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Health sector involvement in the implementation of the Minamata Convention: assessment and prevention of mercury exposure

Report of a meeting
Bonn, Germany
24-25 June 2015



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ABSTRACT

The meeting on Health Sector Involvement in the Implementation of the Minamata Convention: Assessment and Prevention of Mercury Exposure was held on 24–25 June 2015 in Bonn, Germany, under the umbrella of the European Environment and Health Process. The aim of the Meeting was to update participants about the effects on health of mercury and the implications of exposures to hazardous chemicals in early life for child development, and to share knowledge and information relevant to the implementation of the Minamata Convention. Participants noted the need for capacity-building and technical support to facilitate the implementation of the Convention in WHO European Member States, and mapped and investigated synergies with other WHO strategies and policies that could render the implementation of the Convention more efficient.

Keywords

MERCURY
MERCURY POISONING – prevention and control
ENVIRONMENTAL EXPOSURE – prevention and control
ENVIRONMENTAL HEALTH

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Abbreviations

ASGM	artisanal and small-scale gold mining
EU	European Union
HBM	human biomonitoring
UNEP	United Nations Environment Programme

Introduction

The Minamata Convention on Mercury is a global legally binding instrument to protect human health and the environment from the adverse effects of mercury. Adopted in October 2013, by June 2015 it had been signed by 128 countries and ratified by 12 (1). The main agreed actions of the Minamata Convention include a ban on primary mercury mining, the phase-out of mercury-added products, the introduction of control measures on air emissions and the regulation of artisanal and small-scale gold mining.

In May 2014, the World Health Assembly adopted resolution WHA67.11 on the role of WHO and ministries of health in the implementation of the Minamata Convention (2).

On 24–25 June 2015, national counterparts, national focal points for the European Environment and Health Process and representatives of regional, international and nongovernmental organizations met in Bonn to exchange information and discuss the implementation of the Minamata Convention on Mercury in Member States of the WHO European Region, focusing on health aspects. Džejna Milaković-Ramadani and Katerina Sebkova were elected co-chairpersons and Franziska Matthies rapporteur. The programme is in Annex 1 and the list of participants in Annex 2.

Elizabet Paunovic, Head, WHO European Centre for Environment and Health, and Dorota Jarosinska, Programme Manager Environmental Exposures and Risks, opened the Meeting and welcomed the participants. They stressed the importance of the implementation of the Minamata Convention in preventing negative health impacts from mercury, especially on vulnerable population groups and, in that context, highlighted the consequences of *in utero* and early life exposure.

Scope and purpose of the Meeting

The Meeting was convened to:

- share information about the relevance of early life exposures for children's health and development;
- share knowledge and information relevant to the implementation of the Minamata Convention and the prevention of exposure to mercury;
- identify needs for capacity-building and for WHO technical support for the implementation of the Minamata Convention at national and regional levels;
- investigate opportunities for the efficient use of health sector resources in the implementation of the Minamata Convention and for mainstreaming activities with relevant policies and programmes in other sectors;
- introduce the project Development of a Plan for Global Monitoring of Human Exposure to and Environmental Concentrations of Mercury, led by the United Nations Environment Programme (UNEP), and implemented by the WHO European Centre for Environment and Health (WHO ECEH) in cooperation with WHO headquarters and UNEP and funded by the Global Environment Facility.

Role of the health sector in the implementation of the Minamata Convention in the context of resolution WHA67.11

The health sector has played a crucial role for many years in addressing the health impacts of mercury, starting from identification of the health effects and sources of exposure, assessment of the disease burden and the setting of guidelines (for example, for tolerable intakes and developing fish consumption advisories). In terms of WHO, these actions provided the impetus for the development of the Minamata Convention. Resolution WHA67.11 on the Minamata Convention, adopted by the Sixty-seventh World Health Assembly, emphasizes WHO's input into the development of the Convention and clearly defines the roles and responsibilities of both WHO and ministries of health.

The health sector will continue to play a leading role in the implementation of Article 16 of the Convention and other relevant articles, such as Article 4 and annexes on mercury-added products, and Article 7 on the use of mercury in artisanal and small-scale gold mining (ASGM). In relation to Article 4, action taken by the health sector will focus in particular on phasing out the manufacture, import and export of mercury-containing skin lightening products and antiseptics as well as mercury sphygmomanometers and thermometers used in health care. The health sector will also be strongly involved in activities related to the exchange of information about health, public awareness-raising, research regarding health and monitoring, as reflected in Articles 17, 18 and 19 of the Convention.

WHO has already developed extensive resources to assist countries in the implementation of the health-related activities in the Minamata Convention, such as the preparation of short information documents, tools for action, norms and guidance, as well as documents for education and training, burden of disease estimates, fact sheets and question and answer sheets (2). Two in particular are:

- guidance and technical materials to facilitate the phasing-out of materials containing mercury in the health sector, a joint initiative by Health Care without Harm and WHO (3), which relate to Article 4, Annex A, Part I of the Minamata Convention;
- support for the phasing-down of mercury use in dentistry (4), and a publication promoting the phasing-down of the use of dental amalgam and phasing-up of the use of quality alternative restorative material (5), which relate to Article 4, Annex A, Part II of the Minamata Convention.

Several WHO tools on ASGM are available and new ones are being developed to support the implementation of Article 7, including:

- training modules for health care providers on how to identify and address the health impacts of ASGM;
- a rapid survey tool to assess the health situation of miners and their families;
- a model public health strategy for addressing the health impacts of ASGM.

In addition, the health sector supports the implementation of the Minamata Convention through its core role and responsibilities with respect to:

- research on health impacts and the effectiveness of interventions to address them;
- advocacy and education for patients, families, communities, vulnerable groups and health professionals;

- provision of authoritative guidance;
- monitoring and reporting;
- diagnosis and treatment.

Early life exposures and the life-course approach

Early life exposures

There is increasing recognition of the role of early life exposures and events in the risk of noncommunicable diseases, although it has not yet been fully applied in the planning and implementation of preventive interventions. Human and animal studies have demonstrated that the composition of the mother's diet and her exposure to stress affect the development of the fetus, establishing a development trajectory that influences the response of an individual to later exposures, in part due to epigenetic processes. The mechanisms through which chemicals can influence the development of noncommunicable diseases at an early life stage have been less investigated, but studies confirm the ability of chemicals to damage organisms *in utero* and during early development with long-term consequences. For example, in animal studies maternal bisphenol A exposure affects the development and metabolic conditions of both male and female adult offspring. For mercury exposure, there is clear evidence of a link between prenatal exposure and poor cognitive development and behavioural disorders in children. Low-level methylmercury exposure has been shown to impair the growth of fetuses and very young children (0–2 years) and to facilitate the development of noncommunicable diseases.

The concept of the developmental origins of health and disease describes how, prior to conception and during fetal life, infancy and early childhood, the environment induces developmental changes that have a long-term impact on health and the risk of disease.

Despite many challenges in investigating the developmental origins of noncommunicable diseases and collecting evidence of the effectiveness of early interventions (such as subclinical effects of environmental factors, individual differences, difficulties in finding early biomarkers, and a lack of clarity about when and how to intervene), WHO promotes a life-course approach for the prevention and control of noncommunicable diseases. As formulated in the Global Action Plan for the Prevention and Control of Noncommunicable Diseases (2013–2020) (6):

Policies, plans and services for the prevention and control of noncommunicable diseases need to take account of health and social needs at all stages of the life course, starting with maternal health, including preconception, antenatal and postnatal care, maternal nutrition and reducing environmental exposures to risk factors, and continuing through proper infant feeding practices, including promotion of breastfeeding and health promotion for children, adolescents and youth followed by promotion of a healthy working life, healthy ageing and care for people with noncommunicable diseases in later life.

WHO birth cohort survey

In the past 20 years, birth cohort studies to assess the risks to the health of developing children from harmful chemicals in air, water and food have been undertaken in many countries in Europe and worldwide.

The Research Centre for Toxic Compounds in the Environment has gained extensive experience in longitudinal studies linking environment and health, highlighting the birth cohorts in the

Region, mainly in the frame of the European Longitudinal Study of Pregnancy and Childhood. The overall objective of this study is to link environmental factors and exposures to health, with the view of informing policies and practice to improve the health of future generations. Capacity-building, research, and the need to bridge the science and policy interface in the WHO approach to the birth cohort survey are stressed.

Data on parents and children collected in longitudinal studies (such as the Avon, Central European and European Longitudinal Studies of Pregnancy and Childhood) allow for the assessment of environmental and genetic factors that affect a person's health and development, especially when combined with long time-series of environmental data from well-established networks and databases in Europe (such as the ambient air monitoring network and the Global Environmental Assessment Information System).

Birth cohort surveys can be useful to assess the impacts on health of mercury and its compounds, as a source of information and as a platform in relation to monitoring the evaluation of effectiveness of the measures in the Minamata Convention (for example, Article 9 on releases, Article 16 on health aspects, Article 17 on information exchange or Article 19 on research, development and monitoring).

From Minamata disease to the Minamata Convention – and beyond

An industrial release of methylmercury (between 1932 and 1968) into Minamata Bay, Japan, resulted in massive methylmercury exposure in local fish-consumers and caused the development of neurological disorders, later named Minamata disease. It took several decades for scientific evidence to be gathered identifying the impacts on health of mercury and the subsequent use of this evidence in public policy decision-making that eventually resulted in the development of the Minamata Convention, an international legally binding instrument. One of the triggers was the seminal Faroese birth cohort study that provided crucial evidence of neurodevelopmental delays in children exposed prenatally to mercury from the general environment. Novel protective approaches are needed, since developmental damage to the brain is likely to be permanent and because optimal brain functions are important to health and economic productivity. At the same time, the developing brain is extremely sensitive to toxic chemicals which may affect rapid cell division and differentiation, axon formation, or intensive generation and weeding of synapses during prenatal and early postnatal stages.

Furthermore, common heterogeneities in relevant genes can cause predisposition to methylmercury neurotoxicity. Exposure limits based on average neurotoxicity are, therefore, probably much too high to render adequate protection to susceptible subjects.

In the case of fish consumption, which can be the source of methylmercury but is also a source of valuable nutrients, the risks and benefits need to be carefully considered. On the one hand, the nutrients may prevail some or perhaps all toxic effects, but methylmercury will at the same time deprive the consumer of the benefits otherwise associated with seafood.

In addition to mercury, the evidence on other chemical “brain drainers” such as lead, alcohol and polychlorinated biphenyls shows that they jointly cause a silent pandemic of neurological disorders due to environmental chemical exposures. In the context of the Minamata Convention, new protective approaches will have to be complemented by efforts to prevent excessive exposures in the short term that are dangerous to developing brains. An example could be dietary fish/seafood advisories tailored to local conditions. Determination of mercury in hair is a recommended and feasible biomarker of exposure, both to assess national and regional

population exposure levels and to identify individuals at risk. This is especially relevant in obstetric wards, where pregnant women with elevated mercury concentrations can be guided in regard to healthy diets that include seafood with the lowest levels of mercury.

