

Minamata Convention on Mercury

Annotated bibliography of WHO information



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Minamata convention on mercury: annotated bibliography of WHO information

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This document provides an annotated bibliography of World Health Organization (WHO) key information resources 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*.

[Arabic, Chinese, English, French, Russian, Spanish.]

Minamata Convention on Mercury Text and Annexes. Geneva: United Nations Environment Programme; 2017. Available at: <https://www.mercuryconvention.org/Convention/Text/tabid/3426/language/en-US/Default.aspx>

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Section 1. World Health Assembly resolution WHA67.11 on the Minamata Convention on Mercury

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. In: Sixty-seventh World Health Assembly, Geneva, 19–24 May 2014. Geneva: WHO; 2014.

[Arabic, Chinese, English, French, Russian, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/162849>

Full text of the resolution follows.

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”, 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:
 - (1) 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;
 - (2) 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;
 - (3) to cooperate closely with the Minamata Convention Intergovernmental Negotiating Committee, the Conference of the Parties and other international organizations and bodies, mainly, 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;
 - (4) to report in 2017 to the Seventieth World Health Assembly on progress in the implementation of this resolution.

Section 2. Overview of selected WHO information resources organized by articles of the Minamata Convention on Mercury

Key to relevant articles of the Minamata Convention



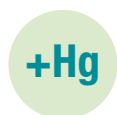
Article 1

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



Article 12

Contaminated sites



Article 4

Mercury-added products



Article 16

Health aspects



Article 5

Manufacturing processes in which mercury or mercury compounds are used



Article 17

Information exchange



Article 7

Artisanal and small-scale gold mining



Article 18

Public information, awareness and education



Article 8

Emissions



Article 19

Research, development and monitoring



Article 9

Releases



Article 20

Implementation plans



Article 10

Environmentally sound interim storage of mercury, other than waste mercury



Article 21

Reporting



Article 11

Mercury wastes



Article 22

Effectiveness evaluation

Table 1. Selected WHO information resources organized by articles of the Minamata Convention on Mercury. Down the side are selected WHO information resources. Across the top are the articles of the Minamata Convention on Mercury (directly) linked to human health issues.

Selected WHO information resources	Articles of the Minamata Convention														Page no.		
	4	5	7	8	9	10	11	12	16	17	18	19	20	21		22	
Cross-cutting materials															9		
Strategic planning for implementation of the health-related articles of the Minamata Convention on Mercury (2019)																	
Preventing disease through healthy environments. Exposure to mercury: a major public health concern (2021)																	
Elemental mercury and inorganic mercury compounds: human health aspects (2003)																	
Mercury and health fact sheet (2017)																	
What is mercury? Infographic (2017)																	
Mercury exposure impacts health. Infographic (2017)																	
What is the Minamata Convention? Infographic (2017)																	
Medical measuring devices (thermometers and sphygmomanometers)															12		
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)	●									●							
WHO technical specifications for automated non-invasive blood pressure measuring devices with cuff (2020)	●									●	●						
Priority medical devices list for the COVID-19 response and associated technical specifications (2020)	●									●	●						
Replacement of mercury thermometers and sphygmomanometers in health care (2011)	●									●	●						
Decommissioning medical devices (2019)	●								●	●	●						
Skin lightening products															14		
Mercury in skin lightening products (2019)	●									●	●	●					
Mercury in skin lightening products animated video (2020)	●									●	●						

Selected WHO information resources	Articles of the Minamata Convention														Page no.	
	4	5	7	8	9	10	11	12	16	17	18	19	20	21		22
Dental amalgam																15
The Minamata Convention and the phase down of dental amalgam (2018)	●									●		●				
Future use of materials for dental restoration (2010)	●									●	●					
Promoting the phase down of dental amalgam in developing countries (2014)	●										●	●				
Artisanal and small-scale gold mining (ASGM)																17
Environmental and occupational health hazards associated with artisanal and small-scale gold mining (2016)			●						●	●	●	●	●			
Addressing health when developing national action plans on artisanal and small-scale gold mining under the Minamata Convention on Mercury (2019)			●							●		●				
Step-by-step guide for developing a public health strategy for artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury (2021)			●							●	●	●	●			
Human biomonitoring in the context of artisanal and small-scale gold mining: ethical and scientific principles (2021)			●							●	●	●	●			
Preventing disease through healthy environments: mercury exposure and health impacts among individuals in the artisanal and small-scale gold mining (ASGM) community (2013)			●							●		●				
Mercury exposure and health impacts among individuals in the artisanal and small-scale gold mining community: a comprehensive review (2014)			●							●		●	●			
Hydrogen cyanide and cyanides (2004)										●	●	●				

Selected WHO information resources	Articles of the Minamata Convention												Page no.					
	4	5	7	8	9	10	11	12	16	17	18	19		20	21	22		
International Chemical Safety Cards (ICSC) on a number of cyanide compounds										●	●	●						
Integrated Management of Adolescent and Adult Illness (IMAI) district clinician manual: hospital care for adolescents and adults. Geneva (2011)										●	●	●						
Storage and waste																	23	
Safe management of wastes from health-care activities (2014)						●	●	●	●			●						
Cleanup, storage, and transport of mercury waste from healthcare facilities (2015)						●	●	●	●			●						
Climate change, air, drinking water, and dietary intake																	24	
WHO guidance for climate resilient and environmentally sustainable health care facilities (2020)					●					●	●		●					
Guidelines for drinking-water quality, fourth edition, incorporating the first addendum (2017)					●					●	●		●					
Air quality guidelines for Europe, second edition (2000)				●						●	●		●					
WHO guidelines for indoor air quality: household fuel combustion (2014)				●						●			●					
Health risks of heavy metals from long-range transboundary air pollution (2007)				●						●	●	●	●					
Safety evaluation of certain contaminants in food, prepared by the seventy-second meeting 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)										●	●		●					

Selected WHO information resources	Articles of the Minamata Convention														Page no.		
	4	5	7	8	9	10	11	12	16	17	18	19	20	21		22	
Biomonitoring																	28
(See also Human biomonitoring in the context of artisanal and small-scale gold mining: ethical and scientific principles (2021) under Artisanal and small-scale gold mining (ASGM))			●							●	●	●	●				
Assessment of prenatal exposure to mercury: human biomonitoring survey (2018)										●	●		●		●	●	
Assessment of prenatal exposure to mercury: standard operating procedures (2018)										●	●		●		●	●	
A state-of-the-science review of mercury biomarkers in human populations worldwide between 2000 and 2018 (2018)										●	●	●	●				
Methodologies for estimating exposure and health impacts (see also Biomonitoring above)																	30
Mercury: assessing the environmental burden of disease at national and local levels (2008)		●								●			●				
Guidance for identifying populations at risk from mercury exposure (2008)		●								●						●	
Minamata initial assessment report: suggested structure and contents (2020)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Risk assessment information and health and safety information for workers																	32
Children's exposure to mercury compounds (2010)										●							
Elemental mercury and inorganic mercury compounds: human health aspects (2003)										●	●						
International Chemical Safety Cards (ICSCs)										●		●					

Selected WHO information resources	Articles of the Minamata Convention														Page no.	
	4	5	7	8	9	10	11	12	16	17	18	19	20	21		22
Training materials																34
Children’s environmental health: training modules and instructions for health care providers (2020)	●				●	●	●	●	●	●	●		●		●	
Virtual course: Mercury effects in human health and the environment and considerations under the Minamata Convention (2019)	●	●	●	●	●			●	●	●	●	●	●	●	●	●
Training modules in health-care waste management (2012)									●		●					
Additional resources relevant to the Minamata Convention on Mercury																38
IOMC Toolbox for decision making in chemicals management										●	●	●				

Section 3. Description of contents of information resources

Each category of materials may be subdivided as guidance documents, country examples and tools.



