

Lead levels in enamel paint in Sri Lanka – Two years after the regulation

By Centre for Environmental Justice in collaboration with IPEN, ARNICA

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Executive Summary

In November 2014, CEJ conducted its fourth study on lead in decorative paints in Sri Lanka. The purpose of this study was to determine whether decorative paints with high lead levels is still being sold in Sri Lanka even after the legislation passed by the Consumer Affairs Authority came into force at the beginning of 2013.

Key findings from the new research shows that more than half (53%) of the 15 paints analysed (belonging to 8 of 15 brands) contained lead concentrations above 600 parts per million (ppm), the legal limit for lead content in enamel paints permitted to be sold in Sri Lanka.

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Seven out of the eight enamel paints manufactured after the mandatory regulation took effect on January 1, 2013 (88%) contained lead below 600 ppm. The analysis therefore, clearly demonstrates that producing paint with low lead levels is possible within Sri Lanka.

Among the analysed paints, paint from one paint brand which states “lead free” on the label, however contained more than 600 ppm lead.

Introduction

Centre for Environmental Justice (CEJ) was instrumental in bringing Sri Lanka’s mandatory standards for lead in decorative paint which took effect in January 1, 2013. The Consumer Affairs Authority (CAA) gazetted this regulation in Gazette Extra Ordinary No 1725/30 on 30th of September 2011. This was the result of the Supreme Court case filed by the Centre for Environmental Justice. CAA brought a subsequent gazette in 2014 requesting the lead level to be printed on the paint label.

CEJ has conducted two major studies of lead in decorative paints sold in Sri Lanka. In 2010, CEJ, in collaboration with IPEN and the Indian NGO, Toxics Link, carried out a global scientific study *Lead in New Decorative Paints*. In that study, 69% of Sri Lankan decorative paints analysed were found to exceed the current standard of 600 ppm. The highest content of lead was 137,325 ppm, which is 228 times greater than the current Sri Lankan limit.

In response to these findings, Sri Lanka Standards Institution (SLSI) negotiated a voluntary lead paint standard in 2010. However, it was not possible to enforce this by the law due to the voluntary nature. This led CEJ to bring a case to the Supreme Court in 2011.

In 2013, CEJ again analysed decorative paints as a part of the Asian Lead Paint Elimination Project, a project funded by the European Union and conducted in collaboration with IPEN. This study, *Lead in Sri Lanka’s New Enamel Household Paints*, included 94 paints from 57 brands covering all parts of the country. It revealed that approximately 50% of the solvent-based paints included in the study exceeded the regulated limit of 600 ppm. The highest lead level detected was 131 000 ppm. Out of the 94 analysed paints, 64 were purchased after the lead paint legislation came into force.

Why lead in paint?

Lead is a toxic heavy metal that until recently was widely used in gasoline. Though it has been banned in gasoline throughout the world, it continues to be widely used in paint and other industries in low- and middle-income countries. Studies have clearly shown, however, that even a small exposure to lead can have a damaging effect, especially on young children and developing foetuses. This impact on children also impacts national economies. In Asia alone, the economic burden of childhood lead exposure is estimated to be 700 billion dollars.

Today, lead in paint is a major source of childhood lead exposure. Once applied, paints start to deteriorate and chip, contaminating the soil and dust near the painted surface with lead. Children who play in those areas, easily ingest lead while engaging in normal hand-to-mouth activity. In addition, chewing on toys and other surfaces painted with high content lead increase the chances of lead exposure. In extreme cases,

children ingest non-food materials such as chalk or paint chips, and are subjected to extremely high levels of lead exposure.

Health effects of Lead

While lead exposure is also harmful to adults, children are impacted at much lower levels, and the health effects are generally irreversible and can have a lifelong impact. The younger the child, the more harmful lead can be, and children with nutritional deficiencies absorb ingested lead at an increased rate (WHO, 2010). The human foetus is the most vulnerable, and a pregnant woman can transfer lead that has accumulated in her body to her developing child. Lead is also transferred through breast milk when lead is present in a nursing mother.

