



## Project Completion Workshop on

“Reduction of demand of mercury  
in mercury containing products in Bangladesh”  
& Discussion on

“Practical Sourcebook on Mercury Storage and Disposal”

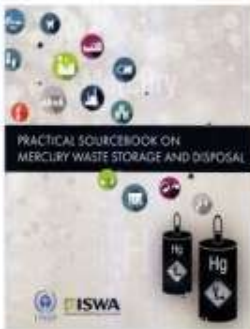
Organised by

Environment and Social Development Organization-ESDO

In association with United Nations Environment Program (UNEP)

17 December, 2015

Venue: The Daily Star Azimur Rahman Conference Hall, Dhaka



Under the project “**Reduction of demand for Mercury in mercury containing products in Bangladesh**”  
-Implemented by Environment and Social Development Organization-ESDO in association with UNEP

## Project Overview

- ❑ The emerging scientific findings about the destructive impacts of even low doses of mercury has been taken into account by WHO. In order to list mercury as one of the top ten chemicals with major public health concerns WHO is paying special heed to this type of findings.
- ❑ A sophisticated understanding of the toxicity lets us know that even low doses of mercury intake on a regular basis can transgress the approved ‘safe’ level for our body. Considering this grave danger of mercury pollution UNEP has established a mercury program within UNEP Chemicals (UNEP Division of Technology, Industry and Economics).
- ❑ It has immediate objective to encourage all countries to adopt goals and take actions as appropriate for the identification of mercury-exposed populations for the minimization of mercury exposure through outreach efforts and for the reduction of anthropogenic mercury releases.

## Project Overview

- ❑ ESDO feels responsible in shaping precautionary public policy and documenting the sources of mercury pollution in Bangladesh . ESDO in collaboration with UNEP, undertook this project with the objective of creating awareness and documenting mercury use and mercury added products in Bangladesh. The initiative also aims to support Bangladesh government towards ratification and implementation of Minamata Convention.





**STUDY  
ON  
MERCURY ADDED PRODUCTS: COUNTRY SITUATION ANALYSIS IN  
BANGLADESH (PRODUCT INVENTORY AND EMISSION SOURCE  
IDENTIFICATION)**

## MERCURY RELEASE SOURCES IDENTIFIED IN BANGLADESH

This report is mainly focused on the preliminary field survey on mercury uses and releases, within Bangladesh territory. These surveys were undertaken during January-May, 2015 throughout Bangladesh by the ESDO team. The team followed the UNEP toolkit format in the design of the survey. Based on the preliminary data,

The findings are as follows;



# MERCURY TRADING: IMPORT-EXPORT

## Mercury Import

- Mercury is not mined or produced in Bangladesh
- Mostly imported from other countries.
- According to **NBR, 2015**, annual import in **3.73 MT**
- Illegal import for mercury through trans-boundary movement is **54.27 MT**
- Annual storage **18.6 MT**
- Annual Supply **39.4 MT**

**39.4 MT** mercury is normally sold to the following **target customers**. They are;

- Dental Colleges/Chambers/ Quacks
- Dental Assistants
- Beauty Product or Cosmetics Producers
- Jewelry Producers (used to re-collect gold from the waste)
- Brick manufacturers
- Pharmaceutical Companies
- Pesticide/biocide companies
- Laboratories (Academic institutions/private sectors)



## MERCURY RELEASE SOURCES IDENTIFIED IN Industrial Sector

### Chlor-alkali Plants

Calculations based on existing Chlor-alkali plants, those using previous technology for producing chlorine ( $\text{Cl}_2$ ), suggest that, in total, **4.49 MT** of mercury per year is being released.

### Cement Production

Though 33 cement industries are present in Bangladesh, only 8 have clinker and cement manufacturing facilities. It is estimated that the release of mercury from the 8 cement factories of Bangladesh is **0.14 MT** per year.

### Brick field/production Sector

Mercury emission into air from brick burning sector is **0.06 MT**

### Aluminum and Steel Production

Total emission of mercury into air from Aluminum Production is **0.011 MT** per year. Based on same calculation it was found that **0.16 MT** mercury is being emitted into air during Steel Production process per year.



# MERCURY RELEASE SOURCES IDENTIFIED IN HEALTH CARE SECTOR

## ➤ Health care instruments (thermometers & sphygmomanometers)

❑ESDO's baseline survey on mercury containing products in 2015 found that 887,472 thermometers are used yearly, and 37.8% of these thermometers break (552,007.58). Similarly, yearly use of the number of sphygmomanometers is 305,926 and 10% (275,333.4) of the total sphygmomanometers break.

