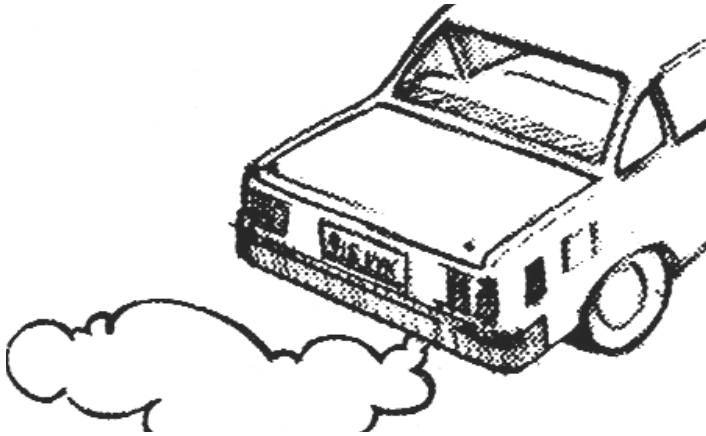


Lead Poisoning: A Background

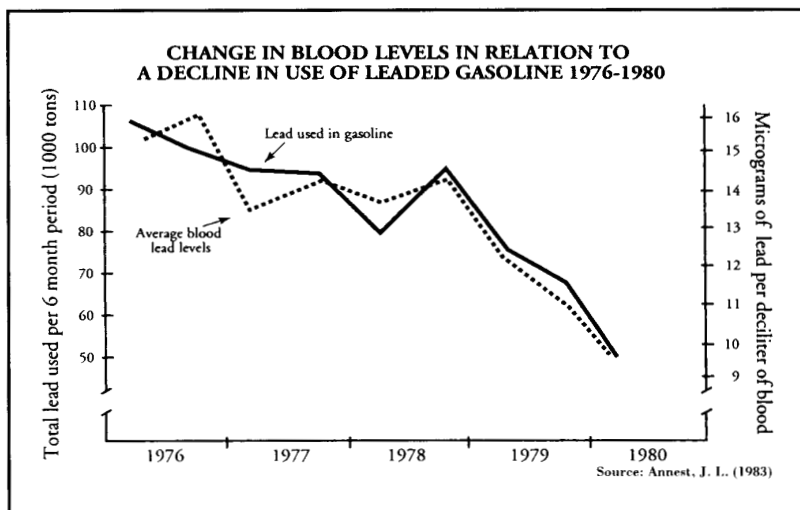


THE SIGNIFICANCE OF LEAD POISONING

The latest official government figures on lead poisoning show that about 930,000 young children, or about 4.4% of pre-schoolers in the United States, have levels of lead in their blood that are considered to be of concern.¹

Blood levels of lead have been declining in the United States over the past several decades, largely because of the phaseout of leaded gasoline. However, at the same time, we have learned from scientific studies that lower and lower levels of lead, previously believed safe, actually have serious health effects. Recent studies have found that even amounts of lead believed to be safe a few years ago might cause damage to young children's developing brains, decreasing IQ and causing behavior and learning problems. And it is unclear to what extent this damage is reversible.²

Because of its detrimental effect on the intellectual potential of each new generation, lead poisoning has been called "the most common and societally devastating



environmental disease of young children.”³ It affects so many people that it threatens the intelligence level and well-being of the nation as a whole.

Lead poisoning is totally preventable. This is because lead can be easily identified in the body, and in the environment. We understand how people get lead poisoning and what we need to do to eradicate the disease.

What Is Lead Poisoning?

Lead poisoning is a disease caused by exposure to and absorption of lead. It is identified by measuring the blood level of lead in an individual. Lead poisoning affects virtually every system in the body, and especially the developing brain and nervous system of unborn and young children.

Lead is a very, very strong poison. An extremely small amount of lead can cause serious harm to a child. The blood concentration of lead that might cause coma, convulsions, and even death in children is 100 micrograms per deciliter. This is comparable to half of a drop of a contaminant in a bathtub full of water. Even concentrations of lead in the blood that are 1/10th that strong, or equivalent to 1/20th of a drop of a contaminant in a bathtub full of water, have been found to be associated with detectable damage to the development of the brain.

The threshold of 10 micrograms per deciliter is a level at which a number of harmful effects of lead have been identified. This is referred to as the **LEVEL OF CONCERN**. Federal figures show that in 19 states examined in the latest studies, about 7.6% of children aged 1 to 5 had such a level in 1998. Fifteen micrograms per

deciliter is of somewhat greater concern, as a larger degree of harmful effects are documented. Under 3% of young children had this blood lead level. Even fewer, about 1%, had levels of 20 or more micrograms per deciliter.⁴

There is no clear level of blood lead that identifies a child as LEAD POISONED. The term is used differently in different contexts. The term LEAD POISONED is used by the U. S. Department of Housing and Urban Development (HUD) to refer to a child who has had a measured blood lead level of 20 or over, or one who has two consecutive measurements of 15 or over. The U. S. Centers for Disease Control does not use a single definition for lead poisoning but rather considers different levels of blood lead as calling for different responses. Some state and local laws define lead poisoning at higher levels than the HUD definition. Some medical works use the term LEAD POISONED to describe a child with a blood lead level of 10 or above.

