

Institutional Capacity Assessment Report

Mozambique

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

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Executive summary

Artisanal and small-scale gold mining (ASGM) in Mozambique poses serious health hazards for miners and communities. The World Health Organization (WHO) has been requested to assist the Ministry of Health of Mozambique (MISAU) to develop a Public Health Strategy as part of the National Action Plan (NAP) required under Article 7 of the Minamata Convention.

This report presents an assessment of the institutional readiness to detect, prevent and address health issues associated with ASGM and aims to provide an input to the Ministry of Health (MISAU) to define key priorities in the Public Health Strategy on ASGM. Based on the consultation of representatives of MISAU as well as various other ministries and stakeholder groups concerned with ASGM, the report assesses institutional capacity strengths and challenges in the public health sector and identifies key stakeholders relevant for the development and implementation of a public health strategy for the ASGM sector.

The assessment was guided by the following questions:

1. To what extent are existing regulations, policies, structures and processes in place at the national and sub-national levels to respond to ASGM health-related issues?
2. Are the current institutional capacities at MISAU available sufficient to deal with health issues in the context of ASGM?
3. What are the strengths and opportunities to enhance existing capacities and what are the challenges that need to be addressed?

The methodological framework consists of three complementary components: the operationalization of the concept of 'institution' (institutional dimensions), the clustering of health relevant topics (priority areas), and the establishment of indicators that allow the assessment of each specific institutional component per content-topic (topical indicators).

The institutional dimensions are operationalized at three levels: policy and regulatory level, organizational structure and resources, and procedural setup. The next step in the operationalization of the assessment consists of clustering ASGM-related health issues into four priority areas, following the WHO guidelines.¹ The priority areas are:

- Health hazards in ASGM communities
- Occupational health hazards related to ASGM
- Environmental hazards related to ASGM that have implications for health
- Chemical management related to ASGM

The last element of the methodological framework consists of indicators describing relevant institutional characteristics for each priority area. The institutional characteristics underlying each indicator show to what extent the characteristics are developed or present in the institutional and organizational setup. In order to visualize challenges, we have created spider diagrams that are intended to be read in conjunction with the text explaining the findings in more detail. The results presented under the different indicators serve as starting points for strengthening institutional capacity and provide a sound basis for prioritizing action.

Relevant findings of the assessment show that in Mozambique ASGM takes place in remote rural areas, where access to primary health care facilities is limited. Available facilities lack the necessary technical and laboratory equipment to address ASGM-related health conditions, and measures to prevent ASGM health hazards are largely absent. Legislation concerning environmental health hazards and occupational diseases for mining activities exist. However, they are drafted for formalized industrial mines while most gold miners work in the informal sector, where these regulations do not always fit and are rarely enforced. In spite of the fact that the use of mercury in artisanal mining operations is banned by law, mercury is extensively used in ASGM.

¹ World Health Organization, 2016. Technical paper #1: Environmental and occupational health hazards associated with artisanal and small-scale gold mining. WHO Press: Geneva. <http://apps.who.int/iris/bitstream/10665/247195/1/9789241510271-eng.pdf> (visited 28 November 2017).

MISAU has several important institutional capacity strengths to build upon:

- There are general regulations in place concerning chemical management, health hazards, occupational health hazards and environmental hazards related to ASGM.
- There are specific policies in place to address nutritional deficits and biological hazards that affect ASGM communities, such as cholera, malaria, dengue fever, sexually transmitted infections (STI) and HIV.
- MISAU's units can be crucial supporting and conducting ASGM health-related policies (e.g. Environmental Protection and Hygiene at the Department of Environmental Health).
- MISAU has laboratories at general, provincial and district hospitals that could eventually diagnose ASGM-related health hazards and health conditions.
- MISAU implements strategies, mechanisms, programs, plans and campaigns that are currently addressed to issues unrelated to ASGM, but could eventually tackle them.
- MISAU conducts programs that address ASGM specific living conditions (e.g. HIV-AIDS, cholera, malaria and chronic obstructive pulmonary disease).
- MISAU and other ministries have implemented programs that can be expanded and enhanced to create preventive mechanisms to address occupational health hazards in the ASGM sector.

At the same time, MISAU faces institutional capacity challenges in extending services to ASGM communities:

- There is no regulation on which public health care institution is explicitly mandated to prevent, detect, monitor or treat populations affected by the exposure to mercury or mercury compounds. A treatment protocol to handle cases of mercury or cyanide intoxication is lacking.
 - Health care facilities at the national, provincial and district levels do not have sufficient specialists, including physicians, nurses and health technicians, to deal with ASGM-related health issues, such as occupational medicine, toxicology or environmental health.
- A division of functions and responsibilities at the national and sub-national levels of the National Health Service is not available. Moreover, according to information provided by the Head of the Department of Environmental Health in 2017, the Department of Environmental Health at MISAU does not have a specific focus on environmental health hazards related to ASGM.
 - There is no technical and laboratory equipment to diagnose, monitor or treat ASGM-related health conditions.
 - There are no training programs in place for health staff to support detection, monitoring and surveillance of chemical hazards related to ASGM.
 - There are no mechanisms in place to address ASGM-related health emergencies, such as chemical spills or accidents, and prevention mechanisms for chemical and other health hazards related to ASGM are lacking.
 - To address challenges and enhance strengths at the ministry level to inform the Public Health Strategy of the NAP, it is recommended that MISAU:
 - Increases efforts to get accurate information on the health status of ASGM communities in general (disaggregated by age and sex) at the primary level.
 - Identifies at its organizational level the divisions in charge of addressing ASGM-related health issues, and enhances and expands capacities for laboratory services in detection of ASGM-related health hazards.
 - Creates institutional capacities for chemical incident response and management of chemical hazards related to ASGM.
 - Considers the technical capacity a top priority, developing regular and effective training programs on ASGM health hazards for health care workers, specially nurses and community health workers, at the national and sub-national levels.
 - Develops awareness-raising activities at the community level through primary health care facilities on mercury and other ASGM-related health hazards.

1 Introduction



“ Miners and surrounding communities are exposed to ASGM-related health and environmental hazards that have well-understood implications for their health and well-being and also for the environment.

”

Introduction

The Government of Mozambique signed the Minamata Convention on 10 October 2013 and is currently in the process of ratifying it. The main objective of the Convention is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. To achieve this goal, the Convention urges signatory countries with more than insignificant ASGM activities in their territory to develop a National Action Plan (NAP) on artisanal and small-scale gold mining (ASGM) no later than three years after entry into force of the Convention for it. Regarding public health, the NAP is expected to include, inter alia, ASGM specific health data, training for health-care workers and awareness-raising through health facilities; strategies to prevent the exposure of vulnerable populations; and strategies for providing information to artisanal and small-scale gold miners and affected communities.

ASGM is practiced extensively in Mozambique. In 2012, the Geological Survey of Denmark and Greenland (GEUS) reported ASGM in at least 10 of the 11 Mozambican provinces, although the main areas identified are located in the central and northern provinces of Cabo Delgado, Manica, Nampula, Niassa, Sofala, Tete and Zambezia (GEUS 2012).

Miners and surrounding communities are exposed to ASGM-related health and environmental hazards that have well-understood implications for the health and well-being and also for the environment.² ASGM-related health hazards are categorized as chemical, biological, biomechanical, physical and psychosocial. Environmental hazards that also affect miners and communities' health include land degradation, mercury emissions/pollution, siltation, erosion and water contamination.³

Men, women and children working in ASGM are exposed to elemental mercury through direct contact, spills and inhalation of mercury vapour during amalgamation. ASGM communities are also in contact with released mercury that persists in the environment, specifically in the air, water, sediments, soil and biota in the form of methylmercury, the most toxic form of mercury that enters the body mainly through fish consumption. Mercury analyzer (Lumex) breath tests of miners and community members in Manica, central Mozambique, showed pre-retort use average mercury levels of around 8.23 µg/m³, about eight times the WHO-recommended maximum levels of Hg (Spiegel et al. 2006). More recent data from Mozambique do not exist.

According to GEUS (2012), nearly all ASGM communities in Mozambique are located in chronically impoverished rural areas. Access to clean water and basic health care is limited and levels of sanitation are inadequate. These problems are exacerbated in cases in which miners gather around a newly discovered "rush area". These sites tend to be less organized and have a higher rate of child and women labour involved. Women miners are usually accompanied by their babies.

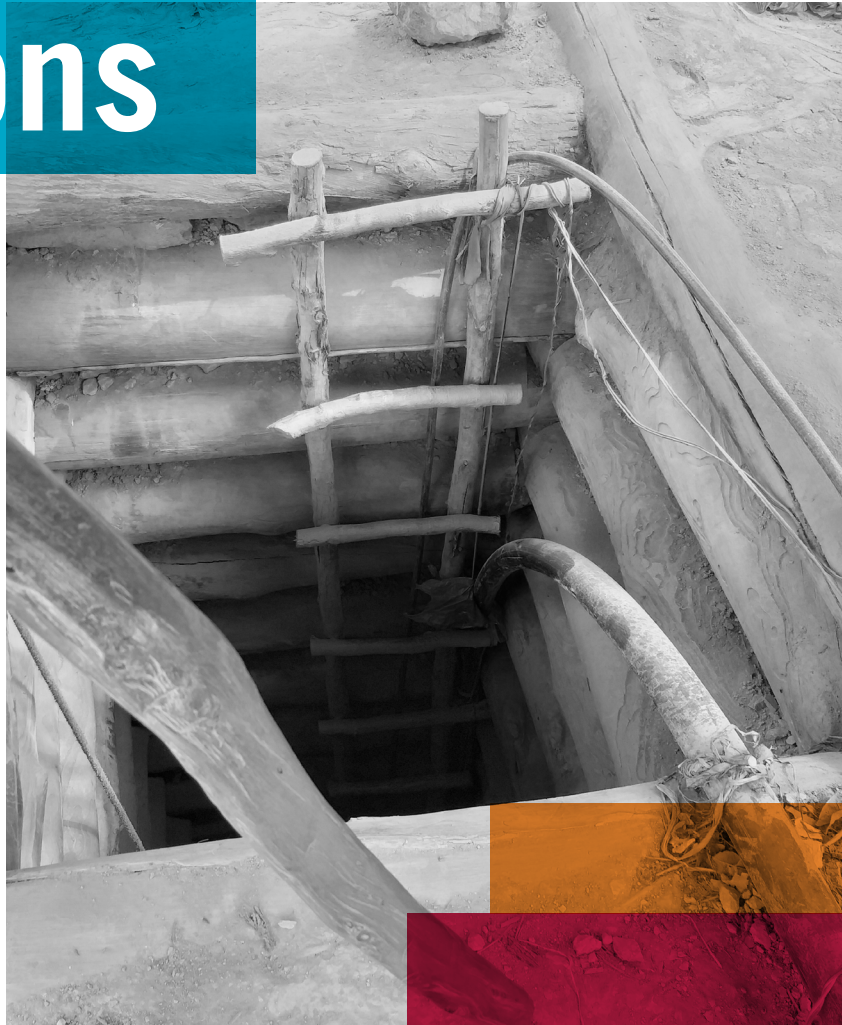
In spite of the health hazards posed by ASGM, the sector is relevant in Mozambique. It is estimated that in 2009 ASGM was responsible for over 90% of the gold production in the country, involving at least 60,000 national and foreign miners, of which 30% were women and children (Shandro et al. 2009). The United States Geological Service (USGS) estimates that Mozambican total output of gold between 2007 and 2011 was 600-900 kilograms per year, although not more than 100-500 kilograms were officially reported.⁴

² World Health Organization, 2016. Technical paper #1: Environmental and occupational health hazards associated with artisanal and small-scale gold mining. Who Press: Geneva. <http://apps.who.int/iris/bitstream/10665/247195/1/9789241510271-eng.pdf> (visited 28 November 2017).