❑It is estimated that, in a year, approximately **0.69 tons** of mercury is released into the environment and atmosphere due to thermometer breakage, and that **3.3 tons** of mercury is released due to sphygmomanometer breakage.



## ➤ Dental Amalgam

People associated with dental care such as dentists, students and health workers and in some cases patients are exposed to mercury vapor during amalgam preparation. Also through,

- Mercury spills
- Malfunctioning amalgamators
- Leaky amalgam capsules,
- Trituration placement
- condensation of amalgam
- Polishing and removal of amalgam and
- vaporization of mercury from other sources.

❑ Based on ESDO's baseline survey it is estimated that a person during amalgam dental fillings inhales, on average, between 3 and 17 micrograms of mercury from its vapor into his or her blood each day. In a year it is 1095 mg to 6205 mg.








❑ Based on the same ESDO survey, **1.09 MT to 6.22 MT** Mercury vapor is released from mercury amalgam fillings per year from the dental sector in Bangladesh.



# Mercury Containing Products

## Tentative quantity of mercury emission & release from different sectors

**বাংলাদেশে পারদ নির্গমনের প্রধান উৎস**

<p>স্বাস্থ্য ও দস্ত চিকিৎসা খাত থার্মোমিটার সিঙ্গমোম্যানোমিটার ডেন্টাল অ্যামালগাম ৭.৬৫ মেট্রিক টন</p> 	<p><b>MERCURY FILLINGS</b></p> 
<p>শিল্প খাত সিমেন্ট শিল্প, ক্রোরো-স্কার ইট ভাটা, ইস্পাত অ্যালুমিনিয়াম উৎপাদন ৪.৮৬ মেট্রিক টন</p> 	
	<p>ভোগ্যপণ্য প্রসাধনী কসমেটিক্স ৪.১০ মেট্রিক টন ৪৬৫৩-৩৩৬১ পিপিএম</p>
<p>জ্বালানী খাত গ্যাস, কয়লা (সম্ভব ক্ষেত্র) ৩.০৬ মেট্রিক টন</p> 	
	<p>বর্জ্য জমাকরা নিষ্কাশন-ভরাট ১.১২ মেট্রিক টন</p>
<p>বিদ্যুত খাত সিএফএল আলোর বাল্ব বাটন সেল ব্যাটারী ০.১৮৬ মেট্রিক টন</p> 	

**Major Sources of Mercury Emission and Release in Bangladesh**

<p><b>Health care &amp; Dental sector</b> Thermometer Sphygmomanometer Dental amalgam <b>7.65 MT</b></p> 	<p><b>MERCURY FILLINGS</b></p> 
<p><b>Industrial processes</b> Chlor-alkali factory, Brick burning sector, Cement, steel, Aluminium Production <b>4.86 MT</b></p> 	
	<p><b>Consumer products</b> Jewelry sector Cosmetics <b>4.10 MT</b> <b>4653-3361 ppm</b></p>
<p><b>Energy Sector</b> (Possible sources) Coal, Gas, Furnace oil <b>3.06 MT</b></p> 	
	<p><b>Waste deposition/land filling</b> <b>1.12 MT</b></p>
<p><b>Electrical sector</b> CFL light bulb, Button cell batteries, measuring devices <b>0.186 MT</b></p> 	



## MERCURY RELEASE SOURCES IDENTIFIED ENERGY SECTORS IN BANGLADESH

### Energy sector and processes

❑ In the near future in Bangladesh a major contributor of mercury emissions into the atmosphere will be coal burning in power plants. The processing of mineral oils, natural gas and fossil fuel extraction are also sources of mercury emission to the atmosphere.

❑ Based on ESDO's country situation analysis, it is estimated that the potential mercury emissions from the energy sector (coal, gas, oil refining etc.) is **3.058 MT**.



