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Lead in new paints in Nepal ☆

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ABSTRACT

Samples from 75 paint products made by 21 domestic and foreign manufacturers were purchased from retail stores in five major cities in Nepal and tested for lead content. Information provided on product labels were noted. Samples were selected to be representative of the large number of brands and colors available in retail shops. Although a majority of the products purchased were manufactured in Nepal, paints from four additional countries were tested. Out of a total of 75 samples, 57 (76%) of the tested paints contained lead at concentrations greater than 90 ppm (ppm). Ninety-three percent of the paints that exceeded 90 ppm had levels in excess of 600 ppm. Lead concentrations in the tested paints ranged up to 200,000 ppm (20%) lead by weight and the median concentration was 5100 ppm. These results indicate that lead paint is commonly being sold for residential and other consumer applications in Nepal without any consumer warnings. Regulations are needed to specify the maximum concentration of lead allowed in paint products manufactured, imported, or distributed in the country to protect public health. Efforts must be made to get lead-containing paint products recalled from stores so that they are not used in homes, schools, and other child-occupied facilities.

1. Introduction

Lead paint is a major source of childhood lead exposure. As paints deteriorate or are subject to friction or impact, they release fine lead particulates into the dust and soil around homes. In homes where lead paint is present, children generally get most of their exposure from dust and soil contamination (World Health Organization, 2010). Lead paint is also used in schools and other child occupied facilities where it contributes to exposures. Workers involved in painting and other construction tasks where lead paint is disturbed can be highly exposed and are a potential source of take-home exposures that can impact their children.

Given the widespread use of paints in homes and other facilities where children can be directly exposed, and the long-term hazard that such uses of lead pose, the removal of lead paint from the market should be a public health priority. In 2009 the UN launched the Global Alliance to Eliminate Lead in Paints (GAELP) with the objective of phasing out the manufacture and use of paints containing lead (United Nations Environment Program (UNEP), and World Health Organization (WHO)).

Lead paint in homes remains in place for decades after first application. In the U.S. approximately 35% of all homes contain lead based paint despite the 1978 restriction on its use in residential properties (U.S. Department of Housing and Urban Development, 2011). In addition, homes with lead based paint on the interior or exterior are more likely to have contaminated lead dust and soil levels above U.S. Environmental Protection Agency (EPA) clearance levels (U.S. Department of Housing and Urban Development, 2011). Children's exposure is also more closely correlated to dust lead levels in homes than other sources (Lanphear et al., 2005; Levallois et al., 2013).

Disturbing lead paint during renovations and in preparing surfaces for painting can cause significant exposures to workers and result in dust contamination in homes. Even manual sanding of painted surfaces can result in airborne lead exposures that are ten times the U.S. Occupational Safety and Health Administration (OSHA) permissible exposure limit (Zhu et al., 2012). Scraping paint also resulted in an average exposure above the PEL (Zhu et al., 2012). Renovation and painting in homes with lead paint can contribute significantly to lead contaminated dust in and around homes unless precautions are taken to thoroughly clean these surfaces (Reissman et al., 2002). One study of wood floor refinishing in homes in the U.S. showed that 70% of the homes had dust

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lead levels on floors exceeding the U.S. EPA clearance levels of 40 μg/ft^2 (Schirmer et al., 2012). In the U.S. a substantial number of children reported with elevated blood lead levels (> 20 μg/dL) were linked to renovation projects involving sanding, scraping, or removing of paint and painted structures in homes built before the 1978 restrictions (Palome et al., 2009).

The term *paint* is used to cover a broad range of specific product types including varnishes, lacquers, stains, enamels, glazes, primers and other coatings. Paint is typically a formulated mixture of resins, pigments, fillers, solvents, and other additives. Lead compounds are added to paint typically as driers or pigments to serve a number of purposes including enhanced color, improved drying, and corrosion resistance.

Safer substitutes are available for all lead compounds used in paint formulations. In some cases these substitutes may be more expensive or less readily available to paint manufacturers. However, the small differences in cost for some raw ingredients used in unleaded paints are generally not accounted for in retail pricing of the finished product (Clark et al., 2009).

