

Eye-Opening Study on the Widespread Danger of Lead Poisoning

Explore the silent global epidemic of lead poisoning, its unexpected consequences for health and society, and leaded gasoline's ongoing environmental legacy.

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For decades, lead, in the form of tetraethyllead, was used as an anti-knock agent in gasoline. The leaded gasoline helped engines run smoothly but released devastating amounts of this toxic metal into the environment. Even though the U.S. began phasing out leaded gasoline in the 1970s,¹ lead poisoning remains a major problem globally.²

The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019 ranked lead as the fourth top environmental health risk, after only ambient particulate matter air pollution, household air pollution from solid fuels and unsafe drinking water, sanitation and handwashing.

A 2023 study published in the Lancet Planetary Health³ further quantified the global effects of lead poisoning, describing their findings as a “wake-up call.”⁴

Lead Exposure May Contribute to 5.5 Million Deaths Annually

GBD 2019 described several health effects due to lead exposure, including cardiovascular disease, chronic kidney disease and idiopathic developmental intellectual disability.⁵ However, the study estimated lead-induced mortality from cardiovascular disease based only on lead causing increased blood pressure.

Further, their estimates for idiopathic developmental intellectual disability didn't tally lead's effects on intelligent quotient (IQ) in most children. As such, the World Bank economists who conducted the Lancet Planetary Health study suggested lead's full effects may be underestimated.

Using data from GBD 2019, the duo conducted a modeling study to estimate the global burden, including cost of IQ loss and cardiovascular disease mortality, from lead exposure.

They found that in 2019 alone, lead exposure led to 765 million lost IQ points in children under 5 years along with 5.5 million deaths in adults due to cardiovascular disease. The vast majority — including 729 million lost IQ points and 5 million cardiovascular disease deaths — occurred in low-income and middle-income countries (LMICs).⁶

According to the researchers, “We estimated that 90% of cardiovascular disease mortality and 95% of IQ loss from lead exposure in 2019 occurred in LMICs.”⁷ When they first saw the “enormous” figures, lead author Bjorn Larsen said “we didn't even dare to whisper the number.”⁸ The numbers suggest the global burden of lead exposure has been significantly underestimated. The IQ loss uncovered by the study was 80% higher than a previous estimate, the study found.

Further, deaths from lead-related cardiovascular disease were six times higher than the GBD 2019 estimate. The team also calculated the global cost of lead exposure at \$6 trillion in 2019, which

amounted to 6.9% of the global gross domestic product (GDP). Broken down, the study found, “77% ... of the cost was the welfare cost of cardiovascular disease mortality, and 23% ... was the present value of future income losses from IQ loss.”⁹

The costs to health and the economy are similar to those caused by particulate matter air pollution, which came in at 6.1% of the global GDP in 2019.¹⁰ In addition to calling for regular testing of the population’s blood lead levels, the researchers called for measures to reduce exposure, while also quantifying the health effects of other dangerous environmental chemicals:¹¹

“In conclusion, our estimated magnitude of global health effects and costs of lead exposure lends urgency to reducing population exposure to lead. First and foremost, periodic national blood lead level measurements must be institutionalized.

These measurements must be accompanied by comprehensive source identification as well as relevant legislative responses in order to effectively combat lead pollution and exposure. It should also be noted that global health effects and costs of other chemicals than lead could also be substantial and largely remains to be quantified at national population levels.”

1 in 3 Children May Have Dangerous Lead Levels

A report from UNICEF and Pure Earth, titled Toxic Truth, also found that children worldwide are suffering from lead poisoning on a “massive and previously unknown scale.”¹² It found that about 1 in 3 children have blood levels above 5 micrograms per deciliter (µg/dL),¹³ which is considered the level at which action is required.

However, the U.S. Centers for Disease Control and Prevention uses a blood lead reference value of 3.5 µg/dL to identify children with blood lead levels that are potentially dangerous.¹⁴

Using the report’s numbers, up to 800 million children globally could be at risk of health damage from lead exposure, with close to half of those affected living in South Asia. However, if 3.5 µg/dL was used as the cut-off, those numbers would be even higher.

In many low- and middle-income countries, improper recycling of lead-acid batteries is a major source of lead exposure. It’s estimated that up to 50% of such batteries are processed in informal, open-air settings, leading to environmental contamination. Overall, the lead exposure to children in LMICs could add up to nearly \$1 trillion of lost economic potential over their lifetime.¹⁵ According to the report:¹⁶

Often unwittingly and with life-altering consequences, these children are growing up in harm’s way, inhaling dust and fumes from informal used lead-acid battery recycling operations and open-air smelters, eating food contaminated by lead-glazed pottery and lead-infused spices, living in homes with peeling lead paint, playing, and even working, in lead-laced electronic waste dumps.”

You can also be exposed to lead in contaminated drinking water and via lead paint in older homes built before 1978, cigarette smoke and cheaply made household objects, including children’s toys and clothing.

Lead Levels in Adults Linked to Significant Health Risks

It's not only children who are at risk from lead poisoning. Research published in *The Lancet Public Health*¹⁷ in 2018 concluded lead levels in adults are strongly correlated with a higher risk of death, especially from cardiovascular complications. Further, nearly 1 in 5 (18%) deaths and more than 1 in 4 (28.7%) cardiovascular deaths are related to lead toxicity.¹⁸

Considering lead exposure has multigenerational impacts, exposure to even low levels of lead in the environment could have devastating effects population-wide. As reported by *The Allegheny Front* in 2016:¹⁹

"[Research²⁰ out of Wayne State University suggests lead exposure can ... cause changes to DNA that might affect several generations. 'When a mother drinks leaded water ... she's exposing her fetus, so that's going to directly affect brain development of her baby,' says Doug Ruden, co-author of the study and Director of Epigenomics at Wayne State's Institute of Environmental Health Sciences.

