



**Annotated Bibliography of Key Information from the World Health Organization
relevant to the Minamata Convention on Mercury**

1 June 2015

The present document provides an annotated bibliography to key information resources from the World Health Organization relevant to the Minamata Convention on Mercury and the associated World Health Assembly 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*.

Chapter 1 presents World Health Assembly Resolution 67.11. Chapter 2 contains a summary of the WHO factsheet on mercury. An overview of WHO information resources organized in accordance with the articles of the Minamata Convention on Mercury is presented in Chapter 3. For each information resource the contents are described, including, if available, conclusions and/or recommendations in Chapter 4. Finally, Chapter 5 presents additional resources which are relevant to the Minamata Convention.

The text of the Minamata Convention on Mercury is available on the following UNEP website in Arabic, Chinese, English, French, Russian and Spanish:
<http://www.mercuryconvention.org/>

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1. World Health Assembly Resolution on Minamata Convention on Mercury

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

Below, the full text of the resolution:

The Sixty-seventh World Health Assembly,

Having considered the report on 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;

Recalling World Health Assembly resolutions WHA60.17 on oral health: action plan for promotion and integrated disease prevention, WHA63.25 on the improvement of health through safe and environmentally sound waste management, and WHA59.15 on the Strategic Approach to International Chemicals Management, as well as the strategy for strengthening the engagement of the health sector in the implementation of the strategic approach adopted by the International Conference on Chemicals Management at its third session;

Recognizing the importance of dealing effectively with the health aspects of the challenges that chemicals and wastes, including mercury, may pose, particularly to vulnerable populations, especially women, children, and, through them, future generations;

Recalling the renewed commitments on sustainable development set out in the outcome document of the United Nations Conference on Sustainable Development, Rio+20 (Rio de Janeiro, Brazil, 20–22 June 2012) entitled “The future we want”,³ as well as the Adelaide Statement on Health in All Policies, of 2010, and the 8th Global Conference on Health Promotion, held in Helsinki in 2013, which promoted collaboration across all sectors to achieve healthy populations;

Taking note that negotiations on the text of a new multilateral environmental agreement on mercury were concluded in October 2013 with the adoption of the Minamata Convention on Mercury, being the first time that a multilateral environmental agreement includes a specific article on health, as well as other relevant provisions, and that the Convention places certain obligations on Parties that will require action, as applicable, by the health sector, together with other competent sectors, including the progressive phase-out, resulting from banning the manufacture, import or export by 2020, of mercury thermometers and sphygmomanometers, of mercury-containing cosmetics, including

skin-lightening soaps and creams, and mercury-containing topical antiseptics, measures to be taken to phase down mercury-added dental amalgam, and the development of public health strategies on the exposure to mercury of artisanal and small-scale gold miners and their communities;

Recalling that the objective of the Minamata Convention on Mercury is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds;

Bearing in mind that the Minamata Convention on Mercury encourages Parties to: (a) promote the development and implementation of strategies and programmes to identify and protect populations at risk, particularly vulnerable populations, and which may include adopting science-based health guidelines relating to the exposure to mercury and mercury compounds, setting targets for mercury exposure reduction, where appropriate, and public education, with the participation of public health and other involved sectors; (b) promote the development and implementation of science-based educational and preventive programmes on occupational exposure to mercury and mercury compounds; (c) promote appropriate health care services for prevention, treatment and care for populations affected by the exposure to mercury or mercury compounds; and (d) establish and strengthen, as appropriate, the institutional and health professional capacities for the prevention, diagnosis, treatment and monitoring of health risks related to the exposure to mercury and mercury compounds;

Noting that the Minamata Convention on Mercury states that the Conference of the Parties, in considering health-related activities, should consult, collaborate and promote cooperation and exchange of information with WHO, ILO and other relevant intergovernmental organizations, as appropriate;

Thanking the Secretariat for its preparatory work, during the negotiations, analysing different risks and available substitutes, as well as analysing and identifying areas requiring additional or new effort, under the Minamata Convention, and encouraging further and continuous analysis and other efforts as may be needed,

1. WELCOMES the formal adoption by Parties of the Minamata Convention on Mercury in October 2013;

2. ENCOURAGES Member States:

- (1) to take the necessary domestic measures promptly to sign, ratify and implement the Minamata Convention on Mercury, which sets out internationally legally binding measures to address the risks of mercury and mercury compounds to human health and the environment;

- (2) to participate actively in national, regional and international efforts to implement the Minamata Convention on Mercury;

- (3) to address the health aspects of exposure to mercury and mercury compounds in the context of their health sector uses, and also the other negative health impacts that should

be prevented or treated, by ensuring the sound management of mercury and mercury compounds throughout their life cycle;

(4) to recognize the interrelation between the environment and public health in the context of the implementation of the Minamata Convention on Mercury and sustainable development;

