CHINA

A. Regulation on sources

Source of lead	Relevant legislation/regulation	Government agencies	Data source
1. Used lead-acid battery recycling	1. Used/waste lead-acid batteries classified as hazardous waste according to the National Catalogue of Hazardous Waste 2016 (issued in 2008, revised in 2016) 2. In a document published in January 2019, China's Ministry of Ecology and Environment ordered the country's lead battery producers to step up their used battery collection rate to 70% by 2025 3. The Action Plan for Prevention and Control of Used Lead-Acid Battery Pollution, drawn up by 9 ministries and government departments, states that the rate of battery collection should be up to 40% by 2020. The Shanghai Metals Market estimates the rate to be no more than 30%, as of 2019	a. Ministry of Ecology and Environment (formerly the Ministry of Environmental Protection) b. Ministry of Finance c. Ministry of Industry and Information Technology d. Ministry of Justice e. Ministry of Public Security f. Ministry of Transport g. National Development and Reform Commission h. State Administration for Market Regulation i. State Administration of Taxation	1. Ministry of Ecology and Environment. 2019. "Notice on Issuing the Action Plan for the Prevention and Control of Waste Lead Battery Pollution." China Water Risk. 2019. "Action Plan for the Pollution Prevention and Control of Waste Lead-Acid Batteries." *China Water Risk*. 2. Ibid. 3. Batteries International. 2019. "China Issues New Collection and Recycling Plan for Lead Batteries." *Batteries International*.
2. Standards for lead in food	1. In March 2017, the National Health Commission (NHC, formerly the National Health and Family	a. Ministry of Health/National	1. Global Agricultural Information Network

Source of lead	Relevant legislation/regulation	Government agencies	Data source
	Planning Commission (NHFPC)), and the State Administration of Market Regulation (formerly the China Food and Drug Administration (CFDA)) released the National Food Safety Standard for Maximum Levels of Contaminants in Foods, which was implemented on September 17, 2017. This standard sets limits for lead and other heavy metals 2. In September 2020, the NHC proposed changes to a set of 16 food safety standards, including a revised draft standard on metals used in Food Contact Materials (FCMs). These changes to metals standard include a table defining stricter maximum limits in FCMs for lead and other heavy metals	Health and Family Planning Commission / National Health Commission b. China Food and Drug Administration/State Administration of Market Regulation	(USDA FAS). 2018. *China Releases the Standard for Maximum Levels of Contaminants in Foods*. FAIRS Subject Report. CH18025. Beijing. 2. Food Packaging Forum. 2020. "China Revises Standard on Metals in FCMs." National Health Commission. 2020. "Letter from the Secretariat of the National Food Safety Standards Review Committee."
3. Standard for lead in cookware	1. MOU in 2010 between the US Food and Drug Administration (FDA) and the Certification and Accreditation Administration of the People's Republic of China (CNCA) on the inspection and certification of ceramicware for export from Chinese factories to the USA		1. US Food and Drug Administration (FDA). 2019. "FDA-China MOU Regarding Ceramicware for the Preparation, Serving or Storage of Food or Drink."
4. Standards for occupational exposure	1. The Occupational Disease Prevention and Control Act which addresses workplace health and safety, was adopted in 2002. 2. Main aims: (a) prevent, control, and eliminate occupational disease hazards, to protect workers' health and related interests. (b) to support the	a. Ministry of Health/National Health and Family Planning Commission / National Health Commission	1. ILO. 2021. "Database of National Labour, Social Security and Related Human Rights Legislation."