Several countries regulate the lead content of new paints including U.S., China, Australia, and Canada. Currently there are no health-based standards for lead concentrations in paint, but there is consensus that paints without added lead compounds have lead concentrations less than 90 ppm (United Nations Environment Program (UNEP), and World Health Organization (WHO), 2011). The U.S. uses 90 ppm as the criteria for paints on homes and other child-occupied structures (U.S. Consumer Product Safety Commission). China also regulates paints at 90 ppm, but it is soluble, not total, lead content (Lin et al., 2009). Canada uses the 90 ppm limit for total lead (Government of Canada, 2013). Among other developing countries, Sri Lanka has a two-tiered standard of 90 and 600 ppm for lead content depending on the paint application (Democratic Socialist Republic of Sri Lanka, 2011). As a result, 90 ppm is becoming the de facto global standard.

2. Material and methods

Samples were purchased in 2012 from retail shops located in five major cities/towns in Nepal including Kathmandu, Bhaktapur, Lalitpur, Tatopani and Birjung. A total of 73 samples of commercially available paint intended for decorative/architectural applications and two for auto body repair were collected. These samples included paints from 21 different companies covering both domestic and imported products. Seventy-six percent of all paints tested were made in Nepal with the rest coming from four additional countries including India, China, Thailand and the U.S.

A survey was conducted of paint labelling information to determine the country of origin, presence of any listed ingredients, warning labels, or any specified lead content. The manufacture, country of origin, and expiration date was also recorded if available. In addition, paint labels with the Nepal Quality Certification Mark (NS) and/or any self-certification label were noted. The size and retail price of the paint products purchased were also recorded.

A stratified sampling plan was devised to ensure that selected paints were representative of most available brands from both foreign and domestic manufacturers. In all but two cases, multiple colors of each brand were selected. Individual colors were selected based on availability with a preference for red, yellow, green and blue paints and with the goal of including samples from all common colors and from a wide range of brands available in Nepal. Table 1 lists the paint manufacturers, colors, and numbers of samples tested and Table 2 shows the breakdown of paint samples purchased by country of origin.

Purchased paints were transported to the offices of LEADERS Nepal in Kathmandu for processing. Paint samples were prepared by applying paints on a clean glass surface of approximately 12 cm × 12 cm with a new brush and left for at least 72 h to dry. The dried paint was then scrapped off with a clean razor and put directly into a new pre-labeled plastic bag. A new pair of disposable gloves was used when applying each paint sample and in scraping dried paints off the glass to minimize cross-contamination.

All samples were labeled with a unique identification number and sent by a commercial express shipper to Occupational Knowledge International (OK International) in San Francisco, USA. Samples were then forwarded via overnight shipment to Forensic Analytical Laboratories (USA) for lead analysis. Samples were prepared by EPA method 3050B for analysis with atomic absorption by EPA method 7420 by Atomic Absorption for total lead content.

Table 1
Paint manufacturers and the number of products/colors tested from each.

Name of paint manufacturer	No. of samples tested	Color(s) tested
Nepal Paint Industries Pvt. Ltd	2	Red, blue
Pashupati Paints Pvt. Ltd		Blue, yellow, green, red
	6	Brown (metal primer), yellow (emulsion)
Yeti Paints Nepal Pvt. Ltd	3	White, black, red
Nepal Shalimars Paints Industry	4	Blue, yellow, green, red
Asian Paints Nepal Pvt. Ltd	5	Blue, yellow, green, red, yellow/emulsion
Berger Johnson & Nicholson Nepal	4	Blue, red, green, yellow
Rukamani Chemicals Pvt. Ltd	4	Blue, red, green, yellow
Reliance Paints Pvt. Ltd	4	Blue, red, green, yellow
Mahalaxmi Pulverising Industry	4	Blue, red, green, yellow
Apollo Paints Pvt. Ltd	4	Blue, red, green, yellow
G7 Paints (P) Ltd	3	Red, brown, green
Shalimar Paints Industry, India	4	White, yellow, brown, red (auto)
Dalmia Paint & Chemicals Industries	4	Blue, black, green, red
ICI, DULUX,	1	Brown
HATO, Thailand	5	Blue, yellow, red, green, golden
Kansai Nerolac Paints Limited, Mumbai	4	Blue, yellow, red, green
Jashmin Paints (P) Ltd	4	Black, brown, green, red
Baba Paint (P) Ltd	3	Black, yellow, green
Gupta Paint Indus., India	3	Blue, yellow, green
Tirupati Balaji Paints & Chemical	3	Blue, chocolate, green
Chinese Auto Paints Outdoor	1	Silver (auto)

Table 2
Country of origin for paint samples tested.