³ Ibid.

⁴ For more details, visit <https://minerals.usgs.gov/minerals/pubs/country/africa.html#ma> (visited 6 June 2017).

2 Objective and questions



“ Inter-sectoral engagement between health and other relevant ministries and agencies, is seen to be essential for ensuring the effective implementation of measures to address the public health impacts of exposure to mercury in ASGM. ”

Objective and questions

This institutional capacity assessment has been carried out to inform the definition of priority areas to be included in the Public Health Strategy component of the Mozambican National Action Plan (NAP) on ASGM. The Public Health Strategy is aimed to address the exposure of ASGM miners and their communities to health hazards.

According to the guidance document,⁵ the public health strategy for ASGM is expected to address three key issues:

Health data collection.

Taking an integrated public health approach to data collection that is not limited to health data related to mercury, but covers the public health status of the community generally.

Training for health care workers.

They are often unaware of the effects of mercury and unable to recognize, diagnose and treat mercury poisoning. Health systems should have treatment protocols in place for mercury-related health effects, including exposure to mercury in ASGM.

Awareness-raising and education among miners.

Existing health care structures that are already integrated into and trusted by communities can provide a readily-available platform for awareness-raising about mercury and its dangers.

In addition, effective inter-sectoral engagement, between health and other relevant ministries and agencies, is seen to be essential for ensuring the effective implementation of measures to address the public health impacts of exposure to mercury in ASGM. It is similarly essential for ensuring that health issues are appropriately addressed as part of measures taken in other non-health areas.

This report presents the results of the institutional capacity assessment in light of the requirements for a ASGM-related public health strategy outlined above, i.e. the capacity that Mozambique and in particular the Ministry of Health has in place to detect, prevent and address health issues associated with ASGM, including mercury exposure. The main questions guiding this institutional capacity assessment are:

1. To what extent are existing regulations, policies, structures and processes in place at the national and sub-national levels to respond to ASGM health-related issues?
2. Are the current institutional capacities at MISAU available to deal with health issues in the context of ASGM?
3. What are the strengths and opportunities to enhance existing capacities and what are the challenges that need to be addressed?

⁵ https://wedocs.unep.org/bitstream/handle/20.500.11822/11371/National_Action_Plan_draft_guidance_v12.pdf

3 Methodological framework



In this section:

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Methodological framework

The methodological framework consists of three complementary components. First, the operationalization of ‘institutions’ (institutional dimensions); second, the clustering of health

relevant topics (priority areas); third, indicators which allow the assessment of each specific institutional component per content-topic (topical indicators). The logic is depicted in Table 1.

Table 1: Logic of the methodological framework

Priority areas	Institutional dimensions		
	Policy and regulatory setup	Structure-level setup	Procedural setup
Health hazards in ASGM communities	Topical indicators (Chapter 1.1)	Topical indicators (Chapter 1.2)	Topical indicators (Chapter 1.3)
Occupational health hazards related to ASGM	Topical indicators (Chapter 2.1)	Topical indicators (Chapter 2.2)	Topical indicators (Chapter 2.3)
Environmental hazards related to ASGM that have implications for health	Topical indicators (Chapter 3.1)	Topical indicators (Chapter 3.2)	Topical indicators (Chapter 3.3)
Chemical management related to ASGM	Topical indicators (Chapter 4.1)	Topical indicators (Chapter 4.2)	Topical indicators (Chapter 4.3)

Institutional dimensions: measuring institutional capacity

The starting point is to understand what is meant by the term ‘capacity’ and ‘institutions’.

For capacity, many definitions are available from various authoritative sources. Here, we refer to a United Nations definition which understands capacity as the ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner (UNDP 2007).

‘Institution’ is a broad term that is understood to comprise both the formal and informal ‘rules of the

game’ that structure human interaction in a society as well as the enforcement characteristics of both (North 1990).

When operationalizing the term ‘institutions’ to render it accessible for assessment of a specific institutional scope or issue domain, the concept is typically disentangled into the policy and regulatory level, organizational structure and resources, and the specific procedural setup. For our case of assessing the institutional readiness to address ASGM related health issues it is useful to assess three complementary levels separately.

1. Policy and regulatory setup.

The institutional aspect includes both the laws and regulations which establish an entity's mandate and define its responsibilities, duties, obligations and powers. Some topics addressed in this dimension are: regulations and policies for chemical hazards, such as mercury, cyanide, chemicals contained in dust and toxic gases.

2. Structure-level setup.

The structural dimension looks at organizational aspects, i.e. how are organizations set up and structured to enable them to fulfill their mandate and put objectives into action. This also includes questions of resources and staffing (i.e. sufficient number of staff with adequate capabilities including their knowledge, skills and attitudes). Some topics addressed in this dimension are the responsibilities of organizational units and staff, availability of primary health facilities and hospitals and technical and laboratory equipment to diagnose, monitor and treat ASGM-related health conditions.

3. Procedural setup.

The procedural requirements determine the way in which critical functions are carried out, including strategic and business planning, managing work flow, communication, budgeting and financial control, reporting, monitoring and performance management, and the recruitment, remuneration, professional development and retention of staff. It further includes the ways in which working relationships are managed between ministries, between ministries and other public bodies and between different levels of central and decentralized government, and their arrangements for the coordination of activities. Some of the topics addressed in this dimension are mechanisms for responding to health emergencies, preventive mechanisms to address health hazards related to ASGM, and training programs for health staff to detect, monitor and treat health conditions related to ASGM.

Priority areas: linking capacity with topical issues

As second step in the operationalization of the assessment we cluster ASGM-related health issues into four priority areas. In order to align with existing WHO issue clusters, we follow the WHO Technical Paper #1 on environmental and occupational health hazards associated with ASGM.⁶ According to this document, the priority areas are:

Health hazards in ASGM communities,

including chemical hazards (mercury, cyanide, chemicals contained in dust and toxic gases), biological hazards (cholera, malaria, dengue fever, STI and HIV), and psychosocial hazards (drugs, alcohol, violence and nutritional deficits).

⁶ World Health Organization, 2016. Technical paper #1: Environmental and occupational health hazards associated with ASGM. WHO Press: Geneva. <http://apps.who.int/iris/bitstream/10665/247195/1/9789241510271-eng.pdf> (visited 28 November 2017).



Occupational health hazards related to ASGM,

including chemical hazards (mercury, cyanide, chemicals contained in dust, toxic gases), and biomechanical and physical hazards (musculoskeletal disorders, overexertion, physical trauma, noise, heat and humidity).

Environmental hazards related to ASGM that have implications for health,

including land degradation, mercury emissions/pollution, siltation, erosion and water contamination.

Chemical management related to ASGM,

including mercury, cyanide, chemicals contained in dust, toxic gases.

Topical indicators: Characteristics of relevant institutional dimensions

The third and final element of the methodological framework consists of indicators describing relevant institutional characteristics for each priority area. They are derived from institutional and organizational theory. The institutional characteristics underlying each indicator are the guiding questions for conducting the assessment.

First, they serve as a heuristic tool to establish to what extent those characteristics are developed or present in the institutional and organizational setup. Typically, the wanted characteristics are present to different degrees, some may be fully developed, some may be rudimentarily available while others may be fully absent. In order to visualize this gap analysis, we have coded the findings on an ordinal scale from 1 to 5, as shown in Table 3 and

represented in one spider diagram for each priority area. Those spider diagrams are intended to be read in conjunction with the text explaining the findings.

Second, the results presented under the different indicators serve as starting points for strengthening institutional capacity. They highlight possible entry points, point to potential synergies between organizational units within and across ministries, and provide a sound basis for prioritizing action.

Table 2 presents the methodological framework applied, linking priority areas, institutional dimensions, and topical indicators.

Table 2: General framework: priority areas, dimensions and topics

Priority area	Institutional dimension	Topical indicator
1. Health hazards in ASGM communities	1.1 Regulatory and policy level	<p>1.1.1 Regulations and policies for chemical hazards, such as mercury, cyanide, chemicals contained in dust and toxic gases</p> <p>1.1.2 Regulations and policies for biological hazards such as cholera, malaria, dengue fever, STI, HIV</p> <p>1.1.3 Regulations and policies for psychosocial hazards such as drugs, alcohol, violence, nutritional deficits</p> <p>1.1.4 Regulations and policies for primary and referral health care provision</p>
	1.2 Structure level	<p>1.2.1 Organization and job responsibilities of key institution(s)</p> <p>1.2.2 Primary health facilities and hospitals</p> <p>1.2.3 Technical and laboratory equipment to diagnose, monitor and treat ASGM-related health conditions</p> <p>1.2.4 Knowledge resources to address ASGM issues</p>
	1.3 Process level	<p>1.3.1 Mechanisms for responding to health emergencies (e.g. chemical spills, disease outbreaks)</p> <p>1.3.2 Preventive mechanisms to address health hazards related to ASGM (e.g. chemical spills, disease outbreaks)</p> <p>1.3.3 Training programs for health staff to detect, monitor and treat health conditions related to ASGM</p> <p>1.3.4 Coordination mechanisms among ministries to address health hazards</p>
2. Occupational health hazards related to ASGM	2.1 Regulatory and policy level	<p>2.1.1 Regulations and policies for the following occupational health hazards in ASGM:</p> <ul style="list-style-type: none"> ■ chemical hazards (mercury, cyanide, chemicals contained in dust, toxic gases) ■ biomechanical and physical hazards (musculoskeletal disorders, overexertion, physical trauma, noise, heat and humidity)
	2.2 Structure level	<p>2.2.1 Organization and job responsibilities of key institution(s)</p> <p>2.2.2 Technical and laboratory equipment to diagnose, monitor and treat ASGM-related occupational health conditions (see also 1.2.3)</p> <p>2.2.3 Knowledge resources to address ASGM issues</p>
	2.3 Process level	<p>2.3.1 Mechanisms for responding to health emergencies in the workplace (e.g. chemical spills and accidents)</p> <p>2.3.2 Preventive mechanisms to address occupational health hazards in the workplace (e.g. chemical, biomechanical, physical)</p> <p>2.3.3 Coordination mechanisms among ministries to address occupational health hazards</p>

Priority area	Institutional dimension	Topical indicator
3. Environmental hazards related to ASGM that have implications for health	3.1 Regulatory and policy level	3.1.1 Regulations and policies for land degradation, mercury emissions/pollution, siltation, erosion, water contamination
	3.2 Structure level	3.2.1 Organization and job responsibilities of key institution(s) 3.2.2 Technical and laboratory equipment to assess, monitor and improve ASGM-related environmental issues 3.2.3 Knowledge resources to address ASGM issues
	3.3 Process level	3.3.1 Mechanisms for responding to environmental emergencies related to ASGM (e.g. mercury pollution, water contamination) 3.3.2 Preventive mechanisms to address environmental hazards related to ASGM (e.g. land degradation, mercury emissions/pollution, siltation, erosion, water contamination) 3.3.3 Training programs for staff to detect and monitor environmental hazards related to ASGM 3.3.4 Coordination mechanisms among ministries to address environmental hazards that have implications for health
4. Chemical management related to ASGM	4.1 Regulatory and policy level	4.1.1 Regulations and policies for chemical management
	4.2 Structure level	4.2.1 Organization and job responsibilities of key institution(s) 4.2.2 Technical and laboratory equipment to identify chemicals (mercury, cyanide, chemicals contained in dust, toxic gases) 4.2.3 Knowledge resources to address ASGM issues
	4.3 Process level	4.3.1 Mechanisms for responding to chemical emergencies 4.3.2 Preventive mechanisms to address chemical hazards 4.3.3 Coordination mechanisms among ministries to address chemical management

Table 3: Value labels used to code the findings on an ordinal scale

Score	Indicators
1	The capacity is <i>absent</i>
2	The capacity exists and it is <i>not available</i>
3	The capacity exists and it is <i>available to a low extent</i>
4	The capacity exists and it is <i>available to a fair extent</i>
5	The capacity exists and it is <i>available to a good extent</i>

Data sources: key informant interviews and document review

Based on the topical indicators, interview scripts were developed covering all priority areas and institutional dimensions. Questions in the interview scripts were aimed to understand to what extent:

1. Regulations and policies are in place and implemented
2. Relevant elements at the structure level are in place and available
3. Elements at the process level are in place and available

In the cases in which existing regulations, structures or processes exist partially or are not in place, the questions of the interview scripts addressed how they could be enhanced, adapted or expanded to accommodate and address ASGM related health issues. These findings are reported as well.