Source of lead	Relevant legislation/regulation	Government agencies	Data source
	sustainable development of human labour resources and improve socio-economic development. 3. With respect to lead, 'poisoning caused by lead and its compounds (excluding tetraethyl lead)' and ' poisoning caused by tetraethyl lead' fall under the category of occupational poisoning under the Act.		2. Zhang, Min, and Jorma Rantanen. 2020. "Improving the Law on the Prevention and Control of Occupational Diseases in China: An Employer-Supporting Management Perspective." *Global Health Journal* 4(2):33–41. 3. Government of China. 2001. "Law of the People's Republic of China on Prevention and Control of Occupational Diseases (Order of the President No.60)."
5. Lead in paint	1. A mandatory limit on the lead content of paint was introduced in 1986 and amended in 2002. Subsequent amendments were made in 2010 and 2016. 2. In 2020, China changed its national standards by setting total lead limits for woodenware and architectural paints to 90 ppm and 1000 ppm for vehicle and industrial protective coatings. 3. The new standards took effect on December 1, 2020. The new regulation updated an older lead paint standard than "total lead". The limit to lead (soluble lead<90 ppm) applies to most paints. The limit to lead in automobile paints, exterior wall	a. Ministry of Industry and Information Technology b. Ministry of Science and Technology c. Ministry of Ecology and Environment (formerly named as Ministry of Environmental Protection)	1. Zhang, Yunhui, David O'Connor, Wendi Xu, and Deyi Hou. 2020. "Blood Lead Levels among Chinese Children: The Shifting Influence of Industry, Traffic, and e-Waste over Three Decades." *Environment International* 135:105379.

Source of lead	Relevant legislation/regulation	Government agencies	Data source
	paints, and steel structure antirust paints is <1000 ppm.	d. The National Development and Reform Commission e. Ministry of Industry and Information Technology	2. SAICM. 2019. "Global Environment Facility (GEF) 9771: Global Best Practices on Emerging Chemicals Policy Issues of Concern under the Strategic Approach to International Chemicals Management (SAICM)." 3. IPEN. 2020. "China Adopts New Lead Paint Standards to Protect Children's Health."
6. Waste generated from smelting or mining	1. Adopted the Solid Waste Environmental Pollution Prevention and Control Law in 1995 which has since been amended five times as of May 2020. Over the years, various regulations, standards, catalogs, and other rules to implement this law have been developed by the Ministry of Ecology and Environment and other agencies like the State Environmental Protection Administration, Ministry of Commerce, National Development and Reform Commission, General Administration of China Customs, General Administration of Quality Supervision, Inspection and Quarantine. 2. Of particular interest are: a. Catalogue of banned solid wastes import to China which includes (a) sludge	a. Ministry of Ecology and Environment (formerly named as Ministry of Environmental Protection) b. Ministry of Industry & Information Technology	1. Institute of Scrap Recycling Industries. 2018. "Announcement on Adjustment to the Catalogue for the Administration of Import Solid Waste." 2. Ministry of Environment and Ecology. 2008. "Announcement on Releasing Catalogue of Solid Wastes Forbidden to Import, Catalogue of Restricted Import Solid Wastes That Can Be

Source of lead	Relevant legislation/regulation	Government agencies	Data source
	containing lead; (b) sludge of mineral slag, ash and residue containing lead; (c) waste lead; (d) calx and draff whose major ingredient is lead b. In 2016, the Ministry of Industry & Information Technology introduced new regulations for secondary lead industry and environmental protection. For example, these regulations stated that "Recovery rate of lead should be above 98%, and lead content should be below 2% in smelting waste residues. Energy consumption of scrap lead-acid battery pretreatment should be lower than 5 kg of standard coal per mt of scrap battery".		Used as Raw Materials, and Catalogue of Automatic-Licensing Import Solid Wastes That Can Be Used as Raw Materials." 3. SMM News. 2016. "China Introduces New and Stricter Regulations on Secondary Lead Industry."

B. International Agreements

Agreement	Year Ratified
1. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	1991
2. Rotterdam Convention on the Prior Informed Consent Procedure for certain hazardous Chemicals and Pesticides in international trade	2005
3. ILO C170 - Chemicals Convention, 1990 (No. 170) Convention concerning Safety in the use of Chemicals at Work	1995
4. Globally Harmonized System of Classification and Labelling of Chemicals	2011
5. Stockholm Convention on Persistent Organic Pollutants	2004

