UGANDA


# LEAD IN SOLVENT-BASED PAINTS FOR HOME USE IN UGANDA

June 2017

NATIONAL ASSOCIATION OF PROFESSIONAL ENVIRONMENTALISTS
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NATIONAL REPORT

# LEAD IN SOLVENT-BASED PAINTS FOR HOME USE IN UGANDA

June 2017

## ACKNOWLEDGMENTS

We take this opportunity to thank all those who were instrumental in compiling and shaping this paint study.

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The analytical study providing data to this report was undertaken as part of the Lead Paint Elimination Project in Africa, funded by the Global Environment Facility (GEF), implemented by UN Environment and executed by IPEN. The Lead Paint Elimination Project in Africa was established to eliminate lead in paint and raise widespread awareness among business entrepreneurs and consumers about the adverse human health impacts of lead-based household enamel paints, particularly on the health of children under six years old. The study was conducted in Uganda by NAPE in partnership with IPEN.

This report was developed by NAPE and IPEN as part of IPEN's Global Lead Paint Elimination Campaign and funded by the Swedish Government.

While this study was undertaken with the assistance of the Global Environment Facility and UN Environment, and the report financed by the Swedish Government, responsibility for the content lies entirely with IPEN and NAPE. The GEF, UN Environment and the Government of Sweden do not necessarily share the expressed views and interpretations.

Established in 1998, IPEN is currently comprised of over 500 Participating Organizations in 116 countries, primarily developing and transition countries. IPEN brings together leading environmental and public health groups around the world to establish and implement safe chemicals policies and practices that protect human health and the environment. IPEN's mission is a toxics-free future for all.

IPEN
a toxics-free future

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# PREFACE

Lead paints for home use continue to be widely produced, sold, and used in developing countries despite the fact that most highly industrial countries banned lead paints for household use more than 40 years ago. IPEN and Participating Organizations are part of the global movement to eliminate lead paint by 2020 to protect children's health.

In 2007 and 2008, NGOs in the IPEN network collected and analyzed decorative (home use) paints on the market in 11 developing countries, and in countries with economies in transition. The results were startling. In every one of these countries, many of the paints contained dangerously high lead levels. In response, IPEN launched its Global Lead Paint Elimination Campaign, which seeks to eliminate lead in paint and raise widespread awareness among business entrepreneurs and consumers about the adverse human health impacts of lead paint, particularly on the health of children. Since then, IPEN-affiliated NGOs and others have sampled and analyzed paints on the market in approximately 40 low- and middle-income countries.

This report presents new data on the total lead content of solvent-based paints for home use available on the market in Uganda. It also presents background information on why the use of lead paint is a source of serious concern, especially to children's health; a review of national policy frameworks that are in place to ban or restrict the manufacture, import, export, distribution, sale and use of lead paint, and provides a strong justification to adopt and enforce further regulatory controls in Uganda. Finally, it proposes action steps by different stakeholders to protect children and others from lead paint.

This study was conducted by the National Association of Professional Environmentalists (NAPE) in partnership with IPEN.

IPEN is an international NGO network of health and environmental organizations from all regions of the world of which NAPE is a member. IPEN is a leading global organization working to establish and implement safe chemicals policies and practices to protect human health and the environment. Its mission is a toxics-free future for all. IPEN helps build the capacity of its member organizations to implement on-the-ground activities, learn from each other's work, and work at the international level to set priorities and achieve new policies.

The National Association of Professional Environmentalists (NAPE) is a local Non-Governmental Organization (NGO) in Uganda. NAPE is involved in several environmental lobby and advocacy activities. It is an affiliate member of IPEN and an IPEN Participating Organization (PO). Among other things, NAPE works to promote sustainable and equitable management of natural resources by promoting the establishment and implementation of good chemicals management policies and practices to protect human health and the environment. In addition, NAPE has for several years worked in partnership with the National Environment Management Authority (NEMA) on a number of activities regarding the Sound Management of Chemicals (SMC).

# EXECUTIVE SUMMARY

Lead is a toxic metal that causes adverse effects on both human health and the environment. While lead exposure is also harmful to adults, lead exposure harms children at much lower levels, and the health effects are generally irreversible and can have a lifelong impact.

The younger the child, the more harmful lead can be, and children with nutritional deficiencies absorb ingested lead at an increased rate. The human fetus is the most vulnerable, and a pregnant woman can transfer lead that has accumulated in her body to her developing child. Lead is also transferred through breast milk when lead is present in a nursing mother.

Evidence of reduced intelligence caused by childhood exposure to lead has led the World Health Organization (WHO) 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.

Lead paint is a major source of childhood lead exposure. The term lead paint is used in this report to describe any paint to which one or more lead compounds have been added. The cut-off concentration for lead paint used in the report is 90 parts per million (ppm, dry weight of paint), the strictest legal limit enacted in the world today. All lead concentrations in the report are total lead levels, unless otherwise specified.

Most highly industrial countries adopted laws or regulations to control the lead content of decorative paints—the paints used on the interiors and exteriors of homes, schools, and other child-occupied facilities—beginning in the 1970s and 1980s. In Uganda, there is currently no specific regulation in place limiting the amount of lead in paint for household and decorative use.

From July to October 2016, NAPE purchased a total of 30 cans of solvent-based paint intended for home use from stores in Kampala, Uganda. The paints represented 14 different brands produced by 14 manufacturers. All paints were analyzed by an accredited laboratory in the United States of America for their lead content, based on dry weight of the paint. The laboratory participates in the Environmental Lead Proficiency Analytical Testing (ELPAT) program operated by the American Industrial Hygiene Association (AIHA), assuring the reliability of the analytical results.

