87		0.39	20.3	162	808	442	563				ICP-MS/AES/AAS	91	N-A	Berg Aukas	Namibia	Podolsky et al., 2015
88		0.02	1.03	5.28	36	1310	48.8	37.95			ICP-MS/AES/AAS	68	N-A	Tsumeb	Zambia	Podolsky et al., 2015
89	37.8	36						13.5			AAS/AFS	14	A	Itomuka	Japan	Kodamatani et al., 2022
90		5.46	0.15	17.95	9.28	25.7	66.37	62.3		30	ICP-MS/AAS	19	A	Halıkoy	Turkey	Gemici et al., 2009
91		26.4	0.1	13.43	8.96	14.04	30.57	160.78	171	9.24	ICP-MS/AAS	21	A	Turkonu	Turkey	Gemici and Tarcan, 2007
92		16.43		92	49	83	79.4		903	75.4	ICP-MS/AAS	20	A	Ladik pond	Turkey	Horasan, 2020
93		22.23	0.94	74.16	58.96	52.86	107.21		1132.6	98.47	ICP-MS/AES	68	N-A	Sarayonu	Turkey	Akay, 2013
94		41.2									ICP-MS/AFS	9	N-A	Puhipuhi	New Zealand	Gionfriddo et al., 2015
95		7.36									AAS/AFS	135	N-A	Julian Alps	Italy	Acquavita et al., 2022
96	17.8	42.3									AAS/AFS	10	N-A	Abbadia San Salvatore	Italy	Rimondi et al., 2012
97		66		81	608	780	602				ICP-MS/DMA-80	18	N-A	Avanza	Italy	Barago et al., 2023
98		253.5									AAS	65	N-A	Pinchi Fault	Canada	Plouffe et al., 2004

No.	MeHg	Hg	Cd	As	Pb	Cu	Zn	Cr	Mn	Ni	Analytical instruments	Sample No.	Land uses	Mine name	Location	References
99		380.6									AAS	9	N-A	La Soledad	Mexico	Camacho-delaCruz et al., 2021
100		279.4		14.7	1.4						AAS	17	N-A	Camargo	Mexico	Saldana-Villanueva et al., 2022
101		7.63			76.1		67.3		75.14		XRF/AAS	35	N-A	Villa Hidalgo	Mexico	Quintanilla-Villanueva et al., 2020

Note: No = Sl. no.; “QA and QC” indicates “Quality assurance and quality control”; Sample No. = Sample size or Sample number; “A” indicates “agricultural soils”; “N-A” indicates “non-agricultural soils” ICP-MS = inductively coupled plasma-mass spectrometry; ICP-AES = inductively coupled plasma atomic emission spectrometer; AAS = atomic absorption spectrometry; AFS = atomic fluorescence spectrometer; XRF = X-ray fluorescence spectrometry; DMA-80 = a mercury vapor analyzer.

Table S2. Background value of PTM concentrations (mg kg^{-1}) in soils in this analysis.

No.	Hg	Cd	As	Pb	Cu	Zn	Cr	Mn	Ni	Location
1	0.11	0.659	20	35.2	32	99.5	95.9	794	39.1	China
2	3.19	0.41	11.4	34	27.1	76.1	19	677	28.5	Spain
3	0.14	0.45	14	42	31	124	91	464	50	Slovenia
4	0.06									Czech Republic
5	0.07			21	51	150	100	900	46	Italy
6	0.06		11.4							Ukraine
7	0.07		11.4	28.4		68.9	112			Algeria
8	0.08	0.2	1.8	12.5	55	70	100	950	75	Philippines
9	0.4									USA
10	0.013	0.49	11.4	28.4	28.2	67.8				Namibia
11	0.009	0.41	10.2	27.5	27.9	58.8	31.5			Zambia
12	0.06						16.1			Japan
13	0.089	0.3	1.5	20	25	95	54		20	Turkey
14	0.06									New Zealand
15	0.06									Italy
16	0.06									Canada
17	0.06			28.4		67.8		571		Mexico
18	0.06	0.06	5.70	25	27.0	75	73	650	34.0	Upper continental crust

Note: The PTM content in upper continental crust is selected as background value, as we cannot obtain the background value of PTM concentrations in this region or country.

Table S3. Basic information on the 18 MeHg sampling sites.

Sampling site	Concentration ($\mu g\ kg^{-1}$)	Mine name	Location	Sample size	References
S1	2.78	Wanshan	China	15	Pei et al., 2022
S2	3.67	Wanshan	China	9	Qian et al., 2019
S3	1.91	Wanshan	China	83	Gao et al., 2021
S4	3.65	Wanshan	China	48	Zhou et al., 2016
S5	4.67	Qingtonggou	China	18	Ao et al., 2020
S6	4.37	Wanshan	China	12	Qiu et al., 2006
S7	3.5	Tongren	China	28	Li et al., 2008
S8	4.88	Xunyang	China	15	Qiu et al., 2012
S9	2.4	Xiushan	China	6	Xu et al., 2018
S10	14.7	Wanshan	China	24	Li et al., 2014
S11	1.02	Wanshan	China	27	Abeysinghe et al., 2017
S12	2.75	Xiushan	China	24	Xing et al., 2020
S13	30.5	Markušovce	Slovenia	18	Fernández-Martínez et al., 2015
S14	4.46	Idrija	Slovenia	20	Tomiyasu et al., 2012
S15	2.2	Alaska	USA	12	Bailey et al., 2002
S16	0.34	Big Bend	USA	21	Gray et al., 2015
S17	37.8	Itomuka	Japan	14	Kodamatani et al., 2022
S18	17.8	Abbadia San Salvatore	Italy	10	Rimondi et al., 2012

Table S4. Hg accumulation (mg/kg) and its translocation in native plant species grown in Hg mining areas worldwide

No.	Native plant species	Shoot accumulation factor	Translocation factor	Shoot Hg concentration	Root Hg concentration	Rhizosphere Hg concentration	References
1	*Pteris vittata L.*	0.0014	0.11	0.1	0.9	69.2	Zhao et al., 2014
2	*Dicranopteris dichotoma (Thunb.) Berhn.*	0.0088	0.12	0.6	5.1	68.3	Zhao et al., 2014
3	*Rubus corchorifolius L.*	0.099	0.39	6.1	15.6	61.5	Zhao et al., 2014
4	*Urtica fissa E. Pritz.*	0.024	0.19	1.6	8.3	66.9	Zhao et al., 2014
5	*Pueraria lobata(Willd.) Ohwi*	0.045	0.31	3.1	10	66.1	Zhao et al., 2014
6	*Medicago sativa L.*	0.0017	0.071	0.1	1.4	57.3	Zhao et al., 2014
7	*Bidensbipinnata L.*	0.01	0.18	0.7	3.8	68.7	Zhao et al., 2014
8	*Artemisia argyi L.*	0.084	0.38	5.2	13.6	62.1	Zhao et al., 2014
9	*Polygonum. hydropiper L.*	0.021	0.19	1.5	8.1	72.1	Zhao et al., 2014
10	*Xanthium sibiricum Patr.*	0.024	0.20	1.9	9.6	78.2	Zhao et al., 2014
11	*Bryum caespiticium*	0.18	-	2.45	-	13.86	Liu et al., 2016
12	*Bryum argenteum*	0.18	-	2.88	-	15.99	Liu et al., 2016
13	*Haplocladium angustifolium*	0.093	-	1.62	-	17.33	Liu et al., 2016
14	*Setaria viridis (L.) Beauv.*	0.52	-	3.31	-	6.41	Liu et al., 2014
15	*Erigeron annuus (L.) Pers.*	0.081	-	1.04	-	12.78	Liu et al., 2014
16	*Phytolacca acinosa Roxb*	0.008	-	0.084	-	10.6	Liu et al., 2014
17	*Boehmeria nivea (L.) Gaudich.*	0.0007	-	0.069	-	104.4	Liu et al., 2014
18	*Miscanthus floridulus*	0.005	-	0.499	-	99.7	Liu et al., 2014
19	*Pteris cretica L.*	0.0028	-	0.164	-	59.5	Liu et al., 2014
20	*Laportea cuspidata*	0.0079	-	0.47	-	59.5	Liu et al., 2014
21	*Anemone vitifolia Buch.-Ham.*	0.019	-	1.04	-	54.9	Liu et al., 2014
22	*Dryopteris emeiensis*	0.011	-	0.15	-	13.8	Liu et al., 2014
23	*Cunninghamia lanceolata (Lamb.) Hook*	0.03	-	0.52	-	17.33	Tang et al., 2021
24	*Senecio scandens Buch.-Ham. ex D. Don*	0.016	-	0.23	-	14.38	Tang et al., 2021
25	*Fagopyrum esculentum Moench.*	0.024	-	0.56	-	23.33	Tang et al., 2021
26	*Selaginella tamariscina (P. Beauv.) Spring*	0.03	-	0.77	-	25.67	Tang et al., 2021

