

# Health and Environmental Impacts of Lead

## Effects of Lead on Human Health

As stated in a 10-12-2022 letter from Earthjustice to the EPA Acting Administrator, Michael Regan,

“Airborne lead is harmful to human health; as EPA has acknowledged, ‘any level of lead in the blood leads to adverse health effects.’ For over forty years, EPA has recognized that lead exposure, even at low levels, is associated with adverse health effects across multiple bodily systems, including harm to the nervous, cardiovascular, immune, and reproductive systems, as well as to the kidneys. Lead exposure can cause anemia, increased blood pressure, an increased risk of cancer, and—at high levels—death. Children are particularly susceptible to harm from low-level lead exposure which can decrease physical growth and cause neurodevelopmental harm, leading to behavioral problems and learning deficits. And as exposure to lead increases, so does the range and severity of adverse effects. There is evidence that many of these deleterious effects are irreversible.”<sup>1</sup>

According to the CDC, “Children less than six years old are at a higher risk of lead exposure. This is because their bodies are rapidly developing and more susceptible to taking in lead if exposed. Young children also tend to put their hands or other objects into their mouths. This is why the most common source of lead exposure in young children is lead dust that they swallow after placing their lead-contaminated hands or other objects in their mouths.”<sup>2</sup>

Pregnant mothers are also at elevated risk “because lead can pass to their baby during pregnancy.” In addition, lead can be passed on to babies when breastfeeding.<sup>3</sup>

Per the CDC, “No safe blood lead level in children has been identified. Even low levels of lead in blood have been shown to affect IQ, ability to pay attention, and academic achievement.” The agency further warns that lead exposure can result in “damage to the brain and nervous system, slowed growth and development, hearing and speech problems, behavior and learning problems.”<sup>4</sup>

To address the negative effects of this toxin the CDC promotes primary prevention - “the removal of lead hazards from the environment before a child is lead exposed. It is the most effective way to ensure that children do not experience harmful long-term effects of lead exposure...According to an analysis from the Health Impact Project, eliminating lead hazards from the places where children live, learn, and play could generate approximately \$84 billion in long-term benefits per birth cohort. Additionally, permanently removing lead hazards from the environment would benefit future birth cohorts, and savings would continue to grow over time.”<sup>5</sup>

The 2021 Reid-Hillview Lead Study pointed to research identifying childhood lead exposure as a causal factor in juvenile delinquency, abnormal behavior and psychology in adolescence, and other adverse behavioral outcomes.<sup>6</sup>

Letter in Support of Endangerment Finding for Leaded Aviation Gasoline and Ban on Leaded Aviation Gasoline at U.S. Airports  
Supplemental Document - Health and Environmental Impacts of Lead

One of the presenters at the RHV lead study community meetings was Dr. Bruce Lanphear, a physician and scientist with expertise in children's environmental health and the impact of toxic chemicals on brain development. In his words "even a little lead is too much." He explained that "Children who have blood lead levels (BLLs) over 1.7 micrograms per deciliter of blood were 2 to 2 1/2 times more likely to have ADHD." This exposure level is well below 3.5 micrograms per deciliter of blood established by the CDC as a reference value for identifying children with blood lead levels that are higher than most children. Dr. Lanphear pointed out that in the U.S. lead exposure is recognized as a causal factor in 1 out of 5 children who have been diagnosed with ADHD. As children's BLLs increase, the size of their brain is diminished, especially the prefrontal cortex which is smaller in children who have ADHD. The prefrontal cortex is the seat of rational thought and executive functioning thus damage to this part of the brain can lead to greater impulsivity.

Dr. Lanphear further noted that elevated blood lead levels in pregnant women contribute to premature births, low birth weight, reduced Apgar scores and places them at higher risk for pre-eclampsia.

