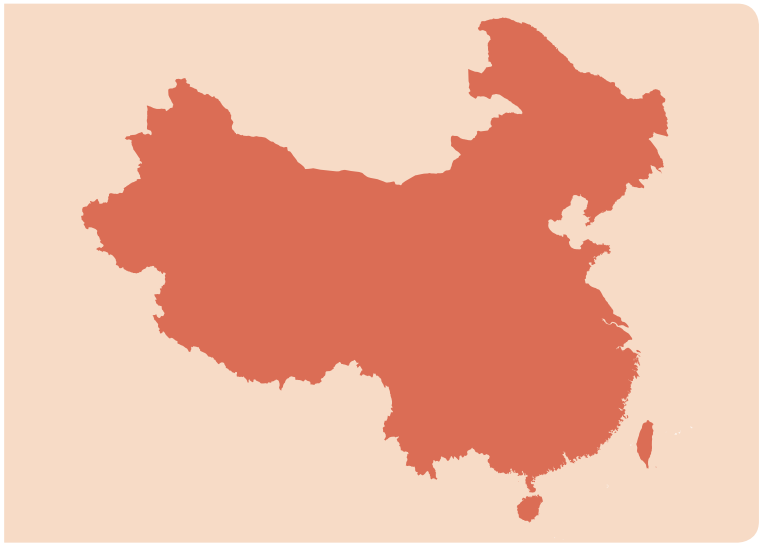
LEAD IN ENAMEL DECORATIVE PAINTS IN CHINA



January 2016

源头爱好者
Insight Explorer

IPEN
a toxics-free future

NATIONAL REPORT

LEAD IN NEW ENAMEL HOUSEHOLD PAINTS IN CHINA

January 2016

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 Asian Lead Paint Elimination Project. The Asian Lead Paint Elimination Project 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 Asian Lead Paint Elimination Project was implemented by IPEN over a period of three years (2012-2015) in seven focus countries (Bangladesh, India, Indonesia, Nepal, Philippines, Sri Lanka, and Thailand) with funding from the European Union (EU) totaling 1.4 million euros. The funding provided also included means to conduct a study on the lead content of paints in China, to assess the need for similar activities in China.

While this study and report was published with the assistance of the European Union and The New York Community Trust, its contents are the sole responsibility of Insight Explorer (IE) together with IPEN, and can in no way be taken to reflect the views of these funders.

源头爱好者
Insight Explorer

Insight Explorer (IE) is an NGO established in 2012 in Beijing. It seeks to increase public awareness and citizens' capacity to take action in the areas of pollution control, ecosystem and biodiversity conservation, and sound environmental governance. Since September 2013, it has launched a project called China Heavy Metal Pollution Map, which focuses on both pollution hotspots and problematic consumer products caused by heavy metals.

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PREFACE

This report presents the results from a recent study of the total lead content of solvent-based enamel decorative paints available on the market in China. Although China already implemented regulations controlling lead content of paint for interior and decorative use in 2001, two studies since then (both published in 2009) showed that many solvent-based decorative paints still contained high levels of lead. The current study was undertaken with an aim to increase information about the lead content of solvent-based enamel decorative paints available on the market in China in 2014.

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, 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 Asian Lead Paint Elimination Project (2012 - 2015). The Asian Lead Paint Elimination Project 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 decorative paints, particularly on the health of children under six years old. The Asian Lead Paint Elimination Project was being implemented by IPEN over a period of three years in seven focus countries (Bangladesh, India, Indonesia, Nepal, Philippines, Sri Lanka, and Thailand) with funding from the European Union (EU) totaling €1.4 million. The funding provided also included means to conduct a study on the lead content of paints in China, to assess the need for similar activities in China. This report was produced with financial support from the New York Community Trust. While this study and report was published with the assistance of the European Union and The New York Community Trust, its contents are the sole responsibility of Insight Explorer (IE) together with IPEN, and can in no way be taken to reflect the views of these funders.

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

The European Union is made up of 28 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development, while maintaining cultural diversity, tolerance and individual freedom. The EU is committed to sharing its achievements and its values with countries and people beyond its borders.

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 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.

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. A regulation limiting the amount of lead in paint for interior and decorative use was introduced in China in 2001. The regulation restricts the amount of lead allowed in these paints to 90 parts per million (ppm) soluble lead, i.e. the amount of lead that can be extracted by a standard acid treatment to simulate the amount of lead bioavailable for absorption when e.g. a painted toy is put in the mouth. Earlier studies estimate that a concentration of 90 ppm soluble lead can be approximated to 600 ppm total lead (dry weight of the paint).

From September to November 2014, the Chinese NGO Insight Explorer (IE) purchased 141 solvent-based, enamel decorative paints representing 47 brands from stores in eight cities in China (Beijing, Shenyang, Zhengzhou, Nanchang, Guangzhou, Xiamen, Shanghai and Kunming). Samples from these paints were analyzed by an accredited laboratory in Italy for total lead content.

The paint study was undertaken as part of the Asian Lead Paint Elimination Project (2012 – 2015), funded by the European Union with 1.4 million euros.

RESULTS

Of the 141 paints, 70 of the paints (50% of paints) contained a total lead content above 600 ppm. Approximately, a 600 ppm total lead content in a paint product often corresponds to 90 ppm soluble lead, the lead

limit for lead in paint in China. This suggests that about half of the paints analyzed exceed the Chinese regulatory limit. Forty-eight of the paints (34%) contained dangerously high lead levels above 10,000 ppm total lead and would not be allowed for sale in any country restricting the use of lead in decorative paint. The highest lead level detected was 116,000 ppm total lead.

BRANDS

One or more paints from 42 of the 47 brands (89% of brands) had a total lead content below 600 ppm (approximately 90 ppm soluble lead), showing that the technology exists in China to produce paint within the regulatory limit. On the other hand, one or more paint from 39 of the brands (83% of brands) contained lead at dangerously high levels above 10,000 ppm total lead.

COLORS

Of the 141 paints sampled, 128 (91% of the paints) were white, yellow and red.

Only five (11%) of the 45 white paints contained total lead levels above 600 ppm (approximately 90 ppm soluble lead), and the highest level detected in a white paint was 1,440 ppm total lead. The average lead concentration of the 45 white paints was 193 ppm total lead.