Protection of human rights and prevention of exposure in early life

Exposure to environmental pollution (such as hazardous substances and waste) has an impact on the human right to a healthy environment (clean air, safe water, safe and healthy food and a safe working environment).

The rights of children, which are indivisible, interrelated and interconnected, need to be specially protected because children: (i) are powerless to change their exposure *in utero* and after birth; (ii) are more vulnerable because their bodies (especially their brains) are developing and their smallness means they are closer to the ground; and (iii) may suffer from latent health effects from exposure to toxic chemicals. In addition, children depend on their parents or carers for protection, although these may not have all the information they need.

The Convention on the Rights of the Child (7) and the Minamata Convention on Mercury have common implications for states in terms of their duty to protect the rights of children, that is, to strive for the highest attainable standards of health and to protect the inherent right to life. Since almost every state is a Party to the Convention on the Rights of the Child and thus has obligations to protect children, and the only way to protect the rights of the child is to prevent harm, states should focus more on protecting children from early life-stages exposure to toxic chemicals to prevent harm in the present and future generations.

Businesses, alongside their economic interests, have a responsibility to avoid toxic chemical pollution, to exercise due diligence regarding the impacts of their activities, to respect human rights and to provide access to effective remedies. In 2011, the Human Rights Council endorsed the Guiding Principles on business and human rights, which help to codify the fact that businesses have a responsibility to respect human rights (8). In the context of chemicals and human health, the situation in future years is projected to become more challenging, as 60% of chemicals produced and used are toxic. There is, however, reason for optimism as communities recognize that environmental issues, health protection and human rights are linked and cooperation is needed, and companies and retailers use their market power to move towards the use of safe chemicals.

Identification of exposed population groups

Environmental exposure to organic and inorganic mercury and to mercury in products

Humans can be exposed to different forms of mercury present in the environment including elemental mercury, inorganic mercury and organic mercury (such as methylmercury and ethylmercury).

There are numerous sources of mercury emissions in the environment. Fossil fuel combustion, metal production and ASGM account for almost 80% of global mercury emissions. The largest single source of mercury is ASGM (37%).

Mercury-added products can also be important sources of exposure to mercury. For example, skin-lightening products are reportedly used regularly by women in Mali (25%), Nigeria (77%),

Senegal (27%), South Africa (35%) and Togo (59%). In India, 61% of the dermatological market also consists of skin-lightening products.

Main sources of mercury emissions and releases into the environment

According to a UNEP overview of the global emissions of mercury, high emissions are detected in some developed countries and countries with intensive industrial development, including countries in the Region (9). Globally, there was a decreasing trend in emissions from 2005 to 2010 for intentional use of mercury by sectors, and a significantly increased trend for unintentional releases.

UNEP has developed a step-by-step toolkit which allows a country to identify possible sources of emissions (10). The initial screening test is qualitative but a quantitative evaluation is possible. The UNEP toolkit is paired with an e-learning tool which helps countries to compile an inventory. The tool is being used in many countries to produce the Minamata Initial Assessments (which serve as first projects eligible for Global Environment Facility funding) to assess the extent of the mercury challenge and the action required.

Specific requirements to control and reduce mercury air emissions are included in the Minamata Convention, in particular through Articles 5, 7, 8, 10 and 11. To promote the implementation of the Convention and to raise awareness, the interim secretariat of the Convention has offered a series of workshops throughout all regions. Further activities will be delivered on the basis of assessed needs, and may focus on specific topics.

Exposure to methylmercury from fish and sea-food

The formation of methylmercury in the biochemical cycle of mercury and its accumulation in the food chain (fish, seafood and wildlife) is an important aspect of human exposure, with elevated methylmercury levels found in many fish-eating populations notably among coastal, island, river and lakeside populations and those living near reservoirs, as well as in people who eat large quantities of commercially sold high-end predators. The Biodiversity Research Institute reports that in the Region (for example, in the North Sea, the Baltic Sea, the Atlantic Ocean and the Mediterranean), methylmercury levels in fish and marine mammals exceed one part per million on a wet weight basis in many samples.

The risks to human health from methylmercury in fish need to be considered in connection with the benefits from nutrients such as long-chained n-3 fatty acids, folic acid and selenium. The effects of prenatal exposure to methylmercury from fish consumption have been evaluated in many studies, although the findings have been inconsistent in particular when assessing the effects of exposure to low levels of mercury. As well as exposure level, the outcomes of the studies depend on the biomarkers of exposure used, developmental tests, age of children, co-exposures and other factors. For example, a moderate but significantly beneficial effect of fish consumption in pregnancy on cognitive and language development in children has recently been shown in a Mediterranean cohort study, which could be assigned to fatty acids in fish.

Recent studies indicate that in some parts of Europe, a high percentage of the population shows higher mercury concentrations in hair than the cut-off values set by different organizations and studies.

The reduction of human exposure to methylmercury in food needs, therefore, to be considered a public health priority objective.

Dental amalgams: population exposure and risks

In relation to population exposure to and risks from dental amalgams, European Union (EU) scientific committees have issued two opinions: the 2015 opinion of the Scientific Committee on Health and Environmental Risks on the environmental risks and indirect health effects of mercury from dental amalgam (11), and the 2014 opinion of the Scientific Committee on Emerging and Newly Identified Health Risks on the safety of dental amalgam and alternative dental restoration materials for patients and users (12).

While various adverse effects associated with the presence of dental amalgams have been suggested, such as developmental neurotoxicity or effects on neurological, psychological or psychiatric diseases, the causal evidence for such effects is weak. The Scientific Committee on Emerging and Newly Identified Health Risks recognizes that dental amalgam is an effective restorative material for the general population, with a low risk of adverse health effects. The use of amalgam restorations is not indicated in patients with mercury allergies and people with chronic kidney diseases and decreased renal clearance. To reduce the use of mercury-added products in line with the intentions of the Minamata Convention, it can be recommended that alternative materials should be used for the first treatment of primary teeth in children. As with any other medical/dental intervention, special care should be exercised when treating pregnant women to try to minimize exposure to any restorative materials (amalgam and its alternatives) and to substances needed during the treatment procedure such as anaesthetics.

The available alternatives to amalgam can be used in the general population, although they are not free from clinical limitations and toxicological risks and more research is need. Further research is mainly recommended on genetic polymorphism related to both mercury and the alternative restorative materials, and on development of new alternative materials with a high degree of biocompatibility.

As regards environmental pollution with mercury released from dental clinics following the use of amalgam, and the risk to human health due to mercury in the soil and air originating from dental amalgam use, the Scientific Committee on Health and Environmental Risks concludes that this proportion of mercury emissions represents a very minor contribution to total human exposure from soil and through inhalation. In the aquatic environment, a worst case scenario risk of secondary poisoning in top predatory fish, mammals and birds due to methylation cannot be excluded. Overall, however, mercury from dental amalgam does not represent a risk in European surface waters.

Population exposure in contaminated sites: case study in Croatia

A case study of population exposure has been undertaken in contaminated sites bordering the Adriatic Sea in Croatia, with pollution from oil refineries, thermal power plants, energy conversion plants, natural gas production and processing plants, the petrochemical and cement industries and fertilizer production. The locations of these industries appear to be particularly relevant for pollution from metals, including mercury, with specific hot-spots in Sisak-Moslavina county and Brodsko county.

An estimated 56 tons of mercury have been released into the sea in 41 years' activity by a chlor-alkali plant located on the north-eastern coast. Elevated mercury concentrations in sediments and bioaccumulation of methylmercury in marine organisms have been found in this area. A study

has shown that 41% of the captive Atlantic bluefin tuna farmed in the Adriatic Sea contained mercury above the level defined by EU and Croatian legislation.

In the affected population, the frequency of consumption of certain fish species showed a significant positive correlation with the mercury levels in hair and blood. It is suggested that further studies should be undertaken, including human biomonitoring (HBM), in a wider population, with a specific focus on areas where environmental pollution and higher exposure have been identified.

Occupational exposure to mercury and its compounds

Workers in various occupations and workplaces may potentially be exposed to mercury. In occupational settings, the main route of mercury uptake is via inhalation. Exposure to mercury can affect the kidneys and the central nervous system as well as other body functions. Strict protective measures are usually in place in formal workplaces where there is potential exposure to mercury. Cases of chronic poisoning are more likely than cases of acute poisoning. Regular health surveillance and HBM of workers, together with recognition of biological exposure limits, help in the early detection of exposure and related biological effects.

Occupational exposure in health care workers

Health care workers can be exposed to mercury from sources such as thermometers and sphygmomanometers or hospital waste. In dentistry, medical personnel may be exposed to mercury emissions during insertion and removal of dental amalgam. As concluded by the Scientific Committee on Health and Environmental Risks, however, there are no indications that dental personnel suffer from adverse health effects (12).

Exposure and health protection for workers in primary mercury mining

In Kyrgyzstan, highly elevated mercury levels have been reported in workers in primary mercury mining, although the capacity of health services to monitor the community and workers' health has been reduced in recent years. Health effects observed in the exposed workers included respiratory and neurological disorders and disorders of the digestive system, malignant tumours, cardiovascular diseases, urinary tract disorders and increased prevalence of chronic diseases. In the past, the country reported about 80 cases of mercury poisoning a year.

Following a strengthening of the health care institutions, there are plans to include mercury in occupational diagnostic checks. While regulations for medical checks for workers are in place (before employment and on a regular basis thereafter), measures need to be introduced for the effective protection of and improvement in workers' health.

The primary mercury mining facilities are located in a remote and poor region of the country where there is a need to strengthen capacities, primarily to build medical expertise in order to improve the quality of the medical checks. Guidance is also needed for the facilities on how to reduce workers' exposure and protect their health.

ASGM: exposure of workers and the community

WHO has addressed the problem of ASGM in a number of projects which have been implemented recently. Both formal and informal (illegal) ASGM has been reported to occur, particularly in North America, Africa and South-East Asia, giving rise to 37% of the global emissions of mercury. ASGM is at least as important as large-scale mining activities, particularly in terms of the numbers of people employed. In various studies, urinary mercury concentrations

in people working or living in ASGM communities exceed the levels at which effects on kidneys and neurological signs are expected to occur. Mercury concentrations in the hair of women in ASGM communities exceed the limit proposed by WHO, and elevated mercury concentrations are measurable in the hair of children and infants living in these communities.

