

EGYPT

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A. Regulation on sources

Source of lead	Relevant legislation/regulation	Government agencies	Data source
1. Used lead-acid battery recycling	1. Egyptian national regulations prohibit exporting used lead acid batteries. No other specific regulations around ULAB found	a. Ministry of Environment b. Egyptian Environmental Affairs Agency	1. Buchert, Matthias, Andreas Manhart, Georg Mehlhart, Stefanie Degreif, Daniel Bleher, Tobias Schleicher, Ir Christina Meskers, Marcel Picard, Franziska Weber, and Sascha Walgenbach . 2016. "Transition to Sound Recycling of E-Waste and Car Waste in Developing Countries."
2. Standards for lead in food	1. The Egyptian government is a member of Codex Alimentarius Commission, a joint FAO/WHO food standards program. 2. The Commission set limits of no more than 0.1 mg of lead per kg of pulses (such as lentils and dried beans), 0.4mg/kg for jams, jellies and marmalades, and 0.05 mg/kg for preserved tomatoes, amongst other maximum levels for processed fruits and vegetables. 3. No other specific set of regulations found. Some specific food safety regulations seem to be there, the documents are in Arabic	a. Ministry of Health b. National Food Safety Authority	1. FAO . 2019. "General Standard for Contaminants and Toxins in Food and Feed."

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	<ol style="list-style-type: none"> 'Lead poisoning and sequels' is included in the list of occupational diseases of the Social (and Health) Insurance Law, 1975. Law no. 4 of 1994 (Environment Law) sets the maximum limits of different type of lead air pollution inside the workplace (according to type of industry). 	<ol style="list-style-type: none"> Ministry of Manpower and Immigration Ministry of Environment 	<ol style="list-style-type: none"> ILO. 2021. "Database of National Labour, Social Security and Related Human Rights Legislation." Ministry of Environment. 1994. "LAW NUMBER 4 OF 1994 PROMULGATING THE ENVIRONMENT LAW."
5. Lead in paint	1. No known law		1. SAICM . 2020. "Lead Paint Law Status Interactive Map." <i>SAICM Knowledge</i> .
6. Waste generated from smelting or mining	1. Law no. 4 of 1994 (Environment Law) sets the permissible limit on emissions from casting and extraction of lead at 100 mg/m ³ while maximum limit on gas and fume lead emissions from industrial waste at 20 mg/m ³	<ol style="list-style-type: none"> Ministry of Environment Egyptian Environmental Affairs Agency 	1. Ministry of Environment 1994. "LAW NUMBER 4 OF 1994 PROMULGATING THE ENVIRONMENT LAW."

B. International Agreements

Agreement	Year Ratified
1. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Accession)	1993 (Accession), 2004
2. Stockholm Convention on Persistent Organic Pollutants	2003

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)

No sites identified

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	Moawad, Eman Mohamed Ibraheim, Nashwa Mostafa Badawy, and Marie Manawill	2016	Environmental and Occupational Lead Exposure Among Children in Cairo, Egypt	<p>Background: The aim of this study was to assess childhood lead exposure in a representative sample of Cairo, and to investigate the possible risk factors and sources of exposure.</p> <p>Methods: This cross-sectional study was conducted from November 2014 through April 2015. The target population was children aged 6 to 18 years, recruited into 4 groups, garbage city, moderate-living standard area, urban and suburban schools, and workshops in the city of Cairo. Blood lead levels (BLLs) and hemoglobin (Hb) concentrations were measured. Also, potential local environmental sources were assessed for hazardous lead contamination.</p> <p>Results: Analysis on 400 participants has been carried out. A total of 113 children had BLLs in the range 10 to 20 µg/dL. Smoking fathers, housing conditions, playing outdoors, and exposure to lead in residential areas were significantly correlated with high BLLs. The mean values of hemoglobin were inversely correlated with BLLs. Children involved in pottery workshops had the highest BLLs and the lowest Hb values with a mean of (43.3 µg/dL and 8.6 g/dL, respectively). The mean value of environmental lead in workshop areas exceeded the recommended levels. Also, those values measured in dust and paint samples of garbage city were significantly high. Moreover, the mean lead levels in the soil samples were significantly higher in urban schools (P=0.03) than the suburban ones. Childhood lead poisoning accounts for a substantial burden in Egypt, which could be preventable. Development of national prevention programs including universal screening program should be designed to reduce incidence of lead toxicity among children.</p>
Childhood exposure	GM Abdel Rasoul, MA Al-Batanony, OA Mahrous, ME Abo-Salem, HM Gabr	2012	Environmental Lead Exposure among Primary School Children in Shebin El-Kom District, Menoufiya Governorate, Egypt	<p>Background: Lead still remains an important problem for poor, inner-city, ethnic minority children, with a particular emphasis on lead paint and dust. In Egypt, there is no national survey about the prevalence of elevated blood lead level among children.</p> <p>Objective: To assess the environmental lead level as well as to determine blood lead level among primary school children and find out its relationship</p>

