LEAD IN NEW ENAMEL HOUSEHOLD PAINTS IN MALAYSIA

March 2016

PULAU PINANG

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National Report

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Acknowledgements

We take this opportunity to thank all those who were instrumental in compiling and shaping this paint study.
This study was undertaken as part of the IPEN Global Lead Paint Elimination Campaign. The Campaign seeks 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 Campaign is being implemented in Malaysia through the Consumers' Association of Penang (CAP) and this study is undertaken using funding from the New York Community Trust.

While this study was undertaken with the assistance of the New York Community Trust, its contents are the sole responsibility of CAP together with IPEN, and can in no way be taken to reflect the views of the New York Community Trust.

The Consumers' Association of Penang (CAP), based in Malaysia, was founded in 1970. Its primary aim is to ensure a sustainable model of development that meets the basic needs of the poor and is also socially just and sustainable. In the field of environmental protection, CAP is a fearless advocate of the people's right to a healthy and sustainable environment, challenging the unsustainable model of production and wasteful consumption patterns. Through the years, CAP's work has led to the exposing of unethical business behaviour, hazards in products and food, pharmaceuticals, etc. CAP's advocacy has led to improvements in the laws to regulate these practices.

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PREFACE

This report presents new data on the total lead content of solvent-based enamel decorative paints available on the market in Malaysia. A previous study conducted by the Consumers' Association of Penang (CAP) in 1992 found that seven out of nine enamel paints (78 percent of paints) contained lead above 600 parts per million (ppm). The highest amount of lead in that study was 11,700 ppm. Another earlier study analysed paints purchased between 2004 to 2007 for total lead content, and found that fifty percent of the paints contained lead above 600 ppm and 31 percent of the paints contained lead levels above 10,000 ppm.

The current study was undertaken to increase information about the lead content of solvent-based enamel decorative paints available on the market in Malaysia.

This study found that 41 percent of the enamel paints analysed contained lead concentrations above 600 ppm, the threshold limit for lead in paint adopted by Singapore and Sri Lanka. In addition, these paints would not be allowed for sale in most industrialised countries where legal limits are even more restrictive.

Included in the report is background information on why the use of paints with high lead content 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 leaded household paints; and recommendations for taking action to protect children and others from lead in paint.

The study was conducted as part of the IPEN 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-based decorative paints, particularly on the health of children under six years old. The Campaign is being implemented in Malaysia through the CAP with funding from the New York Community Trust. While this publication has been produced with the assistance of the New York Community Trust, the contents of the publication are the sole responsibility of CAP and IPEN, and can in no way be taken to reflect the views of the New York Community Trust.

CAP, based in Malaysia, was founded in 1970. Its primary aim is to ensure a sustainable model of development that meets the basic needs of the poor and is also socially just and sustainable. CAP focuses on sustainable and ethical consumption and challenges current aggressive advertising industry that is unfettered

and shapes people's consumption to lifestyles and behaviour that is unsustainable, unethical and inequitable.

In the field of environmental protection, CAP is a fearless advocate of the people's right to a healthy and sustainable environment, challenging the unsustainable model of production and wasteful consumption patterns. CAP champions the interest of citizens and communities against corporate lies and insatiability, toxic pollution and unsustainable use and management of land and other natural resources. CAP has a wide array of popular publications that teach the wider public to be ethical and rational consumers. Using health as a major entry point, CAP educates consumers to change their habits to simpler and more meaningful lifestyles. Through the years, CAP's work has led to the exposing of unethical business behaviour, hazards in products and food, pharmaceuticals, etc. CAP's advocacy has led to improvements in the laws to regulate these practices.

IPEN is an international NGO network of 700 health and environmental organizations in more than 100 countries in all regions of the world in which CAP participates. 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.

EXECUTIVE SUMMARY

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 foetus 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.

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 Malaysia, there is currently no regulation in place limiting the amount of lead in paint for household and decorative use. However, the Ministry of Domestic Trade, Co-operatives and Consumerism (MDTCC) regulates mandatory safety standards for toys intended for children below 14 years old. Under the MS ISO 8124-3 Safety of Toys Part 3 Migration of Certain Elements the maximum acceptable migration of lead in paint shall not be more than 90 parts per million (ppm).

In September 2015, the Consumers' Association of Penang (CAP) purchased a total of 39 cans of solvent-based enamel decorative paint from stores in the states of Penang and Kedah in Malaysia. The paints represented 18 different brands produced by 17 manufacturers. All paints were analysed by a laboratory in the United States of America for their total 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, assuring the reliability of the analytical results.

