



## SUPPORT PURE EARTH'S WORK TO Protect Early Childhood Development

### How Lead Exposure Is Robbing Future Generations of Learning and Potential

Investments in early childhood development are being quietly undermined by lead exposure. Research shows that lead poisoning may account for more than 20% of the learning gap between high- and low-income countries, robbing children of IQ points, school readiness, and lifetime earnings before they ever enter a classroom. Pure Earth is uniquely positioned to close this gap by embedding lead prevention into early childhood development programs, curricula, and government partnerships that shape children's earliest years.

#### Lead Exposure is a Hidden Barrier to Children's Ability to Learn, Play, and Thrive

Lead exposure harms brain development in the earliest years of life, often before a child enters school, undermining school readiness, attention, language, behavior, and long-term learning.<sup>1</sup> Exposure to lead can even begin before birth, as lead crosses the placenta and can impair fetal brain development.<sup>2</sup> In infancy and early childhood, when the brain is developing most rapidly, even low levels of lead exposure can reduce IQ, weaken attention and memory, impair language development, and affect behavior and self-regulation.<sup>3</sup> Lead exposure acts like a hidden tax on childhood investments: it weakens brain development, lowers learning outcomes, and reduces long-term returns on spending in health, nutrition, and education.<sup>4</sup>

#### Why This Matters and How Many Children Are We Talking About

An estimated one in three children—1 billion globally—have blood lead levels (BLLs) at or above 5 µg/dL, the level at which requires action.<sup>5,6</sup> More than 450 million of these children live in South Asia, with over 340 million living in Sub-Saharan Africa.<sup>7</sup> The burden falls most heavily on children in low-and-middle-income countries and marginalized communities, deepening inequality, making it harder for the most vulnerable children to develop, learn, and thrive.

There is no known safe blood lead concentration; even low levels of exposure can reduce IQ, impair executive function, and weaken the cognitive and social-emotional foundations children need to participate fully in learning and play. These harms show up early and persist over time. Children exposed to lead are more likely to enter school already behind, struggle in the classroom, and face reduced educational attainment and lifetime earnings.<sup>8</sup> It is estimated that childhood lead exposure in low- and middle-income countries causes loss through IQ-point reductions and lower lifetime earning potential, amounting to roughly 1.2% of the world's GDP.<sup>9</sup> This is one of the clearest demonstrations that spending on early childhood development, education, and nutrition can be undermined if lead exposure is not addressed at the same time.

## Evidence and Examples from Around the World

- In **India**, a study of 756 children aged 3–7 found that higher blood lead levels were associated with worse neurobehavioral outcomes, including ADHD-like behaviors and executive-function problems, all highly relevant to classroom learning and school readiness.<sup>10</sup>
- In **Bangladesh**, it is estimated that the average blood lead level of children aged <19 is 7.7 µg/dL, with an average loss of 6.9 IQ points among children aged 0–4, severely impacting children’s intellectual function.<sup>11,12</sup> A 2025 CGD summary of nationally representative data from Bangladesh notes that elevated blood lead is linked to children losing IQ points, performing poorly in school, and earning less as adults.<sup>13</sup>
- In **sub-Saharan Africa**, there is concerning evidence, such as in Kabwe, Zambia, where studies document lead contamination around former mines and extremely high blood lead levels in children. This created conditions where severe cognitive and learning harms would be expected based on the wider lead literature, even when those studies did not directly measure IQ or test scores.<sup>14,15</sup> Similar hotspot evidence exists in Kenya around smelter and informal battery-recycling communities, and in Uganda around Kampala, where childhood lead poisoning remained highly prevalent after the phaseout of leaded gasoline.<sup>16</sup>



A 2023 study published by the Center for Global Development, “*How Much Would Reducing Lead Exposure Improve Children’s Learning in the Developing World?*,” concluded that lead poisoning may explain a large share of the global learning gap, as childhood lead exposure could account for **more than 20%** of the difference in learning outcomes between high-income and low- and middle-income countries. The study emphasized that cognitive damage occurs at blood lead levels previously considered low. The study validated the idea that learning losses are economically significant, leading to measurable educational losses like lower test scores, reduced years of effective learning, and long-term reductions in productivity and earnings.<sup>17</sup>



## Why This is Solvable & Pure Earth's 5-Phase Approach

Lead is a high-impact and highly neglected issue. Much of the exposure comes from preventable sources, such as contaminated food, unsafe cookware, lead-adulterated spices, consumer products, such as paint, informal battery recycling, and polluted soil and dust.

Identifying and removing these sources can protect millions of children from irreversible harm and generate benefits across health, education, and economic development.

Drawing on more than 25 years of experience, our 5-phase approach to protect people from lead exposure in low- and middle-income countries is tailored to each local context, with phases that can overlap and be adapted to country-specific priorities.