However, yellow paints contained much higher lead levels. Of the 42 yellow paints, 38 (90%) contained lead concentrations above 10,000 ppm total lead. The average lead concentration in yellow paints was 43,800 ppm total lead. Forty of the yellow paints (95%) contained total levels above 600 ppm (approximately 90 ppm soluble lead).

The average lead concentration in the 41 red paints was 4,100 ppm total lead. Fifteen (37%) of the red paints contained a total lead concentration above 600 ppm (approximately 90 ppm soluble lead) and 4 (10%) contained greater than 10,000 ppm total lead.

COMPARISON WITH EARLIER STUDIES

Two previous studies were conducted in 2009 with a total of 122 paints analyzed. This was prior to the current study but after the regulation in China restricting the use of lead in decorative paint was enacted. Most of these samples were from brands not included in the current study. Although the earlier studies included fewer brands, the percentage of samples with total lead concentrations greater than 600 ppm and 10,000 ppm are similar among the three studies.

RECOMMENDATIONS

For the government and relevant agencies:

- Review the procedures for ensuring compliance and enforcement of current national regulatory controls on lead in paint through a multi-stakeholders process involving representatives of relevant government agencies, the paint industry, civil society and other relevant sectors.
- Establish effective procedures for monitoring and enforcing full compliance with existing regulatory controls on the lead content of paints manufactured and/or sold in China.
- Consider possible revisions to existing regulatory controls on the lead content of paints to be based on the paint's total lead content instead of its soluble lead content and to include a dust lead hazard warning on the labels.

For the paint industry:

- Discontinue using lead-based pigments and lead-based drying catalysts as paint ingredients.
- Participate in a third-party certification program that verifies that your paints do not contain added lead compounds.
- Provide information on product label indicating the lead content of the paint.
- Provide label warnings of possible lead dust hazards when old painted surfaces are disturbed.

For individual, household and institutional consumers:

- Ask for unleaded paints and only patronize businesses that sell unleaded paints.
- Be aware of lead paint and dust hazards, and precautions to take to minimize exposure.

For public health organizations:

- Support efforts to end the manufacture, sale and use of leaded paints.
- Support policy measures that will eliminate childhood lead exposure from all sources.
- Inform the public about childhood health and occupational health risks linked with lead paints and lead in dust.
- Promote efforts to make blood lead testing available.

- Encourage specifications of "lead safe paints" on purchase orders of paint consumers such as schools, day-care centers and housing property owners or managers.

For all stakeholders:

- Support efforts to end the manufacture, sale and use of leaded paints.
- Support policy measures that will eliminate childhood lead exposure from all sources.
- Join in effort to inform the public about childhood health and occupational health risks linked with lead paints and lead in dust.
- Support "lead safe paint" procurement policies.
- Support a third-party certification and labeling program that will ensure all paints sold in the market meet the regulatory standards and help customers in having an informed choice when buying paints.

1. BACKGROUND

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

While lead exposure is also harmful to adults, lead exposure harms children at much lower levels. In addition, children absorb up to five times as much of ingested lead than adults. Children with nutritional deficiencies absorb ingested lead at an even more increased rate.[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 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% 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] There is no known level of lead exposure that is considered safe according to the factsheet on Lead Poisoning and Health from WHO.[1]

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.[10] 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.[11] 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)

Latin America and the Caribbean: $142.3 billion of economic loss, or 2.04% of GDP

1 http://www.who.int/mediacentre/factsheets/fs379/en/

Asia: $699.9 billion of economic loss, or 1.88% of GDP

China: $227 billion of economic loss, or 2% 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 rarely contain intentionally added lead due to their chemical properties, but solvent-based enamel paints have been found to have high lead content in many countries.[12-14]

One of 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.

Lead-free alternate 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. and Canada is 90 ppm total lead, and adherence to this ensures that a manufacturer can sell its paint anywhere in the world. Some other countries have established standards of 600 ppm total lead.

1.3 PAINT MARKET AND REGULATORY FRAMEWORK IN CHINA

Regulation limiting the amount of lead in paint for interior and decorative use was introduced in China in 2001, complementing the Toy Safety standard introduced in 1986 for lead in paint on children's toys. Both regulations limits the lead content of paint to 90 ppm of soluble lead, i.e. the amount of lead that can be extracted by a standard acid treatment to simulate the amount of lead bioavailable for absorption when e.g. a toy painted with lead paint is put in the mouth.

China is the only country today regulating lead content of decorative paint through a maximum soluble lead content limit. The use of a total lead limit or prohibition of addition of leaded compounds is preferred for a number of reasons, including solid scientific evidence of the risk reduction provided by a total lead limit; lower analytical costs; and an easier way for manufacturers to predict final lead content of a paint based on the lead content of the paint ingredients. In addition, soluble lead content does not reflect the route of exposure, and various factors affect the leachability and bioavailability of lead from sources such as paint, dust and soil, making the analytical results very variable. [15] For example, leachability of lead from dried paint films was shown to vary from 4% to 100%.[16]

However, few studies have compared the correlation between total and soluble lead in dried paint films and its implications for legislative measures. The lack of consistent correlation between soluble and total lead content also impose a trade barrier to export paint from China to countries with regulations based on total lead limits, since the total lead content of the paints need additional verification.

China is the world's second largest producer and consumer of coatings and there may be as many as 8,000 paint producers inside China, according to the coatings industry magazine Coatings World. In addition, the Chinese paint market saw a rapid increase in sales and demand during the past decade peaking at around 16% annual growth in production volume

in 2009. The demand for paint for newly constructed buildings have recently started to decrease with the slowing of the real estate market, but demand for paint to repaint existing buildings and homes are on the other hand increasing.[2]

In January 2015, China through the Ministry of Finance and the State Administration of Taxation announced the imposition of a four percent consumption tax on the production, processing and import of batteries and coatings beginning February 1, 2015. The new tax policy will exclude coatings that contain volatile organic compounds below 420 grams per liter. The new consumption tax policy is said to provide indirect support for companies engaged in environment-friendly coatings, and will put pressure on others to follow suit to meet increasing market demand for such coatings.[3]

2 http://www.coatingsworld.com/issues/2011-01/view_china-report/the-chinese-coatings-market-/

3 http://www.coatingsworld.com/issues/2015-04-01/view_china-report/china-architectural-coatings-market-enters-a-new-era/

2. MATERIALS AND METHODS

From September to November 2014, 141 cans of decorative, enamel, solvent-based paint were purchased by Non-Governmental Organization-Insight Explorer (IE) from various stores in 8 cities in China (Shenyang, Beijing, Nanchang, Zhengzhou, Guangzhou, Kunming, Xiamen and Shanghai). The paints represented 47 different brands produced by 36 named manufacturers and three manufacturers whose name were unclear.