To illustrate the problem, a case study from Ghana has shown that workers hardly wore any personal protection equipment, mercury was added when the gold was washed (in some cases with bare hands), and the buckets in which the gold was washed were rinsed in the water system, for which part of a small river had been diverted, while workers stood in the water and washed their hands. Communities were located along and downstream of the small river. The gold amalgam was heated, releasing mercury vapour, and the gold nuggets were sold to shops where they were smelted again. Mercury-contaminated tailings, with the added cyanide, were sold to make bricks.

Ghana has signed the Minamata Convention and asked WHO for assistance in developing an action plan. There is a need for guidance on the development of a public health strategy for ASGM (Article 7 of the Minamata Convention), including risk assessments and the setting up of laboratories, as well as an urgent need to train health workers in the diagnosis and treatment of the occupational health effects of mercury exposure. A certification scheme aims to identify fair mine gold and to make gold traceable to its origin.

Participants discussed considerations such as whether all relevant sources of occupational exposure to mercury are addressed and whether exposure is assessed reliably, with specific mention of the evidence of ASGM in Europe and of silver mining in, for example, Peru. Exposure to mercury from cremation was discussed in the context of occupational risks and environmental exposures.

The effective measures for protection of human health identified by the participants included the discontinuation of mercury use in industrial processes as well as restrictions on the accessibility of mercury through economic instruments (mercury being too expensive) and development of alternative methods or livelihoods for communities depending on ASGM.

HBM as an instrument for assessing exposure to mercury

HBM is a reliable tool for assessing exposure to mercury and serves as a biomarker for cumulative exposure from various sources. The values of mercury exposure biomarkers are linked with health effects. In the plenary session of the Meeting, presentations were given on a selection of sample matrices, an overview of laboratory methods and lessons from a pilot HBM survey of prenatal exposure to mercury using a standardized WHO methodology. The UNEP/WHO project Development of a Global Plan for Monitoring of Human Exposure to and Environmental Concentrations of Mercury was announced.

Selection of sample matrices and overview over laboratory methods

A number of biological matrices are used for measuring chemicals, their metabolites or reaction products, including blood, hair, maternal milk and urine, to assess exposure to mercury. The selection of matrices depends on a range of factors and requires certain information. For example, total mercury in hair indicates exposure to methylmercury through fish consumption, allowing for the evaluation of investigations into short exposure of blood to both organic and inorganic mercury. Non-invasive sampling methods and matrices should be considered as more preferable choices if other conditions are equal.

The determination of mercury in biological specimens requires sensitive analytical methods performed under good quality control conditions. The determination of total mercury concentration is possible through a variety of methods, of which several exist that differ in sample preparation technique and/or detection system. The speciation of mercury should be performed in cases of elevated exposure to differentiate between inorganic/elemental and methylmercury exposure. Obtaining reliable analytical data for mercury requires appropriate collection and pre-treatment of samples, the selection of a measurement method, prevention of contamination of the samples, use of certified reference materials, measurement of blank samples, comparison with another laboratory and quality control.

Lessons from a pilot HBM survey of prenatal exposure to mercury using a standardized WHO methodology

In the framework of monitoring the implementation of the Parma Declaration commitments, WHO has developed a draft methodology for an HBM survey in maternity wards aiming at assessing prenatal exposure to selected priority pollutants in the general population and in exposure hot spots.

Experiences and lessons learnt from a pilot HBM survey conducted in maternity wards in the Moscow region of the Russian Federation, with about 7.2 million inhabitants and 52 maternity wards were discussed. The objectives of that pilot HBM survey were to adapt the WHO HBM protocols to the Russian settings and to provide preliminary, internationally comparable exposure data on prenatal mercury exposure and other selected toxic metals.

The WHO HBM protocol and data collection tools were adapted to the national context. All legal requirements, such as getting permissions from health authorities at the federal and the regional levels, should be addressed at the planning stage. As the research personnel were not allowed to recruit and collect data in the maternity wards, the maternity ward staff had to be trained beforehand. The research staff were responsible for signing contracts with maternity ward staff, supplying all necessary materials and carrying out quality control of the recruitment and collection of data.

Selected biomarkers for early life exposure to mercury and other toxic metals were determined in maternal scalp hair, urine and cord blood. Comparison of the results among laboratories was organized before the survey and internal and external quality control procedures were implemented during the survey.

The survey results revealed that the proportion of women in the Moscow Region with hair mercury concentrations above a cut-off value set in a large European study (DEMONstration of a study to COordinate and Perform Human biomonitoring on a European Scale) was comparatively lower than the proportions observed in other countries participating in the study.

This pilot survey proved the feasibility of the WHO HBM methodology to obtain internationally comparable data on prenatal mercury exposure.

Development of a Plan for Global Monitoring of Human Exposure to and Environmental Concentrations of Mercury – UNEP/WHO project

The WHO Regional Office for Europe leads the implementation of the UNEP/WHO project on the Development of a Plan for Global Monitoring of Human Exposure to and Environmental Concentrations of Mercury (funded by the Global Environmental Facility) as regards HBM, which relates to the articles of the Minamata Convention on research, development and

monitoring as well as on evaluation of effectiveness. The project aims to harmonize approaches for monitoring mercury in humans and the environment, and to strengthen the capacity for mercury analysis in humans and the environment to make an accurate determination of their concentrations globally.

The project steering committee, consisting of UNEP Chemicals, WHO, and representatives from the main global and regional programmes monitoring mercury in humans and environment, will advise on literature sources, programmes and networks, the selection of reference laboratories, the parameters of a global monitoring plan, the dissemination of experiences and lessons learned, and the development and review of analytical schemes and sampling guidelines. They will also ensure synergy with other monitoring efforts. The project consists of four components:

- review of existing information on human exposure to and environmental concentrations of mercury;
- development of a monitoring plan for mercury in ambient air (Italian Research Council);
- development of a monitoring plan on human exposure to mercury (Regional Office and WHO headquarters);
- lessons learned and formulation of a Global Monitoring Plan.

The third component deals with the development of a harmonized approach for using HBM to assess population exposures to mercury, with a focus on assessment of prenatal exposures, and includes capacity-building and surveys in at least five countries selected globally. The tentative selection criteria have been defined for countries to be included for HBM studies. Pilot countries need to be eligible for UNEP/Global Environment Facility funding and have specific emission sources and a large enough population with high exposure levels. The data on mercury emissions and environmental levels need to be available and authorities need to demonstrate a strong interest and provide support. The project will be implemented over 24 months from 2015 to 2017.

Prevention of exposure to mercury

Monitoring of mercury and its compounds in mercury-added products and environmental media: opportunities and challenges

The monitoring of mercury and its compounds in environmental media, mercury-added products and food is important to identify sources of human exposure to mercury and to develop preventive policies. Several specific areas were addressed to demonstrate how monitoring programmes were realized at national and international level.

In Belarus (as in many other countries), sources of unintentional releases of mercury include the production of fluorescent lamps and domestic appliances. Out of an estimated 300 kg of mercury contained in lamps, some 80% are recovered when the lamps are deposited. Nationally, some 240 kg of mercury are contained in waste and 965 kg of mercury have already been deposited. Environmental pollution with mercury is largely due to transboundary pollution.

A national law regulates the prevention of contamination of air, soil and water with mercury as well as concentrations of mercury in waste and their handling. In line with the implementation of the Minamata Convention, national legislation on mercury in medical devices has been drawn up and respective regulations in case of emergencies have been released. The limit levels of mercury in food, especially in fish and dairy products, cosmetic products and children's toys, are

set through the customs union of Belarus, Kazakhstan and the Russian Federation. In practice, regulations for the handling of mercury are needed with regard to monitoring the disposal of mercury-containing domestic waste, such as thermometers. Phase-out of the use of mercury-containing products and waste is envisaged for 2020.

Information on the levels of mercury exposure in humans is, however, lacking. There are plans to set up an HBM study but assistance is needed in developing a laboratory system, methodological training for staff and developing a national strategy.

Harmonized approach to advise the public on methylmercury in fish and other food

Numerous scientific studies in many countries around the world have confirmed that fish remains the dominant source of human exposure to methylmercury since, owing to the biotransformation process in the aquatic environment, most fish contain over 90% of total mercury as methylmercury. Biomagnification results in the mercury concentrations in predator fish being 1 to 10 million times higher than in water. The mercury levels in wild fish can be similar to commercially available fish due to growing conditions or the use of pesticides and antibiotics for treatment.

Other food may also, however, be sources of mercury exposure, for example rice, since wetlands generate methylmercury. A mean estimate of the methylmercury contents of rice is 0.01 µg/g, but more reliable estimates are needed, especially in polluted areas (volcanoes and gold mine sites). Depending on the amounts of consumption, the total estimated intake of mercury from rice amounts to 2 mg per year.

There are several recommended limit values for mercury in fish. The European limit values, based on the Codex Alimentarius, are set at 0.5 mg/kg, and for certain larger predatory species and are applicable for the sale of fish rather than for limiting exposure. The Food and Agriculture Organization and WHO recommend a mercury limit of 1.6 µg/kg body weight per week, while the United States Environment Protection Agency sets a reference dose of 0.1 µg/kg body weight per day. Both the United States Food and Drug Administration and the Environmental Protection Agency give guideline levels and recommendations for the consumption of fish in vulnerable population groups (pregnant women, women in childbearing age and children).

A few issues need to be flagged up when promoting fish consumption as part of a healthy diet.

- It is recommended to eat fish at least twice a week to get the benefits of omega-3 fatty acids without excessive exposure to mercury.
- A certain time should elapse between meals of fish containing high levels of mercury.
- Children, pregnant and breastfeeding women and women who may become pregnant can benefit from the nutrients offered by fish. Owing to the particular vulnerability of the developing fetus and young children, pregnant women and other people caring for young children need to be informed about what types of fish are a good choice for frequent consumption and which should be eaten less often.
- Guiding principles are available for the selection of fish to limit exposure, such as eating smaller fish as well as less exotic or expensive fish and fish products.

Challenges in the prevention of occupational exposure to mercury

In Poland, the chlor-alkali industry, which used mercury cells for the production of chlorine, has been a major source of occupational exposure to mercury. Until recently, three such chemical plants were active; all three have now changed to the mercury-free technology, the last one in March 2015. The chlor-alkali units were scheduled to be dismantled by the end of 2015, but the safe removal of the remaining mercury cells is a challenge.

To prevent workers' exposure to mercury during dismantling of mercury chlor-alkali units, relevant organizational and technical measures have been undertaken including the use of personal protective equipment, regular monitoring of mercury concentrations in urine and control of the quality of the working environment. All these measures have meant that neither the allowed maximum concentration of mercury in the cells proportionate to room air nor the allowed maximum mercury levels in urine have been exceeded during dismantling activities.

Despite implementation of these preventive measures, a case of acute poisoning with mercury occurred in 2014, the second such case in more than 40 years, and about 10 cases of occupational chronic poisoning with mercury have been described.

