DOMINICAN REPUBLIC

A. Regulation on sources

Source of lead	Relevant legislation/regulation	Government agencies	Data source
1. Lead in gasoline	1. The State will take all measures necessary to prevent the manufacture, import, sale, and use of gasoline containing tetraethyl lead.	a. Government of the Dominican Republic b. The Secretary of State for the Environment and Natural Resources	1. Ley General sobre Medio Ambiente y Recursos Naturales (64-00), 2000
	No other standards found at this time for lead.		

B. International Agreements

Agreement	Year Ratified
1. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	2000 (a)[1]
2. Rotterdam Convention on the Prior Informed Consent Procedure for certain hazardous Chemicals and Pesticides in international trade	2006 (a)
3. Minamata Convention on Mercury	2018
4. Stockholm Convention on Persistent Organic Pollutants	2007

[1] Accession (a)

C. Blood lead-level monitoring programs

Details	Data source
1. No details of a national or regional level structured program for blood lead level testing found. However, published studies point to some presence of testing programs at the local level.	1. Refer to section E on scientific papers that perform blood lead-level sampling

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

Site	Province/Region	Details (all data comes from the TSIP website)
Haina	San Cristobal	A legacy battery recycling plant has left residual lead slag / oxide and contaminated topsoil and subsequently the air in this region with lead. The contaminant was also found in the blood of children.

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
Blood-lead levels	Olympio, Kelly; Goncalves, Claudia; Salles, Fernanda; Ferreira, Ana Paula; Soares, Agnes; Buzalaf, Marilia; Cardoso, Maria;	2017	What are the blood lead levels of children living in Latin America and the Caribbean?	**Abstract:** Information on the prevalence of lead exposure is essential to formulate efficient public health policies. Developed countries have implemented successful public policies for the prevention and control of lead poisoning. In the United States, Canada, Japan and the European Union, for instance, periodically repeated prevalence studies show that blood lead levels (BLLs) in children have decreased overall. Although BLL of Latino children in the U.S. have also dropped in recent years, the geometric mean remains higher than that of white children. Little is known about lead exposure in children in Latin America and the Caribbean (LAC). In this

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	Bechara, Etelvino			review, we responded to two questions: What is currently known about lead sources and levels in children in LAC? Are there public policies to prevent children's exposure to lead in LAC?
	Kaul, Balkrishena; Mukerjee, Himansu	2013	Elevated Blood Lead and Erythrocyte Protoporphyrin Levels of Children Near a Battery-recycling Plant in Haina, Dominican Republic	**Abstract:** A survey of children from a community adjacent to an auto-battery-recycling smelter in Raina, the Dominican Republic, revealed alarming elevations of blood lead (B-Pb) and erythrocyte protoporphyrin (EP-ZnPP) compared with controls. The authors recommend follow-up confirmation and treatment of severely lead-poisoned children, shutdown of the plant, controlled disposal of the hazardous waste from the site, and relocation of the community.
Lead contamination	Ratick, Samuel; Osleeb, Jeffrey	2013	Measuring the vulnerability of populations susceptible to lead contamination in the Dominican Republic: evaluating composite index construction methods	**Abstract:** There are several suspected sources of lead contamination in the Dominican Republic (DR)to which populations, to a greater or lesser extent, may be exposed. These sources include: a lead battery recycling plant, a gold mine and vehicles using leaded gasoline. In this paper we create and compare indices of spatial vulnerability using different index construction methods including: the weighted average, ordered weighted average, and Data Envelopment Analysis. The vulnerability attributes used to create these indices include: exposure to lead effluents in water from the gold mine as measured by distance from potentially contaminated water, point source lead air emissions from the battery recycling plant estimated by air plume analysis; and mobile source exposure to lead emissions from road transportation measured by potential traffic impacts. The intensities of vulnerability to lead of the towns and cities in the DR, produced by each of the different index construction methods, are compared and evaluated.