### PURE EARTH'S 5-Phase Approach:

- 1 Reveal the Crisis** by implementing nationally representative blood lead level surveys revealing the true prevalence, severity, and distribution of exposure.
- 2 Pinpoint Exposure Sources** by conducting in-depth exposure source assessments to understand how people, especially young children, are getting poisoned.
- 3 Reduce Exposure** by targeting mitigation efforts on the most critical sources of exposure.
- 4 Mobilize Collective Will** by educating communities, policymakers, peer organizations, and funders on the health and economic toll of lead; and
- 5 Build Durable Systems** by embedding policies and practices into routine government operations, including national BLL monitoring, training health workers, and strengthening enforcement capacity, to ensure sustained reduction of lead exposure over time.





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## Intersectionality: Lead Exposure Prevention and Early Childhood Development (ECD)

Pure Earth has a strong track record of identifying and addressing lead exposure risks in children and school environments across Africa, Asia, and Latin America, through research, assessments, remediation, and community awareness initiatives.

### Our Work Includes:

- BLL surveys, usually focusing on young children (typically under 5 years).
- Home assessments targeting kids identified with high BLLs.
- School remediation projects in Tegal (Indonesia) and Khulna (Bangladesh).
- Studying metallic cookware in schools, in India, Indonesia, Bangladesh and Ghana.
- School assessments in Indonesia, including dust, paint, soil, playground equipment, and furniture.
- Conducting *Lead Pollution Sensitization* campaigns in 20 schools in Greater Accra, Ghana, targeting 1,200 students.
- Partnering with the Ministry of Education for collaboration in reducing lead exposures, such as in Indonesia, Ghana, and Ethiopia.

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## Solutions and the Way Forward

To ensure that investments in early childhood development and education are not impaired by the hidden tax of lead exposure, Pure Earth's approach encompasses several dimensions below:

- **Investment is needed** to strengthen awareness, advocacy, and integration of lead prevention within early childhood development and education systems. Pure Earth can support other ECD-focused programs by providing technical assistance and expertise. By adding dedicated ECD advisors to Pure Earth country technical teams, we can fully serve the various actors in the ECD community.
- This investment would also **support integration** of ECD considerations into Pure Earth's five-phase approach, including ensuring that daycare centers and primary schools are incorporated into source and exposure assessments, and embedding lead poisoning prevention into antenatal, postnatal, and early childhood development curricula.
- **Strengthen and expand** lead-focused technical working groups, including engagement with Ministries of Education, Women's Health, and Nutrition stakeholders. Schools, Ministries of Education, and UN agencies can serve as strategic entry points for lead prevention and awareness efforts, as demonstrated in countries such as the Philippines and Ghana.
- **Healthy schools and preschools** are key entry points for prevention. Advocate for governments to test schools and surrounding areas where children spend time, including soil near healthcare facilities and playgrounds. All new schools should use certified lead-free paint, and local environmental agencies should regularly assess and monitor school environments to ensure they are safe.

- **Advocate** for UNICEF and partners to integrate lead exposure indicators into Multiple Indicator Cluster Surveys (MICS), nutrition surveys, and other population-based assessments, while also supporting the inclusion and expansion of dedicated lead exposure studies.
- **Food** is a critical exposure pathway, particularly staple foods, and vegetables, as well as cookware used in homes and in school cafeterias, which should be verified as lead-free.
- **Remediation efforts** should prioritize areas near schools and playgrounds, where children face the highest exposure risks. Interventions in and around these spaces can meaningfully reduce children’s BLLs and prevent long-term harm across generations.<sup>18</sup>
- **Conduct further research** on subjects such as:
  - Chelation treatment and related clinical interventions for lead exposure
  - Evaluation of hair sampling as a non-invasive alternative for lead screening and care
  - Comparative studies of blood, hair, and hand-wipe testing methodologies
  - Research on geophagy/pica behaviors, including children’s ingestion of soil and contaminated materials
  - School-based testing research, including BLL monitoring, site assessments, and pre-/post-remediation evaluations
  - Development and validation of non-invasive exposure assessment methods, such as hand-wipe sampling after playground exposure and handwashing studies linked to BLLs
  - Expanded research on the impacts of elevated BLLs on child health and development, including cognitive development, learning outcomes, and IQ impacts

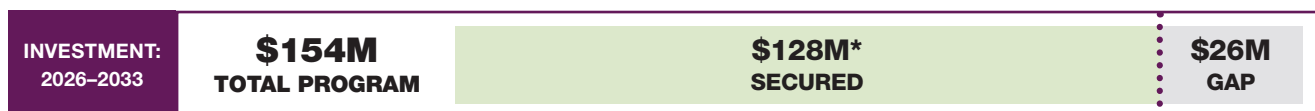
## Transformational Funding Opportunity

Investing in lead exposure reduction protects brain development in the earliest years, strengthens school readiness, supports better education outcomes, and preserves lifelong potential. For scalable, cross-sector impact, lead mitigation offers a chance to improve child development gains and unlock human potential.