## RESULTS

20 out of 30 analyzed solvent-based paints for home use (67 percent of paints) were lead paints, i.e., they contained lead concentrations above 90 parts per million (ppm, dry weight of paint). This is also the regulatory limit for lead in decorative paint in e.g., India, the Philippines, and the United States of America. Moreover, 11 paints (37 percent of paints) contained dangerously high lead concentrations above 10,000 ppm. The highest lead concentration detected was 150,000 ppm in two yellow paints sold for home use—Sadolin Super Gloss and Neptune High Gloss Enamel.

On the other hand, 10 out of 30 solvent-based paints for home use (33 percent of paints) contained lead concentrations below 90 ppm, suggesting that the technology to produce paint without lead ingredients exists in Uganda.

12 out of 14 analyzed brands (86 percent of paint brands) sold at least one lead paint, i.e., a paint with lead concentration above 90 ppm. 9 out of 14 analyzed brands (64 percent of paint brands) sold at least one lead paint with dangerously high lead concentrations above 10,000 ppm.

Yellow paints most frequently contained dangerously high lead concentrations above 10,000 ppm. Of 10 yellow paints, 9 (90 percent of yellow paints) contained lead levels above 10,000 ppm, and of 10 red paints, 2 (20 percent of red paints) contained lead levels above 10,000 ppm.

In general, paint can labels did not carry any information whatsoever about lead content or the hazards of lead paint. All paints did not provide information about lead on their labels and most paints carried little information about any ingredients on can labels. Most paints were merely labeled as "solvents, pigments and resin," with no further details on the type of solvents and pigments (organic or inorganic) provided on paint can labels. Manufacturing dates or batch numbers were included on the labels of 17 out of 30 paints (57 percent of paints) included in this study. Most paint cans did not carry the warning symbols indicating the flammability of the paints and no precautionary warnings or advertisements on the effects of lead dust to children and pregnant women were provided.

## CONCLUSIONS

This study demonstrates that solvent-based paints for home use with high concentrations of lead are widely available in Uganda since the paints included in this study are brands commonly sold in retail stores all over Uganda. However, the fact that 10 out of 30 paints (33 percent of paints) contained lead concentrations below 90 ppm indicates that the technology to produce paints without

added lead exists in Uganda. The study results provide a strong justification to adopt and enforce a regulation that will ban the manufacture, import, export, distribution, sale and use of paints with total lead concentrations greater than 90 ppm.

## RECOMMENDATIONS

To address the problem of lead in paint, NAPE and IPEN propose the following recommendations:

### *Government and Government Agencies*

The National Environment Management Authority (NEMA) should immediately draft a regulation that will ban the manufacture, import, export, distribution, sale and use of paints that contain total lead concentrations exceeding 90 ppm, the most restrictive standard in the world. They should also require paint companies to display sufficient information indicating harmful content on paint can labels such as solvents and provide a warning on possible lead dust hazards when disturbing painted surfaces. The Government should alsobuild the capacity (i.e., provide adequate laboratories) of various institutions to empowerthem to effectively regulate the paint industry.

### *Paint Industry*

Paint companies that still produce lead paints should expeditiously stop the use of leaded paint ingredients in paint formulations. Paint companies that have shifted to non-lead paint production should get their products certified through independent, third party verification procedures to increase the customer's ability to choose paints with no added lead.

### *Individual, Household and Institutional Consumers*

Paint consumers should demand paints with no added lead from paint manufacturers and retailers, as well as full disclosure of a paint product's content. Household and institutional consumers should ask for, consciously buy, and apply only paints with no added lead in places frequently used by children such as homes, schools, day care centers, parks and playgrounds.

### *Organizations and Professional Groups*

Public health groups, consumer organizations and other concerned entities should support the elimination of lead paint, and conduct activities to inform

and protect children from lead exposure through lead paint, lead in dust and soil, and other sources of lead.

### *All Stakeholders*

All stakeholders should come together and unite in promoting a strong policy that will eliminate lead paint in Uganda.

# 1. BACKGROUND

## 1.1 HEALTH AND ECONOMIC IMPACTS OF LEAD EXPOSURE

Children are exposed to lead from paint when lead-containing paint on walls, windows, doors or other painted surfaces begins to chip or deteriorate, since this causes lead to be released to dust and soil. When a surface previously painted with lead paint is sanded or scraped in preparation for repainting, very large amounts of lead-contaminated dust is produced, which, when spread, can constitute a severe health hazard.[1]

Children playing indoors or outdoors get house dust or soil on their hands, and then ingest it through normal hand-to-mouth behavior. If the dust or the soil is contaminated with lead, the children will ingest lead. Hand-to-mouth behavior is especially prevalent in children aged six years and under, the age group most easily harmed by exposure to lead. A typical one- to six-year-old child ingests between 100 and 400 milligrams of house dust and soil each day.[2]

In some cases, children pick up paint chips and put them directly into their mouths. This can be especially harmful because the lead content of paint chips is typically much higher than what is found in dust and soils. When toys, household furniture, or other articles are painted with lead paint, children may directly ingest the lead-contaminated, dried paint when chewing on them. Nonetheless, the most common way that children ingest lead is through lead-contaminated dust and soil that gets onto their hands.[3]

While lead exposure is also harmful to adults, lead exposure harms children at much lower levels. In addition, children absorb up to five times as much of ingested lead than adults. Children with nutritional deficiencies absorb ingested lead at an even increased rates.[2]

The younger the child, the more harmful lead can be and the health effects are generally irreversible and can have a lifelong impact. The human fetus is the most vulnerable, and a pregnant woman can transfer lead that has accumulated in her body to her developing child.[4] Lead is also transferred through breast milk when lead is present in a nursing mother.[5]

Once lead enters a child's body through ingestion, inhalation, or across the placenta, it has the potential to damage several biological systems and pathways. The primary target is the central nervous system and the brain, but lead

## Lead Paint Terminology

As used in this booklet:

• "Paint" includes varnishes, lacquers, stains, enamels, glazes, primers, or coatings used for any purpose. Paint is typically a mixture of resins, pigments, fillers, solvents, and other additives.