Cross-cutting materials

Guidance documents

Strategic planning for implementation of the health-related articles of the Minamata Convention on Mercury. Geneva: WHO; 2019.

[Arabic, Chinese, English, French, Portuguese, Russian, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/329449>

Resource type: Guidance document

Contents: This document provides guidance to health ministries in planning measures to implement the health-related articles of the Minamata Convention on Mercury and to protect public health from exposure to mercury. It will guide health ministries to plan not only obligatory measures under the Convention but also voluntary measures. The approach taken in any country will need to be adapted to that country's particular needs and circumstances. Therefore, the measures suggested here are not prescriptive but are intended to inform health ministries and partners about key considerations to be taken into account while developing plans in relation to the Convention.

Preventing disease through healthy environments. Exposure to mercury: a major public health concern. Geneva: WHO; 2021.

[Arabic, Chinese, English, French, Portuguese, Russian, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/340715>

Resource type: Information note

Contents: This information note provides detailed information for decision-makers in a concise format describing:

- how mercury gets released into the environment;
- sources of exposure to mercury, including:
 - industrial processes
 - food
 - health care
 - use of elemental mercury in traditional practices;
- WHO recommendations for national, regional and global actions to reduce or eliminate releases of mercury and its compounds to the environment;
- strategic actions needed to eliminate mercury-related diseases;
- WHO guidance values on tolerable weekly intake of methylmercury and WHO guideline values for mercury in water and air;
- health effects of mercury;
- WHO recommendations for national, regional and global actions;
- strategic actions required to eliminate mercury-related diseases.

Elemental mercury and inorganic mercury compounds: human health aspects. CICAD 50. Geneva: WHO; 2003.

[English; summary in French, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/42607>

Resource type: Report

Contents: This WHO/International Programme on Chemical Safety (IPCS) Concise International Chemical Assessment Document (CICAD) provides a summary of the relevant scientific information concerning the potential effects of elemental mercury and inorganic mercury compounds upon human health and the environment.

Country examples

Strategic planning for implementation of the health-related articles of the Minamata Convention on Mercury: results from country workshops. Geneva: WHO; 2019.

[English]

Available at: <https://apps.who.int/iris/handle/10665/330146>

Resource type: Advocacy brief

Contents: This advocacy brief summarizes experiences of the Ministries of Health in Lao People's Democratic Republic and Sri Lanka applying the WHO guidance *Strategic planning for implementation of the health-related articles of the Minamata Convention on Mercury* to take stock of mercury risk assessment and control measures implemented by national health authorities, to identify additional measures needed to fully implement the health-related articles of the Convention, to protect public health, and to develop their national strategic plans for implementing the health-related articles of the Convention. Challenges and opportunities confronting health authorities in the two countries in relation to the Convention's health-related articles, as well as needs for technical assistance, are summarized. Their experiences may be of use to other national health authorities.

Health sector involvement in the Minamata Convention on Mercury: outcomes of WHO regional workshops for ministries of health. Geneva: WHO; 2018.

[Arabic, Chinese, English, French, Russian, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/275938>

Resource type: Advocacy brief

Contents: This advocacy brief summarizes the outcomes of regional workshops on health sector involvement in the implementation of the Minamata Convention. The workshops supported awareness-raising and networking among ministries of health to facilitate implementation of the Convention and resolution WHA67.11 (2014). Challenges and opportunities confronting health authorities in each region in relation to the Convention's health-related articles, as well as needs for technical assistance, are summarized.

Tools

Mercury and health fact sheet. Geneva: WHO; 2017.

[Arabic, Chinese, English, French, Russian, Spanish]

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

Resource type: Fact sheet

Contents: Fact sheet for the general public providing key facts about mercury and the effects on human health. Presented in a short format using non-technical language, it provides information about:

- how exposure to mercury occurs;
- health effects of mercury exposure;
- who is especially vulnerable to the adverse health effects of mercury;
- key methods to reduce human exposure from mercury sources;
- mercury use in vaccines and pharmaceuticals;
- the political commitment by governments to take actions against mercury pursuant to their obligations under the Minamata Convention on Mercury;
- the various ways WHO tackles mercury threats to human health and the environment.

Mercury infographics

[Arabic, Chinese, English, French, Russian, Spanish]

Available at: <https://www.who.int/teams/environment-climate-change-and-health/chemical-safety-and-health/health-impacts/chemicals/mercury>

What is mercury? Geneva: WHO; 2017.

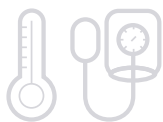
Contents: Infographic showing how mercury gets into the environment.

Mercury exposure impacts health. Geneva: WHO; 2017.

Contents: Infographic showing how exposure to mercury impacts health.

What is the Minamata Convention? Geneva: WHO; 2017.

Contents: Infographic showing how what the health sector is working to do under the Minamata Convention.



Medical measuring devices (thermometers and sphygmomanometers)

Guidance documents

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. Geneva: WHO; 2015.

[English, French, Russian, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/259448>

Resource 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 on Mercury.

Conclusions and recommendations: The guidance document summarizes key steps that 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.

Articles

+Hg 4



WHO technical specifications for automated non-invasive blood pressure measuring devices with cuff. Geneva: WHO; 2020.

[English]

Available at: <https://apps.who.int/iris/handle/10665/331749?locale-attribute=ar&>

Resource type: Technical specifications

Contents: Manual blood pressure (BP) measurement is gradually being replaced by automated measurement because of environmental concerns about mercury, poor calibration and improper measurement with aneroid devices in clinical practice, and the superior consistent accuracy of validated automated devices. There is, however, frequent concern about the accuracy of automated devices that have not been validated. The focus of the publication is on automated non-invasive blood pressure measuring devices (BPMDs) with cuff, including characteristics, regulatory requirements and standards, calibration and maintenance. It also provides guidance on procurement, decontamination and decommissioning. Additional elements on accurate measurement of BP and training for personnel are included. The document updates the WHO 2005 guidance on BPMDs. The manual responds to concern about the lack of accurate, good-quality devices, especially in low- and middle-income countries, through technical consultation and expert review.

Articles

+Hg 4



Priority medical devices list for the COVID-19 response and associated technical specifications. Geneva: WHO; 2020.