In this book, we will refer to children with a level of 10 or above as having ELEVATED BLOOD LEAD LEVELS OR BLOOD LEAD LEVELS ABOVE THE LEVEL OF CONCERN.

Lead Poisoning Affects People in All Geographic Areas

The number of children with elevated blood lead levels has exceeded a shocking 50% in many urban areas.⁵ Lead poisoning, however, is not limited to our cities. It occurs everywhere, including suburbs, small towns, and rural areas.

Parts of the country with older homes have a greater problem with lead from paint, for example. Areas with very cold climates are also likely to have a higher concentration of lead in paint, increasing the likelihood of dangerous levels of exposure to children. In the western United States, the risk of exposure to lead from pottery might be higher than in the east. Certain ethnic groups are exposed to lead in their traditional remedies. Communities in the vicinity of lead smelters and other lead-emitting industries are exposed to greater amounts of lead from such industrial sources. Some water districts may have water that is more corrosive, and prone to contamination with lead, than others. Also, some water systems still have lead water mains, which may contaminate drinking water.

Lead Poisoning Affects Persons of All Socioeconomic Groups

Children living in older houses where the paint is deteriorating are at the greatest risk of lead poisoning. Therefore, the burden falls disproportionately on poor, inner-city, minority families.⁶ However, children in middle-income families are also vulnerable.⁷

Lead paint does not have to be peeling or flaking to pose a threat. Even in well-maintained homes, lead paint can create toxic dust without being visibly disturbed. Any lead-painted surfaces that are subject to friction and abrasion can generate lead dust. When windows are opened and closed, for example, the paint on the window rubs against the paint on the frame and creates very fine particles that fall to the windowsill and the floor. Children pick up this dirt both directly and via toys and pets.

Remodeling or renovating an older home poses one of the greatest threats of lead poisoning. Many severe cases of lead poisoning have resulted when upper- or middle-income families have renovated older homes.⁸

Lead in drinking water also affects households of all income levels. The concentration of lead in drinking water is a function of the characteristics of the water and the presence of lead in the pipes, solder (joining the pipes together), and plumbing fixtures in the home as well as in the pipes bringing the water into the home. Likewise, sources of lead poisoning such as ceramics and crystal can present dangers to any family that is not aware of the threat.

Rebecca Rex moved into her dream house when she was 2 months pregnant, and threw herself into fixing up the 75-year-old suburban home. She was aware of the dangers of lead paint and even knew that she might be especially susceptible because of her pregnancy. She took all of the precautions she was able to find out about to protect her unborn child. She religiously used a painter's mask and gloves when she sanded and scraped the paint from the walls. Unfortunately, she was not aware that a paper mask provides no protection from the fine particles of lead produced when a lead-painted surface is disrupted, and that gloves do no good at all, as lead gets into the body through the mouth and nose (by ingestion and inhalation) and not through the skin.

Rebecca's baby always cried, and never slept longer than an hour and a half at a time. She alternated between having diarrhea and being constipated for days at a time. One day Rebecca happened to pick up a brochure at Toys R Us entitled "Safety Tips." It listed a number of symptoms of lead poisoning—every one of them described her child. She immediately asked her pediatrician to screen the baby for lead poisoning.

But she had to endure eight more months of this before the test was finally done. "Lead poisoning doesn't happen to people like you," she was told by her physician, who refused to perform the lead test for her child. The suburban Texas pediatrician believed that lead poisoning afflicts only poor minority children in inner cities. Once the problem was acknowledged and treated as lead poisoning, she saw improvement within weeks.⁹

The myth that only poor inner-city minority children can be lead poisoned has resulted in the delayed diagnosis of numerous cases of lead poisoning.

THE HEALTH EFFECTS OF LEAD POISONING

Lead travels through the blood to virtually every organ in the body. The parts most noticeably affected are the central nervous system (including the brain), the kidneys, and the blood-producing organs. Lead also affects the digestive and reproductive systems.

Although large amounts of lead can affect anyone, three groups are the most vulnerable to lead poisoning: young children, pregnant women, and certain workers.

