LEAD IN ENAMEL DECORATIVE PAINTS

NATIONAL PAINT TESTING RESULTS: A NINE COUNTRY STUDY

UNEP

IPEN
a toxics-free future

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This publication is a contribution to the Global Alliance to Eliminate Lead Paint.

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- Ecological Restorations in Ghana
- Jeunes Volontaires pour l'Environnement (JVE) in Cote d'Ivoire:
- NGO Independent Ecological Expertise in Kyrgyzstan
- Observatorio Latinoamericano de Conflictos Ambientales (OLCA) in Chile
- Pesticide Action Network Uruguay (RAPAL Uruguay) in Uruguay
- Pesticide Action Nexus Association (PAN) in Ethiopia
- Ruzgar Ecological Society in Azerbaijan
- Taller Ecologista in Argentina

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Preface

Beginning in the 1970s and 1980s, most highly industrial countries adopted laws or regulations to control lead paints. Most banned the manufacture, sale, and use of lead decorative paints – the paints used on the interiors and exteriors of homes, schools, and commercial buildings. Most highly industrialized countries also imposed controls on other lead paints, especially paints and coatings used in applications most likely to contribute to lead exposure in children. These regulatory actions were taken based on scientific and medical findings that lead paint is a major source of lead exposure in children and that lead exposure in children causes serious harm, especially to children's developing brains and nervous systems.

In 1999 and 2003, academic researchers reported high levels of lead in major brands of decorative paints being sold on the market in India and some other countries in Asia. As recently as 2006, however, international experts on chemical safety were still not generally aware that lead decorative paints were still widely available for sale and use in the developing world. The issue of lead in paint, for example, is not mentioned in the *Global Plan of Action* or other documents on the *Strategic Approach to International Chemicals Management* (SAICM) that were adopted at the first meeting of the *International Conference on Chemicals Management* (ICCM1).

In 2007, however, reports appeared in the international news media of toys with lead paint coatings being exported from Asia to the United States, Europe and other highly industrial countries. In response, millions of toys were recalled and strict regulations controlling the lead content of imported toys were adopted by most highly industrialized countries. Little attention was given at the time to lead paints manufactured for domestic use in Asian and other developing countries.

In 2007, responding to news reports about toys coated with lead paint, the Indian Non Governmental Organization, Toxics Link, with support from the NGO Occupational Knowledge International tested paints on the Indian retail market for lead content and found that more than 80 per ent of the enamel (oil-based) decorative paints tested had lead content greater than 1,000 parts per million lead; more than 60 per cent had lead content greater than 5,000 ppm lead.[1] Toxics Link shared these results with IPEN – a global network of organizations working to protect human health and the environment from harm caused by toxic chemical exposure – and several NGOs associated with IPEN began to purchase and test the lead content of paints for sale in their countries. In every country where testing was done and where no national law or regulation prohibited it, the majority of the enamel decorative paints for sale on the market contained levels above 90 and 600 ppm, and many were above 10,000 ppm. Many of these paints would not be permitted for sale or use in most highly industrialized countries. And in virtually all cases, the consumer had no way to tell which of the enamel decorative paints contained added lead and which did not.

As a result of these and other initiatives, a resolution was introduced and adopted at the 2009 second meeting of the International Conference on Chemicals Management (ICCM2) that identified lead in paint as an emerging policy issue and invited the United Nations Environment Programme (UNEP) and the World Health Organization (WHO) to establish a global partnership to promote phasing out the use of lead in paints and serve as its secretariat.[2] UNEP and WHO agreed and jointly initiated the *Global Alliance to Eliminate Lead Paint* (GAELP).[3] GAELP's broad objective is to phase out the manufacture and sale of paints containing lead and eventually to eliminate the risks from such paint.[4]

WHO and the UNEP devote resources, staff time, and their organizational influence to GAELP and the achievement of its objectives. Several academics in the fields of medicine

Most banned the manufacture, sale, and use of lead decorative paints – the paints used on the interiors and exteriors of homes, schools, and commercial buildings. Most highly industrialized countries also imposed controls on other lead paints, especially paints and coatings used in applications most likely to contribute to lead exposure in children.

1 *A Brush with Toxics: An Investigation on Lead in Household Paints in India,* by Dr. Abhay Kuhmar, Toxics Link, 2007, *http://toxicslink.org/docs/lead_in_paints/Lead_in_Paints_Brush_with_toxics.pdf*

2 ICCM2 omnibus resolution II/4 on emerging policy issues, *http://www.saicm.org/documents/iccm/ICCM2/emerging%20issues/ICCM2%20Outcomes/Emerging%20issues/Omnibus%20resolution%20II_4.doc*

3 GAELP Homepage, *http://www.unep.org/hazardoussubstances/LeadCadmium/PrioritiesforAction/GAELP/tabid/6176/Default.aspx*

4 See GAELP Objectives, *http://www.unep.org/hazardoussubstances/LeadCadmium/PrioritiesforAction/GAELP/GAELPObjectives/tabid/6331/Default.aspx*

and public health, and NGO representatives associated with IPEN, Occupational Knowledge International, and others are active GAELP participants and contributors. The leading paint industry international trade association, International Paint and Printing Ink Council (IPPIC), is also a contributor and has been an active participant in GAELP meetings.

Following the ICCM2 decision, resolutions in support of GAELP's lead paint elimination objectives were adopted at the *Fourth African regional meeting on SAICM* in Nairobi in April 2011 and at the *Third Latin American and Caribbean regional meeting on SAICM* in Panama City in June 2011.[5] The SAICM regional Group of Asian and Pacific countries announced at a global SAICM meeting in Belgrade, in November 2011, that it also "accorded high priority to work on lead in paint, urging the world community to phase out the use of lead forthwith."[6] And at the ICCM3 meeting in Nairobi in September, 2012, delegates passed a resolution calling on governments and stakeholders to provide technical and financial assistance to efforts leading to lead paint elimination in all countries including to fill information gaps on the presence or absence of lead paint on the consumer market of those countries where little or no data are now available.[7]

As part of its ongoing support for GAELP, UNEP provided funding in 2012 to the global NGO network, IPEN, to sample and test the lead content of decorative paints on the market in nine regionally and linguistically diverse developing countries and countries with economies in transition where no current data on lead in paint appeared to be available.

In 2007, however, reports appeared in the international news media of toys with lead paint coatings being exported from Asia to the United States, Europe and other highly industrial countries. In response, millions of toys were recalled and strict regulations controlling the lead content of imported toys were adopted by most highly industrial countries.

5 *http://www.saicm.org/images/saicm_documents/OEWG/Meeting%20documents/OEWG%201%20INF%2011%20Compilation%20of%20reg%20mtgs.pdf*

6 Report of the work of the Open-ended Working Group of the International Conference on Chemicals Management, *http://www.saicm.org/images/saicm_documents/OEWG/Meeting%20documents/OEWG1%2019_OEWG1%20Report%20E.pdf*

7 Report of the International Conference on Chemicals Management on the work of its third session, *http://www.saicm.org/images/saicm_documents/iccm/ICCM3/Meeting%20documents/iccm3%2024/K1283429e.pdf*

To carry this out, IPEN formed partnerships with NGOs in Argentina, Azerbaijan, Chile, Cote d'Ivoire, Ethiopia, Ghana, Kyrgyzstan, Tunisia, and Uruguay. Samples of paints available for sale on the market in each of these countries were purchased and tested for their total lead content. These paints available for sale are referred to throughout the reports as "new paints". With the exception of ten samples from Cote d'Ivoire, all of the paints purchased and tested were enamel decorative paints. 10 samples purchased in Cote d'Ivoire were anti-corrosive paints sold in retail establishments for home use.

The term "*decorative paint*" as used in this study refers to paints that are produced for use on inside or outside walls and surfaces of homes, schools, commercial buildings and similar structures. The term "*enamel*" as used in this study refers to oil-based paints. The term "*anti-corrosive*" as used in this study refers to enamel (oil-based) paints that contain anti-corrosive additives, that are produced for use on metal surfaces (like window sashes and frames) and metal articles (like bicycles), and that are sold in retail establishments for home use.

The paint samples were tested in an analytical laboratory for their total lead content and the results are presented in this report. To our knowledge, this is the first time that data on the lead content of enamel decorative paints for sale in these countries have been collected and released to the public.

The nine national NGOs participating in this project are all participants in the IPEN network. They are:

- **Argentina**: Taller Ecologista
- **Azerbaijan**: Ruzgar Ecological Society
- **Chile**: Observatorio Latinoamericano de Conflictos Ambientales (OLCA)
- **Cote d'Ivoire**: Jeunes Volontaires pour l'Environnement (JVE)

Toxics Link, with support from the NGO Occupational Knowledge International tested paints on the Indian retail market for lead content and found that more than 80 per cent of the enamel (oil-based) decorative paints tested had lead content greater than 1,000 parts per million lead; more than 60% had lead content greater than 5,000 ppm lead.

- **Ethiopia**: Pesticide Action Nexus Association (PAN)
- **Ghana**: Ecological Restorations
- **Kyrgyzstan**: NGO Independent Ecological Expertise
- **Tunisia**: Association d'Education Environnementale pour la Future Génération (AEEFG)
- **Uruguay**: Pesticide Action Network Uruguay (RAPAL Uruguay)

This report adds to growing knowledge of the extent of the problem of lead in paint in the developing world. Data have now been collected from more than 35 countries. A summary review of this data is presented below in Section 8 of this report.

The study and report were overseen and prepared by Dr. Scott Clark and Jack Weinberg. Dr. Clark is Professor Emeritus, Environmental Health, University of Cincinnati, United States. He is IPEN's Public Health Advisor for Lead. Jack Weinberg is IPEN's Senior Policy Advisor and overall coordinator of IPEN's global lead paint elimination campaign.

1 Executive Summary

Background

Exposure to lead is much more harmful to children than adults, and the health effects are generally irreversible and can have a lifelong impact.[8] The younger the child, the more harmful lead can be. The human fetus is the most vulnerable and a pregnant woman can transfer lead that has accumulated in her body to that of her developing child.

Evidence of reduced intelligence caused by childhood exposure to lead has led the World Health Organization to list "lead caused mental retardation" as a recognized disease. WHO also lists it as one of the top 10 diseases whose health burden among children is due to modifiable environmental factors.[9]

Lead from paint is recognized as one of the major sources of childhood lead exposure.[10]

Paints contain lead when the paint manufacturer intentionally adds one or more lead compounds to the paint for some purpose. The lead compounds most commonly added to paint are lead pigments that give the paint its color. Lead compounds may also be added to paint to serve as drying agents and catalysts in oil-based paints.

Many highly industrialized countries have enacted laws, regulations or mandatory standards that prohibit the manufacture, import, sale or use of lead paint for interiors or exteriors of homes, schools and commercial buildings. In recent years, these regulations have become increasingly stringent. The standard adopted by the United States imposes an upper limit of 90 parts per million (ppm) on total lead (dry weight) for house paints and many other paint categories. Many other countries have adopted mandatory limits in the range of 90 to 600 ppm total lead (dry weight).

8 Childhood Lead Poisoning, World Health Organization, 2010; p. iii, *http://www.who.int/ceh/publications/leadguidance.pdf*

9 http://www.who.int/quantifying_ehimpacts/publications/preventingdisease.pdf

10 Childhood Lead Poisoning, World Health Organization, 2010, Page 12, list of major sources of children's exposure to lead; *http://www.who.int/ceh/publications/leadguidance.pdf*

Good quality, cost-effective alternatives for all the lead compounds that are added to paint are widely available and have been in widespread use for decades. Any paint manufacturer that currently produces decorative paints that use added lead compounds can easily reformulate its paints using these substitutes with very little if any impact on the characteristics of the paints they produce or on their price.

Nevertheless, decorative paints containing lead are still widely sold and used in many developing countries and countries with economies in transition.

As a part of its support for The Global Alliance to Eliminate Lead Paint (GAELP), the United Nations Environment Programme (UNEP) provided funds to the global NGO network, IPEN, to sample and test the lead content of enamel decorative paints on the market in nine regionally and linguistically diverse developing countries and countries with economies in transition where no current data on lead in paint appeared to be available. To carry this out, IPEN formed partnerships with NGOs in Argentina, Azerbaijan, Chile, Cote d'Ivoire, Ethiopia, Ghana, Kyrgyzstan, Tunisia, and Uruguay. Samples of enamel decorative paints available for sale on the market in each of these countries were purchased and tested for their total lead content and the results are presented in this report.

Findings

A total of 234 cans of enamel decorative paints were purchased in retail establishments in the following nine countries: Argentina, Azerbaijan, Chile, Cote d'Ivoire, Ethiopia, Ghana, Kyrgyzstan, Tunisia, and Uruguay. An additional 10 cans of anti-corrosive enamel paints were purchased in Côte d'Ivoire. All the paints – the 234 samples of decorative paints and the 10 samples of anti-corrosive paints – were tested for their total lead content, and dry weight.

Countries selected for testing are regionally and linguistically diverse, do not appear to have publically available data on the lead content of decorative paints for sale on their national market, and had a capable IPEN partner NGO with both the interest and the ability to carry out this project.

Evidence of reduced intelligence caused by childhood exposure to lead has led the World Health Organization to list "lead caused mental retardation" as a recognized disease.

Lead Levels in Paints

Most of the paints tested in the countries would not meet regulatory standards established in most highly industrialized countries

In five of the nine project countries, 67 per cent or more of the paint samples tested had lead content greater than 90 ppm lead – the regulatory limit in the United States. These countries are: Azerbaijan, Cote d'Ivoire, Ethiopia, Kyrgyzstan and Tunisia.

In the same five countries, 57 per cent or more of the paint samples tested had lead content greater than 600 ppm lead, the regulatory standard in Argentina, Chile and Uruguay.

Paints with extremely high levels of lead are still available in most countries.

In seven of the nine countries, some paint samples tested had lead concentrations greater than 10,000 ppm. Five of these samples were from Argentina; two from Azerbaijan; six from Cote d'Ivoire; 10 from Ethiopia; three from Ghana; three from Kyrgyzstan; and eight from Tunisia.

In four of the nine countries – Argentina, Ethiopia, Kyrgyzstan, and Tunisia – one or more of the paints tested had lead levels of 99,000 ppm lead or greater; they were all nearly 10 per cent or more lead by weight.

In most countries with lead paint, equivalent paint with no added lead is available.

In six of the seven countries with lead paint – Argentina, Azerbaijan, Cote d'Ivoire, Ghana, Kyrgyzstan and Tunisia, paint with very low lead contents coexists in the market with lead paint.

Lead Concentrations in Paints by Color

White Paints had the lowest lead content

The white decorative paints tested had, on average, the lowest lead content, and many contained no lead at the level of detection or only trace quantities of lead. Only one of the 77 white samples tested contained more than 5,500 ppm lead.

Yellow, red and other brightly colored paints had the highest lead content

The yellow decorative paints tested had, on average, the highest lead contents. A total of 58 samples of yellow decorative paint were tested. In seven of the nine countries, one or more of the yellow decorative paints tested had lead content greater than 10,000 ppm. In three of the nine countries, at least one of these had lead content greater than 100,000 ppm lead.

Many red paints had high lead content

A total of 69 samples of red decorative paints were tested. In six of the nine countries, one or more of the red decorative paints had lead content greater than 10,000 ppm. None had lead content greater than 100,000 ppm lead but one sample of red decorative contained 99,000 ppm lead.

Green paints also had high lead content

A total of 30 decorative paints in colors other than white, red and yellow were tested.

