TANZANIA

LEAD IN SOLVENT-BASED PAINTS FOR HOME USE IN TANZANIA

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NATIONAL REPORT

LEAD IN SOLVENT-BASED PAINTS FOR HOME USE IN TANZANIA

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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 Tanzania by AGENDA in partnership with IPEN.

This report was developed by AGENDA and IPEN as part of IPEN´s Global Lead Paint Elimination Campaign.

While this study was undertaken with the assistance of the Global Environment Facility and UN Environment, responsibility for the content lies entirely with IPEN and AGENDA. The GEF and UN Environment 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. AGENDA has been an active participating organization (PO) of IPEN since 2000.

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CONTENTS

ABBREVIATIONS

Organizations and Other Entities	
AGENDA	AGENDA for Environment and Responsible Development
AIHA	American Industrial Hygiene Association
GCLA	Government Chemist Laboratory Agency
GEF	Global Environment Facility
IPEN	International POPs Elimination Network
KPAL	Kansai Plascon Africa Limited
NEMC	National Environment Management Council
NGO	Non-Governmental Organization
OSHA	Occupational Safety and Health Authority
PO	Participating Organization
SAICM	Strategic Approach to International Chemicals Management
TBS	Tanzania Bureau of Standards
UAE	United Arab Emirates
UN	United Nations
WHO	World Health Organization
Technical Terms	
EA	Environmental Audit
EDC	Endocrine-disrupting Chemical
EIA	Environmental Impact Assessment
ELPAT	Environmental Lead Proficiency Analytical Testing
GDP	Gross Domestic Product
Intl$	International Dollars
IQ	Intelligence Quotient
Ltd	Limited
ppm	parts per million

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 Tanzania. 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 Tanzania. Finally, it proposes action steps by different stakeholders to protect children and others from lead paint.

This study was conducted by AGENDA in partnership with IPEN.

IPEN is an international Non-Governmental Organization (NGO) network of health and environmental organizations from all regions of the world of which AGENDA is a participating organization and 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.

AGENDA for Environment and Responsible Development (AGENDA) is a Tanzania-based Non-Governmental Organization (NGO) since 1997. It works closely with government and other like-minded organizations around the globe to push forward the agenda of sustainable development. It has been a key player in setting up national and international policies and agreements such as chemical conventions, and SAICM as well as taking necessary actions for their implementation at national and local levels.

AGENDA is grateful to be part of the four initial IPEN partners for this project since 2014. It carries out project activities at the country level like other NGO partners in other project countries which include Cameroon, Côte d'Ivoire and Ethiopia. It mobilizes local stakeholders for effective engagement in relevant project activities. In addition to being an IPEN member, AGENDA is the IPEN Hub for the region of Anglophone Africa.

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) by weight in a dried paint sample, 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 Tanzania, there is currently no regulation or standard in place limiting the amount of lead in paint for household and decorative use.

From December 2016 to February 2017, AGENDA purchased a total of 46 cans of solvent-based paint intended for home use from stores in the cities of Arusha, Dar es Salaam, and Mwanza, Tanzania. The paints represented 12 different brands produced by 12 manufacturers, 5 brands of which were imported from other countries. 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

21 out of 46 analyzed solvent-based paints for home use (46 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, 10 paints (22 percent of paints) contained dangerously high lead concentrations above 10,000 ppm. The highest lead concentration detected was 84,000ppm in two paints sold for home use—a yellow Basco Value Paint from Kenya, and a green Master Paint from the United Arab Emirates (UAE).

On the other hand, 25* out of 46 solvent-based paints for home use (54 percent of paints) contained lead concentrations below 90 ppm, suggesting that the technology to produce paint without lead ingredients exists in Tanzania.

10 out of 12 analyzed brands (83 percent of paint brands) sold at least one lead paint, i.e., a paint with lead concentration above 90 ppm. 7 out of 12 analyzed brands (58 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 9 yellow paints, 4 (44 percent of yellow paints) contained lead levels above 10,000 ppm; of 10 red paints, 3 (30 percent of red paints) contained lead levels above 10,000 ppm; of 6 green paints, 2 (33 percent of green paints) contained lead levels above 10,000 ppm; and of 3 brown paints, 1 (33 percent of brown paints) contained lead levels above 10,000 ppm.

In all purchased paints, paint can labels did not carry meaningful information about lead content or the hazards of lead paint. No paints provided information about lead levels or information about any ingredients on the can labels. Manufacturing dates or batch numbers were included on the labels of 39 out of 46 paints (85 percent of paints) included in this study. Most warning symbols on the paint cans indicated information such as “keep away from children, foodstuff and sources of ignition,” “highly flammable,” “flammable liquid,” “enamel paint,” “environmentally friendly,” and “do not use this container for storing foodstuffs,” but no precautionary warnings on the effects of lead dust to children and pregnant women were provided.

* Ten paints (TNZ-86, TNZ-88, TNZ-89, TNZ-90, TNZ-91, TNZ-92, TNZ-97, TNZ-98, TNZ-101, and TNZ-129) contained lead concentrations “below 300 ppm,” “below 200 ppm,” or “below 100 ppm.” For this report, these were approximated as “below 90 ppm” in order to compare them to the 90-ppm cut-off limit. It should however be noted that this may lead to an underestimation of the number of paints containing lead concentrations above 90 ppm.

