

Supplementary Information

Levels and sources of PBDEs and PCBs in human nails from e-waste, urban, and rural areas in South China

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Table S1 General information of the participants in the present study

NO.	E-waste area		Urban area		Rural area	
	Age	Gender	Age	Gender	Age	Gender
1	50	male	43	female	24	female
2	50	male	30	female	39	female
3	51	female	35	female	27	female
4	29	female	56	female	47	male
5	32	male	25	male	53	female
6	45	female	45	female	21	male
7	48	male	25	male	23	female
8	39	female	30	female	47	female
9	48	male	52	female	22	male
10	65	female	28	male	48	female
11	60	male	53	male	55	male
12	54	male	54	male	50	female
13	57	female	48	male	22	male
14	48	male	31	female	21	female
15	35	female	21	male	21	female
16	34	male	21	female	24	male
17	35	female	24	male	23	female
18	43	male	23	female	42	female
19	32	female	23	female	22	male
20	40	female	25	male	22	male
21	40	male	26	female	24	female
22	49	male	25	female	37	female
23	49	male	24	female	44	male
24	60	female	24	male	26	female
25	42	male	26	male	27	female
26	43	male	26	female	31	male
27	42	female	24	female	28	male
28	51	female	24	female	26	male
29	54	female	23	male	33	female
30	43	female	26	male	26	female
31			25	male	32	male
32					28	female
33					26	male

Table S2 Summary of PBDE and PCB concentrations in nail samples of separated male and female participants (ng/g dw)

	E-waste recycling area		Rural area		Urban area	
	male (n = 15)	female (n = 15)	male (n = 14)	female (n = 19)	male (n = 14)	female (n = 17)
BDE 28	nd (nd-0.66)	nd (nd-0.89)	nd (nd-0.78)	nd (nd-0.37)	nd (nd-0.29)	nd (nd-0.52)
BDE 47	0.08(nd-2.70)	0.58 (nd-3.18)	nd (nd-1.22)	nd (nd-5.60)	nd (nd-0.42)	nd (nd-0.48)
BDE 99	nd (nd-0.65)	nd (nd-6.53)	0.14 (nd-0.98)	0.26 (nd-1.32)	nd	nd (nd-0.21)
BDE 100	nd (nd-0.16)	nd	nd (nd-0.37)	nd (nd-2.89)	nd	nd
BDE 153	3.12 (nd-17.3)	3.83 (1.19-7.58)	0.03(nd-2.50)	0.07 (nd-6.13)	1.08 (0.62-3.32)	1.11 (0.54-2.02)
BDE 154	0.69 (0.65-2.31)	0.95 (0.32-1.61)	0.17 (0.07-0.13)	0.25 (nd-1.11)	0.23 (0.16-0.67)	nd (0.11-0.96)
BDE 183	3.00 (0.85-64.8)	3.25 (0.54-11.2)	0.27 (nd-88.8)	0.47 (nd-20.9)	0.85 (0.21-2.79)	0.48 (0.19-2.20)
BDE 209	381 (220-1270)	393 (164-1200)	57.9 (14.6-482)	99.1 (nd-670)	133 (65.24-425)	113 (65.9-239)
∑ ₈ PBDEs	411 (224-1280)	404 (168-1210)	71.4 (14.9-487)	104 (3.54-679)	135 (67.4-429)	114 (67.2-244)
PCB8	2.14 (0.83-4.68)	2.00 (0.85-5.93)	0.59 (0.19-3.48)	0.81 (0.10-3.93)	0.47 (nd-0.90)	0.64 (nd-1.44)
PCB18	0.19 (nd-4.93)	0.56 (nd-12.9)	nd (nd-0.80)	nd (nd-0.88)	nd	nd (nd-2.90)
PCB28	5.12 (0.30-18.6)	2.84 (0.23-16.4)	0.33 (nd-4.33)	nd (nd-5.45)	0.04 (nd-0.29)	nd (nd-0.16)
PCB52	11.6 (6.5-23.1)	14.1 (5.7-32.6)	3.13 (1.03-20.4)	5.50 (0.46-35.7)	1.60 (0.82-3.22)	1.83 (1.00-4.82)
PCB44	5.69 (nd-12.8)	5.41 (nd-22.2)	0.52 (0.20-3.74)	1.32 (0.18-6.00)	0.56 (nd-1.83)	0.67 (nd-1.51)
PCB66	3.88 (0.76-10.8)	3.01 (1.64-7.85)	1.85 (0.29-3.48)	1.05 (0.22-5.99)	0.40 (nd-1.50)	0.28 (nd-1.03)
PCB101	5.54 (1.77-13.9)	4.72 (nd-16.9)	0.21 (nd-2.98)	0.55 (0.02-3.16)	0.31 (nd-0.92)	0.31 (nd-1.10)
PCB77	5.39 (0.81-16.5)	4.70 (1.21-31.2)	2.97 (0.74-18.8)	5.39 (0.46-29.3)	0.86 (nd-2.89)	0.59 (nd-9.44)
PCB118	7.34 (2.64-36.2)	5.89 (1.80-39.5)	0.28 (0.061-23.1)	0.35 (0.03-20.1)	0.14 (nd-1.00)	0.16 (nd-1.62)
PCB153	6.33 (nd-33.1)	6.04 (nd-16.6)	0.30 (nd-2.13)	0.42 (nd-11.0)	nd (nd-0.31)	0.07 (nd-0.64)
PCB105	7.17 (0.79-132)	9.37 (1.31-221)	0.30 (nd-18.8)	0.98 (0.10-24.2)	0.35 (0.078-3.6)	0.48 (0.08-0.87)
PCB138	10.0 (2.76-38.1)	7.33 (nd-32.0)	0.89 (nd-9.49)	0.93 (nd-5.37)	nd (nd-2.37)	1.12 (nd-1.89)
PCB126	1.44 (nd-3.72)	0.57 (nd-10.5)	nd (nd-0.30)	0.06 (nd-3.10)	nd (nd-0.67)	nd (nd-0.47)
PCB187	5.11 (nd-10.1)	3.1 (nd-10.4)	nd (nd-1.01)	nd (nd-2.90)	nd (nd-1.43)	nd (nd-1.60)

