

Ghana

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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Institutional Capacity Assessment Report

Ghana

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Abbreviations

AGC	Artisanal Gold Council
ASG	Artisanal and Small-scale Gold
ASGM	Artisanal and Small-scale Gold Mining
CCMC	Chemical Control and Management Centre
CHIM	Centre for Health Information Management
CHPS	Community-based Health Planning and Services
CSO	Civil Society Organization
DHMT	District-Health Management Teams
DTPR	Doctor-to-Population-Ratio
EOA	Environmental Protection Agency
FC	Forestry Commission
GAC	Ghana Aids Commission
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHS	Ghana Health Service
HCC	Hazardous Chemicals Committee
HSB	Health Seeking Behaviour
ILO	International Labour Organization
IMCIM	Inter-ministerial Committee on Illegal Mining
L.I.	Legislative Instrument
Lit.	litera
MELR	Ministry of Employment and Labour Relations
MESTI	Ministry of Environment, Science, Technology and Innovation
MIA	Minamata Initial Assessment
MINCOM	Minerals Commission
MISAU	Ministry of Health
MLNR	Ministry of Lands and Natural Resources
MOH	Ministry of Health
MOTI	Ministry of Trade and Industry
NAP	National Action Plan
NMCP	National Malaria Control Programme
NRDC	Natural Resources Defense Council
PNDCL	Provisional National Defense Council Law
PHC	Primary Health Care
POP	Persistent Organic Pollutants
PPE	Personal Protective Equipment
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infection
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
WHO	World Health Organization
WRC	Water Resource Commission

Executive summary

Gold is the most important export commodity of Ghana, followed by oil and cocoa (The World Bank in Ghana, 2019). The gold mining sector is growing and thereby creating jobs and promoting the local economy. Gold is mined in large-scale industrial mines and in artisanal and small-scale gold mines (ASGM). Many of the latter operate illegally with marginal knowledge about the implications that unsafe mining practices have on their and their communities' health and the environment. The World Health Organization (WHO) has been requested to assist the Ministry of Health (MOH) to develop a Public Health Strategy as part of the National Action Plan (NAP) as stipulated in Article 7 of the Minamata Convention.

This report presents the assessment of the institutional readiness to detect, address and prevent health issues associated with ASGM and aims to provide inputs to the MOH on how to best define key priorities in the Public Health Strategy on ASGM. Based on the consultation of MOH representatives and other key agencies and stakeholders concerned with ASGM-related health topics, institutional capacity strengths and challenges in the public health sector were assessed and key stakeholders identified who appear critical for the development and implementation of a public health strategy tailored to the ASGM sector.

The assessment was guided by the following questions:

- To what extent are existing regulations, policies, structures and processes in place at the national and subnational levels to respond to ASGM health-related issues?
- Are the current institutional capacities at MOH sufficient to deal with health issues in the context of ASGM?
- What strengths and opportunities exist that could strengthen capacities and what challenges need to be addressed?

Methodologically, we focus on the following four health 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, and (4) Chemical management related to ASGM. For

each of those areas, we assess three institutional dimensions: (1) the policy and regulatory level, (2) the organizational structure and resources, and (3) the procedural setup. The health priority areas and the institutional dimensions result in a matrix with health priorities and institutional dimensions as the axes. Topic-specific indicators guide the assessment in each of the cells of the matrix.

The assessment reveals a range of institutional strengths on which the MOH can build its ASGM health strategy on. To start with, Ghana's health legislations are quite comprehensive and provide a basis to manage ASGM-related health issues. Although there is no chemical code, EPA and the MOH exert some strong institutional capacities which are important and that can be built on.

At the structural level, Ghana's health care system is decentralized and Primary Health Care (PHC) is provided in a three-tier way (embedded in a five-level structure). This system is suitable to potentially satisfy ASGM-related health needs. Mandating the focal agency has set grounds to further develop and streamline ministerial capacities on both the horizontal and vertical level while also improving equal accessibility for ASGM communities to health services. Various structural gaps have been identified and corrective initiatives initiated. In view of the Public Health Strategy, these gaps mainly concern the accessibility of quality health services as well as operational chemical emergency response. At large, however, other ministries and their departments are expected to address their ability to govern (health) concerns affecting ASGM communities.

Institutional capacity is reasonably developed, and inter-ministerial coordination seems to be effective in most instances. Deficits exist on one hand in the vertical coordination between national and subnational levels as well as in the availability of technical equipment, infrastructure and capacity in rural areas where ASGM effectively takes place.

Finally, the well-crafted regulatory framework is contrasted by significant gaps in the documentation of implementation measures (except for the recent Inter-Ministerial Committee on Illegal Mining (IMCIM) efforts), which makes it difficult to assess the extent to which regulations are implemented.

1 Introduction



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Introduction

Mercury use in Artisanal and Small-scale Gold Mining

After the Executive Director of the United Nations Environment Programme (UNEP) initiated a global assessment of mercury, its compounds, production and life cycle it was concluded that the amount of mercury used in artisanal and small-scale gold mining (ASGM) has significant adverse effects on human health and the environment, whereby international action to reduce these risks was implicated. As a result, the Minamata Convention was drafted by an intergovernmental negotiating committee with the objective to “protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds” (United Nations, 2017, S.9). Acknowledging that ASGM is commonly related to the (unsafe) use of mercury the legally binding Minamata Convention stipulates specific measures that support the reduction, or where feasible the elimination, of mercury use (United Nations, 2017, § 7, Nr. 2). ASGM is characterized by small to medium sized groups of individuals or communities applying rudimentary techniques to yield marginal outputs of gold (Veiga, Maxson & Hylander, 2006, p. 436). It is often done in an informal setting with

insufficient consideration of the environmental and health impacts. Manual gold mining is hard physical labour profoundly demanding on the human body. Generally, five categories of health hazards related to ASGM are distinguished: chemical, biological, biomechanical, physical and psychosocial. Collapsing tunnels burying miners alive or the spreading of STDs are as common as poisonings due to incautious handling of chemicals. The most common chemical hazards related to ASGM continue to spring from mercury and cyanide use (World Health Organization, 2016, p. 7). Occurring as a natural component of the earth, mercury is a (heavy) metal element and neurotoxin. Cyanide is a chemical compound of hydrocyanic acid. Amalgamation is a common gold-manufacturing practice amongst ASGM whereby mercury is used to obtain amalgam, an alloy which consists of approximately equal parts mercury and gold (Gibb & O’Leary, 2014, p. 667). The alloy is then heated while evaporating the heavy metal without much effort due to its high volatility. Left is quite pure gold. Mercury is affordable allowing quick and effortless gold extraction (Artisanal and Small-scale Gold Mining – Facts and Figures, 2019, p. 9).

Health risks associated with the use of mercury

Every year approximately 1400 tons of mercury are released into the environment (UNEP-UNITAR Mercury Platform, n.d.). Human health is exposed to mercury in two ways when observing the context

of ASGM – elemental mercury exposure and organic mercury exposure (World Health Organization, 2016, p. 7). In order to produce gold amalgam, elemental mercury is used.¹ The heating process evaporates the

¹ The crushed ore is mixed with water and pure mercury. Mercury (Hg 79) has the chemical property of searching for other minerals with a similar chemistry. This is the case for gold (Au 80). The two elements merge this strong bond and form the alloy gold amalgam.

toxin into the air, which is breathed. By doing so the miners' health is immediately endangered through inhalation if no protective gear is worn. People with close proximity to burning sites are also likely to suffer from being exposed to the mercury vapours. An extreme low boiling point causes mercury to dematerialize at room temperature. Skin contact, inappropriate storage or handling is an indirect exposure to elemental mercury vapours. Ultimately residues or disposal of mercury laced water into larger water bodies contaminate the environment. Under certain conditions anaerobic organisms transform mercury into an organic compound known as methylmercury (Gibb & O'Leary, 2014, p. 667).

The Minamata Convention on Mercury owes its name to the first large-scale organic mercury exposure, i.e. methylmercury poisoning that occurred nearby the Japanese city Minamata in 1956 in a small fishing village. Fish and other seafood were intoxicated by methylmercury after a nearby chemical factory discharged wastewater into the ocean. Locals who typically lived on a seafood diet ate the poisoned fish and were taken ill. Similar symptoms related to what is still known as the "Minamata Disease" continue to show evidence amongst ASGM communities (i.e. nausea, headaches, abdominal pain, seizures, blindness, respiratory difficulties, etc.).

Artisanal and Small-scale Gold Mining in Ghana

Ghana's golden history

Ghana has long been famed for its abundant wealth and trade of gold. In the fifth century, owing to the availability of camels and the rising Empire of Ghana (or Wagadu as referred to in oral history) which was founded by the Soninke, the Trans-Saharan trade was on its way (the MET, 2000). Gold that was sourced from Sudan and Ghana was mainly traded for salt, livestock, weapons, brass, iron and silver (Elbra, 2017, p. 70). Eventually, "Ghana" the King of the ancient Empire lost his gold monopoly; the area was hit by drought until the community of the Berber Almoravids from North Africa invaded the kingdom in the 11th century ("Ghana, Historical West African Empire", 2019, "Almoravids, Berber confederation", 2014). One century later the Berber reign was succeeded by the Mali emperor Sundiata ("Ghana, Historical West African Empire", 2019). The repeated invasions induced migration from North-West Africa down to the coastal zones. Amongst the migrants were the Akan people who initiated a state forming process. Setting up the Asante (~Ashanti) Empire with Kumasi as its capital was one of the results. At the same time the Portuguese were the first Europeans to arrive in Ghana, which was then known as Gold Coast in the middle of the 15th century. Almost all the gold coinage of Portugal, Spain and Italy was mined from West Africa at the time, while until the end of the

16th century the Portuguese had a trading monopoly on the newly found gold resources. Desperate to preserve that monopoly (and organize the export of other commodities and slaves) they built forts. The first one to be erected was named "el Mina" – "the mine" – due to the long tradition of gold mining that had already been ongoing. What followed were derogating centuries of colonialism alternately enforced by Dutch, English, Portuguese and North European merchants. The subduing exploitation continued until Ghana gained independence as the first African country in 1957.

Economic relevance of gold

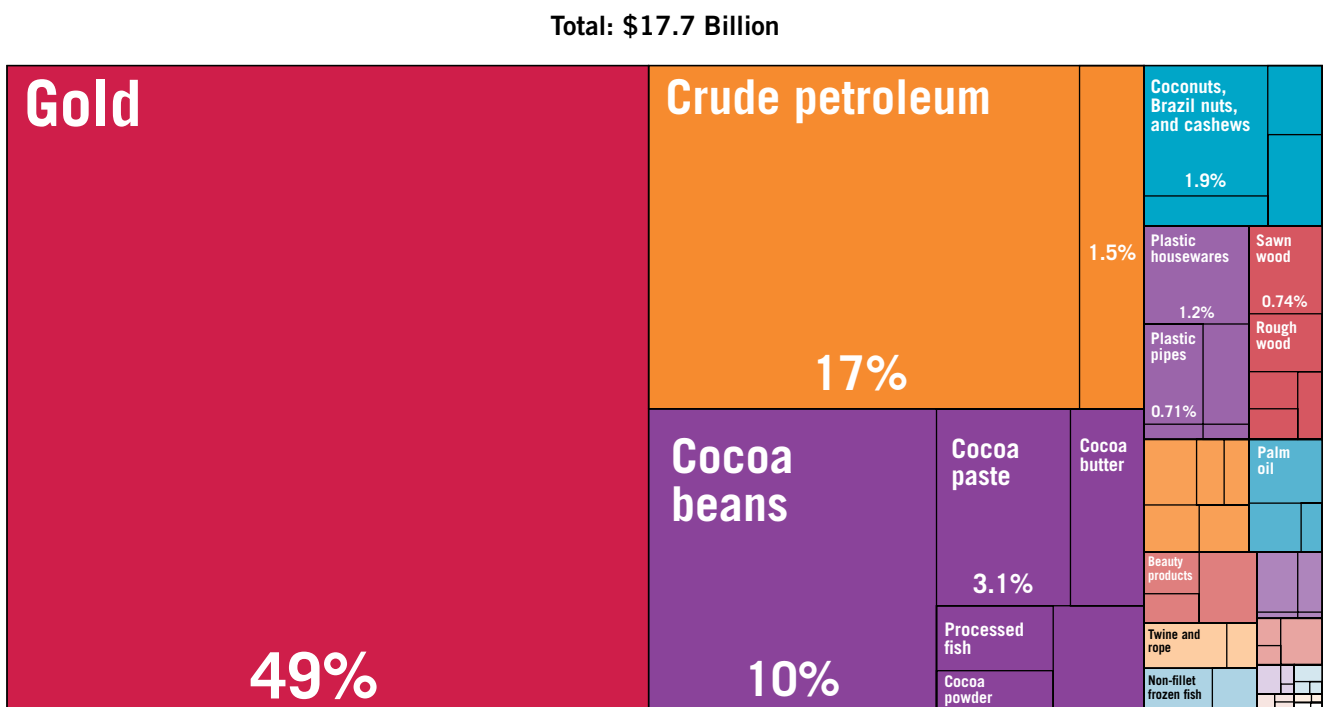
Gold is the most important export commodity after oil and cocoa beans (Ghana Chamber of Mines, 2015, p. 5). In 2017 the precious metal accounted for almost 50% of all commodity exports, earning the country US\$ 8.35 billion ("Products exported by Ghana (2017)", n.d.). One year later, in 2018 the ambitious country overtook South Africa, and is currently the largest gold producer on the African continent. According to Ghana's Minerals Commission artisanal and small-scale gold mining (which is reserved for Ghanaians) accounted for 35% of Ghana's gold output in 2013 while it is estimated that 0.5 million people directly work in ASGM (Ghana Chamber of Mines, 2015, p. 26). In

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response to concerning events of water pollution and illegal logging, which were blamed on the ASGM sector, the government issued a moratorium on all types of small-scale mining. The Inter-Ministerial Committee on Illegal Mining (IMCIM) was empowered with law enforcing authorization and appeared ready to repress mining activities at any cost. Determined to prevent further damage to farmlands, forests,

the air and waterbodies illicit gold mining activities were monitored closely. The ban lasted from March 2017 until December 2018 (Setsoafia, 2017). According to key informants the (illicit) gold mining sector which is locally referred to as “galamsey” is recovering from the disruption and slowly getting back on its feet.