A child's brain undergoes very rapid growth, development and differentiation and lead interferes with this process. For example, it has been shown that moderate lead exposure (5 to 40 ug/dL) during early childhood is connected to region-specific reductions in adult gray matter volume (Cecil *et al.*, 2008). Moderate blood levels have been linked to an increased likelihood of impaired cognition and executive function, impulsiveness, aggression and delinquent behaviour (Mielke and Zahran, 2012, and references therein). The loss of grey matter in the brain constitutes a potential explanation for cognitive and behavioural problems associated with lead exposure (Cecil *et al.*, 2008). Brain damage caused by chronic, low-level exposure to lead is irreversible and untreatable.

Does all Paint Contain Lead?

Water based paints do not contain intentionally added lead due to the physical properties of the leaded ingredients. However, solvent-based paints can contain lead, the concentration usually correlated to the colour of the paint. In countries where no restrictions on the use of lead in paint exist, lead-based pigments are commonly used for red, yellow and green colours and paints of these colours often contain hazardous amounts of lead. However, also other colours of solvent-based paints can contain high lead levels since other paint ingredients – such as dryers – can also contain high levels of lead, and small quantities of leaded pigments may also be used to create a specific shade of colour.

There is no longer any need to use lead in paints. Alternative ingredients and technology for producing lead safe paints are available worldwide and have been in use in high-income countries for more than 40 years. Paint manufacturers can place orders for lead safe raw materials and the quality can be checked by obtaining the MSDS (Material Safety Data Sheet) from the supplier. For further assurance, samples from paint batches can be analysed randomly in order to insure no lead contamination. Moreover, small and medium paint manufacturers indicate that transferring to non-leaded paint has little or no significant impact on their profit margin. Therefore, it is well within the capability of Sri Lankan paint manufacturers to eliminate lead from their paint products.

Legal background for Lead in Paint in Sri Lanka

After lead paint studies carried out by Centre for Environmental Justice (CEJ) showed high levels of lead in paints sold in Sri Lanka, CEJ took the matter to the Supreme Court with a petition asking to reduce the lead level in paint in order to protect children's health. This resulted in mandatory standards for lead concentrations in paint established under the Gazette Extra Ordinary No 1725/30 on 30th of September

2011, which came into effect on January 1, 2013. The maximum permissible levels for total lead are 600 ppm in enamel and floor paints and 90 ppm in paints for toys and accessories for children (soluble in HCl acid), emulsion paints for exterior and interior use.

Late in 2013, CEJ also suggested that paints, varnishes, driers and pigments be added to the controlled items list of the Department of Customs (Imports and Exports control). Limiting imports of paint ingredients with high lead content makes lead safe paints and ingredients more cost effective and assists small and medium sized paint manufacturers who may have more difficulty obtaining ingredients at the price and quantities they require.

CEJ published its third study on lead paint, *National Report on Lead in Household Dust in Sri Lanka*, in 2014. Consumer Affairs Authority published a new gazette on labelling requirements of the paint stating that “The Consumer Affairs Authority directs all manufacturers and traders of paints used in the building industry that they shall print legibly the total content of Lead in paint in mg/ kg on the packs of containers of paints...” (Gazette Extra Ordinary No 1875/38 on 15th of August 2014, to take effect from September 1st, 2014).

Materials and Methods

In 2014, Centre for Environmental Justice (CEJ), through the Asia Lead Paint Elimination Project, purchased 15 cans of oil-based paints from 15 brands in stores in Colombo as well as stores in rural areas. Priority was given to paints with green, red and yellow colours. Only enamel and floor paints were chosen for this study.

Paint sample preparation kits containing individually numbered, untreated wood pieces, single-use brushes and stirring utensils made from untreated wood sticks were assembled and shipped to CEJ by staff at IPEN partner NGO, Arnika, in the Czech Republic. Each paint was thoroughly stirred in the can and applied by a separate, unused single-use brush to duplicate, individual, numbered, unused, wood pieces by CEJ staff.