PCB128	2.62 (0.79-8.70)	3.30 (nd-10.0)	0.04 (nd-0.95)	0.15 (nd-5.23)	nd (nd-0.20)	0.07 (nd-3.54)
PCB180	4.64 (nd-26.7)	2.71 (nd-13.2)	0.56 (nd-8.65)	1.01 (nd-7.71)	nd (nd-2.22)	nd (nd-3.13)
PCB170	2.73 (nd-14.8)	1.33 (nd-9.60)	0.45 (nd-4.90)	0.66 (nd-5.77)	nd (nd-1.00)	nd (nd-1.20)
PCB195	0.32 (nd-12.8)	nd (nd-20.0)	nd (nd-1.61)	nd (nd-16.8)	nd	nd (nd-1.02)
PCB206	1.83 (nd-24.5)	0.99 (nd-14.9)	nd (nd-0.67)	0.31 (nd-10.6)	nd (nd-2.18)	nd (nd-2.69)
PCB209	2.12 (nd-11.1)	3.29 (1.53-22.7)	0.40 (nd-3.39)	1.10 (nd-4.88)	0.08 (nd-1.56)	0.45 (nd-1.89)
Σ_{20} PCBs	102 (72.0-224)	101 (58.7-341)	16.0 (10.5-87.1)	25.9 (2.90-145)	7.24 (4.30-15.3)	9.00 (5.30-18.1)

Table S3 Congener-specific concentrations in hair (ng/g, dw) of e-waste recycling workers, and the corresponding indoor dust (ng/g, dw) from South China