Eight of these were green. Half of the green decorative paints tested contained more than 10,000 ppm lead; one contained more than 100,000 ppm lead.

Lead Concentrations in Paints by Country

Few countries have established regulatory frameworks, but those that have generally have lower lead paint levels.

In two of the nine countries, Chile and Uruguay, all the enamel decorative paints tested had low total lead concentrations.

Both Chile and Uruguay have recently enacted national executive decrees that prohibit the production, import, distribution, sale and use of decorative paints with a lead concentration above 600 ppm.

In each of the other seven countries, two or more of the samples of enamel decorative paints tested had lead content greater than 10,000 ppm. In four of these countries, at least one of the decorative paints tested had a lead concentration at or above 99,000 ppm lead. In five of the nine countries, more than half of the decorative paint samples tested had lead content greater than 600 ppm lead, the regulatory limit in many other countries (See Table A below for a summary of total data for new decorative enamel paint in the nine countries of the present study)

In five of the nine project countries, 67 percent or more of the paint samples tested had lead content greater than 90 ppm lead – the regulatory limit in the United States.

Table A. Summary of Total Lead Concentration Data for New Decorative Enamel Paints in Nine Countries

Country	Number of Samples	Number of Brands	Average Lead Concentration ppm	Per cent Greater Than 90 ppm (Number)	Per cent Greater Than 600 ppm (Number)	Per cent Greater Than 10,000 ppm (Number)	Minimum ppm	Maximum ppm
Argentina	30	12	17,000	23% (7)	23% (7)	17% (5)	< 5	130,000
Azerbaijan	30	16	2,600	77% (23)	67% (20)	7% (2)	< 5	20,000
Chile	23	6	52.6	4% (1)	4% (1)	0% (0)	< 5	1,100
Cote d'Ivoire	20	7	8,700	70% (14)	65% (13)	25% (5)	< 5	42,000
Cote d'Ivoire Anti Corrosive Paints	10	5	27,500	80% (8)	80% (8)	10% (1)	< 15	260,000
Ethiopia	23	8	18,500	87% (20)	83% (19)	30% (7)	< 15	130,000
Ghana	18	8	5,030	33% (6)	28% (5)	17% (3)	< 5	42,000
Kyrgyzstan	30	11	7,160	67% (20)	57% (17)	10% (3)	< 5	99,000
Tunisia	30	16	17,900	70% (21)	63% (19)	27% (8)	< 5	170,000
Uruguay	30	10	9.8	0% (0)	0% (0)	0% (0)	< 5	63

Consumer Information

Few if any manufacturers include warnings about hazards associated with lead on their labels or other consumer information.

Only 20 out of the 234 sampled paint cans offered information about lead content. Seventeen of these cans were sold in Uruguay. There also appears to be no standard practice with regard to the availability of other types of consumer information. A total of 88 cans (38 per cent) included the website address of the paint manufacturer on the label, but no paint can sampled in Chile, Ethiopia or Tunisia carried this information.

Recommendations

Regulatory Frameworks

National efforts to promote the establishment of an appropriate legal and regulatory framework to control the manufacture, import, export, sale and use of lead paints and products coated with lead paints should be encouraged in countries where currently none exists. The evidence of paints with very low lead contents coexisting in the market with equivalent lead paint suggests there should be few economic barriers to the introduction of legal or regulatory controls and the elimination of lead paint.

In setting priorities and timeframes for implementation of a legal and regulatory framework, special attention should be given to the elimination of lead decorative paints and lead paints for those other applications most likely to contribute to childhood lead exposure. In the design of the framework, consideration should be given to the inclusion of provisions for compliance monitoring and enforcement.

Public Awareness

Given the serious impact childhood lead exposure has on both individuals and a nation's future, there is a need for information campaigns in countries where results show the presence of lead paint on the market. These campaigns should inform the public about the hazards of lead exposure, especially in children; the presence of lead decorative paints for sale

The evidence of paints with very low lead contents coexisting in the market with equivalent lead paint suggests there should be few economic barriers to the introduction of legal or regulatory controls and the elimination of lead paint.

and use on the national market; lead paint as a significant source of childhood lead exposure; and availability of technically superior and safer alternatives. There is also a need to raise awareness of the need to take special precautions when preparing a previously painted surface for repainting.

Government agencies, NGOs and other organizations of civil society, as well as health professionals and others are encouraged to carry out awareness-raising in the above-mentioned areas. Stakeholders are encouraged to foster voluntary initiatives by paint manufacturers, importers and vendors to phase out the use of lead compounds in their products even before any national legal instrument is adopted or enters into force.

Voluntary Action and Labeling

Paint manufacturers in countries that lack a well-enforced national lead paint control regime are encouraged to eliminate lead compounds from their paint formulations, especially of those paints likely to contribute to lead exposure in children and others.

Paint manufacturers are also encouraged to consider voluntary participation in programs that provide third party paint certification that no lead has been added to their paint, and to label products in ways that help consumers identify paints that do not contain added lead. In addition, paint manufacturers in all countries could provide information on paint can labels warning of the serious risks that may arise from lead dust when preparing a previously painted surface for repainting.

2

Background on Lead in Paint

Paint contains lead when the paint manufacturer intentionally adds one or more lead compounds to the paint for some purpose. Paint may also contain lead when one or more of the paint ingredients is contaminated with lead.

Sources of Lead in Paint

The lead compounds most commonly added to paints are *pigments*. Pigments are used to give the paint its color; make the paint opaque so that it covers well; and protect the paint and the underlying surface from degradation caused by exposure to sunlight. Lead compounds commonly used as paint pigments include: lead chromates, lead oxides, lead molybdates, lead sulfates and others. As a group, these are all sometimes called *chromate pigments*. Lead-based pigments are sometimes used alone and sometimes used in combination with other pigments.

Lead compounds may be added to enamel (oil-based) paints paint for use as *driers* - sometimes called drying agents or catalysts. Enamel paints dry to a hard and smooth surface through a process that involves chemical reactions in which paint ingredients called *binders* polymerize and crosslink. The driers serve as catalysts speeding up the polymerization and making paints dry faster and more evenly. Lead compounds commonly used as driers include lead octoate and lead naphthenate. These lead-based driers are generally not used alone; typically, they are combined with other driers including compounds of manganese, cobalt and others.

Lead compounds are also sometimes added to paints used on metal surfaces to inhibit rust or corrosion. The most common of these is lead tetroxide, sometimes called red lead or minium.

Inorganic pigments, fillers and possibly some other ingredients used in the manufacture of paints are often derived from natural, earth-based materials such as clay, calcium carbonate, mica, silica, talc, and various naturally occurring salts and metal compounds such as iron oxide. In some cases, these materials may be significantly contaminated with lead depending on geological conditions at the location where they were mined. When lead-contaminated ingredients are used in the manufacture of paints, this can result in paints that contain significant lead content.

Finally, when a paint manufacturer uses lead compounds in the manufacture of some of its paints - such as industrial paints, other paints produced in the same facility can become contaminated with lead when proper housekeeping and cleanup procedures are not followed.

Alternatives to Lead in Paint

Fortunately, non-leaded pigments, driers and anti-corrosive agents have been widely available for decades and are used by manufacturers producing the highest quality paints. Additionally, paint ingredients that are significantly lead-contaminated can be easily avoided when

paint ingredient producers, vendors and users pay attention to the possibility that earth-based materials may sometimes be lead contaminated, and when they utilize appropriate quality control procedures to avoid such ingredients.

Highly industrialized countries in North America, Western Europe and elsewhere have for decades strictly controlled the lead content of all *decorative paints* sold and used in their countries as well as other categories of paints likely to contribute to childhood lead exposure. Therefore, it should not be overly difficult for all paint manufacturers in developing countries and countries with economies in transition to produce these paints. Appropriate substitute ingredients are widely available or can become widely available in response to demand. Furthermore, the cost to manufacturers associated with reformulating decorative paints to avoid the use of lead compounds appears to be minimal.[11]

Highly industrialized countries in North America, Western Europe and elsewhere have for decades strictly controlled the lead content of all decorative paints sold and used in their countries as well as other categories of paints likely to contribute to childhood lead exposure.

11 Though studies in the public literature on the costs to paint manufacturers in developing countries associated with discontinuing the use of added lead compounds in the paints they manufacture are lacking, the authors and associated NGO staff and consultants working on lead paint elimination projects have had personal conversations in several countries with paint manufacturers who have recently reformulated their paints. All reported their additional total ingredient costs were minimal. Some reported that additional materials costs were at most two per cent of total materials costs; many reported lesser amounts. Most or all continued to sell their paints at the same price points after reformulation. For smaller manufacturers, the biggest burdens often appears to be the research and development time and effort associated with reformulation; and identifying an appropriate and reliable vendor willing and able to provide the substitute ingredients and advice on their proper use.

When governments consider the adoption of laws, regulations, standards and/or procedures to control the production, import, sale and use of lead paints, priority might be given to controls addressing decorative paints and paints for the other applications that are most likely to contribute to childhood lead exposure.[12] The obstacles associated with the elimination of lead-based ingredients in the manufacture of decorative paints are known and appear to be minimal. Less is currently known about costs and obstacles associated with eliminating the use of lead compounds in some categories of industrial paints.

12 An indicator for evaluating the implementation of the Global Alliance to Eliminate Lead Paint Business Plan is: "Number of countries that have adopted legally binding laws, regulations, standards and/or procedures to control the production, import, sale and use of lead paints with special attention to the elimination of lead decorative paints and lead paints for other applications most likely to contribute to childhood lead exposure." See GAELP Business Plan: *http://www.unep.org/hazardoussubstances/Portals/9/Lead_Cadmium/docs/GAELP/SAICM_ICCM_3INF%2021%20-%20Business%20Plan%20GAELP.pdf*

Lead paints used for certain industrial applications have a long history of contributing to occupational lead over-exposure in workers. In addition, there are cases where lead industrial paints also contribute to lead exposure in children (as for example, when lead industrial paints are used on bridges and contaminate nearby areas where children may play). Although highly industrial countries do not have a consistent history of controlling the lead content of all industrial paints, this is now changing. Starting in May 2015, the European Union will control the manufacture of lead chromate pigments and their use in all categories of paints and coatings. This has led European pigment manufacturers to phase out of the production of lead-based pigments in Europe[13] and it is has led some paint manufacturers that serve the European market to phase out the use of lead pigments in all their paint and coatings products. In July 2012, DuPont, the world's leading manufacturer of automotive paints, announced it will discontinue the use of all leaded pigments in all the lines of automotive paints it produces.[14] In August 2012, AkzoNobel, the world's largest paint and coatings manufacturer announced it had become the first major industrial coatings producer to eliminate the use of lead compounds in all of its products with the decision of its Marine and Protective Coatings unit to eliminate the use of lead chromates in paints used for marine applications.[15]

Some of the world's leading paint manufacturers appear to be advancing toward eliminating the use of added lead compounds in all the categories of industrial paints they produce. Though it may take time, this process should lower the barriers that may now hinder some developing country-based industrial paint manufacturers from eliminating lead compounds from all the categories of industrial paints they produce.

These advances suggest that the ultimate objective of the Global Alliance to Eliminate Lead Paint to phase-out the

This has led European pigment manufacturers to phase out of the production of lead-based pigments in Europe1 and it is has led some paint manufacturers that serve the European market to phase out the use of lead pigments in all their paint and coatings products.

13 BASF Phasing Out Lead Chromate Pigments; PAINTSQUARE: Paint and Coatings Industry News; February 23, 2012; *http://www.paintsquare.com/news/?fuseaction=view&id=7230&nl_versionid=1759*

14 DuPont Refinish to Pump Unleaded; PAINTSQUARE: Paint and Coatings Industry News; July 16, 2012 *http://www.paintsquare.com/news/?fuseaction=view&id=8041&nl_versionid=2183*

15 International Paint Drops Lead Chromate; PAINTSQUARE: Paint and Coatings Industry News; August 8, 2012;

manufacture and sale of all lead paints can be achieved and that its achievement can contribute to the eventual elimination of the risks associated with lead exposure from paint. It also suggests that many developing countries will be able to eliminate production and use of lead decorative paints more quickly and more easily than lead industrial paints, indicating that the business plan of the Global Alliance is practical.

Interpreting Lead Testing Results

When a paint sample is analyzed and found to contain a significant amount of lead, it is difficult to know with any certainty whether the lead in the paint came from the use of a lead-based pigment, a lead-based drier, a lead-contaminated ingredient, some other source, or a combination of the above. The laboratory results reported in this and most other studies of the lead content of paints are quantitative. That is, they report the measured lead content of the sample as a proportion, typically expressed as here, in parts per million, of the total dry weight of the sample. In most cases and for most purposes, it is too costly for the laboratory to perform qualitative analysis and to determine the specific lead compound(s) present in the sample. It is sometimes possible, however, to make inferences on the source(s) of the lead in a particular sample.

It is of a general understanding the potential impact that different types of paint ingredients may have on the total lead content of a paint sample:

- Added lead compounds are rarely used in water-based paints. Any lead content found in a sample of a water-based paint is almost always very low and is the likely result of a lead-contaminated ingredient, not an intentionally added lead compound
- White lead-based pigments are now very rarely used because the white pigment titanium dioxide is inexpensive and has superior properties
- When a lead-based pigment is used in a paint formulation, the lead content of the paint can often be above 10,000 ppm lead, and sometimes above 100,000 ppm lead. When a lead-based pigment is intentionally used in combination with a non-lead-based pigment or pigments (as it appears is frequently the case with reds and some other colors), the lead-based pigment is still likely to contribute a significant amount of lead to the total lead content of a sample (often at least 1,500 ppm lead)
- In recent paint testing results from other countries,[16] yellow paints (which often use yellow lead chromate pigments) tended to have the highest lead content. Red paints also often had high lead levels. On average, however, the lead content was generally lower in red paints than yellow paints. This may be the result of mixing red-colored lead pigments with non-lead pigments such as ferric oxide
- If a *lead-based drier* is used, this might account for as much as 6,000 ppm lead in a paint sample and sometimes more. Lead-based driers, however, are usually mixed with non-lead driers in different proportions. When a lead-based drier is used in combination with non-lead driers, it is still likely to contribute a significant amount of lead to the total lead content of a sample (often at least 1,200 ppm lead or more)
- When the lead content of a paint sample is low, say 90 ppm lead or less, the source of the lead is almost certainly unintended contamination of one or more of the paint ingredients. When the lead content of a paint sample is more than 90 ppm lead but less than about 600 ppm lead, the source of the lead may be unintended contamination of one or more of the paint ingredients but the inference is less certain.

The above observations and assumptions informed some of the decisions about which paints were selected to purchase and analyze. They also informed some of the suggested conclusions that were reached with regard to the possible sources of lead

16 A summary of this other paint testing can be found in Chapter 9 below.

Added lead compounds are rarely used in water-based paints. Any lead content found in a sample of a water-based paint is almost always very low and is the likely result of a lead-contaminated ingredient, not an intentionally added lead compound.

in the paints that were analyzed.

- No water-based decorative paints were purchased and tested because they are not expected to contain significant quantities of lead.
- When possible, one sample of white paint of each brand was purchased. Since lead pigments are not expected to be present in the white samples, the lead content of a white sample may indicate the manufacturer's use of lead driers or lead-contaminated ingredients.
- When possible, samples of yellow and red paint of each brand were purchased. Other brightly colored paints may be purchased when yellow or red was not available.
- In cases where the lead content of the yellow, red or other brightly colored paint of a particular brand and type of paint is substantially higher than the lead content of the white paint of the same brand and type, it might be inferred that the difference in lead content between the results for the white sample and the brightly colored sample corresponds approximately to the lead content of lead pigments used in the brightly-colored sample.