(5) to promote appropriate health care services for prevention, treatment and care for populations affected by the exposure to mercury or mercury compounds, including effective risk communication strategies targeted at vulnerable groups, such as children and women of childbearing age, especially pregnant women;

(6) to ensure close cooperation between ministries of health and ministries of environment, as well as ministries of labour, industry, economy, agriculture and other ministries responsible for the implementation of aspects of the Minamata Convention on Mercury;

(7) to facilitate the exchange of epidemiological information concerning health impacts associated with exposure to mercury and mercury compounds, in close cooperation with WHO and other relevant organizations, as appropriate;

3. REQUESTS the Director-General:

(8) to facilitate WHO's efforts to provide advice and technical support to Member States to support the implementation of the Minamata Convention on Mercury in all health aspects related to mercury, consistent with WHO's programme of work, in order to promote and protect human health;

(9) to provide support to Member States in developing and implementing strategies and programmes to identify and protect populations at risk, particularly vulnerable populations, which may include adopting science-based health guidelines relating to exposure to mercury and mercury compounds, setting targets for mercury exposure reduction, where appropriate, and public education, with the participation of health and other involved sectors;

(10) to cooperate closely with the Minamata Convention Intergovernmental Negotiating Committee, the Conference of the Parties and other international organizations and bodies, mainly UNEP, to fully support the implementation of the health-related aspects of the Minamata Convention on Mercury and to provide information to the Committee and Conference of the Parties on the progress made in this regard;

(11) to report in 2017 to the Seventieth World Health Assembly on progress in the implementation of this resolution.

The document is available in Arabic, Chinese, English, French, Russian and Spanish at:
http://www.who.int/gb/or/e/e_wha67r1.html

2. WHO Fact sheet

Mercury and Health, 2013

Document type: WHO Factsheet

Contents: This factsheet summarizes information on possible exposure pathways to mercury, corresponding health effects and possibilities to reduce human exposure from mercury sources.

Conclusions/ Recommendations: The fact sheet describes several ways to prevent adverse health effects from mercury exposure, including:

- Burning coal for power and heat is a major source of mercury and therefore the use of clean energy sources that do not burn coal should be promoted;
- Mercury mining, and the use of mercury in gold extraction and other industrial processes, should be eliminated. Non-mercury (non-cyanide) gold-extraction techniques need to be promoted and implemented, and where mercury is still used, safer work practices need to be employed to prevent exposure;
- Non-essential mercury-containing products should be phased out and safe handling, use and disposal of remaining mercury-containing products should be encouraged;
- Dental amalgam is still used in almost all countries and a 2009 WHO expert consultation concluded that a global near-term ban on amalgam would be problematic for public health and the dental health sector, but a phase down should be pursued by promoting disease prevention and alternatives to amalgam; research and development of cost-effective alternatives; education of dental professionals and the raising of public awareness.

Factsheet available in Chinese, English, French, Russian and Spanish at:

<http://www.who.int/mediacentre/factsheets/fs361/en/>

3. Index of Key WHO Information organized by Article of the Minamata Convention

Table 1. WHO information resources in relation to the articles of the Minamata Convention on Mercury. Down the side are the WHO information resources. Across the top are the articles of the Minamata Convention on Mercury (directly) linked to human health issues. Article 4: Mercury- added products, 5: Manufacturing processes in which mercury or mercury compounds are used, 7: Artisanal and small-scale gold mining, 8: Emissions, 9: Releases, 16: Health aspects, 17: Information exchange, 18: Public information, awareness and education, 19: Research, development and monitoring, 20: Implementation plans, 21: Reporting, 22: Effectiveness evaluation. Note that article 1 refers to the objective of the Convention to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds, and is therefore overarching.

WHO Information resources	Articles of Minamata Convention											
	4	5	7	8	9	16	17	18	19	20	21	22
<i>WHO fact sheet -</i> -WHO Fact Sheet on mercury (2013)			X			X		X				
<i>Thermometers (for medical use) and Sphygmomanometers –</i> -Developing national strategies for phasing out mercury-containing thermometers and sphygmomanometers in health care, including in the context of the Minamata Convention on Mercury: key considerations and step-by-step guidance (2015); -Replacement of mercury thermometers and sphygmomanometers in health care (2011); -A new solar-powered blood pressure measuring device for low-resource settings (2010).	X					X	X					
	X					X						
	X					X						
<i>Skin Lightening Products-</i> -Mercury in Skin Lightening Products (2011).	X							X	X			
<i>Dental Amalgam-</i> Future use of materials for dental restoration (2010); -Promoting the phase down of dental amalgam in developing countries (2014); -East Africa Dental Amalgam Phase-Down Project	X						X					
	X						X	X		X		
	X						X	X				
<i>Artisanal and Small-scale Gold Mining -</i> -Mercury Exposure and Health Impacts among Individuals in the Artisanal and Small-Scale Gold Mining Community: A Comprehensive Review (2014); -Mercury Exposure and Health Impacts among Individuals in the Artisanal and Small-Scale Gold Mining Community (2014); -Hydrogen cyanide and cyanides (2004); -International Chemical Safety Cards (ICSC) on a number of cyanide compounds; -IPCS/CEC Evaluation of Antidotes Series- Antidotes for Poisoning by Cyanide (1993); -Integrated Management of Adolescent and Adult Illness district clinician manual: Hospital care for adolescents and adults (2011) - Developing national public health strategies on ASGM, including in the context of the Minamata Convention on Mercury (forthcoming 2015); -Conducting health situation assessments in the context of ASGM (forthcoming 2015);			X						X			
			X						X			
			X			X	X	X				
			X			X		X				

