

Study finds nearly 70 percent of Chicago's children under 6 are exposed to lead contaminated drinking water

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Last month's publication by researchers at the Johns Hopkins Bloomberg School of Public Health in the pediatric section of the *Journal of the American Medical Association (JAMA)* exposing the long-standing and high prevalence of lead in Chicago's drinking water should stand as an indictment of the city's Democratic political leadership that has done little to address this public health issue. Close to 70 percent of Chicago's children under the age of six live in homes containing detectable levels of lead in their drinking water.

To perform their analysis, the researchers utilized artificial intelligence machine learning techniques to estimate levels of lead in tap water across Chicago households, utilizing results in tests conducted in nearly 40,000 homes from 2016 to 2023. The study also found that almost 10 percent of homes had levels above the 15 parts per billion (PPB) that is the "action level" of the Environmental Protection Agency (EPA) for lead in drinking water.

Benjamin Huynh, PhD, lead author of the study, said of the results, "The extent of lead contamination of tap water in Chicago is disheartening—it's not something we should be seeing in 2024."

However, Chicago is not unique in America in this regard. A March 2022 paper published in *PNAS* by Princeton University researchers estimated that over 170 million Americans alive today had previously been exposed in early childhood to high lead levels.

Besides Chicago, high levels of lead have been found in tap water in Baltimore, Detroit, Milwaukee, Newark, New York, Pittsburgh, and Washington D.C., according to the Natural Resources Defense Council (NRDC).

In their analysis of EPA data published in 2021, the NRDC showed that between 2018 and 2020, almost 190 million people drank water from drinking water systems with detectable lead levels above one PPB. More than 61 million drank water exceeding the five PPB maximum set by the Food and Drug Administration for bottled water. Finally,

7 million people were drinking water with more than 15 PPB of lead. Current guidance by the EPA and health experts has emphasized there is no level of lead in drinking water that can be regarded as safe.

Kristi Pullen Fedinick, for NRDC, wrote, "Though the numbers we find in this assessment are quite large, it is possible that we are missing communities with significant issues with lead in their water ... due to underreporting. EPA audits of the data we used to develop these estimates found that states failed to report 92 percent of Lead and Copper Rule health-based violations to the EPA."

Lead has long been known as a serious environmental toxin that poses significant health risks, especially to children whose neurological development and growth can be impaired by even miniscule levels of this heavy metal, which serves no biological function in plant or animal life.

However, due to its favorable physical properties—being malleable and easy to work with—it was, historically speaking, the metal of choice for water pipes. However, due to the metal leaching into water supplies, a byproduct of corrosive materials in the water, a federal ban went into effect in 1986.

Notably, between 1900 and 1950, major American cities fitted their water systems with lead pipe, touting its durability and sanitary qualities. And because they can last for more than 100 years, lead pipes remain part of the country's water infrastructure. The EPA has estimated that there are currently anywhere from 6 million to 10 million lead service lines supplying drinking water to homes across the US. The NRDC 2021 survey placed that figure at 12 million or more. Chicago has nearly 400,000 such lead service lines in place.

However, the Flint water crisis in 2014 underscores the criminal nature of relying on such guidelines to protect the well-being of the population. Pre-existing estimated blood lead levels were already above 5 ppb for 2.4 percent of children under five years old, four times higher than outside

of Flint. With the switch in water sources from Detroit (from Lake Huron) to the heavily contaminated Flint River, levels rose to 4.9 percent for children under five, with the highest ward lead level rising to 6.6 percent.

As a February 2016 report published in the *American Journal of Public Health* on the impact the crisis had on children's blood lead levels (BLL), the authors explained, "Water from the Detroit Water and Sewage Department had very low corrosivity for lead as indicated by low chloride, low chloride-to-sulfate mass ratio, and presence of an orthophosphate corrosion inhibitor. By contrast, Flint River water had high chloride, high chloride-to-sulfate mass ratio, and no corrosion inhibitor. Switching from Detroit's Lake Huron to Flint River water created a perfect storm for lead leaching into drinking water. The aging Flint water distribution system contains a high percentage of lead pipes and lead plumbing, with estimates of lead service lines ranging from 10 percent to 80 percent."

As the report underscored, "Lead solubility and particulate release is highly variable and depends on many factors including water softness, temperature, and acidity." Although the Flint water crisis was the most egregious example of lead contamination, simply having lead service lines poses significant risk regardless of regulations in place. Tap water accounts for 85 percent of total sources of lead exposure, thus it "disproportionately affects developmentally vulnerable children and pregnant mothers." In particular, for the same concentration of lead in water, children drinking from these sources absorb lead at much higher rates than adults.

The science is definite about the dangers posed by even the slightest lead contamination of tap water. A study published in the *New England Journal of Medicine* more than two decades ago compared blood lead concentrations in children up to 60 months of age. For each 10 micro-gram per deciliter increase in blood lead concentrations, there was a 4.6-point decrease in IQ. However, between one and 10 micro-gram per deciliter, the IQ decline was 7.4 points, underscoring the dangers posed by these low levels.

Another long-term longitudinal study published in *JAMA* from 2017, which studied the impact of lead exposure in childhood over four decades, found there were lower adult IQ scores nearly three decades later. After the authors adjusted for maternal IQ, childhood IQ, and socioeconomic status of the children, for each five micro-grams per deciliter in blood lead levels, there was a decline in adult IQ, perceptual reasoning and working memory, with an overall downward social mobility into adulthood.

Finally, an international pooled analysis from 2005 looking at the impact of low-level environmental lead exposure and children's intellectual function, found similar

trends in the more rapid declines in IQ at lower levels before reaching a lower base line after 30 micro-grams per deciliter.

The authors wrote, "The impact of low-level environmental lead exposure on the health of the public is substantial. This pooled analysis focused on intellectual deficits, but environmental lead exposure has been linked with an increased risk of numerous conditions and diseases that are prevalent in industrialized society, such as reading problems, school failure, delinquent behavior, hearing loss, tooth decay, spontaneous abortions, renal diseases, and cardiovascular disease."

Although there has been a recent proposal by the White House to remove all lead pipes across the country in the next 10 years, the funding shortfall for these projects means that nothing will transpire except self-serving campaign promises to address the failures across US infrastructure. The \$45 billion proposed by Biden in his infrastructure bill for lead removal has already been slashed to \$15 billion.

With the 10th anniversary of the Flint water crisis arriving on April 25, 2024, US Judge David Lawson held the city of Flint, Michigan, in civil contempt in February for failing to meet the deadlines imposed on it to replace the lead service lines. Lawson wrote, "Based on the evidence, it is apparent that the City has failed to abide by the Court's orders in several respects, and that it has no good reason for its failures. The City has demonstrated belated compliance since the hearing, but even now, it has not actually replaced all of the lead service lines, which it originally promised to replace by March 28, 2020. The City is in civil contempt of the Court's order."

Clearly, what is taking place in Flint is emblematic of the approach across the country to these issues.



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