Fieldwork for this assessment took place in Maputo between 26 June and 7 July 2017. Semi-

structured interviews were conducted with 25 key informants in the Ministry of Health, Ministry of Mineral Resources and Energy, and Ministry of Land, Environment and Rural Development, the private sector (Impacto Environmental Projects Consultancy and Okeanus Environment Management Consultancy), the non-profit sector (Manhiça Research Health Centre and Medicus Mundi), and the United Nations Industrial Development Organization.

The document review consisted of the analysis of information gathered at public institutions, international organizations and non-governmental organizations. Relevant information gathered for the assessment includes laws, regulations, decrees, organic statutes, legal resolutions, programs, organizational charts, studies, private and public reports, national and international statistics, information from the census and academic papers. The documents were gathered both in print during fieldwork in Maputo and downloaded from the Internet (full list in references section).

Limitations

The main limitation of the assessment was the difficulty in getting access to information concerning the institutional capacities. Despite the fact that key informants were diligent in answering the interview questions, sometimes more than one unit or job position was responsible to fulfil the same function,

or it was unclear which unit or job position was in charge of a specific issue. Moreover, on occasion informants alluded to documents, regulations and policies that could not be found either online or at the ministries.

Structure of the report

This report has the following main sections: executive summary; introduction; objective and questions; methodological framework; findings, strengths and challenges; and recommendations.

The findings, strengths and challenges section is structured following priority areas, institutional dimensions and topical indicators (see Table 2). Main strengths and challenges are highlighted for each institutional dimension. For each priority

area, a radar chart is provided to facilitate the visualization of institutional capacities in place. In this section, we also report options and entry points for institutional capacity strengthening as they were mentioned/discovered during the interviews. The recommendations section is divided into recommendations at the institutional dimensions level and recommendations that specifically address the Public Health Strategy.

4 Findings, strengths and challenges



In this section:

Health hazards in ASGM communities

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Occupational health hazards related to ASGM

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Environmental hazards related to ASGM that have implications for health

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Chemical management related to ASGM

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Findings, strengths and challenges

This section presents a summary of the main findings obtained during the assessment process. Findings are structured into four priority areas:

1. Health hazards in ASGM communities
2. Occupational health hazards related to ASGM
3. Environmental hazards related to ASGM that have implications for health
4. Chemical management related to ASGM

Each priority area is addressed in three dimensions (regulatory and policy level, structure level and process level) and the implementation capacity findings are presented following the topics for every dimension.

Furthermore, this section identifies strengths and opportunities to enhance existing capacities and challenges that need to be addressed.

1. Health hazards in ASGM communities

1.1. Regulatory and policy level

1.1.1 Regulations and policies for chemical hazards such as mercury, cyanide, chemicals contained in dust and toxic gases

- According to interviewees and regulations found, no public health care institution is explicitly mandated to prevent, detect, monitor or treat populations affected by the exposure to mercury or mercury compounds.
- Mercury intoxication and health issues related to contact with cyanide, toxic gases and chemicals contained in dust (e.g. silicosis) are not included in the current epidemiological surveillance system nor in the health information system.

1.1.2 Regulations and policies for biological hazards such as cholera, malaria, dengue fever, STI and HIV

- Policies regarding ASGM specific living conditions include biological hazards affecting these communities. For instance, there are

specific policies for prevention and treatment of cholera, malaria, dengue fever, STI and HIV-AIDS. According to key interviewees these hazards are a major issue in areas where ASGM takes place.

1.1.3 Regulations and policies for psychosocial hazards such as drugs, alcohol, violence and nutritional deficits

- Interviewed authorities are aware that in ASGM communities an undetermined number of men, women and children are exposed to multiple health hazards, including drugs and alcohol abuse, violence and nutritional deficits. However, regulations and policies on these hazards were not found and key interviewees were unsure if they exist.
- The Department of Nutrition at MISAU is involved in a multisector plan that is being implemented with the Ministry of Agriculture, called “Multisector plan to fight chronic malnutrition”. There was no information available on whether this plan covers ASGM communities.

1.1.4 Regulations and policies for primary and referral health care provision

- The Mozambican Constitution (2004, art. 89) establishes the right to health care for all citizens. The Ministry of Health is mandated to promote universal access to health care, promotion, prevention and curative care (Organic Statute of the Ministry of Health. Boletim da República, 2017). Medical and sanitary assistance is organized through the National Health System

(article 116 of the Constitution, 2004) that is in charge of both regular and emergency situations.

- Mozambique has implemented the International Health Regulations (IHR) through the Environmental Health Department at MISAU. These regulations require Mozambique to report disease outbreaks and public health events to WHO in order to prevent and respond to acute public health risks. The outbreaks include biological hazards that might also affect ASGM communities.

Main strengths

A relevant strength in place to tackle ASGM-related health hazards is MISAU's clearly defined mandate. Moreover, the country's medical assistance is organized through the National Health Service that is structured in administrative units that are divided at national and sub-national levels. Health care facilities are in place at the national, provincial and district levels. Furthermore, there are general regulations in place concerning chemical management, health hazards, occupational health hazards and environmental hazards related to ASGM that have implications for health. Moreover, there are specific policies in place to address nutritional deficits of the population in general, and

also to address biological hazards that affect ASGM communities, such as cholera, malaria, dengue fever, STI and HIV.

Challenges

- There is no regulation on which public health care institution is explicitly mandated to prevent, detect, monitor or treat populations affected by the exposure to mercury or mercury compounds.
- A treatment protocol to handle cases of mercury or cyanide intoxication is lacking.
- Regulations and policies concerning psychosocial hazards such as drugs, alcohol and violence are unclear.

1.2 Structure level

1.2.1 Organization and job responsibilities of key institution(s)

- The Organic Statute of the Ministry of Health (2017) defines the structure and functions of the institution. However, an up-to-date organizational chart for the ministry was not available when this study was conducted. The structure of the Ministry of Health is currently being reviewed and may undergo modifications in the near future. Currently the Environmental Health Department, within the National Directorate for Public Health, holds broad responsibilities on chemical health hazards. This department includes three divisions or units: Environmental Protection and Hygiene, Food Safety, and International Health. The Environmental Protection and Hygiene unit includes the Occupational Health and Chemical Safety section which is responsible for setting standards on chemical and radiological exposure

limits for the environment and workplace, collaborating with other entities on actions for registry and control of chemical and radiological substances, evaluating the impacts of chemical and radiological exposures and promoting the development of national policies for health protection from chemical and radiological risks. The reorganization of the ministry would be an opportunity to review the anchoring of responsibility for chemical health hazards.

- Job descriptions as well as roles and responsibilities (e.g. decision making, consultation, execution), at the Ministry of Health are in some cases very dated (old) and in others not clearly defined.
- A division of functions and responsibilities at the national and sub-national levels of the National Health Service was not available.
- The Department of Non-Communicable Diseases has a unit on trauma and violence, although no information could be gathered regarding this unit in official documents or during key interviews. The functions of the unit are unclear and it is

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unknown if the unit is mandated to implement a specific violence-related policy. Addressing trauma in ASGM is important and the fact that such a unit seems to exist is an entry point to build up.

- The Department of Monitoring and Evaluation at MISAU is following the achievement of policies included in the Quinquennial Plan (2015-2019). Some of them are the reduction of cases of HIV and preventable diseases, such as malaria, dengue fever and STI. Specifically, the Department of Monitoring and Evaluation follows up on the “Accelerated Response to HIV Plan”.
- The Department of Health Surveillance MISAU is mandated to maintain routine vigilance of various biological hazards, including malaria, meningitis, diarrhea, measles, plagues, tetanus, and rabies disease.
- Another mandate of the Department of Monitoring and Evaluation is to follow up on the implementation of health sector policies included the Quinquennial Plan (2015-2019). Objectives of this plan include the reduction of morbidity and mortality due to chronic malnutrition (strategic objective ii).

1.2.2 Primary health facilities and hospitals

- The National Health Service’s administrative units are clearly divided at national and sub-national levels. Furthermore, health care facilities in Mozambique exist at the national, provincial and district levels.
- According to information collected in documents and through interviews, health care facilities at the national, provincial and district levels do not have specialists to deal with ASGM-related health issues, such as occupational medicine, toxicology or environmental health.
- One of the objectives of the Quinquennial Plan (2015-2019) is to finish the construction of the Central Hospital of Quelimane and to build 16 district hospitals in nine provinces (Cabo Delgado, Niassa, Zambézia, Sofala, Manica, Tete, Inhambane, Gaza, Maputo Province) and in Maputo City.
- The Direction of Planning and Cooperation at MISAU has registered all medical and hospital services in 2016. However, to understand the services available to ASGM communities, these data would need to be geo-referenced and mapped with the geo-locations of ASGM sites. MIREME is currently working on an inventory of ASGM sites. Relating the two pieces of information will not only provide an important starting point for understanding current service levels but also inform future planning. The list of medical and hospital services is:
 - 4 Central Hospitals
 - 8 Provincial Hospitals
 - 23 District Hospitals
 - 21 Rural Hospitals
 - 6 General Hospitals
 - 1 Specialized Hospital
 - 2 Military Hospitals
 - 162 Urban Health Centres
 - 1,239 Rural Health Centres
 - 130 Health Stations
- Regarding health care workers in Mozambique, according to official information in 2016 there were:
 - 7.6 physicians for every 100,000 inhabitants
 - 29.0 nurses for every 100,000 inhabitants
 - 106.8 health technicians for every 100,000 inhabitants
- Regarding the accessibility of health facilities, it is important to highlight that the National Health Institute in its National Research Agenda, estimates that more than half of the Mozambican population only receives health care provided by traditional medicine practitioners, working with herbal mixtures and spiritual ceremonies. AMETRAMO, the Association of Traditional Medics of Mozambique, was officially recognized by the government in 2001. According to information gathered in the interviews, most ASG miners and communities have access only to traditional medicine because ASGM takes place in remote rural areas where health centres cannot be reached easily by foot or transport, so access to them is extremely limited. For example, diagnosis and treatment for chronic obstructive pulmonary disease that affects gold-searchers is available at the hospital level. However, interviewees agreed that it is unlikely that ASGM miners can reach those hospitals.
- It is also important to notice that key interviewees at MISAU assured that undocumented migrants are entitled to public health in Mozambique. This means that the public system has the duty to provide health care to migrant ASG miners and communities irrespective of their status in the country. However, no regulations or formal documents could be found to prove the entitlement of undocumented migrants to health care.
- The assessment of health services at ASGM level will be covered by the Service Availability and Readiness Assessment (SARA) questionnaire (diagnosis and treatment of occupational diseases, treatment of chemical poisoning, services in case of falls from height and explosion, antidote for mercury poisoning, antidote for cyanide poisoning, artificial breathing machine).