27	*Matteuccia struthiopteris (L.) Todaro*	0.09	-	0.54	-	6	Tang et al., 2021
28	*Clerodendrum bungei var. bungei*	0.08	-	0.59	-	7.38	Tang et al., 2021
29	*Lespedeza bicolor Turcz*	0.14	-	0.97	-	6.93	Tang et al., 2021
30	*Erigeron canadensis L.*	0.06	-	0.47	-	7.83	Tang et al., 2021
31	*Serissa japonica (Thunb.) Thunb.*	0.04	-	0.12	-	3	Tang et al., 2021
32	*Robinia pseudoacacia Linn.*	0.2	-	0.48	-	2.4	Tang et al., 2021
33	*Broussonetia papyrifera (Linn.) L*	0.29	-	0.68	-	2.34	Tang et al., 2021
34	*Boehmeria pseudotricuspis W. T. Wang*	0.36	-	0.83	-	2.31	Tang et al., 2021
35	*Rubus oblongus T. T. Yu et L. T. Lu*	0.24	-	0.57	-	2.38	Tang et al., 2021
36	*Gynostemma pentaphyllum (Thunb.) Makino*	0.04	-	0.09	-	2.25	Tang et al., 2021
37	*Cinnamomum camphora (L.) Presl*	0.37	-	0.61	-	1.65	Tang et al., 2021
38	*Cinnamomum japonicum Sieb.*	0.23	-	0.41	-	1.78	Tang et al., 2021
39	*Epimeredi indica*	0.24	-	0.42	-	1.75	Tang et al., 2021
40	*Coriaria nepalensis Wall.*	0.23	-	0.41	-	1.78	Tang et al., 2021
41	*Rhus chinensis Mill.*	0.37	-	0.63	-	1.70	Tang et al., 2021
42	*Phytolacca americana L.*	1.05	-	1.68	-	1.6	Tang et al., 2021
43	*Glebionis coronaria (L.) Cass. ex Spach*	0.28	-	0.5	-	1.79	Tang et al., 2021
44	*Crassocephalum crepidioides (Benth.) S. Moore*	0.07	-	0.18	-	2.57	Tang et al., 2021
45	*Potentilla sibbaldii Haller f.*	0.59	-	0.08	-	0.14	Tang et al., 2021
46	*Pteris cretica L. var. nervosa (Thunb.) S. H. Wu*	0.002	-	0.003	-	1.5	Tang et al., 2021
47	*Mosla scabra (Thunb.) C. Y. Wu et H. W. Li*	0.001	-	0.002	-	2	Tang et al., 2021
48	*Pinus massoniana Lamb*	0.3	-	0.05	-	0.17	Tang et al., 2021
49	*Indigofera tinctoria Linn*	0.09	-	0.64	-	7.11	Tang et al., 2021
50	*Buddleja lindleyana Fortune*	0.03	-	0.37	-	12.33	Tang et al., 2021
51	*Cyclosorus interruptus (Willd.) H. Ito*	0.16	-	0.95	-	5.94	Tang et al., 2021
52	*Trifolium repens*	0.002	-	0.28	-	140	Tang et al., 2021
53	*Conyza canadensis L.*	0.012	3.97	4.69	1.18	393.4	Wang et al., 2011
54	*Achillea millefolium L.*	0.0005	2.53	0.81	0.32	1792	Wang et al., 2011
55	*Medicago spp.*	0.0077	0.39	0.9	2.29	117	Wang et al., 2011

56	*Crupina vulgaris*	0.028	0.3	48	160	1709	Fernández-Martínez et al., 2015
57	*Typha latifolia*	0.012	0.12	1.1	9.1	91	Fernández-Martínez et al., 2015
58	*Phyllitis scolopendrium*	0.013	0.65	1.7	2.6	128	Fernández-Martínez et al., 2015
59	*Dryopteris filix-mas*	0.17	0.68	7	10.3	41	Fernández-Martínez et al., 2015
60	*Calluna vulgaris*	0.0082	0.67	1.2	1.8	146	Fernández-Martínez et al., 2015
61	*Dryopteris affinis*	0.017	0.18	0.6	3.4	36	Fernández-Martínez et al., 2015
62	*Cirsium arvense (L.) Scop*	0.012	-	2.33	-	190	García-Sánchez et al., 2009
63	*Hirschfeldia adpressa Moench*	0.00032	-	0.06	-	190	García-Sánchez et al., 2009
64	*Hordeum murinum L.*	0.0017	-	0.32	-	190	García-Sánchez et al., 2009
65	*Medicago muricata Benth.*	0.0049	-	0.94	-	190	García-Sánchez et al., 2009
66	*Plantago media L.*	0.017	-	3.16	-	190	García-Sánchez et al., 2009
67	*Trifolium fragiferum L.*	0.021	-	3.97	-	190	García-Sánchez et al., 2009
68	*Xanthium spinosum L.*	0.0021	-	0.4	-	190	García-Sánchez et al., 2009
69	*Agrostis setacea Curtis*	0.0051	-	1.46	-	287	García-Sánchez et al., 2009
70	*Koeleria phleoides (Vill.) Pers.*	0.012	-	3.35	-	287	García-Sánchez et al., 2009
71	*Lamarckia aurea (L.) Moench.*	0.0059	-	1.69	-	287	García-Sánchez et al., 2009
72	*Trifolium angustifolium L.*	0.032	-	9.15	-	287	García-Sánchez et al., 2009
73	*Marrubium vulgare L.*	0.049	-	38	-	778	García-Sánchez et al., 2009
74	*Cynara humilis L.*	0.0041	-	3.22	-	778	García-Sánchez et al., 2009
75	*Centaurea calcitrapa L.*	0.0024	-	1.84	-	778	García-Sánchez et al., 2009
76	*Bromus madritensis L.*	0.017	-	12.9	-	778	García-Sánchez et al., 2009
77	*Eryngium campestre L.*	0.016	-	0.08	-	5	García-Sánchez et al., 2009
78	*Lolium rigidum Gaudin*	0.012	-	0.06	-	5	García-Sánchez et al., 2009
79	*Carlina corymbosa L.*	0.0004	-	0.09	-	202	García-Sánchez et al., 2009
80	*Dactylis glomerata L.*	0.0005	-	0.1	-	202	García-Sánchez et al., 2009
81	*Scabiosa columbaria L.*	0.0003	-	0.06	-	202	García-Sánchez et al., 2009
82	*Vitis vinifera, L.*	0.0034	-	1.63	-	484.4	Amoros et al., 2014
83	*Jatropha curcas*	0.62	0.63	3.74	5.98	6.02	Marrugo-Negrete et al., 2016
84	*Thalia geniculata*	0.35	0.38	1.41	3.7	4.08	Marrugo-Negrete et al., 2016

85	*Piper marginathum*	0.53	0.58	2.7	4.69	5.13	Marrugo-Negrete et al., 2016
86	*Cyperus ferax*	0.3	0.34	1.09	3.22	3.68	Marrugo-Negrete et al., 2016
87	*Ricinus communis*	0.41	0.49	2.55	5.21	6.27	Marrugo-Negrete et al., 2016
88	*Pityrogramma colomelanos*	0.45	0.55	0.18	0.33	0.40	Marrugo-Negrete et al., 2016
89	*Capsicum annuum*	1.01	1.23	0.343	0.28	0.34	Marrugo-Negrete et al., 2016
90	*Stecherus bifidus*	0.61	0.75	0.77	1.02	1.27	Marrugo-Negrete et al., 2016
91	*Guazuma ulmifolia*	0.52	0.71	0.12	0.17	0.23	Marrugo-Negrete et al., 2016
92	*Senna alata*	0.61	0.82	0.14	0.17	0.23	Marrugo-Negrete et al., 2016
93	*Tabebuia rosea*	0.32	0.43	1.57	3.63	4.97	Marrugo-Negrete et al., 2016
94	*Calathea lutea*	0.40	0.55	0.68	1.23	1.69	Marrugo-Negrete et al., 2016
95	*Eleocharis interstincta*	0.53	0.76	0.26	0.34	0.49	Marrugo-Negrete et al., 2016
96	*Cecropia peltata*	0.23	0.34	0.35	1.03	1.50	Marrugo-Negrete et al., 2016
97	*Oxycaryum cúbense*	0.48	0.7	0.35	0.5	0.73	Marrugo-Negrete et al., 2016
98	*Phyllanthus niruri*	0.66	1.11	0.21	0.19	0.32	Marrugo-Negrete et al., 2016
99	*Psidium guajava*	0.27	0.49	1.68	3.42	6.32	Marrugo-Negrete et al., 2016
100	*Cyperus luzulae*	0.44	0.94	0.15	0.16	0.34	Marrugo-Negrete et al., 2016
101	*Muntingia calabura*	0.28	0.73	0.11	0.15	0.4	Marrugo-Negrete et al., 2016
102	*Clidemia sp.*	0.51	1.43	0.33	0.23	0.65	Marrugo-Negrete et al., 2016
103	*Plectramthus sp.*	0.57	1.67	0.25	0.15	0.44	Marrugo-Negrete et al., 2016
104	*Ludwigia octovalvis*	0.29	0.93	0.14	0.15	0.49	Marrugo-Negrete et al., 2016
105	*Inga edulis*	0.35	1.22	0.22	0.18	0.63	Marrugo-Negrete et al., 2016
106	*Stellaria nemorum L.*	0.28	0.78	3.10	4	11.25	Wahsha et al., 2019
107	*Polystichum braunii Spenn.*	0.01	0.48	0.11	0.23	11.25	Wahsha et al., 2019
108	*Chaerophyllum hirsutum L.*	0.71	0.52	8.00	15.4	11.25	Wahsha et al., 2019
109	*Taraxacum officinale Web*	0.098	0.079	1.10	14	11.25	Wahsha et al., 2019
110	*Dittrichia viscosa (L.) W. Greuter*	0.56	-	5.14	-	9.14	Shehu et al., 2014
111	*Echium plantagineum L.*	0.14	-	1.31	-	9.14	Shehu et al., 2014
112	*Tamarix dalmatica Baum*	0.58	-	5.34	-	9.14	Shehu et al., 2014
113	*Limonium anfractum Salmon.*	0.09	-	0.79	-	9.14	Shehu et al., 2014

