Supplementary Material

Human body burden of heavy metals and health consequences of Pb exposure in Guiyu, an e-waste recycling town in China: A critical review

Wenlong Huang, Xiaoling Shi and Kusheng Wu *

Department of Preventive Medicine, Shantou University Medical College, Shantou 515041, Guangdong, China

* Corresponding author:

Kusheng Wu, Ph.D.

Department of Preventive Medicine, Shantou University Medical College

No.22, Xinling Rd. Shantou 515041, Guangdong, China

Tel: 86-754-88900445

Fax: 86-754-88557562

E-mail: kswu@stu.edu.cn

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1. Tables S1 to S6: Body burden of HMs in Guiyu
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Table S1 Pb in blood (μg/dL)

Ref. No.	Sampling time	Age	Guiyu	Reference areas	*p* value	Data genre	Reference
1	2004	< 6 years	15.30	9.94	< 0.01	Mean	(Huo et al., 2007)
2	2004.9~2004.11	1~6 years	15.30	9.94	< 0.01	Mean	(Xu et al., 2006)
3	2005*	1~6 years	15.30	9.94	< 0.01	Mean	(Peng et al., 2005)
4	2006.3~2006.9	3~6 years	11.98	8.50	< 0.01	Mean	(Han et al., 2007)
5	2006.5~2006.6	1~7 years	13.17	10.04	< 0.01	Mean	(Zheng et al., 2008)
6	2008.1~2008.2	3~7 years	14.43	8.72	< 0.01	Mean	(Liu et al., 2011a)
7	2010.10	4~6 years	14.53			Mean	(Xu et al., 2014)
8	2011*	3~7 years	8.20			Mean	(Liao et al., 2011)
9	2011.12	3~7 years	10.34	8.30	< 0.001	Mean	(Zhang et al., 2017b)
10	2012	3~7 years	6.44	4.06	< 0.01	Mean	(Zeng et al., 2018)
11	2012.3~2013.4	Preschool	6.81	4.98	< 0.001	Mean	(Zeng et al., 2019a)
12	2014.12	3~7 years	6.00	3.92	< 0.001	Mean	(Zhang et al., 2016)
13	2017*	4~7 years	9.40	5.04	< 0.001	Mean	(Zhang et al., 2017a)
14	2006~2011	3~7 years	8.19	6.72	< 0.01	Median	(Liu et al., 2015a)
15	2008	3~7 years	13.89	8.55	< 0.01	Median	(Xu et al., 2015c)
16	2009~2011	3~7 years	7.33			Median	(Liu et al., 2014)
17	2011.9~2012.8	Pregnant women	6.66	3.81	< 0.05	Median	(Kim et al., 2019)
18	2011~2013	18~24 years	6.3	3.5			(Kim et al., 2020)
		25~29 years	6.8	3.8			
		>30 years	6.9	4			
19	2011.12~2012.3	3 years	11.30	5.77	< 0.001	Median	(Liu et al., 2015b)
20	2011.12~2012.3	3 years	11.30	5.77	< 0.001	Median	(Liu et al., 2018a)
21	2011.12~2012.3	< 11 years	7.06	5.89	< 0.05	Median	(Guo et al., 2014)
22	2011.12~2012.3	3~7 years	6.76	6.05	0.0020	Median	(Xu et al., 2015a)
	2011	3~7 years	8.76	7.89	0.0310	Median	
	2012	3~7 years	5.83	4.61	< 0.001	Median	
23	2012.1~2012.5	3~7 years	7.90			Median	(Zhang et al., 2015)
24	2012	3~7 years	9.43	6.79	< 0.001	Median	(Lin et al., 2017b)
25	2012*	3~6 years	9.64	7.84	< 0.001	Median	(Sun et al., 2012)
26	2012.12~2013.1	3~8 years	6.24	4.75	< 0.001	Median	(Zeng et al., 2016)
27	2013*	3~8 years	7.30			Median	(Yang et al., 2013)
28	2013*	2~8 years	7.89			Median	(Chen et al., 2013)
29	2013.11~2013.12	5~7 years	5.53	3.57	< 0.001	Median	(Zeng et al., 2017)
30	2013.12	Preschool	5.70	3.53	< 0.01	Median	(Zheng et al., 2021)
31	2014	3~7 years	5.06	3.60	< 0.001	Median	(Cao et al., 2018)
32	2014	3~6 years	8.50	6.00	< 0.001	Median	(Wang et al., 2021)
33	2014	3~7 years	4.94	3.85	< 0.001	Median	(Liu et al., 2018b)
34	2014.12	3~7 years	3.72	2.27	< 0.001	Median	(Zhang et al., 2020b)
35	2014.12	3~7 years	5.29	3.63	< 0.001	Median	(Xu et al., 2020)

