



Mercury Sources, Releases and Management in Lebanon

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Outline



- **Mercury Sources**
- **Mercury Releases**
- **Mercury Impact on Public Health and the Environment**
- **Legal Framework**
- **Mercury Management**



Mercury Sources



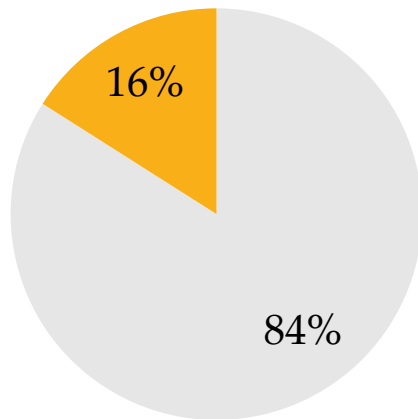
Source category	Activity rate	Unit	Estimated Hg input, Kg Hg/y Standard estimate
Energy consumption			
Other coal uses	347,109	t coal used/y	94
Combustion/use of petroleum coke and heavy oil	1,294,682	t oil product combusted/y	71
Combustion/use of diesel, gasoil, petroleum, kerosene	2,056,606	t oil product combusted/y	11
Other materials production			
Cement production	5,200,000	t cement produced/y	1,430
Pulp and paper production	1,000	t biomass used in production/y	0
Use and disposal of products with mercury content			
Dental amalgam fillings ("silver" fillings)	3,759,100	number of inhabitants	564
Thermometers	400,000	items sold/y	400
Electrical switches and relays with mercury	3,759,100	number of inhabitants	526
Light sources with mercury	4,417,500	items sold/y	55
Batteries with mercury	1,057	t batteries sold/y	1,043
Laboratory chemicals	3,759,100	number of inhabitants	38
Other laboratory and medical equipment with mercury	3,759,100	number of inhabitants	150
Waste incineration			
Incineration of medical waste	352	t waste incinerated/y	8
Open fire waste burning (on landfills and informally)	0	t waste burned/y	0
Waste deposition/landfilling and waste water treatment			
Controlled landfills/deposits	800,700	t waste landfilled/y	4,004
Informal dumping of general waste	502,400	t waste dumped/y	2,512
Waste water system/treatment	99,680,000	m3 waste water/y	523
Crematoria and cemeteries			
Cemeteries	22,926	corpses buried/y	57
TOTAL of quantified releases			5,100

Mercury Releases



Source category	Estimated Hg releases, standard estimates, Kg Hg/y		
	Air	Water	Land
Energy consumption			
Other coal uses	84.3	0.0	0.0
Combustion/use of petroleum coke and heavy oil	71.2	0.0	0.0
Combustion/use of diesel, gasoil, petroleum, kerosene	11.3	0.0	0.0
Other materials production			
Cement production	858.0	0.0	0.0
Pulp and paper production	0.0	0.0	0.0
Use and disposal of products with mercury content			
Dental amalgam fillings ("silver" fillings)	11.3	187.2	0.0
Thermometers	80.0	120.0	80.0
Electrical switches and relays with mercury	157.9	0.0	210.5
Light sources with mercury	16.4	0.0	16.4
Batteries with mercury	260.8	0.0	260.8
Skin lightening creams and soaps with mercury chemicals	0.0	0.0	0.0
Medical blood pressure gauges (mercury sphygmomanometers)	0.0	0.0	0.0
Other manometers and gauges with mercury	-	-	-
Laboratory chemicals	0.0	12.4	0.0
Other laboratory and medical equipment with mercury	0.0	49.6	0.0
Waste Incineration			
Incineration of medical waste	7.6	0.0	0.0
Open fire waste burning (on landfills and informally)	0.0	0.0	0.0
Waste deposition/landfilling and waste water treatment			
Controlled landfills/deposits	40.0	0.4	0.0
Informal dumping of general waste *1	251.2	251.2	2,009.6
Waste water system/treatment	0.0	471.0	0.0
Crematoria and cemeteries			
Cemeteries	0.0	0.0	57.3
TOTAL of quantified releases	1,860.0	620.0	620.0

Mercury Sources



- Use mercury containing thermometers and sphygmomanometers
- Don't use mercury containing thermometers and sphygmomanometers

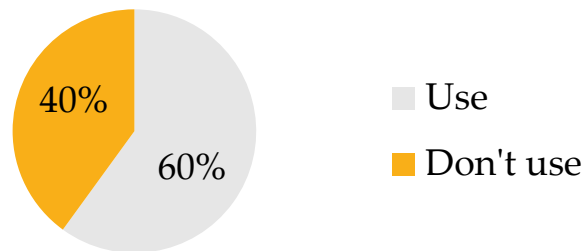
17% of surveyed hospitals (out of 48 surveyed hospitals) are ready to become mercury-free without financial assistance, while 67% showed interest in phasing out mercury in the presence of financial assistance.