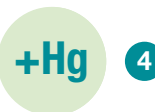
[English]

Available at: <https://www.who.int/publications/i/item/WHO-2019-nCoV-MedDev-TS-O2T.V2>

Resource type: Technical specifications

Contents: This document describes the medical devices required for the clinical management of COVID-19, selected and prioritized according to the latest available evidence and interim guidelines. These include oxygen therapy, pulse oximeters, patient monitors, thermometers, infusion and suction pumps, X-ray machines, ultrasound and computerized tomography (CT) scanners, and personal protective equipment. In order to facilitate access to quality-assured priority medical devices, the document also includes technical and performance characteristics, related standards, accessories and consumables. It is intended for policy-makers and planning officers in ministries of health, procurement and regulatory agencies, intergovernmental and international agencies, and the medical device industry.

Articles



Replacement of mercury thermometers and sphygmomanometers in health care. Geneva: WHO; 2011.

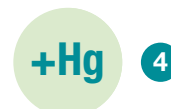
[English, Russian, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/44592>

Resource type: Guidance document

Contents: This short guide is designed to provide step-by-step instructions for the replacement of mercury thermometers and sphygmomanometers with suitable alternatives 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. It is designed for professionals responsible for institutions or ministries desiring to switch to safer non-polluting technologies in health care.

Articles



Decommissioning medical devices. Geneva: WHO; 2019.

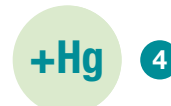
[English]

Available at: <https://apps.who.int/iris/handle/10665/330095>

Resource type: Guidance document

Contents: The document presents guidance for the process of decommissioning medical devices and provides tools for determining why, when, and how to decommission such devices. It is intended to be flexible and adaptable to various environments and health systems, especially in low- and middle-income countries. The document is for those involved in health technology policies and implementation: policy-makers, biomedical and clinical engineers in government and facility regulatory agencies, health technology managers, health care facility managers, health care workers who use and handle medical devices, waste handlers and other users of health care technology. Proper decommissioning of medical devices can ensure patient safety and improve the quality of health care, in accordance with Sustainable Development Goal 3 on health and well-being. The guide also includes disinvestment, a policy decision to withdraw health technology from a health care service when there is evidence that it is clinically ineffective, unsafe, inappropriate or not cost-effective.

Articles





Skin lightening products

Guidance documents

Mercury in skin lightening products. Geneva: WHO; 2019.

[Arabic, Chinese, French, English, Russian, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/330015>

Resource type: Information note

Contents: This short guidance document describes the health impacts, use and availability of mercury skin lightening products, existing regulations, and actions needed to address the problem globally.

Conclusions and recommendations:

- 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, 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.

Articles

+Hg 4



Tools

Mercury in skin lightening products (multimedia: animated video). Geneva: WHO; 2020.

[Arabic, Chinese, English, French, Russian, Spanish]

Available at: <https://www.who.int/multi-media/details/mercury-in-skin-lightening-products>

Resource type: Video

Contents: This short animated video describes the ways in which mercury skin lightening products are a threat to health.

Conclusions and recommendations: Do not use skin lightening products.

Articles

+Hg 4





Dental amalgam

Guidance documents

Fisher J, Varenne B, Narvawz D, Vickers C. The Minamata Convention and the phase down of dental amalgam. *Bulletin of the World Health Organization*. 2018;96:436–8.

[English]

Available at: <http://dx.doi.org/10.2471/BLT.17.203141>

Resource type: Journal article

Contents: Oral health is a neglected area of global health, although oral disease is one of the most common public health issues worldwide. This article discusses the need to shift away from the widespread use of dental amalgam to non-mercury-containing alternatives. It proposed nine measures and strategic interventions to phase down the use of dental amalgam as set out in Part II of Annex A to the Minamata Convention, challenges of a phase-down, actions taken by countries, and policies and strategies that are needed.

Articles

+Hg 4



Future use of materials for dental restoration: report of the meeting convened at WHO HQ, Geneva, Switzerland, 16th to 17th November 2009. Geneva: WHO; 2010.

[English]

Available at: <https://apps.who.int/iris/handle/10665/202500>

Resource type: Report

Contents: The WHO 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 and recommendations: The participants of the meeting formulated a number of recommendations of relevance to restorative dental care in the future, including:

- strengthen the prevention of dental caries;
- further investigate the practical implications of alternative materials;
- develop indicators of success of restoration;
- encourage operational research on alternative materials for dental restoration and coordinate such activity at international level;
- ensure dental care services are financially fair;
- encourage health service facilities to adopt best management practices;
- train personnel (especially in developing countries) in minimal intervention techniques that will reduce the need for dental amalgam;
- ensure that decisions on the use of dental restoration materials are made through informed interaction between the patient and the provider of dental care;
- increase the responsibility of the dental industry;
- strengthen the work of the World Dental Federation (FDI) for translation of sound knowledge about dental materials to oral health practitioners.

Articles

+Hg 4



Promoting the phase down of dental amalgam in developing countries. Geneva: WHO and United Nations Environment Programme (UNEP); 2014.

[English]

Available at: https://www.who.int/oral_health/publications/2014_dental_mercury_phase_down_project_brochure_19nov.pdf

Resource type: Brochure

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

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

- create awareness of the environmental risks of dental amalgam;
- promote alternatives to dental amalgam in dental restoration when clinically indicated;
- build capacities of dentists on oral health promotion and disease prevention;
- support best management practices and environmentally sound management of waste;
- ensure a regulatory framework and legislation are in place;
- encourage waste collection separation and use of facilities for hazardous waste storage and treatment.

Articles

+Hg

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Country examples

Report of the inception workshop for phase II of the East Africa Dental Amalgam Phase-down Project, Nairobi, Kenya. UNEP and WHO; 2015.

[English]

Available at: https://wedocs.unep.org/bitstream/handle/20.500.11822/12781/ReportoftheEADPllinceptionworkshopNairobi_17_August.pdf

Resource type: Workshop report

Contents: This report describes experiences from the inception workshop of phase II of the 2012 East Africa Dental Amalgam Phase-down Project, under the UNEP Global Mercury Partnership and funded by Norway Official Development Assistance. The project created a consortium to investigate challenges faced by developing countries in implementing the phase-down approach to dental amalgam set out in the Minamata Convention on Mercury. In phase I of the project, dental personnel in the three project countries benefited from capacity-building and training on hazards of mercury, oral health promotion, clinical preventive dentistry, promotion of alternatives, and environmentally sound management of waste. Awareness-raising materials were developed by WHO and UNEP. The workshop built on lessons learned, expanded demonstration activities to additional dental clinics and examined approaches to ensure the sustainability of dental amalgam phase-down, addressing specific needs for mercury waste management.



Artisanal and small-scale gold mining (ASGM)

Guidance documents

Environmental and occupational health hazards associated with artisanal and small-scale gold mining. Geneva: WHO; 2016.

[English, French, Portuguese, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/247195>

Resource type: Guidance document

Contents: This document is part of a WHO technical series on artisanal and small-scale gold mining (ASGM) and health developed in response to World Health Assembly resolution WHA67.11. It seeks to inform ministries of public health of roles they can play in supporting the implementation of the ASGM-related provisions of the Minamata Convention on Mercury. The document reviews the literature on the environmental and occupational health hazards and adverse health outcomes associated with ASGM and gives particular attention to considerations for women and children. The document also examines training programmes, toolkits and guidance documents that can be used by a health care audience or developed into a curriculum on occupational and environmental hazards associated with ASGM.