C. Blood lead-level monitoring programs

Details	Data source
1. Leaded petrol was phased out in 2000, which saw a drop in blood lead levels. The current reference value of 10 µg/dL for children's Blood Lead Level was introduced to China in 2006 and has not been updated since.	1. Li, Min-Ming, Zhen-Yan Gao, Chen-Yin Dong, Mei-Qin Wu, Jin Yan, Jia Cao, Wen-Juan Ma, Ju Wang, Ying-Liang Gong, Jian Xu, Shi-Zhong Cai, Jing-Yuan Chen, Shun-Qing Xu, Shilu Tong, Deliang Tang, Jun Zhang, and Chong-Huai Yan. 2020. "Contemporary Blood Lead Levels of Children Aged 0–84 months in China: A National Cross-Sectional Study." Environment International 134:105288. 2. Li, Tao. 2021. "Time for a Change in Blood Lead Reference Value for Chinese Children." Chemosphere 267:128868.
3. No details of a national or regional level structured program for blood lead level testing found. However, published studies point to some presence of testing programs at the local level. 4. A report by the Human Rights Watch (2011) found several limitations to existing blood lead level monitoring including: - local governments in the provinces they studied imposed arbitrary limits on access to blood lead testing; refused appropriate treatment to children and adults with critically high lead levels; withheld and failed to explain test results showing unaccountable improvements in lead levels; and denied the scope and severity of lead poisoning.	1. Cohen, Jane, and Joseph Amon. 2013. "Lead Poisoning in China: A Health and Human Rights Crisis." *Health and Human Rights Journal*.

D. Inventory of toxic sites (Toxic Sites Identification Program (TSIP), Pure Earth)

Site	Province/Region	Details (all data comes from the TSIP website)
1. Beishan village, GongWusu Town, Wuhai City,	Nei Mongol	The grasslands of Beishan Village have been occupied by an Industrial Park where hundreds of stoves are used for coking. The ferro-alloy and ferro-silicon plants produce hazardous smoke. Lead pollution in the soil is very high
2. Longgang Village, Guiyu Town, Shantou City	Guangdong	Electronic waste recycling practices are contaminating the air, water, and soil with heavy metals in Guiyu Town. Longgang Village has been especially affected with lead pollution.
3. Xi River	Liaoning	
4. Hui county	Gansu	A closed nonferrous metal smelting plant released large amounts of lead into the air, leading to the contamination of surrounding soil. High blood lead levels in children have been reported and could result in kidney and intestinal failure.
5. Xinsi Village, Longnan City	Gansu	Nonferrous Metal Smelting Co, Ltd. is polluting the air, soil, and water around the village of Xinsi with lead.
6. Chen Gou An village,LanTian county	Shaanxi	A lead smelter in the town was forced to close in 2007 after 25 children were poisoned with lead. The soil is polluted with lead and cadmium and reaches residents through inhalation and dermal contact.
7. Nansu Village, Fanli town, Lushi county, Sanxia city	Henan	
8. Tianying	Anhui	All of the lead plants in Tianying were forced to shut down due to poor maintenance and illegal practices. The residents still suffer from high levels of lead poisoning.
9. Yixing	Jiangsu	Heavy metals left behind by a closed lead smelter near Yixing City continue to pollute the groundwater and agricultural soil with lead.
10. Yiqiao Village, Yangzhuang Township, Suzhou City,	Anhui	Wastewater from industry and domestic sewage in Xuzhou City is polluting the downriver water of Yiqiao Village with lead.
11. Luqiao district	Zhejiang	