Mercury containing products used in surveyed hospitals	Percentage of hospitals
Dental amalgam	5%
Gastrointestinal tubes (Cantor tubes, esophageal dilators, Miller-Abbott tubes)	35%
Phenyl mercuric acetate preservative	8%
Mercury-containing stains	25%
Thermostat probes	27%
Barometers	18%
Fluorescent tubes	55%
Others (specify)	12.5%

Mercury Sources



Amalgam use in dental clinics



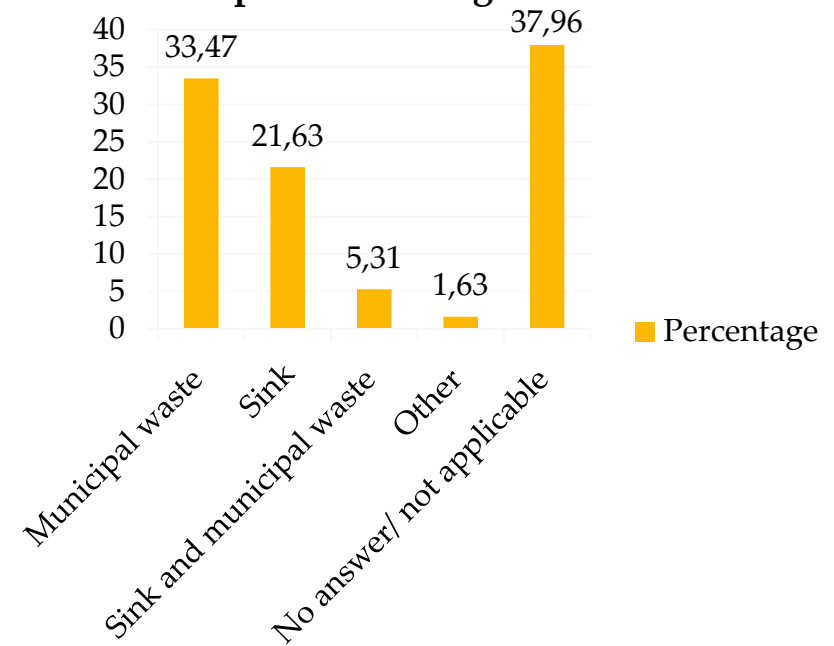
Use of trap and filters for amalgam



Number and Amount of Amalgam used in Dental Clinics

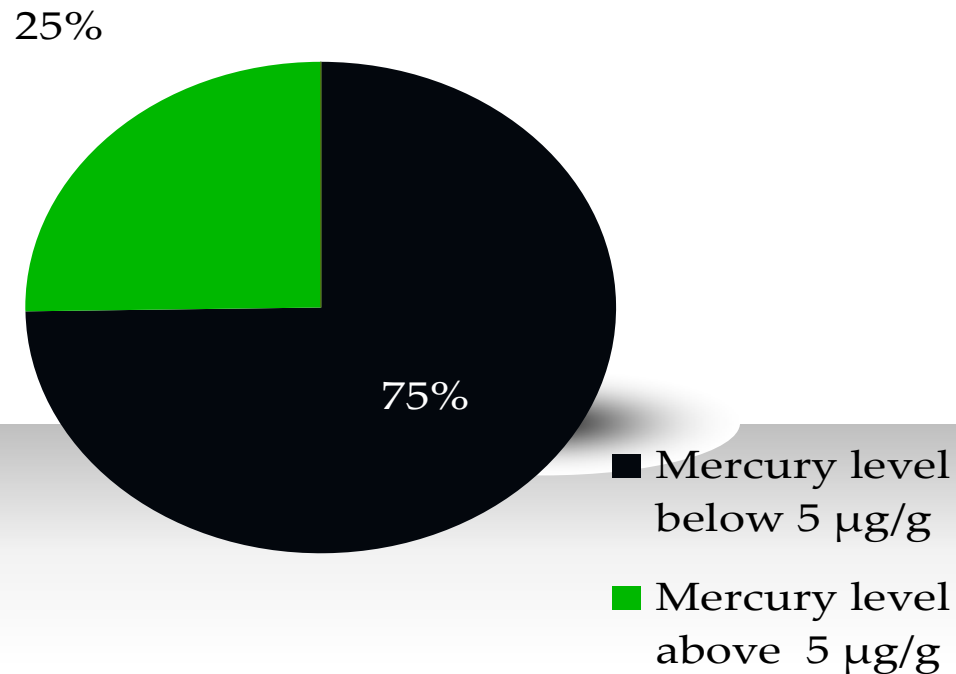
Type of Amalgam	No. of amalgam per clinic per year	Amount of mercury released per clinic per year (g)
Removed old amalgam	161	88.55
Newly placed amalgam	149	81.95
Total	310	170.5