WHO Information resources	4	5	7	8	9	16	17	18	19	20	21	22
<i>Continuation Artisanal and Small-scale Gold Mining]</i> -Training materials (forthcoming 2015)- for training health care providers on how to identify and address environmental and occupational health issues associated with ASGM.			X			X		X				
<i>WHO Health Guidelines on air, drinking water and dietary intake-</i> -WHO Air Quality Guidelines (2000); -WHO guidelines for indoor air quality: Household fuel combustion (2014); -WHO Guidelines for Drinking- Water Quality (2011); -The Seventy-second report of the Joint FAO/WHO Expert Committee on Food Additives (2010); -Joint FAO/WHO expert consultation on the risks and benefits of fish consumption (2010); -Health and the environment: addressing the health impact of air pollution WHO A68/18 (2015); -Health and the environment. Climate and health: outcome of the WHO Conference on Health and Climate (2014).				X X		X X	X		X X			
<i>Biomonitoring-</i> -Human biomonitoring survey; -Report on information on harmonized systems for measuring mercury body burden (2011); -Biomonitoring-based indicators of exposure to chemical pollutants (2012).						X X			X X		X	X
<i>Harmonized methodologies for estimating health impacts-</i> -Mercury: Assessing the environmental burden of disease at national and local levels (2008); -Guidance for identifying populations at risk from mercury exposure (2008); -Report on indicators to evaluate and track the health impacts of mercury and identify vulnerable populations (2010).		X				X			X			
<i>Risk Assessment information and health and safety information for workers-</i> -Elemental mercury and Inorganic mercury compounds: Human health aspects (2003); -International Chemical Safety Cards (ICSC) on a number of mercury compounds; -Children's exposure to mercury compounds, (2010).						X X	X	X			X	

4. Annotated Bibliography

Thermometers and Sphygmomanometers in health care

Developing national strategies for phasing out mercury-containing thermometers and sphygmomanometers in health care, including in the context of the Minamata Convention on Mercury: key considerations and step-by-step guidance, 2015

Document type: Guidance document

Contents: This guidance provides a framework for developing national health-system wide strategies to phase-out the manufacture, import and export of mercury containing thermometers and sphygmomanometers in health care, including in the context of requirements under Article 4 of the Minamata Convention.

Conclusions/ Recommendations: The guidance document summarizes key steps which can guide ministries of health in the process of phasing out mercury-containing measuring devices in ways most suited to the country's particular needs and context, including:

- Development of a stakeholder engagement strategy;
- Situation assessment;
- Strategy development and implementation;
- Monitoring and reporting.

The guidance document is available in English at:

http://www.who.int/ipcs/assessment/public_health/WHOGuidanceReportonMercury2015.pdf?ua=1

Replacement of mercury thermometers and sphygmomanometers in health care, 2011

Document type: Technical guidance

Contents: This short guide is designed to provide detailed technical instructions for the safe substitution of non-mercury thermometers and sphygmomanometers in health-care settings. It identifies available resources that support the equivalent accuracy and comparable clinical utility of the substituted products, while protecting health-care workers and the environment.

Conclusions/ Recommendations: The technical guidance concludes that alternatives to mercury-containing thermometers and sphygmomanometers are

available, and are accurate and practical in clinical settings. These alternatives should be considered when replacing or phasing out mercury units in health-care settings.

The technical guidance document is available in English, Spanish and Russian at:
http://whqlibdoc.who.int/publications/2011/9789241548182_eng.pdf
http://whqlibdoc.who.int/publications/2011/9789243548180_spa.pdf
http://www.euro.who.int/_data/assets/pdf_file/0004/195475/Replacement-of-mercury-thermometers-and-sphygmomanometers-in-health-care-Rus.pdf?ua=1

A new solar-powered blood pressure measuring device for low-resource settings, 2010

Document type: Journal article

Contents: Peer-reviewed publication, by Parati *et al.* (2010), on the New Solar-Powered Blood Pressure Measuring Device for Low-Resource Settings. WHO provided technical support to produce a device which can be used as alternative to mercury sphygmomanometers. This study was coordinated by WHO.