Lead levels in this study are consistent with the results of a similar paint study conducted by AGENDA in 2015. In that study, 56 solvent-based paints from 11 brands were purchased and analyzed. It was found that 36 of 56 paints (64 percent of paints) contained lead levels above 90 ppm, and 13 of 56 paints (23 percent of paints) contained lead levels above 10,000 ppm.

The current study tried as much as possible to purchase the brands and colors that were purchased during the 2015 study to easily compare the findings. In the 2015 study, 64 percent of paints had lead concentrations above 90 ppm compared to 46 percent in the current study. In addition, 23 percent of paints in the 2015 study and 22 percent of paints in the current study had lead concentrations above 10,000 ppm.

Although the comparison showed that there is a decrease in the percentage of paints with lead content above 90 ppm in the latest study, the percentage of paints with very high lead content above 10,000 ppm remains the same. This means that manufacturers of paints with very high lead content have not changed their formulations to exclude the use of lead compounds in paint production. This can also be attributed to the slow market turnaround of paints and its ingredients where stocks of paints, pigments and driers remain on the shelves for long periods of time.

CONCLUSIONS

This study demonstrates that solvent-based paints for home use with high concentrations of lead are still widely available in Tanzania since the paints included in this study are brands commonly sold in retail stores all over Tanzania. However, the fact that 25 out of 46 paints (54 percent of paints), including those produced in Tanzania contained lead concentrations below 90 ppm indicates that the technology to produce paints without added lead exists, and is utilized by some paint manufacturers in Tanzania. The study results provide a strong justification to adopt and enforce a legal instrument 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, AGENDA and IPEN propose the following recommendations:

Government and Government Agencies

The Tanzania Bureau of Standards (TBS) should immediately enforce a 90-ppm total lead paint standard for all paints manufactured, imported, exported, distributed, sold and used in Tanzania. Failure to do so will impede other government ministries and agencies to control lead paints. TBS and the Government Chemist Laboratory Agency (GCLA) should also require paint companies to display sufficient information indicating harmful content on paint can labels such as lead and solvents, and provide a warning on possible lead dust hazards when disturbing painted surfaces. There is also a need for a strong policy that will eliminate lead paint in Tanzania, a policy that will influence control of lead paint importation, production, distribution, sale and use. They should also increase public awareness campaigns on the health effects of lead, as well as essential measures to prevent lead exposure.

Paint Industry

Paint companies that still produce lead paints should expeditiously stop the use of leaded paint ingredients in paint formulations. Lead free ingredients are available and have been used by some manufacturers in Tanzania—those whose paints contain lead below 90 ppm. There is no reason why manufacturers should continue producing lead paints. Lack of regulations should not be an excuse for producing lead paints. They should be responsible in protecting human health and the environment by avoiding environmental pollution at all stages as indicated in the Environmental Management Act of 2004, Part II, Section 4. Similar action should be considered by importers and distributors of paints and other coatings. 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 as indicated by labels such as “lead-free,” “no added lead,” and “unleaded paint” among others. Under such certification schemes, all types of paints sold under a specific brand are regularly subjected to total lead content analysis based on a set standard, i.e., 90ppm. Once paints pass the standard, an independent certifying body provides certificates to paint companies indicating that the brands they produce are lead-free paints.

Paint Consumers (Individuals, Households and Institutions)

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. They 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. Institutions should review their procurement policies to include a requirement to use only lead-free paints.

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 the public and protect the children from lead exposure through lead paint, lead in dust and soil, and other sources of lead.The Contractors Registration Board and Engineers Registration Board should enhance awareness among their members about the effects of lead paint and the need to shift to lead-free paints.

All Stakeholders

All stakeholders should come together and unite in promoting a strong policy that will eliminate lead paint in Tanzania, a policy that will influence changes in procurement procedures at all levels.

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 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 Tanzania is estimated at Intl$4.14 billion (or roughly 9 trillion Tanzanian Shillings), or 6.06 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 the U.S., the Philippines, and India is 90 ppm total lead, 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 TANZANIA

Like in other African countries, the paints and coatings market in Tanzania is driven by three major economic sectors—automotive, construction and a booming oil and gas industry.[17] In the East African region, especially in Tanzania, the demand for paints through various applications is expected to increase with the growth of the middle class, which triggers the need for more housing. The growth of the middle-class, aided by high urban migration projected in Kenya and Tanzania, will increase the demand for residential and commercial buildings, and subsequently, for decorative paints and coatings.

The paint and coatings industry is already a big business in East Africa. It has been estimated that the region's paint industry is worth US$350 million per annum as revealed through an interview following the recent acquisition of Sadolin Paints' operations in Kenya, Uganda, Burundi, Tanzania and Zanzibar by the South Africa-based paint company, Kansai Plascon Africa Limited (KPAL).[18] Kansai, whose share of Africa's construction-paint market is about 40 percent, has been eyeing expansion on the continent since acquiring Plascon South Africa in 2011.

The Tanzanian paint market is dominated by locally manufactured as well as imported paints. The brands and manufacturing industries are shown on Table 1, but there were no publicly available data regarding the companies' market share. Vemacoat is a relatively new brand and was not identified nor included in a previous study in 2015.

TABLE 1. PAINT BRANDS FOUND IN THE TANZANIAN MARKET.