## MERCURY RELEASE SOURCES IDENTIFIED ELECTRONIC SECTORS IN BANGLADESH

### Electronic sector

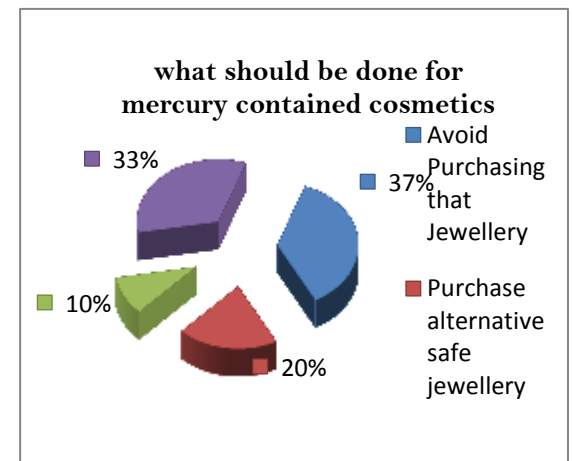
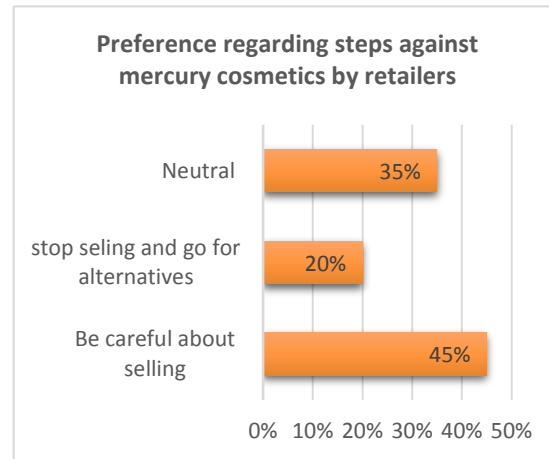
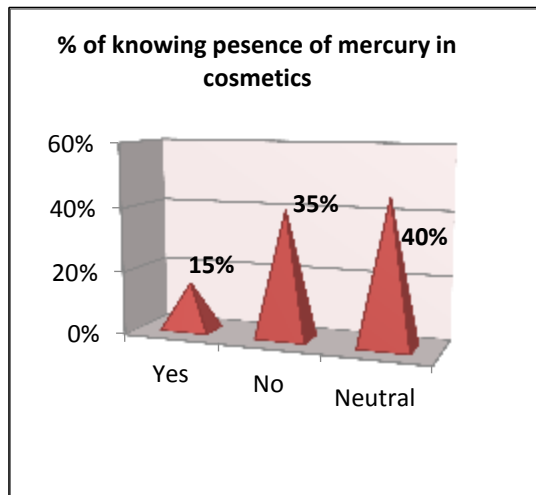
- ❑ Based on ESDOs baseline survey, the total CFL production in Bangladesh is 19,688,097.2 units in the period of 2012-2014 and the mercury released from CFL light bulbs is **0.118 MT**.
- ❑ During the field survey of ESDO in 2015, it was found that each button cell battery may contain **1-2 ppm** mercury as impurities in the salted layer.
- ❑ Button cell batteries also contain mercury as impurities. According to the survey the total mercury release from button cell batteries in Bangladesh are estimated to be **0.0179 MT** per year.



# MERCURY IN COSMETICS

□ According to the report of “Mercury Sources: Products and Hotspots in Bangladesh” prepared by ESDO in 2012, mercury concentration in beauty products ranges from 4653 ppm to 3361 ppm.

□ Mercury level in skin whitening creams, manufactured and marketed in markets of Bangladesh was standardized by the Bangladesh Standards and Testing Institution below 1 ppm (Bangladesh Standard Specification for Skin creams, Second revision, BDS 1382: 2015) after the draft finalized by the Cosmetics and Related Product Sectional Committee and approved by the Chemical Divisional Committee. The standard was revised by in 2011. But specialized skin creams, such as antiperspirant creams, whitening creams, acne creams, hormone creams etc. which have an effect on the physiological functions of the body or for which therapeutic claims are generally made, are not included in this standard. Atomic Absorption Spectrophotometric method is used to determine mercury vaporizer unit in skin creams by BSTI.



# OTHER SECTORS

Based on ESDOs baseline survey on 2015;

- Mercury release from jewelry sector was estimated to be 4.1 MT
- Based on calculation mercury release from measuring devices were 0.85 MT.
- Mercury release from the chemicals, reagents, solvents use in laboratories are 538.263 Kg.