1.2.3 Technical and laboratory equipment to diagnose, monitor and treat ASGM-related health conditions

- The Ministry of Health owns laboratories at the main hospital in Maputo, as well as at general, provincial and district hospitals. However, interviewees suggest that public laboratories in Mozambique do not have the capacity to measure levels of mercury, cyanide or other chemicals in humans. It is unclear if private laboratories in the country could detect mercury or other chemical poisoning.
- There is no evidence of technical and laboratory equipment to diagnose, monitor or treat ASGM-related health conditions caused by chemical hazards (e.g. exposure to mercury, cyanide, chemicals contained in dust and toxic gases) or psychosocial hazards (e.g. drugs, alcohol, violence and nutritional deficits)

1.2.4 Knowledge resources to address ASGM issues

- The Institute of National Health is part of the Ministry of Health and is mandated to coordinate and conduct health research in Mozambique. In 2017, the agency published a National Agenda for Research in Health (2017-2021) aimed to support the definition of health policies and to promote research in priority areas for the National Health Service. This document makes no explicit reference to chemical hazards related to ASGM (e.g. mercury, cyanide or other chemicals), and other ASGM hazards (e.g. malnutrition and drugs and alcohol abuse). However, some biological

hazards related to ASGM (e.g. HIV, STI, malaria) and respiratory diseases are acknowledged as main areas. No references were made either to health insurance or migrants.

- Several units of the health system, such as the National Health Institute, the Department of Health Information and Medical Emergency Service of Mozambique, and divisions of MISAU have links with national and international universities (e.g. University Eduardo Mondlane, University Zambeze, University Lurio and University of Oslo), as well as with research centres (e.g. Manhica Research Centre on Health). The links include the conduction of research for specific health issues (e.g. malaria and HIV) and training for public officers on various topics (e.g. data analysis, emergency and prevention). Mercury-related topics or health issues in the ASGM sector have not been covered so far.
- The Department of Health Information at the Ministry of Health is responsible for gathering information through health care facilities to monitor the population's health conditions. Information is produced at health care facilities that are implementing health programs in their communities. Information is gathered in individual forms for beneficiaries of health programs, usually disaggregated by age and sex. As data collection does not capture the occupation of the patients (which would allow detection of ASGM health patterns) and does not cover ASGM specific diseases, no information on this topic has been produced and no monitoring has been possible so far. An expansion of the information collected would be critical to understanding health patterns of ASG miners as well as services used by them.

Main strengths

Some of the institutions that are currently part of the ministry can be crucial factors to support and conduct ASGM health-related policies. This is the case of the Institute of National Health, in charge of coordinating and conducting research at the country level.

At the structure-level capacities, the up-to-date Organic Statute that defines the structure and establishes clear functions for each of the main units is an asset. Another valuable issue is the fact that the National Health Service is divided into national and sub-national levels regarding health

care facilities at the national, provincial and district levels.

MISAU controls laboratories at the main hospital in Maputo and at general, provincial and district hospitals. Laboratories could potentially diagnose ASGM-related health hazards (e.g. in food and water) and health conditions (e.g. in humans). For example, the National Laboratory for Food and Water Hygiene at MISAU performs routine microbiologic and chemical testing on food and water samples submitted for testing.

A relevant structural asset is that several departments at MISAU have knowledge links with

research centres and national and international universities that include the conduction of research for specific health issues (e.g. malaria and HIV) and training for public officers on various topics (e.g. data analysis, emergency and prevention).

Challenges

- An up-to-date organizational chart for MISAU is not available, while job descriptions, roles and responsibilities are either very old or not clearly defined.
- A division of functions and responsibilities at the national and sub-national levels of the National Health Service was not available.

- The capacity of laboratories (both public and private) are weak in analysing ASGM-related hazards (mercury, cyanide, chemical poisoning).
- ASGM takes place in remote rural areas where public health centres cannot be reached easily by foot or transport, so access to them is extremely limited.
- Health care facilities at the national, provincial and district levels do not have sufficient specialists, including physicians, nurses and health technicians, to deal with ASGM-related health issues, such as occupational medicine, toxicology or environmental health.
- No information on ASGM health-related conditions has been gathered in the country.

1.3 Process level

- The National Research Agenda of the National Institute of Health (Ministry of Health, 2017) defines Mozambican main areas of policies and research in the health sector. The 2017 edition does not mention ASGM health hazards. This instrument would be a good vehicle to put ASGM on the agenda and eventually develop a comprehensive ASGM-health strategy.

1.3.1 Mechanisms for responding to health emergencies (e.g. chemical spills, disease outbreaks)

- The Department of Emergency and Prevention Systems at the Ministry of Health is mandated to develop contingency plans that are supposed to be updated every year. There is a national plan with activities that take place before, during and after the event (e.g. heavy rain, drought, cyclone and epidemics like cholera and meningitis). Contingency plans are implemented several times per year in one or more provinces at the same time. These plans do not cover ASGM-related issues such as chemical spills or accidents. However, this is a key entry point for expanding to ASGM.

1.3.2 Preventive mechanisms to address health hazards related to ASGM (e.g. chemical spills, disease outbreaks)

- Awareness-raising and preventive programs on some ASGM-related biological hazards like

malaria, cholera and HIV take place through health facilities in rural areas. However, the implementation of specific programs regarding biological hazards in ASGM communities is limited. Even if there are policies and programs in place, they usually do not reach ASGM communities because they are in remote areas. This point is key to future planning.

- According to document revision and information gathered in the interviews, the Ministry of Health does not have specific prevention mechanisms, programs or resources for chemical and other health hazards related to ASGM.
- The Department of Non-Communicable Diseases at the Ministry of Health conducts prevention campaigns in which information is given to local communities (e.g. on respiratory diseases). Information is distributed with the support of rural municipalities at schools, churches and markets. Radio, television and the newspaper are also used to raise public awareness on general health issues. No ASGM specific topics are being covered at the moment. Current prevention campaigns are a key asset that can be expanded to address ASGM-related issues.

1.3.3 Training programs for health staff to detect, monitor and treat health conditions related to ASGM

- The Ministry of Health has been implementing the “waterfall training” strategy, which involves training health workers on prevention topics at the provincial, district and primary levels. Usually training sessions are provided by experts from

universities, in topics like malaria, HIV, diarrhea, cholera, tuberculosis, pneumonia, and women's and children's health. This strategy is a relevant entry point to expand training programs for health staff on ASGM health conditions.

- A training program aimed at health staff to support detection, monitoring and surveillance of ASGM-related health issues was not found.

1.3.4 Coordination mechanisms among ministries to address health hazards

- MISAU participates in the National Steering Group, whose leader is MITADER. Other institutions that participate in this group are MIREME, the customs service, the United Nations Industrial Development Organization (UNIDO), national universities and civil society organizations, among others. The National Steering Group is developing a National Action Plan for the ASGM sector under the Minamata Convention.
- ASGM inter-sectoral meetings in the context of the National Steering Group are institutionalized

in some aspects. Meetings appear to have been held periodically and the use of mercury and its effects on health has been discussed. According to key interviewees, objectives have been established and different actors have committed to fulfil specific tasks during the meetings. Despite this, interviewees were not able to clarify these objectives or to specify in which context they were established. Moreover, it was not possible to obtain minutes of the meetings, specific topics discussed, tasks assumed by different actors, or the dates of past and future meetings. Also, public officials interviewed mentioned a lack of clarity regarding the coordination between ministries and external partners such as UNIDO and others. This might also be a communication issue within and between ministries.

- The Environmental Health Department contributed towards regulation of tobacco and alcohol, alongside other departments and divisions within MISAU. National coordination for tobacco and alcohol-related regulations is the competency of the Ministry of Industry and Trade.

Main strengths

MISAU's strengths at the process level can be broken down into strategies, mechanisms, programs, plans and campaigns that are currently addressing issues unrelated to ASGM, but could eventually tackle them. For example, the experience of the Department of Emergency and Prevention Systems in the implementation of the "waterfall training" strategy for training health workers on prevention topics at the provincial, district and primary levels, is a relevant asset. The current strategy includes the design of contingency plans that are updated yearly and that can be implemented several times per year in several provinces at the same time.

Other capacities that MISAU has in place and that could be directed also to ASGM are awareness-raising programs in rural areas and programs that address ASGM specific living conditions, such as prevention and treatment of HIV-AIDS, cholera and malaria, and diagnosis and treatment for chronic obstructive pulmonary disease.

Another asset is the prevention campaigns led by the National Occupational Health Program, that

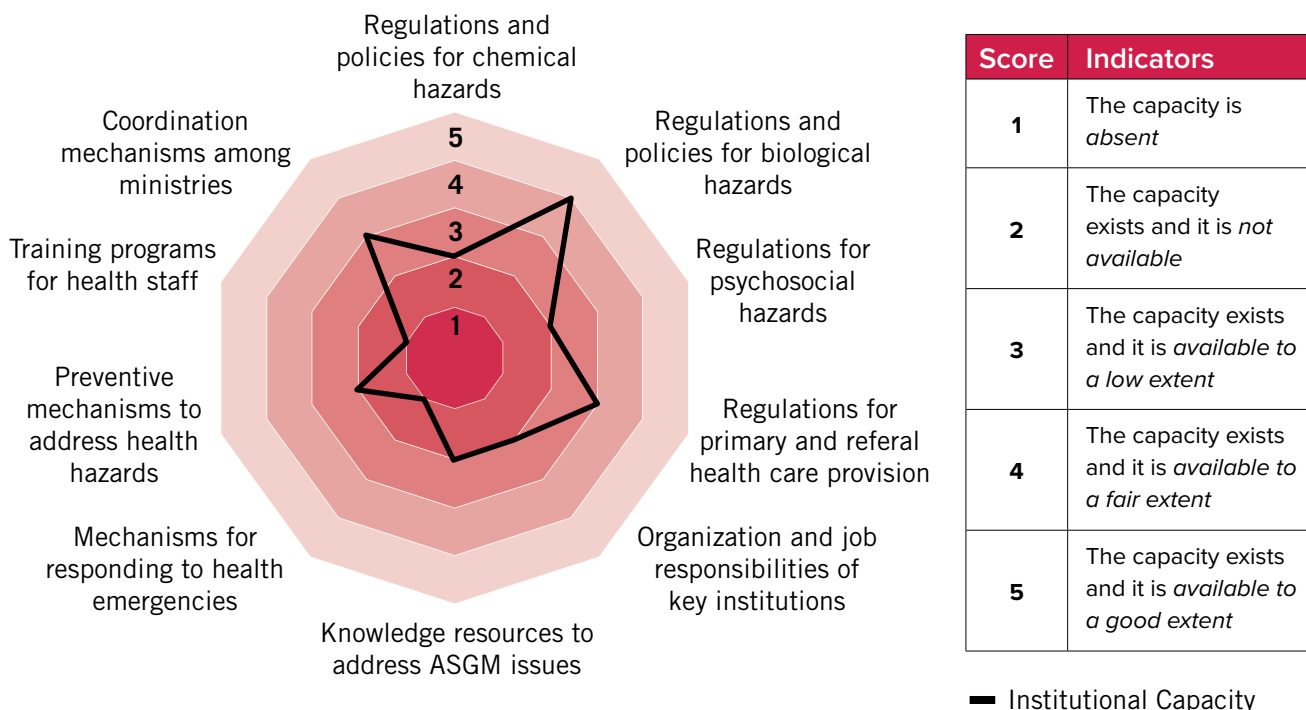
spread health information to local communities through different means (e.g. radio, television, newspapers, etc.). MISAU has relevant emergency response mechanisms for biological hazards that could be expanded and leveraged to chemical emergencies.