No.	Brand Names	Manufacturer	Country of Manufacture
1	AZTEC	Alpha Paints Tanzania Ltd	Tanzania
2	Basco Value	Basco Products (Kenya) Ltd	Kenya
3	Coral	Insignia Ltd	Tanzania
4	Crown	Crown Paints Kenya Ltd	Kenya
5	Dura Coat	Basco Products (Kenya) Ltd	Kenya
6	Goldstar	Goldstar Paints Tanzania Ltd	Tanzania
7	Haraka	Nayan Products (Kenya) Ltd	Kenya
8	Kiboko	Kiboko Paints Ltd	Tanzania
9	Master	National Paints Factories Co. Ltd, UAE	United Arab Emirates
10	Robbialaac	Berger Paints International Ltd	Tanzania
11	Sadolin	Sadolin Paints (T) Ltd	Tanzania
12	Vemacoat	Lutac Enterprises	Tanzania

Most of the Kenyan brands were sold in the North-Western region of Tanzania. Most paints included in this study were purchased in Dar es Salaam, the business capital of Tanzania, including some paints imported from Kenya and the United Arab Emirates (UAE). Usually, the locally manufactured paints are sold in all regions in Tanzania, as well as in neighboring countries such as Burundi, Democratic Republic of Congo, Kenya, Malawi, Mozambique, Uganda and Zambia. Tanzania is a member state of the East Africa Community, which also includes Burundi, Kenya, Rwanda, South Sudan and Uganda. Cooperation to boost trade within the region is expected among these countries.

According to the global research firm Frost & Sullivan, the 2011 revenues from the paints and coatings market in Kenya and Tanzania isestimated at US$123.3 million. Based on their estimation, this market will grow to US$188.5 millionby 2018.[19]

Recent analysis from Frost & Sullivan showed that the 2015 total market size in Kenya and Tanzania was 66.2 million litres, which is expected to reach 91.5 million litres by 2020. Crown Paints Ltd, Basco Paints, and Insignia Ltd dominate the market, while Sadolin Paints and Goldstar Paints are trying to expand their shares.[20]

National Laws and Standards to Control Lead Paint

There is currently no existing mandatory standard which limitsthe use of lead in paints manufactured and sold in Tanzania, as well as imported and exported paints. What exists is a voluntary Standard TZS 722:2008 for matte emulsion paints for interior and exterior use, indicating the allowable maximum lead content at 0.045 percent (450 ppm). This standard does not cover solvent-based paints such as enamel paints, where pigments, driers and resins containing lead are intentionally addedby some manufacturers.

A notable effort has been undertaken by TBS in establishing a 90-ppmmandatory total lead limit to control lead in paint. The standard is now awaiting endorsement. Once the mandatory standard has been endorsed and gazetted, the Standards Act of 2009, and the Industrial and Consumer Chemicals (Management and Control) Act No. 3 of 2003 are the primary laws for its implementation and enforcement. Other laws and regulations which may support the enforcement of the mandatory standard include: TheEnvironmental Management Act of 2004, Environmental Impact Assessment and Audit Regulations, 2005 (G.N. NO. 349 of 2005); the Industrial and Consumer Chemicals (Management and Control) Act No. 3 of 2003, and the Occupational Safety and Health Act of 2003. There is also good relationship among key actors including collaboration with other stakeholders—NGOs, manufacturers, government agencies as well as readiness of paint manufacturers to comply with new standards.

The Tanzania Bureau of Standards (TBS) is the custodian and an overseer of the observance of standards in Tanzania. It has the mandate of formulating standards in the country. Under the Industrial and Consumer Chemicals (Management and Control) Act No. 3 of 2003, conditions for restriction, banning and elimination of a chemical have been stipulated in Section 30 subsection 1 part (a) to (e), which states that:

> *"Upon application for the registration of a chemical or where after registration, a chemical is:*
>
> *a. Proven to be dangerous to human life or environment;*
>
> *b. Proven to be highly toxic, highly hazardous, persistent or biologically accumulative;*
>
> *c. Proven to cause poisoning effect to human and animals of which no effective antidote is available;*
>
> *d. Severely restricted by National, International Convention or Treaty; and*
>
> *e. Subjected to action according to International Convention or Treaty after ratified in the United Republic.*

Also, the Board (under the same Act) has been given powers to restrict, severely restrict, ban or phase out the use and handling of chemicals specified under the Eighth schedule of the Act."

Lead paint is currently not listed under the Eighth scheduleand is therefore not restricted. Setting a legal limit for lead in paint could trigger such a restriction.

The administration and function of the Industrial and Consumer Chemicals Act No 3 of 2003 is under the Government Chemist Laboratory Agency (GCLA). It is also the national focal point for the Strategic Approach to International Chemicals Management (SAICM).

The National Environment Management Council (NEMC) is the national enforcer of the Environmental Management Act of 2004. It oversees the undertaking of the Environmental Impact Assessment (EIA) and Environmental Audit (EA) in the country, through which they can control the use of lead in paints.

The Occupational Safety and Health Authority (OSHA) administers the Occupational Safety and Health Act of 2003. Its main obligation is to ensure safety and health of workers in industries and other places. Exposure of workers to lead compounds used in paint production could be one of the issues of concern.