Each stirring utensil and paintbrush was used only once, and care was taken to avoid cross contamination. After drying, the wood pieces were placed in individual plastic bags and shipped for analysis of lead content to Certottica laboratory in Italy. Certottica is accredited by ACCREDIA – the Italian Accreditation System, which is the Italian National Accreditation Body appointed by the State. This laboratory also participates in the Environmental Lead Proficiency Analytical Testing (ELPAT) program operated by the American Industrial Hygiene Association under a program established by the US Environmental Protection Agency.

The laboratory scraped paint off the wood pieces they received. The paint was then weighed into a hot block digestion tube and the paint chips digested according to method CPSC-CH-E1003-09.1. A quantity of paint was removed from the sample by abrasion. The paint was placed in a beaker of borosilicate, in which were added 3 mL of HNO₃ and 1 mL of 30% H₂O₂. The beaker was first covered with a glass and then was heated on a hotplate (surface temperature of approximately 140 ° C, from 85 initially to 100 ° C) until most of the acid evaporated. This treatment was repeated twice more. The beaker containing the sample was removed from the plate and let cool to room temperature. Following the watch glass was

rinsed with a quantity of HNO₃ 10% from 3 to 5 mL and the solution was left to hot evaporate slowly and let cool to room temperature. Finally, it was added 1 mL of HNO₃ to the residue, which was agitated to dissolve the soluble species. The walls of the beaker and the bottom of the watch glass were rinsed and the whole was transferred into a flask and brought to volume with deionized water.

Lead in the digestates was analyzed by an Atomic emission spectrophotometer (ICP-AES), Thermo Scientific iCAP 6000 Series, using yttrium (2 mg/L) as internal standard.

Paint test results and discussion

a. Overall Findings

More than half (8 out of 15 or 53%) of the paints belonging to 15 different brands contained lead concentrations above 600 ppm, the legal standard for lead concentration in decorative paints permitted to be sold within Sri Lanka.

Six out of the 15 samples (40%) contained lead below the 90 ppm (the U.S. and Canadian lead paint standard) indicating that producing paint with low lead levels is possible within Sri Lanka.

b. Lead Concentration by Date of Manufacture

Almost all paints manufactured after the mandatory regulation took effect on January 1, 2013 that were analysed in the study, contained lead concentrations below 600 ppm.

Seven of the eight paints manufactured after January 1, 2013, contained lead concentrations below 600 ppm, and six paints even below 90 ppm.

This data clearly shows that the mandatory limit has had its desired effect. In order to make Sri Lanka's paint market lead safe, priority should be given to eliminating paints manufactured prior to December 2012 from store shelves.