Articles



Addressing health when developing national action plans on artisanal and small-scale gold mining under the Minamata Convention on Mercury. Geneva: WHO; 2019.

[Arabic, Chinese, English, French, Portuguese, Russian, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/329916>

Resource type: Guidance document

Contents: This guidance document describes an approach to addressing health as part of a broader national action plan (NAP) to reduce and, where feasible, eliminate the use and emission of mercury in ASGM. The NAP must include a public health strategy on the exposure of artisanal and small-scale gold miners and their communities to mercury. The public health strategy should include gathering health data, training of health care workers, and awareness-raising through health facilities.

Conclusions and recommendations: Good intersectoral engagement and coordination is necessary for ensuring coherence between the different NAP elements. Primary audiences include government officials in health ministries as well as in ministries from other sectors (such as environment, mining and labour) that would be involved in the process of developing and implementing the NAP. Other audiences include development partners (for example, United Nations agencies and international organizations), researchers, nongovernmental organizations, and other actors that would also be engaged in this process.

Articles



Step-by-step guide for developing a public health strategy for artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury. Geneva: WHO; 2021.

[Arabic, English, French, Portuguese, Russian, Spanish]

Available at: <https://www.who.int/publications/i/item/9789240022768>

Resource type: Guidance document

Contents: The Minamata Convention states that the NAP for ASGM must specifically include a public health strategy regarding the exposure of miners and their communities to mercury. WHO recommends that health authorities (a) consult the WHO guidance document *Addressing health when developing national action plans on artisanal and small-scale gold mining under the Minamata Convention on Mercury* to obtain broad guidance on addressing health during the wider process of developing the NAP; and then (b) follow the *Step-by-step guide for developing a public health strategy for artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury*.

The step-by-step guide shows how to develop an evidence-based public health strategy for a NAP. The guide includes the research methodology and tools needed to conduct a rapid health assessment and institutional capacity assessment in ASGM communities. Users are guided through all steps from conducting the research to developing a public health strategy for the NAP. The step-by-step guide is intended for researchers, ministries of health, environment, and mines, NGOs, and others conducting research on ASGM.

Articles



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(See also *Developing a national action plan to reduce and, where feasible, eliminate mercury use in artisanal and small-scale gold mining*. Nairobi: UNEP; 2017).

This UNEP guidance document provides technical, legal and policy information on issues related to ASGM, which may be useful when preparing and implementing a NAP.

Available at: <https://wedocs.unep.org/handle/20.500.11822/25473>

Country examples

Developing public health strategies for artisanal and small-scale gold mining within the Minamata Convention on Mercury: findings and lessons learned from country workshops. Geneva: WHO; 2021.

[Arabic, English, French, Portuguese, Russian, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/340192>

Resource type: Advocacy brief

Contents: This advocacy brief is intended for decision-makers in relevant ministries (health, environment, mines and others) as well as other stakeholder organizations, including miners' associations, in countries with ASGM communities. It summarizes multistakeholder workshop experiences in developing evidence-based public health strategies for inclusion in the NAP for ASGM. Ghana, Mozambique and Nigeria were in the process of developing a NAP and held stakeholder workshops to (a) present findings of the rapid health assessment and institutional capacity assessment conducted in each country; (b) present and discuss recommendations from both assessments; and (c) develop public health strategies for ASGM communities.

The process of using robust research tools to gather evidence, discussing findings and recommendations in a multistakeholder workshop, and developing collaboratively a public health strategy for inclusion in the NAP applied the broader guidance set out in *Addressing health when developing national action plans under the Minamata Convention on Mercury*. The steps, tools and methodology for conducting the research are provided in the *Step-by-step guide for developing a public health strategy for artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury*.

Public Health Strategy of the National Action Plan for Reduction/Elimination of Mercury Use in Artisanal and Small-Scale Gold Mining (ASGM) in Nigeria. Abuja, Nigeria: Federal Ministry of Health, supported by WHO; 2020.

[English]

Available at: <https://www.afro.who.int/publications/public-health-strategyof-national-action-plan-reductionelimination-mercury-use>

Resource type: National strategy

Contents: The Nigeria Federal Ministry of Health's public health strategy for the NAP on ASGM was developed with support from WHO. The public health strategy is the outcome of the rapid health assessment, institutional capacity assessment and national multistakeholder workshop process to develop a public health strategy for the NAP. For the research-to-strategy process that was used see the *Step-by-step guide for developing a public health strategy for artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury*.

Rapid health situation assessment reports: piloting a new WHO framework to support the development of public health strategies on artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury. Geneva: Swiss Tropical and Public Health Institute and WHO; 2020.

Available at:

Ghana [English]: <https://www.afro.who.int/publications/rapid-health-situation-assessment-reportghana-piloting-new-who-framework-support>

Mozambique [English and Portuguese]: <https://www.afro.who.int/publications/rapid-health-situation-assessment-report-mozambique>

Nigeria [English]: <https://www.afro.who.int/publications/asgm-nigeria-rha-report-21052020>

Resource type: Report

Contents: The reports describe a rapid health assessment pilot-tested in three countries (Ghana, Nigeria and Mozambique) to support ministries of health develop a public health strategy as part of the ASGM NAP. The health situation assessments generated evidence and information about priority health concerns of ASGM miners and their communities, as well as the capacity of health systems to respond to those health concerns. Results from the assessments informed the selection of priorities and interventions to be included in the public health strategy of the NAP.

Institutional capacity assessment reports: piloting a new WHO framework to support the development of public health strategies on artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury. Geneva: Swiss Tropical and Public Health Institute and WHO; 2020.

Available at:

Ghana [English]: <https://www.afro.who.int/publications/institutional-capacity-assessment-report-ghana-piloting-new-who-framework-support>

Mozambique [English and Portuguese]: <https://www.afro.who.int/publications/institutional-capacity-assessment-report-mozambique>

Nigeria [English]: <https://www.afro.who.int/publications/asgm-nigeria-ica-report-21052020>

Resource type: Report

Contents: The reports describe an institutional capacity assessment pilot-tested in three countries (Ghana, Nigeria and Mozambique) to support ministries of health develop a public health strategy as part of the ASGM NAP. The assessments generated evidence and information about the institutional readiness in each country to detect, address and prevent health issues associated with ASGM. Results from the assessments informed the selection of priorities and interventions to be included in the public health strategy of the NAP.

Human biomonitoring in the context of artisanal and small-scale gold mining: ethical and scientific principles. Geneva: WHO; 2021.

