The State of Mercury in
The Hashemite Kingdom of Jordan

The Minamata Convention on Mercury is the first global agreement specifically designed to address contamination from a heavy metal. Opened for signature on October 10, 2013 and entered into force on August 16, 2017, the Convention seeks to address issues related to the use and release of mercury in trade and in industrial processes. The treaty also addresses major sources of atmospheric emissions and releases of mercury into the environment, as well as long-term storage and disposal of mercury and mercury compounds.

Under the Minamata Convention, individual countries are charged with protecting human health and the environment from the risks of mercury exposure by systematically controlling mercury emissions and releases, including phasing out the use of mercury in certain products and processes.

Jordan signed the Convention on October 10, 2013 and ratified the Convention on November 12, 2015. In order to meet its obligations under the Convention, Jordan is implementing a Minamata Initial Assessment (MIA) to quantitatively and comparatively determine the extent of local mercury pollution. Some findings from the MIA and recommendations from the Jordanian mercury team can be found in this brochure.

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Findings from the Minamata Initial Assessment

What are the Sources of Mercury?

The origin of mercury can be natural (e.g., volcanoes) or anthropogenic (e.g., human-caused releases). The major sources of mercury in Jordan, based on the mercury inventory conducted for the MIA, include the following:

- Waste water system/treatment (772 kg Hg/year)
- Other materials production—Cement (1,519 kg Hg/year)
- Dental amalgam fillings ("silver" fillings) (3,074 kg Hg/year)
- Informal dumping of general waste (3,825 kg Hg/year)*
- Use and disposal of other products (4,535 kg Hg/year)
- Waste Deposition (8,925 kg Hg/year)*

As a result of the MIA process, the magnitude and source distribution of these anthropogenic releases into the air, water, and land are now quantified for Jordan. Based on the MIA findings, a major source of mercury emissions stems from cement production and major sources of releases into the environment (land and water) are through informal dumping of general waste and waste water treatment plants. The total amount of mercury emissions and releases calculated in the Jordan MIA is 10,640 kg/year.

**Note, to avoid double-counting, only 10% of the Hg released from these source types counts toward the overall amount of Hg emitted and released for the country.*

Jordan River

How are People Exposed to Mercury?

Elemental mercury, which is found in manufactured products, is not necessarily toxic to humans. Exceptions may include dental amalgam and cosmetics, but these products are still under scientific investigation, so their potential harm is not yet fully characterized.

Methylmercury, the organic form of mercury, is toxic to humans because it can biomagnify in food webs and bioaccumulate over time in organisms. A neurotoxin, methylmercury can cause physiological harm, behavioral disorders, and a reduction in IQ in people.

Fish from marine or freshwater ecosystems can be a major source of methylmercury. In general, fish species that are small, short-lived, and forage low in the food web contain safe levels of methylmercury, while predatory species that are long-lived and grow larger can contain more elevated and potentially harmful levels of methylmercury. Many of the fish available in Jordan markets are safe to eat, although more information is needed about their mercury concentrations to better characterize how mercury is distributed in different species of fish that are important to the people of Jordan.

Seafood with lower mercury levels (healthier or safe choices):

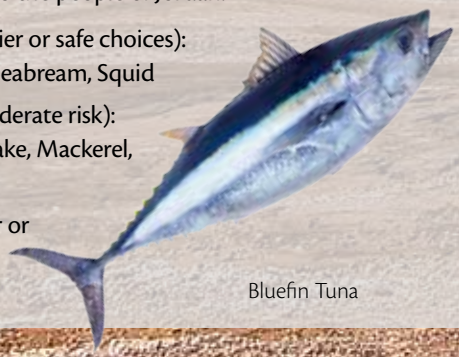
- Anchovy, Flounder, Salmon, Sardines, Seabream, Squid

Seafood with medium mercury levels (moderate risk):

- Bonito, Bluefish, Bream, Bullet Tuna, Hake, Mackerel, Mullet, Octopus, Sole

Seafood with higher mercury levels (riskier or potentially harmful choices):

- Albacore Tuna, Bluefin Tuna



Bluefin Tuna

Azraq Wetlands Reserve

How Does Mercury Affect Ecological Health?

The process of methylation, the conversion of mercury to methylmercury, varies widely on the landscape and within the waterscape. Areas that are particularly sensitive to mercury deposition—where methylation rates are highest and biomagnification in the food web is greatest, and where animals experience significant reproductive harm—are called biological mercury hotspots. These areas generally represent aquatic ecosystems or have an aquatic connection within the food web.

Generally, aquatic ecosystems connected to wetlands are prime areas for high methylation rates. Fish and wildlife predators that forage in a food web associated with aquatic habitats often contain elevated mercury levels. The combination of high methylation rates and longer-lived animals higher in the food web creates the greatest risk. It is unknown if Jordan has biological mercury hotspots (i.e., where fish and wildlife reproductive success is harmed).

Habitats at Greatest Risk:

- The Jordan River, Red Sea estuaries, and associated aquatic habitats, especially ones near contaminated sites

Wildlife at Greatest Risk:

- Herons and egrets, bitterns, ibis, shorebirds, osprey, and certain songbirds

Gulf of Aqabar, Red Sea

Wadi Rum Valley – Mountains/Desert

What is the State of Mercury in Jordan?