• "Lead paint" is paint to which one or more lead compounds have been added.

• "Lead pigments" are lead compounds used to give a paint product its color.

• "Lead anti-corrosive agents" are lead compounds used to protect a metal surface from rusting or other forms of corrosion.

• "Lead driers" are lead compounds used to make paint dry more quickly and evenly.

• "Decorative paint" refers to paints that are produced for use on inside or outside walls, and surfaces of homes, schools, commercial buildings, and similar structures. Decorative paints are frequently used on doors, gates, and windows, and to repaint household furniture such as cribs, playpens, tables, and chairs.

• "Solvent-based, enamel decorative paint" or "enamel decorative paint" refers to oil-based paints.

• "ppm" means parts per million total lead content by weight in a dried paint sample. All lead concentrations in the report are total lead levels, unless otherwise specified.

can also affect the blood system, the kidneys, and the skeleton.[6] Lead is also categorized as an endocrine-disrupting chemical (EDC).[7]

It is generally agreed that one key element in lead toxicity is its capacity to replace calcium in neurotransmitter systems, proteins, and bone structure, altering function and structure and thereby leading to severe health impacts. Lead is also known to affect and damage cell structure.[8]

According to the World Health Organization (WHO): "Lead has no essential role in the human body, and lead poisoning accounts for about 0.6 percent of the global burden of disease."[2] Evidence of reduced intelligence caused by childhood exposure to lead has led WHO 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.[9]

In recent years, medical researchers have been documenting significant health impacts in children from lower and lower levels of lead exposure.[2, 6] According to the factsheet on Lead Poisoning and Health from WHO: "There is no known level of lead exposure that is considered safe."[10]

When a young child is exposed to lead, the harm to her or his nervous system makes it more likely that the child will have difficulties in school and engage in impulsive and violent behavior.[11] Lead exposure in young children is also linked to increased rates of hyperactivity, inattentiveness, failure to graduate from high school, conduct disorder, juvenile delinquency, drug use, and incarceration.[2] Lead exposure impacts on children continue throughout life and have a long-term impact on a child's work performance, and—on average—are related to decreased economic success.

A recent study investigating the economic impact of childhood lead exposure on national economies in all low- and middle-income countries estimated a total cumulative cost burden of $977 billion international dollars* per year.[12] The study considered the neurodevelopmental effects on lead-exposed children, as measured by reduced IQ points, and it correlated lead exposure-related reductions in children's IQ scores to reductions in lifetime economic productivity, as expressed in lifelong earning power. The study identified many different sources of lead exposure in children, with lead paint as one major source. Broken down by region, the economic burden of childhood lead exposure as estimated by this study was:

**Africa:** Intl$134.7 billion of economic loss, or 4.03 percent of Gross Domestic Product (GDP);

**Latin America and the Caribbean:** Intl$142.3 billion of economic loss, or 2.04 percent of GDP; and

**Asia:** Intl$699.9 billion of economic loss, or 1.88 percent of GDP.

Country estimates used in this study can be accessed at a publically available website, **http://www.med.nyu.edu/pediatrics/research/environmentalpediatrics/leadexposure**, and shows that ***economic loss in Uganda is estimated at Intl$3.54 billion, or 7.58 percent of Gross Domestic Product (GDP).***

* 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.

## 1.2 THE USE OF LEAD IN PAINT

Paints contain high levels of lead when the paint manufacturer intentionally adds one or more leaded compounds to the paint for some purpose. A paint product may also contain some amount of lead when paint ingredients contaminated with lead are used, or when there is cross-contamination from other product lines in the same factory. Leaded paint ingredients are most commonly intentionally used in solvent-based paint due to their chemical properties, and solvent-based paints have been found to have high lead content in many countries.[13-15]

The leaded compounds most commonly added to paints are pigments. Pigments are used to give the paint its color, make the paint opaque (so it covers well), and protect the paint and the underlying surface from degradation caused by exposure to sunlight. Lead-based pigments are sometimes used alone, and sometimes used in combination with other pigments.

Leaded compounds also may be added to enamel paints for use as driers (sometimes called drying agents or drying catalysts). Leaded 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.

Non-leaded pigments, driers, and anti-corrosive agents have been widely available for decades, and are used by manufacturers producing the highest quality paints. When a paint manufacturer does not intentionally add lead compounds in the formulation of its paints, and takes care to avoid the use of paint ingredients that are contaminated with lead, the lead content of the paint will be very low—less than 90 parts per million (ppm) lead by dry weight, and frequently down to 10 ppm or less.

Most highly industrial countries adopted laws or regulations to control the lead content of decorative paints beginning in the 1970s and 1980s. Many also imposed controls on the lead content of paints used on toys and for other applications 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 aged six years and under.

The use of lead in production of decorative paint is prohibited in the European Union through regulations related to safety of consumer products and specific prohibitions for most leaded raw materials. In the U.S., Canada, Australia and other countries with regulations restricting the use of leaded ingredients in decorative paint, standards specifying a maximum lead limit are in place. The

current standard for household paints in e.g., the U.S., the Philippines, and India is a total maximum lead content of 90 ppm, and adherence to this ensures that a manufacturer can sell its paint anywhere in the world. Some other countries such as Brazil, South Africa, and Sri Lanka have established standards of 600 ppm total lead.