Figure 1: Economic significance of gold production



ASGM in Ghana

The precious metal is mainly confirmed in the South-Western part of the country and far up north where it is mined from alluvial deposits, waterbodies but also from underground mines (Owusu-Nimo, Mantey, Nyarko, Appiah-Effah & Aubynn, 2018). Often the gold deposits are located in forests and in very remote areas. Surface mining and sub-surface (underground) mining are most prominent amongst ASGM (alluvial washing board, mill-house and chamfi).² All three forms require water for operation and are known to rely heavily on mercury for amalgamation (Owusu-Nimo, Mantey, Nyarko,

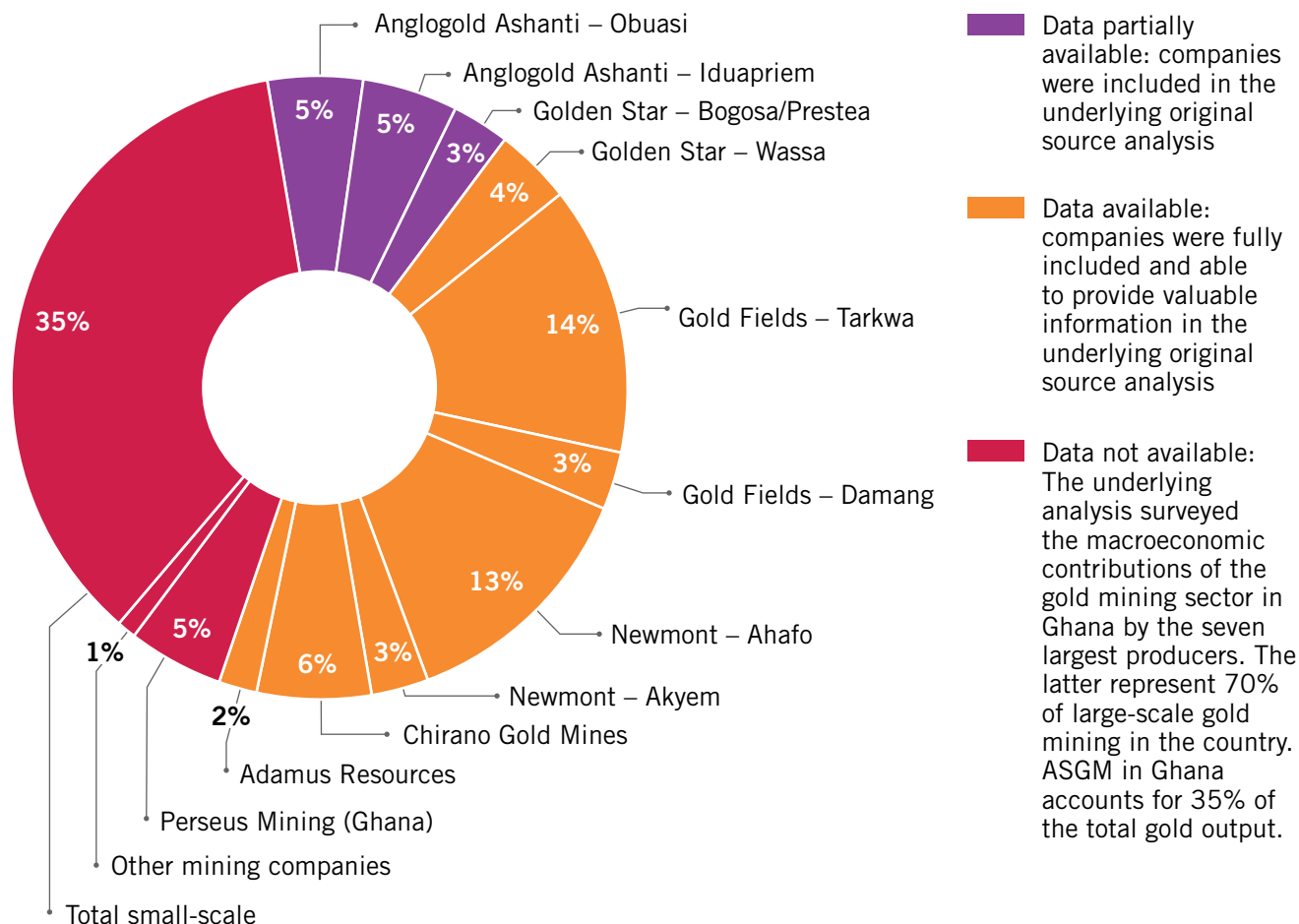
Appiah-Effah & Aubynn, 2018). In Ghana, artisanal and small-scale gold mining is legal provided regulatory requirements are met (*Minerals and Mining (Licensing) Regulations, 2012 (L.I. 2176), 2012, art. 202 et seqq.*). Duly applying for a small-scale license is perceived as cumbersome amongst ASG miners while at the same time demands financial resources. ASGM in Ghana is often poverty driven. Commonly, a miner will not have nest eggs to rely on while awaiting the regulatory approvals. It is known for this process to take up to 24 months, until then not a grain of soil may be extracted. Informal gold mining, i.e. galamsey has thus proliferated.

² Simultaneous mining and gold extraction. Usage of Chan Fa diesel powered engine, mercury, retort, diesel, petrol and lubricants. Requires water for operation (Owusu-Nimo, Mantey, Nyarko, Appiah-Effah & Aubynn, 2018).

Grown from a “hand-to-mouth” venture to a well-organized sector seeking maximum profit, it is estimated that 85% of miners involved in artisanal and small-scale gold extraction operate informally (illegally) (Abdulai, 2017). The ASGM communities

live in close proximity to the mines while they expose themselves to severe health risks on a daily basis throughout the entire gold-production cycle, i.e. extraction, production, transportation, utilization/sale and disposal.

Figure 2: One out of three miners works in an artisanal mine



Ghana Chamber of Mines. (2015). *Mining in Ghana “What future can we expect?”* London: Ghana Chamber of Mines and The International Council on Mining and Metals.

Chemical ASGM in Ghana

Mercury is the main chemical used amongst small-scale gold miners in Ghana while the use of cyanide is on the rise and more common than in other countries. Nonetheless these salts and other compounds of hydrochloric acid continue to play an insignificant role for ASGM. Chemical gold production is only one of many health issues impacting Ghana’s ASGM sector. Small-scale gold mining in Ghana typically involves young and poorly educated men driven by the alleged quick path to wealth. Many of them are migrants from the neighbouring countries far from home with little to lose but much to gain. This economic predicament

influences their willingness to knowingly expose themselves to health risks. Mining is hard labour that is very demanding on the human body. Loss of hearing, kidney problems or silicosis are amongst other diseases typically attributed to ASGM communities. Indulging in drug abuse (alcohol, narcotics, tobacco and others) to numb the burdens, infections with STD and tropical diseases (e.g. malaria, yellow fever) are exacerbating health problems amongst ASGM communities. Insufficient water and sanitation infrastructure and a lack of health facilities further compound the situation. Especially vulnerable groups like women and children are at risk of compromising their well-being, while it is very common for woman to partake in mining and bring their children with them.

The Minamata Convention on Mercury in Ghana

Ghana became a signatory party of the Minamata Convention in 2014 and is currently preparing the National Action Plan that defines national objectives and reduction targets in regard to phasing out the use of mercury within the ASGM sector. The NAP is the provided implementation tool in the context of ASGM while a “Public Health Strategy on the exposure of artisanal and small-scale goldminers and their communities to mercury” is an inherent element (United Nations, 2017, Annex C, 1.h).

All NAPs are due no later than three years after the Convention has been entered into force or after the Secretariat has been notified about artisanal and small-scale gold mining and processing being more than insignificant in Ghana (Art.7 par.3., Minamata Convention on Mercury, 2013). Although no official Notification was submitted with regard to the Significance of ASGM the Minamata Convention was ratified in March 2017. Hence Ghana’s to present its NAP by March 2020.

Ghana’s executing agencies

With the support of the United Nations Industrial Development Organization (UNIDO) the Ghanaian Government is currently preparing its NAP. The steering committee which refers to itself as the Minamata Convention Implementation Committee (MCIC) is the umbrella body and meets approximately twice a year. Affiliated to the MCIC is the technical working group, a subunit of the MCIC. The technical working group is responsible for developing the NAP. The first draft of the latter is expected in November 2019.

The Director of the Chemical Control and Management Centre (CCMC) of the Environmental Protection Agency (EPA) is the designated Focal Point (2019), all of which are overseen by the Ministry of Environment, Science, Technology and Innovation (MESTI), 2019. The focal person for the Minamata Convention is trusted with the

implementation, bringing stakeholders together and coordinating activities. Furthermore, the focal person represents the signatory country, i.e. Ghana, and manages the project finances and the development of NAP relevant plans.

Further institutions concerned with the NAP are Friends of the Nations, the Natural Resources Defense Council (NRDC) and the Artisanal Gold Council (preparation of baseline mercury inventory) Finally, the Ministry of Health (MOH) is the main engaged agency with regard to the Public Health Strategy while also supporting the assessment by data collection, knowledge sharing and strategically supporting involved ministries. With regard to the Public Health Strategy as foreseen in the Convention the World Health Organization (WHO) is an assisting partner (GEF Trust Fund, 2016).

2 Objective and questions



“ The institutional capacity assessment has been carried out to determine priority areas of significant importance which should be considered for the Public Health Strategy component of the Ghanaian National Action Plan (NAP) on ASGM.

”

Objective and questions

This report presents the results of the Institutional Capacity Assessment in light of the requirements for an ASGM-related Public Health Strategy as provided for by the Minamata Convention. More specifically, Ghana – in particular the Ministry of Health – is expected to have in place the capacity to detect, prevent and address health issues artisanal and small-scale gold miners and their communities are exposed to, including mercury exposure.

The institutional capacity assessment has been carried out to determine priority areas of significant importance which should be considered for the Public Health Strategy component of the Ghanaian National Action Plan (NAP) on ASGM. 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?

According to the guidance document, the Public Health Strategy for ASGM is expected to address three key issues:

Health data collection.

Taking an integrated public health approach for 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 perceived as essential for ensuring the effective implementation of measures to address the public health impacts of exposure to mercury in ASGM. Ensuring that health issues are appropriately addressed is comparatively essential to measures anticipated in non-health areas.

3 Methodological framework



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Methodological framework

The methodological framework is based on three complementary components: first, the operationalization of “institutions” (institutional dimensions, horizontal axis), second, the clustering

of health relevant topics (priority areas, vertical axis). Third, indicators which allow assessment of each specific institutional component per content-topic (topical indicators, cells):

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

Definition of institutional capacities

The starting point is to understand what is meant by the term “capacity” and “institutions”.

There is no unilateral definition for the term capacity. Hereinafter the report adopts the UN 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, 2009, p. 53).

Institution “constitutes humanly devised constraints that structure human interaction. They are made

up of formal constraints (rules, laws, constitutions), informal constraints (norms of behaviour, conventions, and self-imposed codes of conduct), and their enforcement characteristics, 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” (UNDP, 2009, p. 57).

Operationalizing institutions is to render them accessible when assessing 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. In this case the assessment was conducted along three

complementary levels in view of institutional readiness to address ASGM-related health issues:

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 fulfil their mandate and put objectives into action. This also includes questions of resources and staffing (i.e. sufficient number of employees 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.

Procedural requirements determine the way in which critical functions are carried out, including strategic and business planning, managing workflow, 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

In a second step regarding the operationalization of institutional capacities, ASGM-related health issues are clustered into four priority areas. The latter are defined in accordance with WHO's existent issue clusters (WHO, 2016):

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).

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. To reflect these varying degrees of implementation, each topical indicator is scored ordinally (1-5) as shown in Table 3. The criteria involve both the existence of the indicator and the extent to which the indicator is actually implemented (in the case of policies), used (in the

case of processes/systems), and available (in the case of structures). The level of implementation/use/availability implies that there is at least the same level of existence of the indicator. If the level of the existence indicator is higher than the level of implementation/use/availability, it should be recorded in a column for comments that will be included at the right of the table containing the indicators. The results of this analysis are visualized 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 planning measures to strengthen 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: Methodological framework applied, linking priority areas, institutional dimensions, and topical indicators

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, STD, HIV/AIDS</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 healthcare 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 Accra between 29 August and 2 September 2019. Semi-structured interviews were conducted with 16 key informants representing the governmental

entities such as the Environmental Protection Agency (EPA), an implementing agency of the Ministry of Environment, Science Technology and Innovation (MESTI), Ministry of Health (MOH) and its implementing agency the Ghana Health Service (GHS), Minerals and Mining Commission (MINCOM), an agency of the Ministry of Mines and the Ministry of Trade. Key informants from private or civil society organizations were also interviewed, as well as the United Nations Industrial Development Organization (UNIDO).

The document review consisted of the analysis of information gathered at public institutions, international organizations and nongovernmental 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 Accra and downloaded from the internet (full list in references section).