Country of origin	No. of samples	No. of companies
Nepal	57	15
India	11	3
Thailand	5	1
China	1	1
USA	1	1
Total	75	21

3. Results

The results for all 75 paint samples are summarized in Table 3 and Table 4 provides results for individual samples by manufacturer, country of origin and color. Out of a total of 75 samples, 57 (76%) of the tested paints contained lead at concentrations greater than 90 ppm (ppm). In addition, 53 (93%) of these paints with lead concentrations above 90 ppm had levels in excess of 600 ppm with concentrations ranging up to 200,000 ppm or 20% lead by weight. The median lead concentration of all paints tested was 5100 ppm.

The results indicate that lead is present at levels above the U.S. regulatory level of 90 ppm in at least one sample of each color paint tested except where only a single brand of a specialty color was tested (i.e. golden). Since lead is added to paints both in pigments (for color) and in drying agents, color alone is not sufficient to predict its lead concentration. Table 3 shows the range of results for each color, the 25th, 50th, and 75th percentiles for colors with multiple samples, and indicates that for most colors there are alternatives without added lead available on the market.

Most of sampled paint cans listed a manufacture date and expiration date on the label, and we observed that some of the products purchased for this study had expired but were still being sold in stores. However, the expiration date alone is not a predictor

Table 3
Range of lead concentrations in paint samples (ppm) by paint color.

Color	Number of samples	Mean	25th Percentile	50th Percentile	75th Percentile	Minimum	Maximum
Red	16	21,163	4825	8300	33,000	70	67,000
Yellow	15	54,755	70	51,000	88,000	60	200,000
Green	16	26,306	2900	24,500	48,500	60	68,000
Blue	14	6990	70	1800	3775	60	41,000
Chocolate	1	–	–	–	–	–	4200
White	2	10,200	–	–	–	4400	16,000
Brown	5	7032	100	2000	14,000	60	19,000
Silver	1	–	–	–	–	–	190
Golden	1	–	–	–	–	–	70
Black	4	3448	1173	3400	5675	190	6800

Table 4
Lead concentration in paint samples by manufacturer.