Young Children Are Especially Vulnerable to Lead Poisoning

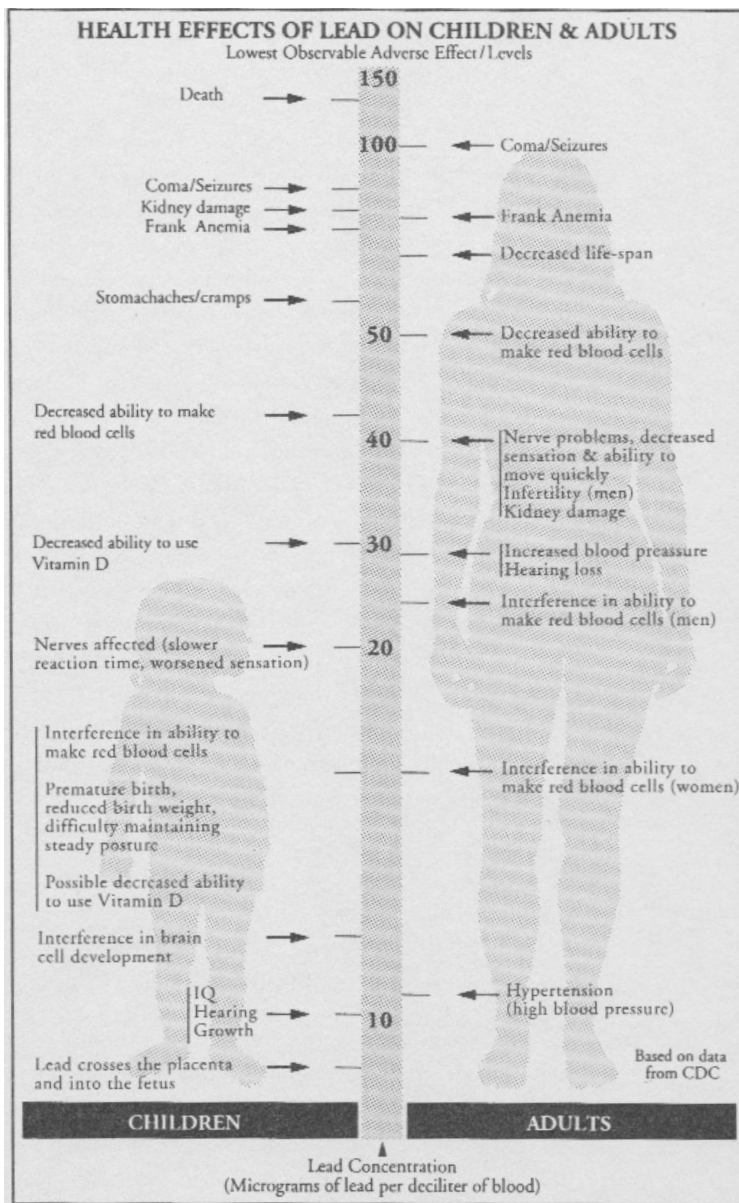
Why Young Children Are Vulnerable. Young children are more vulnerable to lead poisoning because they come into closer contact with sources of lead in the environment. Children spend a lot of time on the floor or ground, thus exposing themselves to lead in dust and soil. They ingest lead-contaminated dirt or dust when they touch their hands to dust on the floor or other hard surfaces, or dirt in an outside play area. They might also mouth toys that are dusty or dirty, or pet a dog or cat that has been in contact with contaminated dust or dirt. Very young children may ingest lead when they explore their environment and relieve teething discomfort by mouthing lead-painted objects and surfaces.

In addition to the fact that they tend to take in more lead than adults, a larger percentage of the lead that enters a child's body is actually retained (absorbed). Fifty percent of the lead ingested by an infant is absorbed, compared to only 5 to 15% of that ingested by an adult.¹⁰

Specific Health Effects in Children. Lead can have a number of adverse health effects, depending on the amount of lead the child has absorbed.

The most alarming danger of lead is the damage it can do to a child's developing brain and nervous system. Even amounts of lead that were considered harmless a few years ago have been shown in scientific studies to cause learning disabilities and behavioral problems.¹¹ A number of studies have found that for each 10 micrograms per deciliter over the threshold of 10 or 15 micrograms per deciliter of lead in a child's blood, IQ is lowered about one to three points.¹²

Lead is a very potent poison. It affects the brain because it interferes with essential aspects of the development of the architecture of the brain as well as with the biochemical connections between cells of the brain.



Only the most severe and long-term exposure to lead, in the cases of certain individuals who are more vulnerable for any of a number of reasons, actually causes enough damage to result in mental retardation.¹³ However, low and moderate levels of exposure, or brief exposure at higher levels, could exacerbate a preexisting developmental delay, or limit the rate of improvement of such a condition.¹⁴

In a recent study, which followed children with mildly elevated levels of dentin (tooth) lead in early childhood, adolescents were found to fail at school seven times as often as those with lower lead levels, and to be six times more likely to have reading disabilities.¹⁵ Moderately elevated blood lead levels affect the way nerves communicate in a young child. As a result, lead exposure can cause minor impairments in hearing, balance, attention, and learning new material in a young child.¹⁶ Because of these physiological effects, schoolchildren exposed to lead when they were younger may exhibit disruptive behavior in the classroom, day-dream, have difficulty staying seated, and be fidgety.¹⁷

Lead poisoning has been associated in scientific studies with various types of problematic behavior. Specific behaviors that have been associated with moderately elevated blood lead levels include sleep problems, depression, hyperactivity, and aggression. THESE NEUROLOGICAL EFFECTS CAN RESULT EVEN WHEN THERE ARE NO DETECTABLE SYMPTOMS OF LEAD POISONING. There is concern that because of these effects lead poisoning might contribute to delinquent behavior.¹⁸ The mechanism for this effect is not fully understood, but clinicians suspect that the lead may negatively impact parts of the brain so as to contribute to increased impulsivity and decreased self-control. These characteristics, combined with social factors, can result in poor judgment and coping skills which may be associated with juvenile delinquency. Although lead has been shown to directly trigger aggressive behavior in laboratory animals, this effect has not been established in humans.¹⁹

