

- Encourage the testing of tap water, soil, air, food, spices, candy and objects
- Promote remediation measures (e.g. changing the pipes, removing or covering contaminated soil, ....)
- Promote hand and face washing and the regular cleaning of the home
- Collaborate in data collection, identify knowledge gaps and promote research

### Future needs

Pediatricians concerned about lead poisoning as an environmental disease with devastating effects on children, which is entirely preventable are called to take action:

- Improving pre-doctoral and in-service training of pediatricians on environmental health matters taking as example lead poisoning in children.
- Expanding the advocacy role of pediatric societies to bolster the political will to remove lead from the environment and protect children from exposure.
- Disseminating information about the importance of lead poisoning and the special susceptibility of children, the potential developmental, behavioural and cognitive effects and the risk reduction interventions that may be carried out at household and community level.

**IPA and WHO are committed to respond to some of these needs in collaboration with governmental and non-governmental organizations.**

### Selected references:

American Academy of Pediatrics. Pediatric Environmental Health (2nd Edition). Etzel RA (ed). Elk Grove Village, IL, USA, American Academy of Pediatrics, 2003

WHO - Lead . Assessing the environmental burden of disease at national and local levels (Environmental Burden of Disease Series, N°2), 2003

### Useful addresses & web sites:

International Pediatric Association:  
<http://www.ipa-world.org>

World Health Organization, Department of the Protection of the Human Environment  
<http://www.who.int/peh>



World Health Organization



international pediatric association  
association internationale de pédiatrie  
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# Lead poisoning in children

## What a pediatrician needs to know...

Lead poisoning remains a pervasive and serious pediatric health problem all over the world. It is estimated that 120 million people have blood lead levels (BLL) between 5 and 10 microg/dL and about the same number had levels above 10 microg/dL. Children represent a population subgroup at particular risk due to their special susceptibility to lead. It may cause a wide range of effects, from anemia and abdominal pain to neurodevelopmental, learning and behavioral problems, as well as convulsions, coma and death. Lead is particularly harmful to the developing nervous system of fetuses and young children, and is linked to mental retardation. New data suggests that chronic exposure early in life may have adverse effects on children's IQ and physical development at BLL previously considered safe (10 microg/dL). Industrialized countries are nowadays lowering what are considered to be "acceptable" blood lead levels. However, in many developing countries the problem remains to be recognized.

Childhood lead poisoning is a fully preventable environmental disease. It is therefore very important that pediatricians and child health professionals increase their efforts to protect children from the effects of lead.

To promote these efforts, IPA and WHO have prepared this material, which is aimed at providing essential information and guidance to pediatricians and other professionals involved in child health.

## Sources of lead poisoning

Lead is a naturally occurring grayish metal, found in all parts of the environment due to human activities (e.g. mining, manufacturing and burning fossil fuels). When heated, it vaporizes and precipitates as a fine dust. Lead is used in the production of batteries, metal products and ammunition, for soldering and manufacturing stained-glass windows, fishing weights and glazed ceramics. Some traditional remedies and spices may be tainted with lead. Lead is found in firing ranges. Major sources of lead in industrialized countries have been lead-based paint, lead in gasoline, industrial emissions and solder in water pipes and cans (banned over 20 years ago) and lead-contaminated dust in deteriorated houses and/or lead pipes (a prevailing problem!). In developing countries, the main sources of lead poisoning include leaded gasoline, contaminated soil and air near smelters and the recycling/repairing of car batteries. Other potential sources are: lead-glazed ceramics, flour mills and adulterated spices, candies and cosmetics. Lead may be ingested or inhaled by the child from these different sources or pass to the fetus through the placenta.

## Health hazards to children due to lead poisoning

Children are especially vulnerable to the effects of lead. Those at higher risk are fetuses and small children (up to 6 years old) and children who are poor, live in older housing, belong to minority/ethnic groups, have "pica", are given traditional remedies or live near smelters or on contaminated land.

Lead poisoning may remain asymptomatic for long time, or induce subtle neurobehavioral or cognitive effects, loss of hearing or altered balance. It is estimated that the IQ decreases about 2 points for each

10 microg/dL increase. High BLL are associated with elevated risk of delinquency. Lead exposure may delay growth and puberal development in girls. The diagnosis of lead poisoning requires the determination of blood lead levels (BLL):

- 5 to 10 microg/dL - cognitive effects, IQ loss (level considered "safe" until recently!)
- 15 microg/dL - current level of concern: requires medical action
- 25 microg/dL - effects on hemoglobin, leading to anemia and its consequences
- 50 to 70 microg/dL - lethargy, headaches, vomiting, constipation
- Above 70 microg/dL - seizures, altered consciousness and coma (lead encephalopathy) and, eventually, death. Serious neurological sequelae if the child survives.

## What pediatricians and other child health professionals can do

Pediatricians and child health professionals should protect children from the effects of lead poisoning at both the individual and community levels:

### Individual level:

- Consider the possibility of lead exposure in children with anemia, abdominal pain, learning or behavioral problems, with "pica" or coming from adverse environments.
- Inquire about potential sources of exposure at home, school and playground (through water, food, air and soil) while taking the pediatric environmental history

- Find out about parental occupation and site of activity (cottage industry?)
- Measure blood lead levels (BLL) in capillary blood, by screening methods (e.g. portable lead analyzer) and/or on anti-coagulated whole blood (by atomic absorption spectroscopy or anodic stripping voltametry), or through fluorescent X-ray of bone...
- Remove the child from the contaminated environment
- Inform the parents/caregivers about the dangers of exposure, potential consequences and the need to clean the environment and change behaviors
- Indicate careful hygiene (washing hands) and running tap water run for 30 seconds before using it (if pipes are leaded)
- Recommend a diet rich in protein with increased calcium and iron intake
- Consider chelation therapy using calcium edetate or succimer if BLL are above 45 microg/dL (call the local Poisons Centre for more detailed advice)

### Community level:

- Inform health/environment authorities/community about the cases detected, initiate epidemiological studies and the BLL screening to identify risk groups.
- Indicate the need to identify and eliminate the sources of lead in the environment, to remove exposed children from contaminated areas and to promote adequate legislation.
- Engage the community in recognizing specific circumstances of exposure and potential risks and removing sources of lead exposure