"What most people don't realize is that you're also expressing the germ line cells, and that can affect the grandchildren, and even potentially beyond that."

Aside from premature death and heart disease, lead exposure has been linked to an increased risk of reproductive problems, headaches, seizures, hearing and vision impairment, high blood pressure,^{21,22} nerve disorders, muscle and joint pain, brain damage and learning difficulties.

There's No Safe Level of Lead Exposure

The World Health Organization states there's no such thing as a safe level of lead exposure. As a powerful neurotoxin, even low-level exposure to lead may interfere with cognitive development, leading to reduced IQ scores, shortened attention spans and potentially increased violent and criminal behavior later in life.²³

Beyond the brain, lead can damage the nervous system, heart, lungs and kidneys. But in the early stages, it may cause only minor symptoms so it often goes undetected. Adults exposed to lead are at increased risk of heart disease and kidney damage, but children under 5 have the highest risk of suffering from lifelong effects.

As explained in "The Toxic Truth," lead poisoning can cause irreversible damage to the body along with significant cognitive effects:²⁴

"Children with blood lead levels above 5 µg/dL may score 3-5, or more, points lower on intelligence tests than do their unaffected peers. These reductions in IQ undermine children's future potential and diminish their prospects. Widespread cognitive declines across large numbers in a city or country result in declines in creative and economic productivity across entire societies."

Lead and calcium are chemically very similar, making lead a competitor at the cellular level capable of disrupting many different bodily systems.²⁵ In your neurological system, it may disrupt neurons that use calcium to transmit information. The presence of lead will cause some neurons to fire more and

decrease the signals in others. This may alter neurological development in the brains of children who have absorbed lead from their environment.

In addition to behavior problems and lower IQ, children with even low blood lead levels may experience slowed growth, hearing problems, anemia and hyperactivity. Lead exposure may also lead to reproductive problems in men and women. If exposure occurs during pregnancy, it can harm the developing baby and increase the risk of miscarriage.²⁶ Other research has demonstrated that lead:^{27,28}

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| Generates superoxide and hydrogen peroxide, which in turn reacts with nitric oxide and produces peroxynitrites | Stimulates vascular smooth muscle cell proliferation and phenotypic transformation |
| Disturbs vascular smooth muscle calcium signaling | Modifies vascular response to vasoactive antagonists |
| Raises plasminogen activator inhibitor-1 production | Suppresses proteoglycan production |
| Causes endothelial injury | Impedes endothelial repair |
| Inhibits angiogenesis | Promotes inflammation |

People Poisoned to Increase Profits

Lead wasn't the only substance that could have been added to gasoline to make it more efficient. The same goal could have been achieved using 10% alcohol, which had the added benefit of clean combustion, which eliminated soot emissions. Lead was used instead — despite well-known hazards — to increase profits.

As explained in the video at the top of this page, by adding a percentage of alcohol to gasoline, the oil industry stood to lose up to 20% of its petroleum sales, depending on how much alcohol was added. On the other hand, by adding lead to gasoline, the oil industry had a product it could control in its entirety, and that was their aim.

You can learn more about how corruption allowed lead to contaminate the environment and poison the population by watching the full 30-minute film, which details the evolution of leaded gas and, ultimately, its removal from the market.

Chelation Therapy With EDTA May Help Get Lead Out

If you have elevated lead levels, you must tread carefully, working with a qualified health care practitioner who can help remove the lead without creating more harm along the way. One option is chelation therapy using edetate disodium (EDTA), an agent that binds with calcium and some heavy metals.

It's often used to treat calcium overload (hypercalcemia), but it may also be useful for lead. In a 2016 study, EDTA chelation effectively lowered the risk for future cardiovascular events, with a number needed to treat (NNT) of 12 to prevent one cardiovascular event over five years.²⁹ Mainstream health care, however, still maintains that EDTA chelation therapy is a form of quackery that has no discernible benefit.

Because EDTA can also draw important minerals from your body, it should only be used under the care of a physician who can monitor your nutritional status and recommend appropriate supplementation. N-acetyl-cysteine (NAC), a precursor to glutathione, which your body requires for efficient detoxification, is another option.

A study published in *Metal Ions in Biology and Medicine* found NAC protected against lead-induced genotoxicity in human liver cancer cells.³⁰ Sauna bathing is another nontoxic detoxification strategy to help remove nearly every toxin from your body, including lead.

How to Reduce Your Lead Exposure

Accumulating research shows that lead continues to pollute the environment. Ideally, all children should be tested for lead at ages 1 and 2, and again at ages 3 and 4 if you live in an older home. It's also recommended to test your child's level whenever there's concern about exposure.

You can also get yourself tested for lead, especially if you have heart disease. A level of 3.5 µg/dL or higher is considered dangerous.³¹ To reduce your exposure to this toxic metal:

- **Remove lead paint** — If your home was built before 1978, get it inspected to determine whether it has any lead paint. Lead paint removal must be done by a certified professional to ensure safety, as the dust is highly toxic.
- **Test your drinking water for lead** — Millions of older water service lines across the U.S. are made from lead and could be carrying contaminated water into your home on a daily basis. Your safest and most economical choice to get lead out of your water supply is to use a high-quality filter rated for lead removal. Always use filtered cold water for drinking or cooking, and don't mix infant formula using unfiltered hot water from the tap.
- **Check household objects** — Be mindful that certain household objects may contain lead, such as lead crystal and even children's toys, cosmetics and medicine. The U.S. Food and Drug Administration maintains a list of lead-containing product recalls.³²

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