

Toxins Explain High Lead Levels in Flint and Detroit

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Although behavioral problems in Flint and Detroit, Michigan are once again attracting media coverage, scientific studies suggest a cause of high blood lead (esp. for many Black children) that hasn't been explained to the American public. Since Ben Franklin, it's been known that lead can lower intelligence; in recent years, scientists like Herbert Needleman of the University of Pittsburgh have extended these findings to include substance abuse and violent crime. Sources of lead include not only old houses with lead paint, but industrial pollution and lead or copper water pipes linked by lead solder.

What's new are recent studies showing that absorption of lead from these sources is greatly increased by two untested chemicals - fluorosilicic acid (H_2SiF_6) and sodium silicofluoride (Na_2SiF_6)- now used for over 90% of U.S. water fluoridation. One of these environmental factors is present in public water supplies of Flint, Michigan.

Since 1967 (except for a brief period in 2014-2015), Flint has shared water supplies with Detroit, where water is treated with fluorosilicic acid. Scientific studies of all U.S. counties over 500,000 population found that water treated with a silicofluoride increases children's blood lead, with higher levels for Blacks than for Whites (with Hispanics intermediate). This effect of exposure to silicofluorides is also greater for 3 to 5-year-old children than for those 5 to 17 (Figure 1 & 2). And, national studies show areas with silicofluoride treated water have higher rates of learning deficits and substance abuse as well as more violent crime (Figure 3 & 4). In short, the traits most strongly associated with anti-Black racism are aggravated by poisoning America's water systems --but the harmful effects are serious and very costly for all Americans.

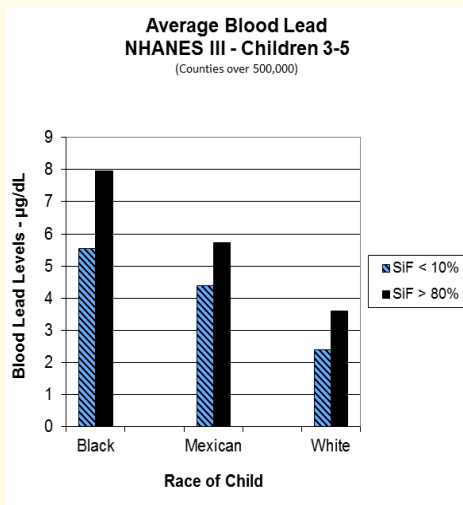


Figure 1: "SiF": % of county's water supplies treated with either fluorosilicic acid (H_2SiF_6) or sodium silicofluoride (Na_2SiF_6), jointly called "silicofluorides."

For NHANES III Children 3-5, mean blood lead is significantly associated with fluoridation status (DF 3, F 17.14, $p < 0.0001$) and race (DF 2, F 19.35, $p < 0.0001$) as well as for poverty income ratio (DF 1, F 66.55, $p < 0.0001$). Interaction effect between race and fluoridation status: DF 6, F 3.333, $p < 0.0029$.

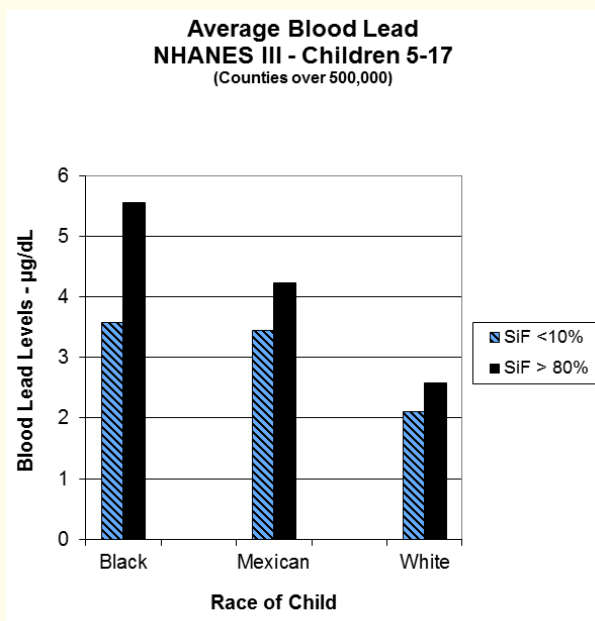


Figure 2: Significance, for ages 5-17: fluoridation status ($DF\ 3, F\ 57.67, p < 0.0001$), race ($DF2, 28.68, p < 0.0001$), Poverty-Income Ratio ($DF\ 1, 252.88, p < 0.0001$). Interaction between race and fluoridation status $DF\ 6, F\ 11.17, p < 0.0001$.