## 1.3 PAINT MARKET AND REGULATORY FRAMEWORK IN NIGERIA

The paint industry in Uganda is one of the rapidly growing industries mainly because of the booming construction activities that are currently going on in the country. Numerous paints are traded on the Ugandan market, some of them locally manufactured, yet several others come into the country from neighboring countries and beyond. Undoubtedly, the paint market in Uganda has various products including decorative paints, primers, water-based paints, textured paints and many others. The market leader in Uganda's paint manufacturing industry is Sadolin Paints (U) Ltd, while other major paints on the market include products from companies like Peacock Paints (U) Ltd, Global Paints, Basco Paints (Kenya) Ltd, Trust Paints Ltd, BPC Chemicals Ltd, and Regal Paints Uganda Ltd (under Crown Paints, Kenya Ltd). Paint products are generally supplied to institutions, real estate developers, construction companies, large and small-scale hardware shops as well as individuals. While the paint industry is steadily growing, little is being done to document information regarding its activities; for example, it is hard to get concrete data on the different aspects of the industry as they enjoy a lot of confidentiality. The paint industry in Uganda is among the least regulated industries in the country, with an emphasis based mainly on their contribution to the country's tax base than on anything else.

On the other hand, while the industry is recording rapid growth ever, there is no specific law in the country which deals with the manufacture, sale and use of lead paint. In general, there is no law in place to specifically regulate and address challenges associated with heavy metals. Most laws which are useful in the management of lead paint are scattered and fragmented under different legislations, and therefore, do not provide a good regulatory environment for lead paint in Uganda. While the Government has outlined the essential institutional structure to develop necessary policy, legal and regulatory frameworks for lead paint, institutions like the National Environment Management Authority (NEMA), Uganda Revenue Authority (URA) and the Uganda National Bureau of Standards (UNBS) have yet to draft a successful legislation on lead paint due to the different challenges they faced.

As earlier noted, there are several fragmented pieces of legislations that may be instrumental in the sound management of lead in paint and other chemicals in

Uganda. However, their being fragmented in nature makes it difficult for them to be adequately implemented. In addition, there is definite lack of coordination among the different stakeholders making it further difficult for the implementation of such legislations. The available legal framework in the country include: the Ugandan Constitution (1995); the National Environment Act Cap 153; the Uganda National Bureau of Standards Act; the National Environment Statute 1995; the Public Health Act 269; the Control of Agricultural Chemicals, Statute 8/1989; the National Drug Statute 1993; the Plant Protection Act Cap. 244 of 1964; the Protection of Animals (anaesthetics) Acts 1954/64; the National Medical Stores Act 2000; the Factories Act 2000; the Employment Decree of 1975; and the East African Community Customs Management Act 2004, among several others.

Chemicals and chemicals in products may also be regulated under some of the following regulations: the National Environment (Conduct and Certification of Environmental Practitioners) Regulations 2003; the Chemicals Regulations (Registration and Control) 1998; the Guidelines for Inspection issued by the Agrochemicals Board, Uganda National Bureau of Standards (UNBS) and the National Drug Authority (NDA); the Modalities for Safe Disposal of Chemicals Regulations; the National Environment Standards for the discharge of Effluents onto Land or Water Regulations 1999; the Regulations on Ozone Depleting Substances; the National Environment (Waste Management) Regulations 1999; the Environment Impact Assessment Regulations 1998; the National Environment (Minimum Standards for the Management of Soil Quality) 2001; the National Environment (Waste Management) Regulations 2001; the Guidelines for Solid Waste Management in Uganda 2004; and the Environmental Audit Guidelines for Uganda 2006, among others.

Uganda lacks comprehensive laws or legislations to specifically address consumer protection regarding various consumer products. There are, however various pieces of legislations, that deal with certain aspects of consumer protection. The examples of the numerous legislations include: the Sale of Goods Act, dealing with the quality of goods; the Customs Management Act, (incorporating the East African Customs and Transfer Management Act, Cap.27, pre-shipment inspection (CMA.s.27 (5) and (6)); Adulteration of Produce Act, Cap. 27, ensuring the production of good quality products that are free of defects; and the Uganda National Bureau of Standards Act, Cap. 327, relating to the quality of goods.

In addition to the existing policies, laws and regulations in the country, the Government of Uganda is a signatory to several multilateral environmental agreements (MEAs) or international Conventions that relate to the sound management of chemicals. Some of these agreements include: the Basel Convention

on the Control of Transboundary Movement of Hazardous Wastes and Convention on the Prohibition of the Development; the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade; the Stockholm Convention on Persistent Organic Pollutants (POPs); the Vienna Convention on the Protection of the Ozone Layer; the Montreal Protocol on Substances that Deplete the Ozone Layer; and the Convention on the Production, Stockpiling and Use of Chemical Weapons and on their Destruction, among others. Although Uganda is a signatory to these wonderful agreements, the national implementation of the principles of these agreements cannot be said to be excellent. There is therefore a need for a comprehensive legislation covering all chemicals.

For the effective regulation of lead paint, the Government of Uganda needs to come up with new policies, laws and regulations to guide the paint industry and trade. Efforts are already in place to review the National Environment Management Policy (NEMP) and the National Environment Act (NEA) with the view of improving the sound management of chemicals in Uganda. Unfortunately, even under the ongoing reviews of the policy and legal framework, lead paint is not specifically being addressed. However, the National Environment Management Authority (NEMA) has already started doing some work around lead paint. NEMA is the main agency with the mandate of spearheading the development of policies, as well as environmentally-related legal and regulatory frameworks in Uganda. These laws are developed by NEMA, approved by the Cabinet, and presented to the Parliament as a proposed bill for approval. The Parliament approves all legal instruments in Uganda. As such, NEMA is a very critical partner in the development of new policies, laws and regulations. Since some of the paints are not locally manufactured in the country but are imported from other countries, other key stakeholders in regulating lead paint in the country include the Uganda National Bureau of Standards (UNBS) and the Uganda Revenue Authority (URA).

