Locating female ‘Voices’ in the *Minamata Convention on Mercury* in Sub-Saharan Africa: The case of Ghana

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**ABSTRACT**

Countries that have ratified the *Minamata Convention on Mercury*, a United Nations-backed international treaty designed to protect human health and the environment from releases of mercury and mercuric compounds, are required to produce a National Action Plan (NAP). Each must state, very clearly, how the mercury being used at artisanal and small-scale gold mines will be phased out. In most areas of sub-Saharan Africa, however, devising a comprehensive NAP promises to be an enormous and indeed, challenging, undertaking. Here, the institutional capacity and resources, expertise and at times, commitment needed to capture the level of detail the Minamata Secretariat expects to be included in each NAP are woefully lacking. One of the more challenging tasks ahead, given the shortage of hard data available on the sector’s populations, production and activities, will be the design and implementation of appropriate educational, communication and support-related strategies for the ‘vulnerable populations’ who rely on work at artisanal and small-scale gold mines for their incomes. This is especially significant for women, who, despite accounting for at least 50 percent of the region’s artisanal and small-gold mine workforce, mostly carry out the manual work at the lower tiers of the sector’s labour hierarchies. Taking stock of this largely ‘invisible’ work, this paper reflects critically on the challenges with reducing women’s exposure to mercury at artisanal and small-scale gold mines in sub-Saharan Africa. It draws on findings from ongoing research in Ghana, the location of one of the largest and most dynamic artisanal and small-scale gold mining sectors in the region.

1. Introduction

Few topics have captured the imagination of environmental and health scientists in recent decades more so than mercury pollution at artisanal and small-scale gold mines. This pressing environmental problem first caught the world’s attention during the heyday of the *garimpeiro* gold rushes in the Brazilian Amazon Rainforest nearly four decades ago (de Lacerda et al., 1989, 1991; Malm et al., 1990; Pfeiffer and de Lacerda, 1988). It has since garnered a cult-like following from scientists, who continue to collect vast amounts of quantitative data in a bid to draw attention to, and reemphasize how the mercury being used by, artisanal and small-scale miners to amalgamate their gold has methylated and bioaccumulated to toxic levels. Studies have been conducted in, and data collected from, areas of Latin America, sub-Saharan Africa and Asia where artisanal and small-scale gold mining activities are heavily concentrated.

But whilst the map of mercury pollution from artisanal and small-scale gold mining is nearly complete, knowledge of the livelihoods and community development dimensions of this problem remains poor. Specifically, key questions such as *Who* is using mercury? *Where* are supplies coming from and *who* is distributing them? *How* aware are miners of the environmental and health-related impacts of mercury? and *What* are miners doing to protect the environment and themselves during the mercury amalgamation process? remain unanswered. On the one hand, and very significantly, an informative body of literature which touches on important social and economic aspects of mercury use at artisanal and small-scale gold mines appears to be taking shape. There is, for example, a small collection of rigorous critiques of potential alternatives to mercury amalgamation (e.g., Davies, 2014; Vieira, 2006; Zolnikov and Ramirez Ortiz, 2018); several critical assessments that reflect on efforts made to educate gold mining groups about mercury’s toxicity (e.g., Hilson et al., 2007; Smith, 2019; Sousa et al., 2010; Veiga and Marshall, 2017); and work which provides some insight into the worlds of the individuals from whom supplies (of mercury) are procured (Hilson and Pardie, 2006; Sippl, 2015).

On the other hand, this valuable work seems to have gone...
unnoticed by policymakers. It lingers in the shadow of a growing collection of reports on contamination levels, the main messages from which continue to be the primary focus of, and resonate powerfully in, policy and donor dialogues on mercury use in the artisanal and small-scale gold mining sector. Moreover, despite failing to offer tangible solutions to the problem, this body of work has managed to energize influential media outlets and the NGO community. Armed with this information, both have skilfully captured the attention of the global public through imagery that depicts mercury use at artisanal and small-scale gold mines as a major threat to global ecosystems and human wellbeing. In sub-Saharan Africa, the discussion and reportage on the sector’s mercury contamination problem has emphasized heavily the experiences of women, portraying their work as arduous and occurring in heavily polluted environments. These images speak very clearly to the discourse on African women’s ‘triple burden’,¹ popularized in the literature by Moser (Moser, 1989, 2014), and emphasized today in development policy that focuses heavily on gender inequality implemented under the auspices of the UN Sustainable Development Goals (SDGs).