Sample ID	*Manufacturer*	*Country of origin*	*Color*	*Lead (ppm)*
P201211085	Apollo Paint Pvt LTD	Nepal	Red	22,000
P201211086	Apollo Paint Pvt LTD	Nepal	Yellow	31,000
P201211087	Apollo Paint Pvt LTD	Nepal	Blue	1200
P201211088	Apollo Paint Pvt LTD	Nepal	Green	11,000
P20121081	Asian Paints	Nepal	Green	80
P20121082	Asian Paints	Nepal	Yellow	70
P20121083	Asian Paints	Nepal	Red	70
P20121084	Asian Paints	Nepal	Blue	70
P201211025	Asian Paints	Nepal	Yellow	70
P201211081	Baba Paints Nepal Ltd	Nepal	Green	48,000
P201211082	Baba Paints Nepal Ltd	Nepal	Yellow	87,000
P201211083	Baba Paints Nepal Ltd	Nepal	Black	5300
P201210161	Berger Johnson & Nicholson Nepal	Nepal	Blue	70
P201210162	Berger Johnson & Nicholson Nepal	Nepal	Yellow	200,000
P201210163	Berger Johnson & Nicholson Nepal	Nepal	Red	11,000
P201211024	Berger Johnson & Nicholson Nepal	Nepal	Green	59,000
P201211221	NA	China	Silver	190
P201210160	Dalmia Paint & Chemicals Industries	Nepal	Red	53,000
P201210167	Dalmia Paint & Chemicals Industries	Nepal	Green	50,000
P201210168	Dalmia Paint & Chemicals Industries	Nepal	Black	1500
P201210169	Dalmia Paint & Chemicals Industries	Nepal	Blue	2400
P20121013	ICI, DULUX	NA	Brown	60
P201210194	G7 Paints (P) Ltd	Nepal	Red	30,000
P201210195	G7 Paints (P) Ltd	Nepal	Green	30,000
P201210196	G7 Paints (P) Ltd	Nepal	Brown	19,000
P201210124	Gupta Paint Industries	India	Green	68,000
P201210125	Gupta Paint Industries	India	Yellow	62,000
P201210126	Gupta Paint Industries	India	Blue	41,000
P20121011	HATO	Thailand	Yellow	60
P20121012	HATO	Thailand	Red	70
P20121014	HATO	Thailand	Blue	70
P20121015	HATO	Thailand	Green	60
P201211051	HATO Paint Industries, Thailand	Thailand	Golden	70
P201211026	Jasmine Paints (P) Ltd	Nepal	Black	190
P201211027	Jasmine Paints (P) Ltd	Nepal	Red	42,000
P201211028	Jasmine Paints (P) Ltd	Nepal	Green	3000
P201211029	Jasmine Paints (P) Ltd	Nepal	Brown	100
P201211052	Kansai Nerolac India Ltd	India	Yellow	70
P201211053	Kansai Nerolac India Ltd	India	Red	70
P201211054	Kansai Nerolac India Ltd	India	Blue	70
P201211055	Kansai Nerolac India Ltd	India	Green	60
P201210190	Mahalaxmi Paint Industries	Nepal	Red	60,000
P201210191	Mahalaxmi Paint Industries	Nepal	Yellow	62,000
P201210192	Mahalaxmi Paint Industries	Nepal	Green	28,000
P201210193	Mahalaxmi Paint Industries	Nepal	Blue	60
P20121080	Nepal Paints Ind. P. LTD	Nepal	Blue	420
P20121089	Nepal Paints Ind. P. LTD	Nepal	Red	4300
P201211056	Pashupati Paint Industries	Nepal	Yellow	60
P201211057	Pashupati Paint Industries	Nepal	Green	38,000
P201211084	Pashupati Paint Industries	Nepal	Brown	2000
P201210121	Pashupati Paint P. LTD	Nepal	Blue	4100
P201210122	Pashupati Paint P. LTD	Nepal	Red	28,000
P201210123	Pashupati Paint P. LTD	Nepal	Yellow	51,000
P20121085	Reliance Paints	Nepal	Yellow	89,000
P20121086	Reliance Paints	Nepal	Blue	39,000
P20121087	Reliance Paints	Nepal	Green	21,000

Table 4 (*continued*)

Sample ID	*Manufacturer*	*Country of origin*	*Color*	*Lead (ppm)*
P20121088	Reliance Paints	Nepal	Red	67,000
P201210120	Rukamani Chemical Industries	Nepal	Red	5100
P201210127	Rukamani Chemical Industries	Nepal	Yellow	19,000
P201210128	Rukamani Chemical Industries	Nepal	Blue	2800
P201210129	Rukamani Chemical Industries	Nepal	Green	3100
P201211222	Shalimar Paint Industries, India	India	Red	5600
P201210197	Shalimar Paints LTD, India	India	White	16,000
P201210198	Shalimar Paints LTD, India	India	Brown	14,000
P201210199	Shalimar Paints LTD, India	India	Yellow	130,000
P201211021	Shalimar Paints Nepal	Nepal	Yellow	90,000
P201211022	Shalimar Paints Nepal	Nepal	Blue	4200
P201211023	Shalimar Paints Nepal	Nepal	Red	5400
P201211020	Shalimar Paints Nepal	Nepal	Green	59,000
P201211050	Tirupati Balaji Paints & Chemical	Nepal	Chocolate	4200
P201211058	Tirupati Balaji Paints & Chemical	Nepal	Green	2600
P201211059	Tirupati Balaji Paints & Chemical	Nepal	Blue	2400
P201210164	Yeti Paint Industries	Nepal	White	4400
P201210165	Yeti Paint Industries	Nepal	Black	6800
P201210166	Yeti Paint Industries	Nepal	Red	5000

of the lead content. In some cases older paints identified from labeling information (but still available in stores) from some manufacturers contained lead after the company indicated that it had reformulated to stop adding lead. In these cases it appears that companies never made an effort to remove these products, or have failed to recall these older products, from store shelves.

From previous studies we know that water-based paints are less likely to contain significant concentrations of lead, and therefore we included only two samples of emulsion paints and the remaining samples were enamel paints (Kumar and Gottesfeld, 2008). Results confirmed that both products were below the U.S. standard of 90 ppm. One sample of a metal primer was tested and the lead content was 2000 ppm. Two paints labeled as auto paints were also tested with one having a lead content of 190 ppm and the other with 5600 ppm. The imported paints were found to have a higher average lead level of 24,826 ppm than domestic brands with an average level of 18,747 ppm.

