



MERCURY FREE

A REPORT ON MERCURY FREE DENTISTRY: NATIONAL ASSESSMENT



Acknowledgment

Environment and Social Development Organization-ESDO team are highly thankful to everyone who supported us to complete this study. This study could not have been possible without the participation and assistance from the different associates and general people from multiple sectors. The contributions are sincerely and gratefully acknowledged.

We would like to express our sincere thanks to Bangladesh Dental Society without whom we wouldn't have done it. Their continuous support and cooperation have made this work easy and convenient.

Our heartfelt gratitude goes to World Alliance for Mercury Free Dentistry and Asian Center for Environmental Health for their belief and support. Their suggestions and enthusiasm helped us get to where we are now. Also, our wholehearted thanks to Zero Mercury Working Group for their tremendous support and assistance which has helped us in many ways to complete the study.

We would like to specially acknowledge all the dentists who participated in the survey. Without their help, this study would not be completed. Their cooperation and enthusiasm were remarkable. They provided us with all the relevant information which helped to complete the analysis of this report fruitfully.

We would also like to thank all the compounders, technicians, and importers for their wonderful cooperation. Their information was very helpful and useful for our survey.

Besides that, a big thanks to all our survey respondents who gave us time to understand our project motive and helped us by giving related information in time of our survey from time to time. They have been a great support to make the backbone of this report.

Finally, we express our deep sense of gratitude to all the government officials and relevant stakeholders for their valuable guidance, keen interest, and encouragement at various stages of this study.

Executive summary

Mercury is a highly persistent and toxic chemical which indicates the chemical is harmful to our health and environment. Inhalation of mercury from any source can be harmful to the nervous digestive and immune systems and it can affect our kidneys and lungs. Children are the most vulnerable group because mercury toxicity can affect their nervous system. Along with the other usages practicing mercury in dentistry is highly prohibited as it is directly affecting our health while minimizing the use of mercury from all other sectors is advisable. A global treaty was developed to phase out mercury and nations are actively participating to prevent the toxic chemical globally. World Alliance for Mercury Free Dentistry is a pioneer organization that is working to ban mercury amalgam globally in line with the convention. Like other nations, Bangladesh is also stepping ahead to prevent the use of mercury in all sectors including dentistry, and Ratify the Minamata Convention on Mercury. Environment and Social Development Organization-ESDO is one of the pioneer organizations that has started the journey for mercury-free dentistry in a collaboration with the Bangladesh dental Society-BDS under the guidance of the World Alliance for Mercury-Free Dentistry. Several achievements have been gained in this journey. Mercury amalgam is no longer used by registered practitioners. However, the informal sector like illegal quack dentists still practices harmful chemicals in dentistry. The survey was conducted as a follow-up study to evaluate the initiatives taken by authorities in minimizing mercury use, and to draw the scenario to provide support to the govt. to be acknowledged the real scenario to take an active step to control the supply chain and ban the use of the chemical The study also focused on the market scenario of mercury availability, supply, and demand. The survey revealed that most people even retailers are aware of the hazardous health impact of mercury. The sales of mercury have also decreased. The gold sector is free from mercury because mercury is not a necessity for manufacturing gold jewelry. Despite the declaration from BDS that 95.7% of Dentists are no longer using mercury amalgam, the dentist is the potential buyer of mercury which reflects that the informal sector is still using alarming mercury. In the local market, mercury is still available and most of the sources of mercury raw materials come from our neighboring countries. Strict regulation is crucial at this moment to completely ban the use and import of mercury.

Introduction:

Mercury is a potential neurotoxin that damages the brain, nervous system, kidneys, and liver [4]. It is highly persistent in the environment due to this characteristic being widely distributed in the environment [5]. As it is a slow poisoning, so initially not visible to take necessary steps to minimize the health impact. Mercury is used as a raw material for several products in numerous industries. However, it is high time to stop the use of toxic chemical that is harming our health as well as the environment. For that purpose a global treaty named Minamata Convention was developed in 2013 which is working to prevent the use of mercury on the planet. 137 countries have joined the convention as a party and are committed to preventing the use of mercury. Bangladesh signed the treaty on October, 10 in 2013. The Department of Environment conducted an initial assessment report in 2019 ahead of ratification. Other signatories including Bangladesh also looking forward to the ratification and proceeding toward a complete phase-out. Among the other sources, mercury in dentistry is considered as a potential source because of the direct health impact. Mercury dental filling has also become one of the major focuses of the Minamata Convention. ESDO is an active observer of the convention since the beginning and advocating to prevent the use of mercury in the dentistry of Bangladesh. Bangladesh Dental Society (BDS) was an active companion and a major stakeholder. The Dental Society (BDS), has already stopped using mercury amalgam for children and pregnant women. Several steps have been taken; numerous achievements have been received in this journey. According to a study conducted by ESDO, 95.70% of registered dentists are mercury-free. Alternatives of mercury amalgam are available in the market. Phase out mercury from dentistry is now a need of time. To proceed with the ratification of the pre-requisite is to stop the import of mercury. Import usually occurred through the informal sector. The survey was designed to visualize the current situation of mercury availability or the inventory status of mercury in Bangladesh. The survey is expected to show the real scenario of the mercury

Objectives

- to conduct a national assessment to identify the market status of mercury amalgam in Bangladesh
- to determine the inventory status of mercury amalgam
- to identify the potential buyer/ user of mercury

Problem Statements

Mercury is widely used due to its physical and chemical properties. Medical equipment, pharmaceutical industry, light bulb industry, cosmetics, Laboratory use, skin whitening products, and many more. Cost-effectiveness is also a reason for its usage. Despite the restrictions on use, the supply chain of mercury is vast. So, it is a challenge to conduct a market assessment of the product because it has become a sensitive issue to be exposed. Secondary data is neither available nor updated in the relevant sources which imposes a great challenge regarding the study.

Background

Mercury

Mercury is a chemical with the symbol Hg. It is commonly known as quicksilver. It is categorized as toxic heavy metal. Mercury is only the metallic element known to be liquid in room temperature. It also can dissolve many metals such as gold and silver to form amalgams. Iron is an exception, and iron flasks have traditionally been used to trade mercury. Because of the characteristics, it is widely used in several products such as in electronic devices, medical equipment, dental amalgam, cosmetics, pharmaceuticals and jewelry items. Mercury is highly persistent in environment, cannot be destroyed or eliminated from the atmosphere.

Mercury and the environment

Mercury is found in a variety of minerals and sulfides in nature. Mercury is naturally circulated in the biosphere from these deposits, chiefly by degassing from the earth's crust and oceans. Mercury emissions from natural sources are roughly 150,000 tons per year (Chin et al., 2000). Globally, approximately 10,000 tons of mercury are mined each year, with an estimated 3-4 per cent used in dentistry [8].

Applications

Mercury metal have many applications. Because of its high-density, mercury is used in thermometers, barometers, manometers, sphygmomanometers, float valves, mercury switches, mercury relays, fluorescent lamps and other devices.

The mercury compounds have many uses:

- The Calomel – mercurous chloride (Hg_2Cl_2) is used as a standard in electrochemical measurements and in medicine as a purgative.
- The mercuric chloride – corrosive sublimate (HgCl_2) is used as an insecticide such as rat poison and disinfectant.
- Mercuric oxide is used in skin ointments.
- Mercuric sulphate is used as a catalyst in organic chemistry.

Mercury is used in barometers, manometers, thermometers, sphygmomanometers, mercury switches, float valves, mercury relays, fluorescent lamps and other instruments. At the same time, concerns about the toxicity of the element have led to mercury thermometers and sphygmomanometers being increasingly phased out in clinical settings in favour of alternatives such as glass thermometers and thermometers filled with alcohol or galinstan. Similarly, mercury sphygmomanometers have replaced mechanical pressure gauges and electronic strain gauge sensors [10].

Mercury in Dentistry

One of the most often used materials in restorative dentistry is dental amalgam. When compared to other direct restorative materials such as composites and glass ionomers, amalgam is preferable in many clinical scenarios due to its physical mechanical qualities, stability, ease of use, and comparatively low cost. One of its main components, mercury, is of special concern because of its potential negative effects on individuals and the environment. Oral galvanism, toxicity, allergenicity, and environmental problems are all possible side effects of dental amalgam [8].

Dental amalgam

Dental amalgam is an alloy produced by mixing liquid mercury with solid particles of silver, tin, copper and sometimes zinc, palladium and selenium; this combination of solid metals is known as the amalgam alloy. In dentistry, the amalgam has been successfully used for more than a century as a restoration material for tooth decay. Dental amalgam fillings containing approximately 50% mercury have been used for almost 200 years and have been controversial for almost the same time.

Dental amalgam is one of the most commonly used materials in restorative dentistry. Its physical and mechanical properties, stability, ease of use and relatively low cost have made amalgam the preferred choice in many clinical situations when compared with other direct restorative materials such as composites and glass ionomers. However, one of its major components, mercury, is of particular concern due to its potential adverse effects on humans and the environment. There are four possible harmful effects of dental amalgam – oral galvanism, toxicity, allergenicity and ecological grievances [8].