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Lead exposure	Espinal, Georgina; Rodriguez, Aurora	2009	Estimation of the population exposed to lead poisoning in Villa Francisca, Santo Domingo	**Abstract:** Lead exposure is a serious public health problem as it affects populations, leading to aggressive results on the most vulnerable socio-economic levels: children, women, workers. The overall objective of this study is to establish, in terms of distance, the zone of influence of lead emission sources in the district of Villa Francisca, Santo Domingo, using the geographic information system, in order to estimate the size of the exposed population. This study is descriptive and transversal. We considered the environmental sector, the demographic information, sources of emission of lead, lead levels in blood of children and environmental lead levels. These variables were related in the space sector to determine the geographical area of influence of emission sources and estimate the size of the exposedpopulation.36.5% of children presented high blood levels of lead, directly related to the closeness of workshops that deal with lead. According to the influence area of emission sources identified, we felt that the exposed population in this neighbourhood is the general population estimated at 23, 103 inhabitants. Therefore, we recommend a government intervention in order to take measures to control emissions of lead and to seek alternatives for survival that will not affect negatively the people who live there, nor the environment.
Lead in species	Tejada, Pamela; Rodriguez, Yaset; Rodriguez de Francisco, Luis, Perdomo, Omar; Boluda, Carlos	2021	Lead, chromium, nickel, copper and zinc levels in Sargassum species reached the coasts of Dominican Republic during 2019: A preliminary evaluation for the use of algal biomass as fertilizer and animal feeding	**Abstract:** The repetitive invasive episodes of Sargassum natans and Sargassum fluitans on the Caribbean coasts during the last years have become a first-order problem threatening tourism, fishing, and local fauna. New massive seaweed arrivals are nowadays expected and could be considered in the near future a normal event, with its associated problems. Appropriate solutions, taking advantage of algal biomass, are necessary to overcome this problem. Due to the well-known ability of these algae to accumulate heavy metals, applications related to animal feeding and agriculture must necessarily be preceded by chemical analysis that guarantees the harmlessness of the algal material. In this research, the contents of lead (Pb), chromium (Cr), nickel (Ni), copper (Cu), cadmium (Cd) and the less toxic zinc (Zn) in S. natans and S. fluitans arrived in the dominican coast during 2019 were analyzed, by using flame atomic absorption spectroscopy (FAAS). The results showed significant levels of copper, although the concentration of all detected metals were within the normal values, reflecting the safety of the algal material as far as these

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				metals are concerned, for use as fertilizers and animal feed. No significant differences in the contents of these elements were found between both species.
Lead poisoning	Ratick, Sam; Osleeb, Jeffrey; Si, Kangping	2015	The Maximal Cover Location Model with Hedging: Siting Facilities under Uncertainty, a Lead Poisoning Screening Network for the Dominican Republic	**Abstract:** The maximal covering location problem (MCLP) model and the large number of applications and modifications that have emanated from it have been extensively used to site facility networks in a wide variety of applications. In this article, we formulate and apply an extension of MCLP, the Maximal Covering Location Problem with Hedging (MCLPH), to address the problem of siting facilities when the demand for service from those facilities is uncertain. The MCLPH model treats the maximal cover of different potential demand populations in the system as different objectives for the MCLP, with some lexicographic ordering of objectives related to the degree of uncertainty about the sizes and spatial pattern of those demands. We apply the MCLPH model to the problem of designing a medical network of screening facilities for people who may have been exposed to lead contamination in the Dominican Republic (DR). In the DR, there are three suspected sources of lead contamination, waterborne lead from runoff as a result of gold mining activities, airborne lead contamination from the emissions of a battery recycling plant, and airborne lead from the use of leaded gasoline in transportation. The geographical patterns of contamination from these three sources are different and therefore, the populations of the cities and towns in the DR can be expected to be differentially exposed depending upon which is the actual source of the lead. A geographical information system-based hazard analysis is used to provide input data to the MCLPH and to display and evaluate the resulting facility location patterns.

