



LEAD IN SOLVENT-BASED PAINTS IN COLOMBIA

October 2023



NATIONAL REPORT: LEAD IN SOLVENT-BASED PAINTS IN COLOMBIA

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

This study was conducted in Colombia by the chemical engineer, Plácido Silva D., with the participation of geographic engineer, Yuli Betin U., and Julián Casasbuenas G. of Colnodo (<https://colnodo.apc.org/>) / Sustainable Development Network (<https://rds.org.co>).

We would also like to thank Fernando Bejarano G. Coordinator of the Regional Hub for Latin America and the Caribbean; Sara Brosché, Manny Calonzo, and Jeiel Guarino from IPEN; Jindřich Petrlík from Arnika; as well as to the staff of SGS Forensic Laboratories, USA.



Colnodo facilitates communications, inter-exchange of information and experiences between Colombian organizations at the local, national and international levels. Colnodo prioritizes human rights, improving the status of women, globalization, democracy and civic participation, sustainable development, democratization of knowledge, digital inclusion, and strategic use of Information and Communications Technology (ICT) for development. Colnodo is the operator of the Sustainable Development Network in Colombia (www.rds.org.co), and is a member of the Colombian Network of Environmental Education (www.redcolombianafa.org).



Established in 1998, **IPEN** comprises over 600 Participating Organizations in over 125 countries, primarily developing and transition countries. IPEN brings together leading environmental and public health groups around the world to establish and implement safe chemicals policies and practices that protect human health and the environment. IPEN's mission is a toxics-free future for all.

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Cite this publication as:
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ACKNOWLEDGMENTS

This report was undertaken as part of IPEN's Global Lead Paint Elimination Campaign and funded by the New York Community Trust (NYCT) and the Swedish Government. It was conducted in Colombia by Colnodo in partnership with IPEN. The views herein shall not necessarily be taken to reflect the official opinion of the donors.

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PREFACE

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

In 2007 and 2008, NGOs in the IPEN network collected and analyzed decorative (home use) paints on the market in 11 developing countries and in countries with economies in transition. The results were startling. In every country, many of the paints contained exceedingly high lead levels. In response, IPEN launched its Global Lead Paint Elimination Campaign to eliminate lead in paint and raise widespread awareness among business entrepreneurs and consumers about the adverse human health impacts of lead paint, particularly on children's health. Since then, IPEN-affiliated NGOs and others have sampled and analyzed paints on the market in more than 50 low- and middle-income countries.

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

This study was conducted by Colnodo in partnership with IPEN.





EXECUTIVE SUMMARY

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

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

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

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

Most highly industrial countries adopted laws or regulations to control the lead content of decorative paints—the paints used on the interiors and exteriors of homes, schools, and other child-occupied facilities—beginning in the 1970s and 1980s. In Colombia, Law No. 2041 of 2020* sets a limit of 90 ppm in household architectural paints. This law† seeks to guarantee the health of people, especially children, in a lead-free environment by establishing general guidelines that will prevent contamination, poisoning, and diseases derived from exposure to the metal lead.

From January to April of the year 2023, Colnodo purchased 48 cans of solvent-based paints—44 paints intended for home and decorative use, two industrial paints, and two anticorrosive paints—from stores in Bogotá and Neiva, Colombia. The paints represented 17 different brands produced or imported by 17 manufacturers. All paints were analyzed by an accredited laboratory in the U.S. for their lead content, based on dry weight of the paint. The laboratory participates in the Environmental Lead Proficiency Analytical Testing (ELPAT) program operated by the American Industrial Hygiene Association (AIHA), assuring the reliability of the analytical results.

RESULTS

Twenty-five of 48 analyzed solvent-based paints (52 percent of paints) were lead paints — that is, they contained lead concentrations greater than 90 parts per million (ppm, dry weight of paint). This is the regulatory limit for lead in decorative paint in Colombia, China, India, Philippines, Kenya, Jamaica, and the US. Moreover, 22 paints (46 percent of paints) contained extremely high lead concentrations, above 10,000 ppm. The highest lead concentration detected was 160,000 ppm in a yellow decorative paint produced by a small paint factory in Bogotá.

On the other hand, 23 out of 48 solvent-based paints (48 percent of paints) did not contain intentionally added lead‡, demonstrating that the technology to produce paint without lead ingredients exists in Colombia.

* “By means of which the right of people to develop physically and intellectually in a lead-free environment is guaranteed, setting limits for its content in products marketed in the country” (<https://rds.org.co/es/resultado-busqueda/la-exposicion-al-plomo.hablemos-sobre-la-ley-2041>)

† CHAPTER III Prohibitions on the use of lead and waste management. Article 9. The use, manufacture, import or marketing of the following products is prohibited when they contain lead in any of their compounds at levels higher than those established by technical regulations in the national territory. b) Architectural paints, also called for decorative use or for home and work. e) Any article that contains lead in its composition and that is identified through the diagnostic study mentioned in paragraph 2 of article 6 of this law. <https://rds.org.co/es/ley-2741-27-de-julio-2020.ambiente-libre-de-plomo>

‡ There were 19 paints with lead concentrations reported as “less than 200 ppm” and “less than 100 ppm”. In this report, we say that these 19 paints did not contain “intentionally added lead”. Intentionally adding lead compounds to paint either as pigment or drier will yield concentrations of lead that are higher than 200 ppm. According to Module A-3 (Paint Basics) of UNEP’s Toolkit for Establishing Laws to Eliminate Lead Paint, “Lead-based pigments may contribute around 1,500 ppm to over 100,000 ppm” concentrations of lead in paint, while “lead-based driers may contribute around 1,200 ppm to 6,000 ppm” concentrations of lead in paint. (<https://wedocs.unep.org/bitstream/handle/20.500.11822/37030/PAINT.pdf?sequence=3&isAllowed=y>, p.14-15)

Eleven out of 17 analyzed brands (65 percent of paint brands) sold at least one lead paint. Also, the same number of paint brands sold at least one lead paint with extremely high lead concentrations above 10,000 ppm.

This study shows that yellow and orange paints most frequently contained extremely high lead concentrations above 10,000 ppm. Of 14 yellow paints, eight (57 percent of yellow paints) contained lead levels above 10,000 ppm and of eight orange paints, five (62 percent of orange paints) contained lead levels above 10,000 ppm. In addition, six out of 16 red paints (38 percent of red paints) and three out of eight green paints (38 percent of green paints) contained lead levels above 10,000 ppm.

In general, paint can labels did not carry meaningful information about lead content or the hazards of lead paint. Only five out of 48 paints (10 percent of paints) provided information about lead on their labels and most paints carried little information about any ingredients on their labels. Most paints were merely labeled as “solvents, pigments and resin,” with no further details on the type of solvents and pigments (organic or inorganic) provided. Manufacturing dates were included on the labels of 13 out of 48 paints (27 percent of paints), while batch numbers were included on the labels of 30 out of 48 paints (62 percent of paints). Most warning symbols on the paint cans indicated the flammability of the paints, but there were no precautionary warnings on the effects of lead dust to children and pregnant women.