2. MATERIALS AND METHODS

From December 2016 to February 2017, 46 cans of solvent-based paint intended for home use were purchased by AGENDA from various stores in Arusha, Dar es Salaam and Mwanza in Tanzania as outlined in Figure 1. The survey carried out by AGENDA prior to purchasing the paints did not identify imported paints in the market in Mbeya, which was the fourth place targeted in the study. The paints included in the study represented 12 different brands produced by 12 manufacturers as shown in Figure 2. These paints include 7 brands from Tanzaniaand 5 brands imported from other countries.

Figure 1. Places in Tanzania where paints were purchased.

Figure 2. Paints included in the study.

In most cases, one white paint and two or three bright-colored paint such as red, orange, yellow, or green were selected. Excluded were automotive and industrial paints that are not typically used for domestic or public 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 as follows:

- blue instead of Danish blue or Dutch blue;
- brown instead of Burley brown, chocolate, or ginger brown;
- green instead of grass green, Kenya green, noble green, ripple green, or serpentine;
- orange instead of mandarine;
- red instead of cherry, geranium, G.S. post red, P.O. red, ruby red, or signal red;
- white instead of brilliant white; and
- yellow instead of caterpillar yellow, golden yellow, lemon, sunglow, or Tibet yellow;

For all colored paints, the protocol called for obtaining “bright” or “strong” colors of 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 AGENDA by the staff of the IPEN partner NGO, Arnika, in The Czech Republic.

Each can of paint was thoroughly shaken, stirred and then opened, and was subsequently applied onto individually numbered triplicates of untreated, labeled wood pieces using different unused, single-use paint brushes by a researcher of AGENDA.

Each stirring utensil and paintbrush was used only for one paint, and extra caution was taken to avoid cross contamination. All samples were then allowed to dry at room temperature for six days. After drying, the painted wood pieces were placed in individually labeled, 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.

The laboratory’s lower limit of detection for the total 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. Therefore, the detection limit was higher (up to 300 ppm) for some of the samples.

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:

- 21 out of 46 analyzed solvent-based paints (46 percent of paints) were lead paints, i.e., they contained lead concentrations above 90 parts per million (ppm), dry weight. In addition, 10 paints (22 percent of paints) contained dangerously high lead concentrations above 10,000 ppm. On the other hand, 25*** out of 46 solvent-based paints for home use (54 percent of paints) contained lead concentrations below 90 ppm, suggesting that the technology to produce paint without lead ingredients exists in Tanzania.
- 10 out of 12 analyzed brands (83 percent of paint brands) sold at least one lead paint, i.e., a paint with lead concentration above 90 ppm. Also, 7 out of 12 analyzed brands (58 percent of paint brands) sold at least one lead paint with dangerously high lead concentrations above 10,000 ppm.
- 16 out of 26 bright-colored paints (62 percent of bright-colored paints) were lead paints, i.e., they contained lead concentrations above 90 parts per million (ppm), dry weight.Yellowpaints were the most hazardous with 4 out of 9 paints (44 percent of yellow-colored paints) containing lead concentrations greater than 10,000 ppm; 3 out of 10 red paints (30 percent of red-colored paints);and 2 out of 6 greenpaints (33 percent of green paints) also contained dangerously high lead concentrations above 10,000 ppm.
- The highest lead concentration detected was 84,000 ppm in two paints sold for home use—a yellow Basco Value Paint from Kenya, and a green Master Paint from the United Arab Emirates (UAE).
- None of the paints had information about lead on their labels. Most warning symbols on the paint cans indicated information such as “keep away from children, foodstuff and sources of ignition,” “highly flammable,” “flammable liquid,” “enamel paint,” “environmentally friendly,” and “do not use this container for storing foodstuffs,” but no precautionary warnings on the effects of lead dust to children and pregnant women were provided.

*** Ten paints (TNZ-86, TNZ-88, TNZ-89, TNZ-90, TNZ-91, TNZ-92, TNZ-97, TNZ-98, TNZ-101, and TNZ-129) contained lead concentrations “below 300 ppm,” “below 200 ppm,” or “below 100 ppm.” For this report, these were approximated as “below 90 ppm” in order tocompare them to the 90-ppm cut-off limit. It should however be noted that this may lead to an underestimation of the number of paints containing lead concentrations above 90 ppm

3.2 LEAD CONTENT ANALYSIS

21 out of 46 analyzed solvent-based paints (46 percent of paints) were lead paints, i.e., contained a lead concentration above 90 ppm—10 of these contained dangerously high lead concentrations above 10,000 ppm (22 percent of paints).

Two paints—a yellow Basco Value Paint from Kenya, and a green Master Paint from the United Arab Emirates (UAE)contained the highest concentration of lead at 84,000 ppm, while the lowest concentration of lead less than60 ppm was detected in 8 paints from the following brands: Basco Value (white), Dura Coat (blue, green and orange), Haraka (white), and Master (red, white and yellow).

The ten solvent-based paints with the highest amounts of lead are summarized in Table 2.

TABLE 2. TOP 10 SOLVENT-BASED PAINTS WITH THE HIGHEST LEAD CONTENT.

