NEPAL

A. Regulation on sources

Source of lead	Relevant legislation/regulation	Government agencies	Data source
1. Used lead-acid battery recycling	1. No specific regulations for ULAB recycling. As of 2017, all ULAB exported to India for recycling. 2. In 2011 the Government commissioned the Alternative Energy Promotion Centre (AEPC) to set up an expert mission to examine the state of the processing of ULAB. 3. There was some attempt to draft rules related to the handling and management of ULABs. In November 2019, the AEPC invited Expression of Interest for the project "Permanent Establishment and Operation of a ULAB Management and Recycling Plant in Nepal"	a. Ministry of Environment/ Ministry of Science Technology and Environment (MOSTE) b. Alternative Energy Promotion Centre (AEPC)	1. Wilson, Brian, and Wim Van Breusegem. 2017."Sustainable Used Lead Acid Battery Management Solutions for Emerging Economies: Case Study – Nepal." Presented at the Pb 2017, Berlin. 2. UNEP. 2015. WORKSHOP ON SOUND MANAGEMENT OF USED LEAD ACID BATTERIES. 3. Alternative Energy Promotion Centre. 2019. "Expression of Interest (EoI) for Permanent Establishment and Operation of a ULAB Management and Recycling Plant in Nepal."
2. Standards for lead in food	1. The 2018 Food and Food Products rules and regulations provides a detailed list of maximum permissible limits for lead in different food commodities	a. Department of Food Technology and Quality Control (DFTQC) b. Department of Food Technology and Quality Control (DFTQC)	1. Department of Food Technology and Quality Control. 2018.

Source of lead	Relevant legislation/regulation	Government agencies	Data source
3. Standards for lead in cookware	1. No specific set of regulations around cookware found so far		
4. Standards for occupational exposure	1. The new Labour Act (2017) replaces old Labour Act (1992). Has a separate chapter on " Provisions Relating to Occupational Safety and Health" (unable to access as original document is in Nepali). 2. Around the same time, a National Occupational Safety and Health Policy was developed in conjunction with the ILO. 3. The Ministry of Federal Affairs and Local Development/Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) developed and adopted Occupational Safety and Health (OSH) guidelines for projects undertaken by the department, which include specific guideline values for 3 lead compounds in the air (0.5 to 1 microgram/cubic metre per hour)	a. Ministry of Labour, Employment and Social Security b. Ministry of Federal Affairs and Local Government	1. ILO. 2021. "Database of National Labour, Social Security and Related Human Rights Legislation." 2. ILO. n.d. "Safety and Health at Work in Nepal (ILO in Nepal)." 3. Ministry of Federal Affairs and Local Government. 2017. Occupational Safety and Health Guidelines.
5. Lead in paint	1. In June 2015, the Ministry of Science Technology and Environment (MOSTE) enacted lead paint standard of 90 ppm and mandated label paints can with lead content and protective precautionary measures to prevent occupational exposure.	a. Ministry of Environment/ Ministry of Science Technology and Environment (MOSTE)	1. IPEN. 2018. "Press Release: The Supreme Court of Nepal Upholds Lead Paint Standard."
6. Waste generated from	1. The Solid Waste Management Act 2011 addresses industrial and hazardous waste, but there is no	a. Ministry of Federal Affairs and Local Government	1. Ministry of Local Development. 2011. "Solid Waste

Source of lead	Relevant legislation/regulation	Government agencies	Data source
smelting or mining	separate mention of waste from mining or smelting as of 2018.	b. Ministry of Environment/ Ministry of Science Technology and Environment (MOSTE)	Management Act, 2068 (2011)."

B. International Agreements

Agreement	Year Ratified
1. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	1996 (Accession)
2. Rotterdam Convention on the Prior Informed Consent Procedure for certain hazardous Chemicals and Pesticides in international trade	2007 (Accession)
3. Stockholm Convention on Persistent Organic Pollutants	2007

C. Blood lead-level monitoring programs

No details of a national or regional level structured program for blood lead level testing found.