36	2014.12~2015.3	2~7 years	5.61	3.57	< 0.001	Median	(Lin et al., 2016)
37	2014.1~2016.12	44~80 years	2.93 ~ 4.06	3.14 ~ 3.79	> 0.05	Median	(Lin et al., 2017a)
38	2014.12~2015.6	4~85 years	8.70	5.10	0.0010	Median	(Chen et al., 2019)
39	2015.11	2~6 years	6.50	4.50	< 0.01	Median	(Dai et al., 2017)
40	2015.11~2015.12	2~7 years	6.51	4.41	< 0.01	Median	(Huo et al., 2019)
41	2016.11~2016.12	3~7 years	7.14	3.91	< 0.001	Median	(Lu et al., 2018)
42	2016.11~2016.12	3~7 years	7.23	3.91	< 0.001	Median	(Zheng et al., 2019)
43	2017	3~7 years	4.89	3.47	< 0.001	Median	(Zhang et al., 2020a)
44	2017.10~2017.12	3~7 years	5.19	3.42	< 0.001	Median	(Zeng et al., 2021)
45	2017.11~2017.12	3~6 years	4.88	3.47	< 0.001	Median	(Cai et al., 2019)
46	2017.11~2017.12	2.5~6 years	4.86	3.47	< 0.001	Median	(Hou et al., 2020)
47	2018*	3~6 years	7.43			Median	(Xu et al., 2018)
48	2018.11~2018.12	2~7 years	4.51	3.98	< 0.001	Median	(Chen et al., 2021)

*Year of article published (As no "sampling time" provided in some original publications, we used "publication year" as an alternative proxy, similarly hereinafter)

Table S2 Cd in blood (μg/L)

Ref. No.	Sampling time	Age	Guiyu	Reference areas	P value	Data genre	Reference
1	2006.5~2006.6	1~7 years	1.58	0.97	< 0.01	Mean	(Zheng et al., 2008)
2	2010.10	4~6 years	0.77			Mean	(Xu et al., 2014)
3	2011.12	3~7 years	2.39	1.79	< 0.001	Mean	(Zhang et al., 2017b)
4	2004.5~2009.10	3~7 years				Median	(Lin et al., 2010)
5	2009~2011	3~7 years	0.69			Median	(Liu et al., 2014)
6	2011.9~2012.8	Pregnant women	1.72	1.43	< 0.05	Median	(Kim et al., 2019)
7	2011.12~2012.3	3 years	1.22	0.72	< 0.001	Median	(Liu et al., 2018a)
8	2012.1~2012.5	3~7 years	0.95			Median	(Zhang et al., 2015)
9	2012	3~7 years	0.12	0.27	< 0.001	Median	(Lin et al., 2017b)
10	2012*	3~6 years	2.29	1.68	< 0.001	Median	(Sun et al., 2012)
11	2012.3~2013.4	Preschool	0.66	0.54	< 0.001	Median	(Zeng et al., 2019a)
12	2012.12~2013.1	3~8 years	0.58	0.50	< 0.01	Median	(Zeng et al., 2016)
13	2013*	3~8 years	0.69			Median	(Yang et al., 2013)
14	2013.11~2013.12	5~7 years	0.58	0.57	0.7170	Median	(Zeng et al., 2017)
15	2013.12	Preschool	0.56	0.47	< 0.05	Median	(Zheng et al., 2021)
16	2014.12	3~7 years	0.33	0.23	< 0.001	Median	(Zhang et al., 2020b)
17	2015.12~2015.6	4~85 years	2.10	2.60	0.4600	Median	(Chen et al., 2019)
18	2018*	3~6 years	0.72			Median	(Xu et al., 2018)

*Year of article published

Table S3 Other metals (Cr, Mn, Ni, Hg, As, Cu, Zn and Se) in blood

Ref. No.	Sampling time	Age	Guiyu	Reference areas	*p* value	Data genre	Reference
Cr in Blood (μg/L)							
1	2004	3~7 years	120.30	63.10	< 0.0001	Mean	(Xu et al., 2015d)
	2006	3~7 years	165.40	44.10	< 0.0001	Mean	
	2008	3~7 years	63.40	28.20	< 0.0001	Mean	
2	2011*	3~7 years	174.30			Mean	(Liu et al., 2011b)
3	2013*	8~13 years	35.50	34.10	> 0.05	Median	(Zheng et al., 2013)
4	2011.9~2012.8	Pregnant women	13.78	8.90	< 0.05	Median	(Kim et al., 2019)
5	2012	3~7 years	14.38	10.64	0.0050	Median	(Lin et al., 2017b)
6	2012.12~2013.1	3~8 years	7.65	7.49	0.3790	Median	(Zeng et al., 2016)
7	2012.3~2013.4	Preschool			> 0.05		(Zeng et al., 2019a)
Mn in Blood (μg/L)							
1	2013*	8~13 years	20.60	14.90	< 0.01	Median	(Zheng et al., 2013)
2	2011.9~2012.8	Pregnant women	25.93	28.51	< 0.05	Median	(Kim et al., 2019)
3	2012	3~7 years	16.31	15.08	0.0300	Median	(Lin et al., 2017b)
4	2012.3~2013.4	Preschool			> 0.05		(Zeng et al., 2019a)
5	2012.12~2013.1	3~8 years	28.18	28.09	0.9330	Median	(Zeng et al., 2016)
6	2009~2011	3~7 years	17.98			Median	(Liu et al., 2014)
7	2014.1~2016.12	44~80 years	12.10 ~ 20.10	9.00 ~ 11.10	< 0.01	Median	(Lin et al., 2017a)
Ni in Blood (μg/L)							
1	Not given	8~13 years	5.30	3.00	< 0.01	Median	(Zheng et al., 2013)
2	2012	3~7 years	4.41	3.44	0.0590	Median	(Lin et al., 2017b)
Hg in Blood (μg/L)							
1	2012	3~7 years	1.92	2.25	0.0510	Median	(Lin et al., 2017b)
2	2018*	3~6 years	11.13				(Xu et al., 2018)
2	2014.12	3~7 years	1.46	1.10	< 0.001	Median	(Zhang et al., 2020b)
As in Blood (μg/L)							
1	2012	3~7 years	5.53	6.56	0.0020	Median	(Lin et al., 2017b)
2	2014.12	3~7 years	5.91	4.18	< 0.001	Median	(Zhang et al., 2020b)
Cu in Blood (μg/L)							
1	2012	3~7 years	919.10	842.45	< 0.001	Median	(Lin et al., 2017b)
2	2014.1~2016.12	44~80 years	780.70 ~ 966.40	740.50 ~ 986.30	> 0.05	Median	(Lin et al., 2017a)
Zn in Blood (μg/L)							
1	2012	3~7 years	4746.39	4313.03	0.0390	Median	(Lin et al., 2017b)
Se in Blood (μg/L)							
1	2012	3~7 years	135.77	149.06	0.0270	Median	(Lin et al., 2017b)