The impacts of mercury pollution can be challenging to identify and reverse. However, strategies to reduce mercury contamination are important because mercury can cause significant adverse effects to human and ecological health.

Findings from the Jordan MIA indicate the input of mercury into ecosystems may be elevated in some areas, but with effort by the government, key stakeholders, and the general public, those inputs can be further identified and reduced.

The impacts of regional mercury loads in the Mediterranean Sea and the effect on fish markets, specifically tuna, may require broader regional actions—but MIAs are being undertaken by many countries in the region, which should significantly reduce mercury in the region's landscape and waterscape.

What Can You Do to Help?

- Choose healthier seafood options (those with lower mercury levels) as part of your diet
- Use your buying power—purchase no- or low-mercury product replacements when possible (See Useful Links on back page for more information)
- Support legislation that helps reduce the impacts of mercury on the environment

Recommendations from the Jordan Mercury Team

- Create legislation that can help facilitate a framework to comply with the Minamata Convention.
- Reduce the import and use of products that contain mercury by selecting no- or low-mercury product replacements:
  - Replace compact and linear fluorescent lights with LED bulbs
  - Check the ingredients in skin lightening creams and lotions to avoid products that contain mercury.
  - Choose brands of batteries that do not contain mercury.
- Properly store waste products with mercury and avoid discarding these produces in landfills by creating proper storage facilities for hazardous waste.
- Generate greater awareness and education through existing outreach programs; oversee the development and distribution of information on mercury to the public, including importers of manufactured products.
- Participate in global mercury database and monitoring programs and coordinate existing data with global efforts organized by UN Environment:
  - Use hair samples for people
  - Use muscle samples for fish
  - Use blood, feather, and egg samples for birds

About Jordan

Jordan, officially known as the Hashemite Kingdom of Jordan, is located on the east bank of the Jordan River. Much of Jordan is covered by the Arabian Desert. The country covers an area of 89,342 km² and is mostly landlocked with the exception 26 km along the Red Sea. Jordan hosts ancient monuments, World Heritage sites including the famed Petra, and is known for its tradition of welcoming visitors.

BRI's Mercury Work in Jordan

Biodiversity Research Institute (BRI) collaborates with its partners in Jordan to help identify and estimate any major mercury sources in the region. As an international advisor on mercury, BRI serves as co-lead of the UN Environment's Mercury Air Transport and Fate Research partnership area to assist with the development of a global mercury monitoring and observation system. In addition, BRI serves as International Technical Expert with the United Nations Development Programme (UNDP) and with UN Environment and an Executing Agency for the United Nations Industrial Development Organization (UNIDO).

Useful Links

- BRI publications on mercury: www.briloon.org/hgpubs
- Minamata Convention: www.mercuryconvention.org

Global Health Trade-Off for Mercury and Omega-3 in Fish

Milligrams of Omega-3 Fatty Acids/4 Ounces of Cooked Fish →

Total Mercury in Muscle Tissue µg/g (ww) ↓

Meal Frequency Recommendations	<500 mg	500-1,000 mg	1,000-2,000 mg	> 2,000 mg
Unrestricted meals (< 0.05 µg/g)	Catfish, Clams, Crab* (most species), Croaker, Haddock, Scallops, Shrimp, Tilapia*	Blue Mussels,* Pink Salmon, Sockeye Salmon	Chinook Salmon,* Coho Salmon, Oysters	Healthier Choices: Atlantic Salmon, Sardines, Shad
1-2 meals per week (0.05–0.22 µg/g)	Atlantic and Pacific Cod, Flounder, Grenadier, Hake, Lobster,* Scad, Seabream, Sole	Atlantic Pollock, Mahi Mahi, Mullet, Scad, Squid, Skipjack Tuna, any canned tuna	Atlantic Horse Mackerel, European Sea Bass, Rays, Skates, Trout	Anchovies,* Herring
1 meal per month (0.22–0.95 µg/g)	Grouper, Orange Roughy, Snapper	Amberjack, Barracuda, Bigeye Tuna, Bluefish, Halibut, Jack, Trevally, Wahoo, Yellowfin Tuna	Atlantic and Pacific Mackerel, Albacore Tuna,* Atlantic Bluefin Tuna, Chilean Sea Bass	
No consumption (> 0.95 µg/g)	King Mackerel Riskier Choices	Marlin, Sailfish, Tilefish	Dogfish, Ground, and Mackerel Sharks; Pacific Bluefin Tuna, Swordfish*	

Data Sources: BRI's Global Biotic Mercury Synthesis (GBMS) Database; U.S. Environmental Protection Agency; U.S. Food and Drug Administration

Pictured

MIA Stakeholders

- Ministry of Environment
- Ministry of Energy and Mineral resources
- Ministry of Health
- Ministry of Industry, Trade and Supply
- Ministry of Municipal Affairs
- Ministry of Water and Irrigation
- Aqaba Special Economic Zone
- Cement companies
- Customs department
- Jordan Chamber of Industry
- Jordan Chamber of Commerce
- Jordan Refinery
- The Royal Scientific Society
- United Nations Development Program

For More Information:

Dr. Mohammad Khashashneh
Director of Hazardous Substances and Waste Management Directorate

Ministry of Environment–Jordan
mkhashashneh@yahoo.com

Tel: +962 6 5560113 • Fax: +962 6 5562952

Credits

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