NO.	Dust																
	BDE 28	BDE 47	BDE 99	BDE 100	BDE 154	BDE 153	BDE 183	BDE 209	Total	CB 28	CB 52	CB 101	CB 118	CB 138	CB 153	CB 180	Total
1	3.24	45.9	11.6	84.0	10.9	21.4	43.7	8530	8750	154	65.9	50.4	65.0	88.5	94.4	49.5	568
2	3.57	96.5	31.1	220	30.8	68.5	142	17100	17700	596	193	139	203	264	263	132	1790
3	3.87	56.4	12.6	82.3	13.9	25.8	62.1	10700	10900	505	217	196	269	292	305	117	1900
4	6.33	271	77.7	483	64.5	219	1140	10900	13200	962	333	412	610	652	643	185	3800
5	3.72	91.4	26.6	168	17.7	30.7	76.7	10800	11200	479	218	198	279	319	329	111	1930
6	4.80	111	28.9	169	18.7	42.7	144	44100	44600	1400	477	278	338	337	345	115	3290
7	3.00	79.8	22.5	168	21.7	45.7	143	49200	49700	1530	572	349	419	407	421	110	3800
8	8.19	142	37.3	248	26.1	59.1	157	10400	11100	1930	607	447	630	607	590	215	5030
9	3.27	46.0	12.8	72.7	12.4	27.9	84.4	9840	10100	1690	724	360	297	268	295	90.5	3720
10	8.22	296	82.0	521	50.4	73.6	135	15100	16300	604	302	203	254	309	336	173	2180
11	3.12	88.9	27.6	153	16.9	26.8	38.0	9550	9910	194	103	73.2	104	139	142	72.6	828
12	7.47	152	36.3	215	34.6	61.3	427	35900	36800	348	281	302	334	418	470	206	2360
13	13.2	211	46.3	388	72.1	231	606	57700	59200	778	744	970	1089	1170	1210	317	6270
14	14.6	235	50.7	365	51.3	117	215	30100	31200	1340	774	751	992	1010	1050	291	6210
15	5.22	79.9	18.8	162	25.6	75.1	110	32100	32600	326	211	152	169	174	183	74.6	1290
16	13.8	251	64.8	448	45.7	123	613	43400	45000	1660	1260	1480	1990	2110	2150	573	11200
17	9.15	181	49.4	360	52.1	110	251	152000	153000	680	518	615	718	740	791	227	4288
18	38.3	600	151	1071	122	405	1370	74900	78700	3950	2770	1330	1360	899	951	255	11500
19	14.3	182	43.8	292	44.0	79.0	136	17500	18300	807	794	566	446	389	441	115	3560
Mean	8.81	169	43.8	298	38.5	96.9	310	33700	34700	1050	588	467	556	557	580	180	3980
Human hair																	
1	3.82	111	4.38	4.71	3.33	30.2	43.8	295	497	247	110	130	87.5	20.4	29.4	2.22	625