Site	Province/Region	Details (all data comes from the TSIP website)
12. Shengao Village,Yuecheng Town,Yueqing City	Zhejiang	Heavy metals left behind by a closed lead smelter near Yixing City continue to pollute the groundwater and agricultural soil with lead.
13. Dai Village,Mingkou Town,Leping City	Jiangxi	Large amounts of farmland in Dai Village have been contaminated by copper mining and industrial production. There are high levels of heavy metals, primarily lead, in the drinking water, the soil, and the crops.
14. Feicao Village, Taiping Town, Leshan City	Sichuan	Industrial emissions from Leshan City are contaminating the air and soil of Feicao Village. Lead is the key pollutant, and is affecting agriculture.
15. Fenghuang county, Xiangxi autonomous district	Hunan	Extraction activities of the Guanzhai Lead-Zinc Mine are contaminating the surface water, air, and agricultural fields of Fenghuang County with lead and zinc.
16. Lixin village, Mijiang rural, Chalin county	Hunan	
17. Yuetang District in Xiangtan City	Hunan	A manganese mine in Xiangtan City that has been in operation since 1914 is polluting the air, soil, and groundwater with lead.
18. Gaojia Village, Bajiang Town, Yongfeng County, Ji'an City	Jiangxi	Smoke emissions from lead smelters near Gaojia Village are contaminating the air, water, and primarily soil with lead. Up to 80% of children in the village have concentrations of lead in their blood above safe limits.
19. Le'an river		
20. Shengao Village,Yuecheng Town,Yueqing City	Zhejiang	A power plant that manufactures lead-acid batteries for cars is contaminating the soil and water of Shengao with high levels of lead. Lead has also been detected in the blood of children.
21. Jianghua county	Hunan	The tailings and smoke from a metal smelter plant in Jianghua County are polluting the air, soil, and water with lead.
22. DaBaoShan mine area & ShanBa village	Guangdong	Dabaoshan is a large poly-metallic sulfide ore deposit. Tailings have washed sulfur, cadmium, copper, zinc, and lead into the Hengshui River. The pollution has affected 83 villages and impaired the health of many.
23. Shaxi village, Longtang town, Qingyuan City	Guangdong	Illegal solution factories and e-recycling in Shaxi have polluted the air, soil, and drinking water with cadmium, zinc, copper, and primarily lead.
24. Guo'an Village, Teng County	Guangxi	Lead and zinc mining activities near Guo'an Village have contaminated the area's drinking water and soils. High levels of lead have been found in the blood of villagers. Lead is inhaled/ingested by people in the area. Dermal contact is common as well.

Site	Province/Region	Details (all data comes from the TSIP website)
25. Shenyang smelter	Liaoning	Smelting
26. Dutou village,Guiyu town, Shantou City,	Guangdong	Air, soil, and water contamination in Guiyu, an electronic waste recycling town, are causing a variety of health concerns. High levels of lead have been found in the blood of children in the town. High levels of chromium have also been found in river sediments.
27. Nanyang Village, Guiyu Town, Shantou City	Guangdong	Electronic waste recycling practices are contaminating the air, water, and soil with heavy metals in Guiyu Town. Nanyang Village has been especially affected with lead and chromium pollution.
28. Huamei village, Guiyu town, Shantou City	Guangdong	A large e-waste recycling industry in Huamei Village is polluting the air, water, and soil of the community with lead and chromium. Elevated blood lead levels have been found in children due to this activity.
29. Minping Village, Longtang Town, Qingyuan City	Guangdong	Electronic waste recycling in Minping Village is contaminating the air with high levels of lead and cadmium. The recycled waste is piled next to a nearby river, contaminating the soil and surface water in the region.
30. Banchong village, Longtang town, Qingyuan City	Guangdong	Banchong village, Longtang town, Qingyuan City
31. Dingan village, Longtang town, Qingyuan City,	Guangdong	A large number of illegal e-waste recycling units in Dingan Village are polluting the air, drinking water, and soil with cadmium and lead.