RESULTS

Sixteen out of 39 enamel decorative paints (41 percent of paints) contained a total lead concentration above 600 ppm. Moreover, twelve paints (31 percent of

paints) contained dangerously high concentrations of lead above 10,000 ppm. The highest lead concentration detected was 150,000 ppm, whilst the lowest was less than 60 ppm.

Eleven of 18 analysed brands (61 percent of brands) sold at least one paint with lead concentrations above 10,000 ppm, including brands from multinational companies.

Yellow paints were the most hazardous with 12 of 19 paints (63 percent of yellow-coloured paints) containing lead concentrations greater than 10,000 ppm. In addition, this study also included 12 red paints and eight white paints.

In general, paint can labels did not carry meaningful information about lead content or the hazards of paint with high lead content and some paints with high lead concentrations were falsely advertised as being "low lead."

COMPARISON WITH RESULTS FROM EARLIER STUDIES

A previous study conducted by the CAP in 1992 found that seven out of nine enamel paints (78 percent of paints) contained lead above 600 parts per million (ppm). The highest amount of lead in that study was 11,700 ppm.

In another earlier study of lead content in paint in Malaysia, seventy-two enamel paints purchased in Malaysia during the years 2004 to 2007 were analysed. Results from the earlier study were similar to those in the current study. Fifty percent of the earlier samples contained less than 600 ppm lead compared to fifty-nine percent in the current study. Similarly, a somewhat higher percentage of the paints in the former study (39 percent) contained more than 10,000 ppm lead compared to 31 percent in the current study.

CONCLUSIONS

In Malaysia, there is currently no regulation in place limiting the amount of lead in paint for household and decorative use. Presently we only have mandatory safety standards stipulating maximum acceptable migration of lead in paint of not more than 90 parts per million (ppm) in toys intended for children below 14 years old. This is not adequate because Malaysia's measure on children's toys provides only partial protection as it does not address domestic paints, which are the paints most likely to contribute to childhood lead exposure.

Reducing the adverse health effects from lead paints necessitates controlling exposures. A ban on the manufacture, import, sale, distribution, use, and export of

lead paints are far more cost-effective in reducing exposure risks than any future remediation programmes. Hence, there is an urgent need for legally binding restrictions on the use of lead in paint.

This study also found that some companies have falsely advertised their product as "lead free" or "contains no added lead." Stringent enforcement is needed to take action against this type of violation and for misleading consumers.

RECOMMENDATIONS

Government and Government Agencies

- Promulgate and enforce regulation to ban lead in paint.
- Mandate lead free paints for all new buildings. Architects and building inspectors to ensure compliance by contractors.
- Ensure paint manufacturers make swift transitions to non-lead paint production.
- Enforce Trade Descriptions Act 2011 which prohibits false trade descriptions and false or misleading statements to ensure compliance of labelling and take action against companies misleading the public or guilty of false labelling.
- Require paint companies to display sufficient information indicating toxic content on paint can labels and provide a warning on possible lead dust hazards when disturbing painted surfaces.
- Require mandatory training of workers on lead-safe work practices when applying paint to previously painted surfaces to minimise dispersal of lead dust.

Paint Industry

- Take immediate action to stop the use of lead-based pigments, driers, and substances used for other purposes in paint formulations, and shift to non-hazardous substitutes.
- Adhere to Trade Descriptions Act 2011.
- Provide lead-dust hazard warnings on paint can labels.
- Provide supplementary leaflets about lead dust hazards, and methods to reduce them, that paint vendors can give to their customers.

Consumers

- Only purchase and use unleaded paints for healthier homes, and patronise businesses that sell unleaded paints.

- Read the label before purchasing any paint and ask about its lead content.
- Become aware of lead paint and dust hazards, and precautions to take to minimise them.

Public Health Organizations

- Support policy measures that will eliminate lead exposure from all sources.
- Join in efforts to inform the public about childhood health and occupational health risks linked with paints with high lead content and lead dust.
- Promote efforts to make blood lead testing facilities available.

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 behaviour. If the dust or the soil is contaminated with lead, the children will ingest lead. Hand-to-mouth behaviour 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 milligrammes of house dust and soil each day.

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.[2]

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 more increased rate.[3] 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 foetus 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 a number of biological systems and pathways. The primary target is the central nervous system and the brain, but lead 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." [3] 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.[3,6] 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 behaviour.[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.[3] 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[1] 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**: $134.7 billion of economic loss, or 4.03% of Gross Domestic Product (GDP)

1 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.