2	0.88	52.4	0.84	1.00	0.40	5.08	2.94	29.5	93	75.5	32.7	38.2	30.2	13.7	15.9	3.97	210
3	1.56	64.7	1.90	1.90	1.73	39.5	13.9	65.2	190	207	8.8	82.8	48.4	13.5	18.6	2.46	381
4	2.08	98.3	4.29	3.02	9.65	26.6	23.8	44.2	212	300	168	147	119	49.0	58.4	11.6	853
5	5.78	105	4.77	2.53	3.60	34.7	15.5	118	289	290	146	184	127	39.9	55.2	6.58	848
6	2.17	72.9	2.60	2.42	2.60	22.3	8.93	52.7	167	108	45.9	41.4	29.9	15.9	19.5	7.18	268
7	3.13	76.6	5.70	5.88	4.02	28.3	52.0	444	620	191	72.1	86.2	85.5	30.8	35.9	5.87	507
8	3.63	23.8	8.88	10.4	14.1	82.1	161.6	742	1046	223	108	84.5	64.0	23.8	28.7	5.09	537
9	1.63	56.7	3.10	1.70	3.52	45.0	37.8	736	885	129	60.4	50.7	36.5	12.9	15.5	3.49	308
10	5.23	146	19.0	22.0	5.99	47.5	54.2	111	411	217	110	97.7	86.5	34.5	39.5	7.72	593
11	3.08	58.2	8.00	5.85	7.80	38.4	87.1	586	794	239	108	274	349	125	146	14.3	1260
12	2.10	68.2	6.32	3.33	0.40	37.2	35.9	582	735	159	76.2	115	125	39.6	46.1	11.3	572
13	2.24	68.7	4.02	4.02	3.61	63.2	42.3	122	310	128	49.9	73.2	96.1	29.7	30.9	6.72	414
14	2.53	69.3	4.04	2.41	2.53	31.4	13.8	159	285	32.4	18.0	16.9	14.1	8.23	10.6	2.17	102
15	1.83	87.1	3.53	5.94	0.40	9.66	10.2	641	760	45.3	28.3	22.2	12.8	5.58	8.70	1.88	125
16	0.50	13.5	0.93	1.00	0.98	13.5	9.21	9.17	48.7	33.8	15.9	19.0	15.6	7.95	9.83	3.06	105
17	3.83	78.6	3.03	1.73	3.03	16.7	5.26	38.8	151	39.3	23.6	38.8	33.5	12.1	16.2	3.66	167
18	0.98	77.1	1.47	1.58	1.80	28.9	5.51	76.8	194	70.9	33.6	45.4	46.0	20.4	25.0	6.72	248
19	2.04	129	0.40	1.00	19.0	15.7	51.5	256	475	54.9	28.5	38.3	35.7	20.5	28.1	12.3	218
20	7.50	74.1	3.39	3.39	2.70	18.5	50.4	2720	2880	407	215	248	262	110	136	28.1	1410
21	2.14	90.8	2.87	1.20	0.40	16.0	8.81	3.83	126	390	214	181	143	57.1	80.3	13.4	1080
22	2.46	94.9	3.92	1.40	3.93	9.45	8.59	20.3	145	146	57	239	174	34.2	35.3	7.67	694
23	2.79	69.1	6.13	5.18	2.44	12.6	17.0	67.0	182	350	217	217	168	81.2	98.7	15.4	1150
24	3.90	76.7	5.47	6.10	4.15	21.2	46.9	702	866	346	287	333	236	77.7	104.0	16.8	1400
25	2.41	73.6	4.22	4.34	3.98	55.2	47.9	142	334	406	288	317	242	95.7	126.8	16.8	1490
26	3.02	148	8.77	3.48	17.6	38.0	39.5	109	367	253	135	163	153	66.2	82.2	14.0	866
27	3.28	89.4	13.3	14.8	13.8	70.3	72.0	535	812	388	192	278	283	111	135	20.6	1410

28	2.35	51.9	3.64	1.69	3.51	42.1	32.6	427	565	276	139	251	271	102	127	23.5	1190
29	2.82	80.3	5.93	2.53	2.89	23.5	17.3	297	433	72.1	36.4	42.5	37.4	15.3	19.6	4.86	228
30	2.27	71.0	0.40	7.25	0.40	11.1	7.81	429	529	129	73.9	65.5	42.2	18.5	15.4	6.72	351
31	1.23	78.2	6.47	5.16	4.9	36.2	49.1	440	622	82.4	39.8	30.8	26.1	12.0	14.9	5.42	212
32	1.47	33.2	1.40	3.14	0.40	6.69	8.37	474	528	127	66.4	103	110	61.3	72.4	15.8	556
Mean	2.71	77.7	4.78	4.44	4.68	30.5	33.8	359	517	193	100	127	112	42.7	52.7	9.61	636

* Hair data was from the (Zheng et al., 2016) . Dust data was from the (He et al., 2017).

