Lead (Pb) and Our Health

in Wesern Pacific Region

Where can we find Lead?

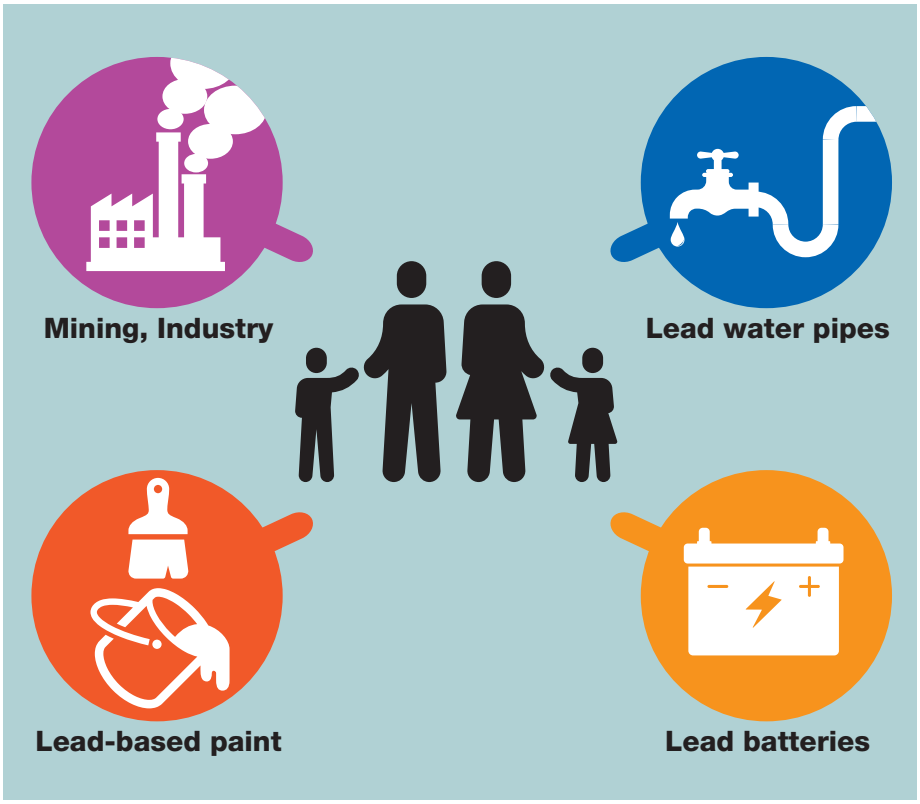
Lead (Pb), a naturally occurring toxic metal, is used in various industrial applications, including batteries, ammunition, metal products (solder, pipes), and X-ray shielding devices. Health concerns have prompted reductions in the lead levels in gasoline, paints, ceramics, caulking, and pipes.

Lead is also found in petrol, paints, ceramics, food cans, candies, cosmetics, traditional remedies, stained glass, crystal vessels, ceramic glazes, jewelry, and toys.Major sources of lead exposure in western pacific region include industries, past mining activities, lead-based paint, and battery recycring. Given the widespread presence of articles containing lead, effective action and knowledge aimed at reducing potential health and environmental risks are essential.

What Efforts have been Undertaken to Reduce Lead Exposure in Recent Years?

Substantial efforts have been made to decrease lead exposure using a diverse range of approaches. All countries in the Western Pacific Region have also enforced bans on leaded gasoline. Industries have embraced the production of lead-free paints and water pipes to enhance indoor safety and drinking water quality. Notable regulations, such as those implemented by the Australian Building Codes Board, focus on reducing lead exposure from waterlines by advocating the use of low-lead alternatives like copper for pipes. These combined efforts underline the global commitment to reduce the health risks associated with lead exposure, from gasoline to consumer products and water infrastructure.

How are We Exposed to Lead?



Exposure occurs through inhalation, ingestion, and dermal contact. The general population is exposed to contaminated food, soil, dust, lead-based paints in older homes, and the inhalation of lead-laden air. Lead exposure sources include dust, soil, water contamination, and residual deposits from past mining activities. Additionally, e-waste recycling, battery recycling, and abandoned mining locales contribute to lead exposure. Inhabitants living near defunct mining sites, in particular, are vulnerable to lead exposure.

Health Risks of Lead Exposure

- Lead exposure poses a health risk to humans, particularly to children and childbearing mothers.
- Acute toxicity due to high lead levels can have severe health consequences.
- Diseases related to lead exposure include anemia, hypertension, renal impairment, reproductive organ toxicity, and respiratory and kidney diseases.
- Even lead levels as low as 3.5 μg/dL in the blood could potentially reduce intelligence in children, cause behavioral problems and learning difficulties.