Lead levels in this study are consistent with the results of a similar paint study conducted by Colnodo in 2016[§]. In that study, 39 solvent-based paints from 11 brands were purchased and analyzed. In the previous study, 28 of 39 paints (72 percent of paints) contained lead levels above 90 ppm, and 23 of 39 paints (59 percent of paints) contained lead levels above 10,000 ppm.

Based on the results of the 2023 study, some companies have taken out lead in their paint production processes. A small company, Pinturas Tito Pabon, no longer produces lead paint, while other small and micro-sized companies reformulated some of their colors like red and green paints. This shows that responsible companies can change their production systems to protect the health of customers and the environment.

CONCLUSIONS

This study demonstrates that solvent-based paints with high lead concentrations remain available in Colombia, as the paints included in this study are brands commonly sold in retail stores throughout Colombia. However, the fact that 23 out of 48 paints (48 percent of paints) did not contain intentionally added lead indicates that the technology to produce paints without added lead exists in Colombia. The results of this study provide a strong justification to fully enforce Law No. 2041 of 2020,** which prohibits the manufacture, import, export, sale, and use of paints and articles with total lead concentrations greater than 90 ppm.

RECOMMENDATIONS

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

GOVERNMENT AND GOVERNMENT AGENCIES

Relevant government agencies should reinforce inspection, surveillance and control systems, among others, in order to guarantee to consumers that both locally manufactured paints and imported paints sold in the market meet product quality standards and do not mislead consumers.

§ https://ipen.org/sites/default/files/documents/Lead_in_Solvent-Based_Paints_for_Home_Use_in_Colombia_ES.pdf

** Article 9. The use, manufacture, import or marketing of the following products is prohibited when they contain lead in any of their compounds at levels higher than those established by technical regulations in the national territory..... Transitory Paragraph. While the National Government issues the corresponding technical regulations, the prohibition on the use, manufacture, import or marketing of products will apply when they contain lead at the levels expressed below: a) Toys and all solid products designed for use by children, whose surface area can be accessible to them, that exceeds 90 ppm. b) Architectural paints, also called for decorative use or for home and work, that exceed 90 ppm (0.009%) of lead.

It is clear that the paints that have significantly high lead content obtained lead through the raw materials (i.e., pigments) used in the production process. It is necessary for government agencies^{††} to prohibit the manufacture, sale, and trade of lead-based pigments since these are the largest contributor of lead contamination in paint. The Customs, DIAN, need to ensure that imported paints, as well as imported paint ingredients such as pigments and driers that enter Colombia do not contain lead compounds.

PAINT INDUSTRY

Paint companies that still produce lead paints should immediately stop the use of leaded paint ingredients in paint formulations.

Paint companies that have shifted to non-lead paint production should have their products certified through independent, third-party verification procedures to increase the customers' ability to choose paints with no added lead since consumers need a responsible industry to ensure that the labels on their products are not misleading.

Pigment suppliers should also be responsible and not sell pigments containing lead.^{‡‡}

INDIVIDUAL, HOUSEHOLD AND INSTITUTIONAL CONSUMERS

Paint consumers should demand paints with no added lead from paint manufacturers and retailers, and call for full disclosure of paint ingredients.

Household and institutional consumers should ask for, consciously buy, and apply only paints with no added lead in places frequently used by children such as homes, schools, day care centers, parks and playgrounds.

ORGANIZATIONS AND PROFESSIONAL GROUPS

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

ALL STAKEHOLDERS

All stakeholders should come together and unite in promoting compliance with Law 2041 of 2020 which prohibits the use of lead in decorative paints in Colombia.

^{††} <https://rds.org.co/es/resultado-busqueda/ley-2741-27-de-julio-2020.ambiente-libre-de-plomo>

^{‡‡} <https://www.quiminet.com/productos/amarillo-cromo-a-511fm-py-34-verdoso-5610888165.htm>

1. BACKGROUND

1.1 HEALTH AND ECONOMIC IMPACTS OF LEAD EXPOSURE

LEAD PAINT TERMINOLOGY

As used in this booklet:

- “Paint” includes varnishes, lacquers, stains, enamels, glazes, primers, or coatings used for any purpose. Paint is typically a mixture of resins, pigments, fillers, solvents, and other additives.
- “Lead paint” is paint to which one or more lead compounds have been added.
- “Lead pigments” are lead compounds used to give a paint product its color.
- “Lead anti-corrosive agents” are lead compounds used to protect a metal surface from rusting or other forms of corrosion.
- “Lead driers” are lead compounds used to make paint dry more quickly and evenly.
- “Decorative paint” refers to paints or coating materials that are produced for use on inside or outside walls, and surfaces of homes, schools, commercial buildings, and similar structures. Decorative paints are frequently used on doors, gates, and windows, and to repaint household furniture such as cribs, playpens, tables, and chairs.
- “Solvent-based, enamel decorative paint” or “enamel decorative paint” refers to oil-based paints.
- “ppm” means parts per million total lead content by weight in a dried paint sample. All lead concentrations in the report are total lead levels, unless otherwise specified.



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

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

In some cases, children pick up paint chips and put them directly into their mouths. This can be especially harmful because the lead content of paint chips is typically much higher than what is found in dust and soils. When toys, household furniture, or other articles are painted with lead paint, children may directly ingest the lead-contaminated, dried paint when chewing on them. However, 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 higher rates.^[2]

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

Once lead enters a child's body through ingestion, inhalation, or across the placenta, it has the potential to damage several biological systems and pathways. The primary target is the central nervous system and the brain, but lead can also affect the blood system, the kidneys, and the skeleton.^[6] Lead is also categorized as an endocrine-disrupting chemical (EDC).^[7]

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

According to the World Health Organization (WHO): “Lead has no essential role in the human body, and lead poisoning accounts for about 0.6 percent of the global burden of disease.”^[2] Evidence of reduced intelligence caused by childhood exposure to lead has led WHO to list “lead-caused mental retardation” as a recognized disease. WHO also lists it as one of the top ten diseases whose health burden among children is due to modifiable environmental factors.^[9]

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

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

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

- Africa: \$134.7 billion of economic loss, or 4.03 percent of Gross Domestic Product (GDP);
- Latin America and the Caribbean: \$142.3 billion of economic loss, or 2.04 percent of GDP; and
- Asia: \$699.9 billion of economic loss, or 1.88 percent of GDP.

