

Global Study to Determine Lead in New Decorative Paints in 10 Countries



Toxics Link

Executive Summary

May 2009

Paints in general are differentiated into decorative or architectural paints and industrial paints. Lead is used in paints mainly as colouring agents. Lead is also used to make paints more durable and corrosion resistant.

Lead based paint in older houses has long been associated with elevated blood lead in children residing within them. Repeated studies have concluded that lead paint is a significant source of lead poisoning.

Several recent studies have indicated the presence of lead in high concentrations in new decorative enamel paints available for purchase by the public in five countries (Van Alphen, 1999¹; Clark et al, 2006²; Adebamowo et al, 2007³; Kumar and Gottesfeld, 2008⁴). There is an urgent need to determine the lead content of paints in other countries to

document the need worldwide for a ban on its continued use. Considering the dangerous effects of lead on human health several countries enacted laws to regulate the lead concentrations in paints. USA recently revised the maximum allowable concentration of lead in new paints from 600 ppm to 90 ppm.

It is also important to determine the extent of the presence of paint and lead-contaminated dust in existing houses in order to develop sound programs to reduce exposure to lead. A pilot study in a cross section of houses in Delhi documented the presence of lead dust in very high levels in many of the houses examined. There is a need for additional such studies elsewhere that also attempt to determine the sources of lead in the dust so that remedial programs will address the major contributing sources of lead that are endangering the children and pregnant women who spend time in these houses.



¹Van Alphen, M. (1999). Lead in paints in water in India. In: George, A. M. (Ed.), Proceedings of the International Conference on Lead Poisoning Prevention & treatment: Implementing a national program in Developing countries, February 8-10, 1999. The George Foundation, Bangalore, India, pp. 265-272

²Clark CS, Rampal KG, Thuppil V, Chen CK, Clark R, Roda S. The lead content of currently available new residential paint in several Asian countries. *Environmental Research* 2006; 102: 9-12. Clark CS, Rampal KG, Thuppil V, Chen CK, Clark R, Roda S. The lead content of currently available new residential paint in several Asian countries. *Environmental Research* 2006; 102: 9-12.

³Adebamowo EO, Clark CS, Roda S, Agbede OA, Sridhar MKC, Adebamowo CA. Lead content of dried films of domestic paints currently sold in Nigeria. *Sci Total Environment* 2007; 388 (1-3): 116-120.

⁴Kumar, A and Gottesfeld, P. (2008). Lead content in household paints in India. *Science of the total environment*, 407(1), 333-337

Although children are known to eat paint chips, more commonly lead paints in and around homes contribute to dust and soil contamination that is often the most significant source of exposure for children. Children then ingest lead from playing close to the ground and having frequent hand-to-mouth contact. Significant exposure may also occur from lead paint when smaller particles become airborne during sanding and scuffing while repainting and remodeling. In addition, damaged paint and the weathering of paints on the exterior of buildings also contribute to lead in soil.

In the United States, health authorities recommend a public health intervention when a child is found to have a blood lead level of $10 \mu\text{g}/\text{dl}$ or more. Recent body of literature points out that there may be no safety margin at existing exposures and that children exposed to even $< 10 \mu\text{g}/\text{dl}$ have also shown intellectual impairment. Young children (below 6 years old) are recognized as the most susceptible to lead exposure even at low levels. Pregnant women are the

second most vulnerable group. Lead also crosses the placenta and reaches the developing fetus.

The sixth session of the Intergovernmental Forum on Chemical Safety (IFCS) held from 15–19 September 2008 in Dakar, Senegal adopted a unanimous resolution to eliminate lead from paints worldwide.

Toxics Link and International POPs Elimination Network (IPEN) decided to work with other partner organisations in various regions of the world to determine the total lead (Pb) concentration in new decorative paints available in various developing countries in the world in order to know the amount of lead being used in developing countries.

Following 10 countries were selected for sampling.

- i) Sri Lanka from South Asia
- ii) Philippines and
- iii) Thailand from South East Asia
- iv) Tanzania,
- v) South Africa,



- vi) Nigeria and
- vii) Senegal from Africa
- viii) Belarus from East European Countries
- ix) Mexico and Brazil from Latin America

Samples were received during the months of November 2008 to February 2009. A total of 317 paint samples, which included 26 samples from India were further processed for lab analysis.