In most cases, one white paint and one or more bright-colored 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.

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

Paint sampling preparation kits containing individually numbered, untreated wood pieces, single-use paintbrushes and stirring utensils made from untreated wood sticks were assembled and shipped to IE 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 the staff of IE.

Each stirring utensil and paintbrush was used only once, 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, one of the painted wood pieces from each paint were placed in individual resealable plastic bags and shipped to the lab of Certottica Scarl in Italy. The other two painted wood pieces from each paint were sent for storage in IPEN's office in Sweden. The laboratory participated in the Environmental Lead Proficiency Analytical Testing (ELPAT) Program operated by the American Industrial Hygiene Association. In addition, earlier quality assurance using paint samples with known lead content have shown that the lab gives reliable analytical results.

The paint samples were analyzed using method CPSC-CH-E1003-09 (Inductively Coupled Plasma (ICP) spectroscopy), as recognized both

by WHO and the United States Consumer Product Safety Commission (CPSC) as appropriate for the purpose.[17, 18]

3. RESULTS

From September to November 2014, a total of 141 cans of solvent-based, enamel decorative paints were purchased in eight cities in China and analyzed for their total lead content. Results are given in parts per million (ppm) total lead, based on dry weight of the paint. Please see Appendix A for detailed results of the analysis.

Of the 141 paints, 70 of the paints (50% of paints) contained a total lead content above 600 ppm. Approximately, a 600 ppm total lead content in a paint product often corresponds to 90 ppm soluble lead, the lead limit for lead in paint in China. This suggests that about half of the paints analyzed exceed the Chinese regulatory limit. Forty-eight of the paints (34%) contained dangerously high total lead levels above 10,000 ppm and would not be allowed for sale in any country restricting the use of lead in decorative paint. The highest lead level detected was 116,000 ppm total lead. Detailed results for all 141 paints are presented in Tables 1 and 3 in Appendix A.

3.1 BRANDS

The distribution of the total lead concentration by brand is presented in Table 3 (Appendix A). One or more paint from 42 of the 47 brands (89% of brands) had a total lead content below 600 ppm (approximately 90 ppm soluble lead), showing that the technology exists in China to produce paint within the regulatory limit. On the other hand, one or more paint from 39 of the brands (83% of brands) contained lead at dangerously high levels above 10,000 ppm total lead.

3.2 COLORS

More than 90% of the paints sampled were white, yellow and red. Results for all colors are included in Table 4 (Appendix A).

Only five (11%) of the 45 white paints contained total lead levels above 600 ppm (approximately 90 ppm soluble lead), and the highest level detected in a white paint was 1,440 ppm. The average lead concentration of the 45 white paints was 193 ppm total lead.

However, yellow paints contained much higher lead levels. Of the 42 yellow paints, 38 (90%) contained total lead concentrations above 10,000 ppm. The average lead concentration in yellow paints was 43,800 ppm total lead. Forty of the yellow paints (95%) contained total lead concentrations above 600 ppm (approximately 90 ppm soluble lead).

The average lead concentration in the 41 red paints was 4,100 ppm total lead. Fifteen (37%) of the red paints contained a total lead concentration above 600 ppm (approximately 90 ppm soluble lead) and 4 (10%) contained greater than 10,000 ppm total lead.

3.3 SOLUBLE VERSUS TOTAL LEAD CONTENT

In a study from Lin et al, soluble lead content and total lead content was determined from dried paint films, and a correlation was shown between 600 ppm total lead content and 90 ppm soluble lead content. Of the 29 paint samples with a total lead content of 600 ppm or higher in that study, only 3% yielded a soluble lead content below 90 ppm. In the same way, of the 29 samples in that study with a total lead content below 600 ppm, 23 (80%) yielded a soluble lead content of below 90 ppm.[19] This suggests that it is unlikely that a paint with total lead content above 600 ppm would yield a soluble lead content below 90 ppm and be allowed for sale in China. Of the 141 paint analyzed in the current study, 70 paints (50%) contained a total lead content of 600 ppm or more.

3.4 COMPARISON WITH EARLIER STUDIES

Two previous studies were conducted in 2009 with a total of 122 paints analyzed. This was prior to the current study but after the regulation in China restricting the use of lead in decorative paint was enacted. Most of these samples were from brands not included in the current study. Although the earlier studies included fewer brands, the percentage of samples with total lead concentrations greater than 600 ppm and 10,000 ppm are similar among the three studies.

4. CONCLUSIONS AND RECOMMENDATIONS

Despite a regulation controlling the lead content of decorative paint, this study shows that paint with very high levels of lead are still easily available on the market in China. However, it also shows that it is feasible to produce both white and brightly colored paint with no added lead in China, since paints from several of the brands contained only low levels of lead. Due to lack of appropriate labeling, consumers have no way of distinguishing between paints with high and low lead content. The lead concentration found in studies prior to the current one are similar to the recent data indicating that lead concentrations have exceeded the regulatory limit for a number of years.

It is clear that compliance to the current regulation needs improved enforcement. In addition, the use of soluble lead content limits cause uncertainty about the risk reduction of the current regulation, as well as imposes additional trade barriers for paint export.

RECOMMENDATIONS

For the government and relevant agencies:

- Review the procedures for ensuring compliance and enforcement of current national regulatory controls on lead in paint through a multi-stakeholders process involving representatives of relevant government agencies, the paint industry, civil society and other relevant sectors.
- Establish effective procedures for monitoring and enforcing full compliance with existing regulatory controls on the lead content of paints manufactured and/or sold in China.
- Consider possible revisions to existing regulatory controls on the lead content of paints to be based on the paint's total lead content instead of its soluble lead content and to include a dust lead hazard warning on the labels.

For the paint industry:

- Discontinue using lead-based pigments and lead-based drying catalysts as paint ingredients.
- Participate in a third-party certification program that verifies that your paints do not contain added lead compounds.