Analysis of cases shows that a lack of awareness among young workers who disregard the rules for safety and health at work could be assumed. Lessons from the latest poisoning case have led to the strengthening of protective measures. Repeated training for employees, supervisors, occupational medicine physicians and safety staff appears to be of particular importance.

Replacement of mercury-added products in health care practice and sound management of mercury containing hospital wastes – WHO guidelines

In line with the respective articles of the Minamata Convention, the health sector is focusing on the replacement of mercury-added products in health care, including thermometers and sphygmomanometers. The process includes phasing out the manufacture, export or import of specified mercury-added products. No further mercury-containing thermometers or sphygmomanometers can be procured after 2020 for routine use in health care settings in countries that are Parties of the Convention.¹

WHO provides technical support with the formulating of national strategies to phase out mercury-containing thermometers and sphygmomanometers (13) by facilitating the development of health-system-wide approaches, building on successes and good experiences in individual institutions. This process recommends that: (i) key stakeholders should be involved in the design, delivery and monitoring and evaluation of the national strategy; (ii) a national policy or regulation should be established related to the phasing out of mercury-containing devices, and (iii) national standards/guidelines should be developed for the use, safe handling, storage and environmentally sound disposal of mercury-containing devices.

For successful implementation it is important to consider:

- national product and quality standards;
- a collection, disposal and replacement strategy if substitution or replacement of mercury-containing devices is considered;
- awareness-raising, training and capacity-building;

¹ 2030 for Parties afforded the maximum exemptions.

- the availability of affordable alternatives.

Technical guidance for the replacement of mercury-containing devices and the safe disposal of hospital waste is available (3,14) and training modules in health care waste management are accessible online (15).

The engagement of stakeholders and targeting of primary care centres are important elements in ensuring the successful replacement of mercury-added products in health care practice. A system-wide approach is considered essential to reach facilities at all levels.

Challenges and opportunities in addressing health aspects in implementing the Minamata Convention

Three working groups discussed issues in relation to the implementation of Article 16 of the Minamata Convention and shared the results of their discussion. They were asked to:

- identify knowledge gaps and needs for WHO assistance and capacity-building at national level to ensure that the Minamata Convention is implemented in the health sector;
- discuss effective ways to implement the Minamata Convention at national level and to focus on the role of intersectoral cooperation in addressing health aspects of mercury;
- give technical input relevant for the development of a toolkit supporting the implementation of the Minamata Convention in the health sector.

WHO provided three background/resource documents for the group discussions:

- an annotated bibliography containing a summary of key WHO information relevant to the Minamata Convention and its implementation, including links to the relevant documents;
- a document covering the integration of the Minamata Convention with existing WHO global and regional policies (Annex 3);
- a thought starter about implementation of Article 16 of the Minamata Convention.

Working group 1

Working group 1 focused specifically on the prevention of occupational exposure to mercury and discussed the challenges and opportunities in addressing health aspects in the implementation of the Minamata Convention.

Summary of findings

The need for education of general practitioners and the importance of raising awareness among the local population about mercury-related issues was emphasized. WHO was asked to develop a toolkit for basic education about such issues.

A challenge is presented by the need to protect illegal workers who are exposed to mercury. Simple leaflets about mercury toxicity could be designed, targeted towards workers. Issues related to occupational exposure could be combined with the informal and formal sectors in the existing public health approach. A holistic approach should be followed to awareness-raising and education about the toxic effects of mercury, which takes into account the links between occupational and environmental exposure.

The role of HBM to evaluate exposure to mercury is important. Important prerequisites for effective HBM include:

- lists of workplaces and occupations where people are exposed to mercury
- criteria for biomonitoring
- follow-up of WHO's proposal on setting threshold limit values.

Areas in which technical support could strengthen national capacity to set up a biomonitoring system were identified as:

- building national analytical capacity regarding laboratory facilities
- addressing the need for reference samples
- setting up inter-laboratory control schemes.

WHO could set up an inter-laboratory comparison mechanism and combine HBM with environmental monitoring.

Given the importance of pre-employment and periodic medical checks to prevent workers' health being affected by mercury, there is a need for clear guidance for the periodic checks (which might be included in the toolkit for the implementation of the Minamata Convention in the health sector), including:

- detailed programmes for pre-employment and periodic medical checks with flow-charts and standards;
- length of the interval between two medical checks;
- identification of effective biomarkers for kidney damage;
- special regulations for pregnant women working with mercury (for example, in dentistry);
- follow-up studies to assess the effects of long-term exposure.

Conclusions and recommendations

The annotated bibliography was considered a very useful document.

Activities are needed in three main areas: awareness-raising and education of workers exposed to mercury, definition of criteria and biomarkers for HBM, and guidance on laboratory practices and medical checks in workers.

Horizontal collaboration between ministries is necessary for the successful implementation of the Minamata Convention. Many countries reported that this is already in place.

Working group 2

Summary of findings

The following suggestions were agreed regarding the annotated bibliography:

- information and emphasis on risk communication should be added, especially regarding the consumption of fish and populations at risk;

- a platform should be created for sharing experience and information between Member States; the clearing house mechanism of the Strategic Approach to International Chemicals Management could be used for this purpose (16);
- practical information should be formulated, targeted at the general population, on the safe disposal of mercury-containing devices.

The discussion paper to facilitate the implementation of Article 16 could include guidance on:

- how to assess baseline risk and exposure and how to collect data at national and local level (for example, on methylmercury in fish);
- how to link to the mercury inventory;
- how to identify specific vulnerable population groups.

Topics that should be addressed in relation to the implementation of Article 16 include the following:

- needs regarding risk communication, awareness-raising and action:
 - establishment of information systems;
 - collaboration with and links to other health programmes dealing with harmful chemicals (such as endocrine disruptors, mother and child health programmes, food safety regulation and relationship with the European Food Safety Authority);
 - reports on positive case studies;
- health concerns in relation to mercury and its compounds:
 - replacement of mercury-added products
 - control of air emissions (coal and industrial processes)
 - management of contaminated sites and waste;
- areas where the capacities of the health sector should be strengthened:
 - identification of exposed population groups and assessment of risk to human health followed by public education and risk communication;
 - collection and sharing of information;
 - management of mercury-containing hospital waste;
 - education and training of health care and public health professionals;
 - development of guidance on setting up and running laboratories;
- other activities in which health sector should be strongly involved:
 - inter-agency coordination and awareness-raising campaigns
 - exposure and risk assessment, monitoring and surveillance
 - strengthening of legislation.

Guidance is needed from WHO in three main areas for the implementation of the Minamata Convention (in a given time-frame):

- exposure assessment, including HBM, and the development of strategy and policy;
- education and training for the public and for workers, with the development of fact sheets, together with information-sharing and networking, including case studies;
- clinical protocols for diagnosis and treatment.

Gaps and issues that could be filled or strengthened with the implementation of the Minamata Convention include:

- practical guidance on dealing with contaminated sites;
- collaboration between WHO and other institutions (such as UNEP), organizations and related conventions (for example, the Basel Convention on Transboundary Movement of Hazardous Wastes (17));
- use of WHO guidance on launching campaigns on mercury-related topics;
- research on low-level exposure (below thresholds and long-term effects).

Conclusions and recommendations

Member States perceive different needs for activities and for support in relation to mercury and its health effects. The annotated bibliography is a very useful document and the format is appropriate. The main perceived needs for technical support included information exchange, awareness-raising, capacity-building and the development of guidance documents, especially as regards exposure assessment, HBM and the development of strategy and policy.

Working group 3

Working group 3 focused on aspects to do with HBM related to mercury.

Summary of findings

The WHO bibliography is user-friendly and includes a broad range of useful information.

Recommendations for improvement of the discussion paper to support the implementation of Article 16 included the development of a toolkit (with case studies) from which countries could select the most appropriate tools for their national situations. The following elements were discussed for inclusion in such a toolkit.

- The intended target audience of the toolkit should be clearly indicated.
- A short summary for politicians (decision-makers) and technical staff should be added.
- Instructions on how to identify all possible sources of mercury exposure should be added.
- Guidance should be included on translating scientific findings into action for management to improve the control of mercury-containing products.
- Certain population groups are highly exposed (for example, the Roma population in Serbia) and there is a need for methodologies to assess the exposure of such small groups.
- Training in how to identify populations at risk is needed to facilitate the implementation of Article 16.
- HBM is the most valuable method for exposure assessment. Advice regarding standardized procedures and cost-effectiveness analysis should be included.

General practitioners could be involved at the prevention stage (not only at the treatment stage) through:

- the development of social cards for general practitioners on a voluntary basis for investigation of potential exposure to toxic chemicals;
- recommendations for the development and implementation of training strategies for medical students and post-graduate students;
- the development of a national programme to raise public awareness on methylmercury in fish based on a large-scale analysis.

The absence of recommendations for the assessment of exposure at contaminated sites is notable.

Mapping actions aimed at implementing the Convention within existing relevant programmes is the most effective way to ensure quick progress.

Mercury-free thermometers and sphygmomanometers should be promoted and the use of dental amalgam should be phased down.

Conclusions and recommendations

A toolkit should be developed as practical guidance for identifying populations at risk and translating scientific findings into action for management to improve the control of mercury-containing products. General practitioners and students should be involved in health prevention activities.

Mapping synergies between the Minamata Convention and WHO strategies and policies at global and regional levels

Links between implementation of the Minamata Convention and WHO strategies and policies

The working document for the Meeting outlined strong links between the Minamata Convention and WHO's main policies and programmes in order to identify the mutual benefits and challenges in an integrated approach to the management of mercury focusing on human health.

A series of WHO strategies and policies have been identified to support or complement the implementation of the relevant articles of the Convention, structured according to three perspectives: multisectoral action, vulnerable population groups and governance. These are listed in Annex 3.

A coordinated and coherent approach and synergy with existing WHO policies, strategies and activities should be considered when planning actions in relation to the Convention.

Health 2020 and the Minamata Convention

The WHO Health 2020 strategy is the main European policy framework, with the four priority areas: a life-course approach, tackling Europe's major disease burdens from communicable and noncommunicable diseases, strengthening people-centred health systems, public health capacities emergency preparedness and response, and creating supportive environments and

resilient communities. These policy priorities intersect with and support sustainable health systems as well as the aims of the Minamata Convention.

Health 2020 builds on the recognition of health as a human right, considering health and well-being as a basis for economic and social development. It promotes whole-of-government and whole-of-society approaches as important to equitable improvement in health, sharing priorities and collaboration with other sectors, and underlines the importance of community and individual resilience and empowerment and the role of partnerships.