All types of dental amalgams contain mercury, which partly is emitted as mercury vapor. All types of dental amalgams corrode after being placed in the oral cavity. Modern high copper amalgams exhibit two new traits of increased instability. Firstly, when subjected to wear/polishing, droplets rich in mercury are formed on the surface, showing that mercury is not being strongly bonded to the base or alloy metals. Secondly, high copper amalgams emit substantially larger amounts of mercury vapor than the low copper amalgams used before the 1970s. High copper amalgams have been developed with focus on mechanical strength and corrosion resistance, but has been sub-optimized in other aspects, resulting in increased instability and higher emission of mercury vapor [7].

Exposure to mercury

All humans are exposed to some level of mercury. Most of the people are exposed to minimum level of mercury but acute exposure is also happened. Generally, two groups are vulnerable to the toxicity of mercury. Unborn child and people who are regularly exposed to high level of mercury. Due to the high toxic capacity of mercury, WHO declared there is no safe limit of mercury in human body. In every extent it has hazardous health impact on health.

Several studies have shown that dental personnel have higher Hg concentrations in urine than the average population. It is important to emphasize that Hg levels in urine and blood can decrease

relatively rapidly when the exposure has ceased, even when the amounts in critical organs (brain and kidneys) remain high. Mercury has a complicated metabolism with various half-lives in different organs. Therefore, a suitable indicator medium that reflects the actual Hg concentrations in the critical organs is not available. The immune system and especially the central nervous system are considered critical targets in long-term exposure to Hg. Early symptoms of chronic Hg vapor poisoning include weakness, fatigue, anorexia, and loss of weight [6].

Health impact

The possible toxic effects of mercury are strongly dependent on its chemical form. Amalgams are the most common source of inorganic mercury exposure for most people excluding those who are occupationally exposed [9]. Mercury vapor is continuously released from amalgam fillings at low levels. Filling size, tooth and surface placement, chewing, food texture, tooth grinding, and brushing teeth, as well as the surface area, composition, and age of the amalgam, all influence the release rate. There are correlations between the quantity of amalgams and the amount of mercury in the urine and expired breath [2]. The neurological and renal systems are the most affected by inorganic mercury, although it can also impair the immunological, pulmonary, cardiovascular, gastrointestinal, hematologic, and reproductive systems. Mercury attaching to sulfhydryl groups of enzymes could cause these harmful consequences [1].

Allergies

Allergies may be another path on how mercury produces its toxic effects. Allergies can cause a multitude of health problems. Djerassi et al²⁴ have demonstrated that dermal allergic reactions to mercury appear more frequently after the amalgam has been in the mouth for greater than 5 years.

Immunity

Mercury from dental amalgam appears to be affecting the immune system.

Stress

Mercury may also be implicated in stress disorders. Mercury poisoning is associated with anger, irritability, depression and anxiety — all symptoms of stress [11].

Minamata convention and Dental Amalgam

The Minamata Convention on Mercury is the most recent global agreement on environment and health, adopted in 2013. It is named after the bay in Japan where, in the mid-20th century, mercury-tainted industrial wastewater poisoned thousands of people, leading to severe health damage that became known as the "Minamata disease." Since it entered into force on 16 August 2017, Parties have been working together to control the mercury supply and trade, reduce the use, emission and release of mercury, raise public awareness, and build the necessary institutional capacity to phase out mercury from the world. The Minamata Convention on Mercury is governed by the Conference of the Parties (COP). The COP advances the application of the Convention through the decisions made at its meetings. Like the previous COPs this time the convention took a few decisions like the

children amendment and others. According to the children amendment, mercury filling should not be used for children under 15 and pregnant and breastfeeding women. Also, restrictions are imposed on the production and usage of mercury-containing CFL bulbs. The convention comes into force for banning mercury use in dentistry for children and pregnant women on 24th June. Being a signatory, Bangladesh must take the necessary steps to complete the ban on dental amalgam by 2024 for all. Bangladesh signed the treaty on October 10 in 2013. The Department of Environment conducted an initial assessment report in 2019 ahead of ratification. The decision on dental amalgam has been taken at COP 4.2 and is subjected to be fulfilled. This new amendment represents a worldwide consensus that dental amalgam is not safe for children and other vulnerable populations – it is not safe in their mouths and it is not safe in their environment [12].

Mercury Free Dentistry and ESDO

Practicing mercury in dentistry is highly prohibited as it is directly affecting our health while minimizing the use of mercury from all other sectors is advisable. A global treaty was developed to phase out mercury and nations are actively participating to prevent the toxic chemical globally. World Alliance for Mercury Free Dentistry is a pioneer organization that is working to ban mercury amalgam globally. Like other nations, Bangladesh is also stepping ahead to prevent the use of mercury in all sectors including dentistry. Environment and Social Development Organization-ESDO is one of the pioneer organizations that has started the journey for mercury-free dentistry in a collaboration with the Bangladesh dental Society-BDS under the guidance of the World Alliance for Mercury-Free Dentistry. Several achievements have been gained in this journey. The survey was conducted as a follow-up study to evaluate the initiatives taken by authorities in minimizing mercury use. The study also focused on the market scenario of mercury availability, supply, and demand [13].

Methodology

To conduct a comprehensive survey, ESDO has surveyed the registered dentists, mercury seller and buyer, and in the jewelry shop. Firstly, ESDO conducted the survey through physical visits and questionnaire survey. In second stage, ESDO has surveyed the dentists more extensively with survey questions. The whole process of surveying the persons to bring out updated information on mercury use has been elaborated below-

- ❖ **Survey population:** According to the previous survey, there are 11,000 registered dentists in Bangladesh. Out of them ESDO managed to survey about 9,086 dentists as some numbers of dentists have died or not practicing anymore as well as there are some foreign students (Nepal, India, Malaysia). But unfortunately, there are a lot of dental quacks/ assistants of dentists who pretend as dentists in rural/peripheral areas of Bangladesh where dentists are scanty. This report has not counted them.

ESDO also surveyed different types of representatives. 30 mercury consumers, 22 sellers and 15 jewelry shops were under the total survey.

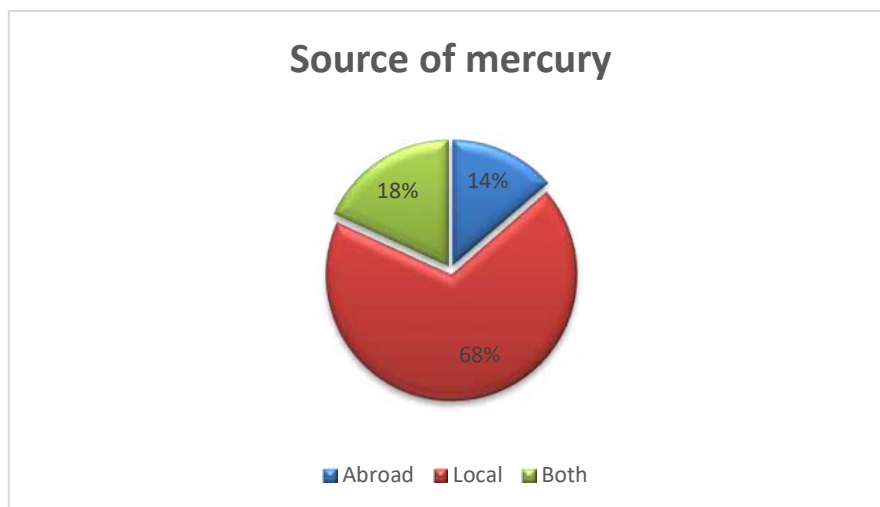
- ❖ **Survey time:** ESDO team members again have visited and recognized several dental chambers and dental institutes who practised mercury free dental amalgam during the last year survey. They also visited to the market for survey during the period of 11th June 2022 to 18th June 2022.
- ❖ **Survey areas:** All over Bangladesh
- ❖ **Survey technique:** Different survey questions were made by the team to collect information from the targeted participants. Then the physical survey was conducted by them and then the collected data was analyzed by the data analysis team.

Key Findings

1st Stage of Survey with Mercury Seller

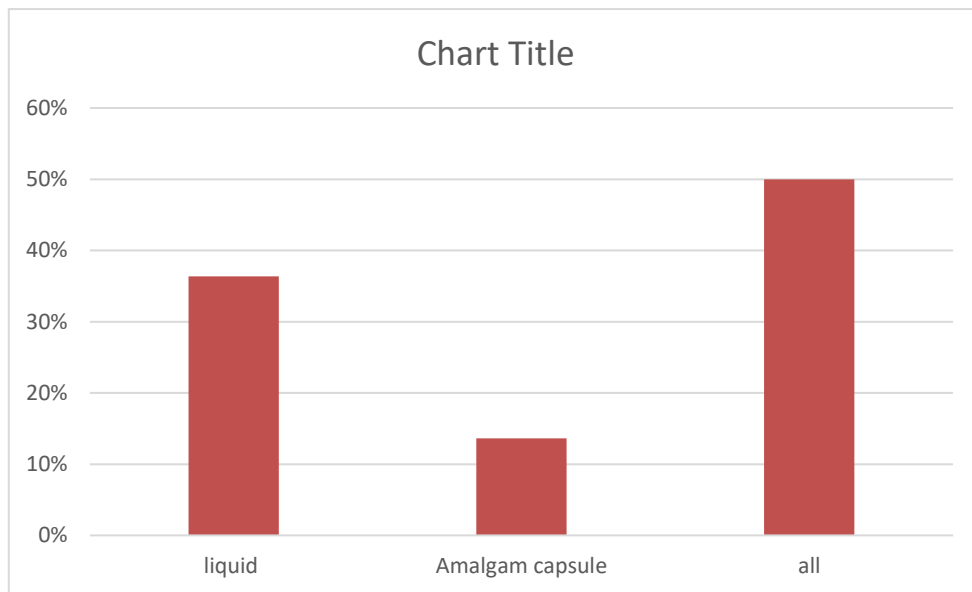
Source of Mercury

From the survey study with the Mercury seller in different market, the team of ESDO found that 14% Hg is exported from abroad. The major source of Hg is local market and its about 68% of total. Again, 18% seller told us the both source from where they get mercury.