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				<p>with their intelligent quotient (IQ), hemoglobin level, hearing impairment and school performance.</p> <p>Methods: 190 primary school children from rural and urban areas were selected and their blood lead levels (BLL), hemoglobin concentrations, IQ, hearing threshold and school performance were measured. Also, environmental lead level was measured in the school and home.</p> <p>Results: The mean value of environmental lead ($\mu\text{g}/\text{m}^3$) in urban schools air was significantly higher than that in rural areas. BLL had a significant negative correlation with hemoglobin level and IQ; it was positively correlated with the hearing threshold. With increasing BLL, the school performance of children decreased significantly.</p> <p>Conclusion: Exposure to lead would deteriorate IQ, school performance and hearing level of school children. Even in the absence of overt clinical manifestations of lead toxicity, lead intoxication should be among differential diagnosis in children presenting anemia, intellectual impairment, poor academic performance and hearing impairment.</p>
Childhood exposure	Sharaf, Nevin, Alia Shakour, Nagat Amer, Mahmoud Abou-Donia, and Nevin Khatab	2008	Evaluation of Children's Blood Lead Level in Cairo, Egypt	<p>Background: Lead is a highly toxic pollutant, exposure to which can produce wide range of adverse health effects for both adults and children, but childhood lead poisoning is more frequent. There's no safe exposure to lead, CDC has defined an elevated BLL's as $\geq 10 \text{ ug}/\text{dl}$ but evidence exists for subtle effects at lower levels. In Egypt, children are exposed to lead from airborne lead and lead bearing dust. The aim of this study was to evaluate lead pollution abatement on children's blood lead level.</p> <p>Methods: Data of year 1999 and 2002 has been taken from the lead monitoring stations, which are distributed by EEAA all over the Cairo city, they are used to identify sources of atmospheric lead then to assess a relation between the concentration of lead in 4 areas representing the different activities present in Cairo city and BLLs of children living in these areas.</p> <p>Results: The mean value of blood lead level in the studied population was ($4.817 \pm 2.97 \text{ ug}/\text{dl}$) with a range (1.1-14.3), the mean of children's BLLs living in the traffic areas showed the highest mean, followed by that of the mixed areas then that of the residential areas and finally that of the industrial areas, while the same pattern could be seen also in the atmospheric lead concentration for year 2002 in the studied areas, where the maximum</p>

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				concentration of atmospheric lead was recorded in the traffic areas followed by the mixed areas and finally that of the residential areas. The total mean of atmospheric lead concentration for year 2002 was significantly decreased in comparison to that for year 1999 especially for the industrial areas followed by the residential areas, then the traffic areas, which means by the year 2002, there was a control on emissions of lead from the industrial sources. There were no correlation between concentrations of atmospheric lead during year 2002 and BLLs of children living in the 4 studied areas, because the decreasing percentage of atmospheric lead concentration was not great.
Food Exposure	Soad A. Ismail & Said K Abolghait	2019	Estimation of Lead and Cadmium residual levels in chicken giblets at retail markets in Ismailia city, Egypt	<p>Background: Lead (Pb) and Cadmium (Cd) are environmental contaminants of food which have deleterious cumulative effect on human health.</p> <p>Methods: Using flame atomic absorption spectrometer (FAAS), the concentrations of Pb and Cd were estimated in 60 samples of chicken giblets comprising of broiler livers, gizzards and hearts collected randomly from retail markets in Ismailia city, Egypt.</p> <p>Results: The greatest Pb concentrations were found in liver samples (0.8762 ± 0.2089 ppm), whereas gizzard samples contain 0.3186 ± 0.1462 ppm and lowest levels of Pb were detected in heart samples 0.1733 ± 0.06777 ppm. Cd deposited in liver samples reached 0.040714 ± 0.0290 ppm; however gizzard and heart samples contain negligible Cd concentrations (0.0041 ± 0.0028 and 0.0036 ± 0.008 ppm, respectively). These data interpreted that Pb residual concentration, particularly in chicken liver sold in Ismailia city, is more than the permissible limit (0.5 ppm) in the Codex Alimentarius international food standards and thus may be hazardous to human consumption and more serious inspection procedures should be applied by the veterinary authorities therein.</p>
Food Exposure	Loutfy, Naglaa, A. Mentler, Maha Shoeab, M. Tawfic Ahmed, and	2011	Analysis and exposure assessment of some heavy metals in foodstuffs from Ismailia city, Egypt	<p>Background: Food is the major source of metal exposure for the nonsmoking general population. Food samples of plant and animal origin from Ismailia, Egypt, were analyzed for the content of cadmium (Cd), lead (Pb), chromium (Cr), zinc (Zn), and copper (Cu) using AAS.</p> <p>Results: The Cr, Zn, and Cu concentrations were in the range of 1.7–249 $\mu\text{g kg}^{-1}$ wet weight (ww), 2–66 mg kg^{-1} ww, and 0.5–3.46 mg kg^{-1} ww, respectively. The mean daily intake of Cr, Zn, and Cu was 28.9 $\mu\text{g day}^{-1}$, 8.55 mg day^{-1}, and 1.7 mg day^{-1}, respectively. The intake estimates are</p>

