



**PURE  
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## **LEAD IN CONSUMER GOODS:**

**A 25-COUNTRY ANALYSIS OF LEAD (PB)  
LEVELS IN 5,000+ PRODUCTS AND FOODS**

## Executive Summary

The scale of childhood lead poisoning is staggering, and due to a lack of research in the most impacted countries, the sources of exposure affecting the majority of the world's children have been poorly understood. The 2020 [report](#) titled *The Toxic Truth*, by Pure Earth and UNICEF, revealed that an estimated 800 million children globally, or one in every three, have levels of lead in their blood that indicate lead poisoning. This prevalence suggests that children are continually exposed to lead in their daily lives. The vast majority of these children live in low- and middle-income countries, where research into exposure sources has been limited. Pure Earth's Rapid Market Screening program (RMS) aims to improve our understanding of these exposure sources and advance the ability of all actors to implement solutions.

### What is the Rapid Market Screening program?

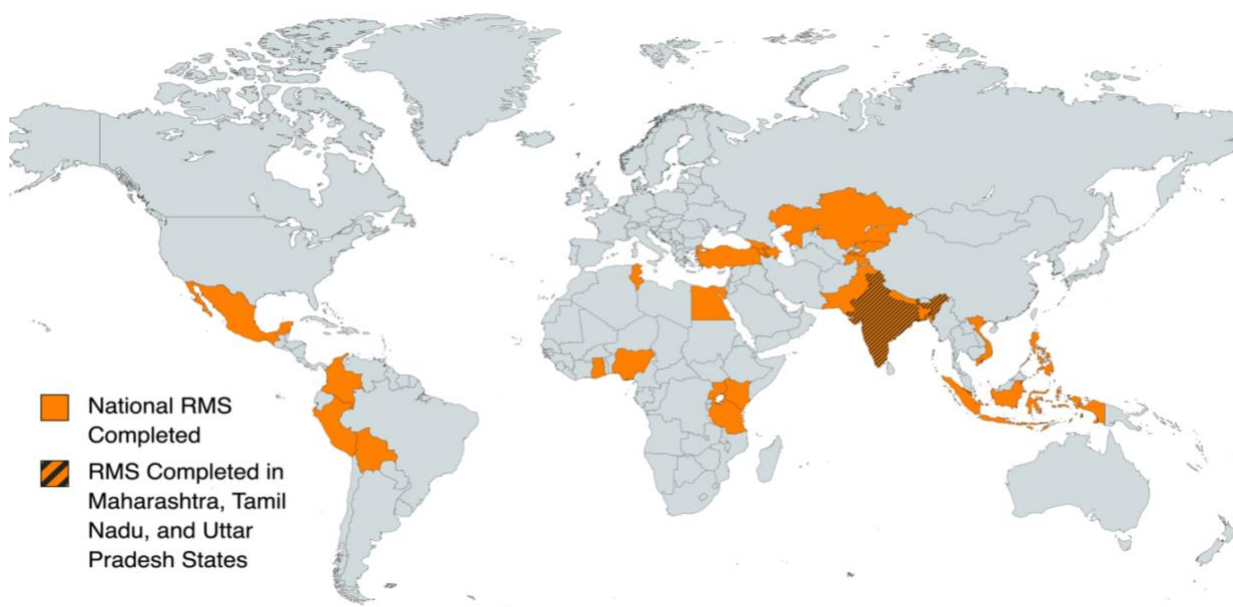
The RMS is a global assessment of lead (Pb) concentrations in more than 5,000 samples of consumer goods and foods from markets across 25 low- and middle-income countries.

### What is new about this assessment and its findings?

While prior studies have identified lead in a variety of consumer goods, the geographic variations in lead exposure sources have been poorly understood. This assessment improves our understanding of which products are more likely to be contaminated, and how contamination levels vary across a diverse set of low- and middle-income countries.

### Which countries were included?

The RMS was implemented in: Armenia; Azerbaijan; Bangladesh; Bolivia; Colombia; Egypt; Georgia; Ghana; the Indian states of Maharashtra, Tamil Nadu, and Uttar Pradesh; Indonesia; Kazakhstan; Kenya; Kyrgyzstan; Mexico; Nepal; Nigeria; Pakistan; Peru; the Philippines; Tajikistan; Tanzania; Tunisia; Türkiye; Uganda; and Vietnam.