MISAU participates in the National Steering Group, an inter-ministerial coordination mechanism to address ASGM-related health hazards.

Challenges

- Training programs for health staff to support detection, monitoring and surveillance of health hazards related to ASGM are not available.
- Objectives, topics discussed or tasks assumed by relevant ministries during the National Steering Group remain unclear. Therefore, inter-ministerial coordination mechanisms regarding health hazards related to ASGM are not clear either. The participation of all partners including MISAU and WHO representatives, at national steering group meetings is important to allow for effective coordination and progress.

Radar chart 1: Visualization of institutional capacities in place for health hazards related to ASGM



2. Occupational health hazards related to ASGM

2.1 Regulatory and policy level

2.1.1 Regulations and policies for the following occupational hazards in ASGM:

- **chemical hazards (mercury, cyanide, chemicals contained in dust, toxic gases)**
 - **biomechanical and physical hazards (musculoskeletal disorders, overexertion, physical trauma, noise, heat and humidity)**
- Occupational health hazards are addressed by the Labour Law, which specifies that an occupational disease is any clinical situation that appears localized or generalized in the organism, of a toxic or biological nature, that results from professional activity and is directly related to it (n° 23/2007, art. 224). This law recognizes eight occupational diseases, namely

those resulting from: (a) lead intoxication, (b) mercury intoxication, mercury amalgams and mercury compounds intoxication, and the direct consequences of such intoxication, (c) intoxication by the action of pesticides, herbicides, dyes and solvents, (d) intoxication by the action of dust, (e) exposure to asbestos fibres or dust or to air or dust from asbestos-containing products, (f) intoxication by the action of x-rays or radioactive substances, (g) carbuncle infections and (h) occupational dermatoses. Despite there being no more specific information on mercury in this law, it is a key instrument to address mercury-related health conditions.

■ From the latter list of occupational health hazards, at least five might affect ASG miners. These are lead intoxication, mercury intoxication, mercury amalgams and mercury compounds intoxication and the direct consequences of such intoxication, intoxication by the action

of dust and occupational dermatoses. These occupational hazards have to be carefully considered in the planning of future policies for the ASGM sector.

- The Regulation on Technical and Health Security in Geology and Mining Activities (26 December 2006, art. 11) states that in case of death, serious injury of a worker, or in situations that pose a serious threat to the health and safety of the workers, the mining holder, mining operator or mining pass holder must notify the General Inspection of Mineral Resources in no more than 24 hours.
- Regarding prevention of occupational hazards, the Regulation on Technical and Health Security in Geology and Mining Activities (26 December 2006) contains several relevant issues for ASM. Artisanal mining operators who work either individually or in associations must use individual protection equipment and are obliged to present an activity program that demonstrates knowledge regarding safety and health prevention (art. 262). Also, artisanal miners' associations must promote safety at work in every exploitation area that they plan to abandon (art. 310).
- The Regulation on Technical and Health Security in Geology and Mining Activities (26 December 2006, art. 285) applies to exploration, search and exploitation of mineral resources activities and it does not explicitly state whether it

applies to industrial and/or ASGM. However, the regulation defines the permitted amounts of silica and asbestos. "When repeated dusts with a free silica content of more than 50% occur ($1\text{mg}/\text{m}^3$ or $100\text{P}/\text{cm}^3$), measurements should be taken quarterly, or whenever the competent authority requests special working, ventilation and personal protection conditions. In places where it is not possible to reduce the dust content below the values (below 5% $5\text{mg}/\text{m}^3$ or $800\text{P}/\text{cm}^3$), workers should wear dust masks to ensure their protection. The masks against dust should be freely distributed, and should not be shared or recommended for individuals with respiratory problems. The quantities of asbestos dust in air shall not exceed the following values: a) short-term exposure - fibers / $\text{cm}^3 = 5$, b) exposure during one shift - fibers / $\text{cm}^3 = 2$. Workers working in dusty environments susceptible to pneumoconiosis should undergo annual medical examinations".⁷ However, the regulation does not state who is responsible for the cost and distribution of the masks and there are no requirements established to monitor the conditions stated.

- Despite the fact that there are regulations concerning occupational health hazards for the ASM sector, the enforcement of inspections remains unclear.

Main strengths

Regarding occupational health hazards, regulations and policies are clearly defined in the Regulation on Technical and Health Security in Geology and in the Labour Law. This regulation acknowledges specific ASGM-related hazards.

The unit of trauma and violence at the Department of Non-Communicable Diseases is an entry point to address trauma in ASGM.

Challenges

- The enforcement of regulations concerning occupational health hazards is unclear.

⁷ Regulation on Technical and Health Security in Geology and Mining Activities (26 December 2006).

2.2 Structure level

2.2.1 Organization and job responsibilities of key institution(s)

- The Unit of Environmental Protection and Hygiene is inside the Environmental Health Department at MISAU. The Environmental Protection and Hygiene unit includes three sections or functions: environmental sanitation; occupational health and chemical safety; and assessment of environmental impacts on people. Key competencies of the division include setting standards on chemical and radiological exposure limits for the environment and workplace, collaborating with other entities on actions for registry and control of chemical and radiological substances, evaluating the impacts of chemical and radiological exposures and promoting the development of national policies for health protection from chemical and radiological risks. The unit is also responsible for analysing investment projects, inspecting workplaces, and checking environmental management plans. The information gathered has to be sent to MITADER. No information on how these tasks are currently performed was found.
- The National Occupational Health Program at MISAU also performs functions related to occupational health, although the job responsibilities and specific tasks accomplished remain unclear. This program is a key starting

point to perform functions in the future related to ASGM occupational health.

- No information was found in official documents or during interviews on policies related to ASGM occupational health or regarding existing policies that could be expanded or enhanced to accommodate ASGM-related occupational hazards.

2.2.2 Technical and laboratory equipment to diagnose, monitor and treat ASGM-related occupational health conditions (see also 1.2.3)

- Biomechanical hazards, such as musculoskeletal disorders, overexertion and physical trauma can be diagnosed, monitored and treated at health facilities. However, effective access of ASG miners to health facilities is limited.
- No information was found in official documents or interviews regarding technical equipment available to address biomechanical and physical hazards at working places, namely, noise, heat and humidity.

2.2.3 Knowledge resources to address ASGM issues

- No information on biomechanical and physical hazards and on exposure to mercury, cyanide, chemicals contained in dust and toxic gases, was found in documents and during interviews.

Main strength

The Department of Occupational Health could become an asset regarding ASGM, using as an input the clear regulation on occupational health hazards and the recognized occupational diseases that might affect ASG miners.

Challenges

- No technical equipment is available to address biomechanical and physical hazards at working places, namely, noise, heat and humidity.
- There is no technical and laboratory equipment to diagnose, monitor or treat ASGM-related health conditions caused by occupational hazards.

2.3 Process level

2.3.1 Mechanisms for responding to occupational health emergencies related to ASGM (e.g. chemical spills and accidents)

- Despite regulations on occupational health in geology and mining activities, there is no

evidence of mechanisms in place for responding to occupational health emergencies related to ASGM, such as chemical spills or serious accidents. Furthermore, no information was found on other mechanisms in the public sector to react to occupational health emergencies that could be expanded or enhanced for ASGM-related emergencies.

- It has been reported that officers from the Department of Artisanal and Small-Scale Mining, the General Inspection and the Direction of Safety Mining (all of them report to MIREME) occasionally visit mining sites when they are informed about the collapse of a mining shaft. Officers work with the police in keeping clear the area of the accident to prevent the occurrence of new accidents. This seems to be a non-institutionalized practice that takes place when public officials at the ministry are invited to go to the site by a local authority.

2.3.2 Preventive mechanisms to address occupational health hazards related to ASGM (e.g. chemical, biomechanical and physical hazards)

- There is no evidence of preventive mechanisms to address occupational health hazards at the Ministry of Health.
- However, there are at least four programs led by public institutions and through international cooperation concerning the promotion of best practices at the workplace in the mining sector. These experiences can be expanded and enhanced to create preventive mechanisms to address occupational health hazards in the ASGM sector. Some of these programs are:
 - A best practices initiative program led by the National Institute of Mining (INAMI), an institution supervised by MIREME, and UNIDO. The project seems to be separate from the NAP project, started in 2016 and is aimed to promote the adoption of safe health practices in the ASGM sector. The results of the program are not yet available.
 - A program led by engineers and geologists from MIREME that consists of identifying new

ASGM areas (known as “invasions for gold”) delimit them to control the activity better, and sensitize both traditional leaders and local communities on occupational health hazards and health hazards that can affect the communities. Engineers and geologists train miners on good practices, excavations by layers and exploration techniques to avoid accidents. However, no details regarding the scope or contents of these training programs could be obtained.

- A Support Program for the Environment Sector was funded by the Danish Cooperation in 2013. The program was aimed at eliminating worst practices and reducing exposure to mercury in the ASGM sector.
- Other programs for preventing occupational health hazards in ASGM have been carried out during the last 15 years by MIREME, mainly in Manica Province. MIREME’s officials have trained miners to use loop retorts and ThermEx technology to avoid mercury health hazards and to recover mercury for future use. These programs have been in most cases unsuccessful because the new technologies are too expensive to purchase and to maintain.

2.3.3 Coordination mechanisms among ministries to address occupational health hazards

Despite the fact that different ministries are currently approaching occupational health hazards, no evidence has been found on inter-ministerial coordination mechanisms in place.