E. Scientific papers on lead exposure (Please contact info@gahp.net for information on studies not in the public domain)

Topic	Authors	Year	Title	Abstract/ description
Childhood exposure	Li, Tao	2021	Time for a Change in Blood Lead Reference Value for Chinese Children	**Background**: In China, the first and also the latest version of national childhood lead exposure control guidelines was issued by the National Health Commission in 2006, when the reference value of high blood lead exposure was set at 10 μg/dL and lead poisoning was set at 20 μg/dL. **Discussion:** Lead exposure levels have been decreasing in China over the last few decades, with almost all blood lead concentrations in children under 7 years of age being under 10 μg/dL in non-industrial areas. However, lead concentrations lower than 10 μg/dL in blood in children are associated with neurodevelopmental deficits. Thus, if the reference value remains at a high level, a large percent of children with exposure levels that are high but lower than the current reference value will be diagnosed as 'safe' and be ignored. Thus, we appeal that the reference value should be lowered according to local actual exposure level. A more stringent reference value would give care givers, doctors, communities, and officials more opportunities to take action earlier.
Childhood exposure	Li, Min-Ming, Zhen-Yan Gao, Chen-Yin Dong, Mei-Qin Wu, Jin Yan, Jia Cao, Wen-Juan Ma, Ju Wang, Ying-Liang Gong, Jian Xu, Shi-Zhong Cai, Jing-Yuan Chen, Shun-Qing Xu, Shilu Tong, Deliang Tang,	2020	Contemporary Blood Lead Levels of Children Aged 0–84 months in China: A National Cross-Sectional Study	**Background:** Despite the global abundance of studies on children's lead (Pb) exposure, the magnitude of Pb exposure among children across China remains unclear, especially for rural areas. In 2000, Pb was removed from petrol, marking a change in the sources of Pb exposure in China. **Methods:** To better understand children's Pb exposure and inform potential approaches to exposure reduction, we conducted a national blood Pb survey of 31,373 children (0–84 months old) from May 2013 to March 2015, using a multi-stage and multi-strata sampling method. Blood lead levels (BLLs) were tested using graphite furnace atomic absorption spectrometry with a detection limit of 1 μg/L. **Results:** The results show that Chinese children had a contemporary geometric mean (GM) BLL of 26.7 μg/L, with 8.6% of BLLs exceeding 50 μg/L. Boys had higher BLLs (GM 27.2 μg/L) compared to girls (GM: 25.9 μg/L) ($p < 0.001$). Children at the age of 0–36 months had a lower PbB (GM 25.7 μg/L) level compared with those aged 36–84 months (GM 27.9 μg/L) ($p < 0.001$). When taking into account sociodemographic

Topic	Authors	Year	Title	Abstract/ description
	Jun Zhang, and Chong-Huai Yan			factors, a multivariate logistic regression analysis shows that the odds ratios (OR) of having a BLL of 27 µg/dL (i.e., median BLL of this study) or higher were 1.88 (95% CI: 1.76, 2.02) and 1.35 (95% CI: 1.22, 1.49) for homes using coal and biomass fuels, respectively, compared to those using gas or electricity. Meanwhile, children in homes close to roads were more likely to have BLLs exceeding 27 µg/dL (OR: 1.11, 95% CI: 1.03, 1.20). In China, rural children had higher BLLs compared to urban children. As a result of pediatric exposure to Pb, there were approximately 144 million and 36 million IQ points lost for rural children and urban children, respectively, revealing a disparity of Pb exposure between rural and urban areas in China. Cleaner domestic fuels and improved cooking/heating equipment will reduce contemporary Pb exposure in rural areas. In addition, the association between contemporary BLLs and distance away from roads further suggests that resuspension of legacy soil/dust Pb should not be neglected in future remediation programs and household interventions. As a large scale survey, this study provides evidence for revising the reference value of BLL, improving the guideline for clinical and public health management, and implementing interventions to prevent adverse health outcomes associated with low-level Pb exposure in children.
Childhood exposure	Li, You, Jian Qin, Xiao Wei, Chunhong Li, Jian Wang, Meiyu Jiang, Xue Liang, Tianlong Xia, and Zhiyong Zhang	2016	The Risk Factors of Child Lead Poisoning in China: A Meta-Analysis	**Background:** To investigate the risk factors of child lead poisoning in China. **Methods**: A document retrieval was performed using MeSH (Medical subject heading terms) and key words. The Newcastle-Ottawa Scale (NOS) was used to assess the quality of the studies, and the pooled odd ratios with a 95% confidence interval were used to identify the risk factors. We employed Review Manager 5.2 and Stata 10.0 to analyze the data. Heterogeneity was assessed by both the Chi-square and I2 tests, and publication bias was evaluated using a funnel plot and Egger's test. **Results**: Thirty-four articles reporting 13,587 lead-poisoned children met the inclusion criteria. Unhealthy lifestyle and behaviors, environmental pollution around the home and potential for parents' occupational exposure to lead were risk factors of child lead poisoning in the pooled analyses. Our assessments yielded no severe publication biases. Conclusions: Seventeen risk factors are associated with child lead