# 2. MATERIALS AND METHODS

From July to October 2016, 30 cans of solvent-based paint intended for home use were purchased by NAPE from various stores in Kampala, Uganda. The paints represented 14 different brands produced by 14 manufacturers.

In most cases, one white paint and one or more bright-colored paint such as red or yellow were selected. Excluded were automotive and industrial paints that are not typically used for domestic housing applications.

During the paint sample preparation, information such as color, brand, manufacturer, country where manufactured, product codes, production dates, and other details as provided on the label of the paint can were recorded. Generic paint colors were recorded, e.g., "yellow" instead of "saffron." For all colored paints, the protocol called for obtaining "bright" or "strong" red and yellow paints when available.

Paint sampling preparation kits containing individually numbered, untreated wood pieces, single-use paintbrushes and stirring utensils made from untreated wood sticks were assembled and shipped to NAPE by the staff of the IPEN partner NGO, Arnika, in The Czech Republic.

Each can of paint was thoroughly stirred and was subsequently applied onto individually numbered triplicates of untreated; labelled wood pieces using different unused, single-use paintbrushes by a researcher of NAPE as shown in Figure 1.

Each stirring utensil and paintbrush was used only for the same paint, and extra caution was taken to avoid cross contamination. All samples were then allowed to dry at room temperature for five to six days. After drying, the painted wood pieces were placed in individually labelled, resealable plastic bags and shipped for analysis of lead content to Forensic Analytical Laboratories, Inc. in the United States of America. The laboratory participates in the Environmental Lead Proficiency Analytical Testing (ELPAT) Program operated by the American Industrial Hygiene Association. In the laboratory selection process, IPEN further assessed the reliability of the laboratory results by conducting an independent quality assurance testing. This was made by sending paint samples with a known lead content to the laboratory, and evaluating the results received.


*Figure 1. Sample preparation by NAPE team.*

The laboratory's lower limit of detection for the lead concentration in the paint samples is dependent on the amount of paint in the samples. Generally, the lowest detection limit for the method used is 60 ppm, but if only a small amount of paint is available, the detection limit increases.

The paint samples were analyzed using method EPA3050B/7000B, i.e., through acid digestion of the samples, followed by Flame Atomic Absorption Spectrometry, as recognized by the WHO as appropriate for the purpose.[16]

# 3. RESULTS

## 3.1 SUMMARY OF RESULTS

This study shows that:

- 20 out of 30 analyzed solvent-based paints (67 percent of paints) were lead paints, i.e., they contained lead concentrations above 90 parts per million (ppm), dry weight. In addition, 11 paints (37 percent of paints) contained dangerously high lead concentrations above 10,000 ppm.
- 12 out of 14 analyzed brands (86 percent of paint brands) sold at least one lead paint, i.e., a paint with lead concentration above 90 ppm. Also, 9 out of 14 analyzed brands (64 percent of paint brands) sold at least one lead paint with dangerously high lead concentrations above 10,000 ppm.
- 18 out of 20 bright-colored paints (90 percent of bright-colored paints) were lead paints, i.e., they contained lead concentrations above 90 parts per million (ppm), dry weight. Yellow paints were the most hazardous with 9 out of 10 paints (90 percent of yellow paints) containing total lead concentrations greater than 10,000 ppm; and 2 out of 10 red paints (20 percent of red paints) also contained dangerously high lead concentrations above 10,000 ppm.
- The highest lead concentration detected was 150,000 ppm in two yellow enamel paints sold for home use from the brands Sadolin and Neptune.
- None of the paints provided information about lead on their labels and most paints carried little information about ingredients. Most paints were merely labeled as “solvents, pigments and resin,” with no further details on the type of solvents and pigments (organic or inorganic) provided. Most warning symbols on the paint cans indicated the flammability of the paints, but no precautionary warnings on the effects of lead dust to children and pregnant women were provided.

## 3.2 LEAD CONTENT ANALYSIS

***20 out of 30 analyzed solvent-based paints (67 percent of paints) were lead paints, i.e., contained a lead concentration above 90 ppm —11 of these contained dangerously high lead concentrations above 10,000 ppm (37 percent of paints).***

Yellow-coloured paint products from Sadolin and Neptune contained the highest concentration of lead at 150,000 ppm, while the lowest concentration of lead less than 60 ppm was detected in 5 paints from the following brands: Basco (white); Global (white); Neptune (white); Nexus (white); and Peacock (white).

The ten solvent-based paints with the highest amounts of lead are summarized in Table 1.

**TABLE 1.** TOP 10 SOLVENT-BASED PAINTS WITH THE HIGHEST LEAD CONTENT.

| Rank | Sample No. | Brand | Manufacturer | Color | Lead Content (ppm) |
|---|---|---|---|---|---|
| 1 | UGA-14 | Sadolin Super Gloss Paint | Sadolin Paints (U) Ltd. | yellow | 150,000 |
| 2 | UGA-29 | Neptune High Gloss Enamel Paint | BPC Chemicals Ltd. | yellow | 150,000 |
| 3 | UGA-19 | Neptune High Gloss Enamel Paint | BPC Chemicals Ltd. | red | 99,000 |
| 4 | UGA-35 | Nexus High Gloss Enamel Paint | Nexus Paints | yellow | 95,000 |
| 5 | UGA-21 | Global High Gloss Paint | Global Paints | yellow | 89,000 |
| 6 | UGA-04 | Imperial High Gloss Enamel Paint | Imperial Paints LLC | yellow | 85,000 |
| 7 | UGA-16 | Peacock High Gloss Enamel Paint | Peacock Paints (U) Ltd. | yellow | 76,000 |
| 8 | UGA-27 | Sun Gloss Paint | Trust Paints Ltd. | yellow | 64,000 |
| 9 | UGA-08 | Regal Rainbow Gloss Paint | Regal Paints Uganda Ltd. (under Crown Paints, Kenya Ltd.) | yellow | 50,000 |
| 10 | UGA-06 | Basco Value Permagloss Enamel Paint | Basco Paints (Kenya) Ltd. | yellow | 50,000 |