When the lead content of a paint sample is more than 90 ppm lead but less than about 600 ppm lead, the source of the lead may be unintended contamination of one or more of the paint ingredients but the inference is less certain.

3

Lead Exposure and its Health Effects

Children are not generally exposed to lead from paint while the paint is still in the can or when the paint is being newly applied to a previously unpainted or uncoated surface. Rather, lead exposure generally occurs after the lead paint has already dried on the wall or on the article that has been painted. Painted surfaces age, weather, and chip with time. During this process, any lead present in the paint may be released in indoor and outdoor dusts and soils in and around the painted home or building. When a surface that was previously painted with lead paint is sanded or scraped in preparation for repainting, very large amounts of lead-contaminated dusts and soils are produced. Children and workers are especially at risk from such dusts.

Children have an innate curiosity to explore their world and engage in developmentally appropriate hand-to-mouth behavior. For example, a typical one- to six-year-old child ingests approximately 100 milligrams of house dust and soil each day[17] and this age group is the most easily harmed by exposure to lead. Wherever house dust and soils are contaminated with lead paint chips and dust, children ingest lead along with the dust and soil. Paint chips can be especially harmful because their lead content can be much higher than is typically found in dust and soils. Ingested lead in children who suffer from nutritional deficiencies is absorbed at an increased rate.[18]

Similarly, young children may chew on toys or other articles painted with lead paint and directly ingest the lead-contaminated dried paint. However, the most common way in which children ingest lead is thought to be through lead-containing dust.

Exposure to lead is much more harmful to children than adults, and the health effects are generally irreversible and can have a lifelong impact.[19] The younger the child, the more harmful lead can be. The human fetus is the most vulnerable and a pregnant woman can transfer lead that has accumulated in her body to her developing child.

Children are more biologically susceptible to lead than adults for several reasons including:[20]

- A child's brain undergoes very rapid growth, development and differentiation and lead interferes with this process. Brain damage caused by chronic, low-level exposure to lead is irreversible and untreatable
- Exposure to lead early in life can re-program genes, which can lead to altered gene expression and an associated increased risk of disease later in life
- Gastrointestinal absorption of lead is enhanced in childhood. Up to 50 per cent of ingested lead is absorbed by children, as compared with 10 per cent in adults. (Pregnant women may also absorb more ingested lead than other adults).

Evidence of reduced intelligence caused by childhood exposure to lead has led the World Health Organization to list "lead caused mental retardation" as a recognized disease. WHO also lists it as one of the top ten diseases whose health burden among children is due to modifiable environmental factors.[21]

In recent years, medical researchers

17 Childhood Lead Poisoning, World Health Organization, 2010, Page 18 *http://www.who.int/ceh/publications/leadguidance.pdf*

18 Ibid, page 48

19 Childhood Lead Poisoning, World Health Organization, 2010; *http://www.who.int/ceh/publications/leadguidance.pdf*

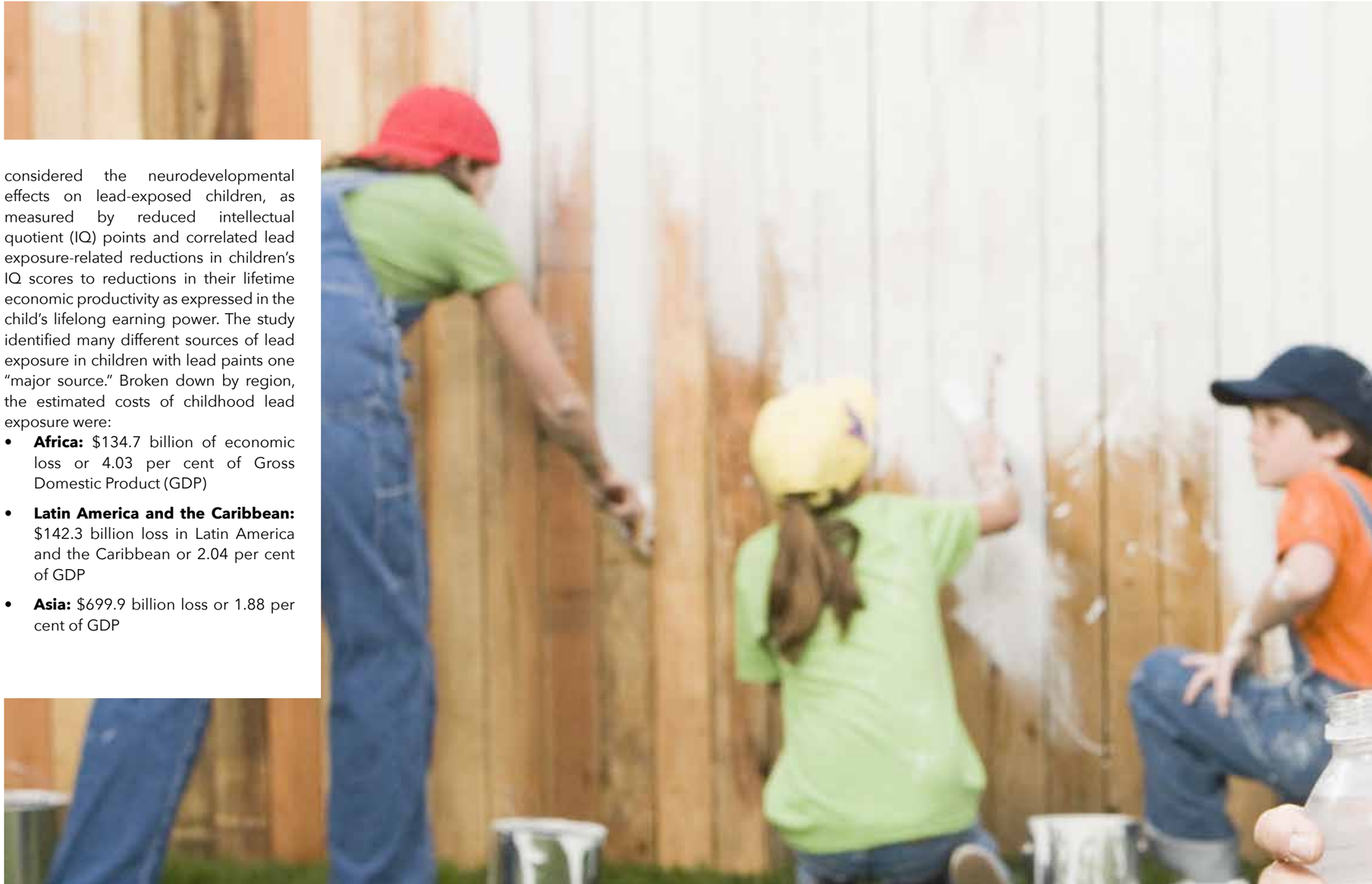
20 Ibid

21 http://www.who.int/quantifying_ehimpacts/publications/preventingdisease.pdf

have been documenting significant health impacts on children from lower and lower lead exposures.[22] In response, the U.S. Centers for Disease Control and Prevention (CDC) and other authorities have concluded that there is no known acceptable lead exposure level for children.[23]

A recent study that investigated the economic impact of childhood lead exposure on national economies estimated a total cumulative cost of $977 billion international dollars[24] per year for all low and middle-income countries.[25] The study considered the neurodevelopmental effects on lead-exposed children, as measured by reduced intellectual quotient (IQ) points and correlated lead exposure-related reductions in children's IQ scores to reductions in their lifetime economic productivity as expressed in the child's lifelong earning power. The study identified many different sources of lead exposure in children with lead paints one "major source." Broken down by region, the estimated costs of childhood lead exposure were:

- **Africa:** $134.7 billion of economic loss or 4.03 per cent of Gross Domestic Product (GDP)
- **Latin America and the Caribbean:** $142.3 billion loss in Latin America and the Caribbean or 2.04 per cent of GDP
- **Asia:** $699.9 billion loss or 1.88 per cent of GDP



22 Lead Poisoning, by Herbert Needleman, Annual Review of Medicine 2004, *http://www.rachel.org/files/document/Lead_Poisoning.pdf*

23 Blood Levels in Children Aged 1-5 Years – United States, 1999-2010, Morbidity and Mortality Weekly Report, Centers for Disease Control and Prevention. *http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6213a3.htm?s_cid=mm6213a3_w*

24 An International dollar is a currency unit used by economists and international organizations to compare the values of different currencies. It adjusts the value of the U.S. dollar to reflect currency exchange rates, purchasing power parity (PPP) and average commodity prices within each country. According to the World Bank, "An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States." The international dollar values in this report were calculated from a World Bank table that lists GDP per capita by country based on purchasing power parity and expressed in international dollars. The data from the table *(at: http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD)* was accessed by the report's authors in February 2012.

25 Economic Costs of Childhood Lead Exposure in Low and MiddleIncome Countries, by Teresa M. Attina and Leonardo Trasande: Environmental Health Perspectives; DOI:10.1289/ehp.1206424; *http://ehp.niehs.nih.gov/1206424/*

4 Framework for Eliminating Lead Paint

Many highly industrialized countries enacted laws, regulations or mandatory standards to protect the health of their people in the 1970s and 1980s. These laws generally prohibit the manufacture, import, sale or use of lead paint for interiors or exteriors of homes, schools and commercial buildings. The standard adopted by the United States imposes an upper limit of 90 parts per million (ppm) on total lead (dry weight) for house paints and many other paint categories. Other countries have adopted mandatory limits in the range of 90 to 600 ppm total lead (dry weight).

In compliance with these regulations, manufacturers in highly industrialized countries have for many years produced decorative paints without adding lead compounds.

In contrast, paint testing campaigns show that where no national law, binding regulation, or other legal instrument specifically forbids it, some or most of the tested brands of oil-based (enamel) decorative paints for sale on the national market contained lead in concentrations greater than 1,000 ppm and often greater than 10,000 ppm. This suggests that national laws, binding regulations, or other legal instruments are the key tool for controlling the lead content of the paints on domestic markets.

Until recently, many international experts in the field of chemical safety mistakenly believed that lead paints for household use were no longer commonly manufactured and sold; that paint companies everywhere had largely stopped adding lead pigments and lead driers to their decorative paints. As recently as 2006 when governments adopted the Strategic Approach to International Chemicals Management (SAICM), an overarching policy strategy to protect human health and the environment from exposure to toxic chemicals, no one thought to identify lead in paint as an exposure source. Since then, however, this omission has been addressed and lead in paint is now an emerging policy issue of SAICM and thus of priority concern.

International Framework for Lead Paint Elimination: Global Alliance to Eliminate Lead Paint (GAELP)

At the second session of the International Conference on Chemicals Management (ICCM) held in 2009, several chemical issues were identified by consensus to be international priority issues of concern. One of these emerging policy issues is lead in paints.[26] In response to the ICCM decision, the United Nations Environment Programme (UNEP) and the World Health Organization (WHO) jointly initiated a global partnership to eliminate the use of lead compounds in paints in order to protect public health and the environment. This partnership is called the Global Alliance to Eliminate Lead Paint (GAELP).[27]

In 2012, the third meeting of the ICCM held in Nairobi agreed by consensus to call upon governments, civil society organizations, and the private sector to contribute to GAELP in various ways including:[28]

- Raising awareness about the toxicity to human health from lead in paint including for young children, paint users, and the workers in paint production facilities
- Filling information gaps by testing paints for their lead content in countries where little or no data are available
- Promoting national regulatory frameworks, as appropriate, to stop the manufacture, import, export, sale and use of lead paints and products coated with lead paints
- Encouraging paint manufacturing companies to substitute lead compounds added to paint with safer alternatives and
- Establishing prevention programs to reduce exposure in and around housing, childcare facilities, schools and other buildings where lead paint has been used in the past.

26 ICCM2 omnibus resolution II/4 on emerging policy issues, *(http://www.saicm.org/images/saicm_documents/iccm/ICCM2/ICCM2%20Report/ICCM2%2015%20FINAL%20REPORT%20E.doc)*

27 The Global Alliance to Eliminate Lead Paint web page can be found at: *http://www.unep.org/hazardoussubstances/LeadCadmium/PrioritiesforAction/LeadPaints/tabid/6176/Default.aspx*

28 ICCM3 meeting report; III/2 on emerging policy issues, Lead in Paint *(http://www.saicm.org/images/saicm_documents/iccm/ICCM3/K1283429-%20SAICM-ICCM3-24%20-%20Report%20-%20%20advance.doc)*

The standard adopted by the United States imposes an upper limit of 90 parts per million (ppm) on total lead (dry weight) for house paints and many other paint categories.

In addition, lead paints for household use have been prioritized by GAELP and others for elimination. GAELP has defined the term "lead paint" to include any paint to which a lead compound is intentionally added to serve as a pigment, drying agent or for some other purpose.

National Frameworks for the Elimination of Lead Paint

Lead decorative paints continue to be widely manufactured and sold despite the fact that good, cost-effective substitutes are readily available for all the lead compounds used in the formulation of decorative paints. This means many children will be exposed to lead from these paints for years to come, causing unnecessary harm to them, their families and their societies. This is a problem that governments can address by establishing a legal framework to control the manufacture, import, sale and use of lead decorative paints and other paints likely to contribute to human lead exposure. However, in most cases, public awareness of the hazards of lead paint is a precondition for establishing such a national legal framework. The present study is one of several initiatives to generate publically-available data on the lead content of paints as part of global efforts to promote national legal and other frameworks to eliminate lead paints in all regions. Legal frameworks used for controlling lead paints vary from country to country.

In the United States, a law passed by the Congress and signed by the President in 2008 revised the previous 600 ppm maximum limit for lead in decorative paints and established 90 ppm as the new limit.[29] This limit applies to paint and other similar surface coatings including coatings used on toys, other articles intended for use by children, and certain furniture articles. In addition to products sold directly to consumers, the ban applies to products used or enjoyed by consumers after sale, such as paints used in residences, schools, hospitals, parks, playgrounds, and public buildings or other areas where consumers will have direct access to the painted surface.[30]

29 Consumer Product Safety Improvement Act of 2008; *http://www.cpsc.gov/PageFiles/109515/cpsia.pdf*

30 FAQs: Lead In Paint (And Other Surface Coatings), United States Consumer Products Safety Commission; *http://www.cpsc.gov/en/Business--Manufacturing/Business-Education/Lead/FAQs-Lead-In-Paint-And-Other-Surface-Coatings/*

"...no Manufacturer, Importer, Packer, Distributor or Trader shall manufacture, import and use or distribute, pack, store or sell or display for sale, expose for sale or offer for sale, wholesale or retail any paints unless such paints shall conform to the corresponding Total Lead Content given hereunder …"

In Argentina,[31] Chile[32] and Uruguay,[33] executive decrees with the force of law established a maximum allowable lead concentration in decorative paints of 600 ppm and prohibit the production and import of paints with a lead concentration above this limit. The Chilean decree was issued in 1997; the Uruguayan decree was issued in 2011. The Argentine resolution was issued in 2009.

In some other countries, an existing law that does not specifically mention lead or paint has been used to control the lead content of paints. For example, in Sri Lanka, the national Consumer Affairs Authority issued a directive[34] under an existing law, the Consumer Affairs Authority Act, directing that "*no Manufacturer, Importer, Packer, Distributor or Trader shall manufacture, import and use or distribute, pack, store or sell or display for sale, expose for sale or offer for sale, wholesale or retail any paints unless such paints shall conform to the corresponding Total Lead Content given hereunder …*" The law under which the directive was issued is not about lead or about paint; it is a law that was adopted in 2003 to establish a Consumer Affairs Authority whose duties include the protection of consumers.