Rank	Sample No.	Brand	Manufacturer	Country of Manufacture	Color	Lead Content (ppm)
1	TNZ-116	Master Paint	National Paints Factories Co. Ltd	UAE	green	84,000
2	TNZ-122	Basco Value	Basco Products (Kenya) Ltd	Kenya	yellow	84,000
3	TNZ-106	Kiboko Paints	Kiboko Paints Ltd	Tanzania	yellow	61,000
4	TNZ-126	Haraka Paints	Nayan Products (Kenya) Ltd	Kenya	yellow	57,000
5	TNZ-100	Robbialaac	Berger Paints International Ltd	Tanzania	red	28,000
6	TNZ-107	Kiboko Paints	Kiboko Paints Ltd	Tanzania	red	24,000
7	TNZ-124	Basco Value	Basco Products (Kenya) Ltd	Kenya	green	21,000
8	TNZ-87	Goldstar	Goldstar Paints Tanzania Ltd	Tanzania	yellow	17,000
9	TNZ-104	Crown	Crown Paints Kenya Ltd	Kenya	brown	15,000
10	TNZ-103	Crown	Crown Paints Kenya Ltd	Kenya	red	11,000

3.3 PAINT BRAND ANALYSIS

7 out of 12 analyzed brands (58 percent of paint brands) sold at least one paint with dangerously high lead concentration above 10,000 ppm.

Among solvent-based decorative paints, a yellow Basco Value Paint and a green Master Paint contained the highest concentration of lead at 84,000 ppm. On the other hand, at least one paint from each of the following brands contained lead below 90 ppm: AZTEC (white); Basco Value (white); Coral (blue, red, white and yellow); Crown (white); Dura Coat (blue, green, orange and white); Goldstar (green, red and white); Haraka (white); Master (red, white and yellow); Robbialaac (blue and white); Sadolin (red, white and yellow); and Vemacoat (blue and white). This indicates that the technology to produce paints without added lead exists in Tanzania.

3.4 PAINT COLOR ANALYSIS

16 out of 26 bright-colored paints (62 percent of bright-colored paints) such as yellow, red, orange and green contained lead concentrations above 90 ppm, 9 paints of which contained dangerously high lead concentrations above 10,000 ppm (35 percent of bright-colored paints).

This study included 12 white paints, 10 red paints, 9 yellow paints,6 green paints, 5 blue paints, 3 brown paints, and 1 orange paint. Yellow, green and red paints contained the highest lead concentrations.

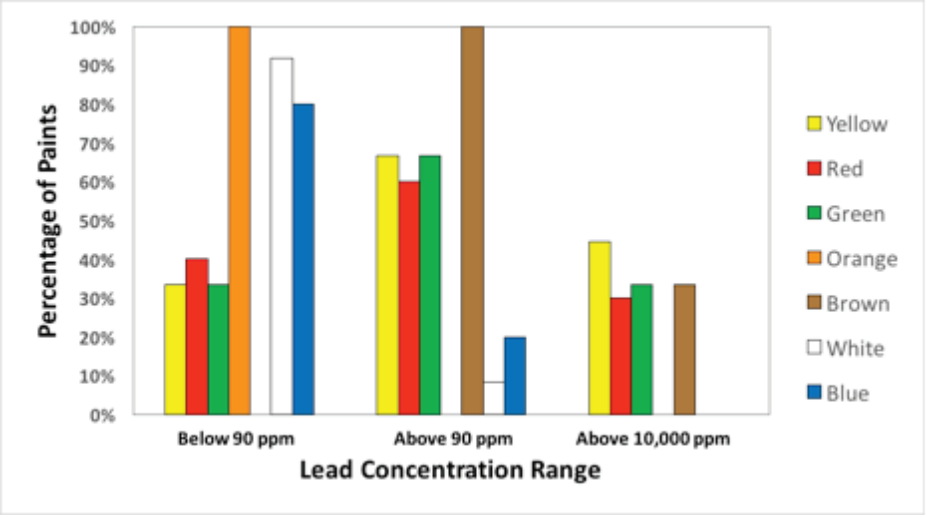

Figure 3. Distribution of Lead Concentrations in Home-Use Solvent-Based Paints by Color.

Among bright colors, 6 out of 9 yellow paints (67 percent of yellow paints) contained lead concentrations above 90 ppm, 4 paints of which exceeded 10,000 ppm lead;6 out of 10 red paints (60 percent of red paints) contained lead concentrations above 90 ppm, 3 paints of which exceeded 10,000 ppm lead; and 4 out of 6 green paints (67 percent of green paints) contained lead concentrations above 90 ppm, 2 paints of which exceeded 10,000 ppm lead. Moreover, all 3 brown paints (100 percent of brown paints) contained lead concentrations above 90 ppm, 1 paint of which exceeded 10,000 ppm lead. Lastly, 1 out of 5 blue paints (20 percent of blue paints) and 1 out of 12 white paints (8 percent of white paints) contained lead concentrations above 90 ppm.

The distribution of lead concentrations in different colors is shown in Figure 3.

3.5 LABELING

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

None of the 46 paints provided information about lead on their labels and most paint can labels carried no information about any ingredients. Manufacturing dates or batch numbers were included on the labels of 39 out of 46 paints (85 percent of paints) included in this study. Most warning symbols on the paint cans indicated information such as "keep away from children, foodstuff and sources of ignition," "highly flammable," "flammable liquid," "enamel paint," "environmentally friendly," and "do not use this container for storing foodstuffs," but no precautionary warnings on the effects of lead dust to children and pregnant women were provided.