Recent studies also show a connection between elevated blood lead levels and the occurrence of dental caries.²⁰

At blood lead levels of 15–20 micrograms per deciliter lead interferes with the production of vitamin D, as well as of heme, a component of hemoglobin, the part of the blood that transports oxygen throughout the body, including to the brain.²¹ At levels over 20–30 micrograms per deciliter, studies have shown that nerve conduction can be slowed. These moderately elevated levels can also prevent children from growing properly and attaining what would be their normal height.²²

At higher levels, additional physiological symptoms can occur. At over 50 micrograms per deciliter a child can suffer from colic. Possible kidney damage should be evaluated when a child has such an elevated blood lead level. Although mild anemia is observed at lower blood lead levels, it can be more serious at over 70 micrograms per deciliter, and is aggravated by medical treatment (chelation therapy).²³

Thanks to broad screening and increased awareness of lead poisoning and its causes, in only a small fraction of a percent of cases of lead poisoning—those with extremely high levels of lead (over 80–150 micrograms per deciliter)—does a child go into convulsions or a coma.²⁴ Although this condition of lead encephalopathy, untreated, usually leads to death, since the 1950s medical treatment with chelation

therapy has reduced the mortality rate to 1–2% in even these extremely rare cases.²⁵

Unborn Children Are Also Particularly Vulnerable

Pregnant Women Need to Be Protected from Exposure to Lead. The lead toxin passes through the placenta to the fetus where it can have far-reaching effects on brain development. Therefore, pregnant women need to be protected from exposure to lead in order to protect unborn children from harm.

The fetus can be harmed not only by lead that the mother is exposed to during pregnancy but also from lead that is stored in her bones from exposure earlier in her life. During pregnancy, the body has an increased need for calcium. The needed calcium is often released from the bones, especially when the mother's diet does not provide an adequate amount. Because lead closely resembles calcium chemically, it can mistakenly be released into the blood along with the calcium and passed in this manner to the fetus.²⁶

This transfer has been shown to begin when a woman is around 12–14 weeks pregnant, and to peak in the third trimester, when more calcium is needed for building the bones of the fetus.²⁷ Blood lead levels that might result in no symptoms in the pregnant mother could cause severe damage to the unborn child. It is not surprising that the fragile and very quickly developing fetus is more susceptible than either adults or children to very small amounts of lead.

Specific Health Effects. Even maternal blood lead levels under 10 µg/dl (micrograms per deciliters) may increase the risks of behavioral problems in children.²⁸ Lead poisoning in unborn children can cause premature birth, low birth weight, and birth anomalies including neurological damage, as well as miscarriage and still births.²⁹ Research has shown that women who were lead poisoned as children, thus having an increased chance of stored lead being passed to the fetus during pregnancy, also have an increased risk of having children with learning disabilities.³⁰

There is also scientific evidence that lead poisoning of the father before procreation may result in abnormalities in the sperm.³¹ Lead can suppress the circulation of testosterone. This disrupts the stimulation of the testes, which in turn alters the functioning of the sperm and interferes with its ability to penetrate and fertilize the egg.³²

Certain Workers Are Vulnerable to Lead Poisoning

Workers who are exposed occupationally to large amounts of lead suffer disproportionately from lead poisoning.

Contractors who are licensed to remove lead paint are trained about the proper precautions to protect themselves from lead on the job. However, if they fail to use the respirators and protective clothing properly, then they might be exposed to dangerous levels of lead on a daily basis.

In other occupations, the enforcement of federal safety standards is left to the employer. In cases where there are under ten employees, these guidelines are not enforced routinely. Even in cases where the recommended safety measures are complied with, it is not clear whether the level of exposure permitted is actually safe. Workers who may be exposed to dangerous levels of lead include: construction workers, painters, carpet layers, and workers in battery recovery, plastic, smelting, insecticide, and electronic component plants.

These workers may bring lead dust back home where children and other family members are often exposed.

For a brief discussion of dust from occupational exposure as a source of lead in the home environment, see Chapter 2.

This book deals with lead poisoning that is not related to occupational exposure.

For information on lead poisoning from occupational exposure, see the resources listed in Appendix B under Occupational Safety. For a more complete list of occupations that present a danger of lead poisoning, see Appendix C.

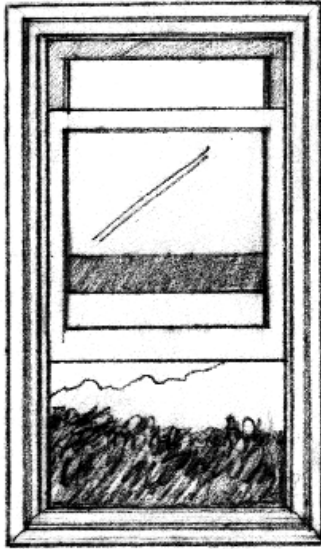
Other Adults Can Also Be Affected

Although the above three groups are the most common victims of lead poisoning, other adults can also suffer adverse effects from lead poisoning. Women are particularly vulnerable during pregnancy, lactation, and old age. At these times, lead tends to be released along with calcium into the blood from storage in the bones.