Conclusions/ Recommendations: The authors conclude that the newly developed blood pressure measuring device is a valuable device for improving blood pressure measurements in low resource settings with non-physician health workers.

Document available at:

http://www.who.int/medical_devices/innovation/compendium_med_dev2012_3.pdf

Skin Lightening Products

Mercury in Skin Lightening Products, 2011

Document type: WHO Information Sheet

Contents: This short information sheet describes the health impacts, use and availability of mercury skin lightening products as well as existing regulations.

Conclusions/ Recommendations: The report concludes that:

- Mercury-containing skin lightening products are hazardous to health and as a result have been banned in many countries. However, there are reports of such products still being available to consumers, and they are advertised on the internet;
- Public awareness needs to be raised regarding the types of products and the specific products that contain mercury and the risks associated with mercury exposure;
- Information on alternatives must also be provided, because skin lightening products that do not contain mercury may contain other hazardous substances.

The document is available in Arabic, Chinese, English, French, Russian and Spanish at: http://www.who.int/ipcs/assessment/public_health/mercury/en/

Dental Amalgam

Future use of materials for dental restoration, 2010

Document type: Report of meeting convened at WHO

Contents: The meeting concluded that a global near-term ban on amalgam would be problematic for public health and the dental health sector, but a phase down should be pursued.

Conclusions/ Recommendations: The participants of the meeting formulated a number of recommendations of relevance to restorative dental care in the future including:

- Strengthening the prevention of dental caries;
- Further investigate the practical implications of alternative materials;
- Development of indicators of success of restoration;
- Encourage operational research on alternative materials for dental restoration and coordinate such activity at international level;
- Ensuring dental care services are financially fair;
- Encouraging health service facilities to adapt Best Management Practices;
- Train personnel (especially in developing countries) in minimal intervention techniques which will reduce the need for dental amalgam;
- Ensure that decisions on the use of dental restoration materials are made through informed interaction between patient and provider of dental care;
- Increasing responsibility of the dental industry;
- Strengthening the work of the Federation Dentaire Internationale (FDI) for translation of sound knowledge about dental materials to oral health practitioners.

Available at:

http://www.who.int/entity/oral_health/publications/dental_material_2011.pdf

Promoting the phase down of dental amalgam in developing countries, 2014

Document type: Summary brochure

Contents: A summary brochure of the East Africa Dental Amalgam Phase-Down Project (EADAP), produced by UNEP and WHO. The EADAP project aimed to demonstrate the phase-down approach for dental amalgam use in developing countries.

Conclusions/ Recommendations: The report summarizes different successful intervention strategies and provides recommendations which are helpful for other countries aiming to phase down the use of dental amalgam, including:

- Creating awareness on the environmental risks of dental amalgam;
- Promoting alternatives for dental amalgam in dental restoration when clinically indicated;
- Building capacities of dentists on oral health promotion and disease prevention;
- Supporting best management practices and environmentally sound management of waste;
- Ensuring regulatory framework and legislation are in place;
- Encouraging waste collection separation and use of facilities for hazardous waste storage and treatment.

Brochure available at:

http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Products/dental%20mercury%20phase%20down%20project%20brochure%20FINAL_lr.pdf

East Africa Dental Amalgam Phase-Down Project

Document type: Other materials

Contents: Other materials (including flyers and posters) relevant to this project coordinated by WHO Oral Health Programme and UNEP Chemicals can be found at:

<http://www.unep.org/chemicalsandwaste/Mercury/GlobalMercuryPartnership/Products/Activities/EastAfricaDentalAmalgamPhase-DownProject/tabid/105844/Default.aspx>

Artisanal and Small-scale Gold Mining

Mercury Exposure and Health Impacts among Individuals in the Artisanal and Small-Scale Gold Mining Community: A Comprehensive Review, 2014

Document type: Journal article

Contents: The purpose of this review, commissioned by WHO, was to evaluate the literature regarding the health effects of mercury among those working and/or living near artisanal small-scale gold mining (ASGM) communities. Articles published between 1990 and 2012 were evaluated and common findings indicate that ASGM workers (and their families) are exposed to mercury vapour and, together with other residents of nearby and downstream communities, are often consuming fish heavily contaminated with methylmercury.

Conclusions/ Recommendations: The authors conclude that the more than 60 studies undertaken in 19 different countries in South America, Asia, and Africa, demonstrated that hair and urine concentrations in ASGM communities are well above World Health Organization health guidance values and that National public health strategies on ASGM, as required by the Minamata Convention, should be implemented immediately.