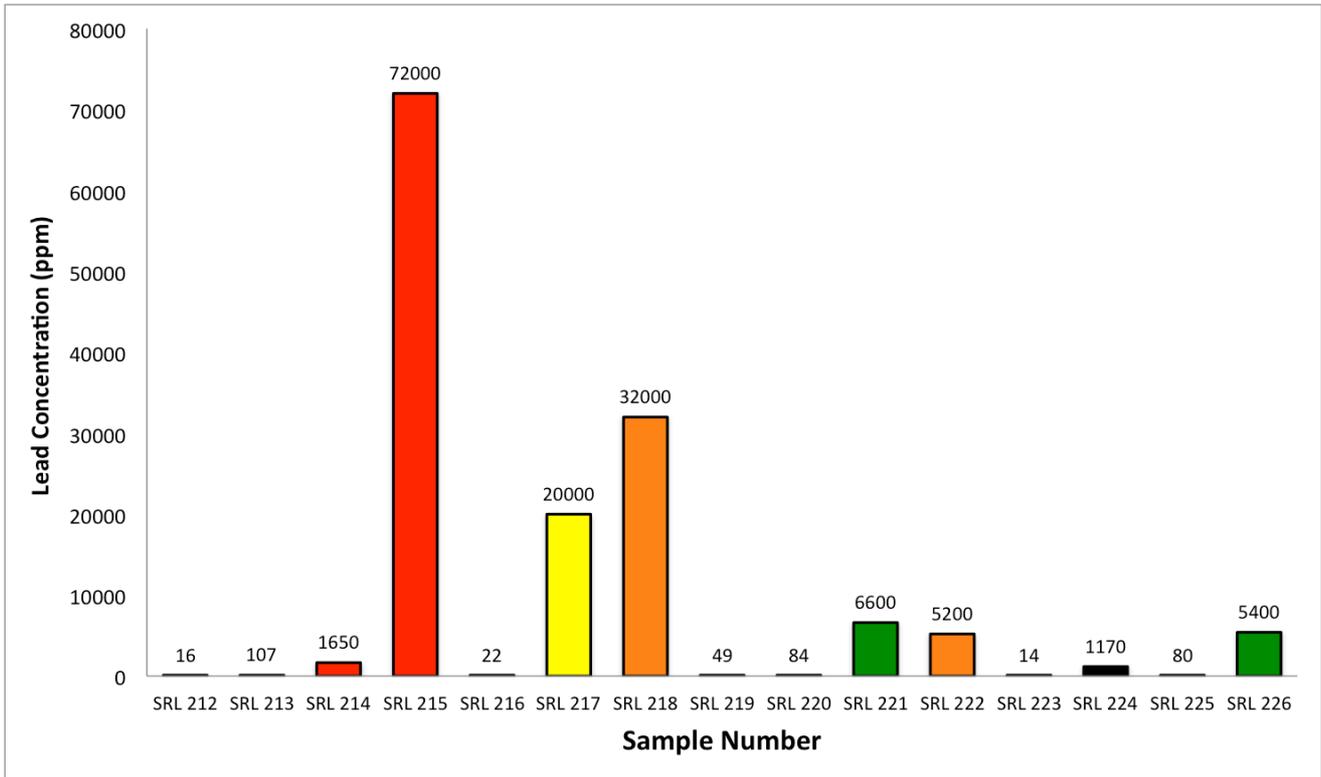


Figure 1: Lead concentration against the date of manufacture. Exact concentration specified on the bar for each paint

c. Lead Concentration by Colour

Brightly coloured paints contained both low and high levels of lead, demonstrating that producing paint with low lead levels is possible within Sri Lanka.

Brightly coloured paints usually contain the highest levels of lead. Therefore, most of the paint sampled were red or orange in colour (Figure 2), and these contained both the highest (72,000 ppm) and the lowest lead concentrations 14 ppm). The green (1 paint), yellow (1 paint) and black coloured paints (2 paints) contained lead levels between 1,100 - 20,000 ppm. However, as shown in Fig 1, manufacture date had more impact on the lead levels than colour, and the results clearly shows that it is possible to produce decorative paints with very low lead content in Sri Lanka.