114	*Cyrtomium macrophyllum*	0.012	2.62	34.4	13.9	226	Xun et al., 2017
115	*Woodwardia unigemmata.*	0.0082	1.56	8.94	5.73	191	Xun et al., 2017
116	*Dennstaedtia hirsute*	0.004	0.88	14.6	16.7	226	Xun et al., 2017
117	*Ageratum conyzoides*	0.0094	0.94	11.5	12.2	100	Xun et al., 2017
118	*Sonchus arvensis*	0.013	1.34	11.4	8.47	106	Xun et al., 2017
119	*Artemisia argyi*	0.0074	1.32	5.94	4.5	179	Xun et al., 2017
120	*Ixeris denticulata*	0.008	1.61	12.3	7.61	193	Xun et al., 2017
121	*Commelina communis.*	0.0011	0.23	8.38	31.2	209	Xun et al., 2017
122	*Scirpus triqueter*	0.0032	0.5	6.81	13.5	157	Xun et al., 2017
123	*Cyperus rotundus*	0.0019	0.19	2.48	13	102	Xun et al., 2017
124	*Calathodes oxycarpa*	0.0037	0.7	3.32	4.47	187	Xun et al., 2017
125	*Allium tuberosum*	0.004	0.18	0.4	2.2	110	Qian et al., 2018
126	*Arthraxon hispidus*	0.16	0.54	70	130	450	Qian et al., 2018
127	*Aster ageratoides*	0.33	3.5	6.3	1.8	19	Qian et al., 2018
128	*Aster subulatus*	0.14	0.28	0.42	1.5	3	Qian et al., 2018
129	*Brassica ampestris*	0.076	22	2.2	0.1	29	Qian et al., 2018
130	*Buddleja lindleyana*	0.054	0.62	5.3	8.5	98	Qian et al., 2018
131	*Buddleja officinalis*	0.044	2.69	1.4	0.52	32	Qian et al., 2018
132	*Campylotropis trigonoclada*	0.017	0.76	0.71	0.93	43	Qian et al., 2018
133	*Cassia nomame*	0.023	0.76	0.5	0.66	22	Qian et al., 2018
134	*Chenopodium glaucum*	0.019	0.12	0.058	0.48	3	Qian et al., 2018
135	*Chromolaene odorata*	0.012	0.8	1.2	1.5	97	Qian et al., 2018
136	*Cibotium barometz*	0.1	2.12	3.6	1.7	35	Qian et al., 2018
137	*Cirsium japonicum*	0.003	0.76	3.8	5	1420	Qian et al., 2018
138	*Clerodendrum bunge*	0.01	0.14	3	22	330	Qian et al., 2018
139	*Coriaria nepalensis*	0.04	0.53	1.8	3.4	41	Qian et al., 2018
140	*Corydalisedulis maxim*	0.05	3.22	0.87	0.27	18	Qian et al., 2018
141	*Cyclosorus acuminatus*	0.08	2.62	3.4	1.3	41	Qian et al., 2018
142	*Debregeasia orientalis*	0.02	0.54	1.3	2.4	54	Qian et al., 2018

143	*Desmodium sequax*	0.39	0.91	3.2	3.5	8.2	Qian et al., 2018
144	*Equisetum ramosissimum*	0.04	0.24	1.7	7	41	Qian et al., 2018
145	*Eremochloa ciliaris*	0.1	1.4	12	8.6	125	Qian et al., 2018
146	*Euphorbia esula*	0.01	0.74	0.66	0.89	83	Qian et al., 2018
147	*Fallopia multiflora*	0.18	1.79	14	7.8	76	Qian et al., 2018
148	*Gynura bicolor*	0.02	1.03	0.82	0.8	40	Qian et al., 2018
149	*Herba artimisiae*	0.04	0.47	2.8	6	65	Qian et al., 2018
150	*Herba bidentis*	0.12	0.35	1.1	3.1	9.1	Qian et al., 2018
151	*Houttuynia crdata*	0.02	1.2	1.8	1.5	86	Qian et al., 2018
152	*Imperata cylindrica*	0.02	0.17	0.96	5.6	46	Qian et al., 2018
153	*Ixeris sonchifolia*	0.31	0.32	20	62	64	Qian et al., 2018
154	*Macleaya cordata*	0.05	1.44	0.98	0.68	18	Qian et al., 2018
155	*Mentha canadensis*	0.01	0.98	0.91	0.93	74	Qian et al., 2018
156	*Neyraudia reynaudiana*	0.24	0.63	0.76	1.2	3.2	Qian et al., 2018
157	*Oenanthe javanica*	0.02	0.59	1	1.7	51	Qian et al., 2018
158	*Oenothera glazioviana*	0.03	0.53	5.2	9.9	165	Qian et al., 2018
159	*Onchus brachyotus*	0.05	4.26	2	0.47	38	Qian et al., 2018
160	*Plantago asiatica*	0.003	0.87	0.53	0.61	170	Qian et al., 2018
161	*Portulaca oleracea*	0.01	1.05	0.86	0.82	73	Qian et al., 2018
162	*Pratia nummularia*	0.07	1.64	1.8	1.1	24.5	Qian et al., 2018
163	*Primula sikkimensis*	0.04	2.52	6.3	2.5	166	Qian et al., 2018
164	*Rumex acetosa*	0.01	1.23	0.49	0.4	42	Qian et al., 2018
165	*Rumex japonicus*	0.01	0.59	1	1.7	69	Qian et al., 2018
166	*Sedum bulbiferum*	0.001	0.51	0.51	1.0	350	Qian et al., 2018
167	*Sedum emarginatum*	0.01	0.82	0.58	0.71	46	Qian et al., 2018
168	*Senecio scandens*	0.04	1.33	0.92	0.69	26	Qian et al., 2018
169	*Sonchus oleraceus*	0.05	0.77	2.4	3.1	46	Qian et al., 2018
170	*Swertia bimaculata*	0.16	0.69	2.4	3.5	15	Qian et al., 2018
171	*Telosma cordata*	0.03	1.7	1.7	1	62	Qian et al., 2018

172	Xanthium sibiricum	0.26	0.35	1.1	3.1	4.3	Qian et al., 2018

Table S5. Hg accumulation (mg/kg) and its translocation in plant species grown in Hg polluted soils under pot conditions.

No.	Native plant species	Shoot accumulation factor	Translocation factor	Shoot Hg concentration	Root Hg concentration	Rhizosphere Hg concentration	References
1	*Brassica juncea*	0.28	0.33	283	869	1000	Su et al., 2018
2	*Polypogon monospeliensis*	0.23	0.12	230	1920	1000	Su et al., 2018
3	*Pteris vittata*	0.49	0.23	245	1066	500	Su et al., 2018
4	*Triticum aestivum*	0.017	-	0.48	-	28.8	Rodriguez et al., 2003
5	*Lupinus luteus.*	0.006	-	0.2	-	32.4	Rodriguez et al., 2003
6	*Poa pratensis*	0.17	0.26	564	2209	3290	Pogrzeba et al., 2016
7	*Miscanthus sinensis*	10.3	1.91	193	101	9.79	Zhao et al., 2019
8	*Opuntia stricta*	0.007	0.092	0.27	2.95	36.6	Liu et al., 2018a
9	*Helianthus tuberosus L.*	4.9	0.1	24.5	257	5	Lv et al., 2018
10	*Zea mays*	0.55	0.16	47.1	294	86	Mello et al., 2020
11	*Jatropha curcas*	0.19	0.29	0.19	0.65	1	Tabibian et al., 2015
12	*Mulberry nigra*	0.84	0.7	25.2	36	30	Hashemi and Tabibian, 2018
13	*Cyrtomium macrophyllum*	22.3	2.51	223	89	10	Xun et al., 2017
14	*Oxalis corniculata L.*	1.11	0.73	0.52	0.71	0.47	Liu et al., 2018b
15	*Lolium perenne*	0.63	6.25	0.75	0.12	1.19	Leudo et al., 2020
16	*Lepidium sativum*	0.005	0.004	0.05	1.12	10	Smolinska and Cedzynska, 2010
17	*Salix viminalis*	3.23	0.08	0.42	5.07	0.13	Sas-Nowosielska et al., 2008
18	*Datura stramonium*	1.1	6.78	454	67	414	Mbanga et al., 2019
19	*Phragmites australis*	1.29	0.84	662	789	514	Mbanga et al., 2019
20	*Persicaria lapathifolia*	0.59	3.38	483	143	817	Mbanga et al., 2019
21	*Melilotus alba*	0.08	0.49	82	169	966	Mbanga et al., 2019
22	*Panicum coloratum*	0.94	6.44	290	45	308	Mbanga et al., 2019
23	*Cyperus eragrostis*	1.21	3.62	416	115	345	Mbanga et al., 2019
24	*Medicago sativa L.*	3.57	0.27	55	204	15.4	Baragano et al., 2022
25	*Paspalum distichum L.*	0.01	0.27	2.58	9.61	252	Xu et al., 2021
26	*Polypogon monspeliensis*	0.06	7.11	25.8	3.63	433	García-Mercado et al., 2019