Adults can also be negatively impacted by exposure to lead. Per Dr. Lanphear, even at very low levels, lead is the leading risk factor for coronary heart disease and is responsible for around 185,000 deaths per year in the U.S. from this diagnosis alone. Lead is also a causal factor for renal failure, essential tremor, and hypertension and is suspected contributor to ALS and dementia.<sup>7</sup>

## Correlation Between Lead and Criminal Behavior

According to a joint report by UNICEF and Pure Earth, "The Toxic Truth: Children's Exposure to Lead Poisoning Undermines a Generation of Future Potential,"

"Studies have postulated a relationship between early and prenatal lead exposure and subsequent criminal behaviour, recidivism and delinquency. With its measurable effect on cognitive development, lead exposure can create learning disabilities and challenges that affect children's executive functioning, impulse control and levels of aggression. These conditions are often irreversible and, studies find, may affect the likelihood for violence and crime in adulthood...

"Population studies in the United States have found that a significant amount of the regional and temporal variation in crime levels corresponds to varying levels of lead exposure. Indeed, studies have found that childhood blood lead levels were predictors of adult arrests for violent offenses and hypothesized that the still-poorly-understood 1990s decrease in crime rates in the United States was the result of a previous decline in blood lead levels. A 2017 study of 12,000 children born from 1990 to 2004 in the United States found that a 1 unit increase in blood lead level (i.e. an extra 1 µg/dL) increased the probability of suspension from school by 6.5 to 7 per cent for boys and by 6.4 to 9.3 per cent for girls. The findings are consistent with published findings that show children with higher bone lead levels are associated with more aggressive and delinquent behaviour when compared with young boys with similar IQ levels. Blood lead levels in preschool children in the United States over the long term (1936-1990) explain 65 per cent of the variation in mental retardation rates, 45 per cent of the variation in average scholastic

verbal achievement tests and 65 per cent of the variation in math achievement tests, according to yet another study.

“These trends mirror experiences across multiple countries in Europe and North America. Other studies have conducted highly geographic specific assessments on the links between lead exposure and crime. One such study found that children living near very busy roads where impacts to soil from leaded gasoline have been higher are more likely to be incarcerated when they become adults, compared with children from similar socioeconomic, gender and ethnic factors who did not live near very busy roads.”<sup>8</sup>

## Effects of Lead on the Ecosystem

In addition, lead can contaminate soil and water. According to the EPA, “Lead is persistent in the environment and can be added to soils and sediments through deposition from sources of lead air pollution...Elevated lead in the environment can result in decreased growth and reproduction in plants and animals, and neurological effects in vertebrates.”<sup>9</sup>

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<sup>1</sup> Letter to EPA Administrator Michael Regan from Earthjustice. (10/12/2021). Pg. 4. Last accessed online on 01/30/2022 at [2021.10.12\\_leadedavgasp petition.pdf \(earthjustice.org\)](#).

<sup>2</sup> Populations at Higher Risk. Centers for Disease Control. (Page last reviewed 10/29/2021). Last accessed online on 01/30/2022 at [Populations at Higher Risk | Lead | CDC](#).

<sup>3</sup> Ibid.

<sup>4</sup> Health Effects of Lead Exposure. Centers for Disease Control. Page last reviewed 01/13/2022). Last accessed online on 01/30/2022 at [Health Effects of Lead Exposure | Lead | CDC](#).

<sup>5</sup> Lead Poisoning Prevention. CDC. Page last reviewed: 01/13/2022. Last accessed online on 1/30/2022 at [Lead Poisoning Prevention | Lead | CDC](#).

<sup>6</sup> Leaded Aviation Gasoline Exposure Risk at Reid-Hillview Airport in Santa Clara County, California. Mountain Data Group. (8/3/2021). Last accessed online on 01/30/2022 at [RHV-Airborne-Lead-Study-Report.pdf \(sccgov.org\)](#). Pg. 1.

<sup>7</sup> [Santa Clara Community Meeting on the Reid Hillview Airport Lead Study \(8-11-2021\)](#). Last accessed online on 01/30/2022. Dr. Lanphear’s presentation begins at approximately the 49 minute mark in the recording.

<sup>8</sup> The Toxic Truth: Children’s Exposure to Lead Poisoning Undermines a Generation of Future Potential. UNICEF and Pure Earth. Pg. 12. Last accessed online on 1/31/2022 at [\\*The toxic truth.pdf \(unicef.org\)](#).

<sup>9</sup> What Are the Effects of Lead on Ecosystems? EPA. (Page last updated 08/16/2021). Last accessed online on 01/30/2022 at [Basic Information about Lead Air Pollution | US EPA](#).