4 Findings, strengths and challenges



In this section:

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Findings, strengths and challenges

Subsequent chapters' structure corresponds with the outline of Table 2 (priority areas, institutional dimensions, topical indicators). 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. Options and entry points facilitating the strengthening of institutional capacity identified during the interviews are also reported. Ultimately the section provides recommendations regarding the institutional level in general and the Public Health Strategy for ASGM in particular.

This section summarizes the main findings obtained during the assessment process and are categorized as 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 of these priority areas is then addressed by reference to 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

Priority area	Institutional dimension	Topical indicator	Score
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	4
		1.1.2 Regulations and policies for biological hazards such as cholera, malaria, dengue fever, STD, HIV/AIDS	4
		1.1.3 Regulations and policies for psychosocial hazards such as drugs, alcohol, violence, nutritional deficits	4
		1.1.4 Regulations and policies for primary and referral healthcare provision	3

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

- According to the **constitution of Ghana**, the government is mandated to “*take appropriate measures needed to protect and safeguard the national environment for prosperity, (...)*” (Constitution of the Republic of Ghana, Act 527, 1992, art. 36 (9)) and to “protect and improve the environment and safeguard the water, air and land, forest (...)”.
- The constitution also requires individuals to protect and safeguard the environment (Constitution of the Republic of Ghana, Act 527, 1992, art. 41 (k)).
- The Environmental Protection Council together with the Ministry responsible for Lands and Natural Resources are subordinate members of the Lands Commission. They are the executive bodies responsible for environmental protection (Constitution of the Republic of Ghana (Act 527), 1992. Art. 259). One year after a new constitution entered into force in 1992, the Ministry of Environment, Science, Technology and Innovation (MESTI) was established and the Environmental Protection Council became the Environmental Protection Agency (EPA) (Environmental Protection Agency Act (Act 490), 1994, sect. 30). The EPA's functions are of a legislative, coordinating, advising and executing nature. The agency is supposed to (“Objectives & Functions | Environmental Protection Agency, Ghana”, 2019):
 - advise the Minister on the formulation of policies on all aspects of the environment and in particular make recommendations for the protection of the environment;
 - co-ordinate the activities of bodies concerned with the technical or practical aspects of the environment and serve as a channel of communication between such bodies and the Ministry;
 - coordinate the activities of such bodies as it considers appropriate for the purposes of controlling the generation, treatment, storage, transportation and disposal of industrial waste;
 - ensure in collaboration with such persons as it may determine the control and prevention of discharge of waste into the environment and the protection and improvement of the quality of the environment;
 - collaborate with such foreign and international agencies as the Agency considers necessary for the purposes of this Act;
 - issue environmental permits and pollution abatement notices for controlling the volume, types, constituents and effects of waste discharges, emissions, deposits or other sources of pollutants and of substances which are hazardous or potentially dangerous to the quality of the environment or any segment of the environment;
- issue notice in the form of directives, procedures or warning to such bodies as it may determine for the purpose of controlling the volume, intensity and quality of noise in the environment;
- prescribe standards and guidelines relating to the pollution of air, water, land, other forms of environmental pollution including the discharge of wastes and the control of toxic substances;
- ensure compliance with any laid down environmental impact assessment procedures in the planning and execution of development projects, including compliance in respect of existing projects;
- act in liaison and co-operation with government agencies, district assemblies and other bodies and institutions to control pollution and generally protect the environment;
- conduct investigations into environmental issues and advise appropriate stakeholders (complainants, policy and law makers) there on;
- promote studies, research, surveys and analyses for the improvement and protection of the environment and the maintenance of sound ecological systems in Ghana.
- initiate and pursue formal and non-formal education programmes for the creation of public awareness of the environment and its importance to the economic and social life of the country;
- promote effective planning in the management of the environment;
- develop a comprehensive database on the environment and environmental protection for the information of the public;
- conduct seminars and training programmes and gather and publish reports and information relating to the environment;
- impose and collect environmental protection levies in accordance with this Act or regulations made under this Act;
- co-ordinate with such international agencies as the Agency considers necessary for the purposes of this Act.
- The Ministry of Lands and Natural Resources (MLNR) is mandated to “*ensure sustainable management and utilization of the nation's lands, forests and wildlife resources as well as the efficient management of the mineral resources (...)*” (“The Ministry”, 2019). With

regard to gold mining and thus the use of mercury the MLNR is supposed to:

- promote sustainable extraction and use of mineral resources
- ensure the restoration of degraded natural resources
- build institutional frameworks for sustainable extractive and natural resource management
- reduce the loss of biodiversity
- encourage appropriate land use management
- enhance community participation in environmental and natural resource management by awareness creation
- enhance community participation in governance and decision making
- adapt the impacts and reduce vulnerability to Climate Variability and Change.
- Further, MLNR supports policy formulation, implementation and monitoring, and provides training in regard to environmental issues, and coordinates affiliated agencies (“The Ministry”, 2019):
 - The Forestry Commission
 - The Lands Commission
 - The Minerals Commission
 - Ghana Geological Survey Authority
 - Precious Metals Marketing Company
 - Office of the Administrator of Stool Lands
- EPA and MLNR are the two main government agencies mandated to oversee and steer Ghana’s environmental protection.
- The **Hazardous Chemicals Committee (HCC)** was established through the Environmental Protection Agency Act and is hosted by the Chemical Control and Management Centre (CCMC), a division of the EPA. Responsibilities include:
 - Monitor the use of hazardous chemicals by collecting information on the importation, exportation, manufacturing, distribution, sale, use and disposal of hazardous chemicals;
 - Advise the Board and the Executive Director on the regulation and management of hazardous chemicals; and
 - Perform such other functions relating to such chemicals as the Board or the Executive Director may determine.
- These responsibilities are to be institutionalized at both the national and decentralized levels by establishing regional and district offices (Environmental Protection Agency Act (Act 490), 1994, sect. 11).
- The CCMC has three departments:
 - (1) Pesticides (PD), (2) Industrial/Consumer chemicals (ICCD) and (3) National Ozone Unit (NOU) (“Chemicals Control & Management Centre | Environmental Protection Agency, Ghana”, 2019).
- Currently, there’s no comprehensive law that regulates chemicals overall. There is a set of individual regulations predominantly referring to the agricultural and health sector (e.g. Pesticides Control and Management Act ³).
- The Mercury Act
 - regulates licensing for import, export, transport as well as the trade of mercury.
 - states that licensed ASG miners are eligible to purchase mercury from licensed vendors in “(...) reasonable quantity that may be shown to be necessary for the purpose if their mining operations” (Mercury Act (PDNCL 217), 1989, art. 4 (1)). ASG miners are ordered to “observe good mining practices” when using mercury (Mercury Act (PDNCL 217), 1989, art. 4 (2)).
- The Small-Scale Gold Mining Law, 1989 (PNDCL 218)
 - orders licensed ASG miners to apply “*good mining practices, health and safety rules and pay due regard to the environment*” (Small-Scale Gold Mining Law, 1989 (PNDCL 218), 1989, art. 11). The wording is almost identical with that of the Mercury Law.
 - allows a miner to purchase a reasonable quantity of mercury that is considered needful for the purpose of operations from an authorized vendor (Small-Scale Gold Mining Law, 1989 (PNDCL 218), 1989, art. 14).
 - Cyanide is not regulated.
- The Minerals and Mining (Health, Safety and Technical) Regulations, 2012 (L.I. 2182)
 - resolves that a lantern retort has to be used when handling mercury in the ASGM process (Minerals and Mining (Health, Safety and Technical) Regulations (L.I. 2182), 2012, r. 473 (1)).
- Minerals and Mining (General) Regulations, 2012 (L.I. 2173) and the Minerals and Mining (Support Services) Regulations, 2012 (L.I. 2174) do not provide specific ASGM relevant regulation.
- Following is a list of further legislations, ordinances, policies and international treaties (of which Ghana is a signatory party) that address chemical management with regard to health hazards. Even though not all of

³ (Pesticides Control and Management Act, 1996 (Act No. 528), 1996)

them make a specific reference to hazardous chemicals used for ASM operations, health relevant issues are phrased in a manner that any case giving rise to claim with regard to mercury or cyanide may be subsumed under the given paragraphs (listed by date of gazette):

- Factories, Offices and Shops Act, 1970 (Act 328)
- Food and Drugs Act, 1992 (PNDCL 3058)
- Local Government Act, 1993 (Act 462)
- Export and Import Act, 1995 (Act 503)
- Water Resources Commission Act, 1996 (Act 522)
- Environmental Assessment Regulations, 1999
- National Land Policy, 1999
- Water Use Regulations, 2001 (L.I. 1692)
- National Water Policy, 2007
- National Health Policy, 2007
- Lands Commission Act, 2008 (Act 767)
- Occupational Health and Safety Policy and Guidelines for the Health Sector, 2010
- Minerals and Mining Policy of Ghana Ensuring mining contributes to sustainable development, 2014
- Ghana E-Health Strategy, 2010
- Criminal Code, 1960 (Act 29)
- Basel Convention, 1989
- Rotterdam Convention, 2002
- Stockholm Convention, 2001
- Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917)

1.1.2 Regulations and policies for biological hazards such as cholera, malaria, dengue fever, STDs and HIV/AIDS and neglected tropical diseases

- The constitution of Ghana ensures the physical and mental well-being of the country's citizens in numerous articles (Constitution of the Republic of Ghana (Act 527), 1992, art. 13 *argumentum e contrario*) and makes specific reference to improved and balanced development in rural areas (art. 2 lit.d).
- Preventing, managing and mitigating biological hazards is regulated more specifically in the **Public Health Act** (*Public Health Act (Act 851)*, 2012). This legislation also defines the term “communicable disease”, which applies to illnesses such as cholera, malaria, dengue fever, STDs and HIV/Aids (*Public Health Act (Act 851)*, 2012, art. 1).
- Malaria:
 - The Ghana Health Service (GHS) published that the **National Malaria**

Control Programme (NMCP), which is the department of the ministry/GHS leading the formulation of policies and co-ordination of malaria control activities, is committed to tackling the epidemic occurrence of malaria. Only a rough outline of the PPP programme was available online but no detailed documentation. While community-based treatment of malaria in all districts is defined as an objective, ASGM communities are not mentioned as target group (“National Malaria Control Programme”, 2017). It is not clear whether this programme is still being executed, what outcomes have been achieved and what the future road map is.

- The guidelines for Case Management of Malaria (published by the MOH in 2014) makes no reference to the ASGM communities and the particular difficulties such as remoteness, diagnosis, capacity, etc., although there is compelling evidence that the burden of malaria is significantly higher in rural areas compared to urban areas due to improved infrastructure, income status and level of education in the latter (“Ghana Severe Malaria Facts”, n.d.)

■ Cholera:

- The MOH has a factsheet published online that provides basic knowledge about cholera and how to prevent it (“What you need to know about cholera”, n.d.)

■ HIV/AIDS:

Ghana has a “generalized HIV epidemic” (“Country Factsheets, Ghana”, 2018; Ghana AIDS Commission, 2016, p. 2) – approximately 330,000 children and adults are living with HIV in Ghana with a higher prevalence in urban areas compared to rural areas. Recognizing the urgency of this situation, the Ghanaian government has a set of regulations, strategic national plans and policies aiming to better control HIV/AIDS:

- Public Health Act, 2012 (Act 851)
- National HIV and AIDS, STI Policy, 2013: No specific reference to ASGM yet to the informal sector in general
- National Population Policy (Revised Edition), 1994: Specific reference to the ASGM community although not in relation to HIV/AIDS
- National HIV & AIDS Strategic Plan 2016 – 2020: No specific reference to ASGM. The document does however call for interventions tailored for i.a. informal sector workers
- Ghana AIDS Commission Act, 2016 (Act 938 derived from Act 613): This

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commission is supra-ministerial and multisectoral established through Parliament based on Act 613, 2002 endowed with the highest policy-making power on HIV and AIDS. This body is mandated to “provide support, guidance and leadership” in responding to the urgency of the HIV/AIDS epidemic in the country. The GAC is determined to fight HIV and AIDS through advocacy, joint planning, monitoring and evaluation in anticipation of eradicating the disease in the country (“Ghana AIDS Commission”, 2013).

- Sexually Transmitted Diseases and Infections:
 - National HIV and AIDS, STI Policy, 2013: With regard to the informal sector, no specific reference is made to STIs.

- National Population Policy (Revised Edition), 1994: No specific reference to ASGM, yet strategic approaches stated for the informal sector in general.

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

- There are a number of relevant pieces of regulation that are applicable to ASGM communities but none of them address ASGM conditions explicitly

Table 4: Regulations referring to psycho-social hazards

Legislation, Ordinance, Policy, Guideline	Refers to drugs	Refers to alcohol	Refers to violence	Refers to nutrition	Refers to mental health
Criminal Act, 1960 (Act 29)	✓	✓	✓		✓
National Health Policy, 2007	✓	✓	✓	✓	✓
Narcotic Drugs (Control, Enforcement and Sanctions) Law, 1990 (PNDCL 236)	✓				
Public Health Act, 2012 (Act 851)	✓	✓	✓	✓	✓
Single Convention on Narcotic Drugs	✓				
Convention on Psychotropic Substances, 1971 (E/RES/1973/1773(LIV))	✓				
United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, 1988	✓				
Tobacco Control Regulations, 2017 (L.L.I. 2247)	(✓)			(✓)	(✓)
National Alcohol Policy, 2018 (Ministry of Health, 2018) ⁴	✓	✓	✓		✓
Various Liquor Licence Regulations ⁵		✓		?	?
Children’s Act, 1998 (Act 732)	(✓)	(✓)	✓	(✓)	✓
National Nutrition Policy for Ghana 2012-2017				✓	✓
Mental Health Act, 2012 (Act 846)	✓	✓			✓
Regenerative Health and Nutrition (RHN) Programme, 2007	(✓)	(✓)		✓	(✓)
Domestic Violence Act, 2007 (Act 732)			✓		

⁴ This document was not available; reference is Ministry of Health (2018).