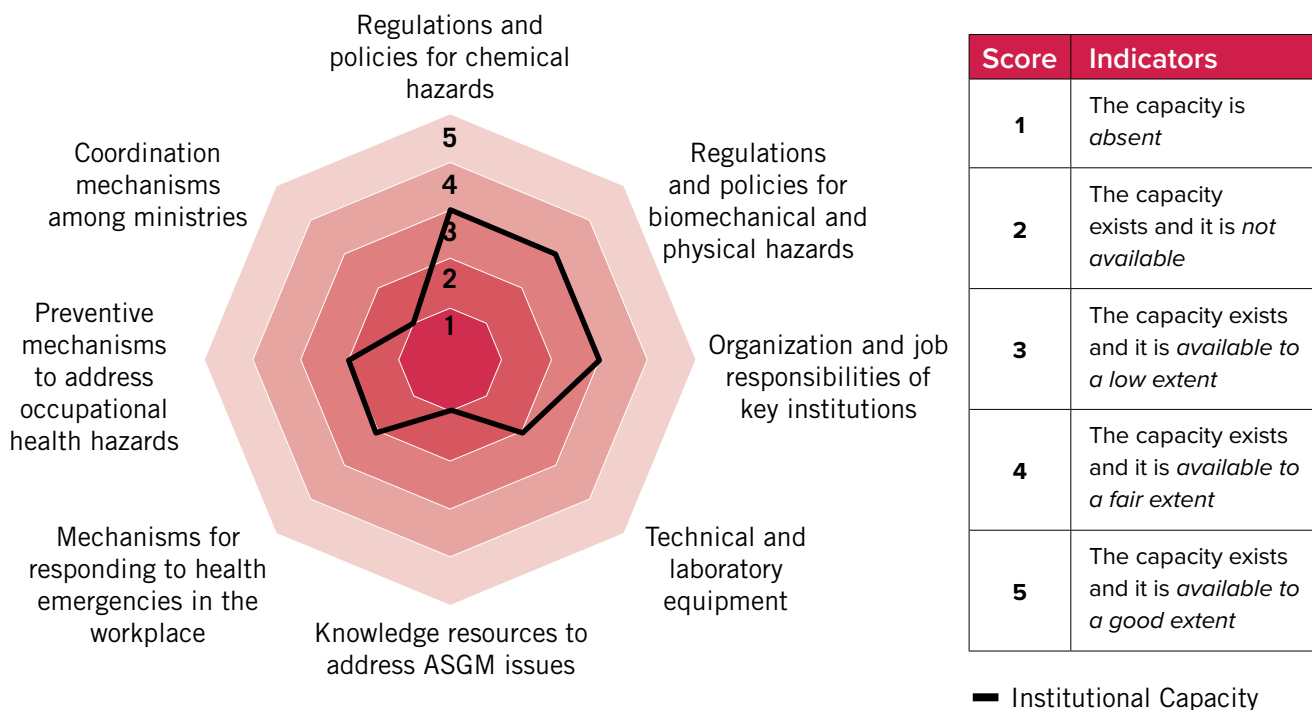
Main strengths

MISAU and other ministries have implemented programs that can be expanded and enhanced to create preventive mechanisms to address occupational health hazards in the ASGM sector.

Challenges

- There are no prevention mechanisms in place to address ASGM-related environmental hazards, nor mechanisms for responding to environmental emergencies.
- Training programs for health staff to support detection, monitoring and surveillance of environmental hazards related to ASGM are not available.
- Inter-ministerial coordination mechanisms regarding environmental hazards related to ASGM remain unclear.

Radar chart 2: Visualization of institutional capacities in place for occupational health hazards related to ASGM



3. Environmental hazards related to ASGM with health implications

3.1 Regulatory and policy level

3.1.1 Regulations and policies for land degradation, mercury emissions/pollution, siltation, erosion and water contamination

- The Mozambican Constitution establishes that the State shall promote initiatives to ensure ecological balance, preservation and conservation of the environment, aiming to improve the quality of life of its citizens. The State is also mandated to adopt policies aimed at the prevention and control of pollution and erosion (art. 117, 2004). There are laws and policies regarding environmental health hazards for mining activities. However, the majority of ASGM miners are informal workers and regulations are not enforced.
- The Ministry of Land, Environment and Rural Development is the central organ of

the Mozambican State that directs, plans, coordinates, controls and ensures the execution of policies (e.g. control of pollution and erosion).

- There is a legal framework that regulates environmental health risks. These regulations cover soil, water, mining effluents and emissions, and are a key asset to address ASGM-related environmental hazards that have implications for health.
- The Regulation on Technical and Health Security in Geology and Mining Activities (26 December 2006, art. 11) states that in case of air pollution, the mining holder must evacuate the workers immediately and notify within 24 hours the General Inspection of Mineral Resources and provide assistance.
- The Regulation on environmental quality standards and effluent emissions (Decree No. 18/2004) and the decree that modifies it (No. 67/2010) establish air and water quality standards. The air quality standards set an annual average limit of 1 µg/Nm³ of mercury

emissions. The regulation also sets general standards for pollutant releases in the water environment, including mercury, ammonia, arsenic, barium, cadmium, lead, cyanide, copper, tin, phenols, fluorides, selenium, sulphides and zinc. The maximum limit of mercury in the water is 0.01 mg/l, while the minimum limit

is 0.002 mg/l. The minimum limit standard establishes the point at which an environmental monitoring plan has to be established by the company whose activities are polluting the environment. During the document revision and interviews, no specific information was found for land degradation, siltation and erosion.

Main strengths

Regulations to address environmental hazards related to ASGM that have implications for health are clearly defined. The Regulation on environmental quality standards and effluent emissions establishes maximum limits of mercury in the water (0.01 mg/l) and there are policies aimed at controlling environmental hazards related to ASGM (e.g. pollution and erosion).

Challenges

- No information was found on specific policies operationalizing current regulations on environmental hazards related to ASGM that have implications for health.

3.2 Structure level

3.2.1 Organization and job responsibilities of key institution(s)

- The Department of Environmental Health at the Ministry of Health is divided into three units: Environmental protection and hygiene; Food safety; and Sanitary control of entry points. These units hold a wide range of functions and responsibilities including on chemical safety or environmental pollution in general. While the units do not have dedicated programs focused on specific environmental health hazards related to ASGM they are key structures whose functions can be expanded to better address specific ASGM-related issues.
- The Environmental Protection and Hygiene Unit at MISAU, through the occupational health and chemical safety and the area and the area for assessing environmental impacts on people holds key mandates and responsibilities: collaborating with other entities on action for registry and control of chemical and radiological substances; promoting the development of national policies that aim to protect health from chemical and radiological risks; evaluating health impacts from chemical and radiological exposures; promoting and planning training and capacity

building of technical health staff at central and local levels in the area of chemical and occupational safety; and developing proposals for norms, standards and regulations on chemical safety and hygiene. The unit is also in charge of appraising investment or infrastructure projects, their environmental impact assessment reports and issuing opinions on the likely project-related health impacts. They also visit working places and are involved in environmental management plans. All relevant information gathered by the unit is sent to MITADER.

- According to information provided during the interviews, the Environmental Protection and Hygiene Unit has in its remit the mandate to conduct inspections of mercury, cyanide and toxic chemicals contained in dust.
- The Centre of Environmental Hygiene, also at MISAU, mainly focuses on inspecting slaughterhouses, markets, industrial units and houses.
- Another key institution mandated to implement policies and programs related to environmental health hazards is MITADER. The Presidential Decree n13 / 2015 (16 March 2015) defines the attributions, competencies and main areas of MITADER. This ministry has an organizational chart, although it is unclear if the chart is up-to-date. A clear division in national and sub-national levels was not found.

3.2.2 Technical and laboratory equipment to assess, monitor and improve ASGM-related environmental issues

- Document revision and information gathered in the interviews to key authorities suggests that at the ministries' level there is no technical or laboratory equipment to assess, monitor and improve mercury-related environmental issues (e.g. mercury emissions and mercury pollution).
- The Agency of Environmental Quality and Control at MITADER is mandated to manage environmental components related to emissions, discharges, soil contamination, etc. Also, MITADER carries out audits and environmental impact evaluations of public and private infrastructure projects. According to information gathered during the interviews,

they do consider land degradation, erosion and water contamination in their assessments. No information was found regarding siltation.

- Next year it is expected that MITADER will have equipment for measuring contamination and afterwards there is a plan of also having their own laboratory.

3.2.3 Knowledge resources to address ASGM issues

- Key interviewees pointed out that while they are informed on the environmental health hazards related to land degradation, erosion and water contamination, they do not have access to information concerning the risks of mercury emissions or mercury pollution.

Main strength

An institution that can be crucial in supporting and conducting ASGM health-related policies is the Unit of Environmental Protection and Hygiene at the Department of Environmental Health that is in charge of chemical and environmental safety.

Another structural strength that involves another ministry is the Agency of Environmental Quality and Control at MITADER. This institution carries out audits and environmental impact evaluations that address environmental hazards related to ASGM that have implications for health (e.g. land degradation, erosion and water contamination).

Challenges

- There is no technical and laboratory equipment to diagnose, monitor or treat ASGM-related health conditions caused by environmental hazards.

3.3 Process level

3.3.1 Mechanisms for responding to environmental emergencies related to ASGM (e.g. mercury pollution)

- According to information gathered through official documents and interviews, none of the ministries has mechanisms in place to respond to environmental emergencies related to mercury, cyanide or other chemicals.
- The Regulation on Technical and Health Security in Geology and Mining Activities provides general instructions in case environmental emergencies occur in mining sites. However, specific

mechanisms at the ministry level on how to respond to environmental emergencies in general or in ASGM sites were not found.

3.3.2 Preventive mechanisms to address environmental hazards related to ASGM, namely land degradation, mercury emissions/pollution, siltation, erosion and water contamination

- No information has been found regarding preventive mechanisms in place to address environmental hazards related to ASGM, such as land degradation, mercury emissions/pollution, siltation, erosion and water contamination.
- However, non-periodical awareness-raising programs have taken place regarding general

environmental health hazards. These programs have been financed by international organizations (e.g. World Bank), and both MITADER and MIREME have participated in them.

- Moreover, there are experiences on carrying out non-periodical awareness-raising programs specifically on ASGM environmental health hazards. The scope of these missions has been limited mainly to the Manica Province and MISAU and MIREME have participated in them. These missions have been funded by UNIDO, the Global Mercury Project and the Blacksmith Institute.
- Key interviewees have noted that ASGM populations claim that even if they are aware of the risks they take (e.g. handling and burning mercury), they have no other alternative to make a living.

3.3.3 Training programs for staff to detect and monitor environmental health hazards related to ASGM

- According to information gathered during interviews and in official documents, there are

no training programs for environmental or health staff to detect and monitor mercury emissions and mercury pollution.

- Despite the fact that there have been occasional training programs at the ministries' level for detecting and monitoring land degradation, erosion and water contamination, they have not been considered as ASGM-related hazards.

3.3.4 Coordination mechanisms among ministries to address environmental hazards that have implications for health

- Besides from the National Steering Group that has been formed in the context of the Minamata Convention, there are no regular coordination mechanisms between ministries to address environmental health issues. Occasionally authorities from different ministries meet to address specific problems together, although according to interviewees there are no formal mechanisms.