Lead poisoning can cause high blood pressure, especially in men.³³ Other symptoms of lead poisoning in adults are kidney malfunction, infertility, loss of hand coordination and strength, peripheral nerve damage, and hearing problems.³⁴ Lead can also interfere with the formation of red blood cells, causing anemia.³⁵ The more research that is done, the more we discover that ever lower levels of lead cause medical problems.

CHAPTER TWO

The Sources of Lead Poisoning



LEAD IN THE ENVIRONMENT

Lead poisoning is referred to as an environmental disease because it is caused by exposure to lead in our daily surroundings. Although we cannot see, taste, or smell it, lead is everywhere in our environment. It is not just in the obvious places, such as the emissions from a lead smelter or the peeling paint in an old house, but also in our air, water, soil, and dust.

Even if we were to eliminate all uses of lead, most of the hundreds of millions of tons of lead already present in our air, soil, plumbing, and homes would remain there.¹ Lead is **PERSISTENT** in the environment. Because lead is an element, once it is mined from the ground, it does not degrade as do organic materials, but rather remains in the environment forever, whether it is in use or disposed of in some way. Our soil is full of it. Our walls are painted with it. Our plumbing is made or joined with it. And our industries still use tons of it every day.

We are still haunted by the ghosts of our past uses of lead. In spite of the phasing out of leaded gasoline and prohibitions and controls on lead-based paint and other uses of lead, overall lead consumption was down only 2% from 1970 to 1985 and

it has been steadily increasing from that date.² Although lead-based paint has been banned from use in housing units, about 38 million homes in this country still bear the lead paint they were painted with before 1978.³

Because we cannot get rid of the huge quantity of lead in our environment, we need to be alert to its hazards so that we can protect ourselves and, especially, our children.

SUMMARY OF SPECIFIC SOURCES

Lead is found everywhere in our environment. The following is a summary of the most common sources of lead poisoning. Those that are the most important are discussed further in later chapters.

Lead-Based Paint Is the Largest Source of Lead Poisoning

Lead in Household Paint. Lead-based paint accounts for the overwhelming majority of lead poisoning cases nationally. Three million tons of old lead-based paint line the walls and fixtures of about half of all homes in this country.

Normal wear and tear, friction from opening and closing windows, and sometimes flaking and peeling of old paint, produce dust over the years, which is ingested unknowingly by small children. Eating paint chips and gnawing on windowsills can produce very severe cases of lead poisoning.

Renovating old houses can result in very dangerous lead exposure, particularly in do-it-yourself operations. Whenever you disrupt paint—that is, whenever you sand, scrape, or strip a surface that has been painted with lead-based paint or perform any demolition or removal of windows or other building parts attached to a lead-painted wall, even if it is covered with other paint or wallpaper—you could be putting lead dust into your living space where it can be ingested by children if you do not take the proper precautions.

The same dangers presented by lead in paint and dust in the home might threaten our children in other settings as well. To ensure that your children are not exposed to dangerous levels of lead in paint and dust, you should be aware of any hazards present in their school or day care as well as at friends' and relatives' homes where they spend a lot of time.

Paint used for commercial and industrial buildings, automobiles, boats, and other exterior uses still contains lead.

Toys, Furniture, and Other Items with Lead-Based Paint. Toys and furniture sold before 1976 may have been painted with lead-based paint. Stripping old fur-

niture can create very high levels of lead dust. Imported toys are still occasionally identified and recalled by the U. S. Consumer Product Safety Commission (CPSC) because they contain dangerous levels of lead paint. Playground equipment may be painted with lead-based paint. Such equipment in a number of city parks around the United States has been found to present a hazard to young children.⁴ For information on product safety and recalls, contact the CPSC, listed in Appendix B under Product Safety.

Imported articles that are intended for decorative use rather than as toys may contain lead paint. Christmas tree ornaments or other types of miniatures or knick-knacks may expose small children to lead if they are chewed on or mouthed. *For a more detailed discussion about lead in paint and dust, see Chapter 10. For a discussion of how to identify and control lead paint hazards, see Chapters 11 to 13.*