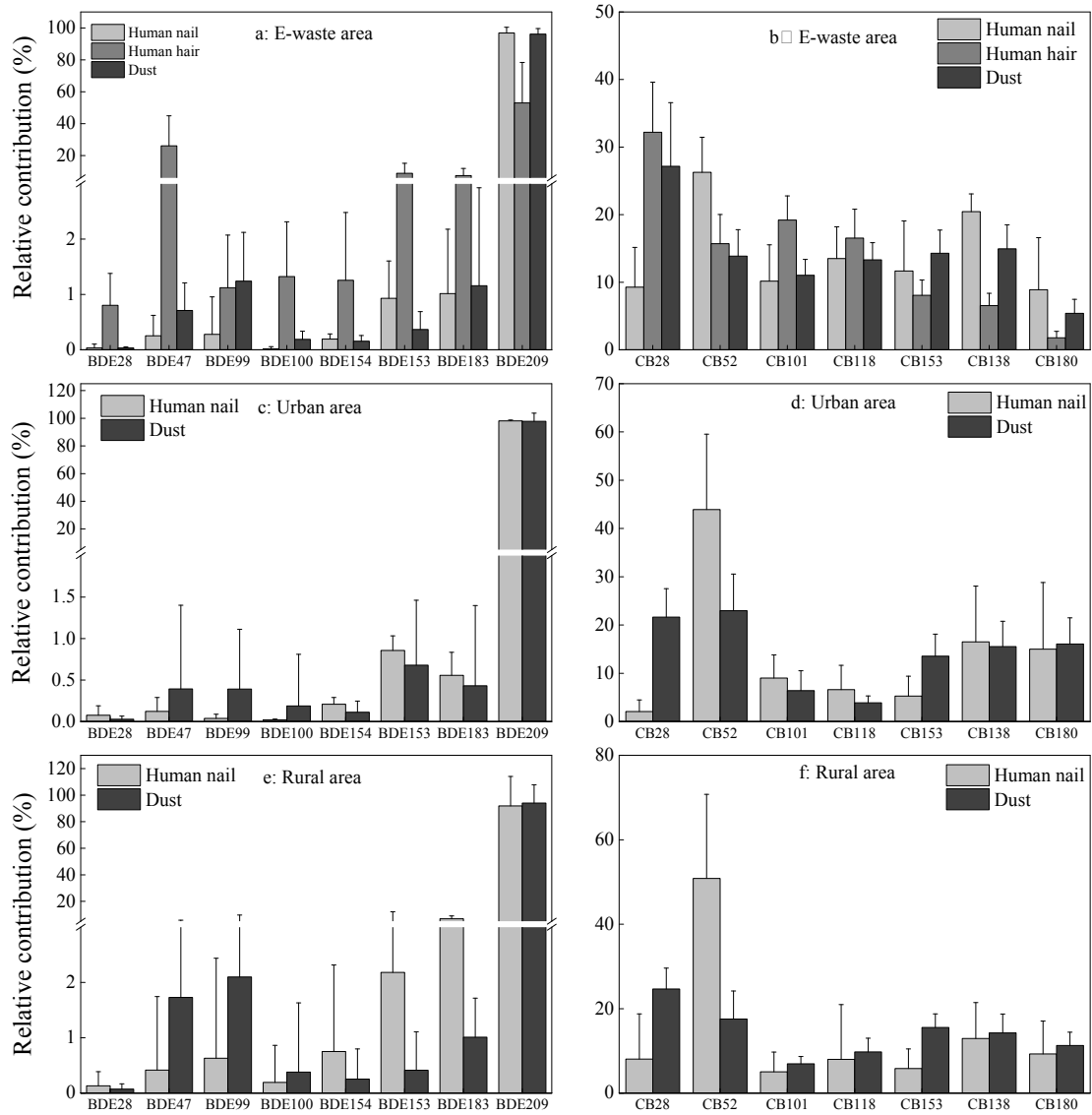


Fig. S1 PBDE congener profiles in nail samples, hair samples (Zheng et al., 2016) of e-waste dismantling workers, and the corresponding dust samples (He et al., 2017) from South China