§§ An international dollar is a currency unit used by economists and international organizations to compare the values of different currencies. It adjusts the value of the U.S. dollar to reflect currency exchange rates, purchasing power parity (PPP), and average commodity prices within each country. According to the World Bank, “An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States.” The international dollar values in this report were calculated from a World Bank table that lists GDP per capita by country based on purchasing power parity and expressed in international dollars.

Comparison of Childhood Lead Exposure as Percent of GDP

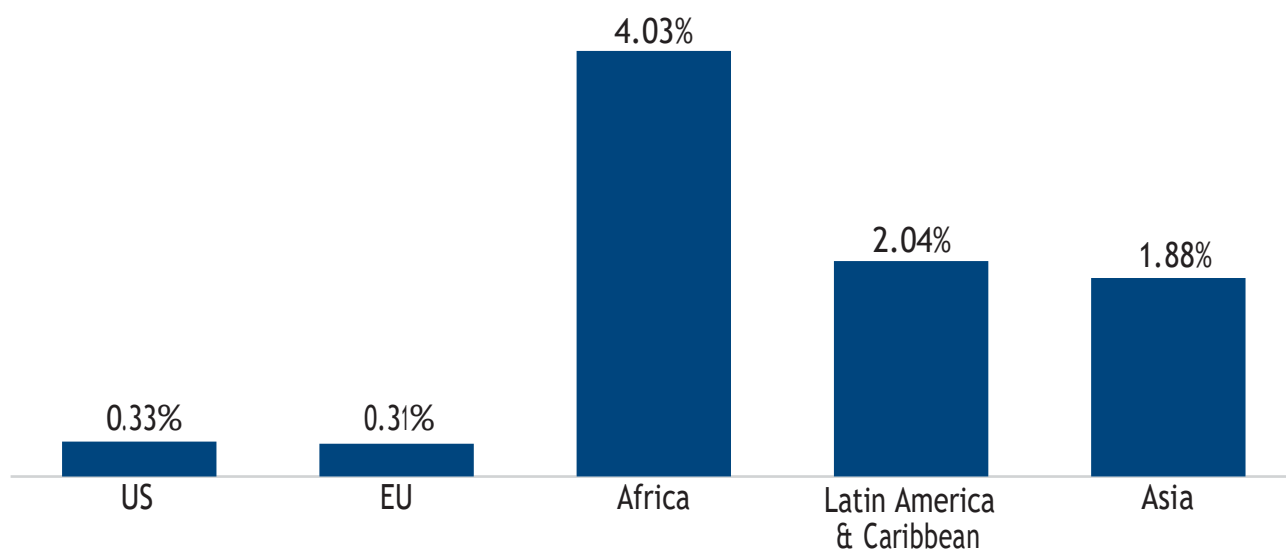


Figure 1 Comparison of Childhood Lead Exposure as Percent of GDP Per Region.

Country estimates used in this study can be accessed at a publicly available website,^{***} and show that the economic loss in Colombia is estimated at \$8.91 billion, or 1.88 percent of the country's Gross Domestic Product (GDP), with a population at risk under the age of five years of approximately 899,600 children.

In a recent study by Björn Larsen, et. al.,^{†††} it is "estimated that children younger than 5 years old lost 765 million (95% CI 443–1098) IQ points and that 5,545,000 (2,305,000 to 8,271,000) adults died from cardiovascular disease in 2019 due to lead exposure, with 729 million of the IQ points lost (95.3% of the total global IQ loss) and 5,004,000 (90.2% of total) cardiovascular disease deaths due to lead exposure occurring in LMICs. IQ loss in LMICs was nearly 80% higher than a previous estimate. Cardiovascular disease deaths were six times higher than the GBD 2019 estimate. The global cost of lead exposure was US\$6.0 trillion (range 2.6 to 9.0) in 2019, which was equivalent to 6.9% (3.1 to 10.4) of the global gross domestic product. 77% (range 70 to 78) of the cost was the welfare cost of cardiovascular disease mortality, and 23% (22 to 30) was the present value of future income losses from IQ loss."

Findings from this study "suggests that global lead exposure has health and economic costs at par with PM2.5 air pollution. However, much work remains to improve the quality of blood lead level measurement data, especially in LMICs."

^{***} <https://med.nyu.edu/departments-institutes/pediatrics/divisions/environmental-pediatrics/research/policy-initiatives/economic-costs-childhood-lead-exposure-low-middle-income-countries>

^{†††} [https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(23\)00166-3/fulltext#seccetitle10](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(23)00166-3/fulltext#seccetitle10)

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

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

Leaded compounds may also be added to enamel paints for use as driers^{†††} (sometimes called drying agents or drying catalysts). Leaded compounds are also sometimes added to paints used on metal surfaces to inhibit rust or corrosion. The most common of these is lead tetroxide, sometimes called red lead or minium.

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

Most highly industrial countries adopted laws or regulations to control the lead content of decorative paints beginning in the 1970s and 1980s. Many also imposed controls on the lead content of paints used on toys and for other applications likely to contribute to lead exposure in children. These regulatory actions were taken based on scientific and medical findings that lead paint is a major source of lead exposure in children, and that lead exposure in children causes serious harm, especially to children aged six years and under.

The use of lead in the 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 decorative household paints in e.g., the U.S., Jamaica, China, India, the Philippines, and Kenya is a total maximum lead content of 90 ppm, and adherence to this standard ensures that a manufacturer can sell its paint anywhere in the world. This standard is also recommended in the *Model Law and Guidance for Regulating Lead Paint*^{§§§} which was developed by the Global Alliance to Eliminate Lead Paint (GAELP) and published by the UN Environment Programme. Some other countries such as Brazil, South Africa, and Sri Lanka have established a standard of 600 ppm total lead.

††† <https://rds.org.co/es/resultado-busqueda/sustitucion-de-secantes-de-plomo-en-pinturas-decorativas-alquilicas-con-base-en-disolventes-3>

§§§ <https://www.unenvironment.org/resources/publication/model-law-and-guidance-regulating-lead-paint>

1.3 PAINT MARKET AND REGULATORY FRAMEWORK IN COLOMBIA

The Colombian paint market has been very dynamic, boosting economic activities in the last 20 years led by recognized manufacturers of ceramic products for construction, as well as a growing number of micro-entrepreneurs who manufacture paints in alliance with construction companies.

The production of paints in Colombia as defined under Code 202**** includes “other chemical products” in the annual manufacturing survey††† conducted by the National Administrative Department of Statistics (DANE). In 2020, the gross production of this industrial group is 7.9 percent—second among industrial groups. It also constitutes 1.9 percent of the total gross production of the sector on substances and chemical products in 2020.

According to a 2020 study‡‡‡ conducted by Colombia’s National Cleaner Production Centre, small- and medium-sized enterprises comprise 80.3 percent of the paint manufacturers in the country, while micro-enterprises and large manufacturers comprise 17.3 percent and 2.4 percent respectively.