- Provide information on product label indicating the lead content of the paint.
- Provide label warnings of possible lead dust hazards when old painted surfaces are disturbed.

For individual, household and institutional consumers:

- Ask for unleaded paints and only patronize businesses that sell unleaded paints.
- Be aware of lead paint and dust hazards, and precautions to take to minimize exposure.

For public health organizations:

- Support efforts to end the manufacture, sale and use of leaded paints.
- Support policy measures that will eliminate childhood lead exposure from all sources.
- Inform the public about childhood health and occupational health risks linked with lead paints and lead in dust.
- Promote efforts to make blood lead testing available.
- Encourage specifications of "lead safe paints" on purchase orders of paint consumers such as schools, day-care centers and housing property owners or managers.

For all stakeholders:

- Support efforts to end the manufacture, sale and use of leaded paints.
- Support policy measures that will eliminate childhood lead exposure from all sources.
- Join in effort to inform the public about childhood health and occupational health risks linked with lead paints and lead in dust.
- Support "lead safe paint" procurement policies.
- Support a third-party certification and labeling program that will ensure all paints sold in the market meet the regulatory standards and help customers in having an informed choice when buying paints.

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APPENDIX A

TABLE 1. SOLVENT-BASED ENAMEL DECORATIVE PAINTS INCLUDED IN THE STUDY

Sample No.	Brand	Manufacturer	Color	Date of Purchase (m/d/y)	Is there website on label?
CHN-100	JINGSHI-LIANXING	Beijing Xihongmen Honglian Coatings Factory	white	10/31/14	No
CHN-101	JINGSHI-LIANXING	Beijing Xihongmen Honglian Coatings Factory	yellow	10/31/14	No
CHN-102	JINGSHI-LIANXING	Beijing Xihongmen Honglian Coatings Factory	red	10/31/14	No
CHN-103	SHIJILIANSHI	Beijing Hongshi Paint Co., Ltd.	white	10/31/14	No
CHN-104	Forbidden City	Beijing Forbidden City Paint Co., Ltd.	yellow	10/31/14	No
CHN-105	Forbidden City	Beijing Forbidden City Paint Co., Ltd.	white	10/31/14	No
CHN-106	HONGSHI	Beijing Hongshi Paint Co., Ltd.	white	10/31/14	No
CHN-107	HONGSHI	Beijing Hongshi Paint Co., Ltd.	red	10/31/14	No
CHN-108	HONGSHI	Beijing Hongshi Paint Co., Ltd.	yellow	10/31/14	No
CHN-109	ZHENDI	Beijing Zhuangdazhendi Trade Co., Ltd.	red	10/31/14	Yes
CHN-110	ZHENDI	Beijing Zhuangdazhendi Trade Co., Ltd.	yellow	10/31/14	No
CHN-111	ZHENDI	Beijing Zhuangdazhendi Trade Co., Ltd.	white	10/31/14	No
CHN-112	QCH	Beijing Shenglongbofa	yellow	10/31/14	No
CHN-113	QCH	Beijing Shenglongbofa	red	10/31/14	No
CHN-114	QCH	Beijing Shenglongbofa	white	10/31/14	No
CHN-115	Monarch	Da Tsing Ma Group HK	yellow	10/31/14	No

Sample No.	Brand	Manufacturer	Color	Date of Purchase (m/d/y)	Is there website on label?
CHN-116	Monarch	Da Tsing Ma Group HK	red	10/31/14	No
CHN-117	Monarch	Da Tsing Ma Group HK	white	10/31/14	No
CHN-118	Beacon	Tianjin Beacon Paint & Coatings Co., Ltd.	red	10/03/14	No
CHN-119	Beacon	Tianjin Beacon Paint & Coatings Co., Ltd.	white	10/03/14	No
CHN-120	Beacon	Tianjin Beacon Paint & Coatings Co., Ltd.	yellow	10/03/14	No
CHN-121	Jinliang	(Unknown)	yellow	10/03/14	No
CHN-122	Jinliang	(Unknown)	white	10/22/14	No
CHN-123	Jinliang	(Unknown)	red	10/03/14	No
CHN-124	DIAOWANG	Tianjin Hongguangweiye Coatings Co., Ltd.	white	10/03/14	No
CHN-125	DIAOWANG	Tianjin Hongguangweiye Coatings Co., Ltd.	yellow	10/03/14	No
CHN-126	DIAOWANG	Tianjin Hongguangweiye Coatings Co., Ltd.	red	10/03/14	No
CHN-127	Yanta	Baoding Jinxiang Paint Co., Ltd.	yellow	10/03/14	No
CHN-128	Yanta	Baoding Jinxiang Paint Co., Ltd.	white	10/03/14	No
CHN-129	Yanta	Baoding Jinxiang Paint Co., Ltd.	red	10/03/14	No
CHN-131	Jinbao	Shenyang Nanyang Chemical Factory	white	10/03/14	No
CHN-132	Jinbao	Shenyang Nanyang Chemical Factory	yellow	10/03/14	No
CHN-133	Jinbao	Shenyang Nanyang Chemical Factory	red	10/03/14	No
CHN-134	JFM	Shenyang Jinfeima Paint Co., Ltd.	white	10/22/14	No
CHN-135	JFM	Shenyang Jinfeima Paint Co., Ltd.	red	10/03/14	No
CHN-136	JFM	Shenyang Jinfeima Paint Co., Ltd.	yellow	10/03/14	No