## What do “reference levels” and percentages mean in this report?

To contextualize the concentrations of lead found in various products, Pure Earth compared measured lead levels to “reference levels” for each product type. These reference levels come from existing public health guidelines and regulatory standards from United Nations agencies, the European Union, and the United States. Note that a lead concentration below a reference level does not mean a product is safe. There is no safe level of lead in blood, and thus exposure at any level can be harmful.

## How should the RMS results be used?

Pure Earth recommends the RMS data be used to identify possible trends and products that warrant further attention and assessment. The data should be viewed as suggestive, not conclusive or representative of all similar products in these countries.

## Results by Product Type

Across 5,010 samples from 25 countries, the following percentages of samples exceeded the relevant reference levels for that specific product type:

**Across all 5,010 samples:** 18% exceeded relevant reference levels

**Ceramic foodware:** 45% of 310 samples exceeded reference levels

**Metallic foodware:** 52% of 518 samples exceeded reference levels

**Plastic foodware:** 12% of 364 samples exceeded reference levels

**Cosmetics:** 12% of 815 samples exceeded reference levels

**Toys:** 13% of 781 samples exceeded reference levels

**Paints intended for large surfaces:** 41% of 437 samples exceeded reference levels

**Paints for art, crafts, & special uses:** 11% of 70 samples exceeded reference levels

**Spices:** 2% of 1085 samples exceeded reference levels

**Sweets:** 3% of 111 samples exceeded reference levels

Staple dry food (grains, flours, legumes): 1% of 362 samples exceeded reference levels

Traditional and herbal medicines: 4% of 54 samples exceeded reference levels

## Results by Country (organized by regional groups)

The table below is organized by country and shows percentages of samples of each product and food category that exceeded the relevant reference level.

Region	Country	Ceramic foodware	Metallic foodware	Plastic foodware	Cosmetics	Toys	Paint - large surfaces	Paint - crafts/art	Spices	Sweets	Staple dry foods	Herbal/trad medicine
Caucasus	Armenia	36%	11%	6%	7%	3%	0%	0%*	4%	NA	11%	NA
Caucasus	Azerbaijan	100%	63%	60%*	10%	69%	100%	NA	0%*	NA	NA	NA
Caucasus	Georgia	48%	16%	0%*	0%	3%	50%*	7%	0%	NA	0%*	NA
C. Asia	Kazakhstan	NA	NA	NA	0%*	33%*	NA	NA	0%	NA	0%*	NA
C. Asia	Kyrgyzstan	44%	19%	13%	15%	6%	33%	NA	0%	NA	0%	NA
C. Asia	Tajikistan	100%*	NA	NA	0%*	0%*	NA	NA	60%*	NA	0%*	NA
S. S. Africa	Ghana	18%	55%	0%	7%	14%	0%*	0%*	0%	NA	0%	NA
S. S. Africa	Kenya	62%	53%	25%	6%	3%	36%	NA	0%	NA	0%	NA
S. S. Africa	Nigeria	29%	66%	4%	18%	16%	76%	NA	0%	NA	0%	NA
S. S. Africa	Tanzania	67%*	35%	4%	3%	10%	7%	NA	2%	3%	0%	NA
S. S. Africa	Uganda	8%	73%	20%	2%	0%	16%	NA	0%	NA	6%	100%*
L. America	Bolivia	60%	54%	14%	46%	6%	0%*	NA	0%	0%*	0%	NA
L. America	Colombia	50%	40%	24%	10%	12%	31%	11%	2%	0%	0%	0%
L. America	Mexico	67%	25%	8%	7%	22%	93%	NA	3%	4%	0%	0%*
L. America	Peru	42%	69%	17%	9%	2%	10%	0%	2%	NA	0%	0%*
MENA	Egypt	50%	55%	13%	42%	4%	0%*	NA	2%	NA	0%*	0%
MENA	Tunisia	56%	12%	4%	11%	4%	50%	NA	0%	NA	0%	17%
MENA	Türkiye	53%	67%	19%	100%*	29%	70%	NA	25%*	NA	NA	NA
S. Asia	Bangladesh	44%	59%	9%	6%	13%	0%*	50%*	7%	NA	17%	NA
S. Asia	Maharashtra, India	71%	63%	19%	3%	21%	19%	17%	0%	NA	0%	0%*
S. Asia	Tamil Nadu, India	50%	70%	14%	9%	23%	57%	NA	0%	NA	0%	NA
S. Asia	Uttar Pradesh, India	0%	65%	0%	2%	24%	42%	NA	12%	NA	0%*	0%*
S. Asia	Nepal	9%	100%	12%	0%	0%	0%	NA	0%	NA	0%	0%
S. Asia	Pakistan	20%*	75%	8%	30%	13%	35%	NA	9%	0%	0%	NA
SE Asia	Indonesia	NA	60%	NA	33%	10%	97%	NA	0%	NA	0%	NA
SE Asia	Philippines	13%	24%	0%	13%	6%	16%	0%*	0%	NA	2%	0%*
SE Asia	Vietnam	29%	56%	0%	23%	7%	59%	50%	3%	NA	0%	0%*