Although the growing body of emotionally-charged media and NGO reports of African women labouring at mercury-contaminated artisanal and small-scale gold mines mostly dismiss the economic importance and poverty-driven nature of their work, collectively, they have managed to stimulate discussion about gendered roles in the sector more generally, identifying – albeit, mostly inadvertently – several issues in need of further investigation. In sub-Saharan Africa, the priority areas seem fairly obvious, even without this analysis. The list includes the need for a deepened understanding of women’s exposure pathways to emissions from amalgamation at sites, greater articulation of the links between their work and the application of mercury, and an improved knowledge of levels of environmental awareness among groups of miners. There is a small body of literature on women in the artisanal mining sector that shares some experiences from sub-Saharan Africa (Buss et al., 2017, 2019; Hilson, et al. 2018a, b; Yakovleva, 2007). It offers important clues but overall, lacks breadth and the data needed to give this issue the visibility it deserves. If the end goal is to design and implement policy more reflective of the roles played by, and needs of, women working in mercury-contaminated gold-producing environments in sub-Saharan Africa, more research must be undertaken at the community-level.

This article responds directly to this need, drawing upon fresh findings from ongoing research which explores the life experiences, examines the labour conditions and surveys levels of environmental awareness of women working at artisanal and small-scale gold mines in Ghana. In sub-Saharan Africa, the need for such information has never been more pressing, given recent policy developments made in the region under the auspices of the Minamata Convention on Mercury, a United Nations-backed international treaty designed to ‘protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds’ (UNEP, 2017, p.14). Countries signatory to the Convention and where ‘ASM [artisanal and small-scale gold mining] in its territory is more than insignificant’ are, in accordance with Article 7, required to develop a National Action Plan (NAP). Significantly, and recognizing the enormity of the task more so than ratifying governments and how ‘the ASM sector is closely linked to complex economic development and poverty issues’, the Minamata Secretariat ‘allows [for] flexible, country-specific solutions through the development of an ASM National Action Plan’.² As a starting point, signatories are encouraged to form a working group to ‘produce an outreach plan to raise awareness about mercury and its risks, the use of mercury in ASM and the NAP [National Action Plan] itself’ (UNEP, 2015, p.25). The list of priority ‘actions and strategies’ that must be detailed includes interventions ‘to prevent the exposure of vulnerable populations’, in particular, women (UNEP, 2015, p.23), who in most countries in sub-Saharan Africa, account for at least 50 percent – and in some cases, a significantly higher share – of the artisanal and small-scale mining (ASM) workforce (Hilson et al., 2018a). Women’s ‘traditional role as transporters and processors of materials’ in ASM, however, often make them ‘invisible’, and ‘Due to [a] lack of research and documentation, it is difficult to determine the exact extent of women’s involvement in ASM over the years’ (UNEP, 2015, p.76).

The article helps to bridge this gap, drawing on data collected, over a 12-month period, from small-scale gold mining communities in Ghana’s Eastern Region. After highlighting, in Section 2, what little is known about women’s exposure to, and awareness of, the mercury being used at artisanal and small-scale gold mines in sub-Saharan Africa generally, the article shares findings from the Ghana case study. Drawing on interview data, it weighs in on a number of important and largely-unknown phenomena: women’s awareness of (methyl)mercury’s toxicity; the specific jobs they undertake in the sector, and whether through this work, they are exposed to pollution, at sites; and the nature of their labour and its economic importance more generally. The article concludes by reflecting on what implications these information gaps have for government bodies in sub-Saharan Africa preparing NAPs.

2. Locating ‘Voices’: Using the Minamata Convention on Mercury to capture realities on the ground

As so little time has elapsed since the launch of Minamata Convention on Mercury, the body of analysis that examines efforts made to prepare NAPs is very limited in focus and depth. The work produced thus far (e.g., Esdaile and Chalker, 2018; Fritz et al., 2016) is mostly descriptive, emphasizes concerns that have been voiced about the environmental and health-related impacts of methylmercury for decades, and offers very little insight on various governments’ journeys in preparing their NAPs and whether they are on track to adequately satisfy the demands of the Minamata Secretariat. To assist governments, officials at the United Nations Environment Program produced a report, Guidance Document: Developing a National Action Plan to Reduce and, Where Feasible, Eliminate Mercury Use in Artisanal and Small Scale Mining (UNEP, 2017) which, in addition to justifying, in their eyes, implementation of the convention, outlines ‘Steps for a National Action Plan’. It complements a very useful document produced two years earlier by the National Research Defence Council (NRDC), Developing National Action Plans for Artisanal and Small Scale Gold Mining: A Step by Step Guide for Countries Applying for Support under GEF Enabling Activities for the Minamata Convention on Mercury (NRDC, 2015), which offers a very simplified and clear set of guidelines for policymakers.