27	*Cyperus odoratus*	0.14	17.68	62.6	3.54	433	García-Mercado et al., 2019
28	*Miscanthus x giganteus*	0.006	0	0.12	-	20	Zgorelec et al., 2020
29	*Eleocharis parvula*	0.07	0.02	0.26	16.1	4	Willis et al., 2010
30	*Saururus cernuus*	0.015	0.02	0.06	3.68	4	Willis et al., 2010
31	*Juncus effuses*	0.018	0.02	0.07	3.89	4	Willis et al., 2010
32	*Typha latifolia*	0.04	0.01	0.15	13	4	Willis et al., 2010
33	*Panicum hemitomon*	0.03	0.01	0.1	17.7	4	Willis et al., 2010
34	*Aloeveravar.chinensis*	2.38	0	1.9	538	0.8	Liu et al., 2015
35	*Chlorophytum comosum*	5.13	0.01	4.1	457	0.8	Liu et al., 2015
36	*Autum violet*	2.25	0	1.8	411	0.8	Liu et al., 2015
37	*Eichhornia crassipes*	1.45	0.64	0.29	0.45	0.2	Mishra et al., 2008
38	*Lemna minor*	0.83	0.66	0.25	0.38	0.3	Mishra et al., 2008
39	*Spirodela polyrrhiza*	0.68	0.66	0.23	0.35	0.34	Mishra et al., 2008
40	*Lepidium sativum L.*	1.11	-	39.9	-	36	Rollinson et al., 2020
41	*Mentha spicata L.*	4.33	-	156	-	36	Rollinson et al., 2020
42	*Hordeum vulgare*	0.4	-	3.37	-	8.34	Rodriguez et al., 2007
43	*Lupinus albus*	0.64	-	5.31	-	8.34	Rodriguez et al., 2007
44	*Lens esculenta*	0.72	-	5.97	-	8.34	Rodriguez et al., 2007
45	*Cicer aretinum*	0.53	-	4.43	-	8.34	Rodriguez et al., 2007
46	*Chenopodium glaucum L.*	0.02	7.52	2.48	0.33	151	Wang et al., 2011
47	*Helianthus annuus*	0.04	0.03	0.7	24	16.4	Cassina et al., 2012
48	*Capsicum annuum L.*	0.08	0.23	0.16	0.7	1.99	Hussain et al., 2022
49	*Bermuda grass*	0.001	0.01	0.11	11.6	100	Ustiatik et al., 2022
50	*Indian goosegrass*	0.001	0.013	0.1	8	100	Ustiatik et al., 2022
51	*Axonopus compressus*	0.06	2.2	0.33	0.15	5.52	Chamba et al., 2017
52	*Erato polymnioides*	0.33	0.42	1.48	3.56	4.44	Chamba et al., 2017
53	*Miconia zamorensis*	0.22	0.48	0.98	2.06	4.37	Chamba et al., 2017
54	*Lolium multiflorum Lam.*	0.02	0.45	1.11	2.48	47	Du et al., 2022
55	*Festuca rubra L.*	0.02	0.61	1.02	1.68	47	Du et al., 2022

Table S6. Classification of pollution levels in soils (Peng et al., 2022)

Indices	classification	Pollution levels
	$I_{geo} \leq 0$	Practically uncontaminated
	$0 < I_{geo} \leq 1$	Uncontaminated to moderately contaminated
	$1 < I_{geo} \leq 2$	Moderately contaminated
I_{geo}	$2 < I_{geo} \leq 3$	Moderately to heavily contaminated
	$3 < I_{geo} \leq 4$	Heavily contaminated
	$4 < I_{geo} \leq 5$	Heavily to extremely contaminated
	$I_{geo} > 5$	Extremely contaminated

Table S7. Grades of the potential ecological risk index (Khan et al., 2021)

Indices	Low PER (Class 0)	Moderate PER (Class 1)	Considerable PER (Class 2)	Very high PER (Class 3)	Extremely high PER (Class 4)
E_r^i	$E_r^i \leq 40$	$40 < E_r^i \leq 80$	$80 < E_r^i \leq 160$	$160 < E_r^i \leq 320$	$E_r^i > 320$
PERI	PERI ≤ 90	90 < PERI ≤ 180	180 < PERI ≤ 360	360 < PERI ≤ 720	PERI > 720

Note: PER = potential ecological risk

Table S8. Exposure indices of human health risk assessment.

Indices	Unit	Definition	Adults	Children	References
c	mg/kg	Concentration of PHE of interest in the soil	–	–	This study
lngR	(mg/d)	Soil average daily intake	20	50	
lnhR	m^3/day	Respiratory rate	16	7.6	(USEPA, 2011; Yang et al., 2020)
CF	kg/mg	Conversion coefficient	1×10^{-6}	1×10^{-6}	(USEPA, 2011)
EF	(d/a)	Exposure frequency	350	350	(USEPA, 2011)
ED	(a)	Exposure duration	24	6	(USEPA, 2011)
SA	cm^2	Exposed area through dermal contact	5700	2800	(USEPA, 2011)
SL	mg/cm^2/d	Adhesion factor of the skin	0.07	0.2	(USEPA, 2011; Chen et al., 2021)
ABS	–	Dermal absorption factor	0.03 for As and 0.001 for other PHEs	0.03 for As and 0.001 for other PHEs	(USEPA, 2011; Liu et al., 2021)
PEF	m^3/kg	Particle emission factor	1.36×10^9	1.36×10^9	(USEPA, 2011)
BW	kg	Average body weight	60.1	24.5	(USEPA, 2011; Liu et al., 2021)
AT_{nc} (Non-carcinogens)	d	Average exposure time	ED × 365	ED × 365	(USEPA, 2011; Chen et al., 2021)
AT_{ca} (Carcinogens)	d	Average exposure time	70 (lifetime) × 365	70 (lifetime) × 365	

Table S9. Reference dose (RfD) for noncarcinogenic elements and slope factor (SF) for carcinogenic elements. (Kan et al., 2021; Liu et al., 2021)

Metal elements	RfD			SF		
	Ingest	Inhale	Dermal	Ingest	Inhale	Dermal
As	0.0003	0.0003	0.000123	1.5	15.1	3.66
Cd	0.001	0.001	0.00001	6.1	6.3	6.1
Zn	0.300	0.300	0.060	–	–	–
Pb	0.0035	0.00352	0.000525	0.0085	–	–
Cr	0.003	0.0000286	0.003	0.5	42	20
Mn	0.04	0.02	0.14	–	–	–
Cu	0.04	0.0402	0.012	1.7	–	42.5
Ni	0.02	0.00009	0.054	1.7	0.84	42.5
Hg	0.0003	0.0000857	0.000021	-	-	-

Note: RfD is the reference dose according to body weight per unit of time that will probably not cause adverse reactions in the human body,

Table S10. The parameters used in the analysis of Monte-Carlo simulation model.

Parameter	Unit	Probabilistic distribution	Value LN (mean, SD) UN (min, max) TRI (minimum, best, maximum)	Reference
C_{soil}	mg kg^{-1}	Log-normal	This study	This study
BW	kg	Log-normal for children	LN (37.0, 2.98)	(MEP, 2013)
		Uniform for adults	UN (55.7, 68.6)	(MEP, 2013)
EF	day year^{-1}	Triangular	TRI (180, 345, 365)	(Smith, 1994)
ED	year	Point	6 for children, 24 for adults	(USEPA, 2011)
AT	day	Point	365×ED for non-carcinogenic, 365×70 for carcinogenic	(USEPA, 2002, 2011)
SA	cm^2	Point for children	2800	(Li et al., 2014)
		Point for adults	5700	(Li et al., 2014)
AF	mg cm^{-2} day^{-1}	Log-normal for children	0.07	(USEPA, 2011)
		Log-normal for adults	0.2	(USEPA, 2011)
ABS	unitless	Point	0.03 (As), 0.001 (other heavy metals)	(USEPA, 2011)
PEF	m^3 kg^{-1}	Point	1.36×10^{9}	(USEPA, 2002)
IR_{ing}	mg day^{-1}	Triangular for children	TRI (66, 103, 161)	(USEPA, 2011)
		Triangular for adults	TRI (4, 30, 52)	(USEPA, 2011)
IR_{inh}	m^3 day^{-1}	Log-normal for children	LN (7.19,1.62)	(Chen et al., 2016)
		Log-normal for adults	LN (16.57,4.05)	(Chen et al., 2016)
RfD	mg kg^{-1} d^{-1}	Point	Table S4	Table S4
SF	mg kg^{-1} d^{-1}	Point	Table S4	Table S4

Table S11. Potential ecological risk of PTMs in soils near Hg mines

Elements	E_r^i			
	Mean	Median	10th	90th
Cd	121	45.5	13.2	196
As	100	29.2	9.79	336
Pb	17.6	7.66	3.61	40.1
Cu	17.9	6.46	3.52	26.8
Zn	1.78	1.29	0.65	3.39
Cr	4.6	1.99	0.8	10.6
Mn	1.21	1.19	0.5	1.82
Ni	18.4	5.33	2.32	47.2
Hg	24771	6624	358	53570
PERI	25053	6723	392	54231

Note: PERI, potential ecological risk index.