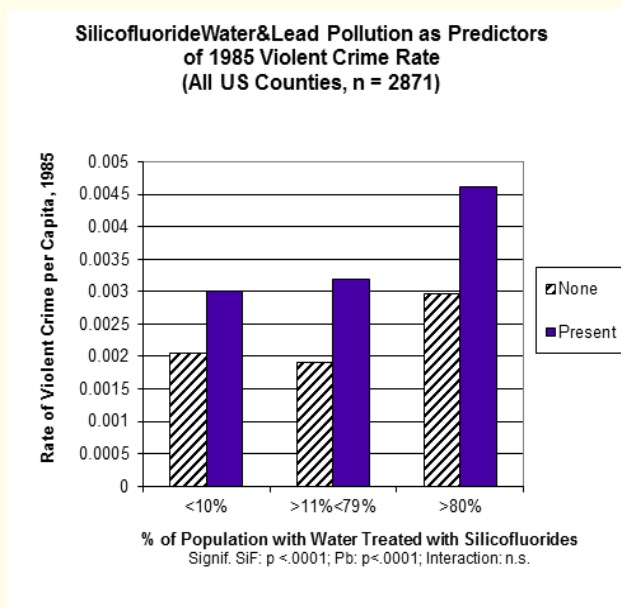


Figure 3: Solid bars: Lead pollution in county as recorded in EPA's Toxic Release Inventory. County usage of silicofluorides are reported in CDC's Fluoridation Census 1992 (Washington: Public Health Service, 1993), pp. 1-993.

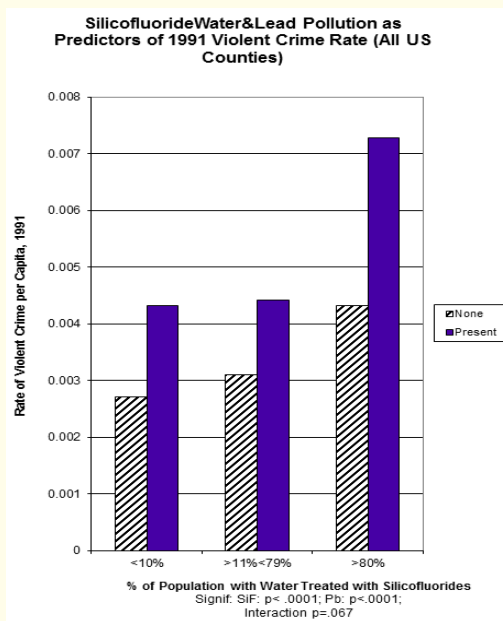


Figure 4: Bars as in Graph 3 with 1991 violent crime data.

Due to the cost of incarceration (\$30,000 to \$50,000 per inmate per year), not to mention other social costs, high rates of violent crime punish taxpayers as well as those criminals sentenced to prison. Since, in recent years, Detroit's violent crime rate ranked #1 and Flint's #3 of America's large cities, scientific evidence linking increased violent crime rates to high blood lead, which in turn is associated with silicofluoride exposure, deserves attention (especially because, unlike other factors linked to violent crime, silicofluoride use can easily be ended). On the one hand, water fluoridation with sodium fluoride can also reduce tooth decay and is not associated with increased violent crime rates. On the other, scientific research has revealed harmful effects associated with fluorosilicic acid and sodium silicofluoride whereas their benefits to dental health haven't been documented since their use began in 1942.