There are concerns – most of which are complex and in certain contexts, poorly-understood – raised in the Guidance Document and elsewhere which the Secretariat expects ratifying governments to pay close attention to when drafting their NAPs. Examples include ASM’s heavily overlooked gender dimension, its child labour ‘problem’, and the potential exposure pathways of vulnerable groups to mercury emissions. In sub-Saharan Africa on the whole, however, governments have shown very little commitment to date to acquiring the details needed to position themselves to address comprehensively concerns such as these. This makes for intriguing observation over the next few years as the demands placed by the Secretariat on governments that have ratified the convention are significant: sweeping changes to informal policy structures and regulations will be unavoidable if these requirements are to be met. Presently, the gap in the level of detail between what the Minamata Secretariat expects a ratifying country ‘that has artisanal and small-scale gold mining and processing...within

¹ The three burdens being reproductive work, productive work and community work. Their significance is of, course, magnified in poor areas.

its territory\textsuperscript{3} to share on the one hand, and what – in this instance – host African governments are capable of providing at this point on the other hand, is sizable. This section of the paper highlights the main causes for concern moving forward, in the process framing the study of women, mercury and ASM being carried out by the authors in Ghana’s Eastern Region.

2.1. Concern 1: The need to overhaul regulatory and policy frameworks

The history of ASM’s policy treatment in sub-Saharan Africa is the first and perhaps most significant cause for concern. Significantly, and a point raised by Hilson et al. (2018a) using the cases of Ghana, Mali and Sierra Leone, the Minamata Secretariat has – it seems, inadvertently – put this issue in the spotlight by demanding, in Annex C of the Convention, that signatories outline ‘Steps to facilitate the formalization or regulation of the artisanal and small-scale gold mining sector’ in their NAPs. This is a requirement that host African governments have embraced reluctantly and are bound to struggle to fulfil because of the wholesale changes in policy, and more importantly, approach and attitude toward the sector, that will need in order to be in any realistic position to achieve this. The Secretariat views formalization in this context as ‘a process that seeks to integrate the ASGM [artisanal and small-scale gold mining] sector into the formal economy, society and regulatory system’, and which ‘is seen by many as an important step for the ASM sector to harness its potential as a tool for poverty alleviation and improvement of working conditions while helping to overcome social and environmental challenges, since a more formal ASGM sector will enable outreach not only on mercury management but also on the full range of social, environmental, and economic development issues related to ASGM’ (UNEP, 2017, p.5–6).

The Secretariat deserves praise for underscoring wherever possible and not losing sight of the livelihoods or social dimension of ASM, despite the impetus behind the convention’s implementation being protection of the environment and human health. The details provided and recommendations made in the Guidance Document and complementary instruction manuals, therefore, were deliberate on its part. This, however, presupposes that ratifying governments are willing to commit the time and resources needed to familiarize themselves with the sector’s social dimension. It has been more than three decades since the World Bank-hosted International Roundtable on Artisanal Mining (May 1995), which brought ASM experts together from around the globe, and very importantly, showcased the sector’s overlooked livelihoods issues for the first time, as well as established that the growth of its activities was linked largely to people’s struggles and financial hardship (Barry, 1996). The ASM sector has since routinely been branded by donors, the NGO community, scholars and even governments as a ‘poverty-driven activity’ (Banchirigha, 2006; Childs, 2008; Yakovleva, 2007). This label provides an entry point for investigating and complementary instruction manuals, therefore, were deliberate on its part. This, however, presupposes that ratifying governments are willing to commit the time and resources needed to familiarize themselves with the sector’s social dimension. It has been more than three decades since the World Bank-hosted International Roundtable on Artisanal Mining (May 1995), which brought ASM experts together from around the globe, and very importantly, showcased the sector’s overlooked livelihoods issues for the first time, as well as established that the growth of its activities was linked largely to people’s struggles and financial hardship (Barry, 1996). The ASM sector