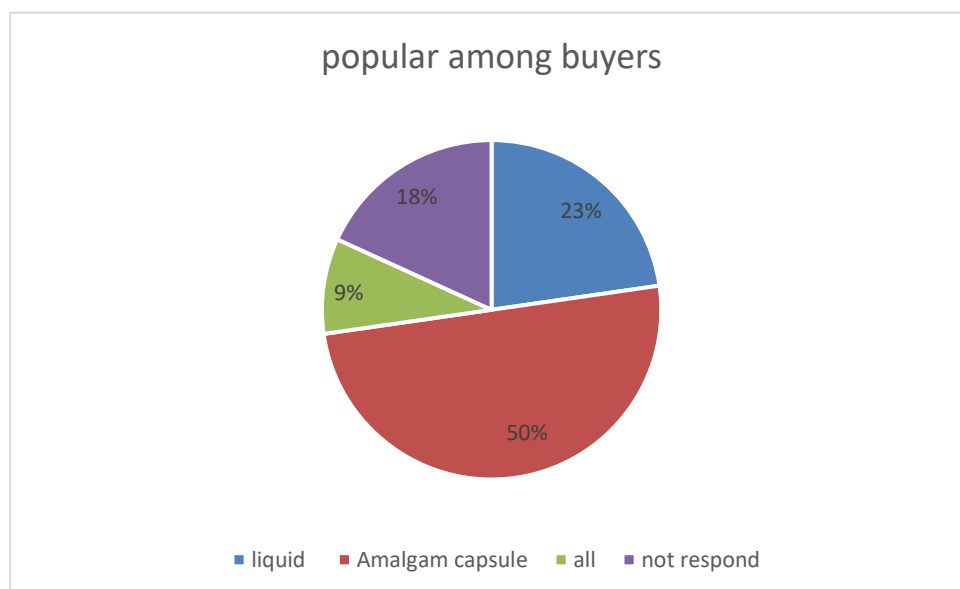
Types of amalgam available in the market

Generally, there are two types of Hg amalgam in the market. They are liquid and amalgam capsules. From the discussion with Hg seller the team came to know that about 36% seller have the liquid Hg, 14% of seller have amalgam capsules and the rest have both the liquid and amalgam capsules.



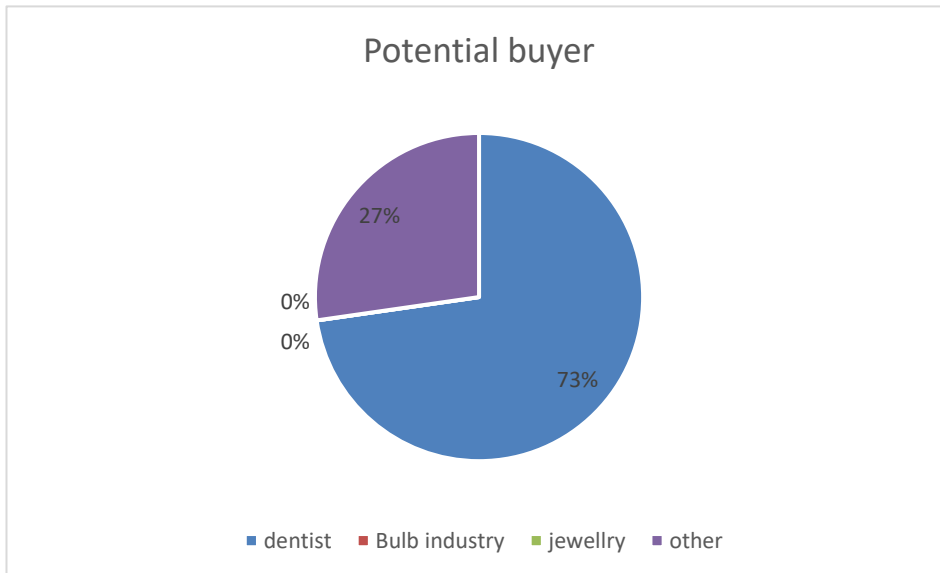
Popular among buyers

The seller told us that the buyers who buy mercury can be divided into four categories. The seller mostly sell amalgam capsules. Then the liquid mercury is about 23%.



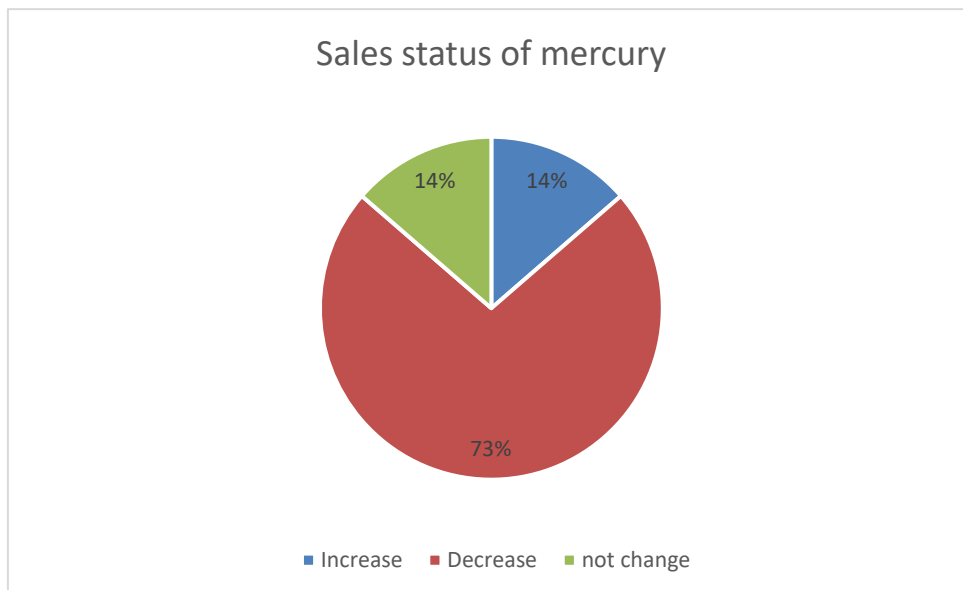
Potential Buyers

From the information collected during the survey, we found the potential buyer. Among all the buyers of mercury 73% is dentists, 27% is other. We thought that there are several buyers who have jewelry shops or the bulb industry. But fortunately, we didn't find any buyers from the jewelry or bulb industry.



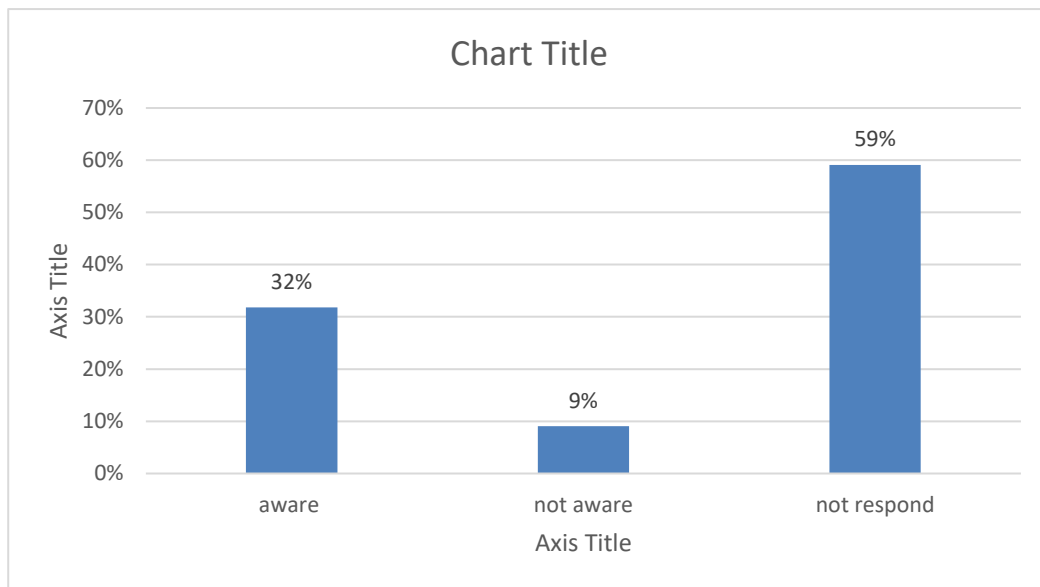
Sales Status of Mercury

Among the seller, the team of ESDO asked a question about the sales status of mercury. 73% said that the sales of mercury is decreased than previous time and 14% said that the sales is increased than before.