4. Discussion

Test results indicate that majority of enamel paints sold in Nepal contain unsafe levels of lead that will impact children's health and contribute to environmental contamination. As paint consumption in Nepal increases along with new construction and renovations, more lead paint is likely to applied in homes and other child-occupied facilities until actions are taken to restrict the use of these products.

Although lead affects both children and adults, in general the same exposure is more harmful to children than adults. For children, the neurological effects are often irreversible and can have a lifelong impact. Lead also affects cardiovascular function in adults and is associated with 674,000 deaths annually (Lim et al., 2012).

4.1. Impact on children

Children's exposures to lead are often higher than adults. Even before birth, the fetus is exposed to lead from the mother throughout pregnancy (World Health Organization, 2010). As children play close to the ground and have more hand-to-mouth behavior, they ingest more lead than an adult would while living in the same environment. Children also generally absorb more lead than adults do (World Health Organization, 2010). Nutritional deficiencies also increase the absorption rate for both children and adults.

The recognized clinical symptoms of moderate level lead exposure in children are wide ranging and include abdominal pain, headache, anemia, and arthralgia (pain in the joints) (California Department of Public Health Occupational Lead Poisoning Prevention Program, 2009). Lead absorbed into the body enters the blood stream and is transported to the bone and soft tissue. Lead in blood and soft tissue has a half-life measured in days, whereas in bone it is stored for years (California Department of Public Health Occupational Lead Poisoning Prevention Program, 2009).

Even low-level lead exposures harm children and are associated with reduced school performance, attention-related behaviors, higher rates of crime, and contribute to cardiovascular disease (Needleman et al., 1996; Navas-Acien et al., 2007). These effects impose a significant cost on Nepal due to the relationship between educational attainment and a loss of lifetime earnings, increased health care costs, and costs due to higher crime rates associated with low level lead exposures. A recent study estimated that the costs of lead poisoning totals almost $700 billion dollars in Asia annually or approximately 1.9% of GDP (Attina and Trasande, 2013). Such costs are generally not borne by the paint manufactures who add lead compounds to their products nor on importers of these paints.

4.2. Lead paint formulation

Paints, whose formulation does not include the use of any intentionally added lead compound may still contain lead as a trace contaminant. In these cases, however, the lead content of such paints is generally less than 45 ppm (United Nations Environment Program (UNEP), and World Health Organization (WHO), 2011). When paints contain more than 90 ppm lead, it is apparent that one or more lead compound was used in the paint's formulation. Therefore it is clear that most of the paints tested contain lead compounds that are intentionally added.

The lead paints available in Nepal are intended for residential use. Our survey indicates that these paints are sold in small quantities in retail shops around the country. The wide availability and relatively low price of these products will ensure that they are applied broadly in a range of housing and other child-occupied facilities throughout Nepal.

The testing conducted indicates that both small and large paint companies are producing lead paints. Only three of the 21 paint companies whose products were tested had lead levels below 90 ppm in all their products tested. Two out of these three

companies are making these paints outside of Nepal. However, the average concentration of lead in paints appeared to be higher in imported products being sold in Nepal than those that were manufactured in the country.

In the case of Berger Paints, three out of the four products tested had excessive levels of lead measuring in the thousands of parts per million. Although the company has stated that it reformulated in July 2011, the three cans tested with higher levels were all manufactured in 2010 according to the label information (personal communication with Mr. Subrato Ghosh, country manager of Berger paints Nepal, March 25, 2013). This situation underlines the need for responsible companies to not just reformulate but to recall products remaining on store shelves. It is not uncommon for paints to remain in stores for years before they are purchased by consumers and since there is no information on these cans indicating the lead content, it is difficult for consumers to differentiate between the lead-containing paints and reformulated paints.

4.3. Information and labeling gaps

The wide availability of lead paints in Nepal suggests that these products may also be applied to other commercial products such as toys or furniture that come into contact with children. This raises significant liability for manufacturers of these products who unknowingly apply lead paint to products that will contribute to a child's lead exposure. To the extent that such products are exported, there is a potential liability and reputational risk to the country's brand and image if lead coatings are discovered on products imported from Nepal.