D. Inventory of toxic sites (Toxic Sites Identification Program (TSIP), Pure Earth)

Site	Province/Region	Details (all data comes from the TSIP website)
1. Raghupati Jute Mill, Biratnagar	Morang	
2. Sugar Mill, Rani Bari, Biratnagar	Morang	
3. Bagmati Plastic Industries Pvt Ltd	Morang	
4. Cigarette Factory, Janakpur		
5. Everest Sugar Mills, Mahottarai,Ramnagar	Dhanusha	
6. RC Lead and Battery Factory, Bardibash, Mahottarai		
7. Paint Industries of Hetauda Area		
8. Feed Industry, Juggernautpur	Birgunj	
9. Unitech Cement Factory	Bara	
10. Surya Nepal Pvt Ltd, Simara	Birgunj	
11. Jagadamba Steel Factory, Bara		
12. Yeti Polychem Pvt Ltd, Hetauda industrial are		
13. Abandoned Marble Factory, Godawari	Lalitpur	
14. Varun + Galaxy Iron industries, Bharatpur	Chitwan	
15. Brick kiln, Chagunarayan, Bhaktapur		
16. Hukam Pharma Industry, Madhyapur Thimi Bhaktapur		

Site	Province/Region	Details (all data comes from the TSIP website)
17. Small metalworks industry, Balkumari, Lalitpur		
18. Mayur Dyeing Factory, Lalitpur		
19. Dhobi Khola River, Kathmandu Valley	Bagmati	The dumping of both industrial and household waste is contaminating the Dhobi Khola River as well as nearby agricultural soils with lead. Edible vegetables show traces of the pollutant above safe limits.
20. Kepy Cement, Dhading		
21. Janakpur alcohol factory, Dharamwan 10, Janakpur		
22. Gorkhkhali Rubber Industry, Majuwa, Derauli	Gorkha	
23. Bhrikuti Pulp Paper, Gaindakot, Nawalparasi		
24. Hamal + Priya Plastic Udyog, Bharatpur	Chitwan	
25. Time Pharma Pvt Ltd, Bhaisakhori, Nawalparasi		
26. Chaudhary Udyog Gram, Dumkauli, Nawalparasi		
27. Laxmi Steels, Sunwal, Nawalparasi		

E. Scientific papers on lead exposure (please contact info@gahp.net for information on studies not in the public domain)

Topic	Authors	Year	Title	Abstract/ description
Childhood exposure	Meghnath Dhimal, Khem Bahadur Karki, Krishna Kumar Aryal, Bimala Dhimal, Hari Datt Joshi, Sajan Puri, Achyut Raj Pandey, Purushotam Dhakal, Arun Kumar Sharma,Ganendra Bhakta Raya, Imran Ansari, David A. Groneberg, Ruth Müller, Ulrich Kuch	2017	High blood levels of lead in children aged 6-36 months in Kathmandu Valley, Nepal: A cross-sectional study of associated factors	**Background:** Young children are at greatest risk of exposure to lead and its effects. Although lead is one of the most widely used elements with known health hazard, there is little data on the blood lead level (BLL) of children in the Kathmandu Valley. Thus, this study aimed to assess factors associated with high BLL in children who were 6–36 months of age and resided in the Kathmandu Valley. **Methods:** In this hospital-based cross-sectional study 6–36-month-old children visiting the Paediatrics Outpatient Department of Tribhuvan University Teaching Hospital, Patan Hospital, and Siddhi Memorial Hospital were enrolled. All three hospitals are located in different areas inside the Kathmandu Valley. Written informed consent was obtained from the parents, and exposure data were collected using a structured questionnaire. Portable Anodic Stripping Voltammetry (ASV) was used to determine BLLs in children. Data were analyzed using SPSS version 16. **Results:** Of 312 children enrolled in the study, 64.4% had BLLs ≥5µg/dl. A significant association was found between BLL and exposure to enamel paints in the household in the form of painting materials used in different parts of the house like walls, windows and doors ($p = 0.001$). Furthermore, multivariate analyses showed that BLLs were 4.5 times higher in children playing with dirt and dust ($p = 0.006$) and that children belonging to the community of lower caste/ethnicity groups had significantly higher BLLs compared to those from the upper caste groups ($p = 0.02$). Our study demonstrated that children living in households that have used enamel paints, children belonging to lower caste/ethnic groups, and children frequently playing with dirt and dust had significantly higher BLLs. The results of this study highlight the importance of policy decisions to limit environmental lead contamination, and to roll out awareness building measures designed to limit lead exposure and break the poverty cycle associated with chronic lead poisoning.