Main strengths

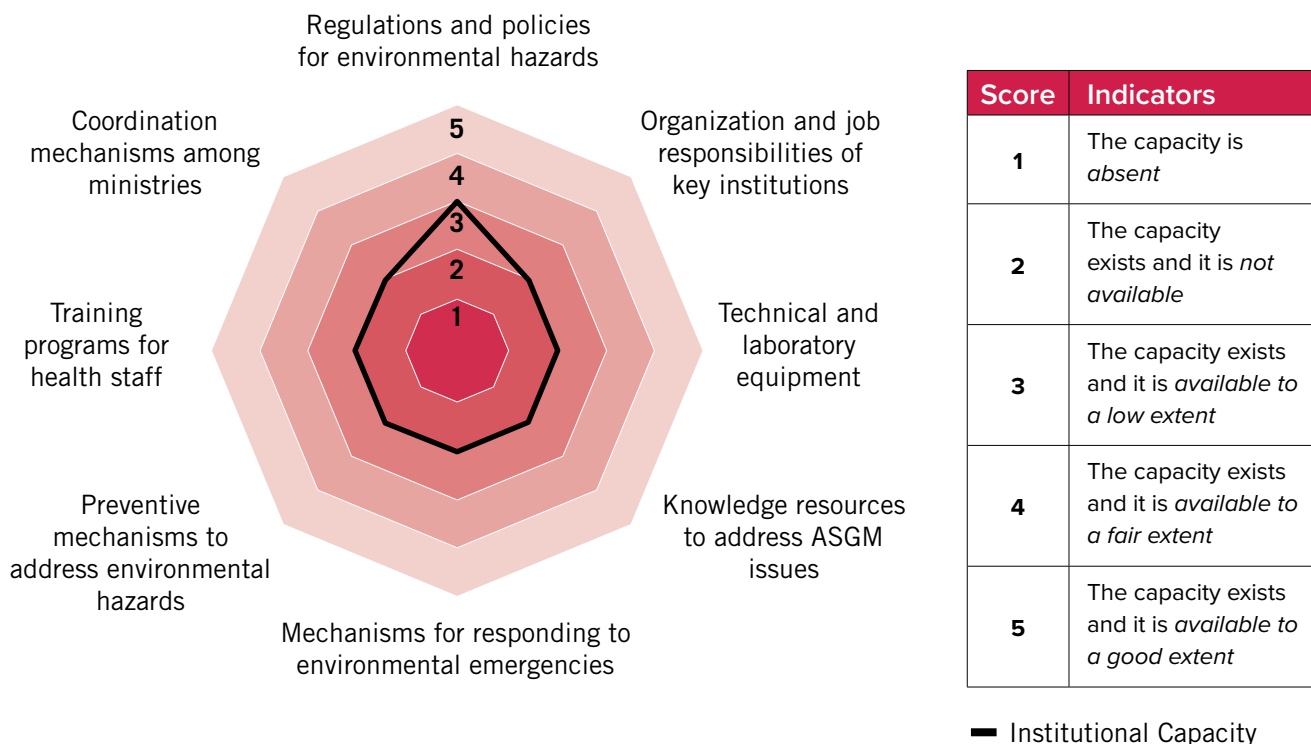
MISAU and MIREME have experience in participating in awareness-raising programs specifically on ASGM environmental health hazards.

The Regulation on Technical and Health Security in Geology and Mining Activities addresses environmental emergencies in mining sites that could be expanded to ASGM.

Challenges

- There are no prevention mechanisms in place to address ASGM-related environmental hazards, nor mechanisms for responding to environmental emergencies.
- Training programs for health staff to support detection, monitoring and surveillance of environmental hazards related to ASGM are not available.
- Inter-ministerial coordination mechanisms regarding environmental hazards related to ASGM remain unclear.

Radar chart 3: Visualization of institutional capacities in place for environmental hazards related to ASGM that have implications for health



4. Chemical management related to ASGM

4.1 Regulatory and policy level

4.1.1. Regulations and policies are clearly defined for chemical management

- In spite of the fact that a general regulation for dangerous chemicals with high levels of toxicity was mentioned during interviews with public officials on several occasions, it could not be obtained from interlocutors or retrieved online. This regulation concerns transport, storage and use of dangerous chemicals. Although mercury is covered by this regulation because of its high level of toxicity, the regulation does not specifically address mercury. No information was found regarding disposal of dangerous chemicals.
- Furthermore, there is no evidence of an inventory of hazardous chemicals in the country that could be used for chemical management.
- The Regulation on Technical and Health Security in Geology and Mining Activities bans the use of mercury in artisanal mining operations or any other noxious substances used for gold processing (26 December 2006, art. 225). However, unregistered gold buyers often supply informal gold miners with mercury.
- Both MITADER and municipalities are mandated to do inspections of chemical substances. Despite the fact that MITADER is mandated to do inspections of hazardous substances in mining sites, no information regarding inspections taking place in ASGM areas was found. It is also unclear if any inspections for mercury take place, although authorities seem to have information regarding important entry points (e.g. Zimbabwe border). According to interviewees at different ministries, the customs office does not check mercury at the borders; municipalities, which are also mandated to

do inspections, do not carry them out. Official information on this issue could not be found.

- The Regulation on Technical and Health Security in Geology and Mining Activities (26 December 2006, art. 11) states that in case of material accidents such as fire, explosion or others, the mining holder or mining operator must notify the Provincial Direction, the General Inspection of Mining Resources and the Labour Inspection. This regulation can be expanded and enforced in ASGM contexts.
- The Ministry of Environment is mandated to implement international conventions regarding hazardous substances. The Basel Convention entered into force in Mozambique in 1997, making the country responsible for controlling transboundary movements of hazardous wastes and their disposal. Mercury, mercury compounds, organic and inorganic cyanide are included among the list of hazardous wastes. The two main aims of the convention that relate to mercury are: (i) the reduction of hazardous waste generation and the promotion of environmentally

sound management of hazardous wastes and (ii) the restriction of transboundary movements of hazardous wastes. It is not clear to what extent these aims are being addressed.

- In 2010, the Rotterdam Convention entered into force in Mozambique, making the country commit to the Convention's two main objectives. The first one is to share responsibility and make cooperative efforts with other countries in the international trade of hazardous chemicals (including mercury), in order to protect the environment and human health. The second one is to contribute to the environmentally sound use of hazardous chemicals (e.g. mercury compounds) by facilitating information exchange on their characteristics and by sharing with other countries a national decision-making process on import and export. Regarding mercury, no information was found concerning shared responsibilities, cooperative efforts, information exchange or national decision-making process on imports and exports.

Main strengths

In relation to chemical hazards, Mozambique has a general regulation for dangerous chemicals with high levels of toxicity. This regulation concerns transport, storage and use of dangerous chemicals. There is also a specific regulation for addressing chemical incidents such as fire, explosion or others.

Challenges

- There is no inventory of hazardous chemicals to be used for chemical management.
- The general regulation for dangerous chemicals with high levels of toxicity does not address mercury specifically.

4.2 Structure level

4.2.1 Organization and job responsibilities of key institution(s)

- MITADER is the key institution mandated to implement policies and programs related to chemical management. This ministry has an organizational chart, although key job responsibilities for chemical handling are unclear. Similarly, there is no information regarding key positions and responsibilities for chemical management at MIREME.
- Functions or responsibilities of MISAU concerning chemical hazards are not clear either.

4.2.2 Technical and laboratory equipment to identify chemicals (mercury, cyanide, chemicals contained in dust, toxic gases)

- The National Laboratory for Food and Water Hygiene at MISAU is a public institution that performs routine microbiologic and chemical testing on food and water samples submitted for testing. The laboratory also tests foods for micronutrient supplementation such as iron and vitamin A, and can perform quality control on samples and products submitted by local industry. The laboratory has limited capacity to detect specific chemical agents in food or water, and it is unclear if it could detect mercury or cyanide in food and water.

- There is no evidence of technical or laboratory equipment in place to identify hazardous chemicals contained in dust and toxic gases.
- There is no information concerning the possibility to carry out medical examinations of populations exposed to chemical hazards.

4.2.3 Knowledge resources to address ASGM issues

- Electricity of Mozambique (EDM, a public company), the Investment Fund and Heritage of Water Supply (FIPAG, which is part of the Ministry of Public Works), and the Regional Water Management Centre (ARA-Centro), conducted studies for mercury assessment. These studies took place between 2003 and 2006 in the Manica Province. A document with the results of these studies could not be found.

Main strengths

As stated before, the Unit of Environmental Protection and Hygiene at the Department of Environmental Health that is in charge of chemical and environmental safety can be crucial for supporting and conducting ASGM health-related policies.

Challenges

- A unit or a position responsible for chemical health hazards (e.g. a mercury, cyanide or other chemical-related health risks unit) is lacking.
- There is no technical and laboratory equipment to diagnose, monitor or treat ASGM-related health conditions caused by chemical hazards.

4.3 Process level

4.3.1 Mechanisms for responding to chemical emergencies

- No evidence was found at the ministries' level on mechanisms and protocols for responding to chemical emergencies.

4.3.2 Preventive mechanisms to address chemical hazards

- Regarding the prevention of chemical hazards, in 2015 UNIDO was the implementing agency in Mozambique for a Global Environmental Facility (GEF) Project on "National capacity and capability improved for the management of mercury, through the preparation of a National

Action Plan (NAP) for the ASGM sector". The two-year project was aimed to identify hotspot areas of ASGM sector, especially in Manica and Niassa provinces, and to promote sound chemical management.⁸ The executing agencies for the project were MIREME, MITADER, MISAU and WHO.

- No preventive mechanisms at the ministries' level were found.

4.3.3 Coordination mechanisms among ministries to address chemical management

- Besides from the National Steering Group, no evidence was found on inter-ministerial coordination mechanisms regarding chemical management.

⁸ For more details, visit <https://www.thegef.org/project/national-action-plan-mercury-mozambican-artisanal-and-small-scale-gold-mining-sector> (visited 19 July 2017).

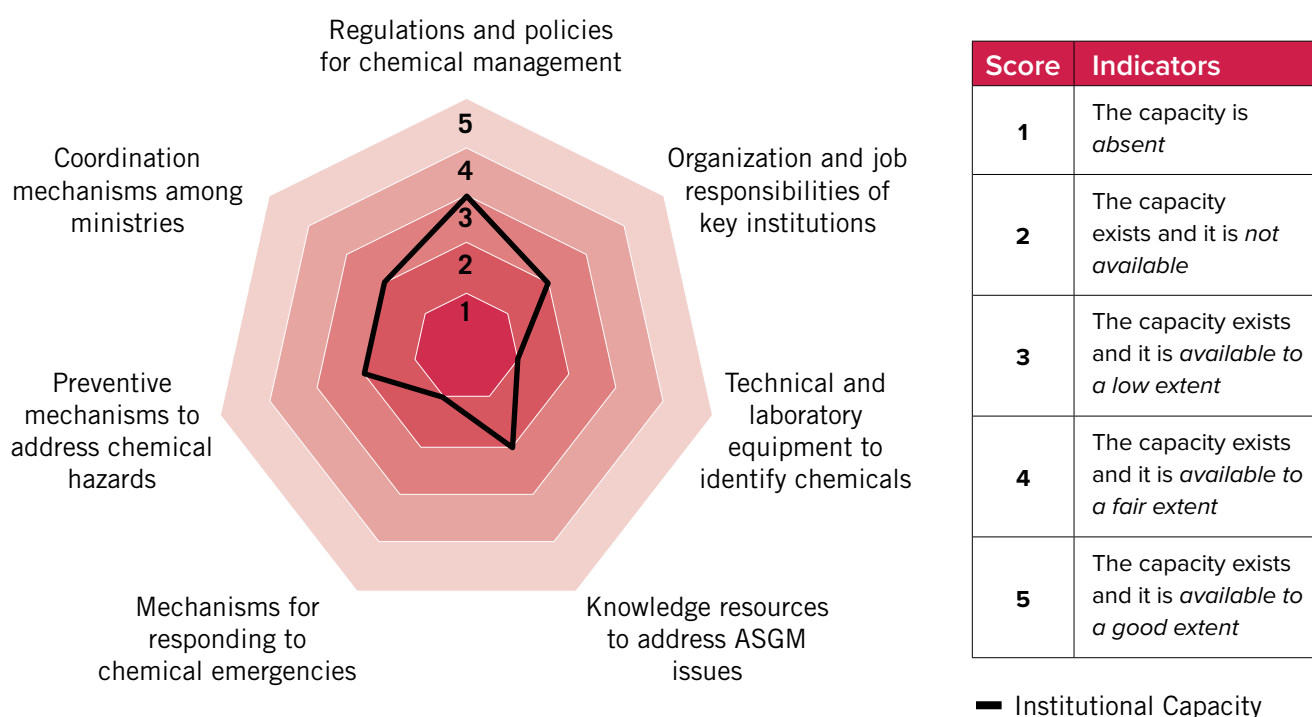
Main strength

MISAU, MITADER and MIREME have experience in participating in a project aimed at identifying hotspot areas of the ASGM sector and promoting sound chemical management.