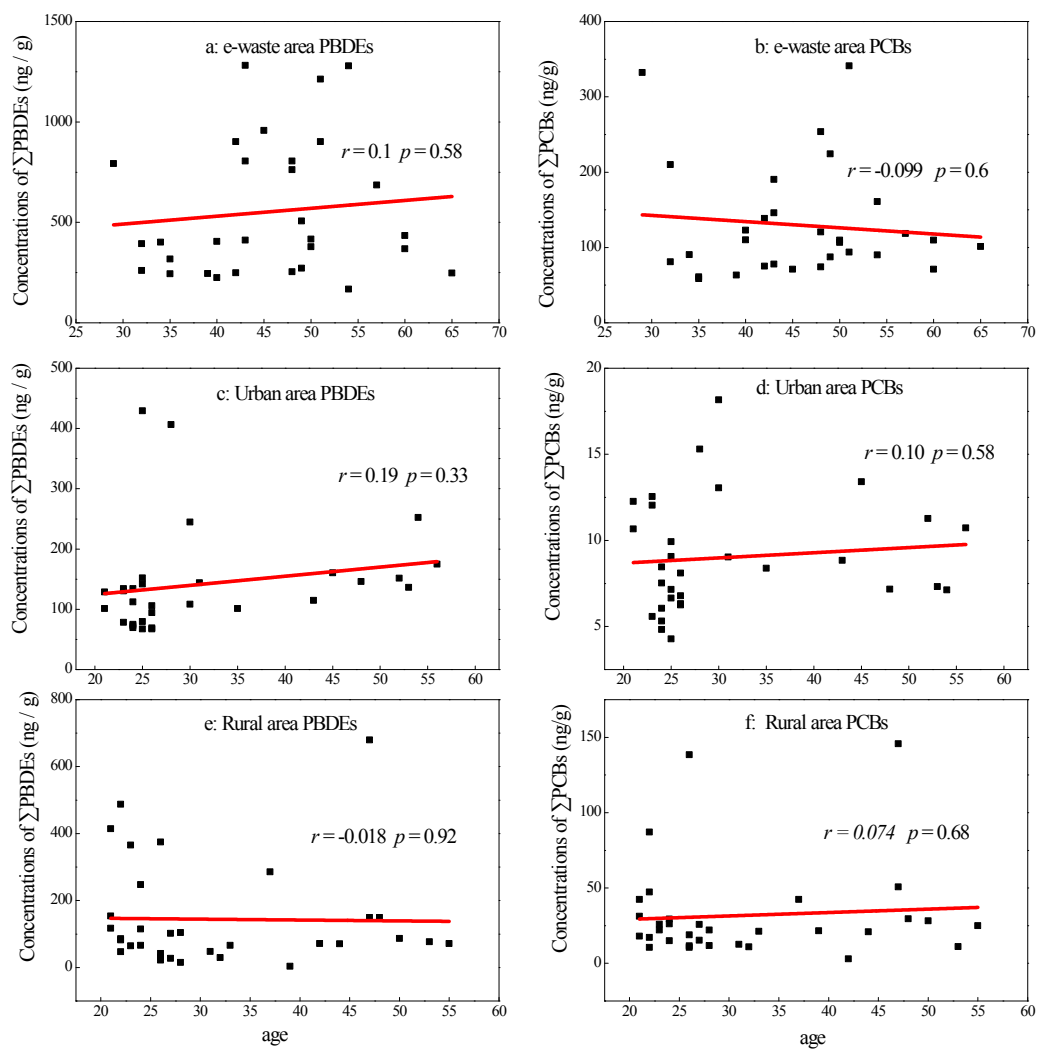


Fig. S2 Spearman correlation of PBDE and PCB concentrations in nails of e-waste dismantling workers (a, b), and residents from urban (c, d) and rural (e, f) areas from South China