*Year of article published

Table S4 Metals in umbilical cord blood (UCB)

Ref. No.	Sampling time	Guiyu	Reference areas	*p* value	Data genre	References
Cr in UCB (μg/L)						
1	2006	93.87	18.10	< 0.01	Median	(Li et al., 2008a)
	2007	70.60	24.00	< 0.01	Median	
2	2011.6~2012.9	5.90	6.23	> 0.05	Mean	(Zeng et al., 2019b)
3	2011.9~2012.8	4.02	3.52	> 0.05	Median	(Kim et al., 2019)
4	2012.3~2013.1	27.52	26.42	> 0.05	Median	(Ni et al., 2014b)
Pb in UCB (μg/dL)						
1	2001~2008	11.59	2.33	< 0.01	Mean	(Xu et al., 2012)
2	2006.7~2006.10	11.33	6.04	< 0.01	Mean	(Li et al., 2008c)
3	2011.6~2012.9	7.34	3.07	< 0.001	Mean	(Zeng et al., 2019b)
4	2004.12~2005.6	10.50	7.79	< 0.05	Median	(Huo et al., 2014)
5	2011.9~2012.8	5.03	3.18	< 0.05	Median	(Kim et al., 2019)
6	2012.3~2013.1	11.05	5.73	< 0.001	Median	(Ni et al., 2014b)
Cd in UCB (μg/L)						
1	2004~2005	5.86	4.84	> 0.05	Mean	(Li et al., 2011)
	2006	5.30	1.82	< 0.01	Mean	
	2007	3.47	0.94	< 0.01	Mean	
	2004~2007	4.84	2.81	< 0.01	Mean	
2	2011.6~2012.9	0.22	0.29	> 0.05	Mean	(Zeng et al., 2019b)
3	2011.9~2012.8	0.18	0.23	< 0.05	Median	(Kim et al., 2019)
4	2012.3~2013.1	2.50	0.33	< 0.001	Median	(Ni et al., 2014b)
Hg in UCB (μg/L)						
1	2008.1~2010.12	8.52	8.37	< 0.01	Median	(Zhuang et al., 2015)
Ni in UCB (μg/L)						
1	2012.3~2013.1	8.63	9.09	> 0.05	Median	(Ni et al., 2014b)
Mn in UCB (μg/L)						
1	2011.9~2012.8	52.93	49.69	< 0.05	Median	(Kim et al., 2019)
2	2011.6~2012.9	54.01	51.21	> 0.05	Mean	(Zeng et al., 2019b)

Table S5 Metals in placenta

Ref. No.	Sampling time	Guiyu	Reference areas	*p* value	Data genre	Reference
Cd in Placenta (ng/g wt)						
1	2006	170.00	100.00	< 0.01	Mean	(Li et al., 2011)
2	2006.5~2006.9	170.00	100.00	< 0.05	Mean	(Li et al., 2010)
3	2012.3~2012.8	96.19	12.65	< 0.001	Mean	(Xu et al., 2016)
4	2006~2010	92.90	23.90	< 0.01	Median	(Lin et al., 2013)
5	2008.10~2009.5	108.75	104.15	0.8420	Median	(Guo et al., 2010)
6	2008.10~2009.6	83.99	51.59	< 0.001	Median	(Zhang et al., 2011)
7	2010.9~2011.9	96.56	20.87	< 0.01	Median	(Xu et al., 2015b)
8	2010.9~2011.9	96.60	20.90	< 0.01	Median	(Qiu et al., 2012)

