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The Toxic Truth: Children's Exposure to Lead Pollution Undermines a Generation of Future Potential

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CONTENTS

EXECUTIVE SUMMARY

Hundreds of millions of children are poisoned by lead. Some of these children live in poor communities in rich countries, but the vast majority live in poor countries where they are exposed to lead through multiple routes. 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.

According to ground-breaking new analysis and research, around 1 in 3 children – up to approximately 800 million globally – have blood lead levels at or above 5 micrograms per decilitre (µg/dL), a level that the US Centers for Disease Control and Prevention (CDC)[1] have determined is cause for action and which the World Health Organization says may be associated with decreased intelligence in children, behavioural difficulties and learning problems.[2] Research on lead has been undertaken and compiled over many decades by UN Agencies such as the World Health Organization, the United Nations Environment Programme and the United Nations Children's Fund, as well as non-governmental organizations and research organizations such as Pure Earth, Human Rights Watch, the US National Institutes of Health, the Institute for Health Metrics and Evaluation, and numerous universities.

The unequivocal conclusion of this research is that children around the world are being poisoned by lead on a massive and previously unrecognized scale.

Most of these children impacted by lead live in Africa and Asia, but many are also affected in Central and South America and Eastern Europe. While blood lead levels have declined dramatically in high-income countries since the phase-out of leaded gasoline and in some places lead-based paint, blood lead levels for children and adults in low- and middle-income countries and in pockets in high-income countries continue to be dangerously high.

Childhood lead poisoning should command an urgent international response. But because lead wreaks its havoc silently and insidiously, it often goes unrecognized. It irreversibly damages children's developing brains and nervous systems, the heart, lungs and kidneys and often does so whilst causing no or only subtle symptoms in the early stages. Hence, the full magnitude of the scale of global lead poisoning is only recently coming to light.

Lasting Damage at Even Low Levels

According to the WHO, there is no known safe level of lead exposure. Relatively low levels of lead exposure that were previously considered 'safe' have been shown to damage children's health and impair their cognitive development. Lead is a potent neurotoxin that, with even low-level exposure, is associated with a reduction in IQ scores, shortened attention spans and potentially violent and even criminal behaviour later in life. Children under the age of 5 years are at the greatest risk of suffering lifelong neurological, cognitive and physical damage and even death from lead poisoning. Older children and adults, as well, suffer severe consequences from prolonged exposure to lead in food, water and the air they breathe, including increased risk of cardiovascular death and kidney damage in later life.[3]

The impact of lead on adults is so large that over 900,000 premature deaths per year are attributed to lead exposure.[4]

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.[5] 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.[6]

Juvenile delinquency, violence and crime have been associated with preschool lead exposure.[7] Conversely, decreases in average blood lead levels in pre-schoolers from above 10 µg/dL to below 5 µg/dL have been linked to significant decreases in crime rates, with juvenile arrest rates for violent and property crimes dropping by as much as to 50 per cent.[8] All of these factors impact a country's economic growth, prosperity and security. Accounting for the wide range of effects, a cost/benefit study in the United States found that there was an estimated benefit of $3.10 for every dollar spent in US Environmental Protection Agency (EPA) rule enforcement to reduce lead hazards.[9]

Common Sources of Exposure

The sources of childhood lead exposure include, but are certainly not limited to: lead in water from the use of leaded pipes; lead from active industry, such as mining and battery recycling; lead-based paint and pigments; leaded gasoline (which has declined considerably in recent decades, but was a major historical source); lead solder in food cans; and lead in spices, cosmetics, ayurvedic medicines, toys and other consumer products.[10] Parents whose occupations involve working with lead often bring contaminated dust home on their clothes, hair, hands and shoes, thus inadvertently exposing their children to the toxic element.[11] Children are also exposed to lead in-utero through exposure of their mothers, with adverse impacts on neurobehavioural development that are comparable to those from childhood lead exposures.[12]

One of the most concerning sources of lead exposure is the unsound recycling of used lead-acid batteries (ULABs), most of which are found in cars, trucks and other vehicles. Recycling activities are often conducted in informal, unlicensed, and frequently illegal open-air operations close to homes and schools.[13] Lead-based batteries are a vital component in the 1 billion petrol and diesel vehicles worldwide, as well as for critical stationary applications and telecommunication systems.[14] Since 2000, the number of new vehicles in low- and middle-income countries has more than tripled.[15] In fact, according to the World Lead Factbook by the International Lead and Zinc Study Group, about 85 per cent of all lead used goes to produce lead-acid batteries.[16] The vast majority of this lead comes from recycled automobile batteries.[17]