Topic	Authors	Year	Title	Abstract/ description
				poisoning, which can be used to identify high-risk children. Health education and promotion campaigns should be designed in order to minimize or prevent child lead poisoning in China.
Environmental exposure	Zhang, Xiuwu, Linsheng Yang, Yonghua Li, Hairong Li, Wuyi Wang, and Bixiong Ye	2012	Impacts of Lead/Zinc Mining and Smelting on the Environment and Human Health in China	**Background:** Mining and smelting are important economic activities. However, mining-related industries are also some of the largest sources of environmental pollution from heavy metals. China is one of the largest producers and consumers of lead and zinc in the world. A large amount of lead, zinc, and related elements, such as cadmium, have been released into the environment due to mineral processing activities and have impacted water resources, soils, vegetables, and crops. In some areas, this pollution is hazardous to human health. **Methods:** This article reviews studies published in the past 10 years (2000–2009), on the environmental and human health consequences of lead/zinc mineral exploitation in China. **Results:** Polluted areas are concentrated in the following areas: the junction of Yunnan, Guizhou and Sichuan provinces, west-central Hunan province, central Guangxi province, northern Guangdong, northwestern Henan province, the border between Shanxi and Gansu provinces, and the region of Liaoning province near Bohai. Lead (Pb) and cadmium (Cd) are the main pollutants and are associated with human health effects such as high lead blood levels in children, arthralgia, osteomalacia, and excessive cadmium in urine.
Environmental exposure/childhood exposure	Ren, H. M., J. D. Wang, and X. L. Zhang	2006	Assessment of soil lead exposure in children in Shenyang, China	**Background**: Soil lead pollution is serious in Shenyang, China. The paper brings together the soil work, the bioaccessibility, and the blood lead data to assess the soil lead exposure in children in Shenyang, China. **Results**: Approximately 15.25% of the samples were above China Environment Protection Agency guideline concentration for soil Pb to protect human from health risk (350 mg kg^{-1}). Pb concentrations varied among use scenarios. The main lead contamination sources are industry emission and automobile exhaust. Bioaccessibility also varied among use scenarios. Children, who ingested soil from industrial area, public parks,

Topic	Authors	Year	Title	Abstract/ description
				kindergarten playground, and commercial area, are more susceptible to soil lead toxicity. The industrial area soil samples presented higher bioaccessibility compared to the other use scenario soil samples contaminated by automobile exhaust. The result also suggested a most significant linear relationship between the level of Pb contamination and the amount of Pb mobilized from soil into ingestion juice. Soil pH seemed to have insignificant influence on bioaccessibility in the present study. Bioaccessibility was mainly controlled by other factors that are not investigated in this study. A linear relationship between children blood lead and soil intestinal bioaccessibility was present in the study. Children who are 4–5 years old are more likely to demonstrate the significant relationship between soil lead bioaccessibility and blood lead as their behaviors place them at greatest risk of soil lead toxicity, and their blood lead levels are more likely to represent recent exposure.
Environmental/Childhood exposure	Jiang, Yong-mei, Hua Shi, Jia-yuan Li, Chuan Shen, Jin-hao Liu, and Hui Yang	2009	Environmental Lead Exposure Among Children in Chengdu, China: Blood Lead Levels and Major Sources	**Methods**: A survey was performed to know blood lead level (BLL) of children under seven and the risk factors of high BLL in Chengdu, China in 2004. **Results:** The mean BLL in children under seven in Chengdu was 63.88 µg/L. The detection rate of high BLL was 8.21%. Chengdu is a moderate popular region of lead poisoning. Substitute of breast milk, living at the base floor or in one-storey houses and houses near the streets are the risk factors of high BLL ($p < 0.05$). The risk of anorexia, spasm and impaired concentration is higher in children whose BLL is higher than those whose BLL is lower ($p < 0.05$). Living circumstances, feeding patterns, and eating habits affect BLL, which in turn influences children's health status.
Food exposure	Wang, Man, Boheng Liang, Weiwei Zhang, Kuncai Chen, Yuhua Zhang, Hongwei	2019	Dietary Lead Exposure and Associated Health Risks in Guangzhou, China.	**Background**: Lead exposure is associated with a wide range of adverse effects on human health. The principal exposure route in the general population is through the diet. In this study, we estimate the dietary lead intake and associated health risks among the residents of Guangzhou, China. **Methods**: Data on lead concentrations were derived from the food safety risk monitoring system, which included 6339 samples from 27 food categories collected in 2014–2017. Food consumption data were