## Jewelry sectors

### Use of mercury in gold jewelry

During the survey it was found that, there are seven steps from production to sell all types of jewelry in Bangladesh. These are,

Metal Processing unit (Paka)	No use
Mixing of alloy (khad or gorit)	Hg use
Jewelry polish	Hg use
Jewelry designing	No use
sent to Jewelry shops	No use
Disposal of waste to the side drains	Hg use
Re-collect of gold from the wastes	Hg use

## Pharmaceutical sectors

A. Mercury containing APIs produced in Bangladesh	<ol style="list-style-type: none"> <li>1. <u>Diclofenac Free Acid</u></li> <li>2. <u>Diclofenac Potassium</u></li> <li>3. <u>Diclofenac Sodium</u></li> <li>4. <u>Diclofenac Diethylamine</u></li> <li>5. <u>Thimerosal (Mercury carboxy phenyl thioethyl sodium salt)</u></li> <li>6. <u>Mucolax (Thimerosal)</u></li> <li>7. <u>Nessler's Reagent (Potassium tetra-iodomercurate)</u></li> <li>8. <u>Phenylmercuric acetate</u></li> <li>9. <u>Phenylmercuric nitrate</u></li> </ol>
B. Mercury containing eye drops imported	<ol style="list-style-type: none"> <li>1. <u>Diclofenac potassium eye drops (0.1%)</u> <ul style="list-style-type: none"> <li>• <u>Thiomersal</u>= 1.00 mg/ml</li> <li>• <u>Tromethamine</u>= 50.0 mg/ml</li> </ul> </li> <li>2. <u>Diclofenac potassium eye drops (0.05%)/diclofenac sodium eye drops (0.1%)</u> <ul style="list-style-type: none"> <li>• <u>Tromethamine</u>= 0.6 mg/ml</li> </ul> </li> </ol>
C. Other pharmaceutical reagents/solvents	<ol style="list-style-type: none"> <li>10. Contact lens solutions</li> <li>11. Formalin (Mercury contaminant)</li> <li>12. Ophthalmic products containing <u>thimerosal</u></li> <li>13. Diuretics with <u>mersalyl</u> and mercury salts</li> <li>14. Pregnancy test kits with Hg containing preservatives</li> <li>15. <u>Merbromin</u> water solution</li> <li>16. Nasal spray with <u>thimerosal</u></li> </ol>



## Mercury waste and release into environment

- ❑ Mercury has a very long life span, therefore, mercury in waste, sludge and by-products is not destroyed with disposal but rather continues to subsist in environment.
- ❑ Based on focus group discussions and surveys, we found that the majority of users of mercury are not aware of the importance of proper disposal of mercury waste or mercury containing compounds. There are also no systems for the large-scale disposal of mercury in Bangladesh. Based on ESDO baseline survey, it is estimated that **1.12 MT** mercury waste is generated and released every year into environment through waste deposition, land filling and waste water treatment.
- ❑ Based on the same study, we found that annual mercury emission from cremation is **0.170 MT**.



## Identification of potential hot-spots

The potential hot-spots of mercury release identified by the UNEP Toolkit refers to abandoned sites of chemical production, pulp and paper manufacturing, Chlor-alkali production etc. are classified as the following:

- Closed/abandoned Chlor-alkali production sites
- Other sites of former chemical production where mercury compounds were produced or mercury or compounds were used as catalysts (cement production etc.)
- Dental clinics and hospitals (where cautionary measures are not in place)
- Gold manufacturing factories
- Closed production sites for manufacturing of thermometers, switches, batteries and other products
- Closed pulp and paper manufacturing sites (with internal Chlor-alkali production)
- Sites of relevant accidents
- Rejected-CFLs using and indiscriminately dumping all over Bangladesh, no management at any stage.





## LEGISLATION AND REGULATORY FRAMEWORK OF THE COUNTRY

Currently there are no specific laws for limiting or banning the use of mercury in specific practices, processes and/or products in Bangladesh. Overall hazardous toxic metal regulation was enacted in 1995 under sec 6A which was “Restrictions on manufacture, sale of articles injurious to environment.” Based on this regulation ESDO is lobbying with the government and concerned agencies to enact a specific regulation and standard for mercury containing products in Bangladesh.

- ❑ Under the Bangladesh Environmental Conservation Rules. 1997 (updated in 2010) the Ministry of Environment and Forest (MoEF) proposed the national thresholds for mercury in industry and drinking water.
- ❑ During revision of the Environmental Conservation Rules 1997, DoE have incorporated all the necessary standard limit value with respect to point source of emission of mercury.



