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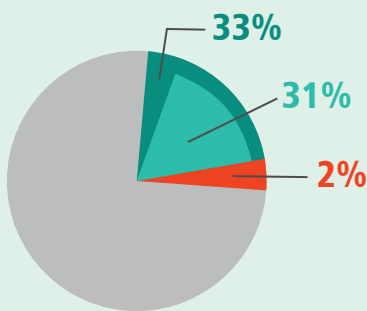
Lead - Poisoning India's food & water supply chain

WHITE PAPER

Lead contamination in drinking water

According to an investigation by the Quality Council of India, 33 percent of over 370 samples of water from the top 26 cities of India have tested positive for harmful content of lead. Another 2 percent of the samples failed to meet even the lenient Indian norms of 50 parts per billion (ppb). Out of these, 31 percent samples failed to adhere to the WHO standards of lead content of less than 10 ppb.

Study by the Quality Council of India



- Tested Positive for harmful content of lead
- Failed to meet Indian norms
- Failed to meet WHO norms

Top 26 Cities | 370 Samples

The recent Maggi controversy in India brought back the poisonous metal as a key discussion topic. Earlier, the topic was either ignored or authorities chose to be silent about it. A lab test found 'very high quantities of lead – 17.2 parts per million' in Maggi, much above the permissible limit.

The presence of lead in much higher quantities than permissible in drinking water in most urban and rural populations in India is a cause of great concern. The country needs to wake up before it is too late.

Children – Innocent victims



Lead - A slow poison

WHO Data

6,00,000

new cases of intellectual disabilities every

70

Types of neurological problems are caused due to lead exposure

10

Micrograms per decilitre can cause behavioral and learning damage in children

Children are the most vulnerable to lead poisoning or lead intoxication and often it can result in fatalities. According to WHO data, over 600,000 new cases of intellectual disabilities in children occur every year due to harmful lead exposure. Excessive exposure to lead can cause more than 70 types of neurological problems, seizures leading to coma and even death. It can also result in decreased hearing, reduced IQ and delayed puberty. Chelation therapy for lead poisoning is a

quite common leading to increased healthcare costs.

While lead poisoning can happen in children and adults through exposure to house paint, toys, polluted soil, etc. the most common reason for lead poisoning is through potable water. Pipes used for supplying water to homes for drinking and agriculture fields for irrigation are the most common source of lead metal entering the human system.

A recent report mentions that young children as a population group are at the greatest risk of exposure. Even a blood level of 10 micrograms per decilitre can cause behavioral and learning damage in children. Lead is a slow poison that can incapacitate the future generations in a silent manner.

Hazardous effects of lead



- Disruption of the biosynthesis of haemoglobin & anaemia
- A rise in blood pressure & kidney damage
- Miscarriages and abortions
- Disruption of nervous systems & brain damage
- Reduced fertility due to sperm damage
- Diminished learning abilities in children

Source: *The Lead Education & Abatement Design Group (LEAD)*

PVC pipes - A major contributor of lead contamination in India

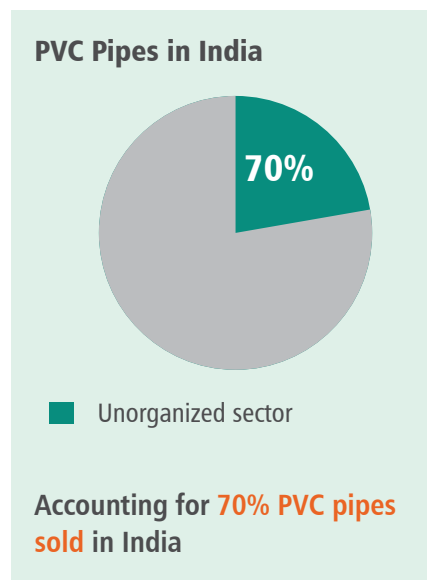
In the Indian context, high lead content can be found both in urban and rural areas. Thus, ground water sources (bore well /well water) have been found to have lead presence more than the permissible limit in almost 41% of the samples, making it unfit for consumption. Another study found was over 15% of municipal water has lead content higher than the permissible limit. Water borne PVC pipes for human and agriculture used over long periods of time are the cause. Lead mixes with water during transportation before it is used in the house for cooking or drinking purposes. Similarly, water used in agriculture be it for watering the fields or pumping out water from deep wells or bore wells is transported using PVC pipes. This causes lead contamination in the ground water table.

PVC pipes used for sanitation and waste disposal cause lead contamination in ground water through sewage water discharge or effluent plant water recycling. PVC pipes used for transporting or storing water cause immense harm to the human ecosystem as they introduce lead into the food and water chain.

Lead as a stabilizer in PVC pipes

Lead based additives are used as stabilizers by most Indian PVC manufacturers to strengthen and

increase the life of the pipe. Most nations in US, Europe and Asia have banned the use of lead-based stabilizers and additives in PVC pipes for water supply purposes. India too follows strict ISI - Indian standards certified by Bureaus of Standards (BIS) for lead usage as an additive in PVC pipes. While good quality pipe manufacturers follow these standards, the unorganized sector which accounts for 70% of the PVC pipes sold do not meet these standards.



BIS standard PVC pipes often cost up to four times the cost of non-BIS standard pipes and thus, the latter is sold at much cheaper rates. Also, building contractors, plumbers and builders often substitute cheap PVC pipes with high lead content in the water supply system to cut costs at the cost of the ignorant consumer. In order to make profits, lead-based additives such as stabilizers and plasticizers are freely used by PVC

manufacturers. Ignorant buyers in both the urban middle class and rural farmers take the bait of the price difference in a price sensitive market. Unknowingly, they compromise their family's health in the long term. The leaching of lead is less in good quality PVC pipes and much higher & faster in low grade PVC pipes. However, the truth is that lead contamination still happens in both the cases.