House Dust Can Be Contaminated with Lead

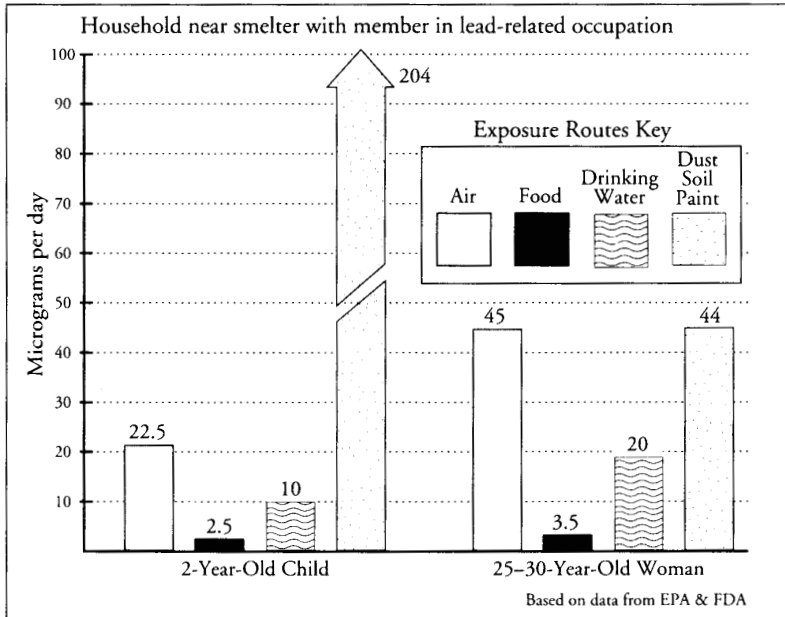
When lead-based paint deteriorates or is worn away via normal wear and tear, fine lead dust is generated. This dust settles on the floor and hard surfaces where young children come into contact with it during the course of normal play and hand-to-mouth contact. Lead dust can also be produced by lead-bearing soil being tracked into the home.

Parents Can Bring Lead Dust Home from Work

Workers in many types of factories, smelters, and construction trades are exposed to high doses of lead daily. They bring lead dust into the home on their clothing, skin, hair, and shoes, thus exposing their children to lead. If contaminated clothing is not laundered separately, it can contaminate the rest of the family's clothing. *For a list of occupations that present a risk of lead exposure, see Appendix C.*

Lead May Contaminate Our Drinking Water

Plumbing Systems. Water can eat away at and release lead from plumbing systems. The characteristics of the water, such as its pH and hardness, affect how corrosive it is, and therefore how much of the lead it carries away. Lead pipes have not been used for decades, but many homes are still connected to municipal services containing old lead pipes. Although lead solder has been outlawed for use in residential plumbing systems since 1986, it nonetheless joins together the copper pipes in many homes. Brass faucets sold before mid 1998 may contain up to 8%



lead. These lead sources can be present in our water distribution systems or in our homes themselves.

Pumps, Fountains, Kettles. Submersible water pumps with lead parts can contaminate drinking water from private wells. Old kettles used for boiling water, or samovars (used for making tea by some Middle Eastern and Russian immigrants), can put lead into water. Drinking fountains can contain lead liners or lead solder joining seams together, contaminating the water that schoolchildren drink.

Water Supplies. Water supplies can be contaminated with lead from industrial emissions and runoff from landfills where batteries or computer monitors have been dumped. For a more detailed discussion of lead in drinking water and how to protect your family from it, see Chapter 16.

Lead Is in Our Soil

Although we no longer use leaded gasoline, our soil has been contaminated from decades of exposure to emissions from cars and trucks burning leaded fuel. Lead is also added to the soil from paint that falls or is scraped from houses and other

structures and equipment painted with lead-based paint. In some cases, industrial emissions and pesticides are also present. The net result is large quantities of lead in our soil. *For a more detailed discussion of lead in soil and how to protect your family from it, see Chapter 14.*

Lead May Get into Our Food

Vegetables grown in soil contaminated with lead are likely to contain lead. In recent years, this problem has been greatly alleviated because of increased awareness and the phaseout of leaded gasoline. However, lead still occasionally enters our food from cans containing lead solder at the seams or from storage or service in improperly glazed ceramics. Old, homemade, or imported ceramic cups and mugs used for juice or hot drinks are still a threat. Wine may be contaminated from the foil wrap on the bottle. Wine and other alcoholic or acidic beverages can also absorb lead from storage in leaded crystal. Some calcium supplements, hairdyes, and traditional Chinese, Hispanic, and other ethnic remedies and cosmetics continue to poison children with lead.⁵ *For a more detailed discussion of lead in food and how to protect your family from it, see Chapter 15.*

Lead Is in Our Air

Millions of tons of lead have been emitted into the earth's atmosphere every year. In 1980, for example, the total was 5.7 million tons. A half million tons was from natural sources, such as dusts, volcanic eruptions, and vegetation. The vast majority, about 4.7 million tons, was from human activities.⁶ In this country, almost 4 gigagrams are emitted annually. This is a huge improvement over the situation 20 years ago, when over 200 gigagrams were emitted each year.⁷ Unfortunately, however, the lead that has been emitted over the decades is still present in our environment, and much of it remains as a health threat in the soil.