(See also under "[Biomonitoring](#)")

[Arabic, Chinese, English, French, Portuguese, Russian, Spanish]
Available at: <https://apps.who.int/iris/handle/10665/339848>

Resource type: Guidance document

Contents: This short guidance document, intended for government decision-makers in ASGM countries, NGOs, and others conducting research on ASGM, explains why research involving human biomonitoring in ASGM communities should not be done without ethics review approval. The document describes the fundamental principle and importance of ethics in research using human biomonitoring in ASGM communities and responds to the following questions:

- What is human biomonitoring ethics review?
- Who does it?
- How is it done?
- Why is going through ethics review essential?
- How does the process work in low- and middle-income countries?
- What are the risks particular to ASGM communities if research using human biomonitoring is done without ethical approval?

Articles



Preventing disease through healthy environments: mercury exposure and health impacts among individuals in the artisanal and small-scale gold mining (ASGM) community. Geneva: WHO; 2013.

[Arabic, Chinese, English, French, Russian, Spanish]

Available at: [https://www.who.int/publications/i/item/mercury-exposure-and-health-impacts-among-individuals-in-the-artisanal-and-small-scale-gold-mining-\(asgm\)-community](https://www.who.int/publications/i/item/mercury-exposure-and-health-impacts-among-individuals-in-the-artisanal-and-small-scale-gold-mining-(asgm)-community)

Resource type: Information note

Contents: Mercury is used in gold mining to extract gold from ore by forming amalgam – a mixture composed of approximately equal parts of mercury and gold. The amalgam is heated, evaporating the mercury from the mixture, leaving the gold. This method of gold extraction is used in the ASGM community because it is cheaper than most alternative methods, can be used by one person independently, and is quick and easy. On a global basis, ASGM is responsible for approximately 37% of mercury emissions and is the largest source of air and water mercury pollution. Mercury vapours in the air around amalgam burning sites can be alarmingly high and almost always exceed the WHO limit for public exposure of 1.0 µg/m³. These exposures affect not only ASGM workers but also those in the communities surrounding the processing centres. The vaporized mercury eventually settles in soil and the sediment of lakes, rivers, bays and oceans and is transformed by anaerobic organisms into methylmercury. In water bodies, the methylmercury is absorbed by phytoplankton and ingested by zooplankton and fish, thereby contaminating the food chain. It especially accumulates in long-lived predatory species, including shark and swordfish.

Articles



Gibb H, O’Leary KG. Mercury exposure and health impacts among individuals in the artisanal and small-scale gold mining community: a comprehensive review. Environmental Health Perspectives. 2014;122(7):667–72.

[English]

Available at: <https://doi.org/10.1289/ehp.1307864>

Resource type: Journal article

Contents: This review, commissioned by WHO, evaluated the literature regarding the health effects of mercury among those working or living near 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 and 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 WHO health guidance values and that national public health strategies on ASGM, as required by the Minamata Convention, should be implemented immediately.

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.

Articles



Hydrogen cyanide and cyanides: human health aspects. CICAD 61. Geneva: WHO; 2004.

[English; summary in French, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/42942>

Resource type: Report

Contents: This WHO/International Programme on Chemical Safety (IPCS) Concise International Chemical Assessment Document (CICAD) provides a summary of the relevant scientific information concerning the potential effects of cyanide and cyanides upon human health and the environment.

Articles



Tools

International Chemical Safety Cards (ICSCs) on cyanide compounds. Geneva: WHO; updated on a regular basis.

Resource type: International Chemical Safety Cards (ICSCs)

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

ICSC on cyanide available in numerous languages at: <https://www.ilo.org/dyn/icsc/showcard.home>

The following cards are available in English at:

Sodium cyanide

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=1118&p_version=2

Potassium cyanide

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0671&p_version=2

Calcium cyanide

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0407&p_version=2

Articles



Integrated Management of Adolescent and Adult Illness (IMAI) district clinician manual: hospital care for adolescents and adults. Geneva: WHO; 2011.

[English]

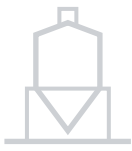
Available at: http://www.who.int/iris/bitstream/10665/77751/1/9789241548281_Vol1_eng.pdf

Resource 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).

Articles





Storage and waste

Guidance documents

Safe management of wastes from health-care activities, second edition. Geneva: WHO; 2014.

[English, Persian]

Available at: <https://apps.who.int/iris/handle/10665/85349>

Summary [English, French, Russian] available at: <https://apps.who.int/iris/handle/10665/259491>

Resource type: Guidance document

Contents: This handbook provides comprehensive guidance on safe, efficient and environmentally sound methods for the handling and disposal of health care wastes in normal situations and emergencies. Future issues, such as climate change and the changing patterns of diseases and their impacts on health care waste management, are also discussed.

For health care settings in which resources are severely limited, the handbook pays particular attention to basic processes and technologies that are not only safe but also affordable, sustainable and culturally appropriate. The guide is aimed at public health managers and policy-makers, hospital managers, environmental health professionals, and all administrators with an interest in and responsibility for waste management. Its scope is such that it will find application in developing and developed countries alike.

Articles



Cleanup, storage, and transport of mercury waste from healthcare facilities. United Nations Development Programme (UNDP) and Global Environment Facility (GEF); 2015.

[English]

Available at: http://www.undp.org/content/undp/en/home/librarypage/environment-energy/chemicals_management/cleanup-storage-and-transport-of-mercury-waste-from-healthcare-facilities/

Resource type: Guidance document

Contents: This document provides guidance from the UNDP/GEF (in cooperation with WHO and Health Care Without Harm) Global Healthcare Waste Project on the clean-up, temporary or intermediate storage, and transport of mercury waste from health care facilities. As health facilities phase out mercury devices, proper methods of storage and transport are needed. The guidance provided is relevant for contexts where no national norms and guidelines on this topic exist.

The guidance document deals with the following different forms of mercury waste from health care facilities:

- elemental mercury collected from broken mercury devices;
- undamaged mercury thermometers and sphygmomanometers;
- devices and equipment containing elemental mercury (gastrointestinal tubes such as Cantor tubes, oesophageal dilators, Miller-Abbott tubes and mercury switches);
- broken glassware contaminated with elemental mercury (specifically, broken thermometers and sphygmomanometers);
- fluorescent lamps (fluorescent tubes, compact fluorescent lights, ultraviolet germicidal lamps);
- dental amalgam.

Articles





Climate change, air, drinking water, and dietary intake

Guidance documents

WHO guidance for climate resilient and environmentally sustainable health care facilities. Geneva: WHO; 2020.

[English, French, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/335909>

Resource type: Guidance document

Contents: This WHO guidance document provides health professionals and health care facility managers with key tools and interventions to build resilience and improve environmental sustainability in health care facilities. It empowers health care facilities to anticipate, respond to, recover from and adapt to climate-related shocks and stresses, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it.

Mercury devices and products and mercury waste are addressed throughout the document, including targeted interventions to support countries in meeting their obligations under the Minamata Convention regarding mercury-containing devices and products used in health care facilities. The document is targeted at health care facility managers in particular, and the health workforce in general. It attempts to cover health care facilities of all sizes.

Articles



Guidelines for drinking-water quality, fourth edition, incorporating the first addendum. Geneva: WHO; 2017.