In some countries, the Environment Ministry or the Health Ministry may have the authority to issue a regulation, a decree or a control order that controls the lead content of paints. A number of countries, as part of their national SAICM implementation programs are attempting to strengthen their national capabilities for sound chemicals management, including the promotion and adoption of enabling laws and the establishment of inter-ministerial committees to coordinate these national efforts. In some other countries, national standards agencies have the power, under certain conditions, to establish legally binding national standards, such as the maximum permissible lead content of paint.

While the establishment of a national law, regulation, decree or binding

31 See: *ARG/166/Add.3 at http://www.puntofocal.gov.ar/formularios/registro_arg04.php*

32 See: *http://seremi9.redsalud.gob.cl/wrdprss_minsal/wp-content/uploads/2012/05/ds_374-FIJA-LIMITE-MAXIMO-PERMISIBLE-DE-PLOMO-EN-PINTURAS-QUE-INDICA.pdf*

33 See: *http://www.mvotma.gub.uy/images/Decreto%2069-011%20Diario%20Oficial.pdf*

34 No. 1725/30 - Friday September 30, 2011, *http://www.caa.gov.lk/web/index.php?option=com_content&view=article&id=112&Itemid=104&lang=en*

standard to control the lead content of paint is very important, it is not, by itself, enough. Any such instrument must also include or establish an effective regime for monitoring compliance and for enforcement.

The elimination of lead paint may also be aided by voluntary industry schemes such as the establishment of a third-party paint certification and labeling program. Under such a program, participating paint companies agree that they will not add lead compounds to their paints, and that they will employ quality control measures sufficient to ensure that the paints they produce do not contain more than, at most, trace quantities of lead beneath an agreed maximum limit (for example, 90 ppm). Participating companies could also agree to place a label on their paints certifying that the paint does not contain added lead compounds. Consumer groups and others would then encourage consumers to look for the label. Third party monitors would test paints to monitor compliance.

It should be possible to eliminate the practice of using lead pigments, lead driers and other lead compounds in the manufacture of decorative paints through some combination of national legal instruments to control the lead content of paints, voluntary action by paint companies to remove lead from their paints, and third party certification programs.

5 Materials and Methods

In each of the nine project countries, the partner NGO – with help and support from IPEN – purchased approximately 30 cans of enamel decorative paints from stores in one or more cities. The paints were then tested for lead content at an independent, accredited laboratory in the United States that participates in an ongoing analytical quality proficiency testing program.

The selection of the brands and paints to purchase was carried out in consultation with IPEN. Efforts were made to include samples from the country's most popular brands. In general, in most countries and for most brands, the samples purchased consisted of one can of white paint, one can of red paint, and one can of yellow paint. These colors were chosen because recent studies of decorative paints for sale in developing countries found that while, in general, white paints had the lowest lead concentrations, reds had medium lead concentrations, and yellows had the highest lead concentrations.[35] Therefore, 87 per cent of the 234 samples collected for this study were of these three colors. The remaining 30 paint samples that were not red, white or yellow were selected because of their availability (when a red or yellow paint of the same brand could not be found), their popularity, or for some other reason.

In Cote d'Ivoire, 10 of the 30 paints collected were not decorative paints but were anti-corrosive paints. These paints were tested because they were available in retail stores and were being marketed for use in homes (e.g. on window sashes) and on children's toys (e.g. bicycles).

During the sampling, information such as color, brand, country where manufactured, purchase details, date manufactured as provided on the label of the paint can was recorded. The formats used for date of manufacturer varied with some companies providing day, month and year and others providing only month and year. In addition, some paint companies used only a single word to describe some colors, such as "red," while others used "bright red." Colors were recorded as provided on the can. For the red and yellow paints the protocol called for obtaining "bright" or "strong" red and yellow paints when available. Dates of purchase were recorded in the day/month/year format in most cases.

All paints were purchased from paint stores in local markets and communities, hardware stores, building supply stores and larger retail establishments used by the general public. In other words, paints presumed to be intended for home use. Excluded were automotive and industrial paints that are not typically used for domestic housing applications or to paint toys or household articles. If there was an indication on the paint can that one of its suggested uses was household-related, then it was eligible to be included. Nonetheless, with the exception of the 10 anti-corrosive paints purchased in Cote d'Ivoire, the other paints were all enamel decorative paints.

Both the enamel decorative paint samples and the anti-corrosive paint samples were prepared for analysis and were analyzed using the same methods. The analytical experts at the Wisconsin Occupational Health Laboratory indicate that the methods they used to digest and analyze the paint samples are appropriate for both the enamel decorative paints and also for the enamel (oil-based) paints that contain anti-corrosive additives.

Staff at partner NGOs prepared the paint samples using sampling kits assembled and shipped to the partner NGO by the U.S.-based IPEN partner NGO, Occupational Knowledge International according to standard instructions provided to them by Professor Scott Clark. Each paint sample was thoroughly stirred in the can and applied to duplicate, individually-numbered, unused, clean wood blocks using a new, single-use paint brush for each sample. Each stirring utensil and paint brush was used only once, and care was taken to avoid cross contamination. After drying, the blocks were placed in individual plastic bags and shipped for analysis of lead content to the Wisconsin Occupational Health Laboratory in the United States. The

All paints were purchased from paint stores in local markets and communities, hardware stores, building supply stores and larger retail establishments used by the general public. In other words, paints presumed to be intended for home use.

35 Please see Chapter 9 of this report for details about previous lead in paint tests (Summary of Global Data for Lead in New Enamel Decorative Paints)

laboratory analyzed the samples of dried paint for their lead content, and prepared a separate Analytical Report for the samples from each country.

The Wisconsin Occupational Health Laboratory's analytical method utilizes inductively coupled plasma-atomic emission spectrometry (ICP-AES). The laboratory is accredited by the American Industrial Hygiene Association (AIHA) under the U.S. EPA Environmental Lead Laboratory Accreditation Program and it participates in the Environmental Lead Proficiency Analytical Testing program (ELPAT) operated by the AIHA and established by the U.S. EPA. The laboratory's analytical methods and certifications are consistent with those recommended by the World Health Organization for measuring lead in paint.

Samples with concentrations below the detection limit of the analytical procedures used, were reported as "less than" (<) a specified value: either <5 or <15 (whichever was appropriate for the laboratory conditions at that time). Where averages are calculated in this report, those samples that fall below the detection limit are averaged as having lead content of one-half the upper limit value. (For example, a sample reported as having <5 ppm lead would be averaged as if its lead content had a value of 2.5 ppm.)

Additional details on the analytical methods for this study, the analytical laboratory reports and the quality control procedures used for this study can be consulted online on the official webpage of the Global Alliance to Eliminate Lead Paint at:

http://www.unep.org/hazardoussubstances/LeadCadmium/PrioritiesforAction/LeadPaints/FocalAreasofWork/GAELP/tabid/106381/Default.aspx

6 Overall Study Results

A total of 234 cans of enamel decorative paints (sometimes called *architectural paints* of *paints for household use*) were purchased in retail establishments in the following nine countries: Argentina, Azerbaijan, Chile, Cote d'Ivoire, Ethiopia, Ghana, Kyrgyzstan, Tunisia, and Uruguay. An additional ten cans of anti-corrosive paints were purchased in Côte d'Ivoire. All of the paints were tested for their total lead content, dry weight.

Countries selected for testing are regionally and linguistically diverse, do not appear to have publically available data on the lead content of decorative paints for sale on their national market, and had a capable IPEN partner NGO with both the interest and the ability to carry out their role in the project.

No Asian countries were included because IPEN is carrying out a more ambitious paint testing program in seven Asian countries with support from the European Union. The results from those countries will be published separately.

Below is a summary of the overall results from the nine countries, and some observations[36].

Lead Levels in Paints

Most of the paints tested would not meet regulatory standards established in most highly industrial countries

In five of the nine project countries, 67 per cent or more of the paint samples tested had lead content greater than 90 ppm lead – the regulatory limit in the United States and some other industrialized countries. These countries are: Azerbaijan, Cote d'Ivoire, Ethiopia, Kyrgyzstan and Tunisia

In the same five countries, 57 per cent or more of the paint samples tested had lead content greater than 600 ppm lead, the regulatory standard in Argentina, Chile and Uruguay.

36 Detailed country-by-country data and information on the testing results can be consulted online on the official webpage of the Global Alliance to Eliminate Lead Paint at: *http://www.unep.org/hazardoussubstances/Home/tabid/197/hazardoussubstances/LeadCadmium/PrioritiesforAction/GAELP/.....* (HYPERLINK OF FOOTNOTE 1 OF THE TABLE OF THE CONTENT)

Paints with extremely high levels of lead are still available in most countries.

In seven of the nine countries, some paint samples tested had lead concentrations greater than 10,000 ppm. Five of these samples were from Argentina; two from Azerbaijan; six from Cote d'Ivoire; ten from Ethiopia; three from Ghana; three from Kyrgyzstan; and eight from Tunisia.

In four of the nine countries – Argentina, Ethiopia, Kyrgyzstan, and Tunisia – one or more of the paints tested had lead levels of 99,000 ppm lead or greater or 10 per cent or more lead by weight.

In most countries with lead paint, equivalent paint with no added lead is available.

In six of the seven countries with lead paint – Argentina, Azerbaijan, Cote d'Ivoire, Ghana, Kyrgyzstan and Tunisia, paints with very low lead contents coexists in the market with lead paint.

Lead Concentrations in Paints by Color

The selection criteria were, whenever possible, to identify 10 common paint brands and purchase one can of white paint, one can of red paint and one can of yellow paint. The actual selections deviated from this protocol because of availability or other reasons. Of the 234 samples of decorative paint samples analyzed, 204 samples, or 87 per cent, were one of these three colors.[37] (Table 1 and 1A)

White Paints had the lowest lead content

The white decorative paints tested, on average, had the lowest lead content, and many contained no lead at the level of detection or only trace quantities of lead. The highest lead concentration of the 77 white samples tested was 9,400 ppm lead in one sample from Cote d'Ivoire. All other white samples tested contained less than 6,000 ppm lead. This finding is consistent

37 This section considers the 234 samples of decorative paints that were analyzed, but does not take into account the ten samples of anti-corrosive paints from Cote d'Ivoire that were analyzed: five of which were red and five of which were grey

with the hypothesis that white lead pigments are now rarely used in decorative paints. In Chile, Ghana and Uruguay, all of the white paints tested contained less than 90 ppm lead. In five of the other nine countries, one or more of the white paints contained more than 1,200 ppm lead but less than 6,000 ppm lead. This finding is consistent with the hypothesis that lead-based driers are still used in some enamel decorative paints in the countries where testing was done.

Yellow, red and other brightly colored paints had the highest lead content

The yellow decorative paints tested had, on average, the highest lead contents. A total of 58 samples of yellow decorative paint were tested. In seven of the nine countries, one or more of the yellow decorative paints tested had lead content greater than 10,000 ppm. In three of the nine countries, at least one of these had lead content greater than 100,000 ppm lead.

Many red paints had high lead content

A total of 69 samples of red decorative paints were tested. In six of the nine countries, one or more of the red decorative paints had lead content greater than 10,000 ppm. None had lead content greater than 100,000 ppm lead but one sample of red decorative contained 99,000 ppm lead.

Green paints also had high lead content

A total of 30 decorative paints in colors other than white, red and yellow were tested.

Eight of these were green. Half of the green decorative paints tested contained more than 10,000 ppm lead; one contained more than 100,000 ppm lead. None of the remaining 22 samples of colored decorative paints tested (other than white, red and yellow) contained more than 10,000 ppm lead.

The above findings are consistent with testing results from other countries[38] in which – on average – white enamel decorative paints had the lowest lead content, yellows had the highest lead content and reds had high lead content but lower than yellows. The findings are also consistent with the hypothesis that some of the yellow, red and green decorative paints tested contain lead-based pigments in their formulations.

38 The past studies are listed in section on global data: Summary of Available Data on Lead Decorative Paints on the Market in Developing Countries and Countries with Economies in Transition

Table 1. Summary of Total Lead Concentration by Country and Color* for New Enamel Decorative Paints in Parts per Million (ppm) Dry Weight

Country	Number of White Paints Sampled	White Maximum / Minimum ppm	Number of Red Paints Sampled	Red Maximum / Minimum ppm	Number of Yellow Paints Sampled	Yellow Maximum / Minimum ppm
Argentina	10	3,900 / <5	8	73,000 / <5	9	130,000 / <5
Azerbaijan	11	4,000 / 16	9	12,000 / 18	1	20,000 / 20,000
Chile	5	5 / <5	11	1,100 / <5	7	28 / <5
Cote d'Ivoire	8	9,400 /<5	6	7,700 / <15	6	42,000 / <15
Ethiopia	8	5,500 / <15	7	25,000 / 44	7	130,000 / 8,500
Ghana	7	27/ < 5	4	22,200 /< 15	7	42,000 / <5
Kyrgyzstan	11	4,200/ <15	8	99,000 /<5	7	73,000 / <5
Tunisia	7	1,900 / < 5	7	30,000 /<5	5	170,000 / <5
Uruguay	10	63 / <5	9	55 / <5	9	<15 / <5
Total	77		69		58	

Note: * Data on per cent and number of samples exceeding 90 ppm, 600 ppm and 10,000 ppm by color and country are presented in each results and discussion section for each country. They can be consulted online on the official webpage of the Global Alliance to Eliminate Lead Paint at: http://www.unep.org/hazardoussubstances/Home/tabid/197/hazardoussubstances/LeadCadmium/PrioritiesforAction/GAELP/.....(HYPERLINK OF FOOTNOTE 1 OF THE TABLE OF THE CONTENT)

Table 1A. Lead Concentrations of Paints of Colors of New Enamel Decorative Paints Other than Red, White and Yellow for Which At Least Two Samples were Tested

Color	Number of Samples	Number of Countries	Minimum ppm Lead	Maximum ppm Lead	Number of Samples greater than or equal to 90 ppm Lead	Number Samples greater than or equal to 600 ppm Lead	Number samples greater than or equal to 10,000 ppm Lead
Aluminum	2	1	250	6,500	2	1	0
Black	3	2	<5	1,000	1	1	0
Blue	4	2	<5	2,700	3	3	0
Brown	3	1	52	1,600	2	2	0
Coffee	4	1	<5	2,000	2	2	0
Green	8	5	<15	110,000	6	6	4
Grey	3	2	<5	1,500	6	6	1

Note: Single samples of gold, orange and topaz colored paints had lead concentrations of 190 ppm, 18 ppm and 2,900 ppm Lead respectively.

Lead Concentrations in Paints by Country

Few countries have established regulatory frameworks but those that have generally have lower lead paint levels

In two of the nine countries, Chile and Uruguay, all the enamel decorative paints tested had low total lead concentrations.

None of the samples from Uruguay exceeded 90 ppm and only one of the samples in Chile exceeded this value (1,100 ppm). Both Chile and Uruguay have recently enacted national executive decrees that prohibit the production, import, distribution, sale and use of decorative paints with a lead concentration above 600 ppm. With one exception, all the tested paints from these countries complied with the law. Argentina has more recently enacted a similar national executive decree. Seven of the 30 Argentine paints tested were found to contain greater than 600 ppm lead.

In each of the participating countries other than Chile and Uruguay, two or more of the samples of enamel decorative paints tested had lead content greater than 10,000 ppm. In four of these countries, at least one of the decorative paints tested had a lead concentration at or above 99,000 ppm lead. In five of the nine countries, more than half of the decorative paint samples tested had lead content greater than 600 ppm lead, the regulatory limit in many other countries.