Samples were analysed as according to Standard Operating Procedures for Lead in Paint by Hotplate or Microwave-based Acid Digestions and Inductively Coupled Plasma Emission Spectroscopy, EPA, PB92-114172, Sept. 1991; SW846-740 (US EPA, 2001)

KEY FINDINGS

1. Overall 317 paint samples, which included 232 enamel samples, 78 plastic samples and 7 varnish samples, were analysed for total lead concentrations.
2. Taking all samples together 53 % samples were found to have lead concentrations more than 90 ppm while 50 % samples had lead concentrations more than 600 ppm.
3. 68.5 % of enamel samples had lead concentrations more than 90 ppm while 64.6% of enamel samples had lead concentrations more than 600 ppm.
4. Only 10 % of plastic paint samples had concentrations more than 90 ppm.
5. The overall average of lead concentrations was 18220 ppm while for enamel samples the average was 23707 ppm. For plastic samples, the average was 1508 ppm.
6. Taking all samples together, 50 % of samples had lead concentrations more than 1541 ppm. In case of



enamel samples the median lead concentration was 3914 ppm. In case of plastic samples, the median lead concentration was 8.6 ppm, which implied that 50 % of plastic samples had lead concentrations more than 8.6 ppm.

7. The lead concentration was found to vary from 0.6 ppm to 505716 (51%). In most of the cases the highest concentration of lead was found in yellow colour enamel sample.

CONCLUSIONS

Some of the major conclusions that can be drawn from the present are stated below.

1. The average new paint lead concentration in the ten counties studied ranged from 4091 ppm to 38,970, many times higher than the recommended limit of 90 ppm. For seven of the countries, the average was greater than 10,000 ppm

2. With a few exceptions, all water-based plastic paint samples had low lead concentrations; often below 90 ppm

3. Majority of oil-based enamel paint samples had lead concentration higher than 90 ppm.

4. Presence of small amount of lead in majority of plastic samples may be due to the background impurities present in the raw materials itself.

5. There is little difference in percentage of samples having lead concentrations more than 90 ppm and percentage of samples having lead concentrations more than 600 ppm. However, this is not the case for some plastic paints, which contained lead levels as high as 45,700 ppm.

6. It is obvious that alternatives to lead in paints exist, as there are few brands, which have low lead concentrations even in their enamel products.

7. There is a general lack of awareness on the whole issue of lead in majority of countries, which participated in the present study.

8. In the absence of any mandatory standard for lead in paints, industries, big and small, are indulging with lead without caring for its environmental and health impacts.

Statistical measurements of lead concentrations of all samples taken together

Countries	Arithmetic Mean (ppm)			Maximum lead Concentration (ppm)			Minimum Lead Concentrations (ppm)			Median (ppm)		
	All Samples	Enamel Samples	Plastic Samples	All Samples	Enamel Samples	Plastic Samples	All Samples	Enamel Samples	Plastic Samples	All Samples	Enamel Samples	Plastic Samples
Sri Lanka	15926.9	25209.8	4176.7	137324.6	137324.6	45743.1	3.7	3.7	5.8	34.4	5137.4	17.75
Philippines	17016.4	28353.6	10.7	189163.5	189163.5	40.2	0.6	3.4	0.6	40.2	3198.6	8.7
Thailand	38970.5	61892.7	2.7	505715.6	505715.6	14.9	0.6	0.6	0.6	2.2	34.8	0.6
Tanzania	11187.3	14536.9	22.2	120862.1	120862.1	40.2	12.7	193.2	12.7	3631.5	4130.5	18.6
South Africa	19861.6	19861.6		195289	195289		2.7	2.7		10.8	10.8	
Nigeria	30332.1	36989.5	8457.9	129837	129837	34597.7	2898.4	4635.7	2898.4	13394.2	23865.7	4560
Senegal	4108.1	5866.4	5.5	29716.7	29716.7	28.7	0.6	0.6	0.6	1614.6	2771.4	2.7
Belarus	4091	5557.5	58.2	59387.2	59387.2	418.1	0.6	0.6	0.6	570.9	1677.7	1.7
Mexico	34575.3	51860.1	5.6	163811.8	163811.8	15.9	0.6	22758.5	0.6	30204.2	45613.6	4.4
Brazil	11618.3	15004.1	9.8	170258.4	170258.4	14.4	0.6	0.6	0.6	16.4	39.6	12.4
India	7966.3	9410.6		49592.8	49592.8		0.6	8.1		24.7	24.7	
All	18220.3	23707.1	1508.45	505715.6	505715.6	45743.1	0.6	0.6	0.6	1541.2	3914.2	8.6