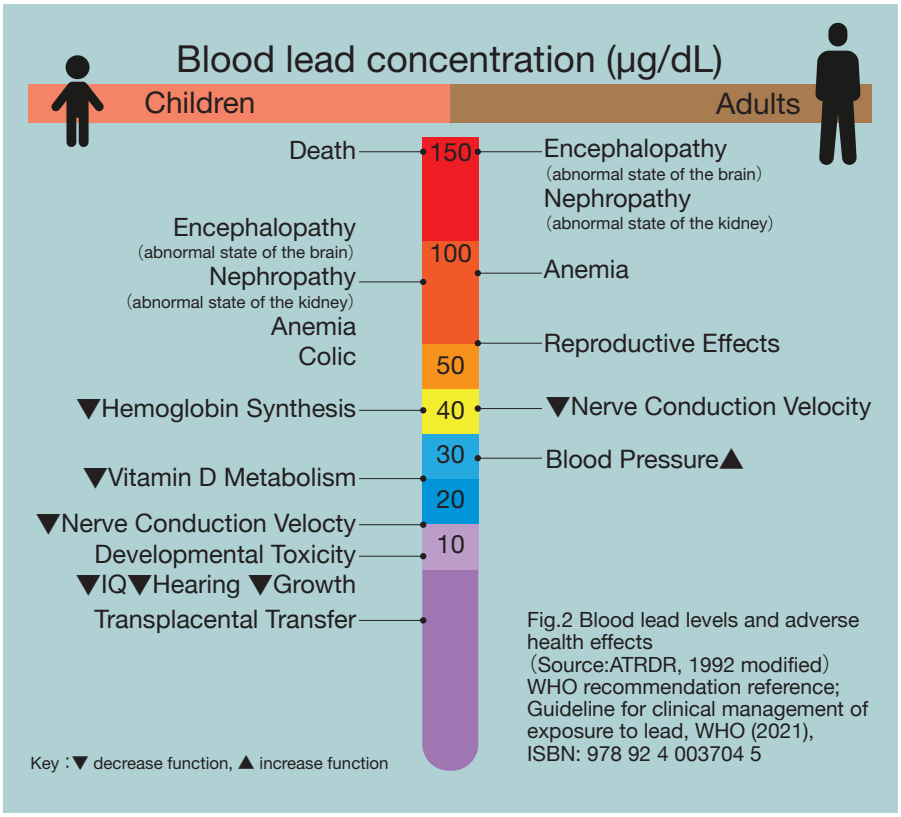
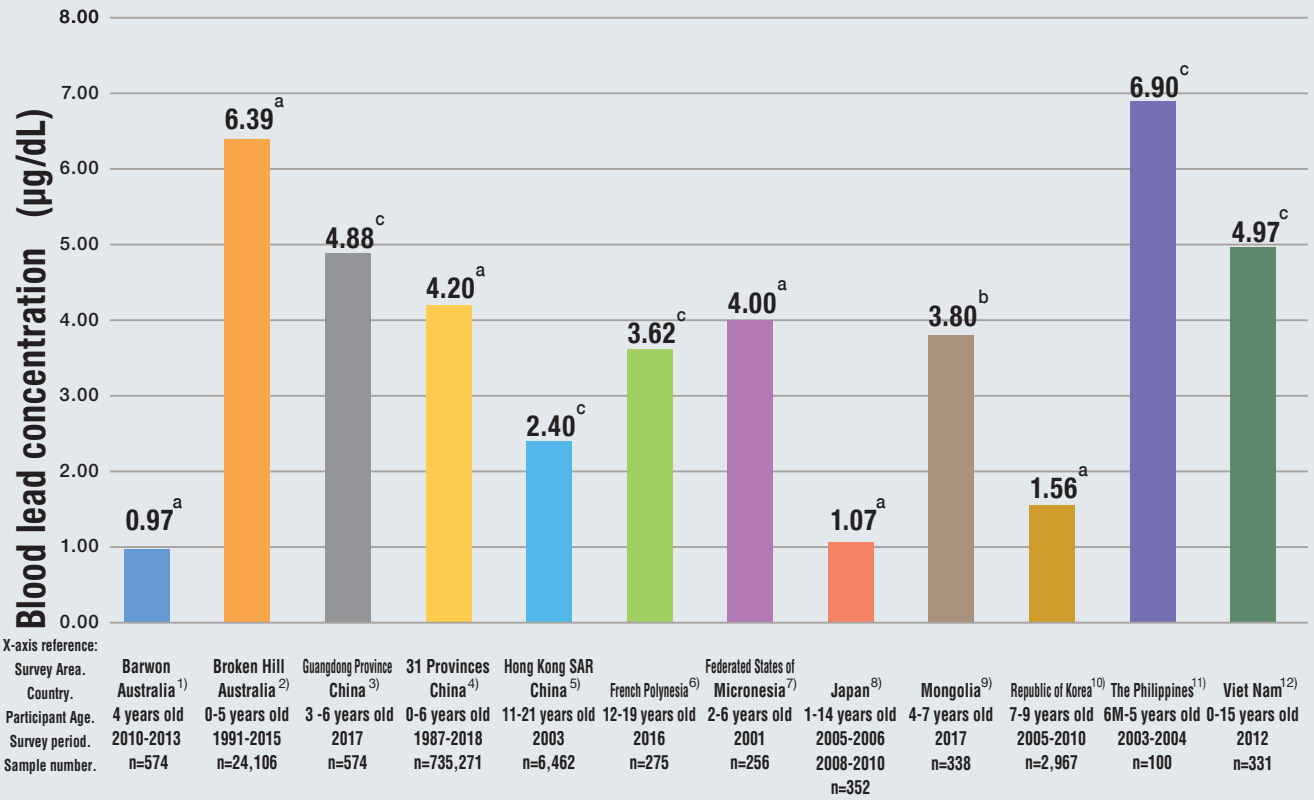