⁵ Regulation of, for example, eligible age for drinking.

1.1.4 Regulations and policies for primary and referral health care provision

- Chapter six of the constitution obliges the government to realize the right to good health care, albeit omitting a definition of “good health care” (*Constitution of the Republic of Ghana (Act 527)*, 1992, chapter 6).
- The health care system is overseen by the Ministry of Health (MOH). Health services are provided by the public and private sector as well as traditional and alternative medicinal practitioners (World Health Organization, 2017, p. 9). The health care system has five levels (*Ghana Health Service and Teaching Hospitals Act (Act 525)*, 1996):
 - Community level (Level 1): CHPS zones (Community-based Health Planning and Services). The CHPS zones with their community support system are usually the first touchpoint for a patient when seeking PHC services. Accessing curative attendance on the next higher level requires a referral (*Referral Policy and Guidelines*, 2012).
 - Sub-district level (Level 2): Curative services provided at health centres.
 - District level (3): Operating district hospitals, managed by District-Health Management Teams (DHMT).
 - Regional level (4): Specialized clinics and diagnostic facilities.
 - National level (5): Mainly teaching hospitals.
- The Ghana Health Service (GHS) is the body mandated to deliver primary health care (PHC) and operates according to a decentralized framework (*Ghana Health Service and Teaching Hospitals Act (Act 525)*, 1996):
 - 10 national divisions
 - 10 regional directorates
 - 216 district health directorates
- GHS’s main responsibilities are (inter alia) to (*Ghana Health Service and Teaching Hospitals Act (Act 525)*, 1996, section 3):
 - Plan, organize and administer comprehensive health services with special emphasis on primary health care;
 - Implement national health policies with regard to health delivery;
 - Ensure improved access to health services and (*Ghana Health Service and Teaching Hospitals Act (Act 525)*, 1996);
 - Allocate resources accordingly.
- Further legislations that regulate primary and referral health care provision are:
 - Patients Charter (“The Patients Charter”, 2017)
 - Code of Ethics (“Code of Ethics”, 2017)
 - National CHPS Policy
 - National Health Insurance Act, 2012 (Act 852)

Main strengths

Ghana has a comprehensive legal framework on public health. The legislations are contemporary and generally available to the public. Key informants were mostly knowledgeable regarding laws and regulations relevant for ASGM communities.

Although Ghana has no Chemicals Act, both the Mercury Act and technical Mining Regulations stipulate provisions for the purchase, storage and use of mercury. The latter also regulates cyanide management to some extent.

The same can be said for biological and psychosocial hazards. Concerning regulatory completeness Ghana is definitely leading a desirable example. Most of the published documents are general enough to allow a case by case interpretation, while at the same time sufficiently accurate to avoid legal loopholes.

Challenges

It is estimated that ASGM currently accounts for approximately 40% of Ghana’s total gold production (Ghana Chamber of Mines, 2019). The Mercury Act dates back to 1989. Considering the significant development of the sector an amendment of this legislation is indicated. It could be argued this flaw is absorbed by the Minerals and Mining Regulations and EPA Act.

Particulars concerning the ASGM sector and issues regarding health hazards are rarely addressed in regulating documents. Although the latter do leave room for interpretation, it may be desirable to specify legal ASGM health issues.

Ghana has numerous laws, acts and policies in this area. Clustering and – where needed – refining existing frameworks seem preferable over drafting new regulation.

1.2 Structure Level

Priority area	Institutional dimension	Topical indicator	Score
1. Health hazards in ASGM communities	1.2 Structure level	1.2.1 Organization and job responsibilities of key institution(s)	4
		1.2.2 Primary health facilities and hospitals	2
		1.2.3 Technical and laboratory equipment to diagnose, monitor and treat ASGM-related health conditions	2
		1.2.4 Knowledge resources to address ASGM issues	4

1.2.1 Organization and job responsibilities of key institutions

- Organizational and job responsibilities of key institutions such as the MOH, EPA and the Minerals Commission, which is a (subordinate) government agency of the MLNR, are well defined; mandate, mission, objectives and functions are described in detail. This observation applies to institutions and civil servants’ job responsibilities on the national/central government level. For this assessment neither regional nor local authority representatives were interviewed.
- The majority of the key informants know specifics of their job, the available means

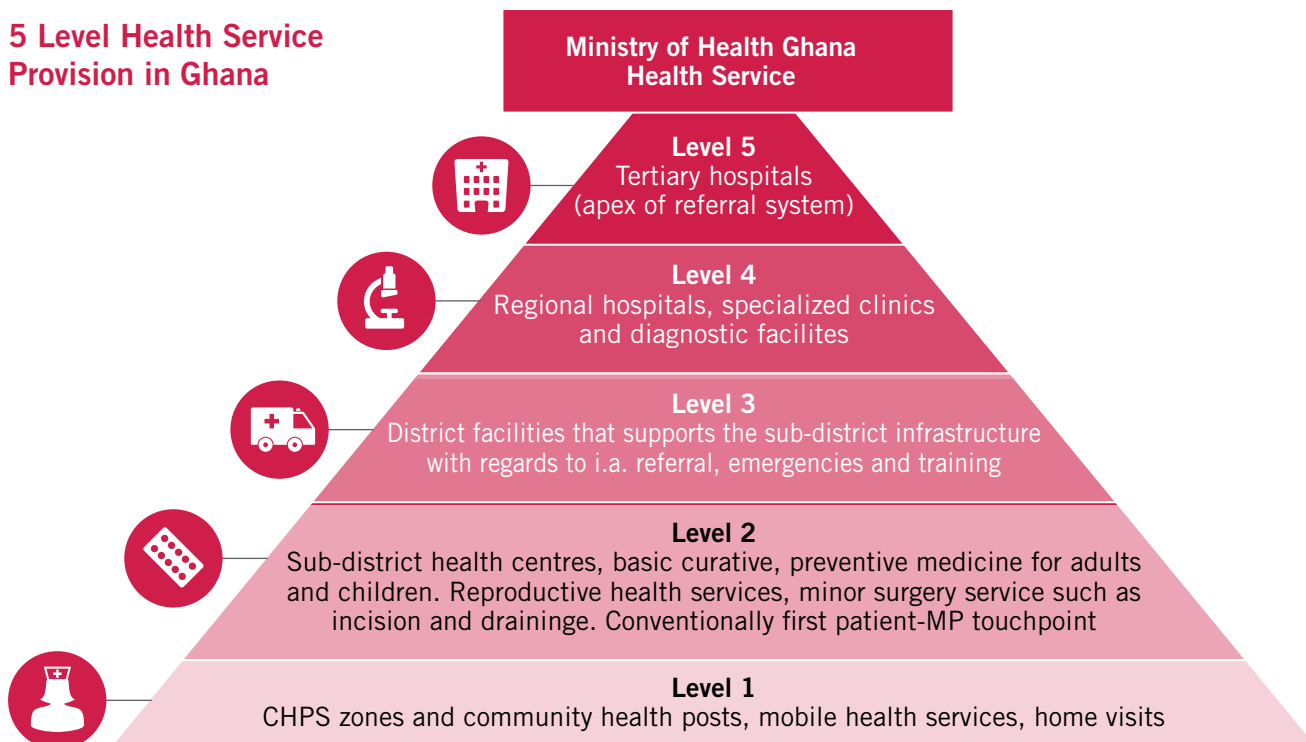
of implementation and what the expected achievements are.

- Many of the organograms are available online. Alternatively, organizational structure charts were usually pinned in the working environment of executive managers for all staff members to see or hard copies were available internally.

1.2.2 Primary health facilities and hospitals

- Ghana Health Service is mandated to manage and operate public health facilities (Act 527). As an autonomous Executive Agency, it is mandated to govern PHC.⁶

Figure 3: Ghana's Health System



⁶ In addition to ensure the implementation of national policies.

- Sub-District Level (2) institutions are the main providers of PHC whereas Health Posts and CHPS Zones (level 1) usually host the first interaction between a patient and a formal health professional (“Regional and District Administration”, 2017).⁷
- Sub-District Health Centres are headed by a Medical Assistant and mainly attend to:
 - Midwifery
 - Laboratory services
 - Public health
 - Nutrition
 - Environmental health
- The Sub-District Health Centre-to-Population ratio should not exceed 1:20,000 (“Regional and District Administration”, 2017)
- Sub-District Health Centres are expected to provide:
 - Basic curative medicine for adults and children,
 - Basic preventive medicine for adults and children,
 - Reproductive health services,
 - Minor surgical services such as incision and drainage.
- In 2016 it was estimated that 70% of Ghana’s citizens live further than 8 km away from the nearest health care provider (National Community-Based Health Planning and Services (CHPS) Policy, 2016, p.2). The regional distribution of health infrastructure is rather unequal; the Doctor-to-Population-Ratio (DTPR) in urban regions is significantly lower than in rural and difficult-to-reach areas (Ghana Health Service, 2018, 3.4).
- Basic health care on the Community Level (1) is provided by the local CHPS attending to:
 - Minor ailments
 - Prevention and Health Promotion
 - House-to-house visits (midwifery, malaria prevention, etc.)
 - Emergency service at the Community Health Officers (CHO) residence
- A total of 4,016 registered doctors practiced in the country in 2018, which is a ratio of 1:7,374 (Ghana Health Service, 2018, 3.4). The number of doctors has almost doubled since 2013 while the doctor-to-patient ratio has reduced by approximately 25%.
- According to key informants ASGM takes place predominantly but not exclusively in the Ashanti and Western Regions. Based on available data the Ashanti and Western Region have a comparatively low number of doctors and thus a relatively high DTP ratio (Ghana Health Service, 2018). PHC is predominantly supplied at CHPS rather than in Health Centres. Curative and preventive interventions are mainly delivered by nurses who depend on the support of CHOs and volunteers (“About CHPS”, 2016). Interviewees reported that health issues typically occurring amongst ASG miners are still insufficiently attended to.
- Key informants reported that the six-month ban which was cast on both formal ASGM and illegal gold mining, commonly referred to as “galamsey” at the beginning of 2018 worsened the situation. The sector was declared an enemy of the state whereby entitlement to access good health care was implicitly denied.
- Larger ASGM operations were reported to have first aid infrastructure as well as diagnosing of cyanide-related ill health and treatment on site.

⁷ The polyclinic is the urban version of the health centre.

Table 5: Health Facility Distribution, DTPR in Ghana compiled from GHS data (Ghana Health Service, 2018)

Region (incl. population)	Type of health facility									# of government hospital beds	# of private hospital beds	# of faith-based hospital beds	# of quasi-government hospital beds	% by Region	Number of doctors	Doctor-to-Patient Ratio
	CHPS	Clinic	District Hospital	Health Centre	Hospital	Maternity Home	Polyclinic	Psychiatric Hospital	Mines							
Ashanti 5,661,728	1122	149	25	164	128	69	1	0	1	1543	879	1274	0	15.5	822	6888
Brong Ahafo 2,786,400	665	74	20	131	19	39	4	0	0	973	366	1611	0	12.4	277	10,059
Central 2,521,118	364	48	12	75	17	36	3	1	0	1357	232	491	0	8.7	320	7878
Eastern 3,171,740	747	81	18	131	18	29	3	0	0	1816	1017	895	0	15.6	253	12,537
Greater Accra 4,831,710	498	322	8	40	99	104	14	2	0	1882	99	68	0	8.6	1583	3052
Northern 2,993,889	459	57	17	105	16	8	5	0	0	1452	0	394	0	7.7	269	11,130
Upper East 1'244'983	255	46	6	55	4	2	0	0	0	925	50	388	0	5.7	47	26,489
Upper West 829,984	256	13	1	71	11	5	4	0	0	629	0	404	0	4.3	56	14,821
Volta 2,549,256	454	44	17	154	11	14	4	0	0	1500	60	875	0	10.2	242	10,534
Western 3,023,529	601	134	16	78	34	40	0	0	10	1487	478	580	104	11.1	147	20,568
National	5421	998	140	1004	357	346	38	3	11	13564	3181	6980	104	100	1016	7374
% by ownership										57	13.3	29.3	0.4			

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

■ According to GHS representative's mobile equipment to diagnose common diseases such as malaria, HIV or cholera is available in urban areas. In general, the primary health services, i.e. Sub-District Health Centres, should be equipped to diagnose, monitor and treat basic health needs.

■ GHS states on its website the mandate to ensure sufficient laboratory equipment at the district level. However, no data or reports were provided documenting the availability of equipment. Key informants were not able to indicate structural obligations on the local level with regard to ASGM other than mobile diagnostic systems for malaria, HIV and TB. Efforts to tackle malaria, HIV or TB by making available relevant infrastructure to diagnose, monitor and treat were confirmed in some cases by civil society representatives.

- Korle Bu, a tertiary teaching facility has a chemical pathology department. It is located in the Greater Accra Region and therefore not easily reachable for ASGM miners.
- NGO sector representatives with comprehensive field experience stated that diagnostic, monitoring and treatment technologies are rather rare in ASGM communities.
- Diagnosis of mercury or other ASGM-specific symptoms (e.g. silicosis, asthma, yellow fever, etc.) has to happen at a Sub-district Level (Health Centres) or District-Level (District Hospitals) or in a tertiary facility (regional or teaching hospital).
- A key informant representing the Water Resources Commission confirmed mobile laboratories that are used to analyse the quality of Ghana's waterbodies. Checking for mercury or cyanide is not a standard procedure though. Only when relevant indications suggest elevated levels of persistent organic pollutants (POP) or when an affiliated agency (e.g. EPA) orders analysis are waterbodies tested for mercury or cyanide.