Sample No.	Brand	Manufacturer	Color	Date of Purchase (m/d/y)	Is there website on label?
CHN-137	Zhen Bao	Foshan Nanhai East New Chemical Co., Ltd.	yellow	10/23/14	No
CHN-138	Zhen Bao	Foshan Nanhai East New Chemical Co., Ltd.	white	10/23/14	No
CHN-139	Zhen Bao	Foshan Nanhai East New Chemical Co., Ltd.	red	10/23/14	No
CHN-140	XYANG	(Invisible)	yellow	10/23/14	No
CHN-141	XYANG	(Invisible)	red	10/23/14	No
CHN-142	XYANG	(Invisible)	white	10/23/14	No
CHN-143	SHUANG TA	Zhengzhou Shangta Coating Co., Ltd.	white	10/23/14	No
CHN-144	Huaxiang	Changsha Huaxiang Paint Co., Ltd.	red	10/23/14	No
CHN-145	Huaxiang	Changsha Huaxiang Paint Co., Ltd.	white	10/23/14	No
CHN-146	Shanbao	(Unknown)	yellow	10/23/14	No
CHN-147	Shanbao	(Unknown)	red	10/23/14	No
CHN-148	Shanbao	(Unknown)	white	10/23/14	No
CHN-149	HaiXing	Huai'an Paint Factory Co., Ltd.	yellow	10/21/14	No
CHN-150	HaiXing	Huai'an Paint Factory Co., Ltd.	white	10/21/14	No
CHN-151	HaiXing	Huai'an Paint Factory Co., Ltd.	red	10/21/14	No
CHN-152	Wuyu	Suzhou Jiren Coatings Co., Ltd.	yellow	10/21/14	No
CHN-153	Tongrun	Changsha Yili Coating Technology Co., Ltd.	red	10/21/14	No
CHN-154	Tongrun	Changsha Yili Coating Technology Co., Ltd.	white	10/21/14	No
CHN-155	Bamboo	Guangzhou Pearl Chemical Industry Group, Ltd.	red	10/21/14	No
CHN-156	Bamboo	Guangzhou Pearl Chemical Industry Group, Ltd.	white	10/21/14	No

Sample No.	Brand	Manufacturer	Color	Date of Purchase (m/d/y)	Is there website on label?
CHN-157	Bamboo	Guangzhou Pearl Chemical Industry Group, Ltd.	yellow	10/21/14	No
CHN-158	JI REN	Suzhou Jiren Coatings Co., Ltd.	red	10/21/14	No
CHN-159	JI REN	Suzhou Jiren Coatings Co., Ltd.	white	10/21/14	No
CHN-160	JI REN	Suzhou Jiren Coatings Co., Ltd.	yellow	10/21/14	No
CHN-161	XIANGHONG	Changsha Huatai Coatings Co., Ltd.	white	10/21/14	No
CHN-162	XIANGHONG	Changsha Huatai Coatings Co., Ltd.	yellow	10/21/14	No
CHN-163	XIANGHONG	Changsha Huatai Coatings Co., Ltd.	red	10/21/14	No
CHN-164	JIATE	Changsha Yili Coating Technology Co., Ltd.	white	10/21/14	No
CHN-165	JINXING	Foshan Gaoming Huatushi Coatings Co., Ltd.	white	10/21/14	No
CHN-166	JINXING	Foshan Gaoming Huatushi Coatings Co., Ltd.	yellow	10/21/14	No
CHN-167	JINXING	Foshan Gaoming Huatushi Coatings Co., Ltd.	red	10/21/14	No
CHN-168	Duodeli	Foshan Nanhai East New Chemical Co., Ltd.	red	10/21/14	No
CHN-169	Duodeli	Foshan Nanhai East New Chemical Co., Ltd.	yellow	10/21/14	No
CHN-170	Duodeli	Foshan Nanhai East New Chemical Co., Ltd.	white	10/21/14	No
CHN-171	HTS	Foshan Gaoming Huatushi Coatings Co., Ltd.	red	10/21/14	No
CHN-172	HTS	Foshan Gaoming Huatushi Coatings Co., Ltd.	yellow	10/21/14	No
CHN-173	HTS	Foshan Gaoming Huatushi Coatings Co., Ltd.	white	10/21/14	No
CHN-174	Wuyang	Guangzhou Wuyang Paints Co., Ltd.	yellow	10/21/14	No

Sample No.	Brand	Manufacturer	Color	Date of Purchase (m/d/y)	Is there website on label?
CHN-175	Wuyang	Guangzhou Wuyang Paints Co., Ltd.	white	10/21/14	No
CHN-176	Wuyang	Guangzhou Wuyang Paints Co., Ltd.	red	10/21/14	No
CHN-177	ERXING	Foshan Xiqiao Xinsheng Chemical Co., Ltd.	yellow	10/21/14	No
CHN-178	ERXING	Foshan Xiqiao Xinsheng Chemical Co., Ltd.	red	10/21/14	No
CHN-179	ERXING	Foshan Xiqiao Xinsheng Chemical Co., Ltd.	white	10/21/14	No
CHN-180	Sanyuan	Guangzhou Hong Mian Chang Jiang Coatings Co., Ltd.	red	10/21/14	No
CHN-181	Sanyuan	Guangzhou Hong Mian Chang Jiang Coatings Co., Ltd.	yellow	10/21/14	No
CHN-182	Sanyuan	Guangzhou Hong Mian Chang Jiang Coatings Co., Ltd.	white	10/21/14	No
CHN-183	QSP	Dongxing Chemical Industry Co., Ltd.	yellow	10/21/14	No
CHN-184	QSP	Dongxing Chemical Industry Co., Ltd.	white	10/21/14	No
CHN-185	QSP	Dongxing Chemical Industry Co., Ltd.	red	10/21/14	No
CHN-186	GANG WEI SHI	Foshan Xiqiao Dasheng Chemical Co., Ltd.	red	10/21/14	No
CHN-187	GANG WEI SHI	Foshan Xiqiao Dasheng Chemical Co., Ltd.	yellow	10/21/14	No
CHN-188	GANG WEI SHI	Foshan Xiqiao Dasheng Chemical Co., Ltd.	white	10/21/14	No
CHN-189	JIALILAI	JIALILAI Chemicals Factory	white	10/21/14	No
CHN-190	JIALILAI	JIALILAI Chemicals Factory	yellow	10/21/14	No
CHN-191	JIALILAI	JIALILAI Chemicals Factory	red	10/21/14	No
CHN-192	YECAI	Foshan Nanhai Xinghe Chemical Industry Co., Ltd.	yellow	10/21/14	No