[English, French, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/254637>

Resource type: Guidance document

Contents: The fourth edition of the WHO *Guidelines for drinking-water quality* builds on over 50 years of guidance by WHO on drinking-water quality, which has formed an authoritative basis for the setting of national regulations and standards for water safety in support of public health.

Chapter 8 addresses chemical aspects and includes guideline values for chemicals from industrial sources and human dwellings that are of health significance in drinking-water, and gives a guideline value of 6 µg/L (0.006 mg/L) for inorganic mercury.

It is the product of significant revisions to clarify and elaborate on ways of implementing its recommendations of contextual hazard identification and risk management through the establishment of health-based targets, catchment-to-consumer water safety plans and independent surveillance. This first addendum updates the fourth edition. Updates reflect new evidence and provide additional explanations to support better understanding and application of the guidance.

Articles



Air quality guidelines for Europe, second edition. Copenhagen: WHO Regional Office for Europe; 2000.

[English, Russian forthcoming]

Available at: <https://apps.who.int/iris/handle/10665/107335>

Resource type: Guidance document

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 international, national and local authorities on the process of risk assessment. In setting priorities for the compounds to be reviewed, the following criteria were applied: (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 and recommendations: 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.

Articles



WHO guidelines for indoor air quality: household fuel combustion. Geneva: WHO; 2014.

[English]

Available at: <https://apps.who.int/iris/handle/10665/141496>

Resource type: Guidance document

Contents: Although the matter is 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 and recommendations of most relevance to mercury include:

- Unprocessed coal should not be used as household fuel.
- Considering the opportunities for 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.

Articles



Health risks of heavy metals from long-range transboundary air pollution. Copenhagen: WHO Regional Office for Europe; 2007.

[English]

Available at: <https://apps.who.int/iris/handle/10665/107872>

Resource type: Report

Contents: This report reviews the sources, chemical properties and spatial distribution of environmental pollution with cadmium, lead and mercury caused by long-range transboundary air pollution, and evaluates the potential health risks in Europe.

Cadmium exposure is associated with kidney and bone damage. Cadmium has also been identified as a potential human carcinogen, causing lung cancer. Lead exposure has developmental and neurobehavioural effects on fetuses, infants and children, and elevates blood pressure in adults. Mercury is also toxic in the elemental and inorganic forms, but the main concern is associated with the organic compounds, especially methylmercury, that accumulate in the food chain, the main route of human exposure.

Exposure to these metals through long-range transboundary air pollution affects even the most remote regions.

Articles



Safety evaluation of certain contaminants in food, prepared by the seventy-second meeting of the Joint FAO/WHO Expert Committee on Food Additives. Geneva: WHO; 2010.

[English]

Available at: <https://apps.who.int/iris/handle/10665/44520>

Resource type: Report

Contents: 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 (pages 55–63).

Conclusions and recommendations: JECFA established a provisional tolerable weekly intake (PTWI) for inorganic mercury of 4 µg/kg body weight, applicable to dietary exposure to total mercury from foods other than fish and shellfish. The PTWI for methylmercury (maternal intake to protect the foetus) is 1.6 µg/kg body weight, applicable to dietary exposure from fish and shellfish.

Articles



Joint FAO/WHO expert consultation on the risks and benefits of fish consumption, Rome, 25–29 January 2010. Rome and Geneva: Food and Agriculture Organization of the United Nations (FAO) and WHO; 2010.

[English]

Available at: <https://apps.who.int/iris/handle/10665/44666>

Resource type: Report

Contents: This report 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 and recommendations: The following conclusions and recommendations were made related 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).
- 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.

Articles





Biomonitoring

Guidance documents

Assessment of prenatal exposure to mercury: human biomonitoring survey: the first survey protocol: A tool for developing national protocols. Copenhagen: WHO Regional Office for Europe; 2018.

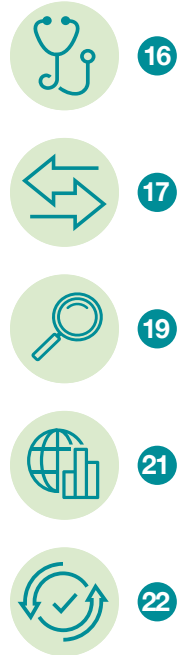
[English, French, Russian, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/334181>

Resource type: Guidance document

Contents: This guidance document describes the design of a survey for assessment of prenatal exposure to mercury using human biomonitoring. The selection of target populations and biological matrix, planning of the survey, recruitment and fieldwork, data management and communication, community involvement strategy and ethical considerations are addressed in the protocol. An informed consent form, an eligibility screening form and a questionnaire for collecting epidemiological information are also included in the protocol. The protocol was used to guide pilot surveys for assessment of prenatal exposure to mercury in China, Ghana, India, Kyrgyzstan, Mongolia and the Russian Federation, and can be applied for mercury human biomonitoring surveys globally. The protocol has been approved by the WHO Research Ethics Review Committee.

Articles



Assessment of prenatal exposure to mercury: standard operating procedures. Copenhagen: WHO Regional Office for Europe; 2018.

[English, French, Russian, Spanish]

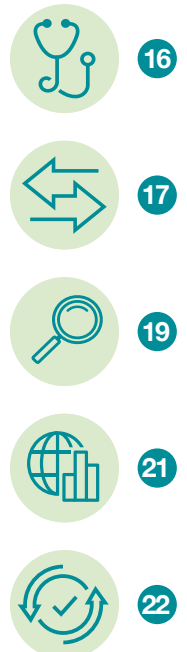
Available at: <https://apps.who.int/iris/handle/10665/332161>

Resource type: Standard operating procedures

Contents: The organization of a human biomonitoring survey is a complex process involving professionals with different technical skills, including epidemiologists, analytical chemists, toxicologists, statisticians, physicians and communication specialists. The WHO standard operating procedures for assessment of prenatal exposure to mercury describe the sampling and analysis of total mercury in blood, urine and scalp hair. The package includes the following procedures:

- a quality control programme for mercury human biomonitoring (defines an effective system for performing quality control activities to ensure the reliability of mercury human biomonitoring results, with activities focused on the preanalytical and analytical stages);
- standard operating procedures for assessment of mercury in human scalp hair (includes sampling, analysis of total mercury, interpretation of results);
- standard operating procedures for assessment of mercury in urine (includes sampling, analysis of total mercury, interpretation of results, and procedures for analysis of creatinine in urine);
- standard operating procedures for determination of total mercury in hair, blood and urine by the alternative method.

Articles



Basu N, Horvat M, Evers DC, Zastenskaya I, Weihe P, Tempowski J. A state-of-the-science review of mercury biomarkers in human populations worldwide between 2000 and 2018. Environmental Health Perspectives. 2018;126(10):106001. doi:10.1289/EHP3904.

[English]

Available at: <https://doi.org/10.1289/EHP3904>

Resource type: Journal article

Contents: The study aimed to increase worldwide understanding of human exposures to mercury by collecting, collating and analysing mercury concentrations in biomarker samples reported in the published scientific literature. This article formed the basis of the chapter on levels of mercury in humans in UNEP’s 2018 Global Mercury Assessment (Available at: <https://www.unep.org/resources/publication/global-mercury-assessment-2018>).