3.6 COMPARISON WITH RESULTS FROM AN EARLIER STUDY

Lead levels in this study are consistent with the results of a similar paint study conducted by AGENDA in 2015. In that study, 56 solvent-based paints from 11 brands purchased in Arusha, Dar es Salaam, and Mwanza in Tanzania were sampled and analyzed. It was found that 36 of 56 paints (64 percent of paints) contained total lead levels above 90 ppm, and 13 of 56 paints (23 percent of paints) contained total lead levels above 10,000 ppm.

The current study tried as much as possible to purchase the brands and colors that were purchased during the 2015 study to easily compare the findings. In the 2015 study, 64 percent of paints had total lead concentrations above 90 ppm compared to 46 percent in the current study. In addition, 23 percent of paints in the 2015 study and 22 percent of paints in the current study had lead concentrations above 10,000 ppm.

Although the comparison showed that there is a decrease in the percentage of paints with total lead content above 90 ppm in the latest study, the percentage of paints with very high total lead content above 10,000 ppm remains the same. This means that manufacturers of paints with very high total lead content have not changed their formulations to exclude the use of lead compounds in paint production. This can also be attributed to the slow market turnaround of paints where stocks of paints remain on the shelves for long periods of time.

TABLE 3. COMPARISON OF LEAD CONCENTRATION IN SOLVENT-BASED PAINTS BETWEEN THE 2015 AND 2017 STUDIES.

	Current Study	Previous Study
Number of Paints	46	56
Percentage of paints with lead ≥ 90 ppm (number of paints)	46 (21)	64 (36)
Percentage of paints with lead ≥ 10,000 ppm (number of paints)	22 (10)	23 (13)
Maximum Concentration, ppm	84,000	99,000

4. CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates that solvent-based paints for home use with high concentrations of lead are widely available in Tanzania since the paints sampled for this study are brands commonly sold in retail stores all over Tanzania. However, the fact that 25 out of 46 paints (54 percent of paints) contained lead concentrations below 90 ppm indicates that the technology to produce paints without added lead exists in Tanzania. 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, AGENDA and IPEN propose the following recommendations:

For the Tanzania Bureau of Standards (TBS) to immediately enforce a 90-ppm total lead paint standard for all paints manufactured, imported, exported, distributed, sold and used in Tanzania. Failure to do so will impede other government Ministries and Agencies to control lead paints. TBS and the Government Chemist Laboratory Agency (GCLA) should also require paint companies to display sufficient information indicating harmful contents on paint can labels such as lead and solvents, and provide a warning on possible lead dust hazards when disturbing painted surfaces. There is also a need for a strong policy that will eliminate lead paint in Tanzania, a policy that will influence control of lead paint importation, production, distribution, sale and use. They should also increase public awareness campaigns on the health effects of lead, as well as essential measures to prevent lead exposure.

For paint companies that still produce lead paints toexpeditiously stop the use of leaded paint ingredients in paint formulations. Lead free ingredients are available and are used by some paint manufacturers. There is therefore no reason why lead paint should continue to be produced. Lack of regulations should not be an excuse for producing lead paints. They should be responsible in protecting human health and environment by avoiding environmental pollution at all stages as indicated in the Environmental Management Act of 2004, Part II, Section 4. Similar action should be considered by importers and distributors of paints and other coatings. 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 as indicated by labels such as "lead-free," "no added lead," and "unleaded paint" among others. Under such certification schemes, all types of paints sold under a specific brand are regularly subjected to total lead content analysis based on a set standard, i.e., 90 ppm. Once paints pass the standard, an independent certifying body provides certificates to paint companies indicating that the brands they produce are lead-free paints.

For paint consumers to demand paints with no added lead from paint manufacturers and retailers, as well as full disclosure of a paint product's content. They 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. Institutions should review their procurement policies to include a requirement to use only lead-free paints.

For public health groups, consumer organizations and other concerned entities to support the elimination of lead paint, and conduct activities to inform the public and protect the children from lead exposure through lead paint, lead in dust and soil, and other sources of lead.The Contractors Registration Board and Engineers Registration Board should enhance awareness among their members about the effects of lead paint and the need to shift to lead-free paints.The skills involved in the elimination of lead paint are relatively new and very limited human and technical resources exist in Tanzania and Africa at large. It is important that enhancement of technical capacity for technical staff and decision makers continue even after the end of the project. All children in Africa need to be protected against exposure to lead paint. The GEF and SAICM focal points in Tanzania and other African countries should look for resources to ensure lead paint is eliminated in the continent. Awareness raising activities should continue so that the public will know the effects of lead paint and theywill be informed to choose lead-free paint when buying paints in the market.

For all stakeholders to come together and unite in promoting a strong policy that will eliminate lead paint in Tanzania, a policy that will influence changes in procurement procedures at all levels.

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APPENDIX

TABLE 4. SOLVENT-BASED PAINTS FOR HOME USE INCLUDED IN THE STUDY.