Health 2020 aims to tackle both noncommunicable and communicable diseases in the Region through integrated strategies and interventions, coordinated public health and health care system interventions and actions on equity, creating supportive environments and empowering people. Similar aims featured in the Minamata Convention, include: strategies and programmes to identify and protect populations at risk (Article 16); phasing out mercury-added products, availability of alternatives (Article 4); development of public health strategies for ASGM (Article 7); engaging the public and assessing health risks in contaminated places (Article 12); information exchange (Article 17); and public information, awareness and education (Article 19).

In general, resilient communities are better prepared for economic, social and environmental change and have strengthened capacities to cope with crises.

Greening the health sector and the Minamata Convention

Another process linked with the implementation of the Minamata Convention is the movement towards environmentally friendly and sustainable health systems, in the context of global environmental changes, which are driven by a range of forces:

- scaling-up of financing for climate-resilient health systems worldwide;
- assessment of the health implications of energy systems and ensuring that these are factored in to overall government policies;
- monitoring and assessment of progress, similar to the Countdown 2015 initiative that has helped to drive progress on reducing maternal and child mortality.

The “triple bottom line” of sustainable development is economic, social and environmental return on investment. In the context of sustainable health systems this implies saving money, improving health and well-being and mitigating climate change.

The ultimate scope for health systems is to:

- promote the opportunities in a healthy environment for restoring and improving the health and well-being of this and future generations;
- increase the resilience of the population; and
- minimize environmental impacts and the burden of disease.

Environmental sustainability should be promoted and ensured in governance, in health services and their delivery, in resource generation and in health financing.

The global plan on workers' health

Occupational exposure to mercury occurs at chlor-alkali plants, mercury mines, thermometer factories, refineries, dental clinics, and sites where gold extracted with mercury is mined and

manufactured. Several articles (4.6, 5.6, 5.7, 5.8 and 7) of the Minamata Convention formulate aims and action in line with occupational health protection with regard to mercury exposure and health risks.

Policies and strategies aiming to protect and improve workers' health that are relevant to implementation of the Minamata Convention include:

- International Labour Organization policies focusing on small-scale mining in developing countries in relation to child labour;
- the WHO Global Strategy on Occupational Health for All (18);
- the WHO Global Plan of Action on Workers' Health (19) and Global Master Plan for 2012–2017 (20); the Global Plan on Workers' Health strives for full coverage of all workers with measures to prevent occupational and work-related diseases and injuries, as well as risk assessments and proper medical surveillance;
- the Global Action Plan 2013–2020 for the prevention and control of noncommunicable diseases, including cancer (6).

Several Sustainable Development Goals are in line with protecting and improving workers' health and well-being: (1) end poverty in all its forms everywhere, (3) ensure healthy lives and promote well-being for all at all ages, and (8) promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

The main challenges in delivering preventive strategies to protect workers' health include: difficulties in reaching out to workplaces in the informal sector, the lack of a mandate to enter private enterprises, rapidly changing work practices, the lack of an occupational health training programme for primary health care personnel, shortages in the health workforce and a lack of knowledge of occupational health hazards among providers.

Poverty and inequity exacerbate the situation of workers and their exposure to environmental health risks. "People with low incomes are less likely to have the means and resources to mitigate the risks and effects of environmental hazards and to overcome the obstacles posed by environmental disadvantages to securing less hazardous living conditions and access to opportunities" (21).

All these obstacles should be addressed when planning how to protect workers' health from adverse impacts from mercury.

The air quality agenda: health effects, monitoring and management at European level

Mercury emissions to air are subject to European environmental policies and regional conventions relevant for the European Member States. Their implementation will lead to reductions in mercury emissions. The most relevant are: the United Nations Economic Commission for Europe Convention on Long-range Transboundary Air Pollution Protocol on Heavy Metals (22) and the EU Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (23).

The Protocol on Heavy Metals referred to above targets three toxic metals: cadmium, lead and mercury, aiming to cut emissions from sources including industry, combustion processes and waste incineration. The Protocol was amended in 2012 to adopt more stringent emission controls. Mercury is also one of the air pollutants included in the WHO Air Quality Guidelines

for Europe (24). The recent Regional Office project reviewing new evidence on the health risks from pollutants in the air concluded that there was no new evidence on exposure–response relationships for mercury or on the health effects of emissions of mercury into the air that would justify the imminent need for re-evaluation in the context of the update of the WHO ambient air quality guidelines, and that should therefore be kept for future consideration.

Conclusions and recommendations

The preferable way to implement the Minamata Convention is to integrate actions related to the Convention into other health sector strategies. Several entry points and suitable existing programmes in this context include: (i) food safety and control of methylmercury to prevent exposure; these regulations are visible and can easily be implemented in all countries; and (ii) hazardous waste management, which can indirectly influence the replacement of mercury-added products in health care settings. Other programmes that can be linked to the implementation of the Convention include Health 2020, national environment and health action plans and educational programmes for health care professionals. Programmes for the handling and modernization of equipment in health care settings (including disposal) are important but challenging. Further suggestions for synergies and opportunities for the integration of activities related to the implementation of the Minamata Convention into WHO strategies, policies and activities are summarized in Annex 3.

Participants welcomed the annotated bibliography of the key information sources from WHO relevant to the Minamata Convention as user-friendly and containing valuable information. They strongly encouraged the further development and finalization of the bibliography and the document on the integration of the Minamata Convention with the existing WHO global and regional policies, and the development of a toolkit to support the implementation of Article 16.

The WHO Fact Sheet on Mercury and Health from 2013 should be updated with the most recent research results and information. A specific fact sheet tackling occupational mercury exposure and health protection should also be developed.

WHO technical support and guidance (depending on the national context and situation) are needed for:

- making exposure assessments, including the development of HBM studies, specifically for small population groups that are highly exposed and vulnerable; in view of the development of a toolkit, relevant methodologies should be included;
- developing strategy and policy;
- training and capacity-building, especially for health care and occupational health professionals;
- awareness-raising for the population and for workers (development of a toolkit and a specific fact sheet);
- information-sharing and networking, including regarding case studies;
- drawing up clinical protocols for diagnosis and treatment;
- establishing laboratories and training in analytical methods, including reference samples or laboratories' own quality control schemes;
- dealing with contaminated sites, including guidance for assessment of exposure at such sites.

Participants supported the promotion of mercury-free thermometers and sphygmomanometers and phasing-down of dental amalgam and suggested that general practitioners and students should be involved in health prevention activities.

Currently, major gaps in knowledge are being addressed through a variety of research projects (such as the UNEP/WHO project on Global Monitoring of Human Exposure to and Environmental Concentrations of Mercury) and analyses in the framework of large European cohort studies. Recommendations include research on possible effects of exposure below thresholds and the long-term effects of exposure.

Experience gathered in countries which address issues related to the implementation of the Minamata Convention should be shared through existing networks. Some examples of relevant activities include the following:

- cohort studies (in Ukraine, a cohort of 7500 families recruited in 1993 with samples of breast milk and cord blood) which could provide relevant information;
- birth cohort studies in the Czech Republic;
- drafting of the National Environmental Health Action Plan in Georgia;
- development of national strategies, for example, in Belarus;
- assessment of exposure at contaminated sites in Croatia;
- experience with dismantling chlor-alkali factories in Poland;
- process and results of the recent HBM pilot study in maternity clinics in the Russian Federation;
- Kyrgyzstan as a pilot country for HBM and for an international project to reduce environmental risks;
- development of training for health care professionals in chemical safety in Bosnia-Herzegovina.

Networks and exchanges of information and experience relating to the implementation of the Convention and supporting research endeavours should be fostered and strengthened.

Next steps

The WHO resource and guidance documents will be finalized and a toolkit developed to support the implementation of Article 16, drawing on the comments and contributions from the Member States.

Participants highlighted the importance of immediate action to leave a legacy of responsibility to future generations.

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Annex 1

PROGRAMME

24 June 2015

Session I Introduction

09:00 – 10:00 Welcome address (*Dr Elizabet Paunovic, Dr Dorota Jarosinska, WHO ECEH*)
Introduction of the participants, election of Chairpersons and Rapporteur
Scope and purpose of the meeting (*Dr Irina Zastenskaya, WHO ECEH*)
The role of health sector in the implementation of the Minamata Convention in the context of WHA Resolution 67.11 (*Ms Carolyn Vickers, WHO headquarters*)

Session II Early life exposures and the life-course approach

10:30 – 13:30 Early life exposure and health through the life-course (*Dr Kirsten Poore, United Kingdom*)
WHO Birth cohort survey (*Dr Katerina Sebkova, Czech Republic*)
Protection of human rights and prevention of early life exposure (*Mr Baskut Tuncak, UN Commission on Human Rights*)
13:00 – 13:30 From Minamata Disease to the Minamata Convention – and beyond (*Professor Philippe Grandjean, Denmark*)

Session III Identification of exposed population groups – panel session

13:30 – 15:30 ***Environmental exposure to organic and inorganic mercury***
Overview and facilitation (*Dr Herman J Gibb, United States*)
Main sources of mercury emissions and releases into environment (*Dr Sheila Logan, UNEP, on a remote connection*)
Exposure to methylmercury from fish and sea-food (*Ms Janja Snoj Tratnik, Slovenia*)
Dental amalgams: population exposure and risks (*Professor Arne Hensten, Norway*)
Population exposure in contaminated sites (*Dr Nataša Janev-Holcer, Croatia*)
Occupational exposure to mercury and its compounds
Overview and facilitation (*Professor Petar Bulat, Serbia*)
Occupational exposure in health care workers (*Professor Arne Hensten*)
Exposure and workers' health protection at primary mercury mining (*Mr Ulanbek Toktogulov, Kyrgyzstan*)
Artisanal and small scale gold mining: exposure of workers and community (*Ms Michaela Pfeiffer, WHO headquarters*)

Session IV Human biomonitoring as an instrument for exposure assessment of mercury

- 16:00 – 17:30 Selection of sample matrices and overview of laboratory methods (*Ms Janja Snoj Tratnik*)
- Lessons from a pilot HBM survey of prenatal exposure to mercury using a standardized WHO methodology: organizational and institutional requirements, required resources and interpretation of results (*Professor Irina Ilchenko, Russian Federation*)
- Announcement of the UNEP/WHO project “Development of a Global Plan for Monitoring of Human Exposure to and Environmental Concentrations of Mercury” (*Dr Irina Zastenskaya and Dr Andrey Egorov, WHO ECEH*)

25 June 2015

Session V Prevention of exposure to mercury

- 09:00 – 10:30 Monitoring of mercury and its compounds in mercury-added products and environmental media: opportunities and challenges (*Dr Irina Ilyukova, Belarus*)
- Harmonized approach to advise public on methylmercury in fish and other food including based on latest scientific knowledge (*Dr David Lean, Canada, on a remote connection*)
- Challenges in the prevention of occupational exposure to mercury (*Professor Anna Skoczynska, Poland*)
- Replacement of mercury-added products in health care practice and sound management of mercury containing hospital wastes: WHO guidelines and experience (*Ms Michaela Pfeiffer*)