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RECOMMENDATIONS

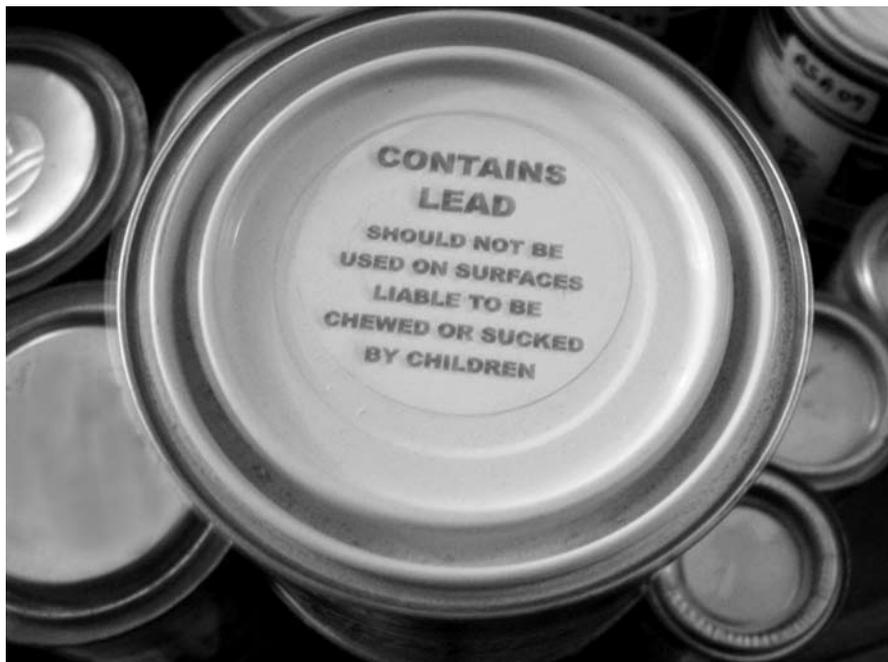
That the problem, which is completely solvable, and is a major source of exposure to children, needs to be tackled through a global effort involving all stakeholders. Accordingly the ICCM2 should resolve to move in this direction.

1. Raising awareness of the problem, especially in developing countries, with all stakeholders.

2. Devising national regulations for limiting lead concentrations in paints, which could be adopted by developing countries.

3. It is also important to determine the extent of lead contamination due to legacy usage of lead in order to develop sound programs to reduce exposure to lead.

4. A proper monitoring plan to ensure that industries and the trade comply with standards and that lead based paints neither be manufactured nor exported or imported.



5. To help developing countries with technical and financial resources to help solve the problem in the future as well as develop capacity to deal with the problem as it exists today.

Percentages of Samples by Country with Concentration greater than 90 ppm and 600

Countries	No of Enamel Samples	No of Plastic Sample	Total No. of samples	% of sample having lead concentrations more than 90 ppm			% of sample having lead concentrations more than 600 ppm		
				All Samples	Enamel Samples	Plastic Samples	All Samples	Enamel Samples	Plastic Samples
Sri Lanka*	19	11	33	45.00%	68.00%	10.00%	45.00%	68.00%	10.00%
Philippines	15	10	25	40%	67.00%	0%	36%	60%	0%
Thailand	17	10	27	30%	47%	0%	30	47	0%
Tanzania	20	6	26	77%	100%	0%	73%	95%	0%
South Africa	29	0	29	65%	65%		62%	62%	
Nigeria	23	7	30	100%	100%	100%	100%	100%	100%
Senegal	21	9	30	60%	86%	0%	53%	76%	0%
Belarus	22	8	30	60%	82%	0%	50%	68%	0%
Mexico	20	10	30	67%	100%	0%	67%	100%	0%
Brazil	24	7	31	32%	42%	0%	28%	37%	0%
India**	22	0	26	31%	36%		31%	36%	
All	232	78	317	53%	68.50%	10.20%	50%	64.60%	10.20%