9	2012*	96.56	21.15	< 0.001	Median	(Qiu, 2012)
Pb in Placenta (ng/g wt)						
1	2012.3~2012.8	498.80	27.01	< 0.001	Mean	(Xu et al., 2016)
2	2006~2010	1249.10	1353.50	> 0.05	Median	(Lin et al., 2013)
3	2008.10~2009.5	301.43	165.82	0.0100	Median	(Guo et al., 2010)
4	2008.10~2009.6	521.01	273.24	0.2990	Median	(Zhang et al., 2011)
5	2012*	-	-	> 0.05		(Qiu, 2012)
6	2010.9~2010.12	399.90	421.00	> 0.05	Median	(Qiu et al., 2012)
Cr in Placenta (ng/g wt)						
1	2008.10~2009.5	234.31	228.40	0.7360	Median	(Guo et al., 2010)
Ni in Placenta (ng/g wt)						
1	2008.10~2009.5	7.64	14.30	< 0.001	Median	(Guo et al., 2010)

*Year of article published

Table S6 Metals in other human matrix (urine, meconium, erythrocyte and hair)

Ref. No.	**Sampling time**	**Age**	**Guiyu**	**Reference areas**	***P* value**	**Data genre**	**Reference**
Pb in erythrocyte (μg/dL)							
1	2006~2011	3~7 years	21.95	17.32	< 0.01	Median	(Liu et al., 2015a)
2	2015.11	2~6 years	17.00	11.90	< 0.001	Median	(Dai et al., 2017)
3	2015.11~2015.12	2~7 years	16.605	11.771	< 0.001	Median	(Huo et al., 2019)
Cd in urine (μg/g creatinine)							
1	2011.9~2012.6	Pregnant women	1.38	0.75	< 0.01	Mean	(Zhang et al., 2018)
			1.59	0.76	< 0.01	Mean	
			0.92	0.67	< 0.01	Median	
			1.00	0.59	< 0.01	Median	
2	2011.9~2012.8	Pregnant women	1.06	0.54	< 0.05	Median	(Kim et al., 2019)
3	2014	3~7 years	2.49	1.80	0.1340	Median	(Liu et al., 2018b)
4	2014.12	3~7 years	1.52	1.21	0.3230	Median	(Xu et al., 2020)
Cr in urine (μg/g creatinine)							
1	2011.9~2012.8	Pregnant women	1.66	0.97	< 0.05	Median	(Kim et al., 2019)
Mn in urine (μg/g creatinine)							
1	2011.9~2012.8	Pregnant women	7.62	3.14	< 0.05	Median	(Kim et al., 2019)
Hg in hair (μg/g)							
1	2012.4~2012.6	Residents	1.12	0.65	< 0.001	Mean	(Ni et al., 2014a)
			0.99	0.59	< 0.001	Median	
Sb in hair (ng/g)							
1	2012.4~2012.6	Residents	389.66	87.96	< 0.001	Mean	(Huang et al., 2015)
			160.78	61.74	< 0.001	Median	
Pb in meconium (μg/g)							
1	Not given	Neonates	1.93	1.01	< 0.01	Mean	(Li et al., 2008b)
2	2006.7~2006.10	Neonates	2.50	1.20	< 0.01	Mean	(Li et al., 2008c)

Table S7. The effects of Pb exposure on several health outcomes in neonate, children and adults in Guiyu

Reference	Exposed population	Matrix*	Health consequences
<u>Nervous system</u>			
(Li et al., 2008c)	Guiyu vs. Chaonan (Neonate)	MPb, UCB-Pb	Negative associations between Pb and total NMNA, activity tone, and behavior scores.
(Zhang et al., 2017a)	Guiyu vs. Haojiang (4~ 7 years, n=118)	BPb	BDNF was positively correlated with Pb. Olfactory memory tests scores negatively correlated with Pb.
(Liu et al., 2015b)	Guiyu vs. Nanao (3 years, n=284)	BPb	Lower cognitive and language scores in Guiyu children (both p<0.001).
(Liu et al., 2018a)	Guiyu vs. Nanao (3 years, n=284)	BPb	Pb negatively correlated with cognitive and language scores (both p<0.001)
(Liu et al., 2014)	Guiyu only (3~7 years, n=240)	BPb	Lower IQ score (95.4), Pb positively correlated with conduct problems, impulsivity-hyperactivity, ADHD index and Rutter antisocial behavior.
(Zhang et al., 2015)	Guiyu only (3 ~7 years, n=243)	BPb	ADHD scores positively correlated with Pb, children with high Pb (≥10 μg/dL) had 2.4 times higher risk of ADHD than those with low Pb (<10 μg/dL).
(Chen et al., 2013)	Guiyu only (2 ~8 years, n=172)	BPb	Positive correlations among Pb and the total and subtypes scores of ADHD (all p<0.01).
(Liu et al., 2011a)	Guiyu vs. Chendian (3~7 years, n=303)	BPb	Higher scores of activity level, approach-withdrawal, and adaptability dimensions in Guiyu children (all p<0.01).
(Han et al., 2007)	Guiyu vs. Chendian (3~6 years, n=136)	BPb	Lower IQ score in Guiyu children (aged 3~4 years) (p<0.01)
(Liu et al., 2018b)	Guiyu vs. Haojiang (3 ~7 years, n=234)	BPb	Elevated hearing thresholds and hearing loss prevalence in Guiyu children. Pb showed a significant OR (1.24) for hearing loss in children by adjusting confounders.
(Xu et al., 2020)	Guiyu vs. Haojiang (3 ~7 years, n=116)	BPb	Higher hearing thresholds in either ear of the exposed children