The survey of paint labeling practices revealed that none of the 75 products contained any information on ingredients or the lead content. In addition, none provided warning labels on the hazards of lead to children, nor the dust hazards created when previously painted surfaces are disturbed by sanding or scraping in preparation for repainting.

Other studies have examined the lead content of paint and compared prices of those products with and without added lead compounds available in the same markets at a comparable retail price (Kumar and Gottesfeld, 2008). In this study we collected price information but found that there was a wide disparity in price depending on if paints were locally made or imported. With further investigation we found that a standard import duty of 30% is imposed on paints from most countries outside of Nepal, but the regulations impose at least three different rates depending on the country of origin (Ministry of Finance Government of Nepal, 2013). Given this structure we abandoned efforts to evaluate the retail price of paint based on lead content.

Paints with certification under the Nepal Quality Certification Mark (NS) were found to have significant lead concentrations in excess of 90 ppm. Although this certification has no criteria for lead content, it may be misleading to consumers who could assume that quality paint products complying with government certification requirements do not contain hazardous levels of lead.

The barriers that national paint manufacturers face to eliminate the use of lead pigments and lead dryers in their paint formulations are minimal as no costly capital investments are generally needed. In addition, these new formulations are not technically difficult to manufacture.

5. Conclusions and recommendations

The lead compounds used in paints pose a risk to human health and are a source of environmental contamination. Given that this study identified concentrations of lead in the tested paints up to 200,000 ppm (20%) lead by weight, we know that there are serious potential exposures to workers from applying and removing these products. In addition, children in homes with lead paint are more likely to be exposed directly to the paint, as well as to higher levels of lead in dust and soil that can be present in and around homes where these paints are applied.

Current labeling practices are insufficient to inform consumers and workers of the hazards associated with these paint products. Safer substitutes for the lead pigments and lead drying agents are available for paint manufacturing. However, given the current lack of awareness about the hazards of lead paint and the absence of any regulatory mechanism, there is little incentive for companies to voluntarily stop the use of these additives.

5.1. Recommendations

There is an immediate need in Nepal to adopt an appropriate national legal instrument to prohibit the manufacture, import, export, sale and use of lead paint. Labeling practices are inadequate to inform consumers about which paints contain lead compounds and none provide hazard warnings. Existing certification criteria of the National Bureau of Standards and Metrology must be revised to require that paints, stains, varnishes, or other coatings displaying the Nepal Quality Certification Mark (NS) be independently tested by a third party to demonstrate that the lead concentration in the product is less than 90 ppm. Paint manufacturers and importers should also be required to immediately recall all lead containing paint products from stores so that they are not used in homes, schools, and other child-occupied facilities.

Industrial hygienists must ensure that precautions are taken in working with these paints to minimize lead exposures. There is particular concern with sanding and scraping lead paint while preparing older paint surfaces for new paint applications. Workers must also be trained to utilize safe work practices to minimize their exposures and to clean up residual lead contaminated dust after renovation and painting projects are complete.

There is a need for an awareness campaign to inform consumers about the hazards of lead paint and to enable them to demand paint products without added lead. New regulations are needed to govern the labeling of new paints to include information on the lead content and the potential hazards of disturbing painted surfaces.

Given the wide availability of lead paint along with the presence of alternatives on the market, architects, engineers, purchasing agents, and government tenders should specify on plans and in construction documents the maximum lead concentration allowed for paints and other coatings in new construction or renovation projects. Such actions can be taken before laws or government regulations take effect.

5.2. Need for blood lead testing

There is no ongoing medical surveillance program and we know of no current data on blood lead levels among children in Nepal. There is also no published information on soil or dust contamination in or around homes in Nepal with lead paint. However, we know that lead exposure from paint is a major source of children's exposure in countries where studies on exposure sources and blood lead have been conducted. In Nepal we need to encourage testing to identify children at risk of lead poisoning. However, any increase in testing will require investments on the part of hospitals and other testing laboratories to acquire the equipment and expertise to test for lead in blood.

Public health prevention policies dictate the need for immediate action to reduce the long-term potential lead exposures and subsequent health impacts imposed by the use of lead paints in

Nepal. Action is needed to minimize the magnitude of this risk by asking companies to withdraw hazardous paint products from the market and to reformulate all new paint production.

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