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	Kaul, B; Sandhu, S; Deptratt, C; Reyes, F	1999	Follow-up screening of lead-poisoned children near an auto battery recycling plant, Haina, Dominican Republic.	**Abstract:** In August 1997 we performed a follow-up survey of 146 lead-poisoned children from a community near a previously active auto battery recycling smelter in Haina near Santo Domingo, Dominican Republic. Our follow-up survey confirmed a severe incidence of elevated blood lead (BPb) and erythrocyte protoporphyrin/zinc protoporphyrin (EP-ZnPP) levels. The mean BPb level was 32 micrograms/dL and the mean EP-ZnPP level was 128 micrograms/dL. The frequency distribution of BPb showed that only 9% of the children had BPb levels below the currently acceptable 10 micrograms/dL threshold level, 23% had between 10 and 19 micrograms/dL, 40% had between 20 and 39 micrograms/dL, 27% had between 40 and 99 micrograms/dL, and the remainder had > 100 micrograms/dL. These findings are significantly greater than the mean BPb and EP-ZnPP levels of 14 and 35 micrograms/dL, respectively, in a comparison group of 63 children in Barsequillo, 4 miles away. BPb frequency distributions for these groups were < 10 micrograms/dL (42%), 10-19 micrograms/dL (32%), and 20-39 micrograms/dL (16%); in the remaining 10%, BPb levels were between 40 and 99 micrograms/dL. Similarly, the corresponding frequency distribution of EP-ZnPP levels in Haina children were proportional to the severity of lead poisoning and significantly higher than those of the Barsequillo comparison group. This study reveals that at least 28% of Haina children require immediate treatment; of these, 5% with lead levels > 70 micrograms/dL are also at risk for severe neurologic sequelae, and urgent action is imperative.

Papers in Spanish

Topic	Authors	Year	Title	Abstract/ description
Blood-lead levels	Cayllahua, Jose; Huamani, Murguia; Lisbeth, Rosa	2017	Concentración de plomo en sangre y factores de riesgo en niños de la localidad de Huachocolpa, Huancavelica	**Resumen:** El objetivo general del presente estudio fue determinar la relación que existe entre la concentración de plomo en sangre y los factores de riesgo en niños de la localidad de Huachocolpa – 2017. Metodología: El diseño fue no experimental transversal correlacional, teniendo como población y muestra 30 niños de la localidad de Huachocolpa, el muestreo fue no probabilístico por conveniencia, la técnica de recolección de datos fue la observación y la encuesta y los instrumentos fueron la guía de observación y el cuestionario de identificación de factores de riesgo. Resultados: El 100% de niños tiene una concentración de plomo baja dentro de los valores permisibles siendo el 43% de sexo masculino y el 47% se sexo femenino, según la edad el 30% tienen la edad de 12 años, el 20% tienen la edad de 8 años y el 7% tienen al edad de 6 años, en relación a los factores de riesgo el 90% de los niños presenta factores de riesgo alto mientras que el 10% presenta factores de riesgo bajo, se identificaron factores de riesgos epidemiológicos donde el 80% de los niños tienen un riesgo epidemiológico alto y factores de riesgos ambientales donde el 56,7% de los niños tienen un riesgo ambiental alto. Conclusiones: Se concluye que de la relación de concentración de plomo en sangre y factores de riesgo el 100% de niños presenta concentraciones plomo en sangre baja en relación a los factores de riesgo, mientras que el 80%(24) presenta riesgo epidemiológico alta, el 57%(17) riesgo ambiental alto, el 43%(13) riesgo ambiental baja y el 20%(6) riesgo epidemiológico bajo.
	Rodriguez, Aurora; Espinal, Georgina	2008	Niveles de plomo en sangre y factores de riesgo asociados en niños de 2 a 10 años en el barrio Villa Francisca, Santo Domingo, República Dominicana	**Resumen:** El plomo es un metal pesado que no juega ningún papel en la fisiología humana, por lo que su nivel ideal en sangre debería ser cero. La Organización Mundial de la Salud define como intoxicación por plomo los valores de plombemia de más de 15 µg/dl y para el Center of Disease Control delos Estados Unidos, cuando los valores son mayores o iguales a 10 µg/dl. Se realizó un estudio descriptivo transversal en junio-noviembre de 2007. Se encontró que un36% de los niños estudiados tenían niveles elevados de plomo, el valor minimo encontrado fuede 1.4 µg/dl y el valor máximo 61.9 ug/dl muy por encima de los valores permisibles.La exposición a los factores de riesgo identificados podrían ser los determinantes de estos nivelesde plomo elevados en los niños. La falta de concientización de la