According to a 2018 publication by the National Planning Department (Document 485),§§§§ most paint manufacturing facilities at the start of 2001 were located in Bogotá (38 percent), Antioquia (26.1 percent), Valle del Cauca (16.3 percent), Atlántico (7.6 percent), and Cundinamarca (7.6 percent). By 2014, the percentage of paint manufacturing facilities decreased in Bogotá (36.2 percent), Antioquia (25.7 percent), Valle del Cauca (13.8 percent), and Atlántico (4.6 percent), while the percentage of similar industrial establishments in Cundimarca almost doubled to 13.8 percent.

The largest Colombian paint company, Pintuco, previously owned by the Orbis Group, was acquired by Azko Nobel in 2021. The deal was first announced in June 2021 and the acquisition was completed in 2022. Currently, Pintuco’s products include 75 percent decorative paints and 25 percent coatings and it offers a wide range of products in ten countries in Latin America.

In Colombia, Law No. 2041 of 2020 sets a limit of 90 ppm in household architectural paints. This law seeks to guarantee the health of people, especially children, in a lead-free environment by establishing general guidelines that will prevent contamination, poisoning and diseases derived from exposure to the metal lead.

In 2016, the Ministry of Commerce, Industry and Tourism published Resolution No. 1154¹, which defines a set of minimum labeling requirements for water-based emulsion paints for architectural and interior use, and establishes the obligation for producers and importers to register with the Superintendence of Industry and Commerce before selling or importing the types of paints defined in the resolution. The Colombian Institute of Technical Standards (ICONTEC), in conjunction with the Ministry of Environment, Housing and Territorial Development and the Ministry of Commerce, Industry and Tourism, issued five voluntary standards for national producers to take into account in their production processes. Colombia has a large paint market and companies are not on a level playing field, so the government must fully implement the law and ensure that all paint companies comply with the legislation.

**** classified according to ISIC Rev. 4 B.C.

††† https://www.dane.gov.co/files/investigaciones/boletines/eam/boletin_eam_2020.pdf

‡‡‡ <http://www.saicm.org/Portals/12/Documents/GEF-Project/Lead-Paint/Baseline-Colombia-SP.pdf>

§§§§ <https://colaboracion.dnp.gov.co/cdt/estudios%20economicos/485.pdf>

¹ Resolution repealed RESOLUTION 1210 OF 2022 “Article 1°. Repeal Resolution number 1154 of 2016, “by which the technical regulation applicable to the label of emulsion-type water-based paints for architectural use, for interiors or exteriors, that are manufactured, imported or marketed in Colombia is issued,” according to what is stated in the motivational part of this administrative act.”

2. MATERIALS AND METHODS

From January to April 2023, Colnodo purchased 48 cans of solvent-based paints—44 paints intended for home and decorative use, two industrial paints, and two anticorrosive paints—from various stores in Bogotá and Neiva. The paints represented 17 different brands produced by 17 manufacturers.

In most cases, one white paint and one or more bright-colored paint such as red, green, orange or yellow were selected. Additionally, two anticorrosive paints for consumer use and two industrial paints typically used for domestic housing applications were also included in this study. 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, manufacturer, country where manufactured, product codes, production dates, and other details as provided on the label of the paint can were recorded. Generic paint colors were recorded, e.g., “yellow” instead of “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 Colnodo 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, labeled wood pieces using different unused, single-use paintbrushes by a researcher of Colnodo as shown in Figure 2.

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

The laboratory’s lower limit of detection for the lead concentration in the paint samples is dependent on the amount of paint in the samples. Generally, the lowest detection limit for the method used is 60 ppm, but if only a small amount of paint is available, the detection limit increases. Therefore, the detection limit was higher (up to 200 ppm) for some of the samples.

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



Figure 2 Sample preparation conducted by a Colnodo staff.

3. RESULTS

3.1 SUMMARY OF RESULTS

This study shows that:

- 25 out of 48 analyzed solvent-based paints (52 percent of paints) were lead paints, i.e., they contained lead concentrations above 90 parts per million (ppm), dry weight. In addition, 22 paints (46 percent of paints) contained extremely high lead concentrations above 10,000 ppm.
- 11 out of 17 analyzed brands (65 percent of paint brands) sold at least one lead paint, i.e., a paint with lead concentration above 90 ppm. Also, the same number of paint brands sold at least one lead paint with extremely high lead concentrations above 10,000 ppm.
- 25 out of 46 bright-colored paints (54 percent of bright-colored paints) were lead paints, i.e., they contained lead concentrations above 90 parts per million (ppm), dry weight. Orange paints were the most hazardous with five out of eight paints (62 percent of orange paints) containing lead concentrations greater than 10,000 ppm; eight out of 14 yellow paints (57 percent of yellow paints), and six out of 16 red paints (38 percent of red paints) also contained extremely high lead concentrations above 10,000 ppm.
- The highest concentration of lead detected was 160,000 ppm in a yellow decorative paint manufactured by 1Acabados and sold for home use.
- Only five out of 48 paints (10 percent of paints) provided information about lead on their labels and most paints carried little information about ingredients. Most paints were merely labeled as “solvents, pigments and resin,” with no further details on the type of solvents and pigments (organic or inorganic) provided. Most warning symbols on the paint cans indicated the flammability of the paints, but no precautionary warnings on the effects of lead dust to children and pregnant women were provided.

3.2 LEAD CONTENT ANALYSIS

Twenty-five out of 48 analyzed solvent-based paints (52 percent of paints) were lead paints, i.e., contained lead concentrations above 90 ppm — 22 of these contained extremely high lead concentrations above 10,000 ppm (46 percent of paints).

A yellow decorative paint manufactured by 1Acabados contained the highest concentration of lead at 160,000 ppm, while the lowest concentration of lead less than 70 ppm was detected in three paints manufactured by Grupo Orbis Compañía Global de Pinturas (grey anticorrosive paint), Pinturas Tito Pabón (orange decorative paint), and Reolpaint (red decorative paint).

Table 1 Top 12 Solvent-Based Paints with the Highest Lead Content.

RANK	SAMPLE NO.	TYPE OF PAINT	MANUFACTURER	COLOR	LEAD CONTENT (PPM)
1	COL-21-2023	Decorative	1Acabados	yellow	160,000
2	COL-59-2023	Decorative	Ultra Pinturas	yellow	150,000
3	COL-33-2023	Decorative	Invesa S.A. Sapolin Premier	yellow	120,000
4	COL-58-2023	Decorative	Ultra Pinturas	orange	120,000
5	COL-42-2023	Decorative	Mavisan	yellow	100,000
6	COL-52-2023	Decorative	Pinturas Super	yellow	100,000
7	COL-62-2023	Decorative	Omega	yellow	80,000
8	COL-39-2023	Decorative	Koran	orange	73,000
9	COL-40-2023	Decorative	Koran	yellow	70,000
10	COL-60-2023	Decorative	Omega	orange	70,000
11	COL-61-2023	Decorative	Omega	red	70,000
12	COL-63-2023	Decorative	Imperio	yellow	70,000

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

On the other hand, 23 out of 48 solvent-based paints (48 percent of paints) did not contain intentionally added lead. There were 19 paints with lead concentrations reported as “less than 200 ppm” and “less than 100 ppm.” In this report, we say that these 19 paints did not contain “intentionally added lead.”