Sample No.	Brand	Color	Volume (L)	Price (TZS)	Date of Manu-facture (d/m/y)	Batch No.	Date of Purchase (d/m/y)	Is there website on label?
TNZ-86	Goldstar	white	0.5	4,000	Not given	1701701	22-Dec-16	email: info@ goldstarpaints.com
TNZ-87	Goldstar	yellow	0.5	4,000	Not given	1605958	22-Dec-16	email: info@ goldstarpaints.com
TNZ-88	Goldstar	red	0.5	4,000	Not given	1610240	22-Dec-16	email: info@ goldstarpaints.com
TNZ-89	Goldstar	green	0.5	4,000	Not given	1502576	22-Dec-16	email: info@ goldstarpaints.com
TNZ-90	Sadolin	white	1	8,000	15-Dec-16	6120217	02-Jan-17	No
TNZ-91	Sadolin	yellow	1	8,000	Not given	6020415	02-Jan-17	No
TNZ-92	Sadolin	red	1	9,000	Not given	6050172	17-Jan-17	No
TNZ-93	Sadolin	green	1	8,000	Not given	4110483	02-Jan-17	No
TNZ-94	Coral	White	1	5,500	Aug 2016	18078	22-Dec-16	http://insignia.co.tz
TNZ-95	Coral	yellow	1	5,500	Feb 2016	3100	22-Dec-16	http://insignia.co.tz
TNZ-96	Coral	red	1	6,000	Jul 2016	16071	22-Dec-16	http://insignia.co.tz
TNZ-97	Coral	blue	1	6,000	Oct 2016	24512	22-Dec-16	http://insignia.co.tz
TNZ-98	Robbialaac	white	1	8,000	Not given	10163139	22-Dec-16	www. bergerpaintsintl. com
TNZ-99	Robbialaac	yellow	1	8,000	Not given	04161056	22-Dec-16	www. bergerpaintsintl. com
TNZ-100	Robbialaac	red	0.5	5,000	Not given	02160422	22-Dec-16	www. bergerpaintsintl. com
TNZ-101	Robbialaac	blue	4	19,000	Not given	09162499	02-Jan-17	www. bergerpaintsintl. com

Sample No.	Brand	Color	Volume (L)	Price (TZS)	Date of Manufacture (d/m/y)	Batch No.	Date of Purchase (d/m/y)	Is there website on label?
TNZ-102	Crown	white	4	29,000	Jan 2015	BX 15JANWK03-00867; Serial No. 1000 16087517	23-Jan-17	www.crownpaints.co.ke
TNZ-103	Crown	red	4	20,000	Nov 2014	BX 14NOVWK10-00109	22-Dec-16	www.crownpaints.co.ke
TNZ-104	Crown	brown	4	20,000	Jul 2016	BX 16JULWK28-000651	22-Dec-16	www.crownpaints.co.ke
TNZ-105	Kiboko	white	4	20,000	Not given	19862	22-Dec-16	www.kibokopaints.com
TNZ-106	Kiboko	yellow	4	20,000	Not given	19356	22-Dec-16	www.kibokopaints.com
TNZ-107	Kiboko	red	4	20,000	Not given	1392	22-Dec-16	www.kibokopaints.com
TNZ-108	Kiboko	blue	4	20,000	Not given	18696	22-Dec-16	www.kibokopaints.com
TNZ-109	AZTEC	white	4	20,000	Not given	5000001010414	22-Dec-16	email: info@alphapaintstz.com
TNZ-110	AZTEC	yellow	4	20,000	Not given	22085000-030816	17-Jan-17	email: info@alphapaintstz.com
TNZ-111	AZTEC	red	4	20,000	Not given	18105000149313	17-Jan-17	email: info@alphapaintstz.com
TNZ-112	AZTEC	brown	4	20,000	Not given	10065000-022040614	22-Dec-16	email: info@alphapaintstz.com
TNZ-113	Master	white	0.5	8,000	Not given	Not given	22-Dec-16	www.national-paints.com
TNZ-114	Master	yellow	0.5	8,000	Not given	Not given	22-Dec-16	www.national-paints.com
TNZ-115	Master	red	0.5	8,000	Not given	Not given	22-Dec-16	www.national-paints.com
TNZ-116	Master	green	0.5	8,000	Not given	Not given	22-Dec-16	www.national-paints.com
TNZ-117	Dura Coat	white	1	20,000	Dec 2009	229296	30-Dec-16	No
TNZ-118	Dura Coat	orange	1	20,000	Mar 2010	233190	30-Dec-16	No
TNZ-119	Dura Coat	green	1	20,000	Mar 2015	233190	30-Dec-16	No

Sample No.	Brand	Color	Volume (L)	Price (TZS)	Date of Manufacture (d/m/y)	Batch No.	Date of Purchase (d/m/y)	Is there website on label?
TNZ-120	Dura Coat	blue	1	20,000	Mar 2016	233190	30-Dec-16	No
TNZ-121	Basco Value	white	1	12,000	Aug 2016	BX No. 663222; SM # 3072	23-Dec-16	www.bascopaints.com
TNZ-122	Basco Value	yellow	1	12,000	May 2016	BX No. 657513	23-Dec-16	www.bascopaints.com
TNZ-123	Basco Value	red	1	12,000	Jul 2016	BX No. 660958; SM # 3072	23-Dec-16	www.bascopaints.com
TNZ-124	Basco Value	green	1	12,000	Jun 2016	BX No. 659833	23-Dec-16	www.bascopaints.com
TNZ-125	Haraka	white	1	12,000	2016	Illegible	23-Dec-16	www.nayanaproducts.com
TNZ-126	Haraka	yellow	0.5	4,000	2016	Illegible	23-Dec-16	www.nayanaproducts.com
TNZ-127	Haraka	red	0.5	4,000	2016	Illegible	23-Dec-16	www.nayanaproducts.com
TNZ-128	Haraka	green	1	7,000	2016	Illegible	23-Dec-16	www.nayanaproducts.com
TNZ-129	Vemacoat	white	0.5	4,000	Not given	Not given	23-Dec-16	e-mail: lutacenterprises@yahoo.com
TNZ-130	Vemacoat	blue	4	22,000	Not given	Not given	23-Dec-16	e-mail: lutacenterprises@yahoo.com
TNZ-131	Vemacoat	brown	4	22,000	Not given	Not given	23-Dec-16	e-mail: lutacenterprises@yahoo.com