Sample No.	Brand	Manufacturer	Color	Date of Purchase (m/d/y)	Is there website on label?
CHN-193	YECAI	Foshan Nanhai Xinghe Chemical Industry Co., Ltd.	white	10/21/14	No
CHN-194	YECAI	Foshan Nanhai Xinghe Chemical Industry Co., Ltd.	red	10/21/14	No
CHN-195	JINXIANGSHAN	Foshan Nanhai Xinghe Chemical Industry Co., Ltd.	yellow	10/21/14	No
CHN-196	JINXIANGSHAN	Foshan Nanhai Xinghe Chemical Industry Co., Ltd.	red	10/21/14	No
CHN-197	JINXIANGSHAN	Foshan Nanhai Xinghe Chemical Industry Co., Ltd.	white	10/21/14	No
CHN-198	Apple Paint	Foshan Nanhai Huaren Chemical Industry Co., Ltd.	red	10/21/14	No
CHN-199	Apple Paint	Foshan Nanhai Huaren Chemical Industry Co., Ltd.	yellow	10/21/14	No
CHN-200	LONGJIANG	Fujian Tenglong Industry Company	white	10/30/14	No
CHN-201	LONGJIANG	Fujian Tenglong Industry Company	red	10/30/14	No
CHN-202	LONGJIANG	Fujian Tenglong Industry Company	yellow	10/30/14	No
CHN-203	QUANXIN	Hunan Xintian Chemical Coatings Co., Ltd.	red	10/30/14	No
CHN-204	QUANXIN	Hunan Xintian Chemical Coatings Co., Ltd.	white	10/30/14	No
CHN-205	QUANXIN	Hunan Xintian Chemical Coatings Co., Ltd.	yellow	10/30/14	No
CHN-206	Shiny	Shantou Dazhong Shiny Paints Co., Ltd.	red	10/22/14	No
CHN-207	Shiny	Shantou Dazhong Shiny Paints Co., Ltd.	yellow	10/22/14	No
CHN-208	Shiny	Shantou Dazhong Shiny Paints Co., Ltd.	white	10/22/14	No
CHN-209	Guxiang	Hunan Xintian Chemical Coatings Co., Ltd.	white	10/22/14	No
CHN-210	Guxiang	Hunan Xintian Chemical Coatings Co., Ltd.	yellow	10/22/14	No

Sample No.	Brand	Manufacturer	Color	Date of Purchase (m/d/y)	Is there website on label?
CHN-211	Katefu	Foshan Nanhai East New Chemical Co., Ltd.	green	09/22/14	No
CHN-212	Katefu	Foshan Nanhai East New Chemical Co., Ltd.	black	09/22/14	No
CHN-213	Katefu	Foshan Nanhai East New Chemical Co., Ltd.	white	09/22/14	No
CHN-214	Katefu	Foshan Nanhai East New Chemical Co., Ltd.	red	09/22/14	No
CHN-215	Katefu	Foshan Nanhai East New Chemical Co., Ltd.	yellow	09/22/14	No
CHN-216	Katefu	Foshan Nanhai East New Chemical Co., Ltd.	blue	09/22/14	No
CHN-217	Bullhead Shark	Foshan Nanhai Huasheng Chemical Co., Ltd.	blue	09/22/14	No
CHN-218	Bullhead Shark	Foshan Nanhai Huasheng Chemical Co., Ltd.	yellow	09/22/14	No
CHN-219	Bullhead Shark	Foshan Nanhai Huasheng Chemical Co., Ltd.	white	09/22/14	No
CHN-220	Bullhead Shark	Foshan Nanhai Huasheng Chemical Co., Ltd.	green	09/22/14	No
CHN-221	Bullhead Shark	Foshan Nanhai Huasheng Chemical Co., Ltd.	black	09/22/14	No
CHN-222	Bullhead Shark	Foshan Nanhai Huasheng Chemical Co., Ltd.	red	09/22/14	No
CHN-223	Huaren	Huaren Chemical Co., Ltd.	green	09/22/14	No
CHN-224	Huaren	Huaren Chemical Co., Ltd.	white	09/22/14	No
CHN-225	Huaren	Huaren Chemical Co., Ltd.	blue	09/22/14	No
CHN-226	Huaren	Huaren Chemical Co., Ltd.	yellow	09/22/14	No
CHN-227	Huaren	Huaren Chemical Co., Ltd.	red	09/22/14	No
CHN-228	Huaren	Huaren Chemical Co., Ltd.	black	09/22/14	No
CHN-229	Pan Zhi Hua	Panzhihua Rongxin Paint Co., Ltd. China	yellow	09/22/14	No
CHN-230	Pan Zhi Hua	Panzhihua Rongxin Paint Co., Ltd. China	white	09/22/14	No

Sample No.	Brand	Manufacturer	Color	Date of Purchase (m/d/y)	Is there website on label?
CHN-231	Pan Zhi Hua	Panzhihua Rongxin Paint Co., Ltd. China	black	09/22/14	No
CHN-232	Pan Zhi Hua	Panzhihua Rongxin Paint Co., Ltd. China	blue	09/22/14	No
CHN-233	Pan Zhi Hua	Panzhihua Rongxin Paint Co., Ltd. China	red	09/22/14	No
CHN-234	Caiyanpai	Foshan Nanhai Xiqiao Qiaopai Chemical Co., Ltd.	white	09/22/14	No
CHN-235	Caiyanpai	Foshan Nanhai Xiqiao Qiaopai Chemical Co., Ltd.	red	09/22/14	No
CHN-236	Caiyanpai	Foshan Nanhai Xiqiao Qiaopai Chemical Co., Ltd.	yellow	09/22/14	No
CHN-237	Caiyanpai	Foshan Nanhai Xiqiao Qiaopai Chemical Co., Ltd.	green	09/22/14	No
CHN-238	Zhonghua	Kunming Zhonghua Coatings Co., Ltd.	white	09/22/14	No
CHN-239	Zhonghua	Kunming Zhonghua Coatings Co., Ltd.	yellow	09/22/14	No
CHN-240	Zhonghua	Kunming Zhonghua Coatings Co., Ltd.	green	09/22/14	No
CHN-241	Zhonghua	Kunming Zhonghua Coatings Co., Ltd.	red	09/22/14	No