Intentionally adding lead compounds to paint either as pigment or drier will yield concentrations of lead that are higher than 200 ppm. According to Module A-3 (Paint Basics) of UNEP’s Toolkit for Establishing Laws to Eliminate Lead Paint, “Lead-based pigments may contribute around 1,500 ppm to over 100,000 ppm” concentrations of lead in paint, while “lead-based driers may contribute around 1,200 ppm to 6,000 ppm” concentrations of lead in paint. ****

3.3 PAINT BRAND ANALYSIS

Eleven out of 17 analyzed brands (65 percent of paint brands) sold at least one paint with extremely high lead concentration above 10,000 ppm.

Among 44 decorative paints, a yellow paint manufactured by 1Acabados contained the highest concentration of lead at 160,000 ppm. On the other hand, an orange paint manufactured by Pinturas Tito Pabón and a red paint manufactured by Recolpaint contained lead less than 70 ppm lead, while a yellow paint manufactured by Recolpaint contained lead less than 90 ppm lead. This indicates that the technology to produce paints without added lead exists in Colombia.

Among the two anticorrosive paints, a grey paint manufactured by Grupo Orbis Compañía Global de Pinturas contained lead less than 70 ppm, while a red paint manufactured by Kolor contained lead less than 100 ppm.

Both two industrial paints (yellow and black) manufactured by Grupo Orbis Compañía Global de Pinturas contained lead less than 200 ppm.

Colnodo and the Sustainable Development Network maintain a web channel to support small paint manufacturers in reformulating paints and have published several documents^{††††} in Spanish to help them transition to using non-lead ingredients in paint production.

3.4 PAINT COLOR ANALYSIS

Twenty-five out of 46 bright-colored paints (54 percent of bright-colored paints) such as red, yellow, orange, and green contained lead concentrations above 90 ppm, 22 paints of which contained extremely high lead concentrations above 10,000 ppm (48 percent of bright-colored paints).

This study included 16 red paints, 14 yellow paints, eight orange paints, eight green paints, one black paint, and one grey paint. Yellow, red, orange, and green paints contained the highest lead concentrations.

Among bright-colored paints, five out of eight orange paints (62 percent of orange paints), eight out of 14 yellow paints (57 percent of yellow paints), six out of 16 red paints (38 percent of red paints), and three out of eight green paints (38 percent of green paints) contained lead concentrations above 10,000 ppm.

**** <https://wedocs.unep.org/bitstream/handle/20.500.11822/37030/PAINT.pdf?sequence=3&isAllowed=y>, p.14-15

†††† *Lead Drier Replacement in Solvent-Based Alkyd Decorative Paints*

(<https://rds.org.co/es/novedades/sustitucion-de-secantes-de-plomo-en-pinturas-decorativas-alkilicas-con-base-en-disolventes-3>); and *Technical Guidelines for the Reformulation of Lead Paints* (<https://rds.org.co/es/novedades/capitulo-5-proceso-de-sustitucion>)

3.5 LABELING

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

Only five out of 48 paints (10 percent of paints) provided information about lead on their labels and most paint can labels carried little information about any ingredients. Most paints were merely labeled as “solvents, pigments and resin,” with no further details on the type of solvents and pigments (organic or inorganic) provided on paint can labels. Manufacturing dates were included on the labels of 13 out of 48 paints (27 percent of paints) and batch numbers were included on the labels of 30 out of 48 paints (62 percent of paints) included in this study. Most warning symbols on the paint cans indicated the flammability of the paints, but no precautionary warnings on the effects of lead dust to children and pregnant women were provided.

The labels of architectural paints and other locally-manufactured or imported products (i.e., toys, etc.) are regulated by the Ministry of Health and Social Protection under Article 10 of Law 2041 (July 2020).

In Colombia, the government issued DECREE 1496 (2018) “in which the Globally Harmonized System of Classification and Labeling of Chemical Products is adopted and other provisions on chemical safety are issued.” The labels must be in Spanish and in accordance to the specifications defined in GHS revision 6. The precautionary advice on the labels provide labeling information on how to prevent exposure to chemicals, first aid response in case of accidental exposures, as well as storage and disposal information that are most relevant to users to minimize the adverse effects of chemical ingredients in paints. Additional advice are provided on the paint products’ Safety Data Sheets (SDS). The decree provided a transition period until the regulation entered into force on April 7, 2023, for pure chemical substances and diluted solutions, and on April 7, 2024, for mixtures.

3.6 COMPARISON WITH RESULTS FROM AN EARLIER STUDY

The lead levels in this study are consistent with the results of a similar paint study conducted by Colnodo in 2016 wherein 39 solvent-based paints were purchased and analyzed for lead content. The percentage of paints with lead levels above 90 ppm decreased from 72 percent in 2016 to 52 percent in 2023. Similarly, the percentage of paints with lead levels greater than 10,000 ppm decreased from 59 percent in 2016 to 46 percent in 2023.

Twenty-four paints analyzed in 2016 were also analyzed in 2023. Among this, seven paints which contained lead in 2016 are now non-leaded, while 11 paints which contained lead in 2016 remained leaded in 2023. On the other hand, six paints without lead in 2016 remained non-leaded in 2023.

It is important to note that some paint manufacturers have completely reformulated their paints as compared to 2016. Pinturas Tito Pabón, a small company, and Grupo Orbis Compañía Global de Pinturas, a big company, no longer produce lead paints. This shows that responsible companies are able to stop using lead ingredients in their production processes to protect the health of its employees and customers.

The 2016 study conducted by Colnodo encouraged the Ministry of Environment and Sustainable Development to conduct a larger study in 2017.####

Table 2 Comparison of Lead Concentration in New Solvent-Based Paints from Current Study with Earlier Study.