Full scientific publication of this WHO-commissioned study is available at: *Environmental Health Perspectives*; DOI:10.1289/ehp.1307864
<http://ehp.niehs.nih.gov/1307864/>

Mercury Exposure and Health Impacts among Individuals in the Artisanal and Small-Scale Gold Mining (ASGM) Community, 2014

Document type: Information Sheet

Contents: This document provides a summary of the full review article on health effects of mercury in ASGM communities.

The information sheet is available in Arabic, Chinese, English, French, Russian and Spanish at: http://www.who.int/ipcs/assessment/public_health/mercury/en/

The following three documents are forthcoming, hence the titles are provisional.

- Title and year: Developing national public health strategies on ASGM, including in the context of the Minamata Convention on Mercury(forthcoming 2015)
- Title and year: Conducting health situation assessments in the context of ASGM (forthcoming 2015)
- Title and year: Training materials (forthcoming 2015)- for training health care providers on how to identify and address environmental and occupational health issues associated with ASGM.

Besides mercury, cyanides are widely used in ore extracting processes for the recovery of gold. As for mercury, there are many health and environmental hazards associated with this extraction method, largely due to the high acute toxicity of the cyanide compounds involved. Therefore WHO information resources on cyanide, which are relevant to ASGM, are provided below.

Hydrogen cyanide and cyanides, 2004

Document type: WHO/IPCS Concise International Chemical Assessment Document (CICAD) 61

Contents: This document provides a summary of the relevant scientific information concerning the potential effects of cyanide and cyanides upon human health and/or the environment.

The document is available (in English, summary in French and Spanish) at: <http://www.who.int/entity/ipcs/publications/cicad/en/cicad61.pdf>

International Chemical Safety Cards (ICSC) on a number of cyanide compounds

Document type: ICSC

Contents: ICSCs provide information on the hazards of specific chemicals together with safety information (including first aid, fire-fighting measures and precaution information for spillage and transport) to promote safe use of chemicals.

ICSC on cyanide available in numerous languages at: <http://www.who.int/ipcs/publications/icsc/en/>

IPCS/CEC Evaluation of Antidotes Series- Antidotes for Poisoning by Cyanide, 1993

Document type: Review

Contents: This review and evaluation on antidotes used in the treatment of poisoning by cyanide is published in 1993, however the information remains correct.

The document is available at:

<http://www.inchem.org/documents/antidote/antidote/ant02.htm>

Integrated Management of Adolescent and Adult Illness (IMAI) district clinician manual: Hospital care for adolescents and adults, 2011

Document type: Manual

Contents: This document provides guidelines for the management of common illnesses with limited resources, including the management of cyanide poisoning (Chapter 3.8, page 188).

The document is available at:

http://www.who.int/iris/bitstream/10665/77751/1/9789241548281_Vol1_eng.pdf?ua1

WHO Health Guidelines on air, drinking-water and dietary intake

WHO Air Quality Guidelines, 2000

Document type: Guidelines

Contents: WHO has set air quality guidelines, to provide a basis for protecting public health from adverse effects of air pollutants. The guidelines provide background information and guidance to (inter)national and local authorities in the process of risk assessment. The document further lists criteria to set priorities for the compounds to be reviewed including: a) the compound (or mixture) posed a widespread problem in terms of exposure sources; (b) the potential for personal exposure was large; (c) new data on health or environmental impact had emerged; (d) monitoring had become feasible since the previous evaluation; and (e) a positive trend in ambient air concentrations was evident. Application of these criteria has resulted in the selection of the air pollutants addressed in the guidelines. Mercury is addressed in chapter 6 on inorganic pollutants.

Conclusions/ Recommendations: The report concludes that to prevent possible health effects in the near future, ambient air levels of mercury should be kept as low as possible. A guideline for inorganic mercury vapour of 1 µg/m³ as an annual average has been established (pages 157-161). This guideline is currently under review.

The document is available at:

http://www.euro.who.int/_data/assets/pdf_file/0005/74732/E71922.pdf

WHO guidelines for indoor air quality: Household fuel combustion, 2014

Document type: Guidelines

Contents: Although not specifically addressed in the Minamata Convention, WHO has established guidelines on the indoor burning of coal, which releases mercury. These 2014 indoor air quality guidelines for household fuel combustion aim to help public health policy-makers, as well as specialists working on energy, environmental and other issues understand best approaches to reducing household air pollution.

Conclusions/ Recommendations: Recommendations of most relevance to mercury include:

- Unprocessed coal should not be used as household fuel;

- Considering the opportunities synergy between climate policies and health, including financing, WHO recommends that governments and other agencies developing and implementing policy on climate change mitigation consider action on household energy and carry out relevant assessments to maximize health and climate gains.