Pure Earth’s **Audacious Project** provides a historic opportunity to combat global lead poisoning at scale by protecting over 500 million children in at least 20 low- and middle-income countries. This expansion is built upon 25 years of field experience, working with governments, and strategic funding partnerships, including

Coefficient Giving, Takeda Pharmaceuticals, and the Clarios Foundation. Now, with anchor commitments from Bloomberg Philanthropies and the Audacious Project totaling \$128M of a \$154M initiative, Pure Earth is moving forward with full implementation.

From the remaining \$26 million, we request \$5-\$10 million to support our work in early childhood development and education. All contributions will be matched at least dollar-for-dollar through The Audacious Project, a TED initiative bringing together some of the world’s most influential philanthropists to fund bold, proven solutions.



\*Anchor Funding Commitments: Bloomberg Philanthropies and the Audacious Project



## Our Commitment to Impact and Sustainability

We integrate lead mitigation into national health and regulatory systems so that countries can sustain impact long after our support ends. We exit when governments and local partners can sustain progress, indicated by: BLL decline, with at least a 20% reduction; national systems are in place to monitor, prevent, and clinically respond to lead poisoning; governments allocate sustained funding and coordinate action across sectors; and when enforceable standards limit lead in consumer products and the environment. This approach ensures lasting health gains, stronger child development outcomes, and scalable impact.

### END NOTES

- <https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health>
- CDC. **Risk Factors and Pregnancy | Childhood Lead Poisoning Prevention**. Lead can be stored in bone, released during pregnancy, and passed to the fetus.
- Lanphear BP et al. **Low-Level Environmental Lead Exposure and Children's Intellectual Function**; CDC, **Lead Exposure Symptoms and Complications**; CDC, **Educational Interventions for Children Affected by Lead**.
- <https://www.worldbank.org/en/topic/environment/brief/how-the-world-bank-is-addressing-lead-pollution>
- The WHO recommends taking action at a blood lead level of 5 micrograms per deciliter (5 µg/dL). Specifically, WHO states that a BLL at or above 5 µg/dL should trigger a thorough assessment of sources of lead exposure, and interventions to reduce or eliminate that exposure.
- Institute for Health Metrics and Evaluation (IHME). **Global Burden of Disease Study 2023 (GBD 2023) Lead Exposure Estimates 1990–2023**. Seattle, United States: IHME, 2026.
- UNICEF and Pure Earth (2020). *The Toxic Truth: Children's Exposure to Lead Pollution Undermines a Generation of Future Potential*. New York: UNICEF
- Attina TM & Trasande L. (2013). **Economic Costs of Childhood Lead Exposure in Low- and Middle-Income Countries**. Estimates large lifetime economic losses from childhood lead exposure.
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- Institute for Health Metrics and Evaluation (IHME). **GBD Results Tool**. Seattle, WA: IHME, University of Washington; 2025.
- Larsen, B., & Sánchez-Triana, E. (2023). **Global health burden and cost of lead exposure in children and adults: a health impact and economic modeling analysis**. *The Lancet Planetary Health*, 7(10), e831–e840.
- <https://www.cgdev.org/blog/cautious-signs-progress-lead-exposure-bangladesh-0>
- <https://www.aljazeera.com/news/2025/3/5/zambia-governments-neglect-exposing-more-children-to-lead-poison-hrw-says#:~:text=News%7CEnvironment,Zambia%20government's%20neglect%20exposing%20more%20children%20to%20lead%20poison%2C%20HRW,of%20lead%20in%20their%20blood.&text=An%20earlier%20version%20of%20this,decades%20of%20toxic%20lead%20exposure.>
- Caravanos J, Fuller R, Robinson S; Centers for Disease Control and Prevention (CDC). **Notes from the field: severe environmental contamination and elevated blood lead levels among children - Zambia, 2014**. *MMWR Morb Mortal Wkly Rep*. 2014 Nov 7;63(44):1013. Erratum in: *MMWR Morb Mortal Wkly Rep*. 2014 Nov
- AP News 2026; CGD 2026; UNICEF & Pure Earth 2020
- Crawford, L., Todd, R., Hares, S., Sandefur, J., & Bonfield, R. S. (2023). **How much would reducing lead exposure improve children's learning in the developing world?** Center for Global Development.
- While these interventions may not represent the highest-return on investment in terms of aggregate BLL reductions, they address critical exposure pathways that would otherwise remain unaddressed, particularly in vulnerable communities where no other actors are likely to intervene.