Conclusions: This review suggests that all populations worldwide are exposed to some amount of mercury and that there is great variability in exposure within and across countries and regions. There remain many geographical regions and subpopulations with limited data, thus hindering evidence-based decision-making. This type of information is critical in helping understand exposures, particularly in light of certain stipulations in the Minamata Convention on Mercury.

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(See also Human biomonitoring in the context of artisanal and small-scale gold mining: ethical and scientific principles. Geneva: WHO; 2021 under “Artisanal and small-scale gold mining (ASGM)”)

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Methodologies for estimating exposure and health impacts

Guidance documents

Mercury: assessing the environmental burden of disease at national and local levels. Geneva: WHO; 2008.

[English, Spanish]

Available at: <https://apps.who.int/iris/handle/10665/43875>

Resource type: Report

Contents: This report provides a review of the health effects from a number of mercury compounds, and methods for estimating the disease burden for methylmercury for several populations. The report present basic steps for estimating the number of disability-adjusted life-years (DALYs) from exposure to methylmercury, 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 and 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. The report identified research needs and recommendations on DALYs and concluded 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.

(See also UNEP mercury inventory toolkit webpage).

Available at: <https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/mercury/mercury-inventory-toolkit>

Articles



Guidance for identifying populations at risk from mercury exposure. Geneva: WHO and UNEP; 2008.

[English]

Available at: [https://wedocs.unep.org/bitstream/handle/20.500.11822/11786/](https://wedocs.unep.org/bitstream/handle/20.500.11822/11786/IdentifyingPopnatRiskExposuretoMercury_2008Web.pdf?sequence=1&isAllowed=y)

IdentifyingPopnatRiskExposuretoMercury_2008Web.pdf?sequence=1&isAllowed=y

Executive summary [Arabic, Chinese, English, French, Russian, Spanish]

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

Resource type: Guidance document

Contents: This document provides guidance to help governments and other organizations identify populations potentially at risk due to exposure to mercury. It focuses on the four steps of the risk assessment process, namely hazard identification, hazard characterization (including dose-response assessment), exposure assessment and risk characterization. However, exposure assessment is given the most emphasis. The information generated from these assessments can help governments and other organizations determine priorities for possible interventions to decrease exposure of these populations. The guide includes an overview of assessments of mercury exposure for some specific exposure scenarios. It can be used as a reference for conducting research or investigations regarding mercury exposure.

Conclusions and recommendations: 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.

Articles



Minamata initial assessment report: suggested structure and contents. UNDP in collaboration with the Inter-Organization Programme for the Sound Management of Chemicals (IOMC), including WHO; 2020.

[English]

Available at: https://www.undp.org/content/undp/en/home/librarypage/environment-energy/chemicals_management/undp-minamata-initial-assessment-guidance-.html

Resource type: Guidance document

Contents: These guidelines stipulate the minimum requirements of the components that a Minamata initial assessment (MIA) is to contain, and provide insight into the type of information and data that would be generated from the implementation of an MIA project. This document is considered a living document. It is updated and improved regularly following feedback and experiences from countries that have prepared their MIA reports.

Articles



Country example

Minamata initial assessment – health component in West Africa: a summary of the health impact assessment undertaken in six West African countries as part of the Minamata Convention pre-ratification process. WHO Regional Office for Africa, United Nations Industrial Development Organization, and Global Environment Facility; 2018.

[English]

Available at: <https://apps.who.int/iris/handle/10665/274314>

Resource type: Report

Contents: The document presents a summary of the health impact assessment undertaken in six West African countries as part of the Minamata Convention pre-ratification process.



Risk assessment information and health and safety information for workers

Guidance documents

Children's exposure to mercury compounds. Geneva: WHO; 2010.

[English]

Available at: <https://apps.who.int/iris/handle/10665/44445>

Resource type: Guidance document

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

Conclusions and recommendations: Children's exposure to mercury poses a significant threat to their healthy development. The main sources of mercury in the environment result from anthropogenic activity (for example, industrial processes and dietary intake). Children are overall more vulnerable than adults to mercury exposure and more susceptible to its health effects. The fetus is particularly vulnerable due to ongoing brain and organ development in utero. 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 sectors (for example, alternatives to mercury-containing thermometers and sphygmomanometers).

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Fisher JF, World Health Organization and International Programme on Chemical Safety. Elemental mercury and inorganic mercury compounds: human health aspects. Geneva: WHO; 2003.

[English, summary in French and Spanish]

Available at: <https://apps.who.int/iris/handle/10665/42607>

Resource type: Concise International Chemical Assessment Document

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

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Tools

International Chemical Safety Cards (ICSCs) on a number of mercury compounds. Geneva: WHO and International Labour Organization; updated on a regular basis.

Resource type: International Chemical Safety Cards

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

ICSCs on mercury compounds are available in Chinese, English, Finnish, French, Hebrew, Hungarian, Italian, Japanese, Polish, Russian and Spanish:

<https://www.ilo.org/dyn/icsc/showcard.home>

The following cards are available in English at:

Mercury:

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0056&p_version=2

Phenylmercuric acetate:

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0540&p_version=2

Phenylmercuric nitrate:

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0541&p_version=2

Mercuric acetate:

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0978&p_version=2

Mercuric chloride:

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0979&p_version=2

Mercuric nitrate:

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0980&p_version=2

Mercuric oxide:

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0981&p_version=2

Mercuric sulfate:

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0982&p_version=2

Mercurous chloride:

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=0984&p_version=2

Dimethyl mercury:

https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=1304&p_version=2

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Training materials

Children's environmental health: training modules and instructions for health care providers. Geneva: WHO; 2020.

[English, Portuguese]

Available at: <https://www.who.int/teams/environment-climate-change-and-health/settings-populations/children/capacity-building/training-modules?>

Resource type: Training modules

Contents: There are 10 training modules and accompanying leaflets, instructions and evaluations. Topics covered include:

- why children?
- children are not little adults
- e-waste
- chemicals
- paediatric environmental history
- mercury
- neurodevelopmental disorders
- developmental and environmental origins of adult disease.

WHO is working on enabling those in the front line – the health professionals dealing with the health of children and adolescents – to recognize and assess diseases linked to, or triggered by, environmental factors. Paediatricians, family doctors, nurses, and primary and other health care workers need to be trained on the relationship between children's health and the environment through the use of harmonized training materials, which can be tailored to the specific needs of countries and professional groups.

WHO, in collaboration with international experts, has developed the WHO training package on children's environmental health for health care providers. The package consists of a collection of modules of internationally harmonized information and peer-reviewed materials to enable health care workers to be trained and, further, to become trainers of their peers and colleagues. The modules include extensive notes and references, case studies and self-evaluation tools, backed up by manuals and guidance documents. These materials are used in training courses and are sent in response to online requests by WHO.

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Mercury effects in human health and the environment and considerations under the Minamata Convention. Washington (DC): Pan American Health Organization (PAHO); 2019.