Industry. Heavy metal production contributes a great deal of lead to the atmosphere. Lead smelters (where lead metal is retrieved either from the lead ore that is mined from the earth or from recycling lead-acid batteries or scrap metal) are among the worst of the industrial polluters in this country. Although there have been federal limitations on how much lead a lead smelter can emit into the air, most smelters in the United States have not complied with those limits.⁸ And the limits themselves have been found by the EPA to be inadequate. An unregulated smelting furnace can typically emit between 28 and 77 tons of lead into the air yearly. Using technologies that are now available, this amount can be cut to less

than 1 ton a year. New regulations on emissions from secondary lead smelters could reduce emissions by lead smelters by 75%.⁹

Another recent regulatory change will make information available to people living near polluting industries about how much lead is being emitted into the air so that they can protect themselves, either by moving further away, or by encouraging the industry to pollute less. The new requirement for industries using 100 pounds or more of lead a year to report lead emissions is expected also to discourage the industries from putting as much lead into the air as they might have.¹⁰

Gasoline. Over the past several decades, leaded gasoline has been the greatest source of lead in our air. Four to five million tons of leaded gasoline were burned before 1986 in the United States.¹¹

Leaded gasoline remains a serious hazard for those living or spending time in other countries, as well as for those Americans living on the Mexican border.

Waste Disposal. The unregulated transportation, handling, and incineration of wastes containing lead and lead-contaminated materials results in the dispersal of lead dust into the air. Waste from lead mining can also contaminate the soil and dust in lead-mining areas.¹²

Bridges and Other Large-Scale Exterior Paint Removal. The uncontained sandblasting of bridges or any exterior structure bearing lead-based paint can temporarily add hazardous amounts of lead to the air in the immediate vicinity and in communities just downwind from the work site.

Some Hobbies Involve Contact with Lead

Toxic levels of lead exposure can occur while doing some types of arts and crafts activities, such as stained glass or jewelry making, enamel work, pottery glazing, antique ceramic doll painting, metal sculpture soldering, antique furniture refinishing, or fishing weight or ammunition making.¹³ Lead that is used in arts and crafts supplies must be appropriately marked. Always check labels for any precautions regarding working with materials containing lead.

There Are a Number of Other Possible Sources of Lead in Our Environment

Children's Art Supplies. In 1994, the U. S. Consumer Product Safety Commission recalled several brands of crayons made in China because they were found to

contain lead.¹⁴ When buying crayons, paint sets, chalk and modeling clay, or any art supplies, look for a statement on the label that they conform with ASTM D-4236, a voluntary industry safety standard.

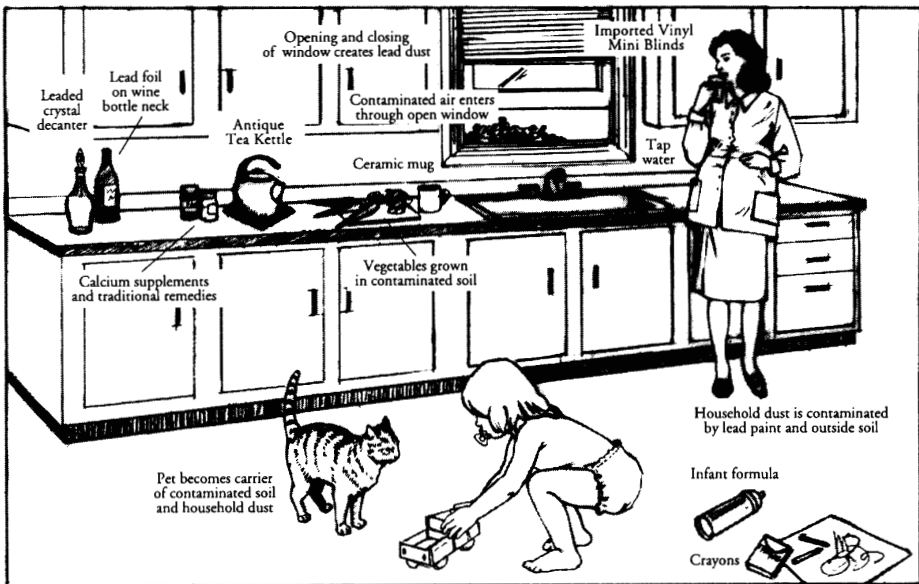
Toys. Miniature solid lead figures sold as toys present a hazard when handled by small children. Toy soldiers and small figures for use with model railroad sets are examples.

Ammunition. Very high levels of lead are present in the air at pistol ranges. This results both from the lead bullets themselves and from materials used to propel the bullets.¹⁵ Lead shot used for duck and game hunting can result in contamination of aquatic ecosystems and the food they produce. On rare occasions, a child can actually be poisoned directly from contact with lead bullets.¹⁶