## 3.3 PAINT BRAND ANALYSIS

***12 out of 14 analyzed brands (86 percent of paint brands) sold at least one paint with dangerously high lead concentration above 10,000 ppm.***

Among solvent-based decorative paints, two yellow paints—Sadolin and Neptune—the products of Sadolin Paints (U) Ltd, and BPC Chemicals Ltd, respectively, contained the highest concentrations of lead at 150,000 ppm. On the other hand, at least one paint from each of the following brands contained lead below 90 ppm: Basco (white); BHC (white); Global (white); Neptune (white); Nexus (white); Peacock (white); Sadolin (white); Trust (yellow); and Twins (red, white). This indicates that the technology to produce paints without added lead exists in Uganda.

One yellow enamel paint from Basco Paints, a multinational brand from Kenya, was found to contain 50,000 ppm lead.

## 3.4 PAINT COLOR ANALYSIS

***18 out of 20 bright-colored paints (90 percent of bright-colored paints) such as yellow and red contained lead concentrations above 90 ppm, 11 paints of which contained dangerously high lead concentrations above 10,000 ppm (55 percent of bright-colored paints).***

This study included 10 yellow paints, 10 red paints and 10 white paints. Yellow and red paints contained the highest lead concentrations.

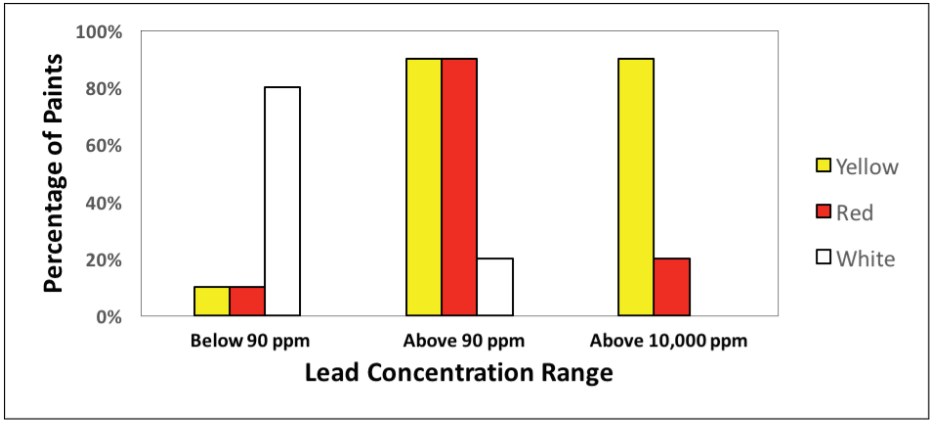


***Figure 2. Distribution of lead concentrations in home-use solvent-based paints by color.***

9 out of 10 yellow paints (90 percent of yellow paints) contained lead concentrations above 90 ppm, all 9 paints of which exceeded more than 10,000 ppm lead.

The distribution of lead concentrations in different colors is shown in Figure 2.

## 3.5 LABELING

***In general, most paint can labels did not carry meaningful information about lead content or the hazards of lead paint.***

No paints provided information about lead on their labels and most paint can labels carried little information about any ingredients. Most paints were merely labeled as "solvents, pigments and resin," with no further details on the type of solvents and pigments (organic or inorganic) provided on paint can labels. Manufacturing dates or batch numbers were included on the labels of 17 out of 30 paints (57 percent of paints) included in this study. Most warning symbols on the paint cans indicated the flammability of the paints, but no precautionary warnings on the effects of lead dust to children and pregnant women were provided.

# 4. CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates that solvent-based paints for home use with high concentrations of lead are widely available in Uganda since the paints sampled for this study are brands commonly sold in retail stores all over Uganda. However, the fact that 10 out of 30 paints (33 percent of paints) contained lead concentrations below 90 ppm indicates that the technology to produce paints without added lead exists in Uganda. The study results provide a strong justification to adopt and enforce a regulation that will ban the manufacture, import, export, distribution, sale and use of paints with total lead concentrations greater than 90 ppm.

To address the problem of lead in paint, NAPE and IPEN propose the following recommendation:

**For the National Environment Management Authority (NEMA)** to immediately draft a regulation that will ban the manufacture, import, export, distribution, sale and use of lead paints, i.e., paints that contain total lead concentrations exceeding 90 ppm, the most restrictive standard in the world. They should also require paint companies to display sufficient information indicating toxic content on paint can labels and provide a warning on possible lead dust hazards when distributing painted surfaces.

**For the Uganda National Bureau of Standards (UNBS) and the Uganda Revenue Authority (URA)** to routinely carry out assessment of lead paint from different outlets and factories.

**For paint companies that still produce lead paints** to expeditiously stop the use of leaded paint ingredients in paint formulations. Paint companies that have shifted to non-lead paint production should get their products certified through independent, third party verification procedures to increase the customer's ability to choose paints with no added lead.

**For paint consumers** to demand paints with no added lead from paint manufacturers, as well as full disclosure of a paint product's content. Household and institutional consumers should ask for, consciously buy, and apply only

paints with no added lead in places frequently used by children such as homes, schools, day care centers, parks and playgrounds.

**For public health groups, consumer organizations and other concerned entities** to support the elimination of leadpaint, and conduct activities to inform and protect children from lead exposure through lead paint, lead in dust and soil, and other sources of lead.