- **Latin America and the Caribbean**: $142.3 billion of economic loss, or 2.04% of GDP
- **Asia**: $699.9 billion of economic loss, or 1.88% of GDP
- **Malaysia**: $11.8 billion of economic loss, or 2.63% of GDP

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. Water-based paints are rarely contaminated with lead, but solvent-based enamel 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 colour, 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) total 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 Nepal 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 Sri Lanka and Singapore have established standards of 600 ppm total lead.

1.3 PAINT MARKET AND REGULATORY FRAMEWORK IN MALAYSIA

The Malaysian paint and coating sector is dominated by large multinational corporations manufacturing coatings for large range of products from architectural coatings to special purpose coatings. Local firms predominantly produce architectural coatings, while some also produce industrial coatings.

Though there are a large number of local firms producing paint, the majority of the market share is held by large multinational corporations. Paint and coating industry sales in Malaysia in 2012 were valued at USD 9.9 billion and were expected to reach USD 8 billion at the end of 2013.[16]

The website of Nippon Paint Malaysia Group[17] states that it is currently Malaysia's No. 1 Total Coating Solutions provider and has held that position since 2008.

Federal Paint, the first Malaysian paint brand, established since 1958, is supported by a wide network of distributors and dealers throughout Malaysia and the brand is also present in the ASEAN region.[18]

In Malaysia, there is no specific legislation to control the use of lead in decorative paints. However, the Ministry of Domestic Trade, Co-operatives and Consumerism (MDTCC) regulates mandatory safety standards for toys intended for children aged below 14 years old. Under the MS ISO 8124-3 Safety of Toys Part 3 Migration of Certain Elements the maximum acceptable migration of lead in paint shall not be more than 90 ppm.[19]

Countries that only have legally binding controls on lead coatings used on children's toys are not counted towards the target of the Global Alliance to Eliminate Lead Paint (GAELP), an international coalition, which works towards the phasing out of lead paint. Furthermore, Malaysia's measure on children's toys provides only partial protection as it does not address domestic paints, which are the paints most likely to contribute to childhood lead exposure.

Figure 1. Household Enamel Paints Purchased in Malaysia.

2. MATERIALS AND METHODS

In September 2015, 39 cans of solvent-based enamel decorative paint were purchased by the Consumers' Association of Penang (CAP) from various stores in several towns in the states of Kedah and Penang in Malaysia. The paints represented 18 different brands produced by 17 manufacturers. A few of the paint cans that were purchased were of old stock but as they had been put up in the shelves for sale, CAP did still select them for analysis.

In most cases, one white paint and one or more bright-coloured paints such as red or yellow were selected. The availability of these paints in retail establishments suggested that they were intended to be used within home environments. Excluded were automotive and industrial paints that are not typically used for domestic housing applications or paint explicitly meant for painting toys.

During the paint sample preparation, information such as colour, 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 colours, for example "red" or "yellow," were recorded for paints where the paint can label did not display specific hue. For all coloured 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 CAP 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 wood pieces using different unused single-use paintbrushes by research officers of CAP, as shown in Figure 2.

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 individual resealable plastic bags and shipped for analysis of total 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 American Industrial Hygiene Association. In the lab selection process, IPEN further assessed the reliability of the lab results by conducting an independent quality assurance testing. This was

Figure 2. Preparation of Paint Samples.

made by sending paint samples with a known lead content to the lab, and evaluate the results received.

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 low-

est detection limit 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 200 ppm) for some of the samples.

The paint samples were analysed using method EPA3050B/7420, i.e., through acid digestion of the samples, followed by Flame Atomic Absorption Spectrometry as recognized by the WHO as appropriate for this purpose.[20]

3. RESULTS

3.1. SUMMARY OF RESULTS

The current study shows:

- Sixteen out of 39 enamel decorative paints (41 percent of paints) analysed contained total lead concentrations above 600 parts per million (ppm) — a mandatory standard in neighbouring countries; and nearly a third (31 percent) contained extremely dangerous lead concentrations above 10,000 ppm.
- 11 of 18 brands (61 percent of brands) sold at least one paint with lead concentrations above 10,000 ppm, including brands from multinational companies.
- Yellow paints were the most hazardous with 12 of 19 samples (63 percent of yellow-coloured paints) containing lead concentrations greater than 10,000 ppm.
- In general, paint can labels did not carry meaningful information about lead content or the hazards of paint with high lead content and some paints with high lead concentrations are falsely advertised as being "low lead."