Level of Awareness

When the team member of ESDO asked the seller that, Do you have any idea that mercury is a toxic chemicals? Are you aware about the mercury toxicity? Then 32% said that they are aware about the mercury toxicity, 59% didn't give their opinion and 9% said they are not aware.



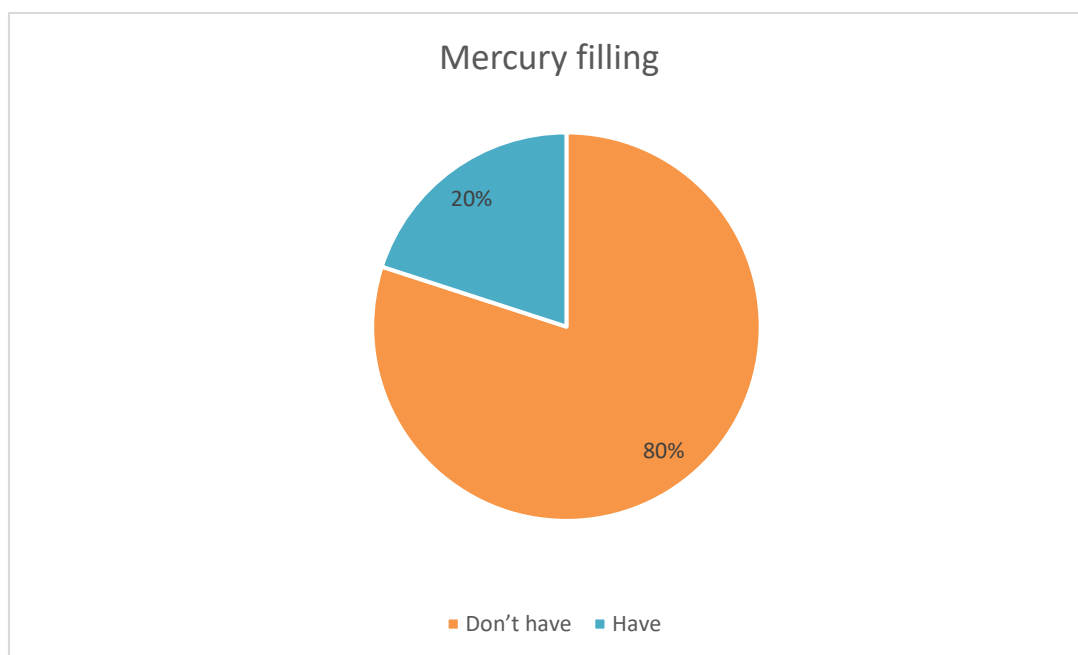
2nd Stage of Survey with Mercury Customer

The team wanted to identify different mercury customer. For this reason, they surveyd among different types of professionals such as student, job holder, business man, house wife etc.

After the consultation with the people the team found out the below findings:

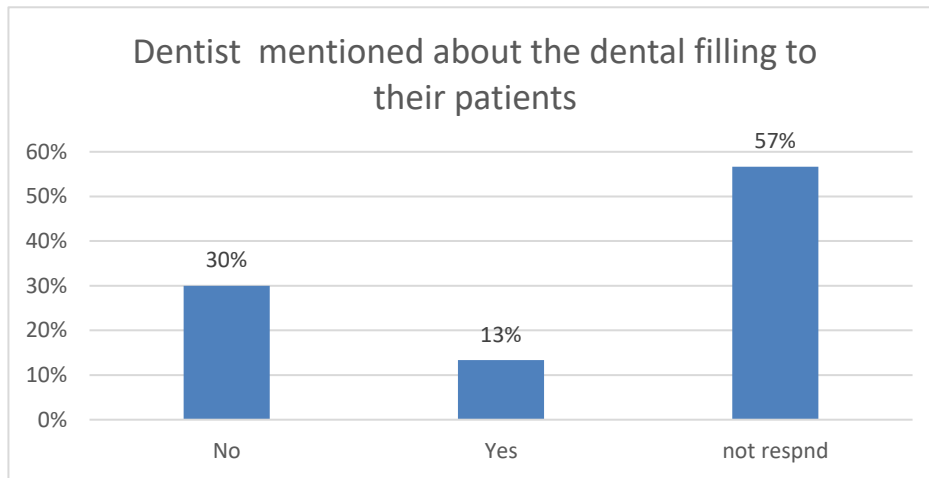
Mercury Flling

They were asked if they had any filling contained with mercury amalgam? Among them 80% said no they didn't have any mercury filling amalgam and 20% said, they had.



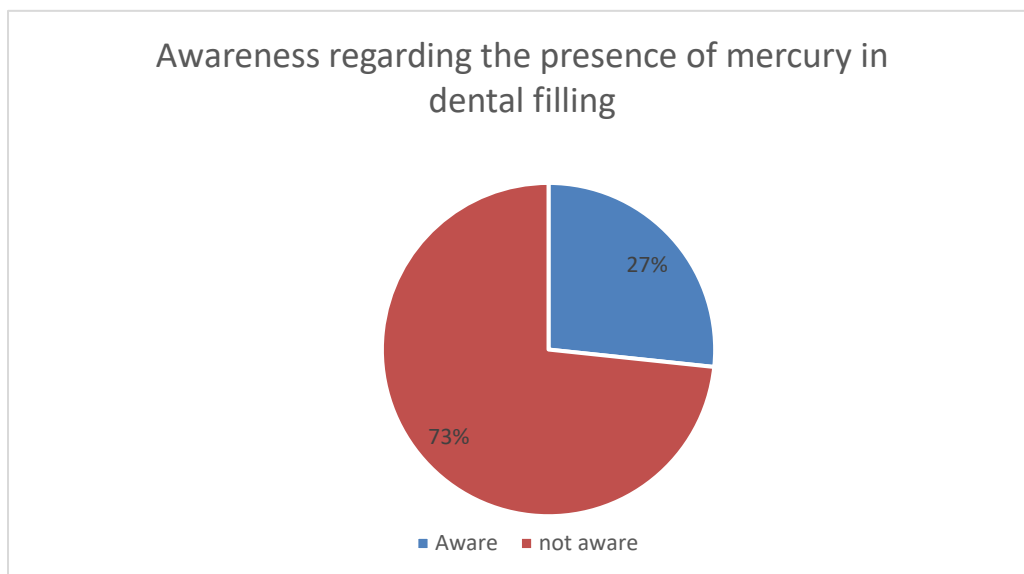
Dentist Mentioned About the Dental Filling?

When the team asked them that, did your dentist ever mention you about the context of the dental filling? 30% said no, 13% said yes and 57% were not interested to talk about this.



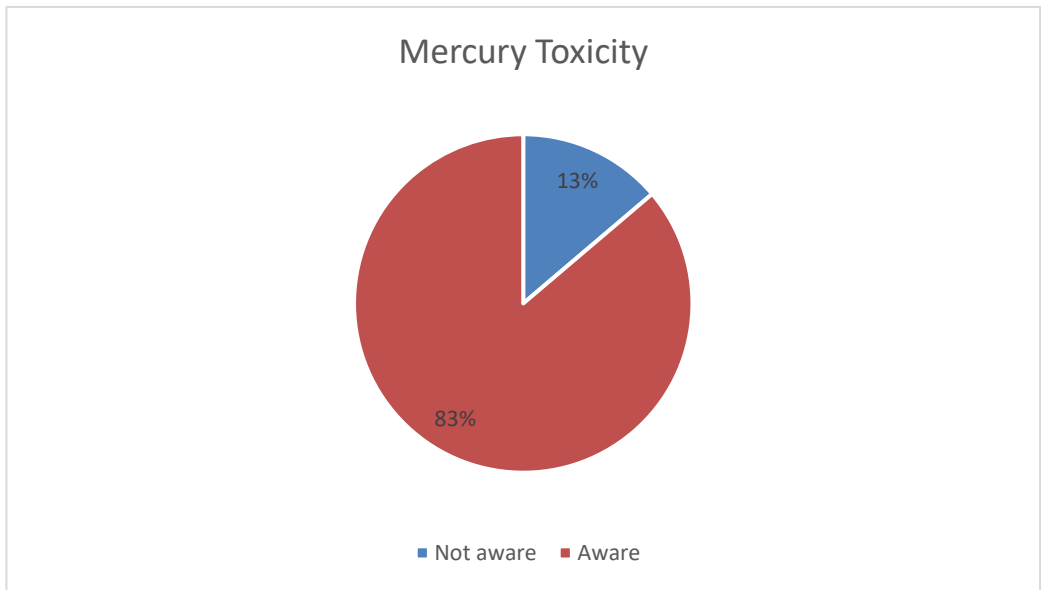
Awareness Regarding the Presence of Mercury in Dental Filling

27% patients are not aware about the presence of mercury in dental filling



Mercury Toxicity

83% said that, they have no idea about mercury toxicity so they are not aware of this. 13% said that they have idea about the toxicity and they are aware of it.