The document is available at: <http://www.who.int/indoorair/guidelines/hhfc/en/>

WHO Guidelines for Drinking-Water Quality, 2011

Document type: Guidelines

Contents: WHO has set water quality guidelines to provide recommendations for managing the risk from hazards that may compromise the safety of drinking-water. The guidelines are applicable to packaged water and ice intended for human consumption. The document emphasizes that, when defining mandatory limits, it is preferable to consider the guidelines in the context of local or national environmental, social, economic and cultural conditions. The guidelines document consists of separate chapters. Mercury is covered in chapter 8: chemical aspects.

Conclusions/Recommendations: WHO has set a drinking-water quality guideline of 0.006 mg/L for inorganic mercury.

The guideline document is available at:

http://www.who.int/entity/water_sanitation_health/publications/2011/9789241548151_ch08.pdf

The Seventy-second report of the Joint FAO/WHO Expert Committee on Food Additives, 2010

Document type: Report

Contents: The report, by the Joint FAO/WHO Expert Committee on Food Additives (JECFA), evaluates certain contaminants in food and provides international guidance in the area of risk assessment of chemicals in food. Mercury is one of the evaluated contaminants (page 55-63).

Conclusions/Recommendations: The FAO/WHO Expert Committee on Food Additives and Contaminants established a provisional tolerable weekly intake (PTWI) for inorganic mercury of 4 µg/kg body weight (bw), applicable to dietary exposure to total mercury from foods other than fish and shellfish. The PTWI for methyl mercury (maternal intake to protect the foetus) is 1.6 µg/kg bw, applicable to dietary exposure from fish and shellfish.

The document is available at: http://whqlibdoc.who.int/trs/who_trs_959_eng.pdf

Joint FAO/WHO expert consultation on the risks and benefits of fish consumption, 2010

Document type: Report of expert consultation

Contents: This document provides scientific advice on the risks and benefits of fish consumption: specifically, a comparison of the health benefits of fish consumption with the health risks associated with different contaminants including methylmercury.

Conclusions/ Recommendations: The Expert Consultation concluded the following in relation to mercury:

- Consumption of fish provides energy, protein and a range of other important nutrients, including the long-chain n-3 polyunsaturated fatty acids (LCn3PUFAs).
- Eating fish is part of the cultural traditions of many peoples. In some populations, fish is a major source of food and essential nutrients.
- Among the general adult population, consumption of fish, particularly fatty fish, lowers the risk of mortality from coronary heart disease. There is an absence of probable or convincing evidence of risk of coronary heart disease associated with methylmercury.
- When comparing the benefits of LCn3PUFAs with the risks of methylmercury among women of childbearing age, maternal fish consumption lowers the risk of suboptimal neurodevelopment in their offspring compared with the offspring of women not eating fish in most circumstances evaluated.
- Among infants, young children and adolescents, the available data are currently insufficient to derive a quantitative framework of the health risks and health benefits of eating fish. However, healthy dietary patterns that include fish consumption and are established early in life influence dietary habits and health during adult life.

The Expert Consultation recommended a series of steps that WHO Member States should take to better assess and manage the risks and benefits of fish consumption and more effectively communicate these risks and benefits to their citizens. The output of the Expert Consultation is a framework for assessing the net health benefits or risks of fish consumption that will provide guidance to national food safety authorities and the Codex Alimentarius Commission in their work on managing risks, taking into account the existing data on the benefits of eating fish.

Report is available at:

http://apps.who.int/iris/bitstream/10665/44666/1/9789241564311_eng.pdf?ua=1

Health and the environment: addressing the health impact of air pollution, WHO A68/18, 2015

Document type: Resolution

Contents: Delegates at the World Health Assembly adopted a resolution to address the health impacts of air pollution.

Conclusions/ Recommendations: This resolution asks the WHO Secretariat to strengthen its technical capacities to support Member States in taking action on air pollution. Furthermore the resolution calls Member States to:

- Redouble their efforts to identify, address and prevent the health impacts of air pollution including enabling health systems and health authorities to play a leadership role in raising awareness about air pollution's impacts and the savings in lives and health care costs that can be realized through reducing pollution and pollution exposures;
- Strengthen multi-sectoral cooperation, integrating health concerns into all national, regional and local air pollution-related policies;
- Develop air quality monitoring systems and health registries to improve surveillance for all illnesses related to air pollution; promote clean cooking, heating and lighting technologies and fuels; and strengthen international transfer of expertise, technologies and scientific data in the field of air pollution.