3.2 TOTAL LEAD CONTENT ANALYSIS

41 percent of the analysed paints contained total lead concentrations above 600 ppm – a mandatory standard in neighbouring countries; and nearly a third contained dangerously high lead concentrations above 10,000 ppm.

Sixteen out of 39 enamel decorative paints (41 percent of paints) contained a total lead concentration above 600 ppm. Moreover, twelve paints (31 percent of paints) contained dangerously high concentrations of lead above 10,000 ppm. The highest lead concentration detected was 150,000 ppm, whilst the lowest was less than 60 ppm.

The ten enamel paints with the highest amounts of lead are summarized in Table 1.

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

Rank	Sample No.	Brand	Manufacturer	Colour	Lead Content (ppm)
1	MAL-38	Seamaster Paint Superglo	Seamaster Paint (Manufacturing) Bhd.	Sunrise Yellow	150,000
2	MAL-01	Federal Glo-10	Federal Paint Factory Sdn. Bhd.	Chrome Yellow	130,000
3	MAL-21	Nippon Paint	Nippon Paint (M) Sdn. Bhd.	Sunflower Yellow	130,000
4	MAL-39	Seamaster Paint Protective Coating	Seamaster Paint (Manufacturing) Bhd.	Bright gold	110,000
5	MAL-06	Sequoia 3000	Sequoia Paint (M) Sdn. Bhd.	Sunflower Yellow	77,000
6	MAL-33	Sunlux Gloss Paint	Syarikat Sanland Paint Industries Sdn. Bhd.	Yellow	62,000
7	MAL-11	KCC Paints Koramel	KCC Paints Sdn. Bhd.	Gold	58,000
8	MAL-35	U1000	Distributor: Supermix Trading	Yellow	45,000
9	MAL-31	UNI Gloss Paint	Unipaint Factory Sdn. Bhd.	Yellow	20,000
10	MAL-34	Ocean II Colour	Distributor: Ocean Hardware Paint Sdn. Bhd.	Yellow	13,000

Note: Sdn. Bhd. (Sendirian Berhad) is the Malay version of Pte. Ltd. (Private Limited).

3.3 PAINT BRAND ANALYSIS

11 of 18 brands sold at least one paint with lead concentrations above 10,000 ppm.

Lead concentrations above 600 ppm were detected in samples from at least one paint from 11 out of 18 brands (61 percent of brands).

A paint from the brand Seamaster Paint Superglo contained the highest total lead concentration of 150,000 ppm. On the other hand, lead concentrations be-

low 60 ppm were found in five paints manufactured by two companies—Kansai Coatings and ICI Paints.

3.4 PAINT COLOUR ANALYSIS

Yellow paints were the most hazardous with 12 of 19 samples (63 percent of yellow-coloured paints) containing lead concentrations greater than 10,000 ppm.

This study analysed 19 yellow-coloured paints, 12 red-coloured paints, and eight white paints. Twelve yellow paints contained lead concentrations above 600 ppm, all of which contained lead concentrations above 10,000 ppm. Only seven out of 19 yellow paints contained lead concentrations below 600 ppm. The highest concentration of lead was 150,000 ppm from the brand Seamaster Paint Superglo (sunrise yellow).

Three out of 12 red-coloured paints that were analysed contained lead concentrations above 600 ppm. UNI Gloss Paint contained the maximum lead concentration of 4,500 ppm. Two red oxide paint samples contained lead concentrations less than 200 ppm.

In terms of the white paints, one out of eight samples contained lead concentration above 600 ppm. The distribution of colours according to the concentration of lead is shown in Figure 3.

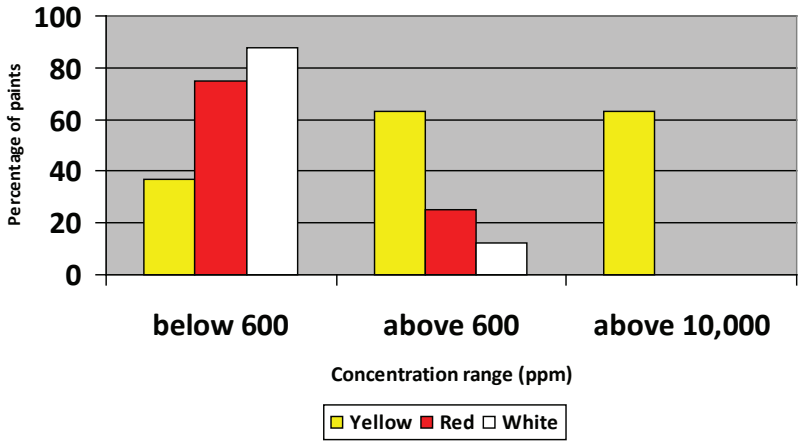

Figure 3. Distribution of Lead Concentrations in Enamel Decorative Paints by Colour.