(Cai et al., 2019)	Guiyu vs. Haojiang (3 ~6 years, n=574)	BPb	Sensory processing scores were positively correlated with Pb.
Cardiovascular system			
(Lu et al., 2018)	Guiyu vs. Haojiang (3 ~7 years, n=590)	BPb	lnBPb was positively associated with TG (p<0.05) and negatively with HDL (p<0.05), SBP and PP (both p<0.01).
(Zheng et al., 2019)	Guiyu vs. Haojiang (3 ~7 years, n=203)	BPb	Pb was positively related to IL-6, IL-12p70, IP-10.
(Chen et al., 2021)	Guiyu vs. Haojiang (3 ~7 years, n=486)	BPb	Smaller left ventricle and impaired systolic function were found in Pb-exposed children.
Immune system			
(Zhang et al., 2016)	Guiyu vs. Haojiang (3 ~7 years, n=411)	BPb	IL-1β and IL-6 were positively associated with Pb. NK cells were negatively correlated with Pb. IL-27 was negatively associated with Pb.
(Zhang et al., 2017b)	Guiyu vs. Haojiang (3 ~7 years, n=294)	BPb	Higher absolute counts of monocytes, eosinophils, neutrophils (all p<0.001) and basophils (p<0.05), higher percentages of eosinophils (p<0.01) and neutrophils in (p<0.001), lower percentages of NK cells (p<0.001) in Guiyu children.
(Dai et al., 2017)	Guiyu vs. Haojiang (2 ~6 years, n=484)	BPb EPb	Both BPb and EPb negatively related to CR1 levels.
(Lin et al., 2016)	Guiyu vs. Haojiang (2 ~7 years, n=378)	BPb	Lower antibody titers against MMR (measles, mumps, and rubella) in Guiyu children (all p<0.001).
(Xu et al., 2015a)	Guiyu vs. Haojiang (3 ~7 years, n=590)	BPb	Lower hepatitis b surface antibody levels (HBs Ab 1.04 vs. 4.06 s/co, p<0.001) in Guiyu children. Pb was negatively associated with HBs Ab.
(Sun et al., 2012)	Guiyu vs. Haojiang (3 ~6 years, n=237)	BPb	Lower percentages of NK cells in Guiyu group.

(Lin et al., 2017b)	Guiyu vs. Haojiang (3 ~7 years, n=284)	BPb	Lower levels of vaccine antibodies (Diphtheria, Pertussis, Tetanus, Japanese encephalitis, Polio, Measles) in Guiyu children (all p<0.01). All vaccine antibodies negatively correlated with Pb.
(Cao et al., 2018)	Guiyu vs. Haojiang (3 ~7 years, n=118)	BPb	Pb was positively associated with CD4+ central memory T cells, negatively associated with CD4+ Tn cells.
(Zheng et al., 2019)	Guiyu vs. Haojiang (3 ~7 years, n=203)	BPb	Higher percentages of $CD4^+$ T cells (56.52% vs. 52.53%, p<0.01) in Guiyu children.
(Huo et al., 2019)	Guiyu vs. Haojiang (2 ~7 years, n=267)	BPb	Higher erythrocyte Pb was associated with lower CD44 and CD58, BPb correlated with higher IL-12p70 and IFN-γ, and lower IL-2
(Zhang et al., 2020b)	Guiyu vs. Haojiang (2 ~7 years, n=147)	BPb	Anti-inflammatory IL-1RA concentration was negatively related with Pb; pro-inflammatory IL-1b and IL-6 were positively correlated with Pb.
(Zheng et al., 2021)	Guiyu vs. Haojiang (2 ~7 years, n=324)	BPb	Pb positively associated with serum levels of IFN-γ, and negatively associated with serum levels of IL-13.
Hematologic System			
(Zeng et al., 2018)	Guiyu vs. Haojiang (3 ~7 years, n=466)	BPb	Elevated PLT, PCT, MPV (all p<0.001), and P-LCR (p<0.01) in Guiyu children. Positive correlation between Pb and PLT, PCT, PDW, MPV and P-LCR.
(Liu et al., 2015a)	Guiyu vs. Chendian & Chaonan (3~7 years, n=855)	BPb, EPb	Hgb and HCT negatively correlated with EPb (both p<0.001). EPb is better than BPb to assess hematoxicity of Pb. EPb is negatively associated with Hgb.
(Zhang et al., 2016)	Guiyu vs. Haojiang (3 ~7 years, n=411)	BPb	Elevated PLT (p<0.05), decrease lymphocyte (p<0.01), no significant differences in monocyte, erythrocyte, neutrophil. PLT, neutrophil and monocyte counts correlated with Pb.
(Zeng et al., 2017)	Guiyu vs. Haojiang & Xiashan (5 ~7 years, n=206)	BPb	Lower Hgb (128.17 vs. 131.49 g/L, p<0.05). Elevated PLT, PCT, RDW-SD and RDW-CV (all p<0.001). Living in Guiyu was positively associated with PLT (p<0.01), negatively associated with Hgb.