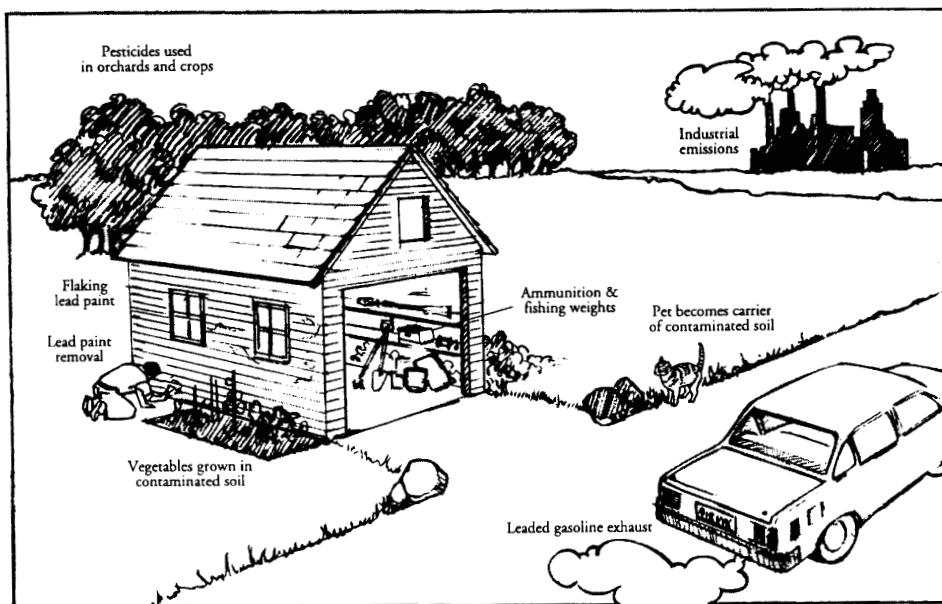
Fishing Sinkers/Curtain and Carpet Weights. Lead fishing weights, as well as lead curtain or carpet weights or any other lead objects, are a source of lead exposure to persons who handle them. Lead may enter the body when hands come into contact with the mouth or food after handling any lead object. Lead can also be ingested when the teeth are used as pliers to attach fishing sinkers to the fishing line.

Very small fishing weights may no longer be made of lead because they can be ingested by waterfowl and contaminate soil where aquatic plants grow. Once enter-

Inside Environmental Sources of Lead Poisoning



Outside Environmental Sources of Lead Poisoning



ing the food chain, they further contaminate birds of prey and aquatic life feeding on these animals and plants.¹⁷

Ceramic Doorknobs and Bathtubs. Cases of lead poisoning have been attributed to lead leaching into bathwater from old ceramic bathtubs.¹⁸ Other ceramic objects, such as doorknobs, may also contain lead.

Plastics. Many plastics contain lead, which can be ingested if chewed. Lead is added to plastic both as a pigment and as a stabilizer, to protect the plastic from deterioration in sunlight. It tends to be used in products designed for outdoor environments. A number of vinyl children's products, such as backpacks and raincoats, contain hazardous amount of lead.¹⁹ Some plastic toys and decals, trim, buttons, and snaps on children's clothing have been found to contain lead.²⁰

Miniblinds. In June 1996, the U. S. Consumer Product Safety Commission reported that nonglossy vinyl miniblinds from China, Taiwan, Indonesia, and Mexico contain lead. The lead, which is added to stabilize the plastic, deteriorates from exposure to sunlight, leaving lead dust on the surface of the blinds, which can be ingested by young children who touch the blinds. Ingesting the dust from just one square inch of the blinds each day, a child could become lead poisoned in just a couple of weeks to a month.

Miniblind manufacturers agreed to change the way the blinds are manufactured. Miniblinds that have been purchased since July 1996 should be safe. Check that they bear labels like “new formulation,” “nonleaded formula,” “no lead added,” or “new! nonleaded vinyl formulation.”²¹

Sources from Other Countries. Industrial pollution is not as well regulated in some other countries. As a result, a young child who spends his or her first months or years in an Asian or Latin American country may already be poisoned from lead sources such as proximity to a smelter, or the mother’s occupational exposure to lead. Adopted children from these countries have been found in some cases to have high lead levels when they come to this country.²²

Miscellaneous Sources. The above list is by no means exhaustive. Lead often shows up in surprising places. Decals on T-shirts and designs on drinking glasses have been found to contain lead. Old wallpaper can contain hazardous amount of lead.²³ Some candlewicks are made of lead.²⁴ Isolated cases of lead poisoning have been attributed to such varied sources as pool cue chalk, an old fishing buoy floating in a child’s wading pool, chewing on electrical wire insulation, and moonshine made in an old lead-soldered radiator.²⁵

THE CUMULATIVE EFFECT OF LEAD

Lead is persistent and cumulative. It does not degrade. Once lead is absorbed into a person’s body, it remains there and accumulates. Therefore even small exposures can pose a risk. When bone has already stored lead from previous exposures, lead from new exposures will be more likely to remain in the blood and travel to other tissues, such as the brain, where damage is done.

Even if a child is never exposed to a single large dose of lead, all of the tiny amounts a child is exposed to can add up to trouble. For instance, the average child living in a town near a smelter may have a blood-lead level of 8 micrograms per deciliter from exposure to emissions. A relatively small exposure to lead paint, therefore, will bring his or her blood lead level over the threshold of concern of 10 micrograms per deciliter. Likewise, a child who drinks lead-contaminated water will be much more likely to suffer toxic effects if exposed later to lead-contaminated soil or dust.