Table S12. Contamination level distribution of nine PTMs in soils from Hg mining areas at a global scale.

No.	Hg	Cd	As	Pb	Cu	Zn	Cr	Mn	Ni	Country	longitude	latitude
1	9.3		0.96	0.75		0.01				Algeria	7.486	35.218
2	11.46									Canada	-125.191	54.297
3	7.73	1.94	-0.37	0.3		0.64				China	109.356	27.786
4	7.07		-0.05							China	107.998	26.199
5	6.84	0.99	-1.17	-0.77	-0.16	-0.06	-1.35		-0.88	China	108.527	27.158
6	3.95	0.17	1.37	0.22	-0.41	-0.2	-0.4		-0.5	China	108.82	28.873
7			-0.54	0.01			-2.81			China	109.389	27.618
8	4.81									China	108.95	27.417
9	1.85									China	107.728	25.022
10	6.95	-1.2	0.06	-0.08			-0.59			China	107.886	26.216
11	3.7	-1.87	0.29	0.29	-1.1	-0.83	-1.26			China	107.584	26.082
12	8.75	0.11	2.17	-2.37	-3.23	-1.43				China	108.554	25.901
13	9.83	-2.17	0.76	-4.44	1.43	0.15				China	108.078	29.013
14	9.75									China	109.901	27.601
15	4.92									China	109.343	27.45
16	6.42	-0.18	-1.08	0.17	-0.21		1.3		-0.8	China	109.404	27.65
17	4.91	-1.2	0.27	0.77	-0.05	-2.01	-0.89		-0.36	China	109.085	27.513
18	8.82									China	109.187	28.032
19	8.77	2.25	-0.08	1.38		-0.22				China	109.403	32.915
20	6.64	1.07	0.95	0.11	-0.03	0.03	-0.45		-0.27	China	107.641	29.725
21	9.79	4.56		0.15						China	108.904	27.612
22	3.47	0.01								China	109.099	32.937
23	9.85	0.01	2.2	-0.93	0.94	-0.65	-1.05		-0.49	China	105.398	25.229
24	6.68	1.05	0.2	-1.16	-0.27	1.2				China	108.656	27.845

25	6.45									China	107.771	28.633
26	5.69									China	108.951	27.812
27	7.6									China	109.564	27.498
28	8.79									China	109.183	28.380
29	6.68	2.07		0.67	-1.01	-0.04		-0.27	-1.31	China	109.448	28.115
30	8.27									China	108.931	28.056
31	11.2									China	108.847	28.406
32	4.4	-0.01	0.96	2.77	0.39	1.01	1.83		2.24	China	109.472	32.931
33	6.69		-0.05	-0.23	-0.72				-1.54	China	109.773	27.969
34	5.18	0.4	0.8	-1.01	0.01	0.78				China	108.988	27.633
35	4.37	1.71	-0.57	1.84	0.31	-0.01	2.59		2.78	China	108.761	28.458
36		4.01		0.3						China	109.683	27.865
37	6.92	0.03	-1.42	-0.36	-0.25	-1.21	-1.06	-1.47	-1.95	China	109.497	28.089
38	11.09	-0.34	1.17	0.12	-1.62	0.74	-1.54		0.01	China	108.453	27.738
39	4.7	-1.2	1.97	-0.11	-0.13	-2.36	-1.27		-1.64	China	109.579	27.773
40	9.11		3.19	0.72	1.65	-0.01			0.37	China	105.186	25.435
41	4.13	-1.36	1.29	0.52		-0.45				China	107.834	26.503
42	-0.14	-0.86	-1.71	0.23	-0.79	-0.54	-0.96		-0.73	China	108.632	29.145
43	1.45	-1.04	0.68	0.39	-0.94	-0.48	-1.61		-1.48	China	107.533	24.912
44	6.94	0.72								China	109.125	27.452
45	9.56									Czech Republic	16.298	49.627
46	6.97			3.03	2.21	0.85	-1.12	-1.23	-1.38	Italy	12.036	46.282
47	6.35									Italy	12.625	45.778
48	8.88									Italy	10.784	44.065
49	9.52		5.17	4.27	3.35	1.42				Italy	12.511	45.954
50	8.64									Japan	140.984	40.485

51	12.05									Mexico	-99.823	19.614
52	11.6		-0.22	-4.93						Mexico	-100.091	21.23
53	6.41			0.84		-0.6		-3.51		Mexico	-111.040	24.484
54	4.32	4.79	3.24	4.25	3.39	2.47				Namibia	16.753	-19.425
55	8.84									New Zealand	175.493	-38.183
56	8.14									Philippines	117.712	8.902
57	5.39	-0.91	1.09	-0.65	-0.7	-0.73	2.29	0.14	3.61	Philippines	118.374	9.322
58	9.5	-0.51	1.77	-0.01	-0.42	0.01	2.53	0.06	3.94	Philippines	119.46	10.49
59	5.95	-0.91	1.09	-0.64	-0.7	-0.73	2.29	0.3	3.61	Philippines	118.362	10.287
60	7.04			-0.72	2.66	0.07				Slovakia	15.042	45.702
61	6.83						1.51		2.74	Slovakia	15.704	46.304
62	9.06									Slovakia	14.03	45.946
63	5.35		-0.35	-0.37		-1.55	-2.23		-2.6	Slovakia	14.661	45.943
64	8.96		-0.38	-0.05	-0.3	-0.66	0.91	-0.27	2.04	Slovakia	16.096	46.492
65	8.55	1.57	-1.18	-0.49		-1.07	-1.91			Slovenia	13.929	46.061
66	5.25	0.57	-0.3	-0.05	-1.15	-0.53	-1.74	-1.57	-2.14	Slovenia	14.048	45.572
67	8.82		0.36	-0.45					0.79	Slovenia	13.91	45.85
68	7.29	2.72		0.47	1.54	0.86				Slovenia	15.893	46.454
69	9.71	0.05	0.32	-0.08	1.88	-0.48	-2.48		-1.84	Slovenia	13.965	46.183
70	3.79	1.26		-0.74	-0.3	-0.78				Slovenia	15.231	46.415
71	6.23			2.86	-0.41	-0.28	0.72	-0.5	0.48	Spain	-5.417	43.263
72	1.45	-2.62	0.42	-1.37	-1.23	-0.68	-0.96	-0.74	-1.05	Spain	-6.521	43.377
73	7.31	0.84		1.56	-0.22	1.59	0.69		-0.29	Spain	-5.886	43.162
74	5.04	0.96	5.56	0.13	0.04	0.36	1.56	-0.04	0.04	Spain	-6.751	43.196
75	3.31		4.47	0.22	0.91	-0.16				Spain	-5.279	43.317
76	6.74		1.77			-0.67				Spain	-7.385	43.438

77	8.67	-0.14		0.47	0.04	0.27	1.24	1.35	-0.11	Spain	-6.502	43.081
78	8.96			2.43	0.38	0.57				Spain	-6.747	38.545
79	12.17			-0.13	-0.7	-0.33				Spain	-3.638	38.285
80	5.3		2.52	0.49		2.11				Spain	-2.165	37.005
81	3.88	-1.29	3.23	-0.6	-0.89	-0.28	-0.81	-0.57	-0.62	Spain	-6.803	37.585
82	11.17	-0.81	3.21	2.78	-0.73	1.51	1.51		-0.93	Spain	-6.085	38.270
83	4.06	-1.3	5.59	-0.3		0.86				Spain	-4.788	36.7
84	3.27	-0.62	4.65	-0.28	-0.89	1	-0.08	-0.87	-0.89	Spain	-6.876	42.512
85	3.64		0.24	0.05	-0.68		1.71		-0.19	Spain	-3.803	38.37
86	3.5		4.89							Spain	-4.373	36.937
87	7.83		4.22	1.47		-1.83		-1.14	4.52	Spain	-4.429	38.211
88	3.28					0.05		-0.33		Spain	-5.109	38.442
89	3.42		5.06							Spain	-5.519	43.06
90			-0.04	0.95	1.47	1.18	1.27		2.15	Spain	-3.183	38.214
91	1.3	-0.28	1.68	-0.36	0.27	-0.58	-1.17	-0.28	-0.68	Spain	-3.809	42.313
92	5.35	-1.58	3	-1.69	-0.55	-1.1	-1.09		0.01	Turkey	30.816	37.176
93	8.2	-2.17	2.58	-1.74	-1.42	-2.22	-2.58	-2.32	-1.7	Turkey	28.498	38.691
94	7.51		5.35	0.71	1.15	-0.84	-0.38	0.08	1.33	Turkey	32.368	37.766
95	7.95	1.06	2.12	0.97	0.5	-0.41	0.99	0.4	1.71	Turkey	32.781	37.737
96	9.94		2.65							Ukraine	38.139	47.712
97	7.32									USA	-119.023	39.145
98	7.75									USA	-119.484	36.012
99	8.45									USA	-157.84	60.736
100	2.42									USA	-104.053	30.663
101	0.57	0.49	-1.7	-0.24	4.95	-1.06				Zambia	25.952	-12.779