TABLE 2. RESULTS OF LABORATORY ANALYSIS OF SOLVENT-BASED ENAMEL DECORATIVE PAINTS

Sample No.	Brand	Color	Total Lead Concentration, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
CHN-100	JINGSHILIAN-XING	white	4	China	China	No
CHN-101	JINGSHILIAN-XING	yellow	69,000	China	China	No
CHN-102	JINGSHILIAN-XING	red	100	China	China	No
CHN-103	SHIJILIANSHI	white	6	China	China	No
CHN-104	Forbidden City	yellow	116,000	China	China	No
CHN-105	Forbidden City	white	36	China	China	No
CHN-106	HONGSHI	white	7	China	China	No
CHN-107	HONGSHI	red	39	China	China	No
CHN-108	HONGSHI	yellow	113,000	China	China	No
CHN-109	ZHENDI	red	900	China	China	No
CHN-110	ZHENDI	yellow	78,000	China	China	No
CHN-111	ZHENDI	white	98	China	China	Yes
CHN-112	QCH	yellow	45,000	China	China	No
CHN-113	QCH	red	360	China	China	No
CHN-114	QCH	white	280	China	China	no
CHN-115	Monarch	yellow	113,000	China	China	no
CHN-116	Monarch	red	92,000	China	China	no
CHN-117	Monarch	white	240	China	China	no
CHN-118	Beacon	red	122	China	China	no
CHN-119	Beacon	white	81	China	China	no
CHN-120	Beacon	yellow	66,000	China	China	no
CHN-121	Jinliang	yellow	10,700	China	China	no
CHN-122	Jinliang	white	39	China	China	no

Sample No.	Brand	Color	Total Lead Concentration, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
CHN-123	Jinliang	red	87	China	China	no
CHN-124	DIAOWANG	white	310	China	China	no
CHN-125	DIAOWANG	yellow	12,200	China	China	no
CHN-126	DIAOWANG	red	370	China	China	no
CHN-127	Yanta	yellow	28,000	China	China	no
CHN-128	Yanta	white	98	China	China	no
CHN-129	Yanta	red	680	China	China	no
CHN-131	Jinbao	white	62	China	China	no
CHN-132	Jinbao	yellow	29,000	China	China	no
CHN-133	Jinbao	red	198	China	China	no
CHN-134	JFM	white	< 4	China	China	no
CHN-135	JFM	red	52	China	China	no
CHN-136	JFM	yellow	78,000	China	China	no
CHN-137	Zhen Bao	yellow	43,000	China	China	no
CHN-138	Zhen Bao	white	280	China	China	no
CHN-139	Zhen Bao	red	147	China	China	no
CHN-140	XYANG	yellow	41,000	China	China	no
CHN-141	XYANG	red	192	China	China	no
CHN-142	XYANG	white	250	China	China	no
CHN-143	SHUANG TA	white	76	China	China	no
CHN-144	Huaxiang	red	3,000	China	China	no
CHN-145	Huaxiang	white	91	China	China	no
CHN-146	Shanbao	yellow	31,000	China	China	no
CHN-147	Shanbao	red	3,400	China	China	no
CHN-148	Shanbao	white	< 4	China	China	no
CHN-149	HaiXing	yellow	50,000	China	China	no
CHN-150	HaiXing	white	350	China	China	no

Sample No.	Brand	Color	Total Lead Concentration, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
CHN-151	HaiXing	red	11,700	China	China	no
CHN-152	Wuyu	yellow	15,100	China	China	no
CHN-153	Tongrun	red	630	China	China	no
CHN-154	Tongrun	white	< 4	China	China	no
CHN-155	Bamboo	red	28	China	China	no
CHN-156	Bamboo	white	51	China	China	no
CHN-157	Bamboo	yellow	11	China	China	no
CHN-158	JI REN	red	1,580	China	China	no
CHN-159	JI REN	white	640	China	China	no
CHN-160	JI REN	yellow	50,000	China	China	no
CHN-161	XIANGHONG	white	< 3	China	China	no
CHN-162	XIANGHONG	yellow	38,000	China	China	no
CHN-163	XIANGHONG	red	660	China	China	no
CHN-164	JIATE	white	24	China	China	no
CHN-165	JINXING	white	5	China	China	no
CHN-166	JINXING	yellow	11,500	China	China	no
CHN-167	JINXING	red	70	China	China	no
CHN-168	Duodeli	red	48	China	China	no
CHN-169	Duodeli	yellow	13,500	China	China	no
CHN-170	Duodeli	white	35	China	China	no
CHN-171	HTS	red	15	China	China	no
CHN-172	HTS	yellow	10,600	China	China	no
CHN-173	HTS	white	11	China	China	no
CHN-174	Wuyang	yellow	64,000	China	China	no
CHN-175	Wuyang	white	1,030	China	China	no
CHN-176	Wuyang	red	108	China	China	no
CHN-177	ERXING	yellow	11,400	China	China	no

Sample No.	Brand	Color	Total Lead Concentration, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
CHN-178	ERXING	red	270	China	China	no
CHN-179	ERXING	white	13	China	China	no
CHN-180	Sanyuan	red	100	China	China	no
CHN-181	Sanyuan	yellow	53,000	China	China	no
CHN-182	Sanyuan	white	330	China	China	no
CHN-183	QSP	yellow	50,000	China	China	no
CHN-184	QSP	white	31	China	China	no
CHN-185	QSP	red	38	China	China	no
CHN-186	GANG WEI SHI	red	510	China	China	no
CHN-187	GANG WEI SHI	yellow	24,000	China	China	no
CHN-188	GANG WEI SHI	white	32	China	China	no
CHN-189	JIALILAI	white	62	China	China	no
CHN-190	JIALILAI	yellow	12,800	China	China	no
CHN-191	JIALILAI	red	178	China	China	no
CHN-192	YECAI	yellow	17,400	China	China	no
CHN-193	YECAI	white	28	China	China	no
CHN-194	YECAI	red	36	China	China	no
CHN-195	JINXIANG-SHAN	yellow	17,700	China	China	no
CHN-196	JINXIANG-SHAN	red	145	China	China	no
CHN-197	JINXIANG-SHAN	white	< 3	China	China	no
CHN-198	Apple Paint	red	2,100	China	China	no
CHN-199	Apple Paint	yellow	37,000	China	China	no
CHN-200	LONGJIANG	white	220	China	China	no
CHN-201	LONGJIANG	red	31,000	China	China	no
CHN-202	LONGJIANG	yellow	104,000	China	China	no
CHN-203	QUANXIN	red	310	China	China	no