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	M. Fűracker			within the range of the recommended intake established internationally. Concentrations of Cd and Pb were in the range of 10–321 $\mu\text{g kg}^{-1}$ ww and 31–1200 $\mu\text{g kg}^{-1}$ ww, respectively. The weekly dietary intake for Cd and Pb (4.02 and 20.4 $\mu\text{g kg}^{-1}$ b.w, respectively) is lower than the FAO/WHO PTWI. Bread is the foodstuff that provided the highest rate of Pb and Cd (62 and 46% of the daily intake) to adults in Ismailia city.
Maternal lead exposure	SM Motawei, SM Attalla, HE Gouda, MA El-Harouny, AM El-Mansoury	2013	Lead Level in Pregnant Women Suffering from Pre-eclampsia in Dakahlia, Egypt	<p>Background: Lead toxicity is a prevalent health problem in both developed and developing countries. One of the proposed mechanisms for lead-induced organ damage is oxidative stress. Oxidative stress is well-associated with the pregnancy disorder, pre-eclampsia. Exposure to lead may be one of the sources of the oxidative stress that leads to development of pre-eclampsia in pregnant women.</p> <p>Objective: To test if blood lead level of pregnant women suffering from pre-eclampsia is higher than the normal limit. Methods: Using atomic absorption spectrophotometry, blood lead level was measured in 115 pregnant women suffering from pre-eclampsia and compared to its level in a comparison group of 25 healthy pregnant women in Dakahlia governorate, Egypt.</p> <p>Results: The mean\pmSD blood lead level was 37.68\pm9.17 $\mu\text{g/dL}$ in women with pre-eclampsia; the value in the comparison group was 14.5\pm3.18 $\mu\text{g/dL}$ ($p < 0.001$).</p> <p>Conclusion: Pre-eclampsia is significantly associated with a high blood lead level.</p>
Maternal lead exposure	Mahmoud A.Saleh, Awad A.Ragab, Alaa Kamel, Joseph Jones, Abdel Khalek El-Sebae	1996	Regional distribution of lead in human milk from Egypt	<p>Background: Bioaccumulation of lead during chronic exposure and its mobilization and secretion with mother's milk constitute a serious health hazard to the newly born children. Lead levels in human breast milk of 120</p> <p>Methods: Egyptian women representing 20 different governorates throughout Egypt were determined using a graphite furnace Atomic Absorption spectrometer.</p> <p>Results: According to the daily permissible intake (DPI) value established by the WHO of 5.0 $\mu\text{g/kg/d}$ in mother's milk, the mean values of lead were around the permissible level in most of the Egyptian governorates. However, lead levels in mother's milk from Alexandria, Assiut and Cairo were significantly higher than the permissible value. Higher lead levels in mother's</p>

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				milk from these governorates may be attributed to heavy automobile traffic using leaded gasoline in addition to the use of lead water pipelines in these areas.
Water Exposure	Mandour, Raafat A., Abdel-Aziz Ghanem, and Somaia M. El-Azab	2013	Correlation between lead levels in drinking water and mothers' breast milk: Dakahlia, Egypt	<p>Methods: This study was performed on fifty-two drinking tap water samples (surface and groundwater) collected from different districts of Dakahlia Governorate and fifty-two breast milk samples from lactating mothers hosted in Dakahlia Governorate hospitals. All these samples were subjected to lead analysis.</p> <p>Results: Lead level in drinking groundwater showed higher levels than in drinking surface water. Also, an elevation of lead levels in breast milk of mothers drinking groundwater was noticed when compared with that of mothers drinking surface water. The comparison between mean lead levels in drinking water and mothers' breast milk samples showed positive relationship. Lead concentrations in breast milk of the studied samples were elevated by exposure to smoking. We conclude that prolonged contact with lead plumbing can increase the lead content in tap water with subsequent increase in lead burden in infant fed formula and infant blood. Also, we recommend that chemical analyses must be carried out periodically for the surface and groundwater to ensure the water suitability for drinking purposes. Passive exposure to smoking during lactation should be avoided.</p>

F. Blood testing in National Health Surveys

National Health Survey	Egypt Demographic and Health Survey (EDHS)	Source
Purpose	The 2014 EDHS was undertaken to provide estimates for key indicators such as fertility, contraceptive use, infant and child mortality, immunization levels, coverage of antenatal and delivery care, nutrition, and prevalence of anemia. In addition, the survey was designed to provide information on the prevalence of female circumcision, domestic violence, and children's welfare	Ministry of Health and Population/Egypt, El-Zanaty and Associates/Egypt, and ICF International . 2015. Egypt Demographic and Health Survey 2014. Cairo, Egypt: Ministry of Health and Population and ICF International.
Sample size	21,762 ever-married women (age 15-49 years) from 28,175 households were part of the sample.	
Blood sample testing	Blood samples were collected from ever married women age 15-49 and children age 0-19 years in one-third of sample households for anaemia testing.	
Latest round	2014	
Next round	Unknown	