Session VI Challenges and opportunities in addressing health aspects in the Minamata Convention implementation – discussion in working groups

- 11:00 – 15:00 Introduction to the discussion on the selected subjects (*Ms Carolyn Vickers, Dr Irina Zastenskaya*):
- implementation of Article 16 of the Minamata Convention
 - knowledge gaps, and needs for WHO assistance and capacity-building at national level to ensure the Minamata Convention implementation in the health sector
 - effective ways of the implementation of the Minamata Convention at national level – the role of intersectoral cooperation in addressing health aspects of mercury
- 13:30 – 14:30 Discussion in working groups (continued)
- 14:30 – 15:00 Reporting from the working groups (*the discussions were chaired by Professor Bulat, Serbia, Mr Shay Reicher, Israel, and Mr Viktor Peter Nyitrai, Hungary*)

Session VII Mapping synergies between the Minamata Convention and WHO strategies and policies at global and regional levels

15:30 – 17:00 Overview of the linkages between the implementation of the Minamata Convention and WHO strategies and policies (*Ms Estelle Payan, France, remote connection*)

Health 2020 (*Dr Dorota Jarosinska, WHO ECEH*)

Greening the health sector (*Dr Bettina Menne, WHO ECEH*)

Global plan on workers' health (*Dr Aliya Kosbayeva, WHO ECEH*)

Air quality agenda (*Dr Dorota Jarosinska, WHO ECEH*)

Discussion

Session VIII

17:00 – 17:30 **Closing session**

Meeting wrap-up, next steps and closure

Annex 2

LIST OF PARTICIPANTS

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Annex 3

INTEGRATION OF THE MINAMATA CONVENTION WITH EXISTING GLOBAL, REGIONAL AND NATIONAL POLICIES FOR THE HEALTH SECTOR

Introduction

Supported by resolution WHA67.11 (Public Health Impacts of Exposure to Mercury and Mercury Compounds: the Role of WHO and Ministries of Public Health in the Implementation of the Minamata Convention, 2014), the engagement of the health sector (both as responsible for advocating and protecting human health and as user of mercury-containing products) and other sectors are needed at national level to implement the Minamata Convention in order to realize its full potential to protect human health.

The Convention should be implemented at national level with the assistance and support of stakeholders including international, intergovernmental and nongovernmental organizations and industry.

A country may consider the development of plans to implement the Convention as an initiative rather than an obligation. Even so, countries should take the opportunity to incorporate relevant action for implementing the Convention into existing programmes and plans to facilitate the process. Global and regional health sector strategies and associated national programmes should be considered to ensure an effective and coherent approach to the implementation of the Convention.

This document was developed to demonstrate the links between the main sectoral policies and action required under the Minamata Convention. It highlights how the coordinated implementation of both WHO's strategies, programmes and plans and the Convention will also benefit the achievement of the main goal of prevention of diseases caused by harmful environmental factors such as hazardous chemicals and mercury and, in particular, mercury compounds. To achieve this goal, a comparative analysis of WHO's work programme vis-à-vis the provisions of the Convention has been conducted to analyse opportunities for synergies, mutual benefits, challenges and limits in an integrated approach to the implementation of existing policies. The main provisions regarding health are listed in the Appendix.

Implementation of the Minamata Convention: role of public health authorities at national level

It is anticipated that the health sector will play a pivotal role in the implementation of the Convention. The responsibilities of national public health authorities and WHO are clearly defined in resolution WHA 67.11.

The involvement of countries and of health authorities is indicated in several provisions of the Convention. For example, the implementation of Article 16 (on health) is the responsibility of the health sector. A significant role for health ministries is indicated in Article 4 on mercury-added products, especially in the phasing-out of the manufacture, import or export of the listed mercury-containing products by 2020 (with some exemptions to 2030). Their involvement is also

contemplated in the development of national action plans to reduce the health impacts of mercury in ASGM (Article 7), as well as the adoption of risk assessments of contaminated sites (Article 12). In relation to Article 17 on information exchange and Article 23 on the Conference of the Parties, cooperation is mandated with WHO as an “appropriate” and “competent” organization. Articles 18 and 19 on education and research mention action related to the mandate of the health authorities and the needs for involvement and cooperation of the Parties. Horizontal collaboration between ministries (such as health, environment and labour) is particularly important for the implementation of the Convention.

To enable the full potential of the Convention for protecting health and environment to be realized, it is crucial for the health sector to be actively involved in its implementation in the most effective way at national level as well as to ensure the allocation of adequate human, financial and other resources.

Multisectoral coordination

The Minamata Convention is an integrated multisectoral policy and its implementation will require multisectoral action.

Building intersectoral relationships between the health and other sectors can be the first step in implementing the Convention at national level. A number of options might be considered, and existing experience, including sustainable development, chemicals safety or health promotion mechanisms, can be kept in mind as being the most suitable basis for the development of intersectoral collaboration.

The Sustainable Development Goals include goal 3 to ensure healthy lives and promote well-being for all at all ages. Human well-being is central to the sustainable development agenda. Addressing sustainable economic and environmental development opens up the possibility for considering the inclusion of overall action for the implementation of the Convention under the sustainable development agenda.

There are also possibilities to explore existing intersectoral mechanisms in the chemical safety area, such as the implementation of the Strategic Approach to International Chemicals Management and/or other multilateral agreements (Stockholm Convention on Persistent Organic Pollutants, Basel Convention on Transboundary Movement of Hazardous Wastes and the Rotterdam Convention on International Trade in Hazardous Chemicals).

Strategic health sector policies also require an intergovernmental approach to ensure that all health determinants, including environmental determinants, are addressed.

Health in All Policies, inspired by the Ottawa Charter for Health Promotion, is a horizontal approach for public policies across sectors that seek synergies and effective coherence in policy in order to improve health.² A binding multilateral agreement such as the Minamata Convention offers a crucial opportunity for Health in All Policies and cross-sectoral policies.

At the regional level, Health 2020 (the European policy for health and well-being) might be a preferable option for seeking an intersectoral mechanism in which the implementation of the

² Health in All Policies: Helsinki statement. Framework for country action. Geneva: World Health Organization; 2014 (http://apps.who.int/iris/bitstream/10665/112636/1/9789241506908_eng.pdf?ua=1, accessed 21 January 2016).

Convention in the health sector can be placed. The strengthening of interagency cooperation and coordination to address health determinants is one of the main pillars for reaching the Health 2020 goal to: “significantly improve the health and well-being of populations, reduce health inequalities, strengthen public health and ensure people-centred health systems that are universal, equitable, sustainable and of high quality”.

Global or regional structures can also provide important support for multisectoral initiatives. Different multilateral organizations can thus play a significant role in the implementation of the Convention through such multisectoral actions on health.

Prevention of noncommunicable diseases: WHO policies and the Minamata Convention

Initiatives, policies and strategies that aim to reduce the burden of noncommunicable diseases, including from environmental determinants of health, such as Health in All Policies, Public Health and Environment, Global Plan Of Actions For Children's Health and the Environment, Global Strategy for Women's, Children's and Adolescents' Health, etc., should be taken into account in planning the implementation of the Convention in the health sector. This paper provides guiding information for advocating the inclusion of action to prevent the negative impact from mercury in national strategies, policies and action plans addressing noncommunicable diseases and health promotion.

Health and environment policies

The Public Health and Environment Global Strategy³ plays a key role in promoting the primary prevention of environmental hazards to avoid unnecessary illnesses and deaths, including the reduction of risks and burdens of environmental diseases such as those caused by exposure to chemicals. It advocates the introduction of effective policies based on scientific knowledge and involving action aimed at protecting humans from ambient and indoor air pollution, water contamination and chemical exposure from other sources.

The Minamata Convention on Mercury is the first multilateral environmental agreement to incorporate a specific article on health (Article 16), as well as other relevant provisions related to health including the prevention of exposure to food, water or air contaminated with mercury as well as occupational exposure. A number of other provisions mention environmental determinants of health (Articles 5, 7 and 8 on air emission and Articles 16, 18 and 19). Risk assessments are also a key priority of the Convention (Articles 12 and 19). In general, these can all be incorporated into environmental health action plans.

The main provision of the Convention that would affect the global level of environmental pollution is that on air emission, which also constitutes a key priority of the Public Health and Environment Global Strategy. Indeed, the pollution of ambient air with mercury can be its exposure pathway. Resolution WHA68 on the impacts on health of air pollution underlines the urgent need to reduce harm from air pollution.

³ Public Health & Environment. Global Strategy Overview 2011. Geneva: World Health Organization; 2011 (http://www.who.int/phe/publications/PHE_2011_global_strategy_overview_2011.pdf, accessed 21 January 2016).

The implementation of the Convention in improving the environmental performance of national services (for example, the use of clean energy that does not burn coal) can also benefit the area of climate change, a recent focus for the Public Health and Environment Global Strategy.

Regional policies on public health

Health 2020 is a policy framework with a sustainable focus that gives a strategic approach and a set of priorities for the European Member States. It is now being implemented in many countries throughout the Region.

The main priorities in Health 2020 linked directly or indirectly with the implementation of the Convention are the following:

- investment in health through empowering people meets the objectives of the Convention through Articles 4, 12, 16, 17 and 18;
- the disease burden is addressed through Articles 7, 16, 17 and 19;
- strengthening health systems, surveillance and response is included in Articles 12, 16, 17, 18 and 19 with the objectives of developing and harmonizing health and environment assessments, inventories and methodologies;
- building resilient communities and supportive environments is a focus of Articles 12, 16, 17, 18 and 19 of the Convention.

Achievement of the goals of Health 2020 will also facilitate the implementation of the Convention. The implementation of measures to prevent exposure to mercury will add to a reduction in noncommunicable diseases and an increase in human well-being.

In the Parma Declaration on Environment and Health, adopted by ministries of health and the environment in 2010 in the framework of the European Environment and Health Process, and its Commitment to Act⁴ four regional priority goals were identified relating to environmental health. The third of these goals (Preventing disease through improved outdoor and indoor air quality) and fourth (Preventing disease arising from chemical, biological and physical environments) linked directly with the provisions of the Convention.

A range of measures in the Convention (in particular from Article 5 on mercury manufacturing processes, Article 7 on ASGM, Article 8 and Annex D on emissions, Article 16 on health, Article 18 on education and Article 19 on research and monitoring) deal with exposure to mercury through two main environmental media, air and water and can, therefore, support these goals.

Thus there is a strong link between health and environmental policies and the Convention in relation to the prevention of an impact from mercury on human health and the environment that benefits the implementation of both the policies and the Convention.