1.2.4 Knowledge resources to address ASGM issues

- All agencies consulted were fully aware that ASGM communities exert (open) amalgamation.
- The National Steering Committee brings together the key ministries that ought to address ASGM issues. Civil servants and affiliates drawn from the MOH, EPA, MLNR, MINCOM, CSOs and the private sector exchange their knowledge on a regular basis so as to overcome silo thinking and ramp up efforts to phase out the use of mercury amongst ASGM communities.
- Generally, the level of ASGM-related knowledge and indicated challenges is very contemporary and comprehensive. It was observed that government units not only collaborate closely with CSOs on a regular basis but also take it upon themselves to visit the mines.
- Systematic ASGM health data collection is happening to some extent and with topical focus (e.g. malaria, HIV). Infrequent surveys have been conducted while longitudinal studies observing ASGM health are planned. Documentation supporting these disclosures was not available.

Main strengths

The respective agencies seem well organized and have defined job responsibilities.

Identified structural and organizational gaps are addressed.

Interventions designed to improve the accessibility and quality of PHC show success in some areas (DTP ratio, number of health facilities, prevalence of HIV, child mortality, etc.).

Cooperation and interaction with national and international organizations is strong based on long-time efforts, political will and determination to overcome silo management.

Ghana's health care system is decentralized and embedded in a five level structure. This system is suitable to satisfy ASGM-related health needs.

Contemporary tools are increasingly utilized; digital platforms make strategies, mandates,

organograms and job responsibilities available to the public, less so more detailed information.

Problems and challenges related to the ASGM communities are acknowledged.

Challenges

Accessible and good-quality health care is not equitably distributed. Government struggles with understaffing, a lack of monitoring data and effective implementation.

The meticulous and numerous job descriptions and agency mandates bear the risk of micromanagement that restricts efficiency.

Not all organograms are up-to-date.

There is no unilateral institutional strategy designed to administer ASGM. Reports, datasets or other documentation reveal information that is not always consistent.

1.3 Process level

Priority area	Institutional dimension	Topical indicator	Score
1. Health hazards in ASGM communities	1.3 Process level	1.3.1 Mechanisms for responding to health emergencies (e.g. chemical spills, disease outbreaks)	2
		1.3.2 Preventive mechanisms to address health hazards related to ASGM (e.g. chemical spills, disease outbreaks)	2
		1.3.3 Training programs for health staff to detect, monitor and treat health conditions related to ASGM	1
		1.3.4 Coordination mechanisms among ministries to address health hazards	3

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

- According to Act 517, national emergencies and disasters are responded to by the National Security Council which is overseen by the Minister responsible for internal affairs (National Disaster Management Organisation Act (Act 517), 1996, art. 4(1), art. 6). The National Security Committee is a supra-ministerial agency of which the EPA is a representative member (National Disaster Management Organisation Act (Act 517), 1996, art.8(2) lit.b subpara. viii).
- The National Committee must ensure (art. 10):
 - the implementation of national disaster policies;
 - effective flow of critical communication between national, regional and district capitals;
 - in the event of any disaster, assess the extent of damage and the needs for the affected areas and report to the council;
 - coordinate regional and district disaster management plans and activities;
 - identify, receive, manage and supervise relief items;
 - investigate reports and analyse the nature of the hazards and vulnerability and risk situations in particular areas and ensure the operational readiness of regional and district disaster management committees in those areas;
 - collect and preserve data on disasters in the area;
 - take steps to ensure the efficient training of organized personnel and other persons available for emergency or disaster duties;
 - disseminate information to educate the public on:
 - human activities most likely to cause environmental disasters in the country;
 - the hazards and natural disasters which are likely to affect the various regions in the country;
 - action to be taken in the event of a disaster of whatever nature;
 - and the control and relief measures most likely to be taken by the state and the necessity for everyone to cooperate with the authorities on these occasions.
- The Act ascribes similar obligations to the Regional Disaster Committee and the District Disaster Committee and is the responsibility of the Regional and District Director of Health, respectively. (National Disaster Management Organisation Act (Act 517), 1996, art. 13 et sqq.).
- The national Disaster Management Plan is designed to prepare the country in case of a national, district or regional disaster. Disasters are mapped in different hazard categories, two of which are diseases and epidemics and chemical hazards. The latter is not applicable for chemical spills. In the event of a chemical spill the manual of “Man-made Disasters” is applicable. This paragraph is rather concise. Albeit the pollution of waterbodies, industrial accidents or the failure of constructions are listed as man-made disasters, details of how to respond to a chemical spill are not specified (National Disaster Management Plan, 2010, 7.3.5).
- In the case of an emergency occurring in an ASGM particular context, the Minerals and Mining (Health, Safety and Technical) Regulations foresee an Emergency Response Plan.
 - The Emergency Response Plan shall:
 - Contain a description and assessment of emergency scenarios and risks;
 - Provide for the establishment of an emergency co-ordination centre;
 - Provide for emergency
 - notification procedures and

- communication system;
- equipment and resources; and
- scenarios and response procedures; and
- Provide for:
 - clean-up, remediation, procedure for returning to normal operation;
 - training of staff; and
 - periodic emergency and evacuation drills of staff.
- Key informants were unable to share the response plan for deployment in the event of a chemical spill. It is unclear a) what interventions are foreseen and b) what infrastructure is available on a local level for ASGM communities should a chemical spill occur.

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

- Awareness raising campaigns are the most widely applied mechanism when addressing health hazards related to ASGM. MINCOM, EPA, the Water Resource Commission (WRC), the International Labour Organization (ILO) and the NGO Solidaridad gave evidence of specific initiatives to promote the safe use of mercury. How to prevent chemical spills is currently not an education component.
- The majority of the awareness raising campaigns and trainings are initiated by CSOs.
- In 2015 Solidaridad and the GHS signed a memorandum of understanding to pilot a health project in two ASGM mines. The outcome of this project has not (yet) been published.
- GHS's representative shared that no longitudinal data have been collected from studies on long-term health implications of mercury use. Thus, no specific prevention methods have been developed.
- A Chemical Response Training is offered by the Occupational Safety and Health Association. Preventive programs focusing on hazardous chemicals or disease safety in ASG mining are not part of the association's training portfolio nor could we find evidence of preventive protocols tailored to the context of ASGM ("Chemical Spill Response Training", 2019).
- Introducing glass lantern retorts to some ASGM communities has had the desired outcome. Data on the number and dispersion of the retorts were not available. This very effective and in principle affordable item is not readily accessible to the miners. Retorts can only be ordered from a wholesaler, according to the Association of Small-scale Miners. Typically, an ASG miner does not have the means (nor need) to purchase large

quantities. As a consequence, the number of retorts in use is diminishing, increasing the risk of mercury exposure.

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

- Training of health staff on the primary level, i.e. local level, is of a generic nature. National programs developed to alleviate malaria, TB and silicosis are being realized. According to the GHS regular training is an inherent component of this initiative.
- No information was obtained that indicates ASGM specific training for health staff. Baseline data are missing that would allow development of a tailored strategy.
- Since malaria and cholera do occur all over the country, it stands to reason that specific trainings are in place to address them. On the other hand, though ASGM is widespread, no tailor-made strategy has been made for the ASGM sector, according to GHS.

1.3.4 Coordination mechanisms among ministries to address health hazards

- Systematic debate about health hazards threatening ASG miners is recent within Government. The national ban on formal and informal ASGM (galamsey) diverted institutional attention away from ASGM-related health issues. Lifting the ban has given reason to re-strategize. Coordinating mechanisms are currently focused on deforestation, illegal operations, land-grabbing or child labour.
- The Minamata Initial Assessment (MIA) was conducted in a joint effort between appointed agencies. According to key informants the urgency of streamlining health issues affecting ASGM communities was spawned while preparing the assessment. Working groups are currently preparing strategies to improve inter-ministerial coordination. Documentation confirming these efforts were not available.
- GHS is not a member of the IMCIM, the reason being that the initial mandate of this inter-ministerial body was to curb illegal mining but not to develop the sector.
- A number of key informants criticize that committing to initiatives (such as the Minamata Convention) aiming to phase out the use of mercury should be ratified as a region. Health hazards are not expected to be reduced any time soon based on the fact that importing mercury illegally is uncompromised.

Main strengths

Emergency response protocols are in force and provide detailed commands in case of an emergency related to chemicals or a disease outbreak. Theoretically, essential interventions prepare the country for the event of an epidemic or man-made disaster.

Ghana's ASGM Research Group (representatives of academia, government and CSOs) conducted an Integrated Assessment of the sector (not to be confused with the Minamata Convention on Mercury Initial Assessment). The technical working group confirms attributed health issues affecting ASGM communities. This research is descriptive and makes little reference to institutional capacity development needs. According to affiliates of the research group their activities continue, and they also share ASGM health expertise with legislators and health staff. They unify broad practical and theoretical expertise and knowledge which could critically support an ASGM health improvement process.

In August 2018 the Minister of Environment, Science, Technology and Innovation published the Minamata Convention on Mercury Initial Assessment Report. The report gives a solid overview of ASGM-related challenges by consolidating facts of different topical categories (waste, health, labour, etc.).

CSOs play a critical role in bridging governmental gaps while covering a broad variety of health

topics. This includes the training of miners and government officials, systematically managing knowledge, linking essential stakeholders and generally advocating for improved ASGM health.

Challenges

Ghana's preparedness for chemical spills seems to be very limited and might not be functional in the case of an emergency.

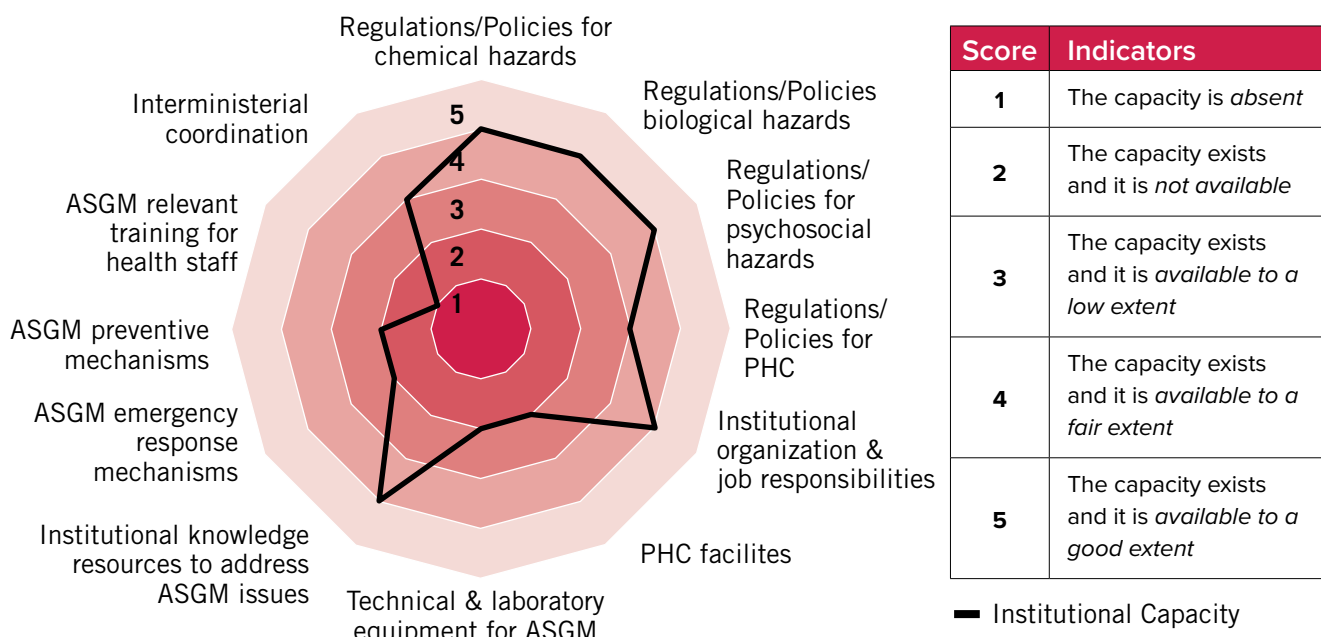
There is a knowledge gap between district agents and national agents. Communication of data on emergency handling in ASGM needs improvement.

Although regulation defines the required capacity for health professionals, the latter do not receive adequate training in ASGM health emergency response.

Chapter three of the Minamata Convention on Mercury Initial Assessment Report assesses the policy, regulatory and institutional framework (Chemicals Control and Management Centre, 2018). While all relevant legislations are mentioned, the report does not suggest institutional interventions that would improve the identified issues.

In order to sustain the momentum of the collaborative research, efforts aiming to improve inter-ministerial alignment need to be reinforced.