Challenges

- There are no prevention mechanisms in place to address ASGM-related chemical hazards, nor mechanisms for responding to chemical emergencies.
- Training programs for health staff to support detection, monitoring and surveillance of chemical hazards related to ASGM are not available.
- Inter-ministerial coordination mechanisms regarding chemical hazards related to ASGM remain unclear.

Radar chart 4: Visualization of institutional capacities in place for chemical management related to ASGM



5 Recommendations

In this section:

Recommendations at institutional level

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Recommendations for Public Health Strategy

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Recommendations

This section is structured in two subsections. The first one presents recommendations for the three institutional dimensions, namely regulatory and policy level, structure level and process level. The second one addresses recommendations for the three strategic

objectives established for the Public Health Strategy in the context of the National Action Plan required in the Minamata Convention. These objectives are health data collection, training of health care workers and awareness raising and education.

Recommendations at institutional level

At the regulatory and policy level, MISAU could take the following steps for improving ASGM-related issues:

- Operationalise regulations concerning health care provision, ASGM-related health hazards, environmental hazards related to ASGM that have implications for health, occupational health hazards and chemical management into public health policies and programs.
- Furthermore, it is crucial to have a specific regulation on which public health care institution is explicitly mandated to prevent, detect, monitor or treat populations affected by the exposure to mercury or mercury compounds.

At the structure level, some opportunities that MISAU could address for improving ASGM-related issues are:

- Identify the divisions in charge of addressing ASGM-related health issues. Currently, the three units that depend on the Department of Environmental Health at MISAU are not focused on environmental health hazards related to ASGM or on pollution in general.
- Spell out the roles of each division that has a role in ASGM health-related issues, as well as the relationship between them. This reorganization would be an opportunity to review the anchoring of responsibility for chemical health hazards. Pros and cons of allocating this responsibility to an existing organizational unit or establishing a new unit have to be carefully considered.

- Establish functions and responsibilities at the sub-national level of administrative units, as well as define the linkages between implementing and administrative units at the national and sub-national levels.
- Assign the responsibility of follow-up, monitoring and evaluating the effectiveness of measures to address health impacts of ASGM to a specific division.
- Improve accessibility of health care facilities at the primary level to ASGM-affected communities in order to provide medical services to those populations.
- Engage with key stakeholders:
 - MISAU can establish links with the Artisanal and Small-Scale Mining Department at MIREME and receive the information gathered by them on working practices and health and safety conditions at ASGM sites. Relevant information on occupational and environmental hazards in ASGM will be a relevant input for designing awareness-raising activities.
 - Build bridges with other ministries (e.g. MIREME and MITADER) and international partners to share data and information on ASGM-related topics through a clearly defined communication channel.

At the process level, MISAU could advance in the following areas to improve ASGM-related issues:

- Use the experience of implementing national emergency plans carried out by the Department

of Emergency and Prevention Systems for developing ASGM health-related emergency plans. MISAU's current emergency response mechanisms for biological hazards can be expanded and leveraged to chemical emergencies.

- Design and implement treatment protocols for mercury-related health effects and other health problems related to ASGM.

- The National Research Agenda of the National Institute of Health would be a good vehicle to use to put ASGM on the agenda and eventually develop a comprehensive ASGM-health strategy.

Recommendations for the Public Health Strategy

Strategic objective 1: gathering of health data

- The Department of Health Information at MISAU could advance in increasing efforts to get accurate information on the health status of ASGM communities in general (disaggregated by age and sex) at the primary level. This department's fieldwork experience can be used to gather ASGM health-related information at primary health care facilities. With this information, MISAU will be able to identify priority ASGM-health issues, relevant population groups affected and most urgent areas for public health interventions.
- The National Health Institute at MISAU could become a key institution to conduct research or work jointly with external knowledge institutions to cover ASGM health-related topics. Some relevant issues to be covered are miners' health seeking behaviour, inputs for the design of awareness-raising activities in health care facilities, and finding out ways to reach ASGM communities.

Strategic objective 2: training for health care workers

- Technical capacity is a top priority when planning for detection and response to ASGM health-related issues. A process of regular and effective training programs on ASGM health hazards can be developed for health care workers, specially nurses and community health workers,

at the national and sub-national levels. These programs should include raising awareness on health problems associated with ASGM, mercury detection, identification of ASGM-related hazards, case management, monitoring and surveillance.

- The Environmental Health Department at MISAU should promote and plan the training and capacity of health professionals at the provincial, district and primary levels within their competency areas, namely occupational health and chemical safety. Furthermore, the Health Promotion Department (DEPROS) at MISAU could use its "waterfall training" strategy for health workers on prevention for ASGM-related issues at the provincial, district and primary levels.

Strategic objective 3: awareness-raising through health facilities

- MISAU can take steps to promote awareness-raising activities at primary health care facilities for ASGM affected communities. For this, training of health care workers and awareness-raising materials are needed. MISAU could use existing structures that have been effective at the primary level and that are trusted by local communities to implement awareness-raising activities on mercury and other ASGM-related health hazards. These activities should target entire ASGM communities, although special attention has to be given to vulnerable populations, namely children and women of child-bearing age, especially pregnant women.

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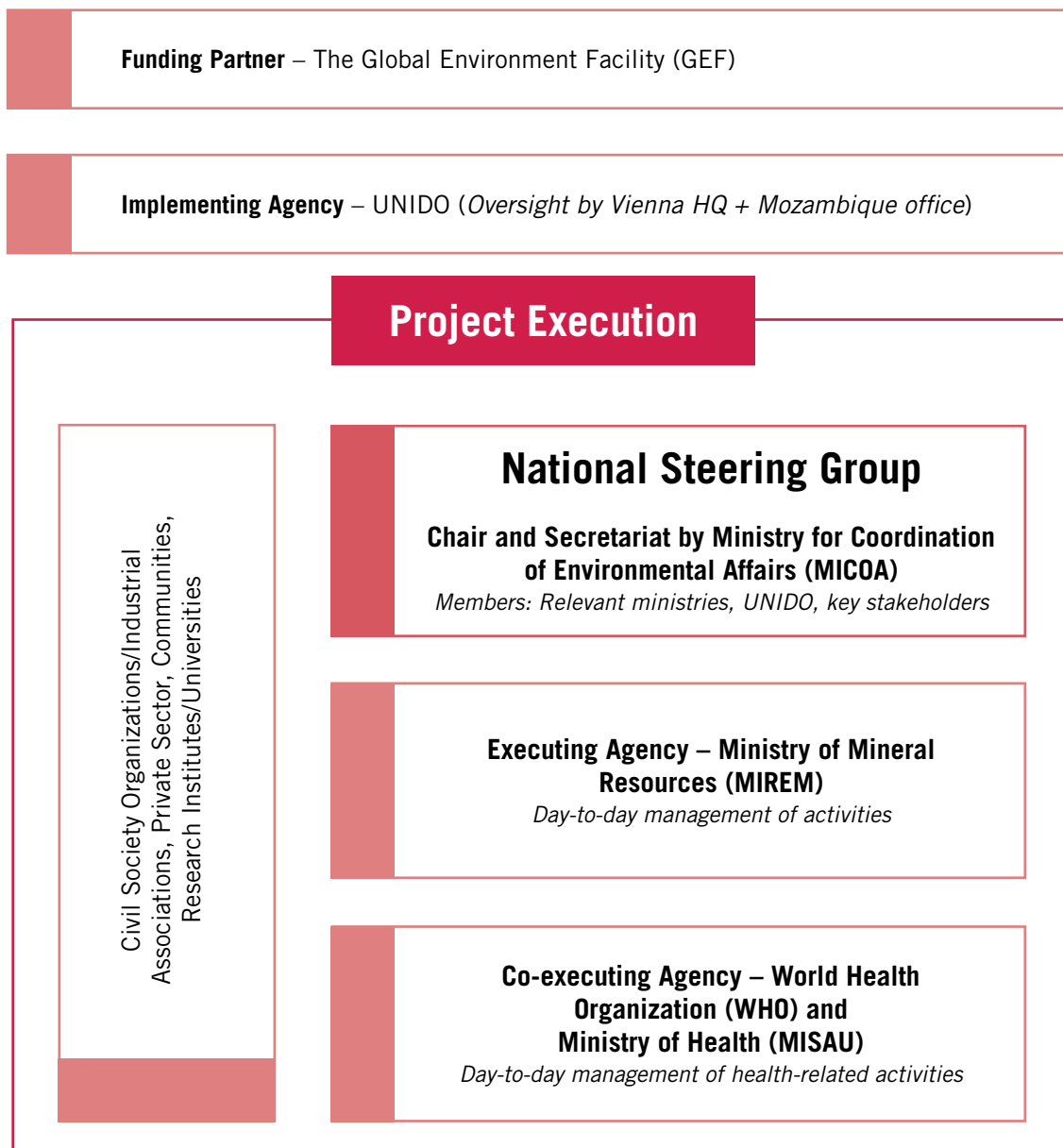
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Annexes

Annex A of the Project Execution Arrangement

National Action Plan on Mercury in the Mozambican Artisanal and Small-Scale Gold Mining Sector, GEF 6 UNIDO, 2016)

Annex A: Project Execution Arrangement



Annex C of the Minamata Convention on Mercury, 2013

Artisanal and small-scale gold mining

National action plans

1. Each Party that is subject to the provisions of Paragraph 3 of Article 7 shall include in its national action plan:
 - a. National objectives and reduction targets;
 - b. Actions to eliminate:
 - i) Whole ore amalgamation;
 - ii) Open burning of amalgam or processed amalgam;
 - iii) Burning of amalgam in residential areas; and
 - iv) Cyanide leaching in sediment, ore or tailings to which mercury has been added without first removing the mercury;
 - c. Steps to facilitate the formalization or regulation of the artisanal and small-scale gold mining sector;
 - d. Baseline estimates of the quantities of mercury used and the practices employed in artisanal and small-scale gold mining and processing within its territory;
 - e. Strategies for promoting the reduction of emissions and releases of, and exposure to, mercury in artisanal and small-scale gold mining and processing, including mercury-free methods;
 - f. Strategies for managing trade and preventing the diversion of mercury and mercury compounds from both foreign and domestic sources to use in artisanal and small-scale gold mining and processing;
 - g. Strategies for involving stakeholders in the implementation and continuing development of the national action plan;
 - h. A public health strategy on the exposure of artisanal and small-scale gold miners and their communities to mercury. Such a strategy should include, inter alia, the gathering of health data, training for health-care workers and awareness-raising through health facilities;
 - i. Strategies to prevent the exposure of vulnerable populations, particularly children and women of child-bearing age, especially pregnant women, to mercury used in artisanal and small-scale gold mining;
 - j. Strategies for providing information to artisanal and small-scale gold miners and affected communities; and
 - k. A schedule for the implementation of the national action plan.
2. Each Party may include in its national action plan additional strategies to achieve its objectives, including the use or introduction of standards for mercury-free artisanal and small-scale gold mining and market-based mechanisms or marketing tools.

