Lead poisoning and health

Key facts

- Lead is a cumulative toxicant that affects multiple body systems and is particularly harmful to young children.
- Childhood lead exposure is estimated to contribute to about 600 000 new cases of children developing intellectual disabilities every year.
- Lead exposure is estimated to account for 143 000 deaths per year with the highest burden in developing regions.
- About one half of the burden of disease from lead occurs in the WHO South-East Asia Region, with about one-fifth each in the WHO Western Pacific and Eastern Mediterranean Regions.
- Lead in the body is distributed to the brain, liver, kidney and bones. It is stored in the teeth and bones, where it accumulates over time. Human exposure is usually assessed through the measurement of lead in blood.
- There is no known level of lead exposure that is considered safe.
- Lead poisoning is entirely preventable.

World Health Organization

Global Alliance to Eliminate Lead Paint

Lead is a naturally occurring toxic metal found in the Earth's crust. Its widespread use has resulted in extensive environmental contamination, human exposure and significant public health problems in many parts of the world.

Important sources of environmental contamination include mining, smelting, manufacturing and recycling activities, and, in some countries, the continued use of leaded paint and leaded gasoline. More than three quarters of global lead consumption is for the manufacture of lead-acid batteries for motor vehicles. Lead is, however, also used in many other products, for example pigments, paints, solder, stained glass, crystal vessels, ammunition, ceramic glazes, jewellery, toys and in some cosmetics and traditional medicines. Drinking water delivered through lead pipes or pipes joined with lead solder may contain lead. Much of the lead in global commerce is now obtained from recycling.

Young children are particularly vulnerable to the toxic effects of lead and can suffer profound and permanent adverse health effects, particularly affecting the development of the brain and nervous system. Lead also causes long-term harm in adults, including increased risk of high blood pressure and kidney damage. Exposure of pregnant women to high levels of lead can cause miscarriage, stillbirth, premature birth and low birth weight, as well as minor malformations.

Sources and routes of exposure

People can become exposed to lead through occupational and environmental sources. This mainly results from:

- inhalation of lead particles generated by burning materials containing lead, e.g. during smelting, informal recycling, stripping leaded paint and using leaded gasoline; and
- ingestion of lead-contaminated dust, water (from leaded pipes), food (from lead-glazed or lead-soldered containers).

The use of some traditional cosmetics and medicines can also result in lead exposure.

Young children are particularly vulnerable because they absorb 4–5 times as much ingested lead as adults from a given source. Moreover, children's innate curiosity and their age-appropriate hand-to-mouth behaviour result in their mouthing and swallowing lead-containing or lead-coated objects, such as contaminated soil or dust and flakes of decaying lead-containing paint. This route of exposure is magnified in children with pica (persistent and compulsive cravings to eat non-food items), who may, for example pick away at, and eat, leaded paint from walls,

door frames and furniture. Exposure to lead-contaminated soil and dust resulting from battery recycling and mining has caused mass lead poisoning and multiple deaths in young children in Nigeria and Senegal.

Once lead enters the body, it is distributed to organs such as the brain, kidneys, liver and bones. The body stores lead in the teeth and bones where it accumulates over time. Lead stored in bone may be remobilized into the blood during pregnancy, thus exposing the fetus. Undernourished children are more susceptible to lead because their bodies absorb more lead if other nutrients, such as calcium, are lacking. Children at highest risk are the very young (including the developing fetus) and the impoverished.

Health effects of lead poisoning on children

Lead has had serious consequences for the health of children. At high levels of exposure, lead attacks the brain and central nervous system to cause coma, convulsions and even death. Children who survive severe lead poisoning may be left with mental retardation and behavioural disruption. At lower levels of exposure that cause no obvious symptoms, and that previously were considered safe, lead is now known to produce a spectrum of injury across multiple body systems. In particular lead affects children's brain development resulting in reduced intelligence quotient (IQ), behavioural changes such as shortening of attention span and increased antisocial behaviour, and reduced educational attainment. Lead exposure also causes anaemia, hypertension, renal impairment, immunotoxicity and toxicity to the reproductive organs. The neurological and behavioural effects of lead are believed to be irreversible.

There is no known safe blood lead concentration. But it is known that, as lead exposure increases, the range and severity of symptoms and effects also increases. Even blood lead concentrations as low as 5 µg/dl, once thought to be a "safe level", may result in decreased intelligence in children, behavioural difficulties and learning problems.

Encouragingly, the successful phasing out of leaded gasoline in most countries has resulted in a significant decline in population-level blood lead concentrations. There are now only six countries that continue to use leaded fuel.

WHO response

WHO has identified lead as one of ten chemicals of major public health concern, needing action by Member States to protect the health of workers, children and women of reproductive age.

WHO is currently developing guidelines on the prevention and management of lead poisoning, which will provide policy-makers, public health authorities and health professionals with evidence-based guidance on the measures that they can take to protect the health of children and adults from lead exposure.

Since leaded paint is a continuing source of exposure in many countries, WHO has joined with the United Nations Environment Programme to form the Global Alliance to Eliminate Lead Paint. This is a cooperative initiative to focus and catalyse efforts to achieve international goals to prevent children's exposure to lead from leaded paints and to minimize occupational exposures to such paint. Its broad objective is to promote a phase-out of the manufacture and sale of paints containing lead and eventually eliminate the risks that such paints pose.

The Global Alliance to Eliminate Lead Paint is an important means of contributing to the implementation of paragraph 57 of the Plan of Implementation of the World Summit on Sustainable Development and to resolution II/4B of the Strategic Approach to International Chemicals Management (SAICM).

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