Peer reviewed research linking such costly behavioral dysfunction to silicofluorides was co-authored with the late Myron J. Coplan, a chemist who played an essential role in the first use of H_2SiF_6 to treat public water supplies in 1942. The story of adding silicofluorides to U.S. water systems is not general knowledge because this practice was top secret when initiated by the Manhattan Project (not known for any interest in dental health).

Immediately after Pearl Harbor, fluorosilicic acid, an extremely strong acid ($\text{pH} = 0$), had to be used to separate weapons-grade uranium from phosphate rocks for our first A-bombs. As a "cover" for this source of uranium for our nuclear weapons, water fluoridation was first introduced using sodium fluoride, after which this public policy was immediately spread by adding silicofluoride to water, and the issue was debated by always speaking of "fluoridation" without mention of the specific chemicals used for the purpose.

At present, U. S. public water supplies are fluoridated with three different compounds: sodium fluoride (NaF), fluorosilicic acid (H_2SiF_6), or sodium silicofluoride (Na_2SiF_6); for the frequency and population served by each, Table 1 and 2.

Fluoridation Compound	Population Served	Number of Communities
Fluorosilicic Acid (H ₂ SiF ₆)	80,019,175	5,876
Sodium silicofluoride (Na ₂ SiF ₆)	36,808,898	1,635
Sodium Fluoride (NaF)	11,201,979	2,491
Totals		

Table 1: Fluoridation Compounds Used in the U.S.

Source: CDC, Fluoridation Census 1992 (Washington: Public Health Service, 1993), Table VI, pp. xvii-xviii.

	Population & %		Number of systems & %	
Fluorosilicic Acid (H ₂ SiF ₆)	80,019,175	62.5%	5,876	58.7%
Sodium silicofluoride (Na ₂ SiF ₆)	36,808,898	28.8%	1,635	16.3%
Sodium Fluoride	11,201,979	8.7%	2,491	24.9%
Total	128,030,052		10,002	

Table 2: Number of U.S. Public Water Supply Systems and Population of Each Fluoridation Chemical Used as of December 21, 1992*.

*Source: TABLE VI, Fluoridation Census 1992 (Washington: Public Health Service, 1993), p.xvii

Sodium fluoride, safe when regularly added to toothpaste, is also safe when added to water supplies. In water, the NaF splits into Na+F; the sodium (Na) is harmless unless swallowed in huge volumes, and the fluoride (F) that bonds to tooth surfaces may help those who don't brush with toothpaste. The silicofluorides (H₂SiF₆ and Na₂SiF₆) are highly acidic compounds that were not tested for safety before they were added to drinking water.

Recent scientific research has discovered that either fluorosilicic acid or sodium silicofluoride increases blood lead (Figure 1 and 2), which contributes to increased rates of learning disabilities, substance abuse, and violent crime (Figure 4 and 5). If reconsideration of this published evidence shows these effects from water treated with H₂SiF₆ exist in both Flint and Detroit, it's reasonable to stop addition of silicofluorides immediately and monitor children's blood lead levels and rates of learning disabilities, substance abuse, and violent crime for a period of ten to twenty years (a time delay needed due to prenatal and infant brain damage associated with exposure to either silicofluoride). If evidence from this test confirms harmful effects from H₂SiF₆ and Na₂SiF₆, water treatment with silicofluorides should not resume unless these two compounds are fully tested and found to be safe by independent laboratories, and the results tests with children show either an absence of the above side-effects or a peer-reviewed scientific study shows these harmful effects are explained by other causes.

There are three essential points to this proposed policy change in Flint and Detroit. First, the extensive national data linking silicofluoride water treatment with higher children's blood lead and the serious behavioral problems described above suggests ending use of H₂SiF₆ could substantially reduce costly educational and criminal behaviors in these two cities. Second, this proposed test would cost virtually nothing even if it failed, but could produce large cost savings to local budgets. Finally, unlike many policy proposals, in this case the moratorium on silicofluoride use is based on over 15 years of peer-reviewed scientific evidence -- almost never seriously challenged with contrary statistics.

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