3.5 LABELLING

In general, paint can labels did not carry meaningful information about lead content or the hazards of paint with high lead content and some paints with high lead concentrations are falsely advertised as being "low lead."

Nineteen out of the 39 paints did not include details whether the product contained lead on the paint can label. Out of the 20 paints with information about the lead content of the paint on the paint can label, some labels carried symbols indicating "no lead;" a few displayed "no added lead" on the label; one brand's label indicated "non-lead colour pigments and 100% heavy metal free;" and another brand label indicated "100% lead free." Three paints displaying "no added lead" labels or "no lead" symbols were found to contain lead concentrations above 600 ppm.

Only one brand indicated the lead content of the paint on the label. This label listed lead chromate as one of the hazardous ingredients. The risks that were indicated on the label were that it may cause cancer and birth defects, and that it is toxic by inhalation and if swallowed. This paint brand also carried symbols showing flammability and toxicity. The analysis found that this particular paint contained 130,000 ppm of lead.

A majority of the paints included information on the label regarding physical properties, application data, surface preparation and direction for use. Most of the brands, did not disclose manufacturing dates, whilst only one paint can label displayed an expiration date.

In terms of risks, most of the paint cans carried labels using words or symbols to indicate that the paints were flammable or harmful, and a very few displayed an irritant or toxic symbol. Although written warning symbols and words indicated that the paint should be kept away from food, drink and animal feeding areas, and out of reach of children, these precautionary warnings were general in nature and did not indicate that lead paint and lead dust is hazardous to children and pregnant women.

The paint brand, KCC Paints Koramel indicated "no added lead" but was found to contain lead concentrations of 2,500 ppm and 58,000 ppm, respectively, in its red and gold-coloured paint. One of the three Koa Gloss paints that was analysed, i.e., its lemon-coloured paint, contained lead concentrations of 12,000 ppm even though the can carried a symbol displaying "no lead."

Most of the other paints which indicated "no added lead" contained lead concentrations less than 200 ppm.

COMPARISON WITH RESULTS FROM EARLIER STUDIES

A previous study conducted by the Consumers' Association of Penang (CAP) in 1992 found that seven out of nine enamel paints (78 percent of paints) contained lead above 600 parts per million (ppm).[21] The highest amount of lead in that study was 11,700 ppm.

In another earlier study of lead content in paints in Malaysia,[14] seventy-two enamel paints purchased in Malaysia during the years 2004 to 2007 were analysed for total lead content. Results from the earlier study were similar to those in the current study. Fifty percent of the earlier paints sampled contained less than 600 ppm lead compared to fifty-nine percent in the current study. Similarly, a somewhat higher percentage of the paints in the former study (39 percent) contained more than 10,000 ppm lead compared to 31 percent in the current study.

4. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

In Malaysia, there is currently no regulation in place limiting the amount of lead in paint for household and decorative use. Presently we only have mandatory safety standards stipulating maximum acceptable migration of lead in paint of not more than 90 parts per million (ppm) in toys intended for children below 14 years old. This is not adequate because Malaysia's measure on children's toys provides only partial protection as it does not address domestic paints, which are the paints most likely to contribute to childhood lead exposure.

Reducing the adverse health effects from lead paints necessitates controlling exposures. A ban on the manufacture, import, sale, distribution, use, and export of lead paints are far more cost-effective in reducing exposure risks than any future remediation programmes. Hence, there is an urgent need for legally binding restrictions on the use of lead in paint.

This study also found that some companies have falsely advertised their product as "lead free" or "contains no added lead." Stringent enforcement is needed to take action against this type of violation and for misleading consumers.

RECOMMENDATIONS

Government and Government Agencies

- Promulgate and enforce regulation to ban lead in paint.
- Mandate lead free paints for all new buildings. Architects and building inspectors to ensure compliance by contractors.
- Ensure paint manufacturers make swift transitions to non-lead paint production.
- Enforce Trade Descriptions Act 2011 which prohibits false trade descriptions and false or misleading statements to ensure compliance of labelling and take action against companies misleading the public or guilty of false labelling.