Vulnerable populations and workers: identifying and protecting population groups at risk from exposure to mercury

⁴ Parma Declaration on Environment and Health. Copenhagen: WHO Regional Office for Europe; 2010 (http://www.euro.who.int/_data/assets/pdf_file/0011/78608/E93618.pdf, accessed 21 January 2016).

Women, children and adolescents: the vulnerable population groups

Pregnant women, infants and children are the groups most vulnerable to mercury exposure. The United Nations Convention on the Rights of the Child⁵ embodies the rights of children. In this context, significant action is required to achieve the right to health, notably as regards preventive interventions relevant to access to health care services, education and information.

A multisectoral approach is promoted throughout this Convention. Article 24 mentions the role of the health sector as well as the education and social sectors and underlines the development of international cooperation. It is relevant for the Minamata Convention which is also multisectoral and promotes collaborative work between different institutions and agreements (Articles 10, 11 and 16).

The Convention on the Rights of the Child requires countries to take appropriate measures considering “the dangers and risks of environmental pollution” (Article 24). This echoes the provisions of the Minamata Convention regarding the toxic environment (Articles 5, 7, 8, 16, 18 and 19).

In this regard, when implementing the action required in the Convention on the Rights of the Child, countries might bear in mind the Minamata Convention and synergies between the two. Indeed, both Conventions support the development of national action that will prove efficient in achieving safer and healthier environments for children.

Children are also in focus in the Minamata Convention as a vulnerable population group (Preamble, Article 16), while Articles 17, 18 and 19 of the Convention promote information exchange, education and research.

The 2015 Global Strategy for Women’s, Children’s and Adolescents’ Health,⁶ which was adopted as a main strategic document in support of the implementation of the Millennium Development Goals and improvement of women and children health until 2030, can be the main entry point for planning and implementing action to prevent the impact of mercury on children.

Even though the Strategy does not directly relate to chemicals, it aims to help women and children to realize their fundamental human rights, including the right to live in a safe environment. It sets out the key areas where action is urgently required to enhance financing, strengthen policy and improve service delivery. These include, for example: support for country-led health plans underpinned by increased, predictable and sustainable investment and integrated delivery of health services and life-saving interventions to enable women and their children to access prevention, treatment and care (including for noncommunicable diseases) when and where they need it, safe drinking-water and food, and coordinated research.

Implementation of the provisions of the Minamata Convention (Preamble, Articles 16, 17, 18, 19 and 20) where they can be included in the relevant national strategies will contribute to the

⁵ Convention on the Rights of the Child. Geneva: Office of the High Commissioner for Human Rights; 1989 (<http://www.ohchr.org/en/professionalinterest/pages/crc.aspx>, accessed 21 January 2016).

⁶ The Global Strategy for Women’s, Children’s and Adolescents’ Health (2016–2030). Geneva: World Health Organization; 2015 (<http://www.who.int/life-course/publications/global-strategy-2016-2030/en/>, accessed 21 January 2016).

implementation of the Global Strategy for Women's, Children's and Adolescents' Health as well as the European Child and Adolescent Health Strategy 2015–2020.

Moreover, the 2015 Global Strategy for Women's, Children's and Adolescents' Health echoes the Millennium Development Goals and the Strategic Development Goals by giving more significance to the empowerment and education of women.

The overall goals of the Minamata Convention will not be achieved unless the vulnerable populations (pregnant women, children and adolescents) become their cornerstone.

In one of its regional priorities for the protection of children and adolescents from environmental risks, Investing in children: the European child and adolescent health strategy 2015–2020⁷ emphasizes the need for country-specific measures dealing with access to safe water and improved quality of outdoor and indoor air. The role of countries in the adoption of national plans or strategies for action is mentioned in Articles 7 and 12.

The Investing in Children strategy requires the development of effective national action and active collaboration between all sectors, including the health sector. The establishment of such mechanisms will contribute to the implementation of the Minamata Convention at the national level.

The implementation of the Convention can take advantage of the actions and resources of these WHO strategies on children to reduce the risk from hazardous working environments during pregnancy, childhood and adolescence. These mirror the Global Plan of Action on Workers' Health through the issues of occupational exposure and the environmental media for exposure to mercury.

Prevention of exposure to methylmercury in food

The WHO Global Strategy for Food Safety⁸ seeks to reduce the health burden of foodborne diseases through science-based measures, communication of information and management of risks with other partners. The implementation of the Minamata Convention can be considered in this overall aim.

WHO has evaluated mercury contamination in drinking-water and food and provided some guidance.^{9,10} Chemical hazards, especially methylmercury, are a significant source of foodborne illnesses.

⁷ Investing in children: the European child and adolescent health strategy 2015–2020. Copenhagen: WHO Regional Office for Europe; 2014 (EUR/RC64/12; http://www.euro.who.int/__data/assets/pdf_file/0010/253729/64wd12e_InvestCAHstrategy_140440.pdf?ua=1, accessed 21 January 2016).

⁸ WHO Global Strategy for Food Safety. Geneva: World Health Organization; 2002 (<http://apps.who.int/iris/bitstream/10665/42559/1/9241545747.pdf>, accessed 21 January 2016).

⁹ WHO Guidelines for drinking-water quality, fourth edition. Geneva: World Health Organization; 2015 (Chapter 8, Chemical Aspects; http://www.who.int/entity/water_sanitation_health/publications/2011/9789241548151_ch08.pdf), accessed 2 February 2016).

¹⁰ Evaluation of certain contaminants in food. The Seventy-second Report of the Joint FAO/WHO Expert Committee on Food Additives, 2011 (WHO Technical Report Series No. 969; http://apps.who.int/iris/bitstream/10665/44514/1/WHO_TRS_959_eng.pdf, accessed 21 January 2016).

In order to prevent exposure to mercury in the food chain and in drinking-water, the potential risks for sensitive populations, such as pregnant women and indigenous people (Preamble of the Minamata Convention) must be taken into consideration in the assessment and management of foodborne risks. Article 16 also identifies the population groups exposed to methylmercury.

There is a need for more data on the concentration of contaminants in food and more information on exposure to such contaminants to assess and manage these risks. Articles 18 on education and 19 on research and monitoring also deal with the issue of methylmercury in fish. Article 19 outlines the exposure of vulnerable populations to biotic media and the processes and approaches necessary to monitor and assess methylmercury.

According to the understanding of methylmercury in fish as the main source of exposure to mercury for human beings, both the Global Strategy for Food Safety and the Global Strategy for Women's, Children's and Adolescents' Health will benefit through the protection of vulnerable population groups from contamination in their diet.

The development of health-based international baselines and trends¹¹ can strengthen the implementation of the Treaty by supporting the risk assessment and science-based measures along the food production chain.

Occupational hazards and the WHO Global Plan of Action on Workers' Health

Workers are one of the population groups identified as at risk from exposure to mercury. The occupational exposure of workers, such as miners in both AGSM and the mining industry, workers in facilities that manufacture mercury-added products, dentists using dental amalgam and other health care professionals is of concern. Since employment in the informal sector is rising in many countries, more and more people are exposed to these occupational hazards.

The WHO Global Strategy on Occupational Health for All,¹² reaffirmed in the Workers' Health Global Plan of Action,¹³ urges countries to guarantee full coverage for all workers with measures to prevent occupational risks, including the integrated management of chemicals and the implementation of risk assessments and proper medical surveillance of workers.

Articles 7 and 12 of the Minamata Convention include the strengthening of governance through the implementation of policy instruments, such as national plans of actions and risk assessments for workers' health. The integrated management of chemicals at the workplace covering all phases of the chemical cycle (production, use and waste) is mentioned in Articles 4.6, 5.6 and 5.7. Articles 4.6 and 5.7 on products and manufacturing processes with added mercury require Parties to take appropriate measure to "discourage"¹⁴ such products or manufacturing processes.

¹¹ Advancing Food Safety Initiatives: Strategic Plan For Food Safety Including Foodborne Zoonoses 2013–2022. Geneva: World Health Organization; 2013

(http://apps.who.int/iris/bitstream/10665/101542/1/9789241506281_eng.pdf?ua=1, accessed 21 January 2016).

¹² Global strategy on occupational health for all: the way to health at work [website]. Geneva: World Health Organization; 2016 (http://www.who.int/occupational_health/globstrategy/en/, accessed 21 January 2016).

¹³ Workers' health: global plan of action. Geneva: World Health Organization; 2007 (WHA60.26; http://www.who.int/occupational_health/WHO_health_assembly_en_web.pdf?ua=1, accessed 21 January 2016).

¹⁴ The interpretation of the term "discourage" can have a great influence on the implementation of the Convention, from minimal requirements to something stronger.

Article 5.6 introduces a ban on the use of mercury in the processes listed in Annex B. These articles reduce the risks of exposure by workers as a result of the avoidance of new uses of mercury. Health promotion and capacity-building for primary prevention in relation to occupational hazards are covered in Articles 5.8, 17, 18 and 19 of the Convention, demonstrating the importance of awareness, education, monitoring and consultation with workers and communities.

The Global Plan of Action on Workers' Health requires national governments to improve their policies and governance relating to workers' health. This mirrors Sustainable Development Goals 1, 3 and 8, which deal with the ending of poverty, healthy lives and well-being for all ages and decent work for all. The implementation of risk reduction measures in the Global Plan is also foreseen in the Strategic Approach to International Chemicals Management and other multilateral environmental agreements. These represent focal points for the implementation of the Minamata Convention at national level.

The Minamata Convention also addresses action to support risk assessments and the reduction of exposure, including exposure of workers (Articles 7, 12, 16 and 19).

The Global Plan of Action on Workers' Health will end in 2017. This may limit the inclusion of the priorities of the Minamata Convention in its action. There are, however, continuing programmes for the protection of workers' health at national levels (under ministries of health or labour or other relevant ministries). Ministries of health should advocate the inclusion of these programmes and action in order to ensure the implementation of the Minamata Convention.

The challenges now are to address workers' health through the integrated management of chemicals at the workplace as well as other determinants of health, not just occupational hazards. The Minamata Convention may be a strong tool in this aim. It is also important to overcome obstacles to the implementation of the Convention, such as those posed by the informal sector, the lack of a mandate to enter private companies or rapidly changing work practices.

Prevention of mercury releases: health sector input

At least three global initiatives can be considered when planning the reduction of mercury releases from the health sector, including the replacement of mercury-added products in health care settings, phasing down of dental amalgams and implementation of energy-efficient practice in hospitals and other health service centres.

The WHO global initiative Safe Management of Wastes from Health-Care Activities (published in 1999 and updated in 2014¹⁵) aims at the avoidance of the substantial disease burden associated with poor practices relating to health care toxic wastes. Mercury is both a chemical and a heavy-metal waste generated by spillage from broken medical devices.¹⁶ The use of mercury-added products increases the risk from contaminated medical wastes as well as the occupational risks for health care providers.