Topic	Authors	Year	Title	Abstract/ description
Childhood exposure	Gautam, K., S. Pradhan, V. Thuppil, D. Pyakurel, and A. Shrestha.	2017	Blood Lead Level among school children in an Industrial city of Nepal	**Background:** Widespread use of lead has caused extensive environmental contamination and health problems in many parts of the world. Children are particularly vulnerable and even relatively low levels of exposure can cause serious health conditions. Our objective was to determine the prevalence of blood lead level in children in industrial city of Nepal, Birgunj. **Methods:** The cross-sectional study was done on 50 school going student in Birgunj city, Nepal from November 2016 to January 2017. Questionnaire was used to collect data. Capillary blood was drawn and Blood Lead Level was measured immediately. SPSS ver. 22 was used to analyze the data. **Results:** The mean age of children in study was 12.5 ± 1.11 years. Among 50 children, 54% were male and 46% were female. The mean blood lead level was 20.33±9.36 µg/dl (male 21.08±8.87µg/dl, female 19.46±10.92 µg/dl). All the children in the study have elevated blood lead level and 84% of them have >10 µg/dl. About 26% of children have blood lead level between 15-20 µg/dl, 12% have level 20-25 µg/dl and 4% of them have more than 35 µg/dl.
Childhood exposure	Rajendra PrasadParajuli, Takeo Fujiwaraa, Masahiro Umezaki. Chiho Watanabe	2013	Association of cord blood levels of lead, arsenic, and zinc with neurodevelopmental indicators in newborns: A birth cohort study in Chitwan Valley, Nepal	**Background:** In this study, we aimed to investigate the association between in utero toxic (lead [Pb] and arsenic [As]) and essential element (zinc [Zn]) levels and neurodevelopmental indicators after birth in Chitwan Valley, Nepal. **Methods:** We conducted a hospital-based birth cohort study with 100 pregnant women in Chitwan, Nepal. We measured Pb, As, and Zn concentrations in cord blood. We assessed 100 infants at 1 day after birth, using the Brazelton neonatal behavioral assessment scale, third edition (NBAS III). Multivariate regression was performed to adjust for mother's age, parity, educational level, and body mass index (BMI); family income; and newborn's birth weight, gestational age, and age in hours at the time of NBAS III assessment. **Results:** Among the 7 clusters of NBAS III, the motor cluster score was inversely associated with the cord blood levels of Pb (coefficient=−2.15, at 95% confidence interval [CI]=−4.27 to −0.03). The cord blood levels of As were inversely associated with the state regulation cluster score (coefficient=−6.71, at 95% CI=−12.17 to