- Require paint companies to display sufficient information indicating toxic content on paint can labels and provide a warning on possible lead dust hazards when disturbing painted surfaces.
- Require mandatory training of workers on lead-safe work practices when applying paint to previously painted surfaces to minimise dispersal of lead dust.

Paint Industry

- Take immediate action to stop the use of lead-based pigments, driers, and substances used for other purposes in paint formulations, and shift to non-hazardous substitutes.
- Adhere to Trade Descriptions Act 2011.
- Provide lead-dust hazard warnings on paint can labels.
- Provide supplementary leaflets about lead dust hazards, and methods to reduce them, that paint vendors can give to their customers.

Consumers

- Only purchase and use unleaded paints for healthier homes, and patronise businesses that sell unleaded paints.
- Read the label before purchasing any paint and ask about its lead content.
- Become aware of lead paint and dust hazards, and precautions to take to minimise them.

Public Health Organizations

- Support policy measures that will eliminate lead exposure from all sources.
- Join in efforts to inform the public about childhood health and occupational health risks linked with paints with high lead content and lead dust.
- Promote efforts to make blood lead testing facilities available.

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APPENDIX

TABLE 2. THIRTY-NINE SOLVENT-BASED ENAMEL DECORATIVE PAINTS INCLUDED IN THE STUDY

Sample No.	Brand	Color	Volume (L)	Price* (RM)	Manufacture Date (d/m/y)	Batch No.	Date of Purchase (d/m/y)	Is there website on label?
MAL-01	Federal Glo-10	Chrome Yellow	1	20.00	N/A	CE9054	17/09/15	No
MAL-02	Federal Glo-10	Signal Red	1	20.00	N/A	F15048	17/09/15	Yes
MAL-03	Federal Glo-10	White	1	20.00	N/A	E412041	17/09/15	Yes
MAL-04	Sissons Tungolac	Golden Ray Yellow	1	30.00	N/A	B 10 13 1	17/09/15	Yes
MAL-05	Sissons Tungolac	Signal red	1	30.00	N/A	F.2.9.1	17/09/15	Yes
MAL-06	Sequoia 3000	Sunflower Yellow	1	26.00	N/A	5A1201R	16/09/15	No
MAL-07	Sequoia 3000	Flamingo Red	1	26.00	N/A	5A2901	16/09/15	No
MAL-08	Sequoia 3000	White	1	26.00	N/A	SG1009	16/09/15	No
MAL-09	KCC Paints Koramel	White	1	25.00	N/A	15072362	17/09/15	Yes
MAL-010	KCC Paints Koramel	Signal Red	1	25.00	N/A	13082485	17/09/15	Yes
MAL-011	KCC Paints Koramel	Gold	1	25.00	N/A	15010244	17/09/15	Yes
MAL-012	Mr Paintman Mirror Gloss	White	0.9	25.00	N/A	1503086A	17/09/15	No

Sample No.	Brand	Color	Volume (L)	Price* (RM)	Manufacture Date (d/m/y)	Batch No.	Date of Purchase (d/m/y)	Is there website on label?
MAL-013	Mr Paintman Mirror Gloss	Signal Red	0.9	25.00	N/A	1504075A	17/09/15	No
MAL-014	Mr Paintman Mirror Gloss	Empress Yellow	0.9	25.00	N/A	1404117A	16/09/15	No
MAL-015	Koa Gloss	Signal Red	1	23.32	N/A	DE010	17/09/15	Yes
MAL-016	Koa Gloss	Lemon	1	23.32	N/A	BA005	17/09/15	Yes
MAL-017	Koa Gloss	White	1	23.32	N/A	BA008	17/09/15	Yes
MAL-018	ICI Glidden	Solar Yellow	1	20.00	N/A	0024/FH	17/09/15	No
MAL-019	ICI Dulux	Citrus Yellow	1	32.00	N/A	0034/DJ	16/09/15	No
MAL-020	Kansai Par Hi Gloss	Mahkota Yellow	1	31.80	N/A	1811542	16/09/15	Yes
MAL-021	Nippon Paint	Sunflower Yellow	1	28.00	N/A	1501235785	16/09/15	Yes
MAL-022	Colourland	White	1	31.00	N/A	TH2-01136	16/09/15	Yes
MAL-023	Colourland	Yellow	1	32.50	N/A	S2-09197	16/09/15	Yes
MAL-024	Colourland	Signal Red	1	36.00	N/A	TT2-12155	16/09/15	Yes
MAL-025	Jotun Gardex	Signal Red	1	38.00	08/15	996264	17/09/15	Yes
MAL-026	Jotun Gardex	Yellow-Blonde Ambition	1	4300	3/3/14	NM104 682981	17/09/15	Yes
MAL-027	Kangaroo	Post Office Red	0.1	3.50	N/A	N/A	17/09/15	No

