

Environmental Pollution, Manuscript Draft

Title:

Lead Isotopes Ratio (LIR) Analysis and Source Apportionment of Lead among Pregnant Women, Newborns and Children in Pakistan

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Abstract:

Lead has been controlled in petrol since 2001 in Pakistan. However, high blood lead levels have been reported among newborns and young children in recent surveys. Different sources of lead exposure including surma (eye cosmetics) have been implicated for lead exposure in studies in Pakistan; however these studies used weak methodology. We objectively assessed using lead isotope ratio (LIR) analysis methodology for possible sources of lead exposure among pregnant women (in turn newborn) and young children (1-3 years) in megacity, Karachi, Pakistan. Of the total 23, selected high and low lead level samples based on pregnant women's blood levels were collected, where simultaneously blood from cord blood (for newborn) and 1-3 year old child was also collected from the same family. In addition, three-day food duplicate samples for women and young child, house-dust, drinking water, respirable dust and petrol and engine lubricant from the surrounding gas stations were analyzed for lead content. All these samples were correlated using LIR to determine the important sources of exposure for lead in this population. Food is the most important contributor for lead exposure among pregnant women and young children. LIR of food and blood sample contains similar isotopes as that in petrol. Therefore, past contamination of environment by petrol emission is contributing to contamination of food, either directly or indirectly through agricultural sources. Food protection and agricultural practices need to improve to reduce further exposure to the population in the near term. Further studies are needed to identify routes of contamination of food in this population.