	CURRENT STUDY (2023)	PREVIOUS STUDY (2016)
Number of Paints	48	39
Percentage of paints with lead \geq 90 ppm (number of paints)	52% (25)	72% (28)
Percentage of paints with lead \geq 10,000 ppm (number of paints)	46% (22)	59% (23)
Maximum Concentration, ppm	160,000	250,000

<https://www.caem.org.co/linea-estrategica-energia-sostenible-2/plomo-pinturas/>
<https://rds.org.co/apc-aa-files/ba03645a7c069b5ed406f13122a61c07/analisis-plomo-pinturas-caem-minambiente.pdf>

4. CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates that solvent-based paints with high lead concentrations remain available in Colombia since the paints sampled in this study are brands commonly sold in retail stores throughout Colombia. However, the fact that 23 out of 48 paints (48 percent of paints) did not contain intentionally added lead indicates that the technology to produce paints without added lead exists in Colombia. The results of this study provide a strong justification to fully enforce Law No. 2041 of 2020, which prohibits the manufacture, import, export, sale and use of architectural household paints with total lead concentrations greater than 90 ppm.

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

- For the Ministry of Environment and Sustainable Development to fully implement the law and ensure all paint companies comply with the lead paint legislation. For relevant government agencies (i.e., the Customs or DIAN; CAR Regional Autonomous Corporations; Ministry of Health and Social Protection; Ministry of Labor; and Ministry of Commerce, Industry and Tourism) to reinforce inspection, surveillance and control systems in order to guarantee to consumers that both locally manufactured paints and imported paints sold in the market meet product quality standards and do not mislead consumers. The importation of lead pigments and other lead-based ingredients must also be prohibited. Microenterprises must be supported to change their production systems using experiences from other companies or other countries to comply with the objectives of Law 2041 of 2020.
- For paint companies that still produce lead paints to expeditiously stop the use of leaded paint ingredients in paint formulations. Paint companies that have shifted to non-lead paint production should get their products certified through independent, third party verification procedures to increase the customer's ability to choose paints with no added lead.
- For paint consumers to demand paints with no added lead from paint manufacturers, as well as full disclosure of a paint product's lead content. Household and institutional consumers should ask for, consciously buy, and apply only paints with no added lead in places frequently used by children such as homes, schools, day care centers, parks and playgrounds.
- For public health groups, consumer organizations and other concerned entities to support the elimination of lead paint, and conduct activities to inform the public and protect children from lead exposure through lead paint, lead in dust and soil, and other sources of lead.
- For all stakeholders to come together and unite in promoting a strong policy that will eliminate lead paint in Colombia.

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ANNEX

Table 3 Solvent-Based Paints Included in the Study.

SAMPLE NO.	NAME OF PAINT MANUFACTURER	TYPE OF PAINT	COLOR	VOLUME (L)	PRICE (COP)	DATE OF MANUFACTURE (M/D/Y)	BATCH NO.	DATE OF PURCHASE (M/D/Y)	IS THERE WEBSITE ON LABEL?
COL-04	Pinturas Tito Pabón	Decorative	Yellow	0.473125	8907	8/4/21	45887	4/10/23	No
COL-05	Pinturas Tito Pabón	Decorative	Orange	0.473125	7058	6/13/20	26950	4/10/23	No
COL-06	Pinturas Tito Pabón	Decorative	Red	0.473125	7647	3/23/22	44290	4/10/23	No
COL-11	Pinturas y Acabados 3p S.A.S.	Decorative	Green	0.94625	18000	None	03042317241-OP17231	4/11/23	No
COL-12	Pinturas y Acabados 3p S.A.S.	Decorative	Orange	0.94625	18000	None	None	4/11/23	No
COL-16	Standard Unipinturas Ltda.	Decorative	Orange	0.94625	17000	None	14171	4/11/23	No
COL-17	Standard Unipinturas Ltda.	Decorative	Green	0.94625	17000	None	12631	4/11/23	No
COL-18	Standard Unipinturas Ltda.	Decorative	Red	0.94625	17000	None	14134	4/11/23	No
COL-19	lacabados	Decorative	Green	0.94625	23529	12/1/22	88876	3/2/23	No
COL-20	lacabados	Decorative	Red	0.94625	23529	10/1/21	85319	3/2/23	No
COL-21	lacabados	Decorative	Yellow	0.94625	23529	4/1/22	86382	3/2/23	No
COL-23	Grupo Orbis Compañía Global de Pinturas	Industrial	Yellow	0.94625	38900	1/2/23	None	4/8/23	No
COL-25	Grupo Orbis Compañía Global de Pinturas	Decorative	Orange	0.3	19900	None	GR2-021761	4/8/23	No
COL-26	Grupo Orbis Compañía Global de Pinturas	Decorative	Yellow	0.3	15900	None	GU2-021674	4/8/23	No
COL-27	Grupo Orbis Compañía Global de Pinturas	Anticorrosive	Grey	0.3	15900	None	GR2-021740	4/8/23	No
COL-28	Grupo Orbis Compañía Global de Pinturas	Decorative	Red	0.3	15900	None	GP3-021909	4/8/23	No
COL-29	Grupo Orbis Compañía Global de Pinturas	Decorative	Green	0.11	9900	11/25/22	GR2-021713	4/8/23	No
COL-33	Invesa S.A. Sapolin Premier	Decorative	Yellow	0.118	6302	None	4211292004	3/17/23	No
COL-34	Invesa S.A. Sapolin Premier	Decorative	Green	0.94625	22857	None	4211088219	3/17/23	No
COL-35	Invesa S.A. Sapolin Premier	Decorative	Red	0.94625	22857	None	4190923148	3/17/23	No
COL-36	Kolor	Decorative	Yellow	0.473125	24900	1/2/23	220505A231/8	4/8/23	No
COL-38	Kolor	Decorative	Red	0.473125	24900	11/1/22	None	4/8/23	No

Table 3 Solvent-Based Paints Included in the Study. (continued)