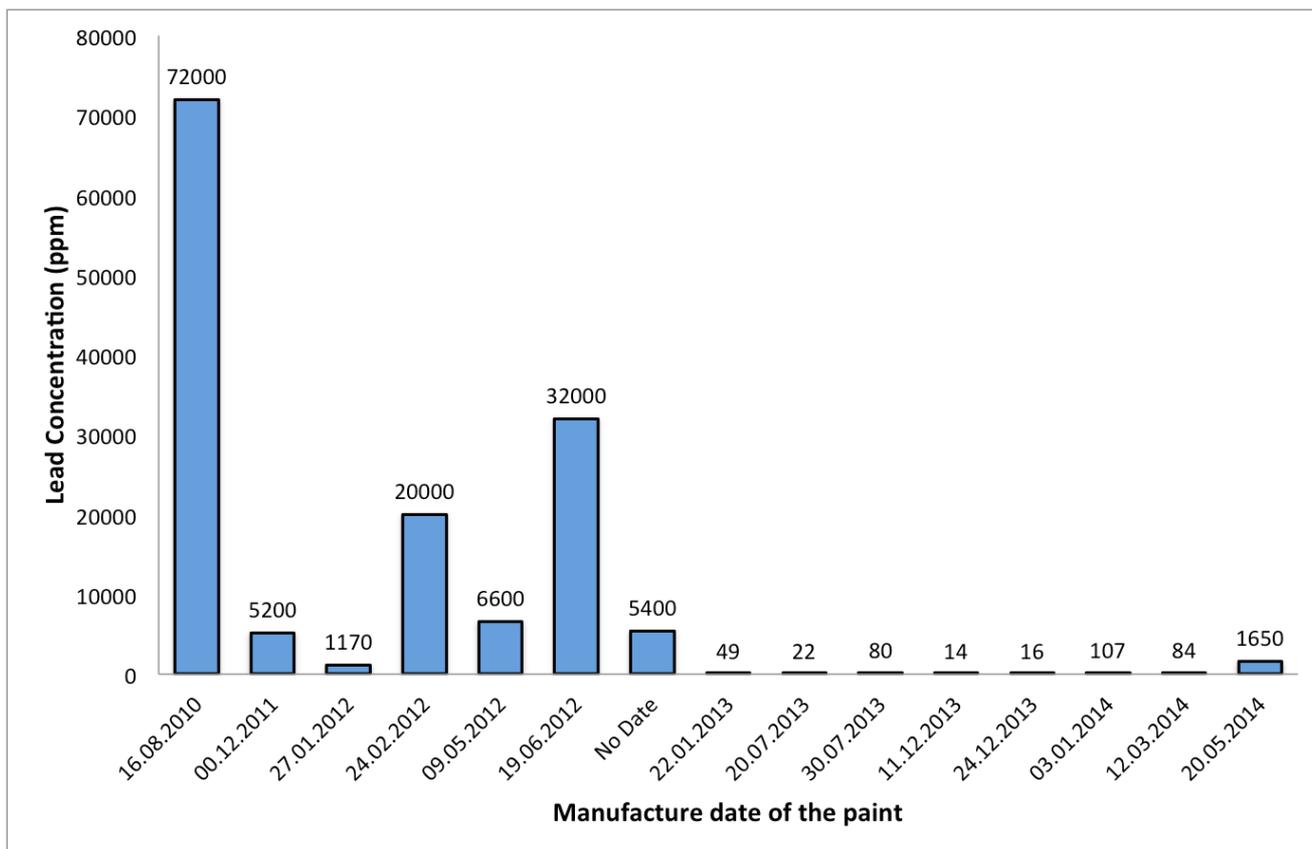


Figure 2: Lead concentration in each paint. Exact concentration specified on the bar for the paint.

d. Lead Concentration and Self-labelling

One paint labelled “LEAD FREE* GUARANTEE *No added Lead, Mercury, Arsenic & Chromium,” contained 1,650 ppm lead. In CEJ’s 2013 paint study, the same brand and colour contained 3,500 ppm of lead. This type of false advertising indicates the need for monitoring lead free claims through a 3rd party certification scheme.

Recommendations

At the National Level

- Enforce the existing laws. Additional effort needs to be taken to make paint manufacturers aware of the paint standard and to regularly monitor paints for lead content.
- Prioritize the removal of old lead paints, which remain on the shelves and available to consumers.
- More strictly monitor paint can label claims, including third party certification. Establish forums where paint manufacturers can get assistance for phasing out the use of leaded materials in their paint production.
- Conduct awareness raising activities among raw material suppliers and paint manufacturers, in order to encourage increased availability and use of lead free raw materials.

- Make available low cost paint testing facilities for small and medium paint manufactures in order to make the newly established law realistic.
- Encourage all government agencies to implement government recommendations to use lead safe paints in offices, buildings and construction
- Implement a blood lead monitoring program, with suitable follow up procedures for children with high blood lead levels

At the consumers level

- Always ask for lead safe paint to protect the health of the children as well as all the members of the family.

At scientific, environmental and health associations' level

- Raise public awareness on health hazards of lead
- Research and aid in safe removal of lead from contaminated sites and buildings

Recommendations to paint manufacturers, vendors, large purchasers, etc.

- Switch to safer non-lead alternatives for paint ingredients. These substitute materials are available in the market at an affordable price.
- Clean the production line with un-lead raw materials and prevent using lead soldered paint cans.
- Support implementation of the existing laws.
- Prevent faulty claim of lead safe.
- Remove and safely dispose of all high lead paint products currently in stores

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