(Dai et al., 2017)	Guiyu vs. Haojiang (2 ~6 years, n=484)	BPb, EPb	Elevated HCT ($p<0.01$), monocytes ($p<0.05$) and decrease MCHC ($p<0.01$) in Guiyu children. BPb negatively correlated with the HCT, MCV, Hgb and MCH (all $p<0.01$), positively associated with RDW ($p<0.05$). EPb also negatively correlated with the HCT, MCV, Hgb and MCH (all $p<0.001$), positively associated with RDW ($p<0.01$).
(Zheng et al., 2019)	Guiyu vs. Haojiang (3 ~7 years, n=203)	BPb	Elevated monocytes, neutrophils and leukocytes (all $p<0.01$) in Guiyu children. Pb positively related to neutrophil and monocyte.
(Chen et al., 2019)	Guiyu vs. Jinping (4~85 years, n=267)	BPb	Higher Hgb (137.0 vs. 123.0 g/L) and RBC (both $p=0.001$). Pb positively correlated with Hgb.
(Sun et al., 2012)	Guiyu vs. Haojiang (3 ~6 years, n=237)	BPb	Elevated eosinophils and neutrophil.
(Chen et al., 2021)	Guiyu vs. Haojiang (3 ~7 years, n=486)	BPb	Elevated blood Pb levels were significantly associated with higher counts of WBCs and neutrophils.
(Wang et al., 2021)	Guiyu vs. Haojiang (3 ~6 years, n=222)	BPb	Hgb level decreased with elevate BPb. Prevalence of anaemia significantly higher in the exposed group.
(Zhang et al., 2020a)	Guiyu vs. Haojiang (3 ~7 years, n=207)	BPb	BPb positively correlated with peripheral monocyte percentage.
Growth effects			
(Zheng et al., 2008)	Guiyu vs. Chendian (1~7 years, n=278)	BPb	Lower height (104.35 vs. 105.81 cm, $p<0.01$). Significant increasing trend in Pb with increasing age in Guiyu ($p<0.01$).
(Zhang et al., 2017a)	Guiyu vs. Haojiang (4~ 7 years, n=118)	BPb	Lower height (107.62 vs. 112.53, $p<0.01$), weight (17.47 vs. 18.72, $p<0.05$) and chest circumference (50.56 vs. 51.80 cm, $p<0.05$), no differences in head circumference.
(Zeng et al., 2017)	Guiyu vs. Haojiang & Xiashan (5 ~7 years, n=206)	BPb	Lower height (111.03 vs. 112.56 cm, $p<0.05$), no differences in weight and BMI.
(Yang et al., 2013)	Guiyu only (3 ~8 years, n=246)	BPb	Pb negatively correlated with both height and weight, positively correlated with bone resorption biomarker.

(Xu et al., 2014)	Guiyu only (4 ~6 years, n=162)	BPb	Pb negatively correlated with weight.
(Huo et al., 2007)	Guiyu vs. Chendian (median 5.0 years, n=226)	BPb	No differences in height, weight, chest circumference, or head circumference.
(Lin et al., 2017b)	Guiyu vs. Haojiang (3 ~7 years, n=284)	BPb	Lower weight (17.05 vs. 18.00 kg, $p<0.05$), chest circumference (51.51 vs. 52.81 cm, $p<0.01$) and head circumference (49.82 vs. 50.47 cm, $p=0.05$), no difference in height.
(Zeng et al., 2019a)	Guiyu vs. Haojiang (preschool, n=470)	BPb	Lower chest circumference (51.18 vs. 51.95 cm, $p<0.05$) and BMI (15.61 vs. 16.12 kg/m^2, $p<0.01$). Pb negatively correlated with height ($p<0.001$), weight ($p<0.001$), BMI ($p<0.05$), head circumference ($p<0.05$), and chest circumference ($p<0.05$).
(Lu et al., 2018)	Guiyu vs. Haojiang (3 ~7 years, n=590)	BPb	Higher BMI (15.67 vs. 15.06 kg/m^2, $p<0.001$).
(Zeng et al., 2018)	Guiyu vs. Haojiang (3 ~7 years, n=466)	BPb	No differences in height, weight or BMI.
(Cao et al., 2018)	Guiyu vs. Haojiang (3 ~7 years, n=118)	BPb	No differences in height, weight.
(Zhang et al., 2016)	Guiyu vs. Haojiang (3 ~7 years, n=411)	BPb	No differences in height, weight or BMI.
(Xu et al., 2020)	Guiyu vs. Haojiang (3 ~7 years, n=116)	BPb	No differences in height, weight or BMI.
(Xu et al., 2015c)	Guiyu vs. Chendian (3 ~7 years, n=167)	BPb	Higher BMI (15.3 vs. 14.8 kg/m^2, $p<0.01$). No differences in height, weight, chest circumference or head circumference (all $p>0.05$). Pb positively correlated with height.
(Zhang et al., 2017b)	Guiyu vs. Haojiang (3 ~7 years, n=294)	BPb	Lower BMI (14.73 vs. 16.06 kg/m^2, $p<0.001$).