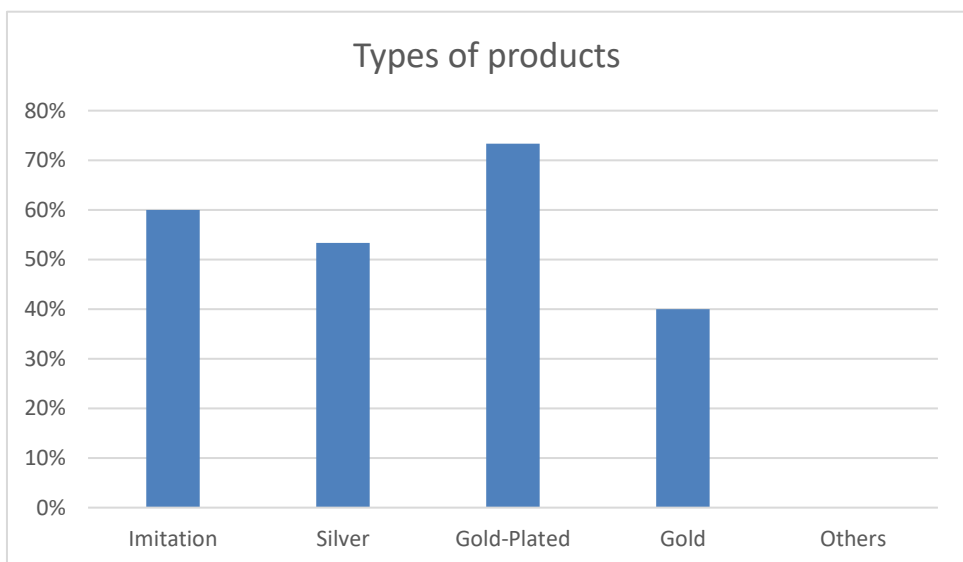


3rd Stage of Survey with Jewelry Shop

The survey team conducted with jewelry shop owner and asked differen types of question to gather information.

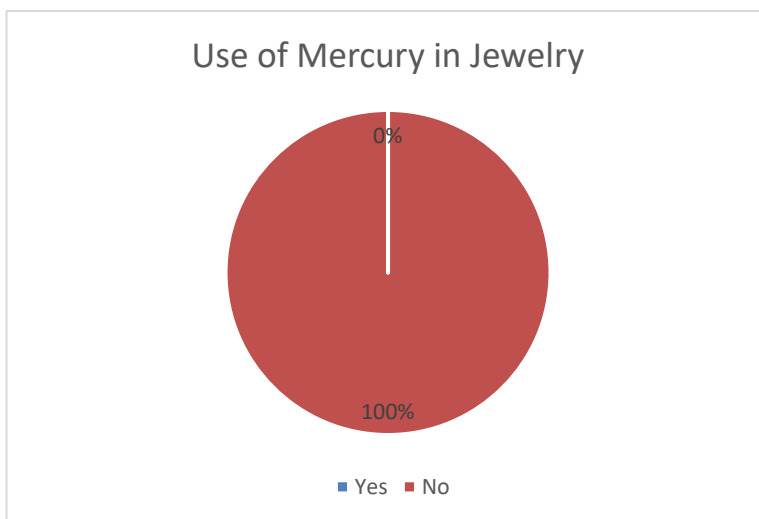
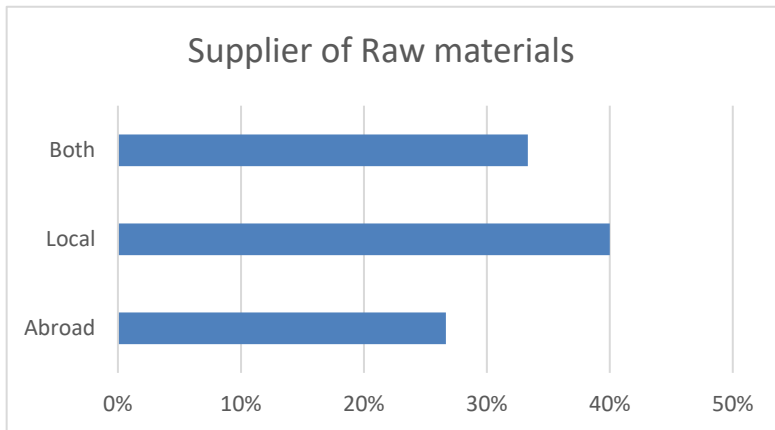
Types of Products

Which types of products do they sell normally? was the question to them. 60% of them sell imitation, 53% silver, and 73% gold-plated jewelry. The demand of gold-plated ornaments are increasing rapidly and so seller sells mostly gold-plated products.



Supplier of Raw Materials

The raw materials mainly supplied from the local source. 27% said that, they brought the raw materials from abroad, and 33% said the both source of raw materials.

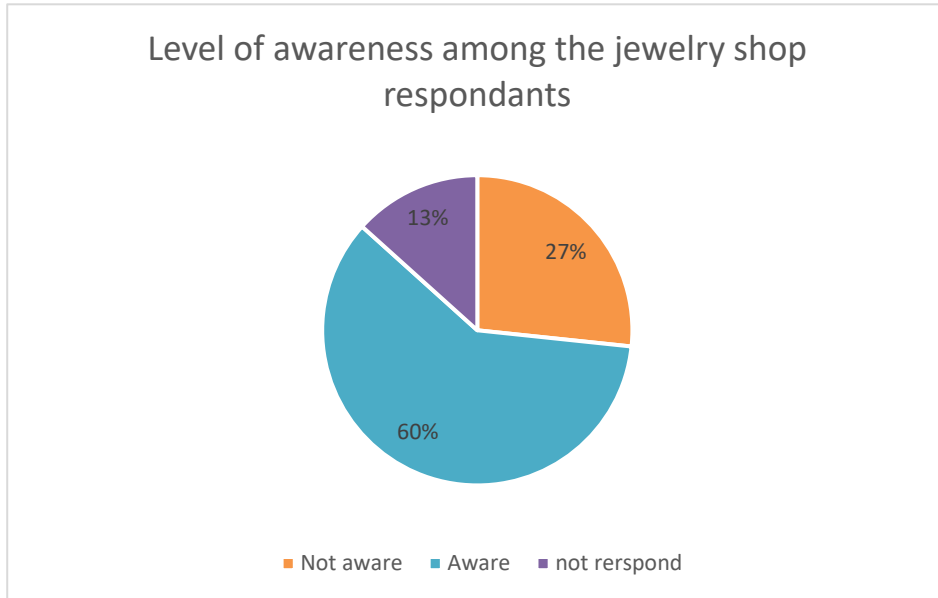


Use of Mercury in Jewelry

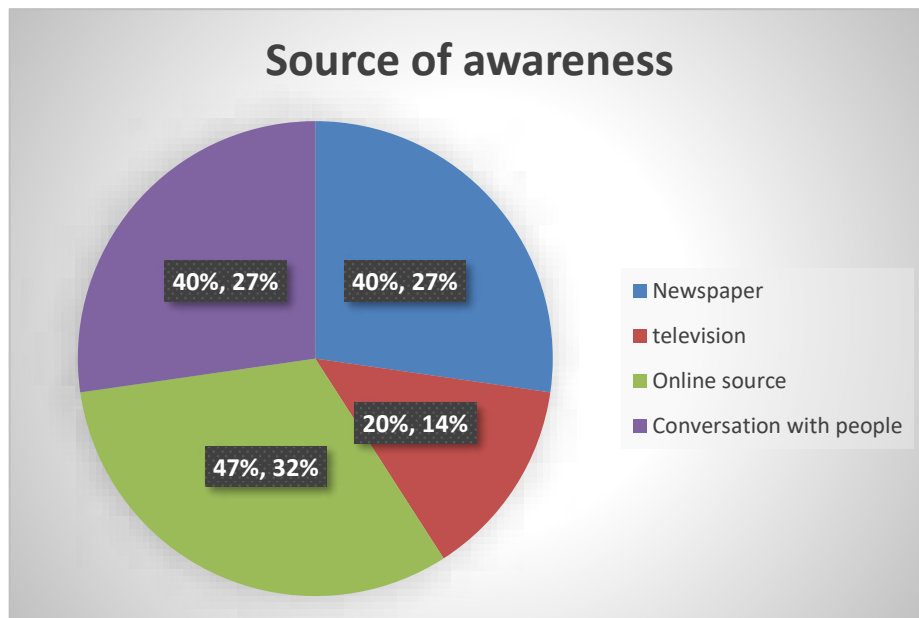
We thought that there will be huge use of Mercury in jewelry. But after the survey we found that, there is no use of mercury in this sector. The responsible persons said that, the color will be spoiled by the use of mercury in jewelry products.

Level of Awareness Among the Jewelry Shop Respondents

60% jewelry shop respondents said that they are aware about the mercury and 27% said not.