Table S13. Assessment of non-cancer risks, carcinogenic risks (CR) and cumulative cancer risk (CCR) from heavy metals in soils near Hg mines

	Metals	Non-carcinogenic risk				Carcinogenic risk			
		HQ_{ing}	HQ_{inh}	HQ_{derm}	HI	CR_{ing}	CR_{inh}	CR_{derm}	CRR
Adults	Hg	1.53E-01	3.14E-04	4.35E-02	1.97E-01	-	-	-	-
	Cd	6.20E-04	3.65E-07	1.23E-03	1.86E-03	1.30E-06	7.82E-09	2.59E-08	1.33E-06
	As	1.43E-01	8.41E-05	2.09E-01	3.52E-01	2.21E-05	1.31E-07	3.22E-05	5.44E-05
	Pb	7.44E-03	4.35E-06	9.89E-04	8.43E-03	-	-	-	-
	Cu	7.33E-04	4.29E-07	4.87E-05	7.82E-04	1.71E-05	-	8.52E-06	2.56E-05
	Zn	1.55E-04	9.14E-08	1.55E-05	1.71E-04	-	-	-	-
	Cr	1.55E-02	9.59E-04	3.10E-04	1.68E-02	7.99E-06	3.95E-07	6.38E-06	1.48E-05
	Mn	6.39E-03	7.52E-06	3.64E-05	6.43E-03	-	-	-	-
	Ni	2.71E-03	3.55E-04	2.00E-06	3.09E-03	3.16E-05	9.19E-09	1.58E-05	4.74E-05
CCR/HI for total metals		3.30E-01	1.72E-03	2.55E-01	5.86E-01	8.01E-05	5.43E-07	6.29E-05	1.44E-04
Children	Hg	9.36E-01	3.66E-04	1.50E-01	1.09	-	-	-	-
	Cd	3.80E-03	4.25E-07	4.26E-03	8.06E-03	1.99E-06	2.29E-10	2.23E-08	2.01E-06
	As	8.77E-01	9.80E-05	7.19E-01	1.60	3.38E-05	3.80E-08	2.77E-05	6.16E-05
	Pb	4.56E-02	5.07E-06	3.41E-03	4.90E-02				
	Cu	4.49E-03	5.0E-07	1.68E-04	4.66E-03	2.62E-05	-	7.33E-06	3.35E-05
	Zn	9.53E-04	1.07E-07	5.34E-05	1.01E-03	-	-	-	-
	Cr	9.53E-02	1.12E-03	1.07E-03	9.75E-02	1.21E-05	1.15E-07	5.49E-06	1.77E-05
	Mn	3.92E-02	8.76E-06	1.25E-04	3.93E-02	-	-	-	-
	Ni	1.66E-02	4.13E-04	6.90E-05	1.71E-02	4.85E-05	2.68E-09	1.36E-05	6.21E-05
CCR/HI for total metals		2.02	2.01E-03	8.78E-01	2.91	1.23E-04	1.56E-07	5.41E-05	1.77E-04

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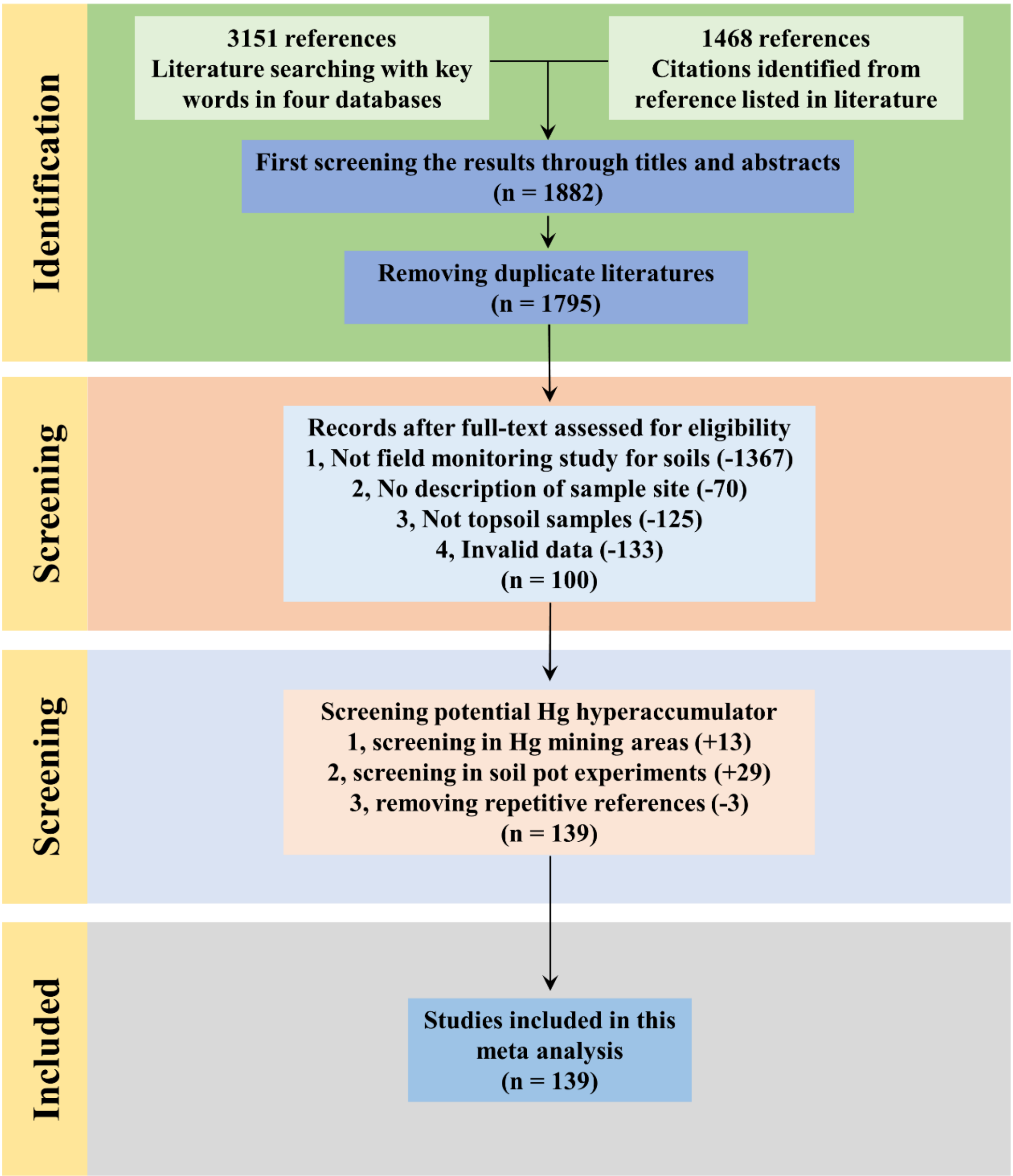

Fig. S1. flow diagram detailing the article selection process for eligible articles to include in the meta-analysis.