* 3 varnish samples are included in the total number of samples

** 4 varnish samples are included in the total number of samples

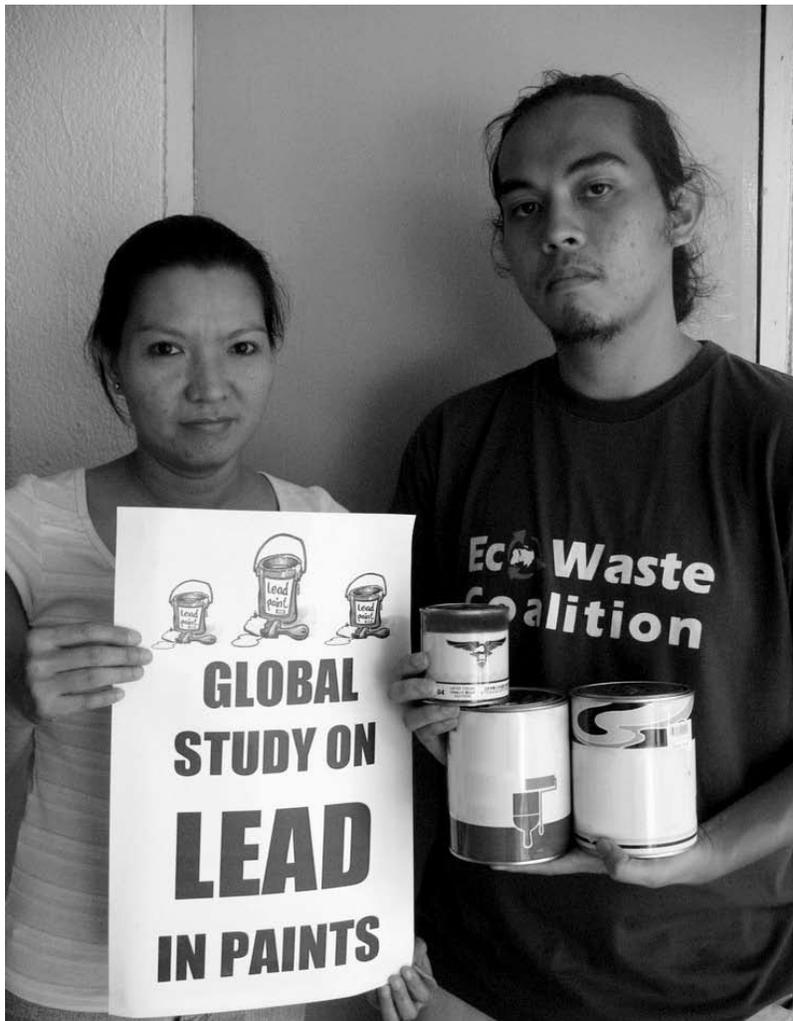
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ABOUT TOXICS LINK

Toxics Link is an information outreach and environmental advocacy organization set up in 1996. It has a special emphasis on reaching out to grassroots groups and community based organization. The areas of its engagements include research, outreach and policy advocacy on issues of communities and urban waste, toxics free healthcare, hazardous waste and pesticides.

Toxics Link works closely with all stakeholders working on similar issues and has been conducive to the formation of several common platforms for them. It also networks internationally and is part of international networks working on similar issues.

The mission of the organization is to:

“Working together for environmental justice and freedom from toxics. We have taken upon ourselves to collect and share both information about the sources and dangers of poisons in our environment and bodies, and information about clean and sustainable alternatives for India and rest of the world”





Toxics Link
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