Source of awareness



Key Findings from the Overall Survey

To know the market status of mercury amalgam in Bangladesh, to determine the inventory status of mercury amalgam and to identify the potential buyer/ user of mercury, ESDO had briefly surveyed the customer, seller and jewelry shop owner. The question has been attached to the annex and the key findings are mentioned below –

- 1. Forms of mercury in use:** At the time of survey, it has been confirmed that due to rising awareness by BDS, ESDO and dentist's consciousness, the use of mercury amalgam is decreased by the dentists of Bangladesh. As a result, the demand and import of mercury has decreased sharply, confirmed by the mercury importing companies in Bangladesh. The selling rate of mercury is also in a decreasing stage. But it is a matter of dispute that still a little amount of mercury is being used by dental quacks at the peripheral district areas of Bangladesh. So some sellers are still selling mercury in market.
- 2. Factors for choosing dental restoratives:** Choosing among the dental restorative materials, cost and durability are two of the main deciding factors. Though mercury is cheap and durable than other alternatives, but due to the health hazard and aesthetic aspect, both the dentists and patients are against to use this metal poison. Mercury amalgam causes ulceration on gum and black in color whereas alternatives are teeth colored and do not impose health risk.
- 3. Health insurance:** There is no public health insurance available in Bangladesh to cover the dental service costs.
- 4. Awareness source:** People from different sectors told us that they became aware from different social media sources, newspapers, televisions or other.

Major Initiatives and Accomplishments of ESDO for MFD

Although Bangladesh has still not ratified the Minamata convention, it is still one of the fast-moving countries towards mercury free dentistry and its elimination. For example, the mandatory standard of mercury in skin cream is only 1ppm announced by Bangladesh Standards & Testing Institution (BSTI) in 2020. In Bangladesh, alternatives to mercury dental amalgam, GIC, and Composite have been already popular which are readily available and affordable. According to the previous study, it has been evident that more than 75% dentist use Composite and the rest use both GIC & Composite in Bangladesh. The major achievements of ESDO's accomplishments regarding the mercury free dental amalgam are mentioned below -

1. ESDO has been working with Bangladesh dental Society (BDS) since 2010 and together they have achieved many remarkable achievements toward mercury free dentistry. As Bangladesh is a signatory country of Minamata Convention, BDS together with ESDO and Asian Center for

Environmental Health made a call to the dental surgeons of Bangladesh to put an end to the use of mercury amalgam in the treatment of pregnant women, nursing mothers, and children in June, 2018.

2. On 28th January 2018, ESDO, Asian Center for Environmental Health and BDS collaborated with World Alliance for Mercury-Free Dentistry (WAFMD) and Asian Centre for Environmental Health inaugurated 'Mercury Amalgam Free Dental Chamber Visit'. After that, total 500 dental chambers have already been visited and recognized till now as mercury free dental chamber by ESDO. But due to COVID-19 situation, the in-person visits had been replaced by online survey started on April 2020 until April 2021.
3. ESDO signed MOU with BDS for the third time on January 2021. The whole year's action plan including awareness campaign, research, policy advocacy, dental curriculum revision, petition to government and implementation of different action-oriented activities toward mercury free dentistry were discussed in the consultation.
4. ESDO and Asian Center for Environmental Health along with BDS has also prepared a petition for submission to the government of Bangladesh in hope to phase out mercury from dentistry. The petition has been primarily submitted to relevant ministries and departments for suggestions and recommendations.
5. Moreover, BDS submitted a letter to Minamata Secretariate mentioning the information regarding their initiatives and achievements in association with ESDO to end dental amalgam in Bangladesh. BDS moving forward to ban dental amalgam use by 2022 and push for a ban on dental amalgam mentioned the Minamata Convention obligations in Annex A-II to phase down the use of amalgam. In Bangladesh, the government and civil society are both following paths to reduce the use of dental amalgam substantially and then phase out entirely.

Event Accomplishments by ESDO for MFD

Action Plan Sharing With BDS-2022

Environment and Social Development Organization-ESDO and Bangladesh Dental Society-BDS have been working together on the Mercury phase-out movement since 2017. ESDO and BDS are working for a long and are determined to continue the work until the complete ban of mercury amalgam. On the date, 30th of December ESDO organize an Action Plan Sharing meeting with BDS at the head office of ESDO. The meeting agenda was to



share and discuss the upcoming plans that ESDO has prepared and intended to do with collaboration with BDS under the program Mercury Amalgam Phase-out by 2022. BDS express their consent to work together in the journey of the mercury phase-out of the program. All respected dentists express enthusiasm to work on the mercury phase-out movement together, and they also express their interest in passing the logo and stickers. At the same time, they come across mercury-free dental chambers and practitioners.

Courtesy Visit with Director General at Directorate General of Health Services (DGHS)

ESDO executive director Siddika Sultana pays a courtesy visit to Prof. Dr. Robed Amin at DGSH, where they discussed an insightful topic on oral health, ESDO's initiative to prevent mercury use from dentistry because mercury is harmful to human health. Dr. Robed Amin mentioned the report and policy for oral care that is yet to be legalized. He also appreciates the works and awareness workshop conducted by ESDO and expresses consent to be with ESDO on the mercury from dentistry that will be able to provide support Govt. in the way of ratification of the Minamata Convention.

An Inter-ministerial meeting on Minamata Convention

Ratification by Bangladesh was held at the Ministry of Environment, Forest and Climate Change to get opinions from the stakeholders and authorities of Bangladesh regarding the Ratification of the Minamata Convention.

Dr. Humayun Kabir Bulbul, Secretary General of Bangladesh Dental Society- BDS said, the mercury emission from the dental sector reduced from 7% to 2% and this is the result of the conjugated efforts and initiative of ESDO and BDS. Siddika Sultana, Executive Director of ESDO attended and emphasized the ratification.



World Alliance for Mercury free Dentistry (WA) Leadership Team Meeting (24 May- 2 June, 2022)

A meeting was organized by WAMFD to share the initiatives or update on the journey of the dental amalgam phase-out program. Each participant shared their journey and initiatives. All the leaders from different countries shared

their achievements in the journey of mercury free dentistry program after COP 4.2. Participants also shared their next step and also agreed to raise question regarding the revised amendment on mercury free dentistry. The representatives from ESDO was also there to share their experiences to phase out mercury from dentistry.

Project Support Group meeting

A step forward Minamata Convention Ratification. On 4th March, ESDO organized a Project Support Group - (PSG) meeting to discuss the „Draft roadmap/strategy for phasing out mercury-added products under the Minamata Convention on mercury in Bangladesh“. ESDO believes that this draft roadmap/strategy will be of great help in the case of ratification of the Minamata Convention. The main objective of this meeting was to share this roadmap with the PSG and collect their recommendation to make this draft roadmap/strategy more concrete. The PSG includes participants from relevant ministries and departments (Minamata focal person), academicians from universities such as BUET and the University of Dhaka along ESDO board members.



Bangladesh Dental Society and ESDO signed MOU for the third time!



ESDO and Bangladesh Dental Society - BDS signed Memorandum of understanding - MOU for the third time. This agreement was signed on a consultation jointly organized by ESDO and BDS on 27th January at ESDO head office. The whole year's action plan and implementation of different action-oriented activities were discussed in the consultation. Action Plan includes Awareness campaign, Study, Policy advocacy, Petition to Government, etc.

Bangladesh Dental Society letter to Minamata Secretariat: BDS moving forward to ban dental amalgam use by 2022

BDS moving forward to ban dental amalgam use by 2022 and Push for a ban on dental amalgam mentioned the Minamata Convention obligations to phase down the use of amalgam. In Bangladesh, the government and civil society are both following paths to reduce substantially, and then phase out entirely, the use of dental amalgam.

ESDO together with BDS sends a request letter to the relevant government authority to phase

out mercury amalgam and the Ministry of Environment, Forest and Climate Change has given a response by the mean of an acknowledgment letter.

Bangladesh is a signatory country of the Minamata convention and looking forward to being a party. The country is expecting to ratify The Minamata Convention on the upcoming COP 4.2 that is going to be held by March 2022. In response to that, Govt. already takes "Minamata Initial assessment" and hopes to join COP4.



High-Level Policy Dialogue

To phase out Mercury Amalgam, a high-level policy dialogue was held at 23rd February 2022 in the Department of Environment Auditorium. This event was started with an introductory session by Samina Khandaker, Program Associate of ESDO, and a welcome speech by Prof Dr. Humayun Kabir Bulbul, Secretary-General, BDS. After the welcome speech, a presentation on the country situation report was presented on the topic of "Country Situation Report on Phasing out Mercury Amalgam from Dentistry of Bangladesh by 2022" by Subhatun Nur Prithy, project associate, ESDO.



After the presentation, a session involved the active participation of special guests from the different national and international organizations such as the president and vice-president of World Alliance for Mercury-free Dentistry, Attorney Charles G. Brown and Dominique Bally, the director of European Center for Environmental Medicine, Florian Schulze, and the director of Department of Environment, Ministry of Environment, Forest and Climate Change, Masud Iqbal Md. Shameem also



gave their recommendation and suggestions to prevent the use of toxic chemical mercury from the dentistry and how Bangladesh can proceed it to Minamata ratification.