Figure 4: Radar Diagram – Health Hazards



2. Occupational health hazards related to ASGM

2.1 Regulatory and policy level

Priority area	Institutional dimension	Topical indicator	Score
2. Occupational health hazards related to ASGM	2.1 Regulatory and policy level	2.1.1 Regulations and policies for the following occupational health hazards in ASGM: <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) 	4

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

A number of laws relate to labour and employment legislations. With regard to chemical hazards, biochemical and physical hazards, the following are key:

1. Constitution of the Republic of Ghana, 1992 (Act 527)
2. The Labour Act 2003
3. Labour Regulation, 2007 (L.I. 1833)
4. Factories, Offices and Shops Act, 1970 (Act, 328)
5. National Employment Policy, 2014
6. Minerals and Mining (Health, Safety and Technical) Regulations, 2012 (L.I. 2182)
7. Minerals and Mining (General) Regulations, 2012 (L.I. 2173)
8. Minerals and Mining Act, 2006 (Act 703)
9. Environmental Protection Agency Act, 1994 (Act 490)
10. Workmen's Compensation Act, 1987 (Act 187)
11. Children's Act, 1998 (Act 560)
12. Jurisprudence and prejudices of Ghana's courts of law
13. International conventions, treaties or protocols

- Since Ghana has no Chemical Act, chemical hazards from mercury or cyanide are not regulated. Human physical and psychological integrity is protected by the constitution while this guarantee is specified occasionally (CHAPTER L1 Labour Act, 2007, §46, sec.2).
- Miners who are excessively exposed to "wet or to any injurious or offensive substances" are to be equipped with protective clothing and appliances (Factories, Offices and Shops Act (Act 328), 1970, sect. 25). Vice versa the employee is obliged to "the safety appliances, firefighting equipment and personal protective equipment provided by the employer in compliance with the employer's instructions to protect his health" (*Labour Regulations (L.I. 1833)*, 2007, art. 118 (3)).
- Child labour is a common phenomenon within ASGM. Regulations concerning child labour in ASGM are to be subsumed under the constitution, Child's Right Act and international regulations.

Main strengths

A broad set of laws and regulations is in force that in theory is applicable to the ASGM sector. Mining regulations go as far as to expect managers of mines to appoint a person solely responsible to assist enforcement of labour regulations that warrant the health and safety of miners (*Minerals and Mining (Health, Safety and Technical) Regulations (L.I. 2182)*, 2012, art. 42).

Some documents make specific reference to mining if not artisanal and small-scale gold mining.

The Factories, Offices and Shops Act and the Labour Act especially regulate clearly how to protect workers from labour-related hazards. They require companies to provide the necessary protective gear to workers. The wording is usually kept in a general manner that allows the subsuming of ASGM circumstances under these acts.

Objective 2 of the National Employment Policy aims to “improve the quality of jobs for those employed”. This objective is outlined to also improve labour standards for vulnerable workers such as women and children. Strategic actions are listed for Objective 2 of the National Employment Policy, including better enforcement of labour laws and regulations on occupational health and safety (National Employment Policy, 2014, 3.2).

Challenges

The National Employment Policy acknowledges that enforcement of relevant regulations has been insufficient. Nonetheless, corrective actions are rarely specified.

Four years have passed since the policy was published. Key informants were not able to present monitoring or evaluation reports that document progress.

With regard to health hazards in the ASGM sector, key informants predominantly focus on the provision of PPE. Regulation knowledge regarding labour health is below average.

Women are particularly impacted when exposed to mercury without protection. No measures specifically addressing the situation of women in ASGM could be identified.

Child labour is common in ASGM. No ASGM specific policy or regulation exists to protect children from chemical, biomechanical and physical hazards, or to reduce child labour.

Finally, there is the question of whether or not current regulations apply to informal ASGM miners. The term “employee” implies a certain grade of formality and seems to exclude the informal ASGM sector. It is argued that bridging this legal gap through argumentative analogy would ultimately defeat the purpose of formality and undermine efforts to formalize the ASGM sector. Key informants struggle with this legal insecurity and were in favour of amending current or drafting new legislation.

2.2 Structure level

Priority area	Institutional dimension	Topical indicator	Score
2. Occupational health hazards related to ASGM	2.2 Structure level	2.2.1 Organization and job responsibilities of key institution(s)	2
		2.2.2 Technical and laboratory equipment to diagnose, monitor and treat ASGM-related occupational health conditions (see also 1.2.3)	1
		2.2.3 Knowledge resources to address ASGM issues	3

2.2.1 Organization and job responsibilities of key institution(s)

The Ministry of Employment and Labour Relations (MELR) clearly defines its mandate, mission and vision, including objectives and functions (“About”, 2015). The organogram of the 14 departments under its jurisdiction is available online.

The Chemical Control Management Centre is responsible for monitoring and providing controls on industrial/consumer chemicals in Ghana (“Chemicals Control Management Centre | Environmental Protection Agency, Ghana”, 2019).

It was not possible to interview a representative of the MELR.

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

- The Department of Factories Inspectorate is responsible for investigating “notifiable occupational accidents and dangerous occurrences” (“Department of Factories Inspectorate”, 2015).
- Generally, health conditions ought to be treated at a public health facility. According to key informants, large-scale gold mining companies have fully equipped laboratories on site allowing diagnosis and basic treatment of occupational health conditions.
- Mining regulations oblige the mining manager to keep first aid kits for emergency treatment ready at all times (Minerals and Mining (Health, Safety and Technical) Regulations (L.I. 2182), 2012).
- Where gold is extracted with cyanide the following requirements apply (Minerals and Mining (Health, Safety and Technical) Regulations (L.I. 2182), 2012, regulation 22 (7) (a)):
 - a separate first aid post;
 - an ambulance;

- emergency showers and eyewash facility.
- The manager shall cause first aid kits to be put in
 - appropriate storage containers in strategic and conspicuous areas on the plant next to an emergency shower; and
 - in the plant control room.
- Where first aid kits are kept under lock and key, the person responsible for a processing plant shall ensure that the key is readily available at all times.
- The manager shall provide and cause to be properly kept first aid kits consisting of
 - a set of personal cyanide protective equipment for emergencies; and
 - special kits for emergency treatment of cyanide poisoning, consisting of antidotes and medical oxygen is used.

- CSOs claim to observe deficient efforts from governmental institutions to inspect the mines and enforce compliance with the standards. Emergency equipment and first aid kits are by far not available on ASGM sites. In addition, it was stated that in the event of reported incidences from the field there is no response or follow-up from the system.

2.2.3 Knowledge resources to address ASGM issues

- All key informants are fully aware of the occupational risks ASG miners expose themselves to. Not wearing PPE is observed across the entire ASGM sector. It is believed that inadequate risk education makes for such ill decisions. Some argue that these practices should instigate the government to question current frameworks. However, data are not collected and transformed into solid information, nor translated into action in a systematic manner.

Main strengths

Overarching mandates are well defined at the MELR. Existing laws and regulations indicate respective responsibilities and desired ministerial cooperation.

Occupational health hazards related to ASGM are on the radar of relevant ministries. The continuous economic importance of the sector and lifting of the ban on ASGM are two drivers that have revived governmental commitment to re-evaluate institutional structures.

Challenges

A large number of regulations appoint various agencies to govern ASGM. This diversity makes it difficult to identify key responsibilities and thus define adequate structures and job responsibilities.

Comprehensive baseline data would support the design of institutional structures, responsibilities and fields of action.

On numerous occasions key informants declared that the regulations are sufficient. The decentralized system is seen to complicate matters as context-specific structures and implementation schedules are the responsibility of district agencies.

2.3 Process level

Priority area	Institutional dimension	Topical indicator	Score
2. Occupational health hazards related to ASGM	2.3 Process level	2.3.1 Mechanisms for responding to health emergencies in the workplace (e.g. chemical spills and accidents)	2
		2.3.2 Preventive mechanisms to address occupational health hazards in the workplace (e.g. chemical, biomechanical, physical)	3
		2.3.3 Coordination mechanisms among ministries to address occupational health hazards	2

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

- The Labour Act not only defines how to prevent occupational emergencies but also outlines response liabilities through general principles (*Labour Act (Act 651)*, 2003). The employer is obliged to report the occurrence of an accident or disease outbreak within seven days to the “appropriate government agency” (*Labour Act (Act 651)*, 2003, art. 120).
- Occupational health and safety are the responsibility of the factory owner or manager, who is obliged to operate the factory in a manner that presents no risk to workers’ integrity. Emergency Response Plans are mandatory and must be submitted to the Inspectorate Division before a mining license is issued (*Minerals and Mining (Health, Safety and Technical) Regulations (L.I. 2182)*, 2012, art.11).
- Preventing and maintaining workspace safety and health is also the workers’ responsibility. The Labour Act, the Factories, Offices and Shops Act as well as the Minerals and Mining (Health, safety and Technical) Regulations outline the employees’ duties.
- The Emergency Response Plan shall:
 - Contain a description and assessment of emergency scenarios and risks;
 - Provide for the establishment of an emergency co-ordination centre;
 - Provide for emergency
 - notification procedures and communication system;
 - equipment and resources; and
 - scenarios and response procedures; and
 - Provide for
 - clean-up, remediation, procedure for returning to normal operation;
 - training of staff; and
 - periodic emergency and evacuation drills of staff.

- The National Disaster Management Organisation (NDMO) has a protocol for the event of major emergencies (National Disaster Management Organisation, 2010). Different plans exist for possible emergency scenarios. How to manage a cyanide spill is explicated in the Minerals and Mining (Health, Safety and Technical) Regulations (*Minerals and Mining (Health, Safety and Technical) Regulations (L.I. 2182)*, 2012).
- Representatives of the EPA shared that awareness raising workshops have been conducted with the objective to educate ASGM miners about minimal emergency response mechanisms. Specific teaching content was not shared.

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

Please refer to the previous paragraph.

2.3.3 Coordination mechanisms among ministries to address occupational health hazards

- To collaborate and consult key implementing agencies is an integral part of the National Employment Policy (*National Employment Policy*, 2014, 41.).
- Key informants confirmed a long-standing culture of inter-ministerial collaboration. Following suit with agreed interventions seems to be the bigger challenge. Therefore, missing documentation that supports evidence of joint efforts was not a surprise.
- The technical working group for the Initial Assessment comprised of inter alia government representatives. A member of the working group for the Initial Assessment stressed that due to insufficient reporting and institutional knowledge, management projects put into action go unrecognized.

Main strengths

Emergency and disaster prevention and response frameworks are available. Several paragraphs outline how to manage cyanide, what preventive measures to adopt and what protocol to follow in the event of a spillage.

CSOs working in the field translate concrete demands and needs for action from the field to board rooms.

International organizations with broad expertise concerning ASGM are supplying the ministries with fundamental data and strategy papers. The ILO is an active partner of the government in the area of occupational safety and health.

Disaster management is (in theory) well-structured across all governmental levels and identifies critical actors.

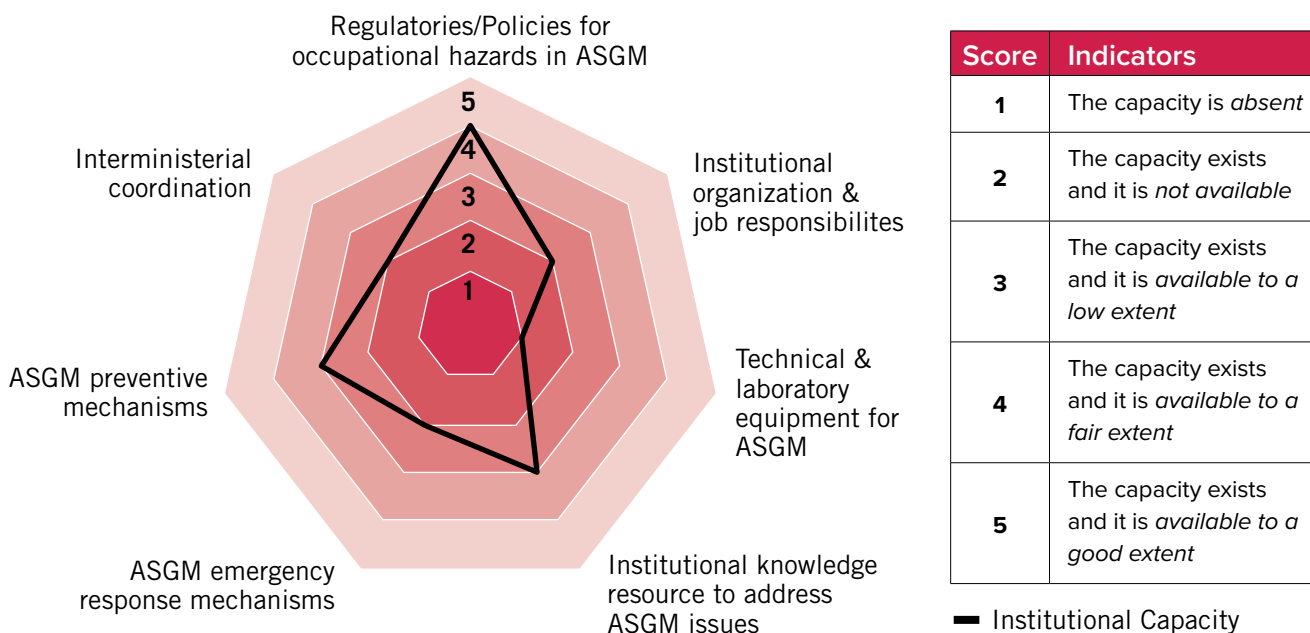
Challenges

On inquiring from key informants about how likely protocols are to be effective in the case of a chemical spill, their evaluation is more worrying. They testify that local areas would not have sufficient fire engines, professional staff, policy, environmental specialists, etc., on call to adequately respond.

In addition, key informants' opinion differs as to whether responding to such an event is a national or a district responsibility.

How designated prevention mechanisms are being implemented is unclear. Monitoring, evaluation and continuous recording of tracks are done only moderately and not available online or through key informants.