The report is available in Arabic, Chinese, English, French, Spanish and Russian at: http://www.who.int/gb/ebwha/pdf_files/WHA68/A68_18-en.pdf

The anticipated World Health Assembly Resolution will be available in Arabic, Chinese, English, French, Spanish and Russian at: http://www.who.int/gb/e/e_wha68.html

Document type: Work plan

Contents: The conference concluded from an analysis of presented literature that continued greenhouse gas emission at current rates will cause significant increases in mortality from climate change. The new WHO climate change work plan provides information on tools to enhance population resilience to climate change and to support health-promoting policies on climate change. This document, similar to the previous document (*Health and the environment: addressing the health impact of air pollution*), makes reference to the co-benefits of climate-change mitigation policies including reductions in greenhouse gas emissions from coal-fired power generation.

The workplan is available at:

http://www.who.int/gb/ebwha/pdf_files/EB136/B136_16-en.pdf

Biomonitoring

Human biomonitoring survey

Contents: The website contains documents on the current work of WHO in coordinating the development of standardized protocols for human biomonitoring surveys for mercury, and planning pilot testing in volunteer countries, under the mandate of the Parma Declaration commitments to reduce early life exposure to environmental pollutants.

Information available in English and Russian at:

<http://www.euro.who.int/en/data-and-evidence/environment-and-health-information-system-enhis/activities/human-biomonitoring-survey>

Report on information on harmonized systems for measuring mercury body burden, 2011 (UNEP(DTIE)/Hg/INC.2/6)

Document type: Mercury INC2 Meeting document

Contents: This meeting document was prepared by WHO for the intergovernmental negotiating committee to prepare a global legally binding instrument on mercury requested the secretariat, in 2010, to provide information on harmonized systems for measuring mercury body burden.

Conclusions/ Recommendations: recommendations include:

- Hair sampling is the preferred method for measuring methylmercury concentrations;
- Urine samples are considered to be the best determinant of body burden of mercury from long-term exposure to elemental and inorganic mercury;
- Blood samples are useful primarily in cases of short-term, higher-level exposures to mercury;
- Different potential pilot studies, including collecting data on hair mercury in the general population of countries with high fish consumption, should be undertaken;
- In the undertaking of any pilot studies, it is essential that biological specimens be collected from informed and willing study participants.

Document available in Arabic, Chinese, English, French, Russian and Spanish at:
<http://www.mercuryconvention.org/Negotiations/INC2/tabid/3435/Default.aspx>

*Biomonitoring-based indicators of exposure to chemical pollutants,
2012*

Document type: Report of technical meeting

Contents: The WHO European Centre for Environment and Health (ECEH) is coordinating the development of standardized protocols for human biomonitoring-based indicators. This document is a report of a technical meeting which involved 38 biomonitoring experts from 15 Member States. Meeting participants evaluated a large number of chemicals, and defined a list of high priority biomarkers for further evaluation, methodology development and pilot testing in a region with chemical pollution problems.

Conclusions/ Recommendations: This report makes a number of specific recommendations for the selection of biomarkers relevant to the general population and high exposure groups.

The report of the technical meeting is available at:
http://www.euro.who.int/_data/assets/pdf_file/0004/170734/e96640.pdf?ua=1

Harmonized methodologies for estimating exposure and health impacts

Mercury: Assessing the environmental burden of disease at national and local levels, 2008

Document type: Environmental Burden of Disease Series

Contents: This report provides a review of the health effects from a number of mercury compounds, and methods for estimating the disease burden for methyl mercury for several populations. The report present basic steps to estimate the number of disability-adjusted life years (DALYs) from exposure to methyl mercury, discusses benefits of using DALYs in burden of disease estimates and presents a table with compiled data on methylmercury exposure, mild mental retardation and DALYs for selected populations.

Conclusions/ Recommendations: The authors conclude that reducing the consumption of seafood with high methylmercury concentrations is the most direct way to reduce the risk of methylmercury-related cognitive deficits in a highly exposed population. However, consumption recommendations must also consider the nutritional value of fish and shellfish; the risks and benefits of fish consumption depend on the amount and species of fish consumed and must be weighed carefully for each subgroup in the population. In addition the report identified research needs and recommendations on DALYs and concludes that the use of DALYs to estimate the burden of disease of environmental chemicals is limited by the lack of disability weights for relevant health outcomes. Disability weights must be determined for additional diseases and symptoms to fully characterize the disease burden from mercury.

The report is available in English and Spanish at:

http://whqlibdoc.who.int/publications/2008/9789241596572_eng.pdf

http://www.who.int/iris/bitstream/10665/78130/1/9789243596570_spa.pdf?ua=1

Guidance for identifying populations at risk from mercury exposure, 2008

Document type: Guidance document

Contents: This document, developed by WHO and UNEP, provides information on potential health impacts of mercury pollution, approaches used to estimate exposure to mercury (including biomonitoring), and environmental models that can be useful in predicting exposure. Additionally, the guide includes an overview of assessments of mercury exposure for some specific exposure scenarios. This document can therefore be used as a reference for conducting research or investigations regarding mercury exposure.