An open discussion session was moderated by the Secretary-General of ESDO, Dr. Shahriar Hossain, where the discussion was made to phase out mercury from Bangladesh. Here, our guest of honor, Prof. Dr. Md. Abul Kasem, President, Bangladesh Dental

Society, the chief guest of the event, and Habibun Nahar, Deputy Minister of Ministry of Environment, Forest and Climate Change, gave their insightful remarks on the vital issue of using mercury and also discuss the strategies to ban this toxic chemical. Moreover, the closing remark was delivered by Syed Marghub Murshed, Former Secretary, Government of the People's Republic of Bangladesh & Chairperson, ESDO, and Siddika Sultana, Executive Director, ESDO.

Discussion and suggestions by our notable guests, representatives of numerous institutions, and government authorities presented in this policy briefing are as follows:

1. The policy dialogue was successfully able to draw the attention of different organizational bodies, stakeholders, and the Bangladeshi government on the issue of banning mercury from dentistry.
2. Through the event we were able to receive an expert opinion on Bangladesh's current dentistry regulating system and its shortcomings and the insightful ideas of future studies.
3. The event served as a platform of discussion among the stakeholders on the negative health effects of mercury poisoning was able to draw the attention of media personnel that is going to be helpful in spreading awareness among mass people later on.
4. Moreover, the event successfully gave an opportunity to the dentists to urge for the establishment of Regulation as relevant experts and regulatory bodies were present.

A pledge by dentists to practice Mercury-free Dentistry

According to the previous studies of ESDO, about 95.7% of dentists have stopped using mercury in their dentistry in Bangladesh. They are now practicing mercury-free dentistry. ESDO in association with BDS has been working on a Mercury-free Dentistry project for a long time and started to create a database consisting of the name of the dentists who are not using mercury in their practice. The dentists will be recognized nationwide for their support and will be given a certificate for practicing mercury-free dentistry.

Recommendations

Awareness:

- Repeated mass awareness programs should be administered to make the people concern about the harmful effects of mercury amalgam.

Sueveillance:

- Government and dental organizations should monitor the dentist's use of mercury filling.
- Monitoring the prices of the alternatives to mercury amalgam and making them available to the patients
- The import of mercury for the purpose of dentistry needs to come to an end
- Works of quacks need to be checked

Training:

- Training of the dentists regarding the usage of alternative to mercury amalgam (GIC, composite etc.) must be arranged by the BDS as well as the companies which are importing them
- Dental educational institute should also initiate programs to discourage the new dentists about the usage of mercury amalgam

Regulations:

- Scaling-up the policy framework for phasing out mercury dental amalgam
- Govt. should accelerate the process of ratifying Minamata Covention under which the mercury use can be monitored properly

Conclusion

In dentistry, dental amalgam has traditionally been the primary restorative material utilized directly on the teeth. While composite resins and glass ionomers are excellent direct restorative materials, they are prohibitively expensive when compared to numerous indirect restorative options. The debate in dentistry about mercury and dental amalgam revolves around the possibility that mercury leaking from amalgam fillings is harmful to one's health.

Mercury is known to be a neurotoxic at large level, capable of causing a wide range of neurobehavioral consequences. The availability of alternative materials and new techniques to cavity preparation, such as the concept of removing as little of the tooth as possible, are contributing to a further trend away from dental amalgam as a primary restorative material.

Mercury amalgam and silver fillings are widely used across the world, but it's long past time to cease them. It's time for dentists to do their part for the greater good, and mercury amalgam-free dentistry is a key indicator of Bangladesh's healthy rise within the global movement. The government should also help BDS and ESDO minimize mercury consumption in dental amalgam and ratify the Minamata Convention.

Dental amalgam is still a desired direct restorative material from a cost and lifespan viewpoint. It is the material of choice in some clinical settings where its characteristics are superior to other materials. Dental amalgam must be phased out if dentists are to do their part. Consumers in general, on the other hand, should be extra cautious when it comes to dental exams.

Dental amalgam (also known as "dental mercury") phase-out will have a substantial influence on dental education and practice in developing nations. To teach future generations of dentists in mercury-free minimal intervention dentistry, dental schools will need to adapt their curricula quickly. This is critical if they want to preserve their ecosystem and the health of future generations. Dental schools should be the focal point of all phase-down efforts and should also lead the way in upgrading general dentists' knowledge and abilities in minimal intervention dentistry through conferences, seminars, and hands-on workshops. Dental faculties, governments and international bodies should provide financial and equipment assistance to dental schools so that they can perform their obligations. The moment to act has come.

Result & Discussion

From our recent studies, we have found that in 2022 the number of dentists using Mercury in dental amalgam is decreased. The awareness among the users of mercury is also increased than the previous study. The jewelry producers are also not using mercury. But they are using some other chemicals which have negative health and environmental impact. But nowadays people are becoming aware of mercury pollution from social media, television, posters, leaflets or others. So, the patients are now asking dentists about the amalgam before taking treatment. From the seller of mercury, it is clear that in recent times, the selling of mercury amalgam is decreased but they sell a little to other users.

Conclusion

It is important to protect human health and the environment against adverse effects of Hg. In line with this, dental amalgam is banned in Norway and Sweden. In other industrial countries, the use of the filling material is about to be phased out(Aaseth et al., 2018).

In dentistry, dental amalgam has traditionally been the primary restorative material utilized directly on the teeth. While composite resins and glass ionomers are excellent direct restorative materials, they are prohibitively expensive when compared to numerous indirect restorative options. The debate in dentistry about mercury and dental amalgam revolves around the possibility that mercury leaking from amalgam fillings is harmful to one's health.

Mercury is known to be neurotoxic at a large level, capable of causing a wide range of neurobehavioral consequences. The availability of alternative materials and new techniques to cavity preparation, such as the concept of removing as little of the tooth as possible, are contributing to a further trend away from dental amalgam as a primary restorative material.

Mercury amalgam and silver fillings are widely used across the world, but it's long past time to cease them. It's time for dentists to do their part for the greater good, and mercury amalgam-free dentistry is a key indicator of Bangladesh's healthy rise within the global movement. The government should also help BDS and ESDO minimize mercury consumption in dental amalgam and ratify the Minamata Convention.

Dental amalgam is still a desired direct restorative material from a cost and lifespan viewpoint. It is the material of choice in some clinical settings where its characteristics are superior to other materials. Dental amalgam must be phased out if dentists are to do their part. Consumers in general, on the other hand, should be extra cautious when it comes to dental exams.

Dental amalgam (also known as "dental mercury") phase-out will have a substantial influence on dental education and practice in developing nations. To teach future generations of dentists in

mercury-free minimal intervention dentistry, dental schools will need to adapt their curricula quickly. This is critical if they want to preserve their ecosystem and the health of future generations. Dental schools should be the focal point of all phase-down efforts and should also lead the way in upgrading general dentists' knowledge and abilities in minimal intervention dentistry through conferences, seminars, and hands-on workshops. Dental faculties, governments and international bodies should provide financial and equipment assistance to dental schools so that they can perform their obligations. The moment to act has come.

References:

1. Agency for Toxic Substances and Disease Registry, 1999. Toxicological Profile for Mercury. US Department of Health and Human Services: Public Health Service.
2. Patterson, J. E., Weissberg, B. G., & Dennison, P. J. (1985). Mercury in human breath from dental amalgams. *Bull. Environ. Contam. Toxicol.*; (United States), 34(4).
3. <https://www.who.int/news-room/fact-sheets/detail/mercury-and-health#:~:text=Mercury%20may%20have%20toxic%20effects,of%20major%20public%20health%20concern.>
4. Bjørklund, G., Tinkov, A. A., Dadar, M., Rahman, M., Chirumbolo, S., Skalny, A. V., ... & Aaseth, J. (2019). Insights into the potential role of mercury in Alzheimer's disease. *Journal of Molecular Neuroscience*, 67(4), 511-533.
5. Barago, N., Floreani, F., Acquavita, A., Esbrí, J. M., Covelli, S., & Higuera, P. (2020). Spatial and temporal trends of gaseous elemental mercury over a highly impacted coastal environment (Northern Adriatic, Italy). *Atmosphere*, 11(9), 935. <https://doi.org/10.3390/atmos11090935>
6. Aaseth, J., Hilt, B., & Bjørklund, G. (2018). Mercury exposure and health impacts in dental personnel. *Environmental Research*, 164(February), 65–69. <https://doi.org/10.1016/j.envres.2018.02.019>
7. Bengtsson, U. G., & Hylander, L. D. (2017). Increased mercury emissions from modern dental amalgams. *BioMetals*, 30(2), 277–283. <https://doi.org/10.1007/s10534-017-0004-3>