Topic	Authors	Year	Title	Abstract/ description
	Zhou, Yanfang Cheng, Huachun Liu, Xianwu Zhong, Yingyue Li, and Yufei Liu			taken from a 2011 dietary survey of 2960 Guangzhou residents from 998 households. **Results:** Dietary lead intake was estimated by age group (3–6, 7–17, 18–59, and ≥60 years), and relevant health risks were assessed using the margin of exposure (MOE) method. The mean and 95th percentiles (P95) of dietary lead intake were respectively 0.7466 and 2.4525 μg/kg body weight per day for preschool children aged 3–6 years; 0.4739 and 1.5522 μg/kg bw/day for school children aged 7–17 years; 0.3759 and 1.1832 μg/kg bw/day for adults aged 18–59 years; and 0.4031 and 1.3589 μg/kg bw/day for adults aged ≥60 years. The MOE value was less than 1 for preschool children at the mean exposure level and for all age groups at the P95 exposure level. Rice and its products, leafy vegetables, and wheat flour and its products were found to be the primary food sources of lead exposure. Our findings suggest that the health risk from dietary lead exposure is low for Guangzhou residents overall, but that young children and consumers of certain foods may be at increased risk. Continued efforts are needed to reduce the dietary lead exposure in Guangzhou
Food exposure	Jin, Yingliang, Pei Liu, Yongning Wu, Jie Min, Cannan Wang, Jinfang Sun, and Yafei Zhang	2014	A Systematic Review on Food Lead Concentration and Dietary Lead Exposure in China	**Background:** By synthesizing results from primary studies, systematic review can provide empirical information of concerned problems. This study aimed to review the available surveillance data from studies reporting the contamination surveillance of food lead in China. **Methods:** Relevant studies were identified by systematically searching Chinese Biological Medicine Database and China National Knowledge Infrastructure using the key term of "lead" for surveillance data published in Chinese between 2006 and 2012. To avoid potential selection bias, all articles were evaluated by two independent reviewers, and the disagreements were resolved by discussion or the third author was asked to arbitrate. **Results:** Among 269 identified publications on surveillance data of lead in food, 43 articles met the defined inclusion criteria. The food samples were divided into 11 groups (cereal grains and pulses, fish, eggs, vegetables, meat, edible fungi, milk and dairy products, fruits, offal, tea and preserved egg). Surveillance data of publications were reviewed to calculate the weighted mean and rate exceeding maximum levels. Our

Topic	Authors	Year	Title	Abstract/ description
				results indicated that the highest lead concentration was 1.937 mg/kg in tea. The total percentage of samples exceeding the maximum levels was 5.57%. Dietary exposure to lead was assessed by combining the weighted mean concentration of surveillance data with national consumption data in 2002. In this review, dietary intake of lead was 1.232 μg/kg b.w./day.
Occupational exposure	Chen, Laiguo, Zhencheng Xu, Ming Liu, Yumei Huang, Ruifang Fan, Yanhua Su, Guocheng Hu, Xiaowu Peng, and Xiaochun Peng	2012	Lead exposure assessment from study near a lead-acid battery factory in China	Study a lead-acid battery factory's effects on the nearby environment and residents. Atmospheric dispersion was the main route for environmental Pb pollution propagation. Dust intake was the dominant exposure pathway for humans. The calculated lead exposure levels in the polluted area were far higher than provisional tolerable weekly intake. Elevated blood lead levels were strongly correlated with house dust lead levels.