(Lin et al., 2016)	Guiyu vs. Haojiang (2 ~7 years, n=378)	BPb	No differences in height, weight, chest circumference or head circumference.
(Zeng et al., 2016)	Guiyu vs. Haojiang (3 ~8 years, n=470)	BPb	Lower chest circumference (51.18 vs. 51.95 cm, p<0.05) and BMI (15.61 vs. 16.12 kg/m^2, p<0.01) in Guiyu children, no differences in head circumference, height or weight.
(Liu et al., 2018a)	Guiyu vs. Nanao (3 years, n=284)	BPb	Higher BMI (15.47 vs. 14.96 kg/m^2, p<0.01).
(Guo et al., 2014)	Guiyu vs. Haojiang (under 11 years, n=837)	BPb	Lower height (105.95 vs. 104.52) and weight (17.25 vs. 17.72 kg) (both p<0.05), no differences in chest circumference, head circumference (both p>0.05).
(Xu et al., 2015a)	Guiyu vs. Haojiang (3 ~7 years, n=590)	BPb	Lower weight (17.14 vs. 17.94 kg) and chest circumference (51.65 vs. 52.53 cm) (both p<0.01), no differences in height and head circumference.
(Zheng et al., 2019)	Guiyu vs. Haojiang (3 ~7 years, n=203)	BPb	Lower height (104.70 vs. 108.71), weight (16.68 vs. 18.81 kg) and BMI (15.17 vs. 15.80 kg/m^2) (all p<0.01).
(Liu et al., 2015b)	Guiyu vs. Nanao (3 years, n=284)	BPb	Higher BMI (15.47 vs. 14.96 kg/m^2, p<0.01).
(Zheng et al., 2021)	Guiyu vs. Haojiang (2 ~7 years, n=324)	BPb	Higher BMI (15.57 vs. 15.08 kg/m^2, p=0.025).
(Chen et al., 2021)	Guiyu vs. Haojiang (3 ~7 years, n=486)	BPb	Lower BMI (14.7 vs. 15.9 kg/m^2, p<0.001)
(Hou et al., 2020)	Guiyu vs. Haojiang	BPb	Lower BMI (14.97 vs. 15.42 kg/m^2, p<0.001)
(Zhang et al., 2020b)	Guiyu vs. Haojiang (2 ~7 years, n=147)	BPb	No differences in BMI.
(Zhang et al., 2020a)	Guiyu vs. Haojiang (3 ~7 years, n=207)	BPb	No differences in BMI.
Adverse birth outcomes			

(Xu et al., 2012)	Guiyu vs. Xiamen (Neonate, n=244493)	UCB-Pb	Higher rates of adverse birth outcomes (stillbirth, low birth weight, term low birth weight and lower Apgar scores) (all $p<0.01$). birth weight 3.17 kg vs. 3.26 kg, $p<0.01$
(Li et al., 2008c)	Guiyu vs. Chaonan (Neonate, n=152)	MPb, CBPb	No differences in birth height, birth weight, or Apgar scores.
(Lin et al., 2013)	Guiyu vs. Chaonan (mother–infant pairs, n=320)	PCPb	Lower birth weight ($p<0.05$) and Apgar scores ($p<0.01$), longer birth length ($p<0.05$).
(Guo et al., 2010)	Guiyu vs. Shantou (mother–infant pairs, n=220)	PCPb	No differences in birth height, birth weight, or Apgar scores.
(Zhang et al., 2011)	Guiyu vs. Shantou (mother–infant pairs, n=105)	PCPb	No differences in birth height, birth weight, or Apgar scores.
(Qiu, 2012)	Guiyu vs. Control (mother-infant pairs, n=281)	PCPb	Shorter birth length ($p<0.01$). No difference in birth weight.
(Xu et al., 2016)	Guiyu vs. Haojiang (mother–infant pairs, n=185)	PCPb	Shorter birth length in Guiyu neonates ($p<0.01$)
(Ni et al., 2014b)	Guiyu vs. Shantou (mother-infant pairs, n=201)	UCB-Pb	No differences in birth length, birth weight.
(Zeng et al., 2016)	Guiyu vs. Haojiang (3 ~8 years, n=470)	BPb	Lower birth weight ($p<0.01$), shorter birth length ($p<0.05$).
(Liu et al., 2018a)	Guiyu vs. Nanao (3 years, n=284)	BPb	No differences in birth BMI.