**For all stakeholders** to come together and unite in promoting a strong policy that will eliminate lead paint in Uganda.

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# APPENDIX

**TABLE 2.** SOLVENT-BASED PAINTS FOR HOME USE INCLUDED IN THE STUDY.

| Sample No. | Brand | Color | Volume (L) | Price (UGX) | Date of Manufacture (d/m/y) | Batch No. | Date of Purchase (d/m/y) | Is there website on label? |
|---|---|---|---|---|---|---|---|---|
| UGA-26 | Sadolin Budget Gloss | white | 0.5 | 6,000 | 14/09/2015 | 1527016 | 13/07/2016 | No |
| UGA-14 | Sadolin Super Gloss | yellow | 0.5 | 8,000 | 21/05/2016 | 1614428 | 19/07/2016 | No |
| UGA-33 | Sadolin Budget Gloss | red | 0.5 | 8,000 | 11/09/2015 | 1534196 | 19/07/2016 | No |
| UGA-08 | Regal Rainbow Gloss | yellow | 0.5 | 6,000 | Mar-16 | FG-16MARWK10 -000161 | 13/07/2016 | No |
| UGA-11 | Regal Rainbow Gloss | red | 0.5 | 6,000 | Jun-15 | 06/043/15 | 13/07/2016 | No |
| UGA-22 | Peacock High Gloss Enamel | white | 0.5 | 6,000 | None | None | 18/07/2016 | No |
| UGA-16 | Peacock High Gloss Enamel | yellow | 0.5 | 6,000 | None | None | 13/07/2016 | No |
| UGA-34 | Peacock High Gloss Enamel | red | 0.5 | 6,000 | None | None | 13/07/2016 | No |
| UGA-12 | Neptune High Gloss Enamel | white | 0.5 | 5,500 | 19/05/2016 | 919516 | 13/07/2016 | No |
| UGA-29 | Neptune High Gloss Enamel | yellow | 0.5 | 5,500 | 12/03/2015 | 2531215 | 13/07/2016 | No |
| UGA-19 | Neptune High Gloss Enamel | red | 0.5 | 5,500 | 08/06/2015 | 66815 | 19/07/2016 | No |
| UGA-17 | Basco Value Permagloss Enamel | red | 0.5 | 6,000 | 07/2016 | 1768 | 28/08/2016 | No |
| UGA-06 | Basco Value Permagloss Enamel | yellow | 0.5 | 5,000 | 08/2015 | 636009 | 13/07/2016 | No |

| Sample No. | Brand | Color | Volume (L) | Price (UGX) | Date of Manufacture (d/m/y) | Batch No. | Date of Purchase (d/m/y) | Is there website on label? |
|---|---|---|---|---|---|---|---|---|
| UGA-42 | Basco Value Permagloss Enamel | white | 0.5 | 5,000 | 05/2016 | 655683 | 28/07/2016 | No |
| UGA-03 | Trust Primer Coat | yellow | 0.5 | 5,000 | None | None | 13/07/2016 | No |
| UGA-05 | Trust Primer Coat | red | 0.5 | 5,000 | None | None | 13/07/2016 | No |
| UGA-27 | Sun Gloss | yellow | 0.5 | 5,000 | None | None | 13/07/2016 | http://www.trustpaintsug.com |
| UGA-20 | Imperial High Gloss Enamel | white | 0.5 | 5,000 | None | None | 08/11/2016 | No |
| UGA-04 | Imperial High Gloss Enamel | yellow | 0.5 | 5,000 | None | None | 08/11/2016 | No |
| UGA-15 | Nexus High Gloss Enamel | white | 0.5 | 5,000 | 27/08/2016 | N270816 | 10/12/2016 | No |
| UGA-35 | Nexus High Gloss Enamel | yellow | 0.5 | 5,000 | 06/01/2016 | N010616 | 10/12/2016 | No |
| UGA-31 | Nexus High Gloss Enamel | red | 0.5 | 5,000 | 27/08/2016 | N270816 | 10/12/2016 | No |
| UGA-37 | BHC High Gloss Paint | white | 0.5 | 5,000 | None | None | 13/07/2016 | No |
| UGA-09 | Super Gloss Enamel | white | 0.5 | 5,000 | None | None | 13/07/2016 | No |
| UGA-41 | Twins Paints High Gloss | red | 0.5 | 5,000 | None | None | 13/07/2016 | No |
| UGA-36 | Twins Paints High Gloss | white | 0.5 | 5,000 | None | None | 13/07/2016 | No |
| UGA-38 | Royal Paints Gloss Enamel | red | 0.5 | 6,000 | None | None | 13/07/2016 | No |
| UGA-25 | Global High Gloss Paints | white | 0.5 | 5,000 | 05/06/2016 | 8987 | 13/07/2016 | No |
| UGA-21 | Global High Gloss Paints | yellow | 4 | 45,000 | 27/07/2016 | 9127 | 11/10/2016 | No |
| UGA-02 | Global High Gloss Paints | red | 4 | 45,000 | 30/05/2016 | 9029 | 10/11/2016 | No |