Conclusions/ Recommendations: The report emphasizes that, depending on the nature of the research, involvement of stakeholders in various stages of research is important, especially for local communities. This includes the process of evaluating and addressing environmental issues. For research involving biomonitoring, consultation with the community and consideration of ethical and confidentiality issues are essential.

The document is available in English at:

<http://www.who.int/foodsafety/publications/chem/mercuryexposure.pdf>

Executive summary available as UNEP(DTIE)/Hg/INC.2/19 in Arabic, Chinese, English, French, Russian and Spanish at:

<http://www.mercuryconvention.org/Negotiations/INC2/tabid/3435/Default.aspx>

Report on indicators to evaluate and track the health impacts of mercury and identify vulnerable populations, UNEP(DTIE)/Hg/INC.2/5, prepared by WHO, 2010

Document type: Mercury INC2 Meeting document

Contents: A report on indicators to evaluate and track the health impacts of mercury used to identify vulnerable populations. This includes the design of a sustainable awareness-raising and sensitization programme.

Available in all UN languages at:

<http://www.mercuryconvention.org/Negotiations/INC2/tabid/3435/Default.aspx>

Risk Assessment information and health and safety information for workers

Title and year: Elemental mercury and Inorganic mercury compounds: Human health aspects, 2003

Document type: WHO/IPCS Concise International Chemical Assessment Document (CICAD) 50

Contents: This document provides a summary of the relevant scientific information concerning the potential effects of mercury upon human health and/or the environment.

The document is available (in English, summary in French and Spanish) at: <http://www.who.int/ipcs/publications/cicad/en/cicad50.pdf>

International Chemical Safety Cards (ICSC) on a number of mercury compounds

Contents : ICSCs provide information on the hazards of specific chemicals together with safety information (including first aid, fire-fighting measures and precaution information for spillage and transport) to promote safe use of chemicals.

ICSC on mercury available in numerous languages at: <http://www.who.int/ipcs/publications/icsc/en/>

Children's exposure to mercury compounds, 2010

Document type: Report

Contents: This report contains information and guidance materials for health professionals on children's exposure to mercury compounds, with an emphasis on primary prevention.

Conclusions/ Recommendations: The report concludes that children's exposures to mercury pose a significant threat to their healthy development and the main sources of mercury in the environment result from anthropogenic activity (e.g. industrial processes and diet). Children are overall more vulnerable to mercury exposures and more susceptible to its health effects, and the fetus is particularly vulnerable due to ongoing brain and organ development in utero. The report emphasizes that immediate and long-term policy actions are necessary to reduce the release of mercury and its compounds into the environment in order to protect children from current and future exposure threats. The most important action that national, regional, and international agencies can take is the development and

promotion of mercury-free alternatives in the industrial, medical, and occupational sector (e.g. thermometers and manometers).

Available at:

http://whqlibdoc.who.int/publications/2010/9789241500456_eng.pdf

Web pages

- *WHO/IPCS* home page. The website displays the work of WHO's International Programme on Chemical Safety (IPCS), which is to establish the scientific basis for the sound management of chemicals, and to strengthen national capabilities and capacities for chemical safety. The website is in English, with versions in Chinese, French, Russian: <http://www.who.int/ipcs/en/>
- *WHO/IPCS 10 Chemicals of Major Public Health Concern*, Mercury page, English with versions in Chinese, French, Russian: http://www.who.int/ipcs/assessment/public_health/mercury/en/
- *Human bio monitoring survey*. The website displays the work of WHO concerning the development of a standardized methodology for a cross-sectional human biomonitoring survey that assesses prenatal (in utero) exposures to prioritize environmental pollutants. <http://www.euro.who.int/en/data-and-evidence/environment-and-health-information-system-enhis/activities/human-biomonitoring-survey>
- *Poisons centres*. The webpage displays information on poisons centres, including information on the chemical safety and public health roles of poisons centres and how WHO assists Member States to establish poisons centers. <http://www.who.int/ipcs/poisons/centre/en/>

5. Additional resources

WHO advice on topics exempt from the Minamata Convention

Thiomersal in vaccines

- *Report of the global advisory committee on vaccine safety WHO*, 2012. The report is published in the WHO Weekly Epidemiological Record on 27 July 2012, and available at: <http://www.who.int/wer/2012/wer8730.pdf>

Mercury in traditional medicines

- *WHO Guidelines for Assessing Quality of Herbal Medicines with Reference to Contaminants and Residues*, 2007. World Health Organization. The document is available at: <http://www.who.int/medicinedocs/en/m/abstract/Js14878e/>
- *Safety Issues in the Preparation of Homeopathic Medicines*, 2010. World Health Organization. The document is available at: <http://www.who.int/medicinedocs/en/m/abstract/Js16769e>
- *General traditional medicines home page*. <http://www.who.int/medicines/areas/traditional/en/>