Topic	Authors	Year	Title	Abstract/ description
Occupational exposure	Gottesfeld, Perry, and Amod K. Pokhrel	2011	Review: Lead Exposure in Battery Manufacturing and Recycling in Developing Countries and Among Children in Nearby Communities	**Background:** The battery industry is the largest consumer of lead, using an estimated 80% of the global lead production. The industry is also rapidly expanding in emerging market countries. **Methods**: A review of published literature on exposures from lead-acid battery manufacturing and recycling plants in developing countries was conducted. The review included studies from 37 countries published from 1993 to 2010 and excluded facilities in developed countries, such as the United States and those in Western Europe, except for providing comparisons to reported findings. **Results:** The average worker blood lead level (BLL) in developing countries was 47 µg/dL in battery manufacturing plants and 64 µg/dL in recycling facilities. Airborne lead concentrations reported in battery plants in developing countries averaged 367 µg/m3, which is 7-fold greater than the U.S. Occupational Safety and Health Administration's 50 µg/m3 permissible exposure limit. The geometric mean BLL of children residing near battery plants in developing countries was 19 µg/dL, which is about 13-fold greater than the levels observed among children in the United States. The blood lead and airborne lead exposure concentrations for battery workers were substantially higher in developing countries than in the United States. This disparity may worsen due to rapid growth in lead-acid battery manufacturing and recycling operations worldwide. Given the lack of regulatory and enforcement capacity in most developing countries, third-party certification programs may be the only viable option to improve conditions.
Occupational exposure	Ye, Xibiao, and Otto Wong	2006	Lead Exposure, Lead Poisoning, and Lead Regulatory Standards in China, 1990-2005	**Background:** This article presents a summary of lead exposure levels and lead poisoning at workplaces in China reported in the Chinese medical literature between 1990 and 2005. **Methods:** A comprehensive literature search identified 618 papers reporting lead exposure and lead poisoning data. The data were analyzed in terms of time period, type of industry, size of factory, and task or process. In 2002 the new Occupational Diseases Prevention and Control Act was passed in China, with new provisions specifically for regulatory enforcement. Therefore, a comparison of lead exposure levels and lead poisoning rates before and after the 2002 Act will shed some light on the effectiveness of the new regulation.

Topic	Authors	Year	Title	Abstract/ description
				Results: The reported lead exposure levels covered a wide range; some measurements were in excess of 250 mg/m(3), which was orders-of-magnitude higher than the occupational exposure levels (OELs) for lead in China. The overall arithmetic mean, median, and geometric mean were 0.92, 0.25, and 0.24 mg/m(3), respectively. Approximately 53.7% of the averages reported in the papers were above the national OELs. The data demonstrated that many facilities in the lead industries reported in the literature were not in compliance with the OELs. Similarly, there appeared to be only a minor impact of the 2002 Act on the reduction of occupational lead poisoning in China. The lead poisoning rates reported in the literature were well above 30%. Judging by the lead exposure levels and the lead poisoning rates, the current overall occupational health monitoring system appears inadequate, lacking the necessary enforcement. The 2002 Act, without the necessary enforcement, did not appear to have a major impact on either lead exposures or lead poisoning in China. Much work in enforcing the 2002 Act remains to be done.

F. Blood testing in National Health Surveys

National Health Survey	China Health and Nutrition Surveys 1989-2015	Source
Purpose	The purpose of these longitudinal surveys is to examine the effects of the health, nutrition, and family planning policies and programs implemented by national and local governments and to see how the social and economic transformation of Chinese society is affecting the health and nutritional status of its population.	Carolina Population Center, University of North Carolina at Chapel Hill, Chinese Center for Disease Control and Prevention (CCDC). China Health and Nutrition Survey. Chapel Hill, United States: Carolina Population Center, University of North Carolina at Chapel Hill.
Sample size	For the 2015 round, 7319 households and 20914 individuals were surveyed.	
Blood sample testing	In the three survey rounds conducted since 2009, blood samples were taken to evaluate major cardiovascular biomarkers (lipids, diabetes such as HbA1c, glucose, insulin, triglycerides, CRP) and important nutrition biomarkers (transferrin, hemoglobin, and ferritin).	
Latest round	2015	
Next round	2019 (ongoing)	