## LEGISLATION AND REGULATORY FRAMEWORK OF THE COUNTRY

- ❑ With the initiatives of DoE, SRDI under Ministry of Agriculture has taken a project to set up a laboratory to analyze specifically the Mercury level in the fertilizer and pesticides.
- ❑ Recently MoEF has taken initiative to formulate the regulatory framework for E-waste Management and medical waste management. CFL's and other mercury contained waste management have been decided to incorporate in the proposed management activity.
- ❑ Besides these, government wing- BSTI has Bangladesh Standards and Testing Institution Ordinance act, 1985 and BSTI (Amendment) Act 2003 to provide for the establishment of an Institution for Standardization, testing methodology, quality control, grading and marking of goods. BSTI has already decided the threshold value for mercury in cement, CFL light bulbs and cosmetics production. For, cosmetics the threshold value is 1ppm, for CFL light bulb the value is 2.5 ppm and for cement production the threshold value is suspended particulate matter (spm)<200 ppm.





## Recommendations!!!

In Bangladesh we need to immediately start the process of banning mercury containing products within the deadline of 2020. Early ratification of the Minamata Convention will prevent the further exposure of human health, wildlife, aquatic animals to toxic mercury.

### *Government should take initiatives in*

#### ❑ Encouraging Alternatives

- Ensure availability and accessibility of mercury free safer, accurate and cost effective alternatives. The government must allocate budget for shifting from mercury to alternate products/instruments.

#### ❑ Training about Alternatives

- Encouraging professional associations and concerned stakeholders to educate and train professionals on the use of mercury free alternatives and on promoting the best management practices.

#### ❑ Promulgation of Government Regulatory and Institutional frameworks and Programs, making national plan

- Sectors specific regulations of banning mercury based products and process, environment friendly waste management plan, discouraging insurance policies and program favorable for mercury use and encourage insurance policies and programs favorable for mercury free alternatives.



## Recommendations!!!

- ❑ **Making Plan to Minimize and eliminate the uses of Mercury and Mercury base products and practices**
  - Setting national objectives aiming at minimizing and possible elimination of the use of mercury containing products and practices.
  - The curriculum of medical, nursing, dental, schools etc. should be re-designed adding required information about mercury pollution, hazards, waste management and other environment friendly methods.
  - Periodic testing of the products (cosmetics, beauty creams, hair treatment creams, antiseptics, drugs etc.) to ensure that standard or low level of mercury is being maintained.
  - Enforcement of ordinance or suggested institutional policies in industrial trade bodies and manufacturers asking for complete ban on mercury containing products.
  - Restrictions should be made on the use of mercury or mercury compounds in the manufacturing processes.





## Recommendations!!!

- ❑ **Making Plan to Minimize and eliminate the uses of Mercury and Mercury base products and practices**
  - Control and regulate import of liquid mercury, mercury chemicals. Placing it on restriction list and phasing out as alternatives come in.
  - Establishing protocols for proper clean-up of mercury spills involved in the hot spots of the country and also protocols for methyl mercury exposure through fish consumption.
  - Follow the UNEP guideline on environmentally safe and sound mercury waste management protocol.
  - Training programs for waste management and occupational safety manuals should include details on mercury toxicity and handling.

## Concluding remarks

- ❑ The Government of Bangladesh is yet to take any steps to ratify Minamata Convention. We need to influence and create public demand for early ratification of the convention as the level of public awareness about mercury pollution is very low.
- ❑ ESDO has taken a strategic approach to have a dialogue with the government of Bangladesh, civil society, other government and non- government organizations, both national and regional, public and private companies and industries where there is exposure to mercury in particular.
- ❑ Stakeholders are urged to formulate policy, and its proper implementation regarding products containing mercury. They have a greater responsibility of working as a source of information dissemination to guide and assist people to understand the need of ratifying Minamata Convention. ESDO believes this study will foster this aim and create awareness among the stakeholders and commoners.



**THANK YOU FOR YOUR  
ATTENTION!**



Environment and Social Development Organization-ESDO  
House # 8/1, Level # 5, Block # C, Lalmatia, Dhaka-1207, Bangladesh.  
Phone: 880-2-912-2729, Fax: 880-2-913-0017, E-mail: [info@esdo.org](mailto:info@esdo.org),  
URL: [www.esdo.org](http://www.esdo.org) [www.facebook.com/esdobd](http://www.facebook.com/esdobd)