Lead is recyclable. It can be reused safely and cleanly through practices consistent with the circular economy and closed-loop supply chain principles, as is the case in countries with appropriate environmental regulations and monitoring.[18] **However, many countries lack sufficient formal recycling infrastructure and capacity to handle the quantity of used lead-acid batteries flooding their markets.** As a result, as much as half of the used lead-acid batteries end up in the informal economy[19] where unregulated and often illegal recycling operations break open battery cases, spilling acid and lead dust onto the ground, and smelt lead in open-air furnaces that spew toxic fumes and dust that contaminate surrounding neighbourhoods.[20]

Lead from informal secondary recycling makes its way into products beyond vehicle batteries. In Mexico, lead-based pottery glaze on cookware and serving dishes remains a significant source of lead exposure for children and adults.[21] Spices, such as turmeric, are adulterated with lead chromate to enhance their colour and weight in many countries.[22] These lead-adulterated spices and lead-glazed pottery can contribute significantly to elevated blood lead levels among children and adults.

Lead exposure, whether associated with informal ULAB recycling or contaminated foods, not only impacts the affected children but also impacts entire communities. Yet this societal burden of disease, the lifelong injuries and cognitive damage, the increases in violence, and the tragic deaths are preventable.[23,24] The technology exists to improve ULAB and e-waste recycling and lead-smelting operations without remaking industrial cycles.[25] With financial and technical assistance, innovation, and collaboration between private industry, the public sector and non-governmental organizations, solutions can be implemented that establish good practices, eliminate unsafe lead recycling and smelting, clean-up contaminated communities, phase-out the use of lead in paint and consumer products, and manage the safety of drinking water. The return on investment is enormous: improved health, increased productivity, higher IQs, less violence and brighter futures for millions of children across the planet.[26]

A Six-Pronged Approach

Addressing lead pollution and exposure among children requires a coordinated and concerted six-pronged approach across the following areas:

Monitoring and Reporting Systems: This includes building capacity for blood lead level testing; strengthening the role of the health sector in prevention, diagnosis and management of childhood lead exposure; introducing blood lead level monitoring in household surveys; conducting source apportionment assessments at local levels to determine how children are being exposed; and identifying lead-contaminated sites.

Prevention and Control Measures: Prevention of exposure is paramount. This includes preventing children's exposure to high-risk sites; preventing pregnant women and children's exposure to products that contain lead (e.g., certain ceramics, paints, toys, and spices); and ensuring that children, pregnant women and lactating mothers are receiving adequate health services and nutrition, which can help mitigate the impacts of lead exposure. This also includes improving recycling practices and collection systems of ULABs; replacing lead in pottery glazes and cookware with safer alternatives; eliminating the adulteration of spices with lead chromate; eliminating the manufacture and sale of lead paint by adopting lead paint laws; and completely removing the potential for exposure to lead in areas where children live, play and learn.

Management, Treatment and Remediation: This includes strengthening primary health care, including providing training for healthcare workers about how to identify, manage and treat lead exposure in children and pregnant women; providing children with improved nutrition and health services to help treat lead exposure; providing enhanced educational interventions and cognitive behavioural resources and mediums to reach audiences that may not be aware of the risks of lead exposure to children and pregnant women; educating workers and owners of lead-related industries (e.g., ULAB recyclers and smelters, ceramic potters, spice adulterators) about the risks from lead exposures and the ways to protect themselves, their families and their communities; and educating classroom teachers and children themselves about the risks as part of school health interventions.

Legislation and Policy: This includes developing, implementing and enforcing environmental, health and safety standards for manufacturing and recycling of lead-acid batteries, e-waste and other substances that contain lead; enforcing environmental and air-quality regulations for smelting operations; eliminating the use of lead compounds in paint and gasoline (in places where it is still being used), eliminating the use of lead in ceramics and pottery, children's toys, cosmetics, spices and medicines; adopting legally binding limits on lead paint; discouraging informal recycling and use of lead containing waste*; eliminating child labour in e-waste picking or metals mining; reducing access to toxic sites, especially for children and pregnant women; and managing drinking water safety so that quality standards have strict parameters on lead.

Global and Regional Action: This includes creating global standard units of measure to verify and track the results of pollution intervention on public health, the environment and local economies; building an international registry of anonymized results of blood lead level studies; creating international standards and norms around recycling and transportation of used lead-acid batteries, including transboundary movement; establishing partnerships that mobilize resources and technical assistance, including from the private sector and industry, to address unsound ULAB recycling and other lead sources; and fostering

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