Sample No.	Brand	Color	Total Lead Concentration, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
CHN-204	QUANXIN	white	1,440	China	China	no
CHN-205	QUANXIN	yellow	42,000	China	China	no
CHN-206	Shiny	red	189	China	China	no
CHN-207	Shiny	yellow	60	China	China	no
CHN-208	Shiny	white	19	China	China	no
CHN-209	Guxiang	white	25	China	China	no
CHN-210	Guxiang	yellow	910	China	China	no
CHN-211	Katefu	green	102,000	China	China	no
CHN-212	Katefu	black	77	China	China	no
CHN-213	Katefu	white	19	China	China	no
CHN-214	Katefu	red	200	China	China	no
CHN-215	Katefu	yellow	29,000	China	China	no
CHN-216	Katefu	blue	1,000	China	China	no
CHN-217	Bullhead Shark	blue	16,700	China	China	no
CHN-218	Bullhead Shark	yellow	42,000	China	China	no
CHN-219	Bullhead Shark	white	1,300	China	China	no
CHN-220	Bullhead Shark	green	42,000	China	China	no
CHN-221	Bullhead Shark	black	9,100	China	China	no
CHN-222	Bullhead Shark	red	3,000	China	China	no
CHN-223	Huaren	green	24,000	China	China	no
CHN-224	Huaren	white	27	China	China	no
CHN-225	Huaren	blue	37	China	China	no
CHN-226	Huaren	yellow	97,000	China	China	no
CHN-227	Huaren	red	96	China	China	no
CHN-228	Huaren	black	27	China	China	no
CHN-229	Pan Zhi Hua	yellow	76,000	China	China	no
CHN-230	Pan Zhi Hua	white	860	China	China	no

Sample No.	Brand	Color	Total Lead Concentration, Dry Weight (ppm)	Country of Brand Headquarters	Country of Manufacture	Is there information on can about lead content of paint?
CHN-231	Pan Zhi Hua	black	960	China	China	no
CHN-232	Pan Zhi Hua	blue	1,070	China	China	no
CHN-233	Pan Zhi Hua	red	1,100	China	China	no
CHN-234	Caiyanpai	white	38	China	China	no
CHN-235	Caiyanpai	red	10,800	China	China	no
CHN-236	Caiyanpai	yellow	6,100	China	China	no
CHN-237	Caiyanpai	green	18,600	China	China	no
CHN-238	Zhonghua	white	122	China	China	no
CHN-239	Zhonghua	yellow	94,000	China	China	no
CHN-240	Zhonghua	green	84,000	China	China	no
CHN-241	Zhonghua	red	990	China	China	no

TABLE 3. DISTRIBUTION OF TOTAL LEAD CONCENTRATION BY BRAND

Brand	No. of Samples	No. of Samples Above 600 ppm	No. of Samples Above 10,000 ppm	Minimum Lead Concentration (ppm)	Maximum Lead Concentration (ppm)
JINGSHILIANXING	3	1	1	4	69,000
SHIJILIANSHI	1 (white)	0	0	6	6
Forbidden City	2 (yellow, white)	1	1	36	116,000
HONGSHI	3	1	1	7	113,000
ZHENDI	3	2	1	98	78,000
QCH	3	1	1	280	45,000

Brand	No. of Samples	No. of Samples Above 600 ppm	No. of Samples Above 10,000 ppm	Minimum Lead Concentration (ppm)	Maximum Lead Concentration (ppm)
Monarch	3	2	1	240	113,000
Beacon	3	1	1	81	66,000
Jinliang	3	1	1	39	10,700
DIAOWANG	3	1	1	310	12,200
Yanta	3	2	1	98	28,000
Jinbao	3	1	1	62	29,000
JFM	3	1	1	< 4	78,000
Zhen Bao	3	1	1	147	43,000
XYANG	3	1	1	192	41,000
SHUANG TA	1 (white)	0	0	76	76
Huaxiang	2 (red, white)	1	0	91	3,000
Shanbao	3	2	1	< 4	31,000
HaiXing	3	2	2	350	50,000
Wuyu	1 (yellow)	1	1	15,100	15,100
Tongrun	2 (red, white)	1	0	< 4	630
Bamboo	3	0	0	11	51
JI REN	3	3	1	640	50,000
XIANGHONG	3	2	1	< 3	38,000
JIATE	1 (white)	0	0	24	24
JINXING	3	1	1	5	11,500
Duodeli	3	1	1	35	13,500
HTS	3	1	1	11	10,600
Wuyang	3	2	1	108	64,000
ERXING	3	1	1	13	11,400
Sanyuan	3	1	1	100	53,000
QSP	3	1	1	31	50,000
GANG WEI SHI	3	1	1	32	24,000

Brand	No. of Samples	No. of Samples Above 600 ppm	No. of Samples Above 10,000 ppm	Minimum Lead Concentration (ppm)	Maximum Lead Concentration (ppm)
JIALILAI	3	1	1	62	12,800
YECAI	3	1	1	28	17,400
JINXIANGSHAN	3	1	1	< 3	17,700
Apple Paint	2 (red, yellow)	2	1	2,100	37,000
LONGJIANG	3	2	2	220	104,000
QUANXIN	3	2	1	310	42,000
Shiny	3	0	0	19	189
Guxiang	2 (yellow, white)	1	0	25	910
Katefu	6	3	2	19	102,000
Bullhead Shark	6	6	3	1,300	42,000
Huaren	6	2	2	27	97,000
Pan Zhi Hua	5	5	1	860	76,000
Caiyanpai	4	3	2	38	18,600
Zhonghua	4	3	2	122	94,000

TABLE 4. DISTRIBUTION OF TOTAL LEAD CONCENTRATION BY COLOR

Color	No. of Samples	No. of Samples Above 600 ppm	No. of Samples Above 10,000 ppm	Minimum Lead Concentration (ppm)	Maximum Lead Concentration (ppm)
Blue	4	2	1	37	16,700
Black	4	2	0	27	9,100
Green	5	5	5	18,600	102,000
Red	41	15	4	15	92,000
Yellow	42	40	38	11	116,000
White	45	5	0	<3	1,440

TABLE 5. COMPARISON OF TOTAL LEAD CONCENTRATION IN CURRENT STUDY WITH THOSE OF PREVIOUS STUDIES CONDUCTED AFTER LEAD IN PAINT REGULATION WAS ENACTED IN CHINA

Study	No. of Samples	No. (%) of Samples Above 600 ppm	No. (%) of Samples Above 10,000 ppm	Minimum Lead Concentration (ppm)	Maximum Lead Concentration (ppm)
Lin et al (2009)	58	29 (50%)	n.a.	0.8	153,000
Clark et al (2009)	64	21(33%)	16 (25%)	33 and below	207,000
Current Study	141	70 (50%)	48 (34%)	Below 3	116,000

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