Figure 5: 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

Priority area	Institutional dimension	Topical indicator	Score
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

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

In Ghana the Environmental Protection Agency is the leading public body in charge of protecting and improving the environment (“Objectives & Functions | Environmental Protection Agency, Ghana”, 2019). This agency is eligible to draft regulations, monitor and inspect compliance, and prosecute fallible conduct. Some of EPA’s functions to safeguard the environment include to:

- advise the Minister on the formulation of policies;
- coordinate the activities of bodies concerned with the technical or practical aspects of the environment and serve as a channel of communication between such bodies and the Ministry;
- coordinate the activities of such bodies as it considers appropriate for the purposes of controlling the generation, treatment, storage, transportation and disposal of industrial waste;
- ensure in collaboration with such persons as it may determine the control and prevention of

discharge of waste into the environment and the protection and improvement of the quality of the environment;

- *issue environmental permits and pollution abatement notices for controlling the volume, types, constituents and effects of waste discourages, emissions, deposits or other source of pollutants and of substances which are hazardous or potentially dangerous to the quality of the environment or any segment of the environment;*
- *issue notice in the form of directives, procedures or warning to such bodies as it may determine for the purpose of controlling the volume, intensity and quality of noise in the environment;*
- *prescribe standards and guidelines relating to the pollution of air, water, land, other forms of environmental pollution including the discharge of wastes and the control of toxic substances;*
- *ensure compliance with any laid down environmental impact assessment procedures in the planning and execution of development projects, including compliance in the respect of existing projects;*
- *act in liaison and co-operation with government agencies, District Assemblies and other bodies and institutions to control pollution and generally protect the environment;*
- *conduct investigations into environmental issues and advise appropriate stakeholders (complainants, policy and law makers) there on;*
- *promote studies, research, surveys and analyses for the improvement and Protection of the environment and the maintenance of sound ecological systems in Ghana;*
- *initiate and pursue formal and nonformal education programmes for the creation of public awareness of the environment and its importance to the economic and social life of the country;*
- *promote effective planning in the management of the environment;*
- *develop a comprehensive database on the environment and environmental protection for the information of the public.*

Subsequent laws and policies regulate prior listed eco-hazards and complement the Environmental Protection Agency Act:

1. Constitution of the Republic of Ghana, 1992
2. Minerals and Mining (Health, Safety and Technical) Regulations, 2012 (L.I. 2182)
3. Minerals and Mining (General) Regulations, 2012 (L.I. 2173)
4. Minerals and Mining Act, 2006 (Act 703)
5. Environmental Protection Agency Act, 1994 (Act 490)
6. Hazardous and Electronic Waste Control and Management, 2016 (Act 917)
7. National Land Policy, 1999
8. Water Resources Commission Act, 1996 (Act 522)
9. Water Use Regulations, 2001 (L.I. 1692)
10. National Water Policy, 2017
11. Forest Protection Act, 1974 (NRCD 243)

GHS reports that addressing environmental health issues and following suit with execution is less of a priority. With regard to environmental health, key informants were not always sure what existing laws apply and how they target the ASGM sector and the extractive industry as a whole.

Based on testimonies by the WRC, environmental hazards endangering ASGM communities are not an issue. Groundwater quality is checked in general but no initiatives are described to manage the environment of the ASGM sector.

WRC informed that when taking water samples, it was discovered that ASGM communities reveal a conduct of concern such as diversion of waterbodies, extraction of alluvial gold from river sediment, limited fresh water supply, sachets pollution, open defecation, etc. Although the findings were communicated to superordinate agencies, the situation remains. Local authorities lack manpower, technical knowledge and funds to adequately address the issues.

3.2 Structure level

Priority area	Institutional dimension	Topical indicator	Score
3. 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)	3
		3.2.2 Technical and laboratory equipment to assess, monitor and improve ASGM-related environmental issues	2
		3.2.3 Knowledge resources to address ASGM issues	3

3.2.1 Organization and job responsibilities of key institution(s)

- At national level, job responsibilities related to environmental hazards are defined. The EPA and WRC have detailed job descriptions available for the majority of key posts. A key informant representing the GHS stated that due to a lack of legislative powers vested in the GHS, no decentralized units are established to be in charge to govern environmental health issues.
- Organograms and allocation of staff are available.

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

- The WRC is well equipped with mobile laboratory instruments and takes random as well as strategic water samples. Nonetheless, there is no evidence of systematic surveillance of soil, air and water in ASGM areas. As indicated earlier, monitoring and evaluating mercury levels in waterbodies happens upon events that indicate contamination.
- International organizations or local NGOs conduct regular environmental analyses in ASGM areas. For instance, the Artisanal Gold

Council (contracted by the NRDC) supported research methodology and the mercury baseline inventory that is a requirement for the NAP in any country in which the use of mercury is more than insignificant. It is known, that some of the results ought to guide the development of strategies and objectives for phasing out the use of mercury (advocacy, internal awareness raising).

3.2.3 Knowledge resources to address ASGM issues

- Key agencies have the knowledge about environmental (health) hazards jeopardizing ASGM communities. Mines are visited on a regular basis, though large-scale mines more often than ASG mines and a long-standing culture of collaboration between the EPA, MINCOM, WRC and CSO ensure knowledge management. A track record of how the knowledge is strategically translated into institutional structures, working papers, programmes or projects was not shared. The impacts of cyanide on the habitat are not a focal topic and therefore not included in political or legislative agendas and programs.

3.3 Process level

Priority area	Institutional dimension	Topical indicator	Score
3. Environmental hazards related to ASGM that have implications for health	3.3 Process Level	3.3.1 Mechanisms for responding to environmental emergencies related to ASGM	2
		3.3.2 Preventive mechanisms to address environmental hazards related to ASGM (e.g. land degradation, mercury emissions/pollution, siltation, erosion, water contamination)	3
		3.3.3 Training programs for staff to detect and monitor environmental hazards related to ASGM	2
		3.3.4 Coordination mechanisms among ministries to address environmental hazards that have implications for health	2

3.3.1 Mechanisms for responding to environmental emergencies related to ASGM

Please refer to 1.3.1 and 2.3.2.

3.3.2 Preventive mechanisms to address environmental hazards related to ASGM (e.g. land degradation, mercury emissions/pollution, siltation, erosion, water contamination)

- Key informants representing the EPA and MINCOM stated that regular mercury workshops are held so as to educate ASGM communities. These workshops also highlight the importance of adequately disposing chemicals and using (subsidized) lantern retorts. Statistics that reveal frequencies and/or coverage of such trainings were not available.
- The IMCIM (a MESTI affiliate) was established by President Akufo-Addo with the objective to ensure coherence of the various agency interventions and speed up action against illegal mining. The approach taken by IMCIM is predominantly repressive. A task force including almost half a million soldiers was commissioned and new tools were introduced to monitor illegal logging and mining activities, including the analysis of satellite and drone imagery. IMCIM statements made between 2017 and 2018 portrayed illegal mining as against the interest of the state, harming the environment and communities, and seriously disrupting Ghana's gold market.
- CSOs regularly facilitate programs and workshops with ASGM communities to train them on how to prevent environmental hazards (see next section).

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

- CSOs have a broad portfolio of trainings that are designed to educate mining communities in preventing and detecting environmental hazards. Such include enhanced sanitation standards (on open defecation, enhanced hygiene around water bodies, burning of waste, etc.), water management and adequate handling of mercury. Since cyanide is not common in ASGM, managing this chemical is not a topic.
- The EPA, together with the GCM and the WRC, offers an Environmental Impact Assessment Training. No information was shared about training programs to detect and monitor environmental hazards. The most recent workshop was offered in 2015 when the last training was offered. Its objective was: *The EIA Training Seminar seeks to offer hands on refresher training for Presidents, (...) who are involved in the content development and documentation of EIAs. The aspired outcome is described as follows: "At the end of the seminar, participants should be able to present acceptable EIA proposals that would simplify and speed up the permitting process"*. The trainings (i.e. workshops) target:
 - Presidents/Vice Presidents
 - Managing Directors
 - Mine Planning Managers/Officers/Supt
 - Technical Service Departments
 - Environmental Managers/Supt/Officers
 - Rehabilitation Superintendent/Managers/Officers
 - Community Affairs Manager/Supt/Officers
 - Geologist/Geology & Exploration Department
 - Corporate Offices

FINDINGS, STRENGTHS AND CHALLENGES

- *General Managers*
- *Contract/Procurement*
- *Community Affairs and Public Relations*
- *Mining, Metallurgy and Geologists*
- *Processing, Civil/Operations department*
- *Water and Tailings Managers*
- *Mine Managers*
- *Project Managers*
- *Mining Engineer and Mine Planners*
- *Process Managers*
- *Hydrologists*
- *External Relations Managers*
- *Legal Team*
- *Environmental Consultants*

Health-related ASGM issues were not a component of the training. Insight on outcomes, learning or future training agendas were not available.

- The IMCIM train staff from the MINCOM, WRC and the Forestry Commission (FC) on how to identify galamsey through data from drones and satellites.
- ASGM-related training and capacity-building is not seen as a priority.

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

- The IMCIM was established not only as an intervention unit but also to ensure coherence of the various agency interventions.

Main strengths

National environment protection is well established, and codices are in place.

Minerals and Mining legislations specify more generic environmental legislation for the mining industry. Water is regulated in more detail than other environmental issues.

The Water Resource Commission is well equipped with mobile laboratory instruments and samples waterbodies on a regular basis.

Inter-ministerial knowledge exchange is well developed.

Challenges

Despite the comprehensive national legal framework, there was no documentation of implemented programs or trainings available.

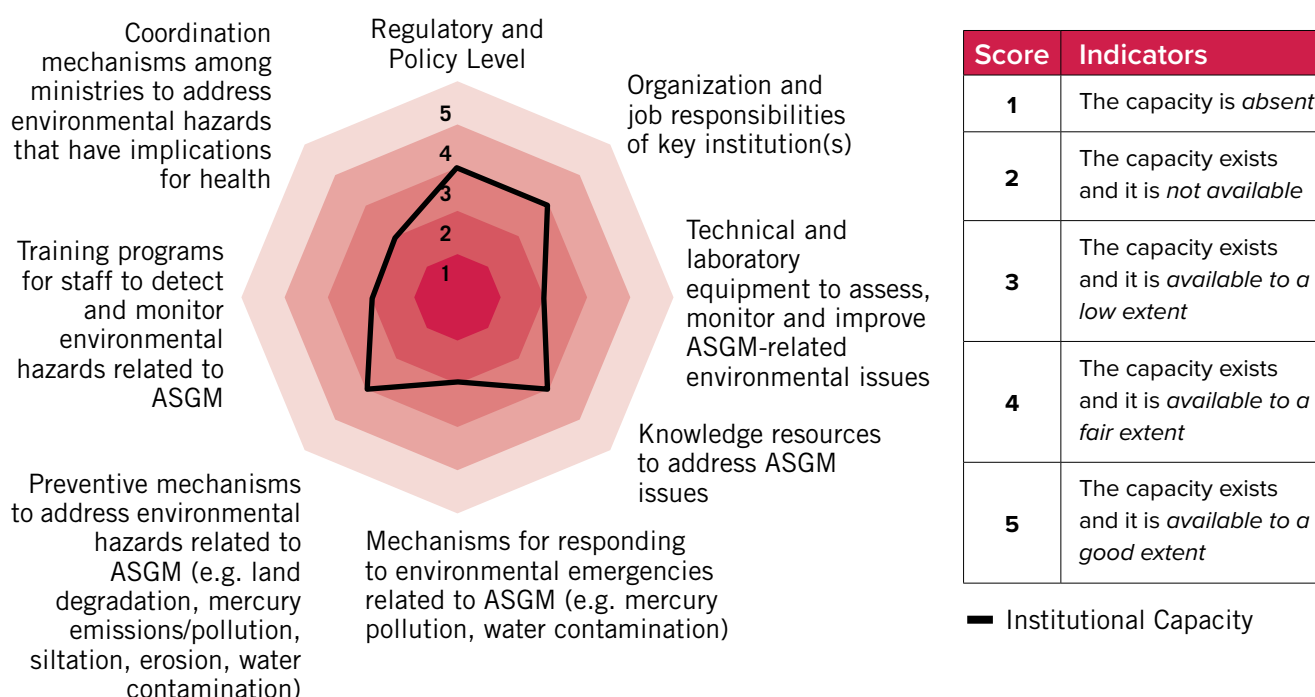
A structural gap exists between the national level and district entities that are the main implementing bodies. Coordination or vertical institutional integration remains unclear.

Topics such as degradation, water pollution, deforestation, etc., are addressed but they do not target the ASGM context. Many ministries are aware of the environmental hazards of ASGM but are not aware of measures taken to address those issues.

Corruption was said to undermine efforts to curb adverse environmental impacts of ASGM.

Insufficient budgets and capacities limit efforts to address the problem.

Figure 6: 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

Priority area	Institutional dimension	Topical indicator	Score
4. Chemical management related to ASGM	4.1 Regulatory and policy level	4.1.1 Regulations and policies for chemical management	4

4.1.4 Regulations and policies are clearly defined for chemical management

- Despite the absence of a chemical act, existing laws and institutional mandates define responsibilities for chemical management in ASGM, focusing mainly on mercury.
- The following codes and regulations govern chemical management applicable to the ASGM sector:
 1. *Constitution of the Republic of Ghana, 1992. Mainly chapter five (Constitution of*

the Republic of Ghana (Act 527), 1992, “Emergency Powers”)

2. *Mercury Act, 1989*
3. *Environmental Protection Agency Act, 1994*
4. *Export and Import Act, 1995*
5. *Minerals and Mining (Health, Safety and Technical) Regulations, 2012*
6. *Minerals and Mining (General) Regulations, 2012*
7. *Minerals and Mining Policy, 2014*
8. *Small-scale Gold Mining Law, 1989*
9. *Food and Drugs Act, 1992*
10. *Local Government Act, 1993*

11. *Standards Authority Act, 1973*
12. *Environmental Protection Agency Act, 1994 (Act 490)*
13. *Hazardous and Electronic Waste Control and Management, 2016 (Act 917)*
14. *Water Resources Commission Act, 1996 (Act 522)*
15. *Water Use Regulations, 2001 (L.I. 1692)*
16. *National Water Policy, 2017*
17. *Common law and jurisprudence of the federal courts of law*

- The Chemicals Control Management Centre (CCMC) is a division of the EPA mandated to “ensure the proper labelling, distribution, storage, transportation, use, application, and disposal of chemicals and associated hazardous waste within Ghana through fair and equitable implementation and enforcement of the EPA Act 490 (“Chemicals Control Management Centre”, 2019).