Topic	Authors	Year	Title	Abstract/ description
				−1.24). The cord blood levels of Zn were not associated with NBAS III scores. The cord blood levels of Pb and As, but not Zn, showed significant inverse association with the neurodevelopment of newborns. These results suggest that high levels of Pb or As exposure during the prenatal period may induce retardation during in utero neurodevelopment.
Lead in cosmetics	Sah, Ram Charitra	2012	Poisonous Cosmetics: The problem of lead in Lipsticks in Nepal	**Background:** Cosmetics are being used from the early historical era but simply the form of the cosmetics and the way of using it was different. From the time immemorial both the men and women are equally fund of cosmetics. In earlier days people use to mix different types of chemicals and products to make cosmetics to be applied in their face which include even the heavy metals. Galena Mesdemet is one example of such cosmetic used in ancient Egyptian period. It is an eye product that is made up of copper and lead ore. Different literatures available prove that the heavy metals are used in large quantity in cosmetics during different time period depending in the products of cosmetics they wanted to use. And these cosmetics that have been prepared as heavy metals as there ingredients is very toxic to health. It may cause various problems like damage in brain, kidney, nervous system, reproductive system and even cause a cancer and death. Many European and African countries have banned heavy metals in cosmetics and even fix the standard. However, Nepal does not have any standards, guidelines or policies regarding the concentration of heavy metals in cosmetics or in any other products. There is no any government agencies responsible for regulating chemicals in cosmetics in Nepal. Therefore, there is no limit for such impurities in products in Nepal. For this reason, under this study the guideline considered for analyzing the result of lead in lipstick is US Food and Drug Administration's 0.1 ppm of lead in candy standard since there is no exact guidelines for lead in lipsticks. This was the first ever study carried out by CEPHED in Nepal about chemicals in product

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				especially in cosmetics to inform the wide users about the level of contamination and associated health impacts. **Methods:** Basically the study was done in very popular and most used cosmetic products: lipsticks. The concentration observed in these products were Lead, a very toxic chemical at very alarming level of health concern. 8 Samples of different most common and popular brand of Lipsticks were collected from different market areas of Kathmandu. The collected lipsticks samples were tested for lead (Pb) at Nepal Environmental and Scientific Services (P) Ltd, Kathmandu, Nepal. Lead in lipsticks samples were tested by AAS method. The result shows that the popular lipsticks available in the Nepalese market contain very high level of lead enough to cause different kinds of disabilities and problems in human health up on continuous use. **Results:** The test result of lead in lipstick shows the alarming amount of lead contamination. All the samples of lipsticks have lead level higher than USFDA guidelines of 0.1 ppm. The highest amount of lead concentration was found in blood red color of MAC brand lipstick (i.e. 145 ppm, 1450 times higher than USFDA guidelines). The lowest amount was found in berry- berry 18 of Loreal Paris brand (i.e. 30 ppm, 300 times higher than the USFDA guidelines). The market survey shows that there is no any monitoring regarding quality, sell, import and distribution of cosmetics in Nepalese market. There is no proper labeling of ingredients in the cosmetic products and specially regarding heavy metals. So, general people are not aware of such contamination in the product they are relying on. Therefore, there is an immediate need to formulate a guidelines and standards regarding the heavy metal concentration in cosmetics to minimize the exposure of general public with toxic heavy metals as well as there should be some institutional arrangement to regulate the sector. The mass awareness about the chemicals in products especially in cosmetics needs to be launched.

F. Blood testing in National Health Surveys

National Health Survey	Nepal Demographic and Health Survey (NDHS)	Source
Purpose	The objective of the NDHS 2016 is to provide information on fertility levels, marriage, fertility preferences, awareness and use of family planning methods, child feeding practices, nutrition, adult and childhood mortality, awareness and attitudes regarding HIV/AIDS, women's empowerment, and domestic violence.	Ministry of Health - MOH/Nepal, New ERA/Nepal, and ICF. 2017. Nepal Demographic and Health Survey 2016. Kathmandu, Nepal: MOH/Nepal, New ERA/Nepal, and ICF.
Sample size	The nationally representative sample consists of 12,862 women (age 15 to 49) and 4,063 men (age 15 to 49) from 11,040 households.	
Blood sample testing	Blood tests were conducted for the presence of anemia in women and children ages 6-59 months,	
Latest round	2016-17	
Next round	2021 (ongoing)	