Sample No.	Brand	Color	Volume (L)	Price* (RM)	Manufacture Date (d/m/y)	Batch No.	Date of Purchase (d/m/y)	Is there website on label?
MAL-028	Kangaroo	White	0.1	3.50	N/A	N/A	17/09/15	No
MAL-029	Kangaroo	Chrome Yellow	0.1	3.50	N/A	N/A	17/09/15	No
MAL-030	UNI Gloss Paint	Red	0.075	3.71	N/A	N/A	15/09/15	No
MAL-031	UNI Gloss Paint	Yellow	0.075	4.03	N/A	N/A	15/09/15	No
MAL-032	UNI Gloss Paint	White	0.075	4.03	N/A	N/A	15/09/15	No
MAL-033	Sunlux Gloss Paint	Yellow	0.075	3.50	N/A	N/A	15/09/15	Yes
MAL-034	Ocean II Colour	Yellow	0.075	2.45	N/A	N/A	15/09/15	No
MAL-035	U1000	Yellow	0.075	3.50	N/A	N/A	16/09/15	No
MAL-036	FOXX 398	Red Oxide Paint	1	15.00	N/A	N/A	16/09/15	No
MAL-037	Kangaroo A53	Red Oxide Paint	1	17.00	N/A	40422764	17/09/15	No
MAL-038	Seamaster Superglo	Sunrise Yellow	1	20.50	N/A	36/482	17/09/15	Yes
MAL-039	Seamaster Protective Coating	Bright Gold	1	32.00	N/A	37/478	17/09/15	Yes

**Price inclusive of 6% GST.*

TABLE 3. RESULTS OF LABORATORY ANALYSIS OF 39 SOLVENT-BASED ENAMEL DECORATIVE PAINTS

Sample No.	Brand	Colour	Lead Content, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
MAL-01	Federal Glo-10	Chrome Yellow	130,000	Malaysia	Malaysia	No
MAL-02	Federal Glo-10	Signal Red	300	Malaysia	Malaysia	No
MAL-03	Federal Glo-10	White	< 200	Malaysia	Malaysia	No
MAL-04	Sissons Tungolac	Golden Ray Yellow	< 200	Founded in England. Multinational	Malaysia	Yes. No added lead & mercury symbol.
MAL-05	Sissons Tungolac	Signal Red	120	Founded in England. Multinational	Malaysia	Yes. No added lead & mercury symbol.
MAL-06	Sequoia 3000	Sunflower Yellow	77,000	Malaysia	Malaysia	No
MAL-07	Sequoia 3000	Flamingo Red	3,900	Malaysia	Malaysia	No
MAL-08	Sequoia 3000	White	3,800	Malaysia	Malaysia	No
MAL-09	KCC Paints Koramel	White	< 80	South Korea	Malaysia	Yes. No added lead & mercury symbol.
MAL-010	KCC Paints Koramel	Signal Red	2,500	South Korea	Malaysia	Yes. No added lead & mercury symbol.

Sample No.	Brand	Colour	Lead Content, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
MAL-011	KCC Paints Koramel	Gold	58,000	South Korea	Malaysia	Yes. No added lead & mercury symbol.
MAL-012	Mr Paintman Mirror Gloss	White	< 60	Malaysia	Malaysia	Yes. No added lead & mercury symbol.
MAL-013	Mr Paintman Mirror Gloss	Signal Red	< 70	Malaysia	Malaysia	Yes. No added lead & mercury symbol.
MAL-014	Mr Paintman Mirror Gloss	Empress Yellow	< 60	Malaysia	Malaysia	Yes. No added lead & mercury symbol.
MAL-015	Koa Gloss	Signal Red	< 70	South Korea	Malaysia	Yes. No lead symbol.
MAL-016	Koa Gloss	Lemon	12,000	South Korea	Malaysia	Yes. No lead symbol.
MAL-017	Koa Gloss	White	< 70	South Korea	Malaysia	Yes. No lead symbol.
MAL-018	ICI Glidden	Solar Yellow	< 60	United States of America	Malaysia	Yes. Label states no added lead.
MAL-019	ICI Dulux	Citrus Yellow	< 60	Founded in USA	Malaysia	Yes. No added lead & mercury symbol.