[English]

Available at: <https://www.campusvirtualsp.org/en/course/mercury-effects-human-health-and-environment-and-considerations-under-minamata-convention>

[Spanish]

Available at: <https://www.campusvirtualsp.org/es/curso/los-efectos-del-mercurio-en-la-salud-y-en-el-ambiente-y-los-aspectos-considerados-bajo-el>

Resource type: Virtual training course

Contents: This PAHO/WHO virtual course explores the different forms of mercury and its compounds with their respective sources, environmental distributions, toxicological aspects and prevention measures. It aims to develop skills in public health and chemical safety professionals to better understand and manage issues regarding the sources of mercury exposure and how to act with preventive measures. In addition, it introduces the Minamata Convention and World Health Assembly resolution WHA67.11 (2014), and their considerations on public health aspects of mercury.

Unit 1: Mercury as a global pollutant of public health concern

Unit 2: Toxicology of mercury and its compounds

Unit 3: Use of mercury-added products in health services

Unit 4: Populations exposed to mercury: cases of ASGM and skin lightening soaps and creams

Unit 5: Safe fish consumption

Unit 6: Exchanging information and creating knowledge

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Training modules in health-care waste management. WHO/UNDP/GEF Global Project on Demonstrating and Promoting Best Techniques and Practices for Reducing Health-Care Waste to Avoid Environmental Releases of Dioxins and Mercury. UNDP, GEF, WHO, Health Care Without Harm and University of Illinois School of Public Health; 2012.

[English]

Available at: <https://greenhealthcarewaste.org/wp-content/uploads/2020/12/HCWM-Training-Modules-Slides-Instructor-Student-Guides.7z>

Resource type: Training modules

Contents: Training modules on good practices in health care waste management have been created as part of the Global Healthcare Waste Project jointly sponsored by UNDP, GEF, WHO, Health Care Without Harm and the University of Illinois School of Public Health. Links are provided to the individual modules covering all aspects of waste management activities from identification and classification of wastes to considerations guiding their safe disposal using both non-incineration and incineration strategies. Modules 9 and 10 on the classification and segregation of health care waste also have instructor and student guidance documents.

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Training video on mercury waste in hospitals. Health Care Without Harm; 2011.

[English, Spanish]

Available at: <https://noharm-global.org/articles/news/global/new-training-video-mercury-waste-hospitals>

Resource type: Video

Contents: This video can be used as part of a training programme for hospitals around the world working to eliminate mercury and safely manage and store mercury waste while governments search for a more permanent solution. The video is based on the Global Healthcare Waste Project mercury waste management guidelines.

The video was developed in support of a WHO/Health Care Without Harm Global Mercury-Free Initiative goal of developing replicable models of sound mercury waste management in the health sector. It is available in Spanish and English and is adaptable to other languages. It is targeted for health care workers, and is disseminated and used in low- and middle-income countries.



Webpages

WHO/IPCS home page.

[English]

Available at: <http://www.who.int/ipcs/en/>

Contents: This WHO webpage displays the work of the WHO International Programme on Chemical Safety (IPCS), which aims to establish the scientific basis for the sound management of chemicals, and to strengthen national capabilities and capacities for chemical safety.

WHO/IPCS: 10 chemicals of major public health concern – mercury page.

[Arabic, Chinese, English, French, Russian, Spanish]

Available at: <https://www.who.int/teams/environment-climate-change-and-health/chemical-safety-and-health/health-impacts/chemicals/mercury>

Contents: This WHO webpage displays WHO-produced publications related to mercury.

Poisons centres.

[Arabic, Chinese, English, French, Russian, Spanish]

Available at: <https://www.who.int/teams/environment-climate-change-and-health/chemical-safety-and-health/incidents-poisonings/poisons-centres>

Contents: This WHO 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 centres.

Minamata Convention on Mercury.

[English, French, Spanish]

Available at: <http://www.mercuryconvention.org/News/fromtheConvention/tabid/3430/language/en-US/Default.aspx>

Contents: The official website of the Secretariat of the Minamata Convention on Mercury provides a comprehensive repository of information related to the Convention. It contains all information about the Convention, meetings, up-to-date numbers of signatories and ratifications, specific information about countries and implementation of the Convention, as well as a wealth of resources and news, such as reports on the progress countries are making in implementing the Convention and information about indicators for effectiveness evaluation, and much more.

Minamata Convention repository for MIAs.

[English, French, Spanish]

Available at: <http://www.mercuryconvention.org/Countries/Parties/MinamataInitialAssessments/tabid/6166/language/en-US/Default.aspx>

Contents: This website provides the final Minamata Convention initial assessment (MIA) project reports as submitted to the Minamata Convention Secretariat. Development of the MIA is one of the enabling activities supported by the GEF for developing countries and countries with economies in transition. UNDP has developed a guidance document on the development of MIA reports, in cooperation with the intergovernmental organizations participating in the IOMC and the Minamata Convention Secretariat. Final project reports are made available at this website as submitted to the Secretariat.

Section 4. Additional resources relevant to the Minamata Convention on Mercury

IOMC Toolbox for decision making in chemicals management. Inter-Organization Programme for the Sound Management of Chemicals (IOMC); updated on a regular basis.

[English, French, Spanish]

Available at: <https://www.iomctoolbox.org/>

Resource type: Toolbox

Contents: The Inter-Organization Programme for the Sound Management of Chemicals (IOMC) is a cooperative agreement among nine international organizations: FAO, ILO, UNDP, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD.

The IOMC internet-based *Toolbox for decision making in chemicals management* is aimed at countries that wish to address specific national issues regarding chemicals management. The resources on mercury from the nine partner organizations are pooled in the toolbox, eliminating the need to search the organizations' individual websites.

The toolbox is a problem-solving tool that enables countries to identify the most appropriate and efficient actions to address specific national problems related to chemicals management. It identifies the available IOMC resources that will help the country address the identified national problems or objectives. Special focus is given to identifying simple cost-effective solutions to national chemicals management issues.

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Mercury wastes – Basel Convention.

[English]

Available at: www.basel.int

The official website of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal provides a comprehensive repository of information related to mercury waste. The website contains information and guidelines related to the environmentally sound management of wastes consisting of elemental mercury and wastes containing or contaminated with mercury, procedures, implementation of the Convention, information from countries and partners, and much more.

WHO advice on products excluded from the Minamata Convention Annex A on mercury-added products

Report of the global advisory committee on vaccine safety. Geneva: WHO; 2012.

[English, French]

Available at: <https://apps.who.int/iris/handle/10665/242026>

The report, published in the WHO Weekly Epidemiological Record on 27 July 2012, includes information on thiomersal in vaccines.

WHO traditional, complementary and integrative medicine webpage.

[English]

Available at: <http://www.who.int/medicines/areas/traditional/en/>

The webpage includes information on use of mercury in traditional, complementary and integrative medicines.

WHO guidelines for assessing quality of herbal medicines with reference to contaminants and residues. Geneva: WHO; 2007.

[Chinese, English]

Available at: <https://apps.who.int/iris/handle/10665/43510>

Safety issues in the preparation of homeopathic medicines. Geneva: WHO; 2010.

[English]

Available at: <https://apps.who.int/iris/handle/10665/44238>

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