SAMPLE NO.	NAME OF PAINT MANUFACTURER	TYPE OF PAINT	COLOR	VOLUME (L)	PRICE (COP)	DATE OF MANUFACTURE (M/D/Y)	BATCH NO.	DATE OF PURCHASE (M/D/Y)	IS THERE WEBSITE ON LABEL?
COL-39	Koran	Decorative	Orange	0.11828	5000	None	None	4/11/23	No
COL-40	Koran	Decorative	Yellow	0.11828	5000	None	None	4/11/23	No
COL-41	Koran	Decorative	Red	0.11828	5000	None	None	4/11/23	No
COL-42	Mavisan	Decorative	Yellow	0.473125	10504	11/9/22	OP57025	3/24/23	No
COL-43	Mavisan	Decorative	Green	0.473125	10504	11/10/22	OF56821	3/24/23	No
COL-44	Mavisan	Decorative	Red	0.473125	10504	2/27/23	OP60032	3/24/23	No
COL-45	TEKBOND	Decorative	Red	0.2	3600	None	None	4/11/23	No
COL-46	Recolpaint	Decorative	Red	0.06	16900	None	1222-10018495	4/8/23	No
COL-47	Recolpaint	Decorative	Green	0.06	17900	None	1022-10017913	4/8/23	No
COL-48	Recolpaint	Decorative	Yellow	0.06	16900	None	1122-10018028	4/8/23	No
COL-49	TEKBOND	Decorative	Orange	0.35	7200	None	None	4/11/23	No
COL-50	Kolor	Anticor-rosive	Red	0.473125	15500	None	218354D221/8	4/8/23	No
COL-51	Pinturas Super	Decorative	Green	0.473125	14800	None	None	4/11/23	No
COL-52	Pinturas Super	Decorative	Yellow	0.473125	14800	None	None	4/11/23	No
COL-53	Pinturas Super	Decorative	Red	0.473125	14800	None	None	4/11/23	No
COL-54	Grupo Orbis Compañía Global de Pinturas	Industrial	Black	0.3	18900	None	GU2-021607	4/8/23	No
COL-55	Tonner	Decorative	Red	0.94625	6600	None	ES-305 2209-5006	4/11/23	No
COL-56	Imperio	Decorative	Red	0.4	6600	None	0902903802	4/11/23	No
COL-57	Ultra Pinturas	Decorative	Red	0.473125	9400	None	None	4/10/23	No
COL-58	Ultra Pinturas	Decorative	Orange	0.473125	9400	None	None	4/10/23	No
COL-59	Ultra Pinturas	Decorative	Yellow	0.473125	9400	None	None	4/10/23	No
COL-60	Omega	Decorative	Orange	0.118	5000	None	None	4/11/23	No
COL-61	Omega	Decorative	Red	0.118	5000	None	None	4/11/23	No
COL-62	Omega	Decorative	Yellow	0.118	5000	None	None	4/11/23	No
COL-63	Imperio	Decorative	Yellow	0.4	6600	None	90290325	4/11/23	No
COL-64	Mesa Hermanos	Decorative	Yellow	0.1	-	None	None	4/11/23	No

Table 4 Results of Laboratory Analysis of Solvent-Based Paints.

SAMPLE NO.	NAME OF PAINT MANUFACTURER	TYPE OF PAINT	COLOR	LEAD CONTENT, DRY WEIGHT (PPM)	COUNTRY OF BRAND HEADQUARTERS	COUNTRY OF MANUFACTURE	IS THERE INFORMATION ON CAN ABOUT LEAD CONTENT OF PAINT?
COL-04	Pinturas Tito Pabón	Decorative	Yellow	< 200	Colombia	Colombia	No
COL-05	Pinturas Tito Pabón	Decorative	Orange	< 70	Colombia	Colombia	No
COL-06	Pinturas Tito Pabón	Decorative	Red	< 200	Colombia	Colombia	No
COL-11	Pinturas y Acabados 3p S.A.S.	Decorative	Green	28,000	Colombia	Colombia	No
COL-12	Pinturas y Acabados 3p S.A.S.	Decorative	Orange	12,000	Colombia	Colombia	No
COL-16	Standard Unipinturas Ltda.	Decorative	Orange	46,000	Colombia	Colombia	No
COL-17	Standard Unipinturas Ltda.	Decorative	Green	60,000	Colombia	Colombia	No
COL-18	Standard Unipinturas Ltda.	Decorative	Red	4,900	Colombia	Colombia	No
COL-19	lacabados	Decorative	Green	9,000	Colombia	Colombia	No
COL-20	lacabados	Decorative	Red	42,000	Colombia	Colombia	No
COL-21	lacabados	Decorative	Yellow	160,000	Colombia	Colombia	No
COL-23	Grupo Orbis Compañía Global de Pinturas	Industrial	Yellow	< 200	Netherlands	Colombia	No
COL-25	Grupo Orbis Compañía Global de Pinturas	Decorative	Orange	< 200	Netherlands	Colombia	“No Lead” Symbol
COL-26	Grupo Orbis Compañía Global de Pinturas	Decorative	Yellow	< 200	Netherlands	Colombia	“No Lead” Symbol
COL-27	Grupo Orbis Compañía Global de Pinturas	Anticorrosive	Grey	< 70	Netherlands	Colombia	“No Lead” Symbol
COL-28	Grupo Orbis Compañía Global de Pinturas	Decorative	Red	< 200	Netherlands	Colombia	“No Lead” Symbol
COL-29	Grupo Orbis Compañía Global de Pinturas	Decorative	Green	< 200	Netherlands	Colombia	No
COL-33	Invesa S.A. Sapolin Premier	Decorative	Yellow	120,000	Colombia	Colombia	No
COL-34	Invesa S.A. Sapolin Premier	Decorative	Green	5,700	Colombia	Colombia	No
COL-35	Invesa S.A. Sapolin Premier	Decorative	Red	< 200	Colombia	Colombia	No
COL-36	Kolor	Decorative	Yellow	< 200	Chile	Colombia	No
COL-38	Kolor	Decorative	Red	< 200	Chile	Colombia	No
COL-39	Koran	Decorative	Orange	73,000	Colombia	Colombia	No

Table 4 Results of Laboratory Analysis of Solvent-Based Paints. (continued)

SAMPLE NO.	NAME OF PAINT MANUFACTURER	TYPE OF PAINT	COLOR	LEAD CONTENT, DRY WEIGHT (PPM)	COUNTRY OF BRAND HEADQUARTERS	COUNTRY OF MANUFACTURE	IS THERE INFORMATION ON CAN ABOUT LEAD CONTENT OF PAINT?
COL-40	Koran	Decorative	Yellow	70,000	Colombia	Colombia	No
COL-41	Koran	Decorative	Red	55,000	Colombia	Colombia	No
COL-42	Mavisan	Decorative	Yellow	100,000	Colombia	Colombia	No
COL-43	Mavisan	Decorative	Green	< 200	Colombia	Colombia	No
COL-44	Mavisan	Decorative	Red	< 200	Colombia	Colombia	No
COL-45	TEKBOND	Decorative	Red	< 200	Brazil	Brazil	No
COL-46	Recolpaint	Decorative	Red	< 70	Colombia	Colombia	No
COL-47	Recolpaint	Decorative	Green	< 200	Colombia	Colombia	No
COL-48	Recolpaint	Decorative	Yellow	< 90	Colombia	Colombia	No
COL-49	TEKBOND	Decorative	Orange	< 200	Brazil	Brazil	No
COL-50	Kolor	Anticorrosive	Red	< 100	Chile	Colombia	No
COL-51	Pinturas Super	Decorative	Green	15,000	Colombia	Colombia	No
COL-52	Pinturas Super	Decorative	Yellow	100,000	Colombia	Colombia	No
COL-53	Pinturas Super	Decorative	Red	30,000	Colombia	Colombia	No
COL-54	Grupo Orbis Compañía Global de Pinturas	Industrial	Black	< 200	Netherlands	Colombia	“No Lead” Symbol
COL-55	Tonner	Decorative	Red	35,000	Colombia	Colombia	No
COL-56	Imperio	Decorative	Red	< 200	Colombia	Colombia	No
COL-57	Ultra Pinturas	Decorative	Red	60,000	Colombia	Colombia	No
COL-58	Ultra Pinturas	Decorative	Orange	120,000	Colombia	Colombia	No
COL-59	Ultra Pinturas	Decorative	Yellow	150,000	Colombia	Colombia	No
COL-60	Omega	Decorative	Orange	70,000	Colombia	Colombia	No
COL-61	Omega	Decorative	Red	70,000	Colombia	Colombia	No
COL-62	Omega	Decorative	Yellow	80,000	Colombia	Colombia	No
COL-63	Imperio	Decorative	Yellow	70,000	Colombia	Colombia	No
COL-64	Mesa Hermanos	Decorative	Yellow	< 200	Colombia	Colombia	No

