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First ever meta-analysis on Indian lead exposure reveals link to devastating intellectual disability in children

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New Macquarie University research has revealed the devastating disease burden associated with elevated blood lead levels in India. The results of

the first ever meta-analysis of Indian blood lead levels found the burden of disease to be significantly larger than previously calculated, with negative outcomes on intellectual disability measures in children.

The research calculated the pooled mean blood lead level from data published between 2010 to 2018 to estimate the attributable disease burden in IQ decrement and Disability Adjusted Life Years (DALYs). The DALY is a measure of overall disease burden, expressed as the number of years lost due to ill health, disability, and early death.

Previous studies have estimated 4.6 million lead-attributed DALYs and nearly 165,000 deaths, far fewer than reported by the new Macquarie University study, which found that the total could be as high as 4.9 million DALYs, or, in other words, 4.9 million years lost due to ill-health, disability or early death as a result of the high blood lead levels.

At low levels, one µg/dL of lead contamination in the blood causes more than half a point of IQ decrement. For children living in India, whose blood lead level contamination is at almost 7 µg/dL, the impact on IQ is significant, explains lead author Mr Bret Ericson of Macquarie University and Pure Earth, New York.

"At a societal level, the bell curve of IQ shifts to the left, with more people falling into the intellectually disabled category, and far fewer in the gifted category. The potential impacts on a country's productivity and associated disease burden are, therefore, significant."

India's significantly elevated blood lead levels can in part, be attributed to battery smelting, which is poorly regulated in India.

"Given that a large number of people ride motorbikes or drive cars, and that the battery life is only two years, there are a significant number of used lead batteries recycled each year. These are often processed

informally with little or no pollution controls, resulting in significant contamination across urban areas" says Mr Ericson.

However, there are also other known causes of exposure, including ayurvedic medicines, eyeliner, noodles and spices, which continue to cause the high levels of blood lead found in children.

Study co-author, Professor Mark Taylor, also of Macquarie University, notes that the implications of exposure are extremely detrimental, and with no evidence that the adverse outcomes remit with age, is calling for better regulation.

"We've identified a number of areas of exposure, but more work needs to be done to further determine the exact source, or sources, of the problem. There also needs to be better regulation and centralisation of battery smelting to combat preventable contamination."

Chronic low lead exposure has also been associated with cognitive impairment, cardiovascular disease, anemia, and low birth weight, and premature mortality.

More information: Bret Ericson et al. A meta-analysis of blood lead levels in India and the attributable burden of disease, *Environment International* (2018). DOI: 10.1016/j.envint.2018.08.047

Provided by Macquarie University