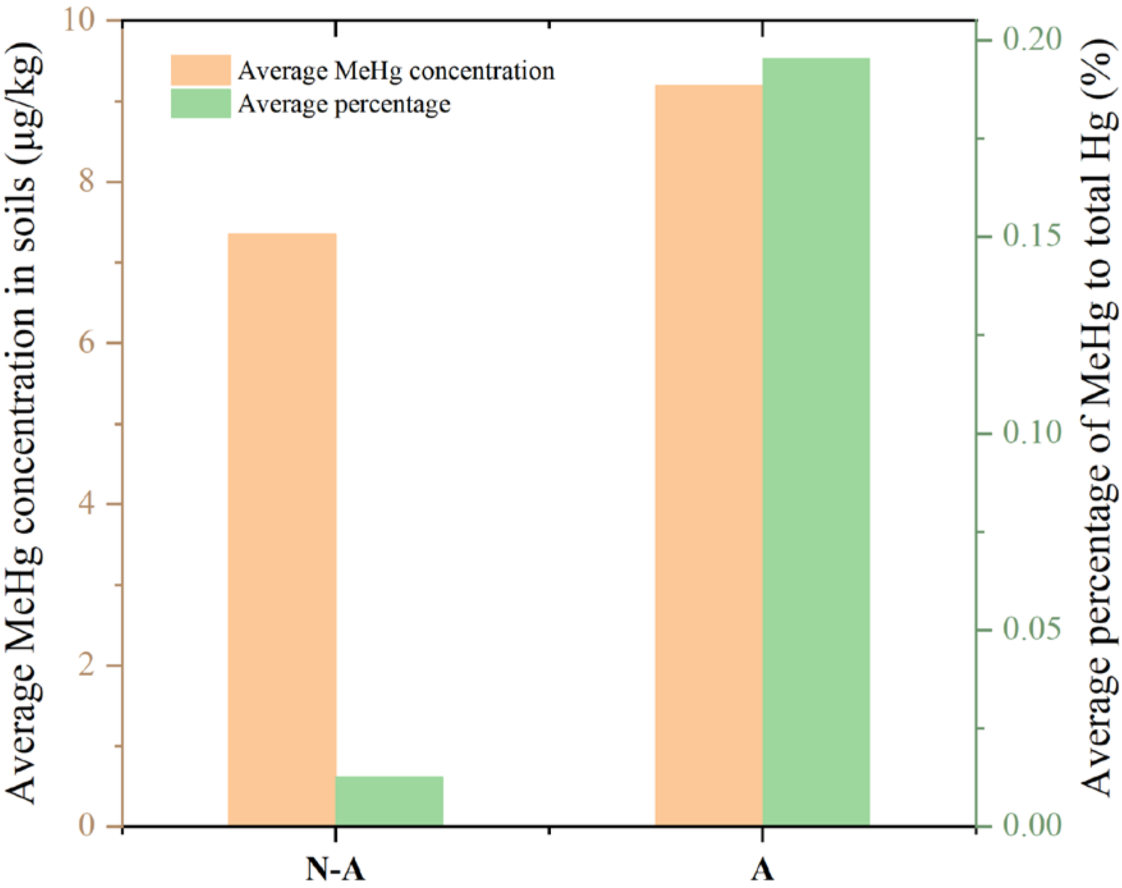

Fig. S2. Average MeHg concentrations (μg/kg) and its percentage (%) to total Hg in agricultural soils (A) and non-agricultural soils (N-A) from Hg mining areas.

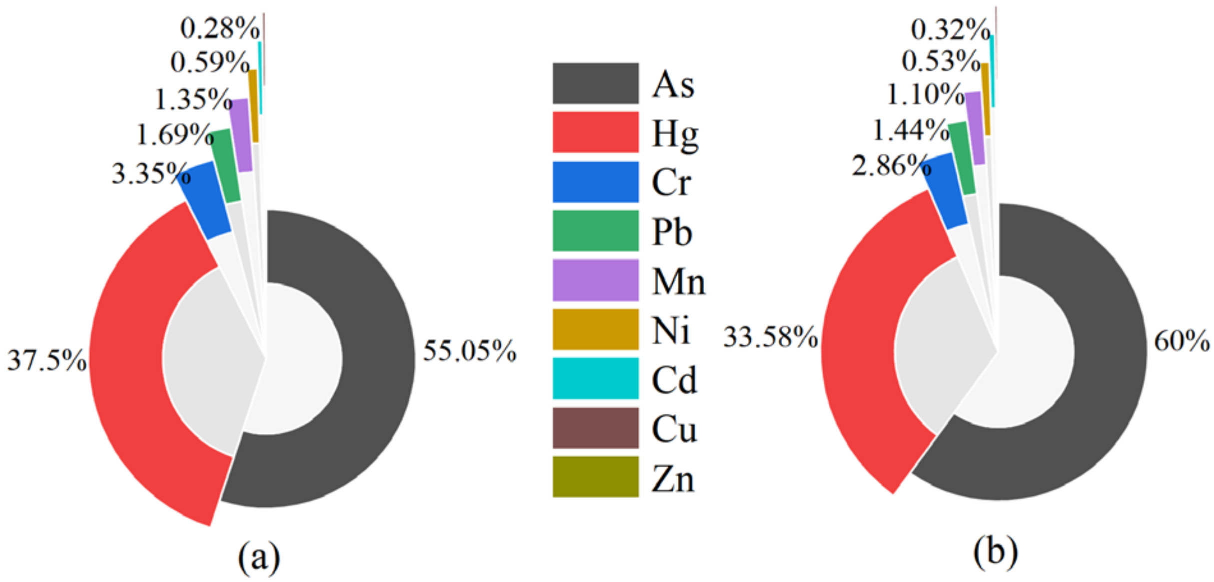

Fig. S3. Contribution of nine PTMs to total hazard index (HI) for adults (a) and children (b).

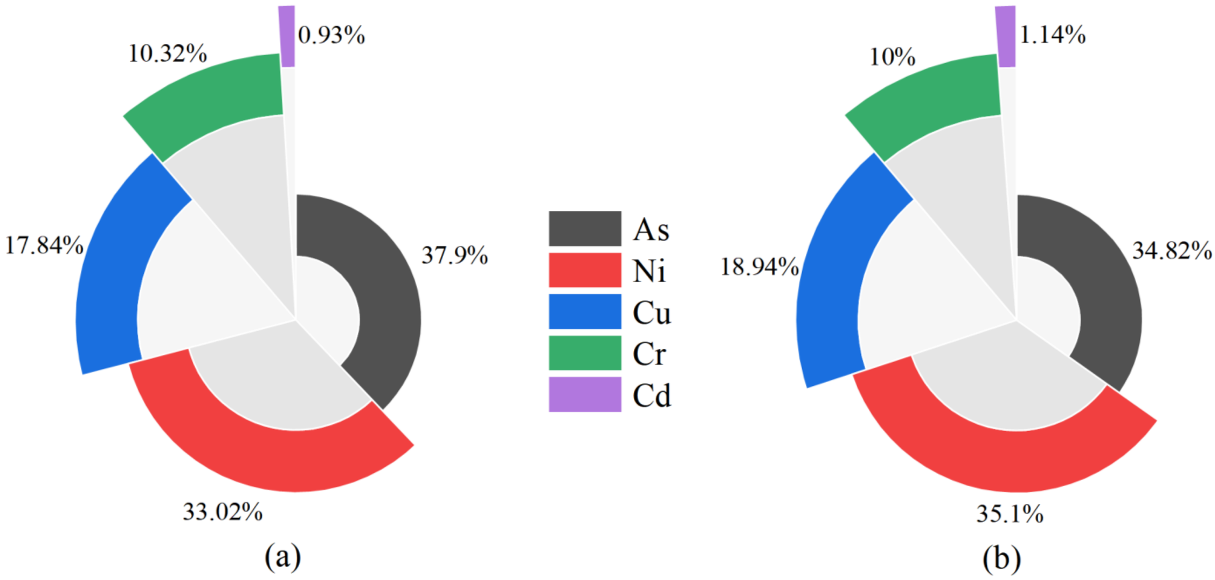

Fig. S4. Contribution of five carcinogenic PTMs to cancer risk (TCR) for adults (a) and children (b).