\* Results from 5 or fewer samples

## Key recommendations from Pure Earth

1. **Blood lead level testing.** Few low- and middle-income countries conduct large surveys or ongoing monitoring of children's blood lead levels. The result is that we have little visibility into the prevalence, severity, and geographic distribution of lead poisoning for most countries. This is one of the largest impediments to solutions. Governments and their development partners should explore and invest in ways to generate primary data on children's blood lead levels so resources can be allocated appropriately, and so progress can be measured. The importance of blood lead level surveillance testing is highlighted by the identification of widespread lead exposure sources in low- and middle income-countries as part of the RMS.
2. **Home-Based Source Assessments.** Blood lead level surveys should be conducted in conjunction with in-home source analyses to establish connections between contaminated products and actual incidents of lead poisoning. During home-based source assessments, investigators assess a variety of products and environmental media in and around the homes of children with elevated blood lead levels. This combination of blood lead level testing with in-home source analysis can point to correlations between elevated blood lead levels and the presence of contaminated products like those highlighted in the RMS to help identify potentially significant local contributors to lead poisoning.
3. **Research into foodware leachability and use.** The high prevalence and wide geographic distribution of contaminated metallic and ceramic foodware was a surprise to Pure Earth's team. However, total lead levels in foodware, as measured in the RMS, provide only limited insights into the potential dangers from use. Total lead levels cannot yet tell us concretely what lead dose a person is likely to receive from each use of a pot or pan. While Pure Earth is conducting ongoing leachate testing of more than 100 aluminum pots to help answer these questions, field research is also needed to determine if lead contaminated foodware is used in settings where high concentrations of children could be exposed (e.g., schools, daycares, hospitals) and if the food prepared in such foodware is being contaminated. If contaminated foodware is used in settings with high concentrations of children and the food prepared in that foodware is becoming contaminated, interventions to replace contaminated foodware at these locations could be highly impactful at a relatively low cost.

Given the extraordinary prevalence of contaminated metal foodware, research is needed to determine if there are ways to reduce the leachability of lead from metallic pots during or after production through the introduction of an additive, coating, or other means.

4. **Establishing recommended limits for total lead in foodware.** The RMS team did not find public health guidelines or regulatory standards for total lead concentrations in foodware from which to set reference levels. Instead, the RMS team created the reference level of 100 parts per million for foodware based on guidelines for other products and on Pure Earth's ongoing research into foodware leachability. While some

countries have limits for leachable lead in foodware, assessing the leachability of lead in a product generally requires a lab, which makes screening expensive and time consuming. Instead of establishing leachability limits, regulators should consider setting a maximum allowable concentration for total lead at the lowest achievable level. If exceptions are needed, regulations should force producers to demonstrate that products exceeding the allowable level would not leach lead into food under any condition.

5. **Track cosmetics to production sources.** There is a need to track commonly contaminated cosmetics to their production facilities and then work with governments and producers to eliminate lead use. Contaminated eyeliners, for example, can be bought through e-commerce retailers worldwide. Efforts to eliminate lead in such products could have global impacts.
6. **Enact and enforce lead paint laws.** All governments should enact and enforce regulations limiting lead in paint and consider guidance provided in the UNEP Model Law And Guidance for Regulating Lead Paint developed by the Global Alliance to Eliminate Lead Paint. Additionally, countries and their development partners should invest in monitoring and enforcement capacities to ensure strict regulatory compliance, taking into consideration the UNEP Lead Paint Law Compliance and Enforcement Guidance.
7. **Replicate programs to eradicate spice adulteration.** Successful efforts to stop the adulteration of spices with lead-based pigments in Bangladesh and Georgia should be adapted to other countries with similar challenges, particularly Northern India and Pakistan, where recent assessments suggest a pattern of adulteration.