TABLE 5. 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?
TNZ-86	Goldstar	white	< 200	Tanzania	Tanzania	No
TNZ-87	Goldstar	yellow	17,000	Tanzania	Tanzania	No
TNZ-88	Goldstar	red	<200	Tanzania	Tanzania	No
TNZ-89	Goldstar	green	<100	Tanzania	Tanzania	No
TNZ-90	Sadolin	white	<300	Tanzania	Tanzania	No
TNZ-91	Sadolin	yellow	<200	Tanzania	Tanzania	No
TNZ-92	Sadolin	red	<200	Tanzania	Tanzania	No
TNZ-93	Sadolin	green	2,600	Tanzania	Tanzania	No
TNZ-94	Coral	white	<70	Tanzania	Tanzania	No
TNZ-95	Coral	yellow	<70	Tanzania	Tanzania	No
TNZ-96	Coral	red	<90	Tanzania	Tanzania	No
TNZ-97	Coral	blue	<200	Tanzania	Tanzania	No
TNZ-98	Robbialaac	white	<200	India	Tanzania	No
TNZ-99	Robbialaac	yellow	500	India	Tanzania	No
TNZ-100	Robbialaac	red	28,000	India	Tanzania	No
TNZ-101	Robbialaac	blue	<100	India	Tanzania	No
TNZ-102	Crown	white	<90	Kenya	Kenya	No
TNZ-103	Crown	red	11,000	Kenya	Kenya	No
TNZ-104	Crown	brown	15,000	Kenya	Kenya	No
TNZ-105	Kiboko	white	2,500	Tanzania	Tanzania	No
TNZ-106	Kiboko	yellow	61,000	Tanzania	Tanzania	No
TNZ-107	Kiboko	red	24,000	Tanzania	Tanzania	No
TNZ-108	Kiboko	blue	1,600	Tanzania	Tanzania	No
TNZ-109	AZTEC	white	<90	Tanzania	Tanzania	No
TNZ-110	AZTEC	yellow	4,900	Tanzania	Tanzania	No
TNZ-111	AZTEC	red	1,300	Tanzania	Tanzania	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?
TNZ-112	AZTEC	brown	600	Tanzania	Tanzania	No
TNZ-113	Master	white	<60	Pakistan	UAE	No
TNZ-114	Master	yellow	<60	Pakistan	UAE	No
TNZ-115	Master	red	<60	Pakistan	UAE	No
TNZ-116	Master	green	84,000	Pakistan	UAE	No
TNZ-117	Dura Coat	white	70	Kenya	Kenya	No
TNZ-118	Dura Coat	orange	<60	Kenya	Kenya	No
TNZ-119	Dura Coat	green	<60	Kenya	Kenya	No
TNZ-120	Dura Coat	blue	<60	Kenya	Kenya	No
TNZ-121	Basco Value	white	<60	Kenya	Kenya	No
TNZ-122	Basco Value	yellow	84,000	Kenya	Kenya	No
TNZ-123	Basco Value	red	300	Kenya	Kenya	No
TNZ-124	Basco Value	green	21,000	Kenya	Kenya	No
TNZ-125	Haraka	white	<60	Kenya	Kenya	No
TNZ-126	Haraka	yellow	57,000	Kenya	Kenya	No
TNZ-127	Haraka	red	9,900	Kenya	Kenya	No
TNZ-128	Haraka	green	6,000	Kenya	Kenya	No
TNZ-129	Vemacoat	white	<200	Tanzania	Tanzania	No
TNZ-130	Vemacoat	blue	<70	Tanzania	Tanzania	No
TNZ-131	Vemacoat	brown	230	Tanzania	Tanzania	No

TABLE 6. 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)
AZTEC	4	3	0	<90	4,900
Basco Value	4	3	2	< 60	84,000
Coral	4	0	0	<70	< 200
Crown	3	2	2	<90	15,000
Dura Coat	4	0	0	<60	70
Goldstar	4	1	1	<100	17,000
Haraka	4	3	1	< 60	57,000
Kiboko	4	4	2	1,600	61,000
Master	4	1	1	< 60	84,000
Robbialaac	4	2	1	< 100	28,000
Sadolin	4	1	0	< 200	2,600
Vemacoat	3	1	0	<70	230

TABLE 7. 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)
Blue	5	1	0	< 60	1,600
Brown	3	3	1	230	15,000
Green	6	4	2	< 60	84,000
Orange	1	0	0	< 60	< 60
Red	10	6	3	< 60	28,000
White	12	1	0	<60	2,500
Yellow	9	6	4	<60	84,000

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