Sample No.	Brand	Colour	Lead Content, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
MAL-020	Kansai Par Hi Gloss	Mahkota Yellow	< 60	Japan	Malaysia	Yes. Label states no added lead or mercury.
MAL-021	Nippon Paint	Sunflower Yellow	130,000	Japan	Malaysia	Yes. Label states hazardous ingredients, listing lead chromate.
MAL-022	Colourland	White	< 200	Malaysia	Malaysia	Yes. Label states non-lead colour pigments.
MAL-023	Colourland	Yellow	< 200	Malaysia	Malaysia	Yes. Label states non-lead colour pigments.
MAL-024	Colourland	Signal Red	< 70	Malaysia	Malaysia	Yes. Label states non-lead colour pigments.
MAL-025	Jotun Gardex	Signal Red	< 200	Norway	Malaysia	Yes. Label states 100% lead free.
MAL-026	Jotun Gardex	Yellow-Blonde Ambition	< 90	Norway	Malaysia	Yes. Label states 100% free from heavy metals.
MAL-027	Kangaroo	Post Office Red	< 200	Singapore	Malaysia	No
MAL-028	Kangaroo	White	< 200	Singapore	Malaysia	No
MAL-029	Kangaroo	Chrome Yellow	11,000	Singapore	Malaysia	No
MAL-030	UNI Gloss Paint	Red	4,500	Malaysia	Malaysia	No

Sample No.	Brand	Colour	Lead Content, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manu-facture		Is there information on can about lead content of paint?
MAL-031	UNI Gloss Paint	Yellow	20,000	Malaysia	Malaysia	No	
MAL-032	UNI Gloss Paint	White	80	Malaysia	Malaysia	No	
MAL-033	Sunlux Gloss Paint	Yellow	62,000	Malaysia	Malaysia	No	
MAL-034	Ocean II Colour	Yellow	13,000	N/A	Malaysia	No	
MAL-035	U1000	Yellow	45,000	N/A	Malaysia	No	
MAL-036	FOXX Coat-ings Next 398	Red Oxide Paint	< 200	Malaysia	Malaysia	No	
MAL-037	Kangaroo A53	Red Oxide Paint	< 200	Singapore	Malaysia	No	
MAL-038	Seamaster Superglo	Sunrise Yellow	150, 000	Malaysia	Malaysia	No	
MAL-039	Seamaster Protective Coating	Bright Gold	110,000	Malaysia	Malaysia	No	

TABLE 4. DISTRIBUTION OF LEAD CONCENTRATION BY BRAND

Brand	No. of Samples	No. of Samples Above 600 ppm	No. of Samples Above 10,000 ppm	Minimum Lead Content (ppm)	Maximum Lead Content (ppm Maximum Lead Content (ppm))
Federal Glo-10	3	1	1	< 200	130,000
Sissons Tungolac	2 (yellow, red)	0	0	120	< 200
Sequoia 3000	3	3	1	3,800	77,000
KCC Paints Koramel	3	2	1	< 80	58,000
Mr Paintman Mirror Gloss	3	0	0	< 60	< 70
Koa Gloss	3	1	1	< 70	12,000
ICI	2 (both yellow)	0	0	< 60	-
Kansai Par Hi Gloss	1 (yellow)	0	0	< 60	
Nippon	1 (yellow)	1	1	-	130,000
Colourland	3	0	0	< 70	< 200
Jotun Gardex	2 (yellow, red)	0	0	< 90	< 200
Kangaroo	4	1	1	< 200	11,000
UNI Gloss	3	2	1	80	20,000
Sunlux Gloss	1 (yellow)	1	1	-	62,000
Ocean	1 (yellow)	1	1	-	13,000
U1000	1 (yellow)	1	1	-	45,000
FOXX	1 (red)	0	0	< 200	-
Seamaster Paint	2 (both yellow)	2	2	110,000	150,000

TABLE 5. DISTRIBUTION OF LEAD CONCENTRATION BY COLOUR

Colour	No. of Samples	No. of Samples Above 600 ppm	No. of Samples Above 10,000 ppm	Minimum Lead Content (ppm)	Maximum Lead Content (ppm)
Yellow	19	12	12	< 60	150,000
Red	12	3	0	< 70	4,500
White	8	1	0	< 60	3,800

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