Global best practices in banning lead in PVC pipe manufacturing

Research in the late 1980s and early 1990s in quite a few cities of US and Europe revealed the problem of lead contamination through the water supply network. Because it affected children, it was taken up with equal gravity. These findings led to the ban on lead as an additive in PVC pipe manufacturing in most developed nations, especially, in the West. According to news reports, a full risk assessment on harmful effects of lead was submitted to the European Union in 2004.

In 2000, the European PVC industry consisting of ECVM (vinyl resin producers), ECPI (PVC plasticizer producers), ESPA (PVC stabilizer producers) and EuPC (PVC converters) signed the first voluntary commitment to replace lead based stabilizers by the end of 2015 across EU. The entire industry collaborated with stabilizer producers to develop alternatives to lead based

systems. This required significant time and resource commitments. The development of alternative stabilizers for PVC systems in Europe got a major thrust with the Vinyl 2010 program. Since 2011, the VinylPlus program has led the course. It was a voluntary commitment to phase out lead based stabilizers by 2015.

The pipe producers' members of European association TEPPFA, a partner of Vinyl 2010 voluntarily discontinued the use of lead stabilizers in potable water piping in 2005 end.

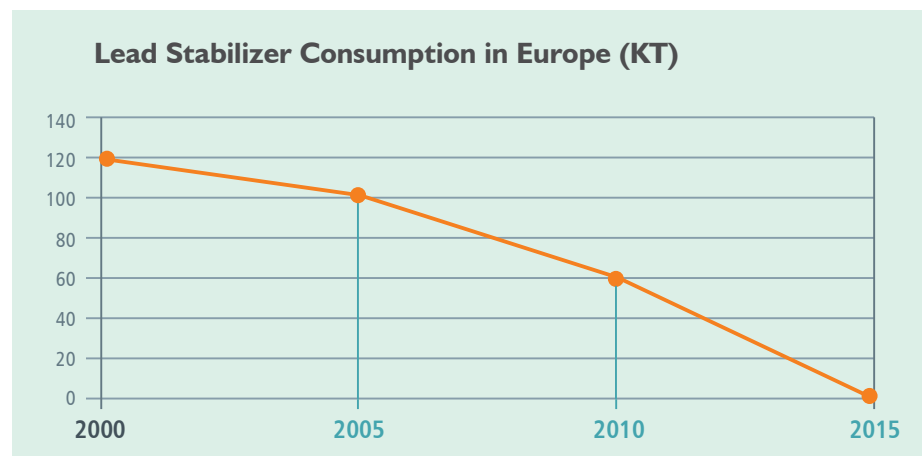
Increasing global pressure to ban lead in PVC pipes

PVC pipe manufacturers who are one of major users of lead-based stabilizers are coming under increasing scrutiny and pressure to use alternate environment-friendly additives. For example, the Beijing-based China Plastics Piping Association passed a voluntary policy to encourage local companies to stop lead usage by 2015, similar to the voluntary commitment by the European vinyl industry. Back in 2006, Chinese national standards banned lead stabilizers in PVC pipes used in water supply though officials are circumspect of the actual implementation.

As per a news report in September 2013, German stabilizer maker Baerlocher GmbH said that

lead is used in 95 percent of PVC pipes in India (almost similar to China), 86 percent in Middle East & Africa, 61% in South America. In contrast, only 29% percent of all PVC pipe systems use lead in Europe while the figure is less than 1 percent in North America as nearly 100 percent of vinyl pipe systems use tin as a stabilizer. By 2015 end, Europe completely discontinued the use of lead as a stabilizer.

A measure like this will not only provide health benefits for the next generation but also ensure quality standards in PVC pipe manufacturing. While many PVC pipe manufacturers have started using lead-free alternative stabilizers, mandatory or voluntary compliance will reduce the gap of an undue price advantage enjoyed by unorganized players. The Asian PVC pipe industry in South Korea,



Need to implement a voluntary ban on lead stabilizers

It is time for Indian PVC pipe manufacturers to take voluntary action to ban the use of lead-based stabilizers in manufacturing. Like global counterparts, use of tin-based environment-friendly stabilizers should be adopted as an industry standard. Like their European and Chinese counterparts, Indian PVC pipe manufacturers should take a voluntary pledge to phase out lead based additives in the next 3-5 years.

Australia, New Zealand, etc. has been at the forefront in moving away from lead as a stabilizer in PVC pipe manufacturing.

India as a lead-free nation

Both the industry and the Indian government should act together to phase out and ultimately ban the use of lead and cadmium-based stabilizers and plasticizers in India. It is definite way of preventing lead poisoning from PVC pipes permanently. PVC pipes that use lead as an additive should be banned and removed from all



direct and indirect water supply use, both in residential, office and agri-use.

Specialty chemical companies in India need to collaborate with their customers in developing effective alternative solutions like tin-based stabilizers. Downstream and upstream players need to work closely to ensure that environment-

friendly stabilizers are used in PVC pipes. Training and reskilling of the workforce to use non-lead based stabilizers will be required and must be done.

As a nation that wants to 'Make in India' and 'Sell to the World', PVC pipes with no lead content will see a surge in export demand, especially from Europe, USA

and Gulf countries where public infrastructure and housing spend is on the rise. Last but not the least, young children who are India's future will not be affected by any physical and mental disability due to slow lead poisoning from the food and water supply. The Indian PVC pipe industry and its allied partners should contribute to making India a lead-free nation.

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