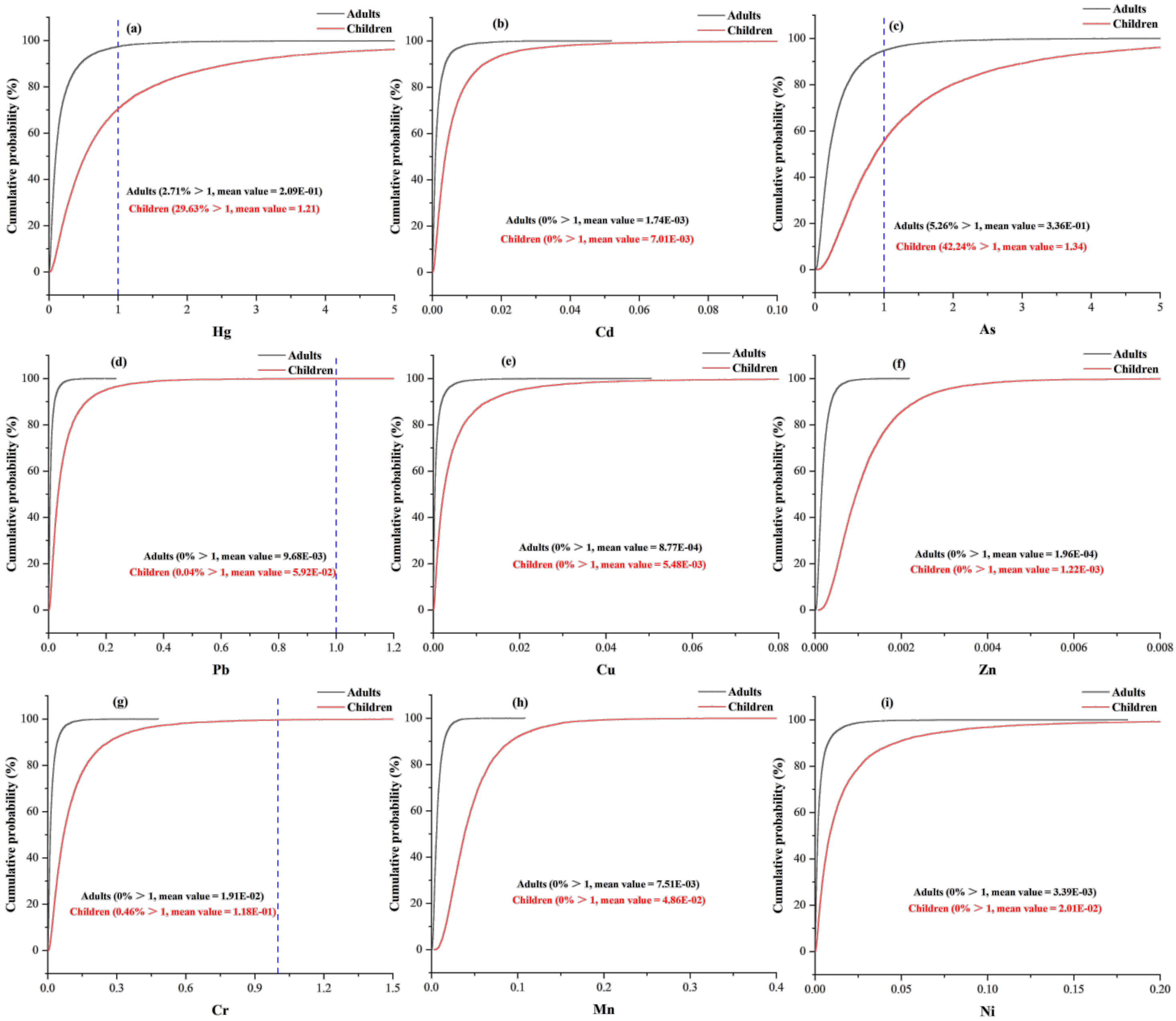

Fig. S5. Probability distribution of hazard index (HI) for nine PTMs in the soils.

Note: The blue dashed vertical lines indicate the safe level (1.0) of hazard index (HI).

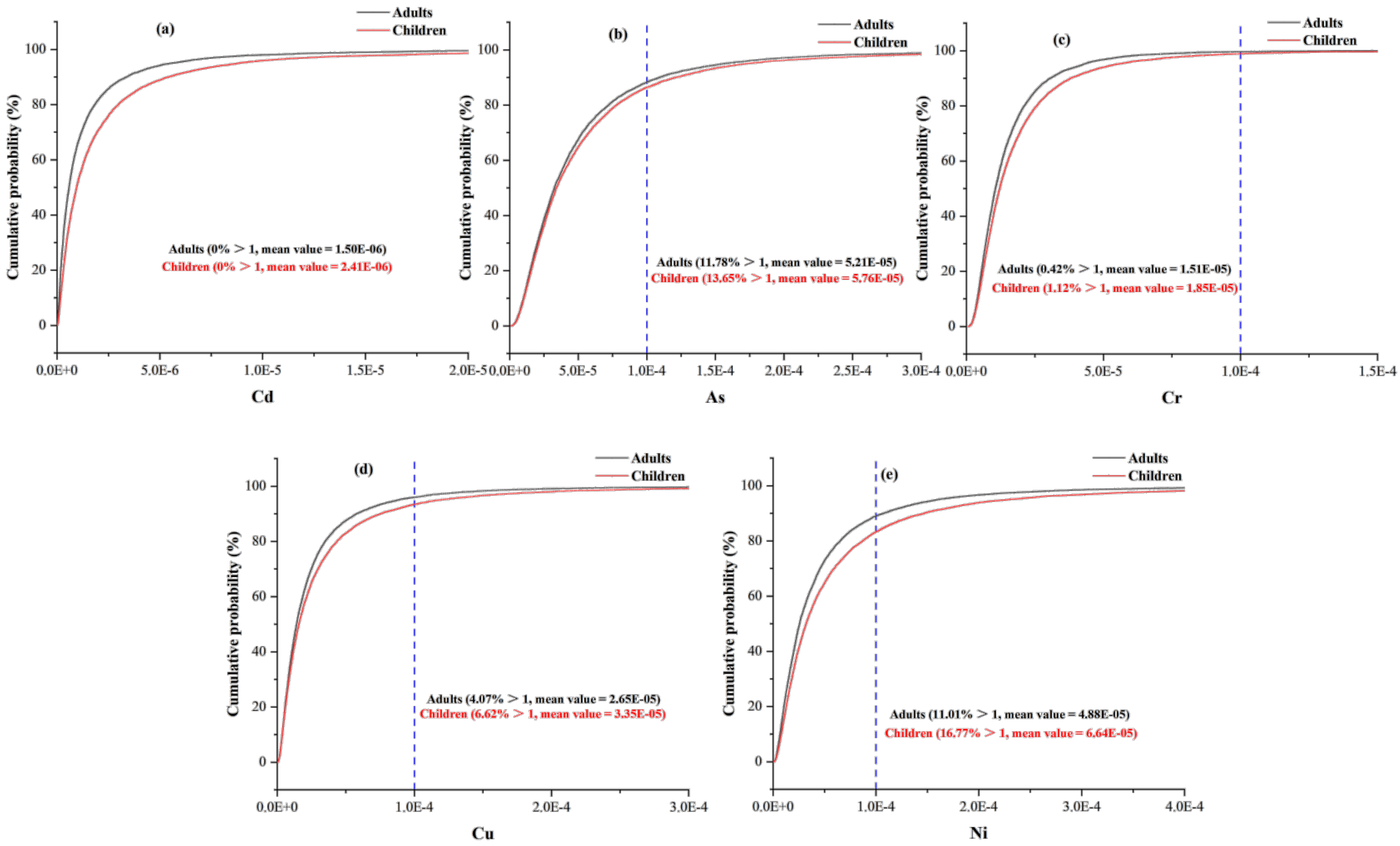

Fig. S6. Probability distribution of cancer risk (CR) values for five cancer PTMs in the soils.

Note: The blue dashed vertical lines indicate that safe level (1.0E-04) of cancer risk.

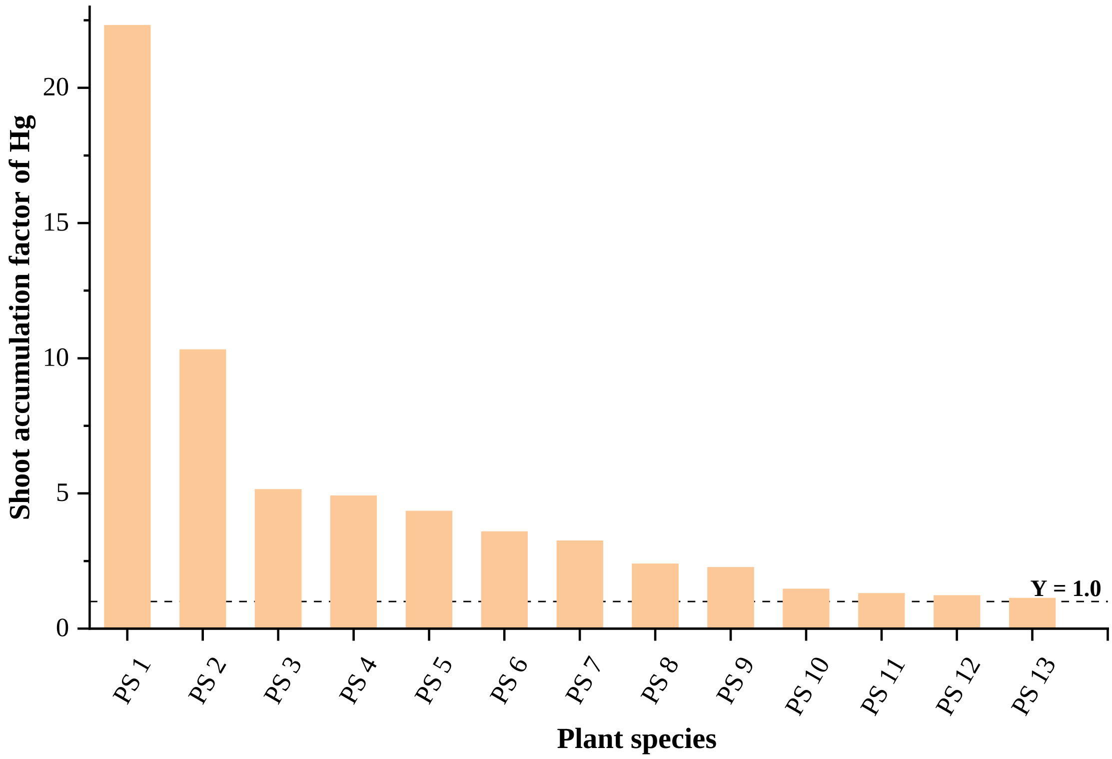

Fig. S7. The top 25% of shoot accumulation factor among 55 plant species grown in Hg polluted soils under pot conditions.

Note: PS1, *Cyrtomium macrophyllum*; PS2, *Miscanthus sinensis*; PS 3, *Chlorophytum comosum*; PS 4, *Helianthus tuberosus L.*; PS 5, *Mentha spicata L.*; PS 6, *Medicago sativa L.*; PS 7, *Salix viminalis*; PS 8, *Aloeveravar.chinensis*; PS 9, *Autum violet*; PS 10, *Eichhornia crassipes*; PS 11, *Phragmites australis*; PS, 12, *Cyperus eragrostis*; PS 13, *Lepidium sativum L.*