8. Chin, G., Chong, J., Kluczevska, A., Lau, A., Gorjy, S., & Tennant, M. (2000). The environmental effects of dental amalgam. *Australian Dental Journal*, 45(4), 246–249. <https://doi.org/10.1111/j.1834-7819.2000.tb00258.x>
9. Clarkson, T. W. (2002). The three modern faces of mercury. *Environmental Health Perspectives*, 110(SUPPL. 1), 11–23. <https://doi.org/10.1289/ehp.02110s111>
10. <https://byjus.com/chemistry/mercury/#:~:text=Uses%20of%20Mercury,-Mercury%20metal%20have&text=Because%20of%20its%20highFluorescent%20lamps%20and%20other%20devices>. Ddensity, F. (n.d.). *No Title*.
11. Siblingud, R. L. (1990). Health effects after dental amalgam removal. *Journal of Orthomolecular Medicine*, 5(2), 95–106.
12. http://www.mercuryconvention.org/Portals/11/documents/meetings/COP4/submissions/ESDO_DentalAmalgam.pdf
13. <https://mercuryfreedentistry.net/2018/03/10/bangladesh-dental-society-calls-for-amalgam-phase-out-in-the-treatment-of-children-pregnant-women-and-nursing-mothers-by-june-2018/>

Annex

Annex A



Photo: Survey with jewellery shop, ESDO- 2022

Annex-B

Survey Questionnaire on National Assessment on Mercury Available in the Local market

Questionnaire for Importer or producer of jewelry

Time: **Date:** **Location:**

Part-1 (Participant's Identical outline)	
Name	
Designation	
Sex	<input checked="" type="checkbox"/> Male <input type="checkbox"/> Female
Age	<input type="checkbox"/> < 10 <input type="checkbox"/> 10-20 <input type="checkbox"/> 20-30 <input type="checkbox"/> 30-40 <input type="checkbox"/> > 40
Type of shop	<input type="checkbox"/> Importer <input type="checkbox"/> Wholesaler <input type="checkbox"/> Retailer
Total employees	
Education	<input checked="" type="checkbox"/> Illiterate <input type="checkbox"/> Primary <input type="checkbox"/> High School <input type="checkbox"/> Higher education
Income	<input type="checkbox"/> < 20,000 <input type="checkbox"/> 20,000-50,000 <input type="checkbox"/> 50,000-70,000 <input type="checkbox"/> Above 70,000

Part-2 (Survey Questions)	
1. What type of jewelry you mostly sell?	<input type="checkbox"/> Titanium <input type="checkbox"/> Silver <input type="checkbox"/> Gold-plated <input type="checkbox"/> Gold <input type="checkbox"/> Others (specify)
2. Who is your supplier? (from where you mainly collect raw materials or products?)	<input type="checkbox"/> Local (name) <input type="checkbox"/> Abroad

Survey Questionnaire on National Assessment on Mercury Available in the Local market

3. Amount of monthly production of jewelry?	<input type="checkbox"/>
4. What kind of elements do you usually use during making jewelry?	<input type="checkbox"/> Mercury <input type="checkbox"/> Lead <input type="checkbox"/> Cadmium <input type="checkbox"/> Copper <input type="checkbox"/> Arsenic <input type="checkbox"/> Nickel <input type="checkbox"/> Chromium <input type="checkbox"/> Zinc <input type="checkbox"/> Others
5. In which purpose metals/elements are used in your jewelry?	<input type="checkbox"/> Durable alloy making <input type="checkbox"/> Durable metal extraction <input type="checkbox"/> Others (please describe)
6. Who are the supplier of these chemicals?	<input type="checkbox"/> Local <input type="checkbox"/> Abroad
7. How much mercury (Chemicals above) you used to buy Monthly/yearly basis?	<input type="checkbox"/> Monthly
8. While handling these chemical do you ever feel any health problems?	<input type="checkbox"/> Yes <input type="checkbox"/> No
9. If you then what kind of problems?	<input type="checkbox"/> Skin irritation <input type="checkbox"/> Rash, allergic reaction <input type="checkbox"/> Black spots/skin <input type="checkbox"/> Skin cancer <input type="checkbox"/> Others (specify)
10. What do you do with your by products/waste?	<input type="checkbox"/> Dispose with domestic rubbish <input type="checkbox"/> Directly dispose into air/water ways <input type="checkbox"/> Burial/In situ <input type="checkbox"/> others

Survey Questionnaire on National Assessment on Mercury Available in the Local market

11. Do you have any idea that mercury is a toxic chemical?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No comments
12. If yes, what is the source of your knowledge?	<input type="checkbox"/> Newspaper <input type="checkbox"/> Television <input type="checkbox"/> Online source <input type="checkbox"/> Conversation with people <input type="checkbox"/> Others
13. Do you ever face any difficulties to report due to law/regulation?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Name of interviewer:

Signature & Date

Survey Questionnaire on National Assessment on Mercury Available in the Local market

Questionnaire for Consumers

Time: Date: Location:

Part-1 [Participant's Identical outline]

Name	
Sex	<input type="checkbox"/> Male <input type="checkbox"/> Female
Age	<input type="checkbox"/> ≥ 19 <input type="checkbox"/> 20-29 <input type="checkbox"/> 30-39 <input type="checkbox"/> 40-49 <input type="checkbox"/> ≥ 50
Occupation	<input type="checkbox"/> Govt. <input type="checkbox"/> Private <input type="checkbox"/> Business <input type="checkbox"/> Student
Education	<input type="checkbox"/> Illiterate <input type="checkbox"/> Primary <input type="checkbox"/> High School <input type="checkbox"/> Higher education
Income	<input type="checkbox"/> $\leq 20,000$ <input type="checkbox"/> 30,000-50,000 <input type="checkbox"/> 60,000-70,000 <input type="checkbox"/> Above 70,000

Part-2 [Survey Questions]

1. Do you have dental filling?	<input type="checkbox"/> YES <input type="checkbox"/> No
2. If yes what type? (can ask black or white)	<input type="checkbox"/> Mercury amalgam <input type="checkbox"/> Alternative (composite, GIC)
3. Did your dentist ever mentioned you about the context of the dental filling?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Survey Questionnaire on National Assessment on Mercury Available in the Local market

Questionnaire for Importer/Wholesaler/Retailer

Time: Date: Location:

Part-1 [Participant's Identical outline]

Name	
Designation:	
Sex	<input type="checkbox"/> Male <input type="checkbox"/> Female
Age	<input type="checkbox"/> ≤ 19 <input type="checkbox"/> 20-29 <input type="checkbox"/> 30-39 <input type="checkbox"/> 40-49 <input type="checkbox"/> 50
Type of shop	<input type="checkbox"/> Importer <input type="checkbox"/> Wholesaler <input type="checkbox"/> Retailer
Education	<input type="checkbox"/> Illiterate <input type="checkbox"/> Primary <input type="checkbox"/> High School <input type="checkbox"/> Higher education
Income	<input type="checkbox"/> $\leq 20,000$ <input type="checkbox"/> 30,000-50,000 <input type="checkbox"/> 60,000-70,000 <input type="checkbox"/> Above 70,000

Part-2 [Survey Questions]

1. Do you sell Mercury in amalgam? (Locally known as Pital)	<input type="checkbox"/> YES <input type="checkbox"/> No
2. From where you get the Mercury? (If abroad then which country?)	<input type="checkbox"/> Local <input type="checkbox"/> Abroad
3. If Abroad What form you import mercury?	<input type="checkbox"/> Dental filling <input type="checkbox"/> Others
4. How many different types of mercury do you have in your stock?	<input type="checkbox"/> Liquid mercury <input type="checkbox"/> Amalgam caplet <input type="checkbox"/> Not for dental filling

Survey Questionnaire on National Assessment on Mercury Available in the Local market

4. Do you have any idea that filling can contain mercury?	<input type="checkbox"/> Yes <input type="checkbox"/> No
5. Do you have any idea that mercury is a toxic chemicals?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No comments
6. If yes, what is the source of your knowledge?	<input type="checkbox"/> Newspaper <input type="checkbox"/> Television <input type="checkbox"/> Online source <input type="checkbox"/> Conversation with people <input type="checkbox"/> Others.....

Name of Interviewer: _____

Signature & Date _____

Survey Questionnaire on National Assessment on Mercury Available in the Local market

5. Which type of mercury for dental filling you sell most?	
6. Who is the potential buyer?	<input type="checkbox"/> Dentist <input type="checkbox"/> Staff industry <input type="checkbox"/> Jewelry <input type="checkbox"/> Others
7. How much mercury do you sell on a Monthly/yearly basis?	
8. How much do you import/buy per month/year?	
9. Do the sales status?	<input type="checkbox"/> Increase <input type="checkbox"/> decrease
10. Cost of the Unit of Mercury-	<input type="checkbox"/> Increase <input type="checkbox"/> decrease
11. Do you have any idea that mercury is a toxic chemicals?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No comments
12. If yes, what is the source of your knowledge?	<input type="checkbox"/> Newspaper <input type="checkbox"/> Television <input type="checkbox"/> Online source <input type="checkbox"/> Conversation with people <input type="checkbox"/> Other
13. Do you ever face any difficulties to import due to law/regulations?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Name of Interviewer: _____

Signature & Date _____

Survey questionere for different respondents.



Environment & Social Development Organization-ESDO
House # 8/1, Level# 5, Block# C, Lalmatia,
Dhaka-1207, Bangladesh
Website: <http://esdo.org/>