Fig.2 Blood lead levels and adverse health effects
(Source:ATRDR, 1992 modified)
WHO recommendation reference; Guideline for clinical management of exposure to lead, WHO (2021), ISBN: 978 92 4 003704 5

Blood Lead Levels in Children in the Western Pacific Region

Lead exposure and its health effects tend to be greater in children than in adults. Increased lead exposure in children could be due to their high absorption and detoxification of environmental lead exposure, developmental immaturity, and specific behaviors, such as hand-to-mouth. Local activities significantly affect children's lead levels.The figure below shows the existing evidence and emphasizes lead exposure levels in the Western Pacific region, specifically in children.

Children's and Adolescent's Blood Lead Concentration in Western Pacific Region



(Lead-level data were acquired from published references below and may not fully represent the whole country).
a Geometric mean, b Mean, c Median, Hong Kong SAR, China was converted from nmol/L to μg/dL
1) Symeonides C et al., 2020; 2) Dong C et al., 2020; 3) Cai H et al., 2019; 4) Zhang Y et al., 2020; 5) Chan IH et al., 2012; 6) St-Jean A et al.,2019;
7) Brown LM et al., 2005; 8) Yoshinaga et al., 2012; 9) Erdenebayar E et al., 2019; 10) Choi WJ et al., 2016; 11) Riddell et al., 2007; 12) Havens et al., 2018

No Safe Blood Lead Level without Harmful Effect

The World Health Organization (WHO) that individuals with blood lead levels ≥ 5 μg/dL should initiatie clinical intervention. This includes determining the exposure source of lead. Eliminating the source is crucial. No safe level of lead exposure has been identified.

What Efforts need to be Undertaken to reduce Lead Exposure?

1. Identifying lead exposure sources, such as e-waste, mining, and lead-based paints. Governments can implement evidence-based behavioral interventions via policies and awareness campaigns.
   Effective monitoring and regulation of lead released through industrial activities, such as mining, as well as ensuring occupational standards and hygiene to ensure the health of workers and their communities.
2. Substituting lead-based waterpipe materials with safer alternatives.
3. Coordinating efforts involving national, regional, and international government agencies, environmental organizations, and local communities to remediate lead-contaminated soil and water from activities such as mining and e-waste.
4. Minimizing lead exposure from e-waste and lead battery through environmental monitoring and proper waste management.
5. Implementing the WHO's legally binding control of lead paint in all countries across the Western Pacific region.

References

- World Health Organization (WHO), Lead poisoning,https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health,2023
- The Australian Building Codes Board (ABCB) , Lead in plumbing products in contact with drinking water: Final Regulation Impact Statement 2021, https://www.abcb.gov.au/sites/default/files/resources/2022/Lead-in-plumbing-products-final-RIS-20210517.pdf, 2021
- Our World in Data, How the world eliminated lead from gasoline, https://ourworldindata.org/leaded-gasoline-phase-out, 2022
- World Health Organization (WHO), Legally-binding controls on lead paint, https://www.who.int/data/gho/data/themes/topics/indicator-groups/legally-bindingcontrols-on-lead-paint, 2023
- World Health Organization (WHO), Guideline for clinical management of exposure to lead, https://www.who.int/publications/i/item/9789240037045, 2021
- World Health Organization (WHO), Children's health and environment: training package for the health sector: improving the capacity to diagnose, prevent and manage paediatric diseases linked to the environment, https://apps.who.int/iris/handle/10665/330296, 2019
- Poudel K, Ikeda A, Fukunaga H, Brune Drisse MN, Onyon LJ, Gorman J, Laborde A, Kishi R. How does formal and informal industry contribute to lead exposure? A narrative review from Vietnam, Uruguay, and Malaysia. Rev Environ Health. 2023 Feb 6. doi: 10.1515/reveh-2022-0224. Epub ahead of print. PMID: 36735953.

CONTACT

WHO Collaborating Centre for Environmental Health and Prevention of Chemical hazards
Hokkaido University Center for Environmental and Health Sciences
Kita 12, Nishi 7, Kita-ku, Sapporo, 0600812, Japan
info@cehs.hokudai.ac.jp

HOKKAIDO UNIVERSITY
Center for Environmental and Health Sciences

WHO Collaborating Centre for Environmental Health and Prevention of Chemical Hazards

This leaflet on lead (Pb) is published by the Hokkaido University Center for Environmental and Health Sciences (HU-CEHS), which is a WHO Collaborating Centre; The HU-CEHS is responsible for the views expressed in this leaflet.

issued in October, 2023