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				población en relación al peligrode esta exposición es un factor a tomar en cuenta para la prevención de este problema de salud pública.
	Espinal, Georgina; Macey, Evelyn	2007	Condiciones ambientales y de vivienda en niños con niveles de plomo en sangre elevados en el Barrios de Villa Francisca de la ciudad de Santo Domingo	**Resumen:** El objetivo general de este estudio es establecer las condiciones ambientales y de la vivienda en la que habitan niños con niveles de plomo en sangre elevados, encontrados en el Barrio de Villa Francisca, con el fin de tomar medidas que tiendan a disminuir la exposición de estos niños a este metal, para contribuir así con la mejoría significativa de su calidad de vida. Para la medición del plomo se colectaron 7 mL de sangre total, los cuales fueron procesados en un laboratorio clinico de la ciudad por la técnica de Espectrofotometría de Absorción Atómica. A las madres de los niños participantes se les aplicó un instrumento que recogía las siguientes variables : edad, tiempo en la vivienda, índice de hacinamiento, condiciones estructurales de la vivienda e higiene del hogar. Las características ambientales del interior y el exterior de las viviendas donde residen los escolares del estudio favorecen el ingreso y el establecimiento de valores elevados de plomo en el organismo
Lead exposure	Sanchez, Afripina	2018	Evaluación del potencial fitorremediativo para el control de la exposición al plomo y otros metales y restauración ambiental en Haina, República Dominicana	**Resumen:** La presente investigación se realizó en la comunidad de Haina, ubicada al sur de Santo Domingo (República Dominicana), designada por el Instituto Blacksmith (EE UU) como el tercer lugar más contaminado del planeta, debido a la acumulación de metales pesados, especialmente plomo, donde estuvo ubicada durante 20 años una fábrica de reciclaje de baterías ácidas. Los objetivos de este estudio fueron: i) evaluar los niveles de contaminación por Plomo (Pb) y otros elementos traza como Cromo (Cr) y Zinc (Zn) de los suelos de la zona objeto de estudio; ii) buscar nuevas especies vegetales propias de ambientes tropicales y habituales en la zona de estudio, útiles desde el punto de vista de la fitorremediación; iii) evaluar el potencial de algunos taxones de interés agronómico cultivados en áreas tropicales para su uso en labores de fitorremediación, mediante la determinación de sus niveles de tolerancia y de bioacumulación de Pb. Se

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				seleccionaron 11 zonas de estudio, nueve de ellas formando una malla alrededor del foco de contaminación, otra ligeramente alejada y una zona de control considerada, a priori, libre de contaminación.

F. Blood testing in National Health Surveys

National Health Survey	Non-Communicable Diseases Risk-Factors Surveillance	Source
Purpose	Provide up to date information on levels of fertility and infant mortality; fertility preferences; knowledge and use of family planning methods; maternal and child health; knowledge and attitudes towards HIV/AIDS and other sexually transmitted infections; HIV prevalence among the adult population; violence against women, household health expenses, among others.	Encuesta Demografica y de Salud (Health and Demographic Survey), Centro de Estudios Sociales y Demograficos
Sample size	Women aged 15-49 years old and their kids of less than 5 years old, and men aged 15-59 years old.	
Blood sample testing	Blood testing for HIV/AIDD screening and for future non-specified tests.	
Latest round	2014	
Next round	-	