(Zeng et al., 2019a)	Guiyu vs. Haojiang (preschool, n=470)	BPb	Lower birth weight (p<0.01), shorter birth length (p<0.05).
(Zeng et al., 2017)	Guiyu vs. Haojiang & Xiashan (5 ~7 years, n=206)	BPb	Lower birth weight (p<0.05).
(Huo et al., 2014)	Guiyu vs. Chendian (mother-infant pairs, n=504)	BPb	No differences in birth height, birth weight, or Apgar scores.
(Kim et al., 2020)	Guiyu vs. Shantou (mother-infant pairs, n=634)	BPb	Lower birth weight, head circumference and BMI, longer birth length
(Zeng et al., 2019b)	Guiyu vs. Haojiang (mother-infant pairs, n=204)	UCB-Pb	Lower birth BMI (p<0.001).
<u>Respiratory system</u>			
(Zeng et al., 2017)	Guiyu vs. Haojiang & Xiashan (5 ~7 years, n=206)	BPb	Lower lung function (FVC and FEV1) levels in Guiyu children. No significant difference in FVC/FEV1. No significant association between Pb and FVC, FEV1.
(Zeng et al., 2016)	Guiyu vs. Haojiang (3 ~8 years, n=470)	BPb	Higher prevalence of cough, phlegm, dyspnea, and wheeze were in Guiyu children.
<u>Thyroid function</u>			
(Liu et al., 2018a)	Guiyu vs. Nanao (3 years, n=284)	BPb	Higher levels of FT4 (16.65 vs. 16.06 pmol/L, p<0.01) and TSH (2.79 vs. 2.21 mIU/L, p<0.01) in Guiyu children. Exposure to Pb affects thyroid function. Both FT4 and TSH were positively related to the recycling industry.
<u>Hepatic function</u>			

(Chen et al., 2019)	Guiyu vs. Jinping (4~85 years, n=267)	BPb	Higher activity of serum GGT (p<0.005) in Guiyu residents. Exposure of Pb is linked with risk of abnormal liver function.
Oral anti-inflammatory and anti-microbial ability			
(Hou et al., 2020)	Guiyu vs. Haojiang (2.5 ~6 years, n=574)	BPb	BPb negatively correlated with salivary sialic acids. The prevalence of dental caries in deciduous teeth was significantly higher in the Guiyu children than in Haojiang.
(Zhang et al., 2020a)	Guiyu vs. Haojiang (3 ~7 years, n=207)	BPb	BPb negatively correlated with saliva salivary agglutinin (SAG).
Gestational age (weeks)			
(Xu et al., 2016)	Guiyu vs. Haojiang (mother–infant pairs, n=185)	PCPb	Longer gestational age (40.86 vs. 39.54, p<0.001) in Guiyu group. No significant correlation between Pb and gestational age.
(Xu et al., 2012)	Guiyu vs. Xiamen (Neonate, n= 244493)	UCB-Pb	Longer gestational age (39.5 vs. 38.9, p<0.01).
(Li et al., 2008c)	Guiyu vs. Chaonan (Neonate)	MPb, UCB-Pb	No significant difference of gestational age.
(Guo et al., 2010)	Guiyu vs. Shantou (mother–infant pairs, n=220)	PCPb	No significant difference of gestational age.
(Lin et al., 2013)	Guiyu vs. Chaonan (mother–infant pairs, n=320)	PCPb	Longer gestational age (39.69 vs. 39.28, p<0.05).
(Zhang et al., 2011)	Guiyu vs. Shantou (mother–infant pairs, n=105)	PCPb	No significant difference of gestational age.
(Qiu et al., 2012)	Guiyu vs. Shantou	PCPb	PCPb correlated with gestational age.

	(mother–infant pairs, n=251)		
(Huo et al., 2014)	Guiyu vs. Chendian (mother–infant pairs, n=504)	UCB-Pb	No significant difference of gestational age between two groups.
<u>Chromosome, DNA damage and epigenotoxic</u>			
(Ni et al., 2014b)	Guiyu vs. Shantou (pregnant women, n=201)	UCB-Pb	No significant association between 8-OHdG and CBPb.
(Lin et al., 2013)	Guiyu vs. Chaonan (Neonate, n=320)	PCPb	No significant correlation between PCPb and placental telomere length.
(Zhang et al., 2011)	Guiyu vs. Shantou (mother–infant pairs, n=105)	PCPb	Higher MT levels (p<0.01), and lower S100P protein levels (p<0.05) and mRNA (p<0.001) in Guiyu placentas. No correlation between PCPb and S100P or MT expression.
(Xu et al., 2018)	Guiyu only (3 ~6 years, n=118)	BPb	8-OHdG 407.79 (152.05~876.26) ng/g creatinine, hOGG1 mRNA expression level 0.038 (0.009~0.542). Children with high Pb had significantly higher 8-OHdG than low Pb exposure.
(Liao et al., 2011)	Guiyu only (3 ~7 years, n=118)	BPb	Pb exposure can affect urine 8-OHdG level, association between increase of oxidative stress level and higher Pb.
(Zeng et al., 2019b)	Guiyu vs. Haojiang (mother-infant pairs, n=204)	UCB-Pb	Differential methylation of two CpGs of BAI1 and CTNNA2 involved in brain neuronal development in newborns which were associated with the maternal Pb exposure

* blood Pb (BPb); erythrocyte Pb (EPb); Umbilical cord blood Pb (UCB-Pb); placenta Pb (PCPb); meconium Pb (MPb);

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