Mode of Disposal of Amalgam in Dental Clinics



Mercury Impacts on Public Health and the Environment

Occupational & Public Health Risks



Mercury level in dentists' hair

- Among ninety-nine dentists in Beirut, **25.25%** had a mercury level **above** the safe baseline of **5 µg/g**.
- Of those, **7.07%** had a concentration approximately **10 µg/g**.

Harakeh, S., Sabra, N., Kassak, K., & Doughan, B. (2002). Factors Influencing Total Mercury Levels Among Lebanese Dentists. *The Science of Total Environment* .

Mercury Impacts on Public Health and the Environment

Environmental Impacts



Mercury levels in fish samples

- Fish samples were selected from local Lebanese markets and fisheries and included 94 samples of which were fresh, frozen, processed, and canned fish.
- The level of mercury ranged from 0.0190 to 0.5700 $\mu\text{g/g}$ in fresh samples, 0.0059 to 0.0665 $\mu\text{g/g}$ in frozen samples, and 0.0305 to 0.1190 $\mu\text{g/g}$ in canned samples.
- The data clearly showed that higher levels of mercury were detected in local fresh fish as opposed to other types thus placing consumers at higher risk from mercury exposure.

Pierre J Obeid, Bilal El-Khoury, Joanne Burger, Samer Aouad, Mira Younis, Amal Aoun, & John Hanna El-Nakat. Determination and assessment of total mercury levels in local, frozen and canned fish in Lebanon. *Journal of Environmental Sciences, Volume 23, Issue 9.*

Legal Framework



Laws

Law 64/1988: Conservation of the environment against pollution from hazardous waste and hazardous materials

- 1 • The law punishes crimes related to breaching of the terms of the various stages of management of hazardous waste.
 - Sanctions include responsible and people who know about the crime and refrain from reporting it to concerned authorities.
 - Sanctions range from payment of fines to death penalty.

Law 387/1994: Ratification of Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal

- 2 • Controls trans-boundary movements of hazardous waste (including hazardous healthcare waste).
 - The only legitimate trans-boundary shipments of hazardous waste are exports from countries without facilities, or expertise to dispose safely of certain wastes, to countries which have both facilities and expertise.

Legal Framework



Laws

Law 444/2002: Protection of the environment

- 3
 - The precautionary principle.
 - The principle of preventive action.
 - The polluter pays principle.
 - The principle of avoiding degradation of natural resources.

Legal Framework



Decrees & Decisions

Decree 13389/2004: Determining the types of waste from healthcare facilities and their disposal

- 1
 - Defines the types of HCW;
 - Requires proper waste segregation and waste minimization;
 - Sets some guidelines for the collection, storage, treatment and disposal of the different types of wastes;
 - Requires an EIA study for licensing HCWT facilities.
 - Gave HCF 120 days for compliance with the decree.

Decision 8/1/2001: Standards for air emissions, liquid effluents, and waste water treatment plants

- 1
 - Standards for wastewater.
 - Standards for air emissions.

Mercury Management



- Encouraging the use of alternatives
- Segregation
- Proper containment
- Training on spill management
- Temporary storage
- Absence of infrastructure to properly dispose of mercury





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Resilient nations.*

THANK YOU!

For further information: www.gefmedwaste.org

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