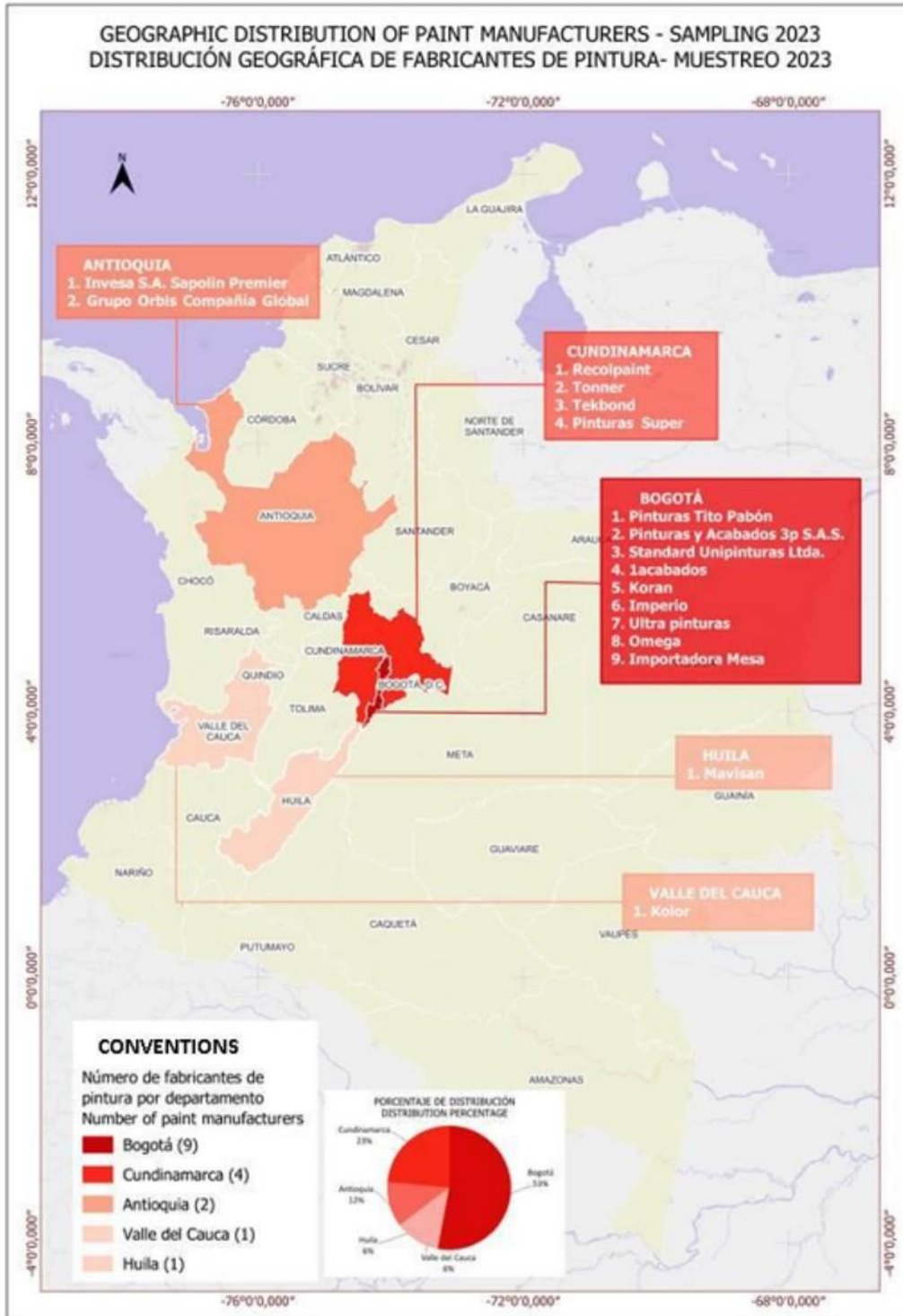
Table 5 Distribution of Lead Concentration by Brand Manufacturer..

NAME OF BRAND MANUFACTURER	NO. OF SAMPLES	NO. OF SAMPLES ABOVE 90 PPM	NO. OF SAMPLES ABOVE 10,000 PPM	MINIMUM LEAD CONTENT (PPM)	MAXIMUM LEAD CONTENT (PPM)
1acabados	3	3	2	9,000	160,000
Grupo Orbis Compañía Global de Pinturas	7	0	0	< 70	< 200
Imperio	2	1	1	< 200	70,000
Invesa S.A. Sapolin Premier	3	2	1	< 200	120,000
Kolor	3	0	0	< 100	< 200
Koran	3	3	3	55,000	73,000
Mavisan	3	1	1	< 200	100,000
Mesa Hermanos	1	0	0	< 200	< 200
Omega	3	3	3	70,000	80,000
Pinturas Super	3	3	3	15,000	100,000
Pinturas Tito Pabón	3	0	0	< 70	< 200
Pinturas y Acabados 3p S.A.S.	2	2	2	12,000	28,000
Recolpaint	3	0	0	< 70	< 200
Standard Unipinturas Ltda.	3	3	2	4,900	60,000
TEKBOND	2	0	0	< 200	< 200
Tonner	1	1	1	35,000	35,000
Ultra Pinturas	3	3	3	60,000	150,000

Table 6 Distribution of Lead Concentration by Color.

COLOR	NO. OF SAMPLES	NO. OF SAMPLES ABOVE 90 PPM	NO. OF SAMPLES ABOVE 10,000 PPM	MINIMUM LEAD CONTENT (PPM)	MAXIMUM LEAD CONTENT (PPM)
Black	1	0	0	< 200	< 200
Green	8	5	3	< 200	60,000
Grey	1	0	0	< 70	< 70
Orange	8	5	5	< 70	120,000
Red	16	7	6	< 70	70,000
Yellow	14	8	8	< 90	160,000

GEOGRAPHICAL MAP OF PAINT MANUFACTURERS





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