In Cote d'Ivoire, 10 samples of anti-corrosive paints were also tested. One of these had lead content of 260,000 ppm lead or greater than 25 per cent of its dry weight.

Table 2 includes a summary of total data for new decorative enamel paint in the nine countries of the present study.

Table 2: Summary of Total Lead Concentration Data for New Decorative Enamel Paints In Nine Countries

Country	Number of Samples	Number of Brands	Average Lead Concentration ppm	Per cent Greater Than 90 ppm (Number)	Per cent Greater Than 600 ppm (Number)	Per cent Greater Than 10,000 ppm (Number)	Minimum ppm	Maximum ppm
Argentina	30	12	17,000	23% (7)	23% (7)	17% (5)	< 5	130,000
Azerbaijan	30	16	2,600	77% (23)	67% (20)	7% (2)	< 5	20,000
Chile	23	6	52.6	4% (1)	4% (1)	0% (0)	< 5	1,100
Cote d'Ivoire	20	7	8,700	70% (14)	65% (13)	25% (5)	< 5	42,000
Cote d'Ivoire Anti Corrosive Paints1	10	5	27,500	80% (8)	80% (8)	10% (1)	< 15	260,000
Ethiopia	23	8	18,500	87% (20)	83% (19)	30% (10)	< 15	130,000
Ghana	18	8	5,030	33% (6)	28% (5)	17% (3)	< 5	42,000
Kyrgyzstan	30	11	7,160	67% (20)	57% (17)	10% (3)	< 5	99,000
Tunisia	30	16	17,900	70% (21)	63% (19)	27% (8)	< 5	170,000
Uruguay	30	10	9.8	0% (0)	0% (0)	0% (0)	< 5	63

Note: Additional data on total lead concentration in anti-corrosive paints purchased in Cote d'Ivoire are presented in the results and discussion section for this country. They can be consulted online on the official webpage of the Global Alliance to Eliminate Lead Paint at: http://www.unep.org/hazardoussubstances/Home/tabid/197/hazardoussubstances/LeadCadmium/PrioritiesforAction/GAELP/.....(HYPERLINK OF FOOTNOTE 1 OF THE TABLE OF THE CONTENT

Consumer Information on Paint Can Labels

Few if any manufacturers include warnings about hazards associated lead on their labels.
Only 20 out of the 234 sampled paint cans offered information about lead content. Seventeen of these cans were sold in Uruguay.

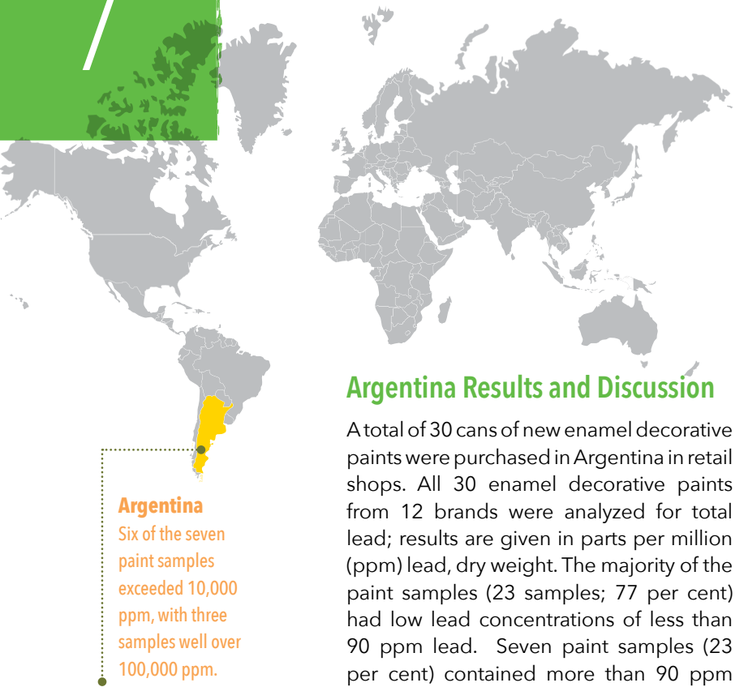
There appears to be no standard practice with regard to the availability of other types of consumer information. A total of eighty-eight cans (38 per cent) included the website address of the paint manufacturer on the label, but no paint can sampled in Chile, Ethiopia or Tunisia carried this information.

Approximately half of the cans of paints sampled had manufacture dates or batch numbers on their label. The countries where paints were least likely to carry this information were Tunisia, Ethiopia and Cote d'Ivoire.

Kyrgyzstan was the country most likely to sell paint with website information as well as manufacture date and batch number.

7

Country By Country Results[39]



Argentina
Six of the seven paint samples exceeded 10,000 ppm, with three samples well over 100,000 ppm.

Argentina Results and Discussion

A total of 30 cans of new enamel decorative paints were purchased in Argentina in retail shops. All 30 enamel decorative paints from 12 brands were analyzed for total lead; results are given in parts per million (ppm) lead, dry weight. The majority of the paint samples (23 samples; 77 per cent) had low lead concentrations of less than 90 ppm lead. Seven paint samples (23 per cent) contained more than 90 ppm lead; lead concentrations in all of these same samples also exceeded 600 ppm. Six of the seven paint samples exceeded 10,000 ppm, with three samples well over 100,000 ppm.

Lead Concentration in Paint by Brand

High lead concentrations were found in four of the 12 brands tested).

The brands with paint samples that tested the highest were Productora Química Llana y Cía (130,000 ppm), Fadepa (120,000 ppm), Colvinil (110,00 ppm), and Sinteplast (3,900 ppm). One or more of the tested paints from each of these four brands also contained less than 90 ppm lead.

Paints of the other eight brands had very low lead concentrations. Most of the paints tested from these brands contained lead in concentrations less than the laboratory's detection limit of 5 ppm; none contained more than 23 ppm lead.

39 Individual results for each of the nine country of the present study can be consulted online on the official webpage of the Global Alliance to Eliminate Lead Paint at: *http://www.unep.org/hazardoussubstances/Home/tabid/197/hazardoussubstances/LeadCadmium/PrioritiesforAction/GAELP/*. ..(HYPERLINK OF FOOTNOTE 1 OF THE TABLE OF THE CONTENT)

Lead Concentration in Paint by Color

A total of five different colors of paint were tested. 10 white paints, nine yellow paints, eight red paints, two black paints and one green paint were tested.

Yellow and red paints had the highest average lead concentrations of 40,000 ppm and 18,200 ppm respectively. Of the colors for which there were more than two samples, the white paints had the lowest average lead concentration.

Consumer Information

Only one paint can of the thirty tested carried information about lead on its label.

Discussion

Though more than three-quarters of paints sold tested below 90 ppm, a significant number of paints had high lead levels. The patterns of lead concentration by color in Argentina are consistent with what has been found in other countries.

In 2009, the Argentina Health Ministry (Ministerio de Salud) issued resolution 7/2009 which prohibits the manufacture and import for use of paints, lacquers and varnishes containing more 0.06% lead in the non-volatile portion of the paint (dry weight). This resolution entered into force in 2010.[40]

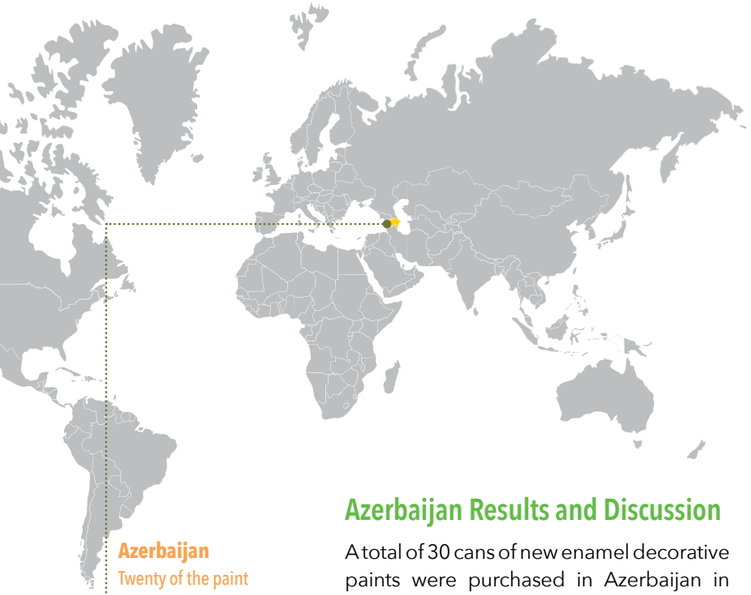
All the paints from eight of the twelve brands tested complied with this resolution but paints from four brands did not comply. These brands were: Productora Química Llana y Cía, Fadepa, Colvinil, and Sinteplast.

For the Sinteplast brand paint, a red paint and a green paint were tested and both had lead concentrations below the level of detection. A white paint, however, contained 3,900 ppm lead. No yellow Sinteplast paint was tested.

For each of the remaining 3 brands with high lead content, two of the three paints tested had very high lead content; and one paint sample from each had lead concentrations greater than 100,000 ppm.

Based on these sampling results, it appears that there is not yet full compliance with the Argentina resolution 7/2009, and that decorative paints with high lead content are still available for sale on the domestic market.

40 See: *ARG/166/Add.3 at: http://www.puntofocal.gov.ar/formularios/registro_arg04.php*



Azerbaijan
Twenty of the paint samples (67 per cent) contained more than 600 ppm total lead. Two of the paint samples (seven percent) contained more than 10,000 ppm total lead. The paint sample with the highest concentration had 20,000 ppm lead content.

Azerbaijan Results and Discussion

A total of 30 cans of new enamel decorative paints were purchased in Azerbaijan in retail shops. All 30 enamel decorative paints from 16 brands were analyzed for total lead; results are given in parts per million (ppm) lead, dry weight.

Twenty-three of the paint samples (77 per cent) contained more than 90 ppm total lead. Twenty of the paint samples (67 per cent) contained more than 600 ppm total lead. Two of the paint samples (seven per cent) contained more than 10,000 ppm total lead. The paint sample with the highest concentration had 20,000 ppm lead content.

Lead Concentration in Paint by Brand

There were 16 different brands purchased in Azerbaijan. However, for 10 of the brands, only one paint sample was purchased. Two or more samples were purchased for only six of the brands. Of these, only one brand, Betek, had lead concentrations less than 90 ppm in all tested paints. Two of the three samples from the Yarko brand paint contained less than 90 ppm, while the third sample contained 550 ppm of total lead.

The brands with two or more samples with the highest average lead content were Antipas (6,400 ppm), Best (3,700 ppm), and FAB (3,000 ppm). A yellow paint of the Best brand had the highest concentration of lead of 20,000 ppm but it also had two paints with very low lead concentrations (16 and 20 ppm).

Lead Concentration in Paint by Color

A total of eight different colors of paint were tested, including eleven white paints, nine red paints, four coffee paints, two grey paints, one yellow plant, one green paint, one blue paint, and one black paint.

The highest lead concentration was found in the one yellow paint sample (20,000 ppm). The nine red paint samples had the highest average lead concentration (3,810 ppm). A white paint had a lead concentration of 1.100 ppm and a coffee paint had a lead concentration of 860 ppm.

Consumer Information

None of the thirty paint cans carried information about lead on its label.

Discussion

In most countries, the highest lead concentrations are often found in brightly colored paints, especially the yellows. This pattern seems to be followed in Azerbaijan with the one sample of yellow paint having the highest lead concentration. Two-thirds of the paints tested from Azerbaijan were not brightly colored, but were white, coffee, grey and black and had an average of 1,150 ppm. Perhaps as a result, the overall average lead concentration of the paints tested was 2,600 ppm – somewhat lower than was found in many of the other project countries but still considerably above the 90 ppm or 600 ppm regulatory frameworks that have been established in other countries. It is likely that the overall average would have been higher if more yellow paints and other brightly colored paints had been sampled,

The Azerbaijani Labor Code has rules which prohibit children under the age of 18 from working in facilities where exposure to lead is likely.[41] Azerbaijan also has a Cabinet decision 343 (July 1, 1993) and other decisions addressing mandatory certifications to ensure that products, processes and services are in conformity with mandatory requirements of regulatory documents.[42] However, there appear to be no laws, decrees or regulations that are currently in force in Azerbaijan that set a maximum permissible limit on the lead content of paints.

41 See *http://e-qanun.az/files/framework/data/0/f_893.htm*
42 General Information, State Committee for Standardization, Metrology, and Patent of the Republic of Azerbaijan; *http://www.azstand.gov.az/index.php?lang=3&id=81*

Chile
Only one paint sample had a lead content of 1,100 ppm, nearly double Chile's regulatory limit of 600 ppm.

Chile Results and Discussion

A total of 23 cans of new enamel decorative paints were purchased from retail shops in Chile. All 23 paints from six brands were analyzed for total lead; the results are given in parts per million (ppm) lead, dry weight.

Twenty-two of the 23 paint samples tested were beneath or near the laboratory detection limit for lead, containing at most trace quantities. Only one paint sample had a lead content of 1,100 ppm, nearly double Chile's regulatory limit of 600 ppm.

Lead Concentration in Paint by Brand

Only one paint sample – a Tricolor brand red paint – had a lead concentration of 1,100 ppm lead, greater than Chile's maximum permissible limit of 600 ppm. Most sampled brands produced paints with low lead

Lead Concentration in Paint by Color

A total of three different colors of paint were tested. These included eleven red paints, seven yellow paints, and fivewhite paints. With the exception of the Tricolor red paint (1,100 ppm lead), the red and yellow paints sampled had lead concentrations below 90 ppm.

Consumer Information

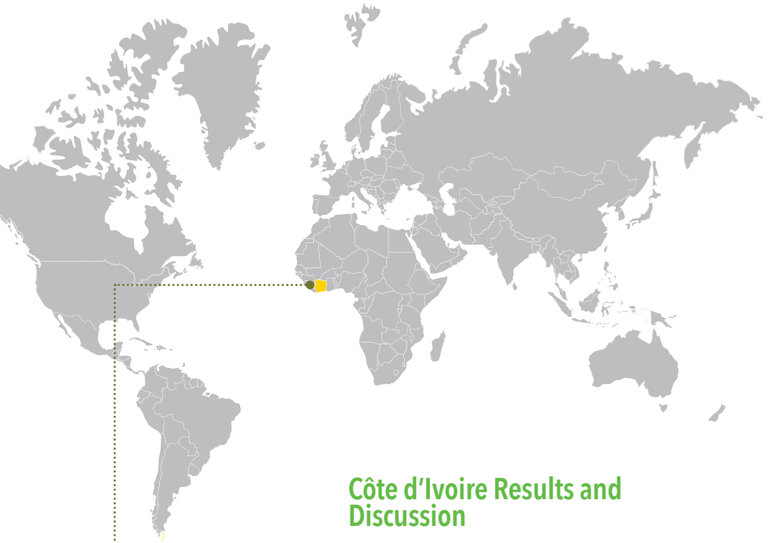
None of the 23 paint cans carried information about lead on its label.

Discussion

The Health Ministry of Chile promulgated a decree in 1997 that establishes the maximum lead content allowed in paints, varnishes and similar coating materials of no greater than 0.06% (600 ppm) lead, by weight, expressed as per cent of metallic lead in the total nonvolatile content, determined on a dry basis. [43] Compliance monitoring is the responsibility of the regional and metropolitan health services, and violations are to be punished under the National Health Code. The decree applies to decorative paints for household use but exempts paints used in certain industrial and other applications.

It appears that the Health Ministry decree has been largely successful in keeping lead decorative paints off the Chilean national market. However, the fact that one sample contained nearly twice the lead content permitted under the Ministry decree suggests that further paint testing might be useful in order to monitor and evaluate compliance with the decree and, if appropriate, to set the stage for possible enforcement measures.

43 See: *http://seremi9.redsalud.gob.cl/wrdprss_minsal/wp-content/uploads/2012/05/ds_374-FIJA-LIMITE-MAXIMO-PERMISIBLE-DE-PLOMO-EN-PINTURAS-QUE-INDICA.pdf*



Côte d'Ivoire
The paint sample with the highest concentration had a lead content of 42,000 ppm.

Côte d'Ivoire Results and Discussion

A total of 30 new enamel paints were purchased from retail shops in Cote d'Ivoire. Some 20 of these were decorative paints. The remaining 10 samples were enamel, anti-corrosion paints intended for use on metal doors and windows in housing, metal toys, playground equipment and other domestic uses.

Decorative Paints Twenty decorative paints from seven brands were analyzed for total lead; results are given in parts per million (ppm) lead, dry weight. One of these brands was taken from a can sold with no label and was designated "unknown".

Fourteen paint samples (70 per cent) had lead concentrations higher than 90 ppm; thirteen paint samples (65 per cent) had lead in concentrations higher than 600 ppm. Five of the paint samples (25 per cent) had lead in excess of 10,000 ppm. The paint sample with the highest concentration had a lead content of 42,000 ppm.

Anti-corrosion Paints Ten enamel anti-corrosion paints from five brands were analyzed for total lead; the results are given in parts per million (ppm) lead, dry weight.

Eight of the ten (80 per cent) paint samples had lead concentrations higher than 90 ppm; eight (80 per cent) paint samples had lead concentrations higher than 600 ppm. One paint sample had a lead concentration of 260,000 ppm.

Lead Concentration in Paint by Brand

Decorative Paints Three or four samples of decorative paints were collected for each of six brands.

The four paint samples of the Seigneurie brand, a subsidiary of the transnational company PPG, were all near or below the detection limit for lead: the highest sample from this brand had only 16 ppm lead.

The only paint sample from the Jaline brand paint that was tested, a white paint, did not contain detectable lead.

Most of the paint samples from the other four brands - Deluxe, Magic, Super, Topline, and the unlabelled sample, contained high levels of lead with the brand averages ranging from 5,930 ppm to 19,700 ppm total lead. One or more samples from each of these five brands contained lead in excess of 10,000 ppm.

Anti-corrosion Paints Two samples for each of five brands of anti-corrosive paints were tested.

Both samples of Seigneurie brand anti-corrosive paint contained less than 90 ppm lead and both were near or below the laboratory detection limit. All the other anti-corrosion paints tested had lead content greater than 600 ppm.

Magic and Topline brands moderately exceeded this limit, with Deluxe brand higher yet. The Super brand grey anti-rust paint had an extremely high lead content of 260,000 ppm: the dry paint was more than 25% lead by weight.

Lead Concentration in Paint by Color

Decorative Paints A total of three different colors of decorative paints were tested, including eight white paints, six red paints, and six yellow paints.

The highest average concentration, 23,800 ppm lead, was found in yellow paint samples, as has been the case in a number of other new enamel decorative paint surveys. Red and white paints had lower concentrations, but were still high with averages of 2,890 ppm and 1,700 ppm, respectively.

Anti-corrosion Paints Two different colors of anti-corrosion paints were tested, including five grey paints and five red paints.

Both the red and the grey paint samples of Seigneurie brand anti-corrosive paint contained at most trace quantities of lead. For the other four brands, the red anti-corrosive paints ranged from a low of 700 ppm lead to a high of 2,900 ppm lead. The grey anti-corrosive paints from Magic and Topline brands were in a similar range.

The sample of grey Deluxe brand anti-corrosive paint contained 7,000 ppm lead; the grey Super brand anti-corrosive paint contained 260,000 ppm lead.

Consumer Information

One can of Seignenurie brand enamel decorative paint carried information about lead content on its label (Contient des traces de plomb (Contains traces of lead)) and one can of Super brand anti-corrosive paint carried information about lead content on its label (Minium De Plomb (Red Lead)).

Discussion

There is currently no law or regulation in Cote d'Ivoire that controls or limits the lead content of paints.

It appears that the lead content of some decorative paints and of some anti-corrosive paints sold and used in Cote d'Ivoire could contribute to significant national levels of childhood lead exposure. However, paints formulated without added lead compounds are available on the retail market suggesting there is no price barrier.

Ethiopia Results and Discussion

A total of 23 cans of new enamel decorative paints were purchased from retail shops in Ethiopia. All 23 enamel decorative paints from eight brands were analyzed for total lead; results are given in parts per million (ppm) lead, dry weight.

Twenty of the paint samples tested (87 per cent) had lead concentrations greater than 90 ppm; 19 of the paint samples tested (83 per cent) had lead concentrations greater than 600 ppm.

Seven of the paint samples tested (30 per cent) had lead content greater than 10,000 ppm. Three of the paint samples had lead content at or above 70,000 ppm; and the paint sample with the greatest lead content had 130,000 ppm lead.

Lead Concentration in Paint by Brand

Three paint samples were tested from eight brands.

One or more paint samples from each brand had lead content greater than 3,000 ppm. Samples from six brands - Abay Paints, Bright Paints, Dil (MBI) Paints, Kadisko Paints, Nifas Silk Paints, Zemili (DH Geda) Mega, had lead concentrations greater than 10,000 ppm. Dil (MBI) Paints had the sample with the highest lead concentration of 130,000 ppm.

Ethiopia

Twenty of the paint samples tested (87 percent) had lead concentrations greater than 90 ppm; 19 of the paint samples tested (83 percent) had lead concentrations greater than 600 ppm.

Lead Concentration in Paint by Color

A total of four different colors of paint were tested, including eight white paints, seven yellow paints, seven red paints, and one green paint.

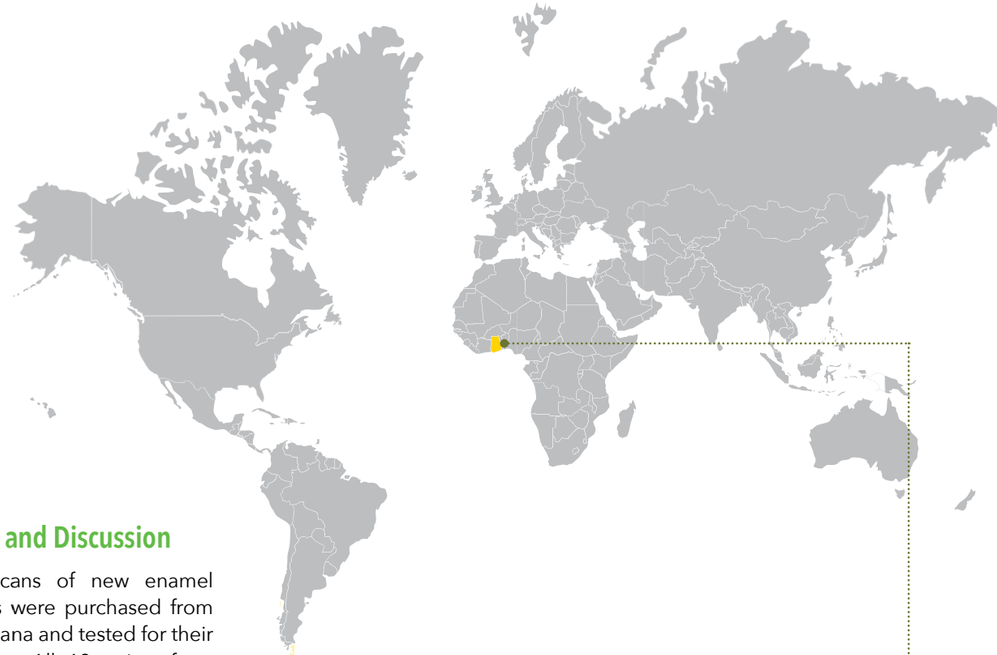
Yellow paints had the highest average lead concentrations (52,200 ppm) and a yellow paint had the highest lead concentration of 130,000 ppm; red paints had an average lead concentration of 5,400 ppm; white paints had the lowest average lead concentrations.

Consumer Information

None of the 23 paint cans carried information about lead on its label.

Discussion

There is currently no law or regulation in Ethiopia that controls or limits the lead content of paints used for household decoration in Ethiopia. The high levels of lead in tested paints suggests that lead in enamel decorative paints potentially poses a significant children's health hazard in those parts of Ethiopia where these or similar paints are being used on home interiors and or exteriors.



Ghana Results and Discussion

A total of 18 cans of new enamel decorative paints were purchased from retail shops in Ghana and tested for their total lead content. All 18 paints from eight brands were analyzed for total lead; results are given in parts per million (ppm) lead, dry weight.

Six of the paint samples tested (33 per cent) had lead concentrations greater than 90 ppm; five of the paint samples tested (28 per cent) had lead concentrations greater than 600 ppm.

Three of the paint samples tested (17 per cent) had lead concentrations greater than 10,000 ppm.

Lead Concentration in Paint by Brand

At least two paint samples were analyzed for six of the eight brands.

Two paint samples from the Glasurit brand (a yellow and a white) contained less than 5 ppm lead. Two of three paint samples from the Shield brand contained less than 90 ppm lead and the third slightly exceeded this with 140 ppm lead. Each of the four other brands for which multiple samples were tested had one or more paint sample that exceeded 600 ppm lead.

Ghana
Three of the paint samples tested (17 percent) had lead concentrations greater than 10,000 ppm.

The paint samples with the highest lead levels came from two of the eight brands that were tested: Leylac (manufactured by the Ghanaian company BBC Industrials Co. Ltd) and Azar (manufactured by the Ghanaian company Azar Chemical Industries Ltd). The paint sample with the greatest lead content (a yellow Leylac paint) had 42,000 ppm lead.

A yellow paint was the only sample collected from the Dulux brand paint. This sample contained less than 5 ppm lead. Dulux paints have been analyzed in many other countries and have generally very low lead concentrations, often beneath the level of detection.

Lead Concentration in Paint by Color

A total of three different colors of paints were tested - seven white paints, four red paints, and seven yellow paints.

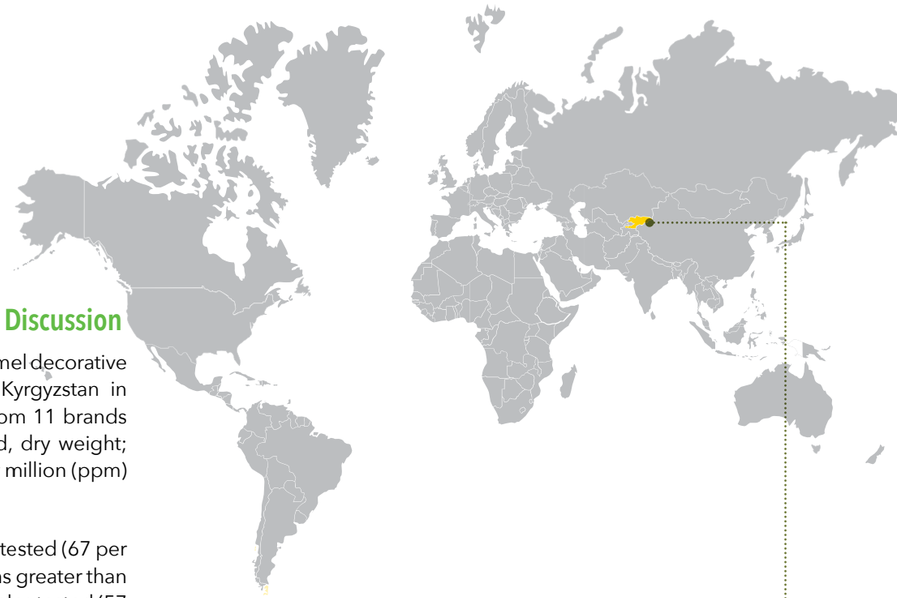
The highest average concentration was found in the yellow paints (9,780 ppm). The average concentration of the red paints was 5,520 ppm. All of the white paints tested had very low lead concentrations; the highest was 27 ppm lead and the average 8.1 ppm lead..

Consumer Information

Only the Dulux brand carried information about lead on its label.

Discussion

There is currently no law or regulation that controls or limits the lead content of paints used for household decoration in Ghana. It appears that the lead content of many of the decorative paints sold and used in Ghana are sufficiently high to contribute to significant national levels of childhood lead exposure. However, brands of paint without added lead are available indicating that there is no competitive barrier.



Kyrgyzstan
Three of the paint samples tested (10 percent) had lead content greater than 10,000 ppm.

Kyrgyzstan Results and Discussion

A total of 30 cans of new enamel decorative paints were purchased in Kyrgyzstan in retail shops. All 30 paints from 11 brands were analyzed for total lead, dry weight; results are given in parts per million (ppm) lead, dry weight.

Twenty of the paint samples tested (67 per cent) had lead concentrations greater than 90 ppm; 17 of the paint samples tested (57 per cent) had lead concentrations greater than 600 ppm. Three of the paint samples tested (10 per cent) had lead content greater than 10,000 ppm.

Lead Concentration in Paint by Brand

Two or more paint samples were tested from 11 brands.

All paints tested from Apollow and Tikkurila brands were beneath the level of detection; all paints tested from Fawori (Betek) brand were less than 90 ppm lead; all paints tested from Valoshino brand were beneath 600 ppm lead. For each of the other seven brands, two or more of the samples contained more than 600 ppm lead.

The two brands with the highest tested levels of lead were National Paints and Chemist brand. From National Paints brand a red paint contained 99,000 ppm lead

and a yellow paint contained 73,000 ppm lead. A red paint sample from Chemist brand contained 13,000 ppm lead.

All samples from the remaining five brands of paints contained less than 5,000 ppm lead.

Lead Concentration in Paint by Color

A total of five different colors were tested, including 11 white paints, seven yellow paints, eight red paints, three brown paints and one topaz paint.

The highest average concentrations were found in the red paints and yellow paints, with average concentrations of 14,780 and 10,980, respectively. White paints had the lowest average lead concentration.

Consumer Information

None of the 30 paint cans carried information about lead on its label.

Discussion

Lead content in test brands of enamel paints for sale on the Kyrgyzstan market range widely from at most trace quantities of lead to extremely high lead content, suggesting that the lead content of many of the decorative paints sold and used in Kyrgyzstan is sufficiently high to contribute to significant national levels of childhood lead exposure. At present, there appears to be no law or regulation in Kyrgyzstan that explicitly establishes maximum limits for the lead content of paints. The availability of brands of paint without added lead indicates that there is no competitive barrier.

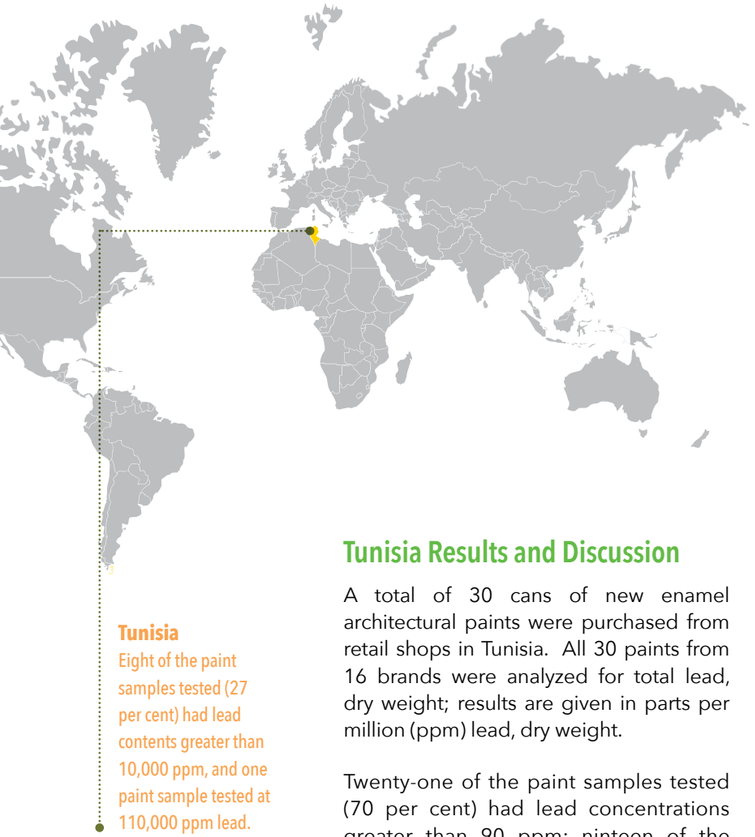
The Kyrgyz Constitution, the law On Public Health, and/or the Technical Regulations on the Safety of Building Materials might provide a basis for establishing such limits:

- Article 48 of the Constitution of the Kyrgyz Republic[44] states that every citizen has the right to an enabling environment for life and health, and a right to be compensated for damage to health or property caused by the operations of individuals or entities in the environmental sphere.
- The Kyrgyz Republic law "On public health[45]" defines right of the citizens to an enabling environment to include restrictions that require potentially hazardous chemicals to be produced, transported, procured, stored, sold and used only in accordance with the legislation of the Kyrgyz Republic.
- The Kyrgyz Republic Technical Regulation on "Safety of building materials, products and designs,[46]" establishes requirements on building materials including paints and varnishes and states that they must meet the requirements of the appropriate regulatory-legal documents connected with the technical regulation. Maximum allowed concentration of hazardous chemicals might be established by regulatory-legal acts connected with the technical regulation.

44 See: *http://www.wipo.int/wipolex/en/details.jsp?id=10576*

45 See: *http://www.dgsen.kg/podrazdel.php?podrazdel=19;* download MS Word file number 14 on the list of laws

46 See: *http://www.mineconom.kg/index.php?option=com_content&view=article&id=1523&Itemid=503&lang=ru;* 16th entry; downloaded PDF; see Article 7.3



Tunisia
Eight of the paint samples tested (27 per cent) had lead contents greater than 10,000 ppm, and one paint sample tested at 110,000 ppm lead.

Tunisia Results and Discussion

A total of 30 cans of new enamel architectural paints were purchased from retail shops in Tunisia. All 30 paints from 16 brands were analyzed for total lead, dry weight; results are given in parts per million (ppm) lead, dry weight.

Twenty-one of the paint samples tested (70 per cent) had lead concentrations greater than 90 ppm; ninteen of the paint samples tested (63 per cent) had lead concentrations greater than 600 ppm.

Eight of the paint samples tested (27 per cent) had lead contents greater than 10,000 ppm, and one paint sample tested at 110,000 ppm lead.

Lead Concentration in Paint by Brand

Two or more paint samples were tested for eight of the sixteen brands.

All three samples tested from M. Bricolage brand paint were beneath the level of detection; two of three paint samples tested from Astral brand paint were beneath detection and the third had a concentration of 190 ppm lead.

Of the other six brands for which two or more samples were tested, four had one or more sample with 10,000 ppm lead or higher, and all had an average of all paints tested higher than 10,000 ppm: Cogepur (54,500 ppm); Luxtral (16,500); Pingomail (43,500 ppm); and Supremail (35,000 ppm).

The brands with samples with the highest lead content were Pingomail (170,000 ppm) and Vitalque (110,000 ppm).

For nine of the 16 brands only one sample of paint was tested. In four cases, the sample tested was a white paint. These four samples contained only trace quantities of lead but it is not possible to generalize from this result whether or not colored enamel paints from these same brands would be likely to have high or low lead content. Single samples from the other five brands were for a colored paint. Each of these paints had lead concentrations exceeding 600 ppm; two exceeded 10,000 ppm; and the maximum lead content detected was 110,000 ppm.

Lead Concentration in Paint by Color

A total of eight different colors of paints were tested, including seven red paints, seven white paints, five yellow paints, and four green paints. Three blue paints, two aluminum paints, one gold paint, and one grey paint were also tested.

Green and yellow paints had the highest average lead concentration with averages of 60 ppm, 750 ppm and 47,860 ppm, respectively.

With the exception of gold (for which there was only one sample tested), at least one sample of every other color contained more than 600 ppm lead. For colors with more than one sample tested, white had the lowest lead content.

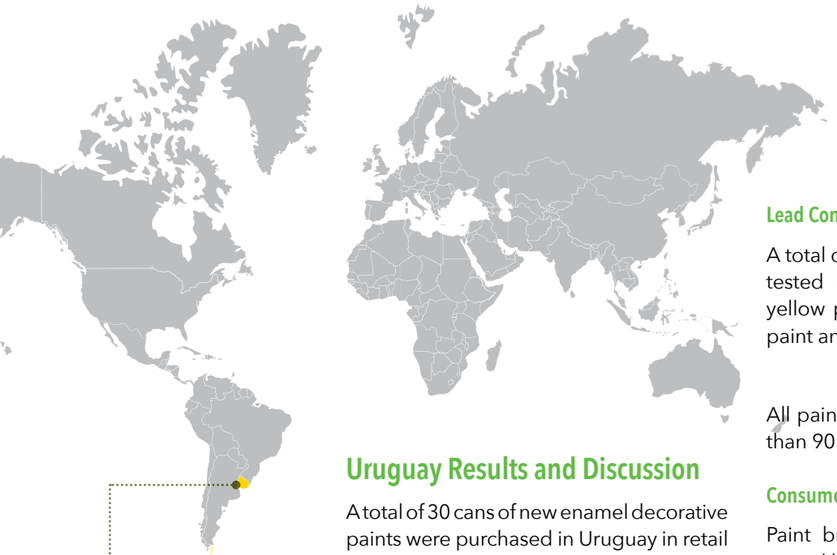
Consumer Information

Only one can of the Astral brand carried information about lead on its label.

Discussion

There is currently no law or regulation in Tunisia that controls or limits the lead content of decorative paints.

Because of the relatively large number of paints tested with more than 10,000 ppm lead and the two paint samples that tested above 100,000 ppm lead, it appears that the lead content of many of the decorative paints sold and used in Tunisia is sufficiently high to contribute to significant national levels of childhood lead exposure. However, brands of paint without added lead are available indicating that there is no competitive barrier.



Uruguay
All of the paint samples, and thus all of the brands, had low lead content of less than 90 ppm lead.

Uruguay Results and Discussion

A total of 30 cans of new enamel decorative paints were purchased in Uruguay in retail shops. All 30 paints from 10 brands were analyzed for total lead; results are given in parts per million (ppm) total lead, dry weight.

All of the paint samples, and thus all of the brands, had low lead content of less than 90 ppm lead.

Lead Concentration in Paint by Brand

Three paint samples from 10 brands were tested. All paint samples from all brands were below 90 ppm. The paint sample with the highest lead content contained 63 ppm lead.

Lead Concentration in Paint by Color

A total of five different colors of paint were tested including ten white paints, nine yellow paints, nine red paints, one green paint and 1one orange paint.

All paint colors had low lead content, less than 90 ppm.

Consumer Information

Paint brands sold in Uruguay were the most likely to carry information on paint can labels. Eighteen paint cans of the 30 tested carried information about lead on its label.

Discussion

In 2004, Uruguay's Ministry of Housing, Spatial Planning and the Environment, and its Ministry of Industry, Energy and Mining promulgated Article 5° of Law No. 17,775, which controls the lead content of paint.[47] It covers architectural paints (also called decorative or household use), varnishes and similar surface coatings, and it establishes that the maximum lead content of such paints must be less than or equal to 600 ppm determined on a dry basis or total non-volatile content.

The decree also covers paints used by children such as temperas and watercolors; and also printing inks. The decree excludes paints used on agricultural and industrial equipment; metal structures; bridges and harbors; road safety paints and traffic signs; motor vehicles, aircraft, ships and railways, and the maintenance or restoration of works of art, antiques, and buildings of historic or artistic value.

Based on the testing results, it appears that decorative enamel paints on the Uruguayan market comply with this decree. Labels on the cans for some of the brands did not indicate lead content, and warnings about lead dust hazards from disturbing older painted surfaces did not appear to be present.

47 See: *http://www.mvotma.gub.uy/images/Decreto%2069-011%20Diario%20Oficial.pdf*

8

Conclusions and Recommendations

Regulatory frameworks

As indicated above, Chile and Uruguay have both recently prohibited decorative paints with lead concentrations greater than 600 ppm. With one exception, all the paint samples tested from these two countries were in compliance; and the one outlier moderately exceeded the mandatory limit.

In Argentina, the Health Ministry promulgated a resolution in 2004 (7/2009) that also prohibits the manufacture and import for use of paints, lacquers and varnishes containing more 0.06 per cent (600 ppm) lead in the non-volatile portion of the paint. The resolution indicated that it would enter into force in 2010. Of the 30 paint samples tested from Argentina, 23 appear to be in compliance with the Health Ministry resolution. Seven of the samples, however, exceeded 600 ppm lead. Of these, five had lead concentrations greater than 10,000 ppm lead.

The remaining six countries – Azerbaijan, Cote d'Ivoire, Ethiopia, Ghana, Kyrgyzstan and Tunisia – appear to have no specific law, regulation, decree, or mandatory standard that prohibits the manufacture, import, sale and use of lead paints and paints containing lead were available on the retail market.

In the countries where currently no law or regulation that controls or limits the lead content in paints used for household decoration, it appears that the lead content of some of the decorative paints sold and used could be sufficiently high to contribute to significant national levels of childhood lead exposure. However, brands of paint without added lead could also be available in those countries indicating that there is no competitive barrier.

National efforts in each of these countries should be encouraged to promote the establishment of appropriate national regulatory frameworks to control the manufacture, import, export, sale and use of lead paints and products coated with lead paints. In setting priorities and timeframes for implementation, special attention should be given to the elimination of lead decorative paints and lead paints for other applications most likely to contribute to childhood lead exposure. In the design of the regulatory framework, consideration should be given to the inclusion of provisions for compliance, monitoring, and enforcement.

In a number of these countries, lead paint coexists on the retail market with paint to which no lead has been added, suggesting that there should be few economic barriers to the introduction of legal or regulatory controls.

Public Awareness

Given the serious impact childhood lead poisoning has on both an individual and a nation's future, there is a need for public information campaigns in countries where results show the presence of lead paint on the market. These campaigns should inform the public about the hazards of lead exposure, especially in children; the presence of lead household paints for sale and use on the national market; lead paint as a significant source of childhood lead exposure; and the availability of technically superior and safer alternatives. There is also a need to raise awareness on the need to take special precautions when preparing a previously painted surface for repainting; the need for training in lead-safe work practices for painters and others working on previously-painted surfaces; and the need for resources to conduct such training.

Government agencies, NGOs and other organizations of civil society, as well as health professionals and others, are encouraged to carry out awareness-raising in the above-mentioned areas. Stakeholders encouraged to foster voluntary initiatives by paint manufacturers, importers and vendors to phase out the used of lead compounds in their products even before any national legal instrument is adopted or enters into force.

Voluntary Action and Labeling

The testing results indicate that in some countries, some paint manufacturers have acted voluntarily to eliminate lead compounds in the formulation of their paints. In doing so, not all manufacturers

have provided labels indicating that their paint does not contain added lead.

Other paint manufacturers in those countries that lack a well-enforced national lead paint control regime should be encouraged to act voluntarily to eliminate lead compounds in the formulation of their paints – particularly, their decorative paints and paints for other applications likely to contribute to lead exposure in children and others.

Paint manufacturers are also encouraged to consider voluntary participation in programs that provide third-party certification of no added lead and product labeling to enable consumers to identify paints that do not contain added lead. In addition, paint manufacturers in all countries could provide information on paint can labels warning of the serious risk that may arise from lead dust when preparing a previously painted surface for repainting.

9

Global Data on Lead in New Enamel Decorative Paints

Collection of data on lead in paint in developing countries and countries with economies in transition began as early as 1999 by a number of University-based teams and NGOs. More NGOs became involved in paint testing starting in 2007 after there were numerous, high profile reports in the international news media about toys coated with lead paint being exported from Asia to North America and Europe. Most of the NGOs which have collected data on lead in paint are members of IPEN, a network of 700 non-governmental public health and environmental organizations representing in 116 countries.[48] To date, data has been collected on the total lead concentration in more than 1,500 new enamel paints from 37 countries.

A summary of the lead concentrations in the 1500+ samples analyzed to date is presented by country in Table 3 below. In the table, the average lead concentration and per cent (%) of samples with lead concentrations equal to or exceeding 90 ppm and 600 ppm are given. These values were selected because the former is the current U.S. standard for new paint for use in houses and an international goal; while 600 ppm is the standard in a number of countries such as Argentina, Brazil, Chile, Singapore, Sri Lanka and Uruguay. Also shown, where available, are the per centages of samples that were extremely high (above 10,000 ppm total lead).

48 Results from 850 paint samples collected in seven Asian countries participating in the IPEN Asian Lead Paint Elimination Project, funded by the European Union, will be available in 2013, but were not ready in time for this report. An additional approximately 800 paint samples will be collected in these seven countries over the next two years.

Table 3. Global Data for Lead in New Enamel Decorative Paints

Country	Year of Study/ Report	Number of Samples	Average, ppm Lead	Per cent of Samples greater than 90 ppm Lead	Per cent of Samples greater than 600 ppm Lead	Per cent of Samples greater than 10,000 ppm Lead
Argentina[1]	2013	30	17,000	23%	23%	17%
Azerbaijan[1]	2013	30	2,570	70%	60%	7%
Armenia[2]	2013	26	24,800	77%	77%	38%
Bangladesh[3]	2011	6	42,300	100%	100%	83%
Belarus[4]	2009	22	5,560	82%	68%	9%
Brazil[2]	2013 / 2011	20	5,644	35%	30%	10%
Brazil[4]	2009	24	`15,000	42%	37%	21%
Cameroon[5]	2011	60	23,100	67%	65%	Not available
Chile[1]	2013	23	52.6	4.3%	4.3%	0%
China[6]	2006	64	15,100	44%	33%	25%
China[7]	2008	58	Not available	Not available	50%	Not available
China (Taiwan)[13]	2011	15	24,000	56%	56%	Not Available
Cote d'Ivoire[1]	2013	20	8,700	70%	65%	25%
Egypt[6]	2006	20	26,200	65%	65%	Not Available
Ecuador[6]	2009	10	32,000	70%	60%	Not Available
Ethiopia[1]	2013	23	18,500	87%	83%	30%
Ghana[1]	2013	18	5,030	33%	28%	17%
India[6]	2006	72	29,700	88%	82%	47%
India[8]	1999	24	50,800	100%	92%	54%
India[9]	2007/ 2009	31	26,100	Not Available	84%	Not available
India[4]	2009	22	9,410	36%	36%	36%
India[10]	2009	25	32,700	72%	72%	64%
India[2]	2009	26	16,600	50%	50%	19%
Indonesia[6]		11	14,800	82%	73%	36%
Kazakhstan[2]	2013	26	15,700	81%	77%	38%

Kenya[11]	2012	31	14,900	87%	81%	39%
Krygyzstan[1]	2013	30	7,160	67%	57%	10%
Lebanon[12]	2012	15	48,300	87%	73%	53%
Malaysia[6]	2009	72	24,500	60%	50%	39%
Mexico[4]	2009	20	51,900	100%	100%	95%
Nepal[3]	2011	12	28,400	67%	33%	33%
Nigeria[4]	2009	23	37,000	100%	100%	65%
Nigeria[6]	2006	25	15,800	96%	96%	44%
Paraguay[12]	2012	15	23,100	27%	27%	20%
Peru[6]	2009	10	11,600	90%	80%	40%
Philippines[4]	2009	15	28,400	67%	60%	27%
Russia[12]	2102	21	8,340	76%	67%	19%
Senegal[4]	2009	21	5,870	86%	76%	19%
Seychelles[6]		28	24,900	75%	61%	43%
Singapore[6]		41	6,990	44%	37%	7%
South Africa[4]	2009	29	19,900	65%	62%	28%
Sri Lanka[4]	2009	19	25.200	68%	68%	37%
Tanzania[4]	2009	20	14,500	100%	95%	25%
Thailand[4]	2009	17	61,900	47%	47%	41%
Thailand[14]	2010	31	13,000	87%	84%	55%
Tunisia[1]	2013	30	17,900	70%	57%	27%
Uruguay[1]	2013	30	9.8	0%	0%	0%

[1] Present study (2013)
[2] University of Cincinnati-EPA Study: Development of Data to Support the Characterization of Lead Concentrations in Residential Paint, Final Report, 2013 (not yet published)
[3] Berne R, Rajankar P, Sah R, Hossain S (2011), Double Standard: Investigating Lead (Pb) Content in Leading Enamel Paint Brands in South Asia, Toxics Link (India), Environment and Social Development Organization-ESDO (Bangladesh), Center for Public Health and Environmental Development (CEPHED) (Nepal).
[4] Toxics Link-IPEN Global Study: Lead in New Decorative Paints (2009). *(http://www.ipen.org/ipenweb/documents/work%20documents/global_paintstudy.pdf)*
[5] The Research and Education Center for Development (CREPD) (2011), Lead Concentrations in New Residential Paints in Cameroon, CREPD Publication 2011/001.
[6] Clark, C.S., Rampal, K.G., Thuppil, V., Roda, S.M., Succop, P., Menrath, W., Chen, C.K., Adebamowo, E.O., Agbede, O.A., Sridhar, M.K.C., Adebamowo, C.A., Zakaria, Y., El-Safty, A., Shinde, R. M., and Yu, J. (2009) Lead levels in new enamel household paints from Asia, Africa and South America, Environmental Research 109:930-936. {Includes data for China, India, Malaysia and Singapore presented in Clark et al (2006) Environmental Research 102:9-12.; and data for Nigeria presented in Adebamowo, Clark et al (2007) presented in Science of the Total Environment 388:116-120.)
[7] Lin G Z, Peng R F, Chen Q, Wu Z G, Du L (2008) Lead in housing paints: an existing source still not taken seriously for children lead poisoning in China. Environmental Research 109, 1-5.
[8] Van Alphen, M. (1999) "Lead in Paints and Water in India", pgs. 265-272, in Lead Poisoning Prevention & Treatment: Implementing a National Program in Developing Countries, A.M. George (Ed), The George Foundation, Bangalore, India.
[9] Kumar A, (2007) A Brush with Toxics: An Investigation on Lead in Household Paints in India (Report by Toxics Link); then published Kumar A, Gottesfeld P (2009) Lead content in household paints in India, Science of the Total Environment 407:333-337.
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[11] Nganga C, Clark S, Weinberg J (2012) Lead in Kenyan Household Paint, September, 2012, iLima, Nairobi, Kenya, University of Cincinnati, IPEN.
[12] IPEN and University of Cincinnati (2012) Report on Total Lead Concentration (ppm) of New Enamel Decorative Enamel Paints in Lebanon, Paraguay and Russia.
[13] Ewers L, Clark C S, Peng H., Roda Sandy M, Menrath B, Lind C, Succop P (2011). Lead Levels in New Residential Enamel Paints in Taipei, Taiwan and Comparison with those in Mainland China, Environmental Research 111:6, 757-760.
[14] Mooksuwan W, Supradid J (2010) The Results of Lead Analyses in Decorative Paints in Thailand, Ecological Alert and Recovery-Thailand and IPEN.

Results in several countries where two or more paint lead surveys have been conducted at different times are shown separately. In India, six studies of lead in paint were reported between 1999 and 2012. Some of the same brands and colors were tested in multiple studies, and in some cases it was possible to determine that changes in lead concentration had occurred. Several examples are included in this report.

The average lead concentrations by country vary widely, from less than 90 ppm lead in Chile and Uruguay to greater than 20,000 ppm lead in sixteen countries – nearly one-half of the countries where paints were analyzed.

Additional Key Lead Paint Reports

More than half of the data collected on lead in paint is from three multi-country studies: *Lead in New Decorative Paints: A Global Study* (IPEN/Toxics Link 2009); *Lead Levels in New Enamel Household Paints from Asian, Africa and South America*, (Clark, Rampal, Thuppil et al. 2009) and the current study, *Lead in New Enamel Decorative Paints: Paint Testing Results From Nine Developing Countries* (IPEN/UNEP 2013).

Lead in New Decorative Paints: A Global Study (2009): In this study, conducted by IPEN and Toxics Link, 68.5 per cent of the 232 enamel samples (from eleven countries) had lead concentrations more than 90 ppm; 64.6 per cent of enamel samples had lead concentrations more than 600 ppm. The average concentration was 18,200 ppm. The lead concentration was found to range from non-detectible (<9 ppm) to 506,000 ppm (50.6 per cent). In most of the cases the highest concentration of lead was found in a yellow color enamel sample.

Lead Levels in New Enamel Household Paints from Asia, Africa and South America (Clark, Rampal, Thuppil et al. 2009): The average lead concentration by country ranged from 6,990 to 32,000 ppm. The range in concentration for individual samples was 0.8 ppm to 153,000 ppm. Of the total of 78 paint brands sampled, 57 (73 per cent) had at least one sample with a lead concentration greater than or equal to 600 ppm; 54 (69 per cent) had at least one sample with more than 10,000 ppm lead. In one country, paints of one brand decreased from an average of 43,500 ppm to less than 10 ppm after the retail store installed an instrument to produce the desired paint color at the time of the paint purchase.

Changes Over Time in Lead Concentration in Paint

One goal of sampling and monitoring the lead concentrations in new enamel decorative paints is to document the impact of efforts to end the use of lead in the production of paints. For some countries, such as Brazil and India, paint samples produced at various points in time have been analyzed and can be evaluated to determine if decreases can be documented. The data indicated changes in lead concentration by brand both in Brazil and India.

Brazil. A regulatory limit of 600 ppm went into effect in Brazil on August 1, 2009. The samples from Brazil that were tested in the Toxics Link-IPEN Global Study were manufactured prior to the entry into force of this regulatory limit. Samples collected in Brazil for the University of Cincinnati-EPA Study: *Development of Data to Support the Characterization of Lead Concentrations in Residential Paint* (2013) were purchased in December 2011 and manufactured after the regulatory limit entered into force in August 2009. As shown in Table 4, lead concentrations in paints manufactured before the regulation entered into force were often greater than 10,000 ppm lead, but samples of the same brands and colors manufactured after the regulation entered into force were <9 ppm lead. However, some other brands that were not tested in the Global Study did have many samples with high lead concentration, indicating that all brands on the market in Brazil had not, at the time of the study, removed lead compounds from their decorative paint formulations.

Some of the same brands and colors were tested in multiple studies, and in some cases it was possible to determine that changes in lead concentration had occurred.

Table 4. Brazil: Changes in Total Lead Concentration in New Enamel Decorative Paints

Purchased Before and After August 1, 2009 – the Effective Date for the 600 ppm Regulatory Limit

Brand *	Date Current Sample Manufactured	Color	Lead Before Regulation [Toxics Link 2009] Global Study (ppm)	Lead in Most Recent Sample [Univ. of Cincinnati-EPA 2013 study] (ppm)	Label Notations on Most Recent Sample Regarding Lead Content
Suvinil	Aug 2014**	Yellow	66,100	<9	Does not contain heavy metals
Suvinil	Aug 2015**	Red	21,000	<9	Does not contain heavy metals
Renner	March 2011	Yellow	170,000	<9	Does not contain heavy metals
Renner	Dec 2010	Red	5,630	<9	Does not contain heavy metals
3RM	Sept 2011	Black	4,440	<9	No information
3RM	Aug 2011	White	3,900	<9	No information
Dacar	June 2013**	Orange	60,700	<9	No lead
Dacar	Apr 2014**	Green	7,670	<9	No lead
Dacar	Sept 2013**	Blue	573	<9	No lead
Dacar	Nov 2013**	Red	19,100	<9	No lead

Note: * All brands located in Brazil and all paints manufactured in Brazil.
**Date of manufacturing not provided; date of expiration was provided and is shown inparenthesis.

India. In India efforts have been underway by NGOs and others for several years to establish a mandatory regulation governing the lead content of paints. During this period several paint companies have pledged that they will stop adding lead compounds in their paints.

Data on lead concentrations in decorative paints in India produced by the top five brands (Asian Paints, Berger, Nerolac, Dulux (ICI), and Shalimar) are now available for several points in time. Of these brands, early testing rounds indicated that Dulux

brand paints had consistently very low lead concentrations. For this reason, the brand was not included in later testing. Of the other four brands, at least three had some paints with very high lead content in earlier tests but more recently show a marked decline in the lead concentrations of decorative paints.

In Table 5 below evidence of decreased use of lead compounds in these paints can be seen. Five of the six colors recently tested from Asian Paints had lead concentrations less than 90 ppm, and the fifth was only slightly higher with 143 ppm. This compares with earlier tests in which paints of the Asian Paints brand had lead concentrations as high as 122,000 ppm lead.

Table 5. India: Lead Concentrations in Four Major Brands of Enamel Decorative Paint

Brands Manufactured in 2010-2011 Compared with the Most Recent Prior Sample Available

Brand Name	Brand Head-quarters	Date Manufactured Most Recent Sample	Color	Lead (ppm) Prior Sample	Lead (ppm) Most Recent Sample[1]	Label Notations Most Recent Sample Regarding Lead Content
Asian Paints	India	Jan 2011[2]	Imperial crimson red	6,800[3]	18.7	No added lead
Asian Paints	India	April 2011[2]	Grey	2,410[3]	<9	No added lead
Asian Paints	India	May 2011[2]	Phirozi blue	3,370[3]	<9	No added lead
Asian Paints	India	April 2011[2]	Lemon yellow	122,000[3]	10.2	No added lead
Asian Paints	India	Jan 2011[2]	Brown	11,000[3]	40.9	No added lead
Asian Paints	India	Sept 2010[2]	Bus Green	54,900[3]	143	No added lead
Berger	India	May 2011	Black	9,560[3]	15.2	No added ;ead
Berger	India	Jan 2010	Oxford blue	22,300[4]	20.1	No information
Berger	India	July 2011	Snow white	15,200[4]	13.7	No added lead
Berger	India	May 2010	Golden yellow	41,400[4]	3,410	No information
Nerolac	Japan	April 2011	Phirozi blue	3,890[3]	9.1	No added lead
Nerolac	Japan	April 2011	Black	4,840[3]	10.1	No added lead
Nerolac	Japan	Jan 2010	Golden brown	200[3]	382	No added lead
Nerolac	Japan	Aug 2010	Tractor orange	85,200[4]	<9	No added lead
Shalimar	India	Apr2011	Black	14,900[5]	<9	No added lead
Shalimar	India	Not clear	Bus green	35,300[5]	29,800	No information
Shalimar	India	March 2011	Dazzling white	3,460[5]	14.4	No added lead
Shalimar	India	May 2010	Golden yellow	287,000[5]	97,300	No information
Shalimar	India	April 2011	Deep orange	185,000[5]	9,490	No added lead

1 University of Cincinnati-EPA Study: Development of Data to Support the Characterization of Lead Concentrations in Residential Paint, Final Report, 2013
2 Packaging date
3 Clark, C.S., Rampal, K.G., Thuppil, V., Roda, S.M., Succop, P., Menrath, W., Chen, C.K., Adebamowo, E.O., Agbede, O.A., Sridhar, M.K.C., Adebamowo, C.A., Zakaria, Y., El-Safty, A., Shinde, R. M., and Yu, J. (2009) Lead levels in new enamel household paints from Asia, Africa and South America, Environmental Research 109:930-936.
4 Toxics Link-IPEN Global Study to Determine Lead in New Decorative Paints in 10 Countries May 2009.
5 Johnson S, Salkia N, Sahu R (2009) Lead in Paints, Centre for Science and Environment, PML/PR-34/2009, New Delhi India

Three of four recently tested Berger brand paints also had less than 90 ppm lead. The fourth was manufactured in 2010 and contained 3,410 ppm lead. This compares with previously tested paints of the same colors that had much higher lead concentrations. Results indicate that there has been progress over time toward eliminating the use of lead compounds.

Three of the four colors recently tested from Nerolac contained less than 90 ppm lead. The fourth was slightly elevated with 382 ppm lead. These results generally compare favorably with previously tested Nerolac brand paints and suggest progress toward no added lead.

Progress is less evident in the Shalimar brand paints tested. While black and white paint samples had low lead concentrations, all the recently tested samples of paint of bright colors proved to have high lead concentrations.

Another study of the lead content of paints in India is presently under way, and will include testing samples from these and many other brands. This study will provide further evidence of the progress (or lack thereof) being made toward the elimination of added lead compounds in decorative enamel paints on the Indian market.

List of anexes and appendixes

Annex 1. COUNTRY BY COUNTRY RESULTS [1]

Appendix A: Argentina Paint Testing Results

Appendix B: Azerbaijan Paint Testing Results

Appendix C: Chile Paint Testing

Appendix D: Cote d'Ivoire Paint Testing Results

Appendix E: Ethiopia Paint Testing Results

Appendix F: Ghana Paint Testing

Appendix G: Kyrgyzstan Paint Testing Results

Appendix H: Tunisia Paint Testing Results

Appendix I: Uruguay Paint Testing Results

[1] Individual results for each of the nice country of the present study can be consulted online at:
http://www.unep.org/hazardoussubstances/Portals/9/Mercury/Documents/publications/Global_9country_report_Annex1.pdf

Annex 2.MATERIALS AND METHODS, INCLUDING ANALYTICAL LABORATORY RESULTS AND QUALITY CONTROL PROCEDURES 2

Appendix J: Analytical Methods

Appendix K: Quality Control

Appendix L: Analytical Laboratory Reports

Appendix M: Copies of ELPAT Reports for WOHL

Appendix N: EHD Metals Method 400.2

Appendix O: EHD Metals Method 750.1

[2] Additional details on the analytical methods for this study, the analytical laboratory reports and the quality control procedures used for this study can be consulted online on at:
http://www.unep.org/hazardoussubstances/Portals/9/Mercury/Documents/publications/Global_9country_report_Annex2.pdf


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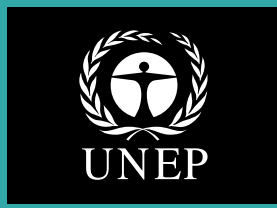
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