Main strengths

The above cited codes are able to manage chemicals overall. The Mining regulations specify what is indicated by the EPA Act more generally. The Chemical Management Policy covers general risks related to chemicals, their handling, storage and disposal. The Policy includes the Mining sector and its handling of chemicals. Furthermore, it proposes a strategy on capacity development, the availability of laboratory and testing equipment and risk management (in terms of an emergency response protocol).

Challenges

The legal framework regulating chemical management is incoherent. Ghana has no chemical code and many of the regulations are outdated.

It is not clear whether technical terms (e.g. factory, office or shop) are applicable for the ASGM sector.

The Ministry of Trade and Industry (MOTI) is mandated to issue licences for the import and trade of mercury. It is estimated that only 10% of mercury enters the country through licensed importers. Systematic observation and tracking of the domestic mercury supply chain requires insight that so far has been impossible to gain.⁸ MOTI suspects Burkina Faso to be the main (illegal) supplier of mercury; porous borders with other countries might be entry points as well. Curbing supply of mercury is currently not a priority of MOTI due to financial limitations.

4.2 Structure level

Priority area	Institutional dimension	Topical indicator	Score
4. Chemical management related to ASGM	4.2 Structure level	4.2.1 Organization and job responsibilities of key institution(s)	3
		4.2.2 Technical and laboratory equipment to identify chemicals (mercury, cyanide, chemicals contained in dust, toxic gases)	2
		4.2.3 Knowledge resources to address ASGM issues	2

4.2.1 Organization and job responsibilities of key institution(s)

Organizational structures and responsibilities on the national level are well documented. Although

some organograms are not up-to-date, the major obligations and mandates are mostly clear. Assessing institutional capacities and structures was more difficult.

⁸ MOTI granted the last license to import mercury in 2016. The license expires after six months.

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

A broad range of laboratory equipment is available. Yet, little to no equipment is deployed in areas with informal ASGM activity. Testing of mercury or cyanide poisoning and/or contamination is insignificant according to interviewed informants. According to EPA and MOH, miners consult the traditional healer first in the event of discomfort.

4.2.3 Knowledge resources to address ASGM issues

Not much is known about the supply chain of mercury (or cyanide). Evidently, it is being imported illegally since the number of licenses do not correlate with the volumes that are being used in the sector. Both government and CSO personnel claim that mercury is imported from Burkina Faso or is harboured in illegal maritime shipments from China. Mercury appears to be sold openly in village kiosks nearby mines, usually tightly sealed in small plastic bottles (eyedrop bottles) wrapped in a plastic bag. It can be very easily purchased. Consumers of mercury are aware of its volatility and handle it with great care to avoid spilling or evaporation. Their knowledge is limited to those few facts though.

Main strengths

The Minerals and Mining (Health, Safety and Technical) Regulations govern ASGM-related chemical management, suggest preventive means and decree chemical emergency response.

Relationships with competent international organizations (i.e. UNIDO, ILO) are established.

Challenges

The agencies appointed to administer chemical management are understaffed and lack both human and technical capacities.

Data on the use of chemicals in ASGM are limited. Infrequent efforts are made to systematically survey the sector.

Suggestions for chemical alternatives that ought to be made available to ASG miners include Borax, a boron compound. Governmental subsidies will have to be considered though due to Borax' price tag.

The chemical management framework related to ASGM would benefit from more coherence and streamlining.

Interventions that translate policies are not documented.

4.3 Process level

Priority area	Institutional dimension	Topical indicator	Score
4. Chemical management related to ASGM	4.3 Process level	4.3.1 Mechanisms for responding to chemical emergencies	1
		4.3.2 Preventive mechanisms to address chemical hazards	2
		4.3.3 Coordination mechanisms among ministries to address chemical management	2

4.3.1 Mechanisms for responding to chemical emergencies

- According to key informants, the large-scale mining sector is well prepared for the event of a chemical spill while complying with ISO standards.

- For the ASGM sector no protocol is available. In principle, the mining regulations would apply to the ASGM industry but it is not able to meet those requirements.
- Further details of the mandatory Emergency Response Plan stipulated in the Mining Regulations are described in chapter 1.3.1.

4.3.2 Preventive mechanisms to address chemical hazards

No national-level prevention protocols were shared. It is assumed that chapter 1.3.1 applies accordingly.

4.3.3 Coordination mechanisms among ministries to address chemical management

- The EPA, i.e. its CCMC, works closely with the MINCOM and WRC (technical working groups).

- On the national level inter-governmental coordination and collaboration is predominantly horizontal.
- Vertical coordination and approaches that include regional and district agencies are rarely mentioned.
- Ideas or approaches to improve the overall management of mercury and cyanide could not be identified.

Main strengths

Chemicals management and emergency response processes are well elaborated.

The ban on ASGM between 2017 and 2018 disrupted the sector and might – according to some informants – push it even further into anonymity, making it more difficult for government agencies to identify the scope of their mandate. The ban was lifted recently, which allows for a review of the agencies’ responsibilities and approach towards ASGM.

Challenges

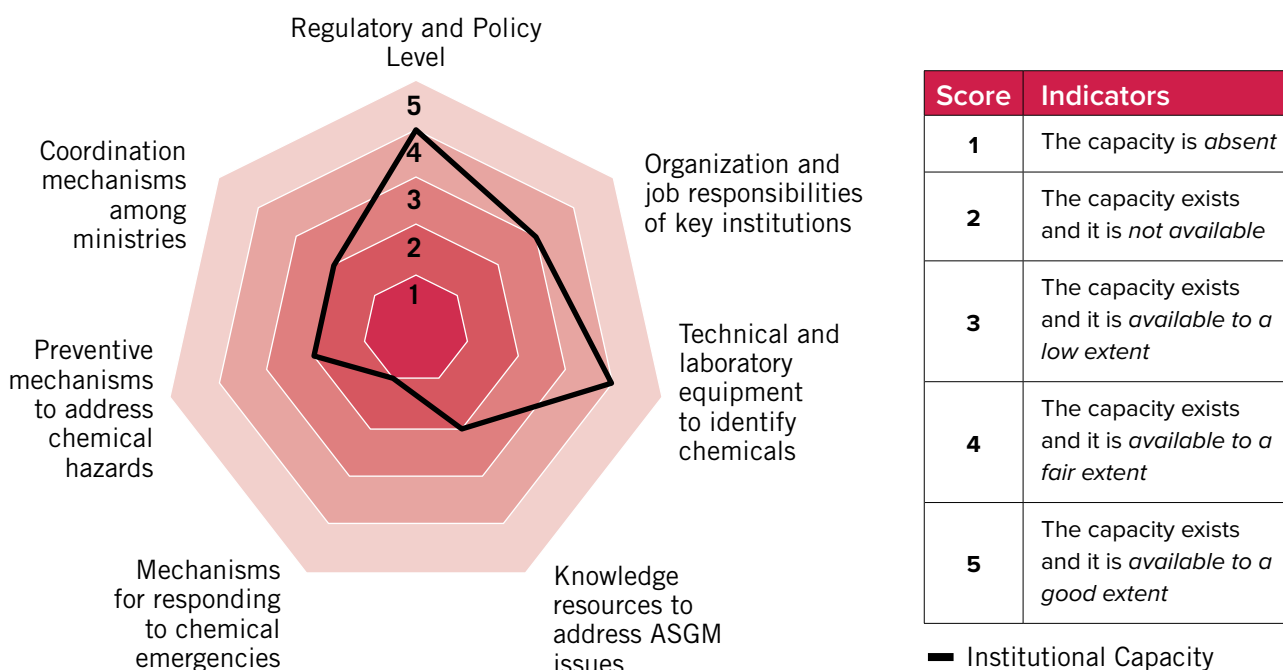
There is no national chemical emergency response plan that specifies the more general emergency protocols. A protocol developed specifically for the case of chemical emergencies in ASGM communities is non-existent.

Based on testimonies of governmental toxicologists, antidotes are not inventoried.

According to key informants, response in due time would not be possible in the event of a chemical spill.

Strengthened inter-ministerial coordination would increase effectiveness and efficiency.

Figure 7: Visualization of institutional capacities established for chemical management related to ASGM



5 Recommendations



In this section:

Recommendations at dimension level

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Recommendations for the Public Health Strategy

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Recommendations

We first present recommendations for the three institutional dimensions: regulatory and policy level, structure level, and process level. Second, we present recommendations for the three strategic

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

Recommendations at dimension level

Before referring to the three-tier dimension levels it is essential to point out the importance of data. ASGM information that maps the sector in the relevant areas is missing. Considering the fact that up to a third of gold is produced by the ASGM sector, MINCOM (and other institutional stakeholders involved in research) should increase the size of its/their samples in order to render it more representative. Systematic and continuous surveillance (M&E) should be ensured to inform the identification of needs, foster effective prevention of adverse health situations, and monitor the effectiveness of measures taken.

Regulatory and policy level

- Operationalize 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.
- Define more explicitly which public health service providers are mandated to prevent, detect, monitor or treat populations affected by the exposure to mercury or mercury compounds.
- Chemical spills regulation could be strengthened by revising existing policies and extending documents and formalizing vertical coordination.
- Increase regulative protection of vulnerable groups, especially women and minors.
- The dimension of psychosocial hazards implicated through indulging in alcohol and other drugs, violence, STIs and communicable

diseases should be addressed within existing regulations.

- Acknowledge inherent links to other sectors (i.e. agriculture) and strategically tap synergies.

Structural level

- Clearly identify the divisions in charge of addressing ASGM-related health issues especially at the district level. Currently, the units affiliated with the Environmental Protection Agency and Ministry of Lands and Natural Resources are not focused on environmental health hazards related to ASGM.
- Aggregating and consolidating: Existing institutional structures involved in ASGM and health-related issues might be consolidated and relationships between agencies reviewed. This reorganization would be an opportunity to review the allocation of responsibility for chemical health hazards.
- We suggest prioritizing coordination with subnational level of administrative units, as well as defining the linkages between implementing and administrative units at the national and subnational levels.
- It might be worthwhile to consider assigning 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 ASGM affected communities to health care facilities at the primary level in order to provide medical services to those populations.

- Initiate systematic sharing of data and information where this does not yet exist. For example:
 - MOH could benefit from data collected by the Artisanal and Small-Scale Mining Department on working practices and health and safety conditions at ASGM sites to design awareness-raising activities.
 - The administration could benefit from an institutionalized exchange with CSOs working in ASGM areas through exchange of information, coordinated data collection, monitoring & evaluation.

Process level

- Mining regulations are already quite comprehensive in terms of emergency response. With marginal effort and based on the experience of already executed national emergency response, ASGM health-related emergency plans can be developed.
- Emergency response plans should be tested to prove their effectiveness. In addition, local institutions lack resources (vehicles, first aid response, facilities, etc.) to ensure adequate emergency response in general and for ASGM situations in particular.
- Ghana's current emergency response mechanisms for biological hazards can

be expanded and leveraged to chemical emergencies. Such protocols are available for the petroleum industry, not for emergency on a broader level though.

- Design and implement treatment protocols for mercury-related health effects and other health problems related to ASGM.
- The importance of anti-corruption initiatives to address land degradation, mercury emission, siltation, erosion and water contamination.
- Develop training programs for staff at national, district and local levels to detect and monitor environmental hazards related to ASGM.
- Improve the accessibility of improved technologies through training (e.g. manual for chemical and mechanical alternatives), creating market linkages to potential suppliers (e.g. Borax, glass lantern retorts, mechanical alternatives, etc.), and considering economic incentives (e.g. subsidizing certain technologies).
- Use the presence of IMCIM to move from a repressive to a more integrative approach by cementing established relationships, systematically managing knowledge and building on know-how.
- Identify ways to improve relationships between miners and government officials. Expanding cooperation with CSOs might be a promising opportunity.

Recommendations for the Public Health Strategy

Strategic objective 1: gathering of health data

A data collection framework to which different agencies contribute was identified as a priority.

Strategic objective 2: training for health care workers

Technical capacities are a fundamental requirement when treating people. Health workers of all three

tiers should be trained in ASGM-related issues regularly. Such programs should enable health personnel to identify, monitor and treat ASGM specific health problems, especially those related to mercury, as well as emergency response to epidemic disease outbreak and chemical accidents. Adequate data collection would be an inherent component of monitoring.

Chiefs and traditional healers should be included to improve ASGM health education in order for it to be effective.

Strategic objective 3: awareness raising through facilities

In order to reach ASGM communities with awareness-raising and health services, expanding the number of health facilities in rural and remote areas is the first step.

The explicit communication that every miner is entitled to get health care at a PHC irrespective of his/her formal status is particularly important when more repressive measures to curb illegal mining are implemented.

Strategic objective 4: strategically include all relevant stakeholders

Cooperation with international agencies is well established.

The implementation of the Minamata Convention is an opportunity to strengthen cooperation between civil society, administration and academia.

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Annexes

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.