¹⁵ Safe management of wastes from health-care activities. Geneva: World Health Organization; 2014 (http://www.searo.who.int/srilanka/documents/safe_management_of_wastes_from_healthcare_activities.pdf?ua=1, accessed 22 January 2016).

¹⁶ Health-care waste. Geneva: World Health Organization; 2015 (Fact Sheet No. 253; <http://www.who.int/mediacentre/factsheets/fs253/en/>, accessed 22 January 2016).

WHO encourages countries to develop relevant legislation and action plans to reduce the risks inherent in medical waste management and, as a priority, to avoid production of hazardous waste. This is sometimes described as tackling waste at source rather than adopting “end-of-pipe” solutions. Waste minimization usually benefits the waste producer: costs for both the purchase of goods and for waste treatment and disposal are reduced.

The Minamata Convention aims at addressing the risks potentially caused by using mercury-added products, including thermometers and sphygmomanometers and light bulbs. Article 4 sets a clear deadline (2020, or 2030 with some exemptions) for phasing out their production and trade and replacing them by mercury-free devices when they expire. Such replacement, in accordance with the Minamata Convention, will contribute significantly to minimizing the production of toxic medical waste, which is an important consideration when planning the phasing-out of mercury-added products from health care practice.

The Minamata Convention recalls the importance of some previous multilateral environmental agreements, particularly the Basel Convention on transboundary movement of hazardous wastes and the Rotterdam Convention on international trade in hazardous chemicals (Preamble, Articles 10 and 11 on mercury storage and wastes). In this regard, a WHO policy paper on mercury in health care reflects the need to rely on existing multilateral environmental agreements in order to discourage and reduce the import, sale and use of mercury in health care devices.¹⁷

WHO’s Oral Health Strategy aims at the promotion of oral health, development of evidence base on dental amalgam and research for mercury-free alternatives. This initiative has worked hard to promote integrated disease prevention, education, studies and research for the development of cost-effective alternatives to dental amalgam.

The Minamata Convention takes into account the sound management of mercury (Articles 3 and 11) and of contaminated sites (Article 12) and the development of mercury-free alternatives (Articles 4 and 5).

It addresses the promotion of preventive health care services (Article 16) through information and awareness (Articles 17 and 18) and research (Article 19).

WHO’s solutions to mercury-related issues in oral health require the action set out in the Convention: a phase-down rather than a wide ban (Article 4.3 on mercury-added products and Annex A, part II). Reductions in the release of mercury will diminish the impacts on global health, workers’ health and the environment.

The use of mercury-free alternatives makes a significant contribution to reducing both mercury releases and, simultaneously, the exposure of workers and patients to mercury. The inclusion of relevant measures aimed at the use of mercury-free alternatives in the Oral Health Strategy (as well as in the Global Strategy for Women’s, Children’s and Adolescents’ Health and the Global Plan of Action on Workers’ Health) will also help to protect population groups at risk and will lead to relevant reductions in the impacts on health of mercury.

In the context of strategies for “greening” health care settings, the joint Health in the Green Economy initiative of WHO and Health Without Harm mandates, on the one hand, the

¹⁷ Mercury in health care [website]. Geneva: World Health Organization; 2005 (http://www.who.int/water_sanitation_health/medicalwaste/mercury/en/, accessed 22 January 2016).

substitution of mercury-based medical devices and the dissemination of awareness and education related to mercury, and on the other, it includes action to reduce the influence of health care settings on climate change through reducing air emissions and an energy-saving approach.¹⁸

The Minamata Convention deals with the use of best environmental practices and technologies that are “environmentally, technically, socially and economically viable” (Article 7).

This joint initiative may also strengthen the implementation of the Minamata Convention (particularly Article 4 on mercury-added products, Article 5 on manufacturing processes and Article 11 on mercury wastes) by establishing and replicating model projects about the management of health care waste and development of mercury-free alternatives.

Reductions in air emissions and the generation of clean and reliable energy are examples of how the health sector can create other environmental and health benefits from the phasing-down and -out of products containing mercury. Indeed, action related to air releases, energy-saving approaches, climate change and waste management in health care settings, which are also foreseen as major priorities in the Public Health and Environment’s Global Strategy, may strengthen the implementation of several provisions of the Minamata Convention at national levels.

Other health-related aspects of the Minamata Convention and WHO activities

There are several specific health-related aspects of the Minamata Convention, such as risk assessments, that are not explicitly addressed in the WHO global strategies but are of particular importance as they form the scientific basis for planning and implementing action aimed at the protection of human health from mercury.

Recent WHO initiatives, such as the setting up of the Chemical Risk Assessment Network,¹⁹ can assist countries in the implementation of risk assessments at national level. This structure provides an opportunity to create a forum for scientific and technical exchanges, facilitates and contributes to capacity-building, promotes best practices and the harmonization of methodologies, and assists in identification of emerging risks to human health from chemicals. By joining the Network, opportunities are opened for countries to facilitate the implementation of risk assessments at national level and identification of exposed population groups, including those exposed to mercury and its compounds.

Poison centres are multifunctional specialized units which were set up under the collaborative International Programme on Chemical Safety.²⁰ They provide a number of core services such as maintaining databases and ensuring the cost-effective management of poisonings.

¹⁸ Healthy hospitals, healthy planet, healthy people: addressing climate change in healthcare settings [website]. Geneva: World Health Organization; 2009 (http://www.who.int/globalchange/publications/healthcare_settings/en/, accessed 22 January 2016).

¹⁹ WHO launches new Chemical Risk Assessment Network [website]. Geneva: World Health Organization; 2013 (<http://www.who.int/ipcs/networks/ranetwork/en/>, accessed 22 January 2016).

²⁰ Guidelines for poison control. Geneva: World Health Organization; 1997 (http://apps.who.int/iris/bitstream/10665/41966/1/9241544872_eng.pdf, accessed 22 January 2016).

Implementation of the Minamata Convention can be considered (Articles 16, 18 and 19) in the context of poison centres' requirements regarding: (i) the promotion of science-based educational and preventive programmes on mercury, and (ii) the promotion of appropriate health care services for prevention, diagnosis and treatment related to mercury exposure.

The Chemical Risk Assessment Network and the poison centres offer a significant chance to reinforce the implementation of the Convention, since the provision of Article 19 on research stresses the need to build on existing networks.

Conclusion

It is important to emphasize that a coordinated and coherent approach to the implementation of the Minamata Convention in the context of existing WHO policies, processes and initiatives is necessary and should be employed.²¹ Countries need to bear this in mind when planning activities aimed at the ratification and implementation of the Convention.

²¹ See the Appendix, Table 3.2, for a summary of the synergies between WHO's strategic documents and the articles in the Minamata Convention.

Appendix

Table 3.1. Main provisions of the Minamata Convention regarding health

Articles	Content	Provisions	Obligation or Voluntary
1	Objective	General objective: to reduce supply and use of mercury.	
4	Mercury-added products	1. Prohibition of manufacture, import and export of mercury-added products. (Annex A, Part I). 3. Measures (Annex A, Part II). 5. Prevention of the incorporation of assembled mercury-added products. 6. Obligation to discourage the manufacture and distribution of new products.	o o o, v
5	Manufacturing processes in which mercury is used	2. Prohibition of mercury use in the processes, listed in Part II of Annex B. 3. Obligation to restrict the use of mercury in the processes listed in Part II of Annex B. 5. Obligation to take measures to address emissions and releases from all processes and/or to endeavour to identify facilities. 6. Prohibition of the use of mercury in new facilities. 7. Discouragement for the development of new facilities using any other mercury-based manufacturing process.	o o v o, v
7	ASGM	2. Reduction/elimination of emissions from ASGM. 3. Determination of significance of ASGM. Development and implementation of a national action plan, if applicable.	o o
8	Emissions	3. Control of emissions: development of a national plan. 4. Requirement for best available techniques and guidance on best environmental practices for new sources. 5. Establishment of emission control measures for existing sources. 7. Establishment of an emissions inventory.	v v o, v o
12	Contaminated sites	1. Assessments of risk for populations in contaminated sites	v
17	Information exchange	1. Scientific, technical, economic and legal information. Information on the reduction or elimination of the production, use, trade, emissions and releases of mercury. Information on alternative solutions. Epidemiological information, in close cooperation with WHO.	v
18	Public information, awareness and education	2. Use of existing mechanisms or consideration of the development of mechanisms.	v
19	Research, development and monitoring	1. Impact assessments. 2. Building on existing monitoring networks and research.	v v
20	Implementation plans		v
21	Reporting	Notably with other chemical and waste conventions.	o, v
22	Evaluation of effectiveness		o, v
16	Health aspects	Diverse legal aspects: water food safety occupational health safety.	v

Source: Minamata Convention on Mercury [website]. Geneva: United Nations Environment Programme; 2016 (<http://www.mercuryconvention.org/>, accessed 14 January 2016).

Table 3.2. Mapping the synergies

WHO strategies	Articles relating to mercury
Safe Management of Wastes from Health Care Activities	4
Oral Health Strategy	3, 4, 5, 8, 11, 12, 16, 18, 19
Health Care Without Harm/WHO joint Mercury-Free Health Care Initiative 2008	4, 5, 7, 11, 12
Chemical Risk Assessment Network, poison centres	12, 16, 18, 19
Health in All Policies	Preamble, 1, 16
Public Health and Environment Global Strategy	5, 7, 8, 12, 16, 18, 19
Health 2020	4, 7, 12, 16, 17, 18, 19
Global Strategy for Food Safety	Preamble, 16, 18, 19
Global Plan of Action for Children's Health and the Environment 2010–2015	Preamble, 16, 17, 18, 19
Global Strategy for Women's, Children's and Adolescents' Health 2016–2030	Preamble, 16, 18, 19, 20
Investing in Children: the European child and adolescent health strategy 2015–2020	5, 7, 8, 12, 16, 18, 19, 22
Global Plan of Action on Workers' Health	4.6, 5.6, 5.7, 5.8, 7, 17, 18, 19

The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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The meeting on Health Sector Involvement in the Implementation of the Minamata Convention: Assessment and Prevention of Mercury Exposure was held on 24–25 June 2015 in Bonn, Germany, under the umbrella of the European Environment and Health Process. The aim of the Meeting was to update participants about the effects on health of mercury and the implications of exposures to hazardous chemicals in early life for child development, and to share knowledge and information relevant to the implementation of the Minamata Convention. Participants noted the need for capacity-building and technical support to facilitate the implementation of the Convention in WHO European Member States, and mapped and investigated synergies with other WHO strategies and policies that could render the implementation of the Convention more efficient.

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