**TABLE 3.** RESULTS OF LABORATORY ANALYSIS OF SOLVENT-BASED PAINTS FOR HOME USE.

| Sample No. | Brand | Color | Lead Content, Dry Weight (ppm) | Country of Brand Headquarters | Country of Manufacture | Is there information on can about lead content of paint? |
|---|---|---|---|---|---|---|
| UGA-26 | Sadolin Budget Gloss | white | Below 90 | Sadolin Paints (U) Ltd. | Uganda | No |
| UGA-14 | Sadolin Super Gloss | yellow | 150,000 | Sadolin Paints (U) Ltd. | Uganda | No |
| UGA-33 | Sadolin Budget Gloss | red | 23,000 | Sadolin Paints (U) Ltd. | Uganda | No |
| UGA-08 | Regal Rainbow Gloss | yellow | 50,000 | Regal Paints Uganda Ltd. (under Crown Paints, Kenya Ltd.) | Uganda | No |
| UGA-11 | Regal Rainbow Gloss | red | 900 | Regal Paints Uganda Ltd. (under Crown Paints, Kenya Ltd.) | Uganda | No |
| UGA-22 | Peacock High Gloss Enamel | white | Below 60 | Peacock Paints (U) Ltd. | Uganda | No |
| UGA-16 | Peacock High Gloss Enamel | yellow | 76,000 | Peacock Paints (U) Ltd. | Uganda | No |
| UGA-34 | Peacock High Gloss Enamel | red | 4,400 | Peacock Paints (U) Ltd. | Uganda | No |
| UGA-12 | Neptune High Gloss Enamel | white | Below 60 | BPC Chemicals Ltd. | Uganda | No |
| UGA-29 | Neptune High Gloss Enamel | yellow | 150,000 | BPC Chemicals Ltd. | Uganda | No |
| UGA-19 | Neptune High Gloss Enamel | red | 99,000 | BPC Chemicals Ltd. | Uganda | No |
| UGA-17 | Basco Value Permagloss Enamel | red | 360 | Basco Paints (U) Ltd. | Uganda | No |
| UGA-06 | Basco Value Permagloss Enamel | yellow | 50,000 | Basco Paints (Kenya) Ltd. | Kenya | No |
| UGA-42 | Basco Value Permagloss Enamel | white | Below 60 | Basco Paints (Kenya) Ltd. | Kenya | No |

| Sample No. | Brand | Color | Lead Content, Dry Weight (ppm) | Country of Brand Headquarters | Country of Manufacture | Is there information on can about lead content of paint? |
|---|---|---|---|---|---|---|
| UGA-03 | Trust Primer Coat | yellow | Below 70 | Trust Paints Ltd. | Uganda | No |
| UGA-05 | Trust Primer Coat | red | 450 | Trust Paints Ltd. | Uganda | No |
| UGA-27 | Sun Gloss | yellow | 64,000 | Trust Paints Ltd. | Uganda | No |
| UGA-20 | Imperial High Gloss Enamel | white | 710 | Imperial Paints LLC | Uganda | No |
| UGA-04 | Imperial High Gloss Enamel | yellow | 85,000 | Imperial Paints LLC | Uganda | No |
| UGA-15 | Nexus High Gloss Enamel | white | Below 60 | Nexus Paints | Uganda | No |
| UGA-35 | Nexus High Gloss Enamel | yellow | 95,000 | Nexus Paints | Uganda | No |
| UGA-31 | Nexus High Gloss Enamel | red | 200 | Nexus Paints | Uganda | No |
| UGA-37 | BHC High Gloss Paint | white | Below 90 | Prime Paint | Uganda | No |
| UGA-09 | Super Gloss Enamel | white | 5,600 | SEWECO Paints | Uganda/Kenya | No |
| UGA-41 | Twins Paints High Gloss | red | Below 80 | Multiple Twins Enterprises Ltd. | Uganda | No |
| UGA-36 | Twins Paints High Gloss | white | Below 70 | Multiple Twins Enterprises Ltd. | Uganda | No |
| UGA-38 | Royal Paints Gloss Enamel | red | 4,500 | Revonia Enterprises (U) Ltd. | Uganda | No |
| UGA-25 | Global High Gloss Paints | white | Below 60 | Global Paints | Uganda | No |
| UGA-21 | Global High Gloss Paints | yellow | 89,000 | Global Paints | Uganda | No |
| UGA-02 | Global High Gloss Paints | red | 2,000 | Global Paints | Uganda | No |

**TABLE 4.** DISTRIBUTION OF LEAD CONCENTRATION BY BRAND.

| Brand | No. of Samples | No. of Samples Above 90 ppm | No. of Samples Above 10,000 ppm | Minimum Lead Content (ppm) | Maximum Lead Content (ppm) |
|---|---|---|---|---|---|
| Sadolin Paint | 3 | 2 | 2 | Below 90 | 150,000 |
| Regal Paint | 2 | 2 | 1 | 900 | 50,000 |
| Peacock Paint | 3 | 2 | 1 | Below 60 | 76,000 |
| Neptune Paint | 3 | 2 | 2 | Below 60 | 150,000 |
| Basco Paint | 3 | 2 | 1 | Below 60 | 50,000 |
| Trust Paint | 2 | 1 | 0 | Below 70 | 450 |
| Sun Paint | 1 (yellow) | 1 | 1 | 64,000 | 64,000 |
| Imperial Paint | 2 | 2 | 1 | 710 | 85,000 |
| Nexus Paint | 3 | 2 | 1 | Below 60 | 95,000 |
| BHC Paint | 1 (white) | 0 | 0 | Below 90 | Below 90 |
| Super Paint | 1 (white) | 1 | 0 | 5,600 | 5,600 |
| Twins Paint | 2 | 0 | 0 | Below 70 | Below 80 |
| Royal Paint | 1 (red) | 1 | 0 | 4,500 | 4,500 |
| Global Paint | 3 | 2 | 1 | Below 60 | 89,000 |

**TABLE 5.** DISTRIBUTION OF LEAD CONCENTRATION BY COLOR.

| Color | No. of Samples | No. of Samples Above 90 ppm | No. of Samples Above 10,000 ppm | Minimum Lead Content (ppm) | Maximum Lead Content (ppm) |
|---|---|---|---|---|---|
| White | 10 | 2 | 0 | < 60 | 5,600 |
| Yellow | 10 | 9 | 9 | < 70 | 150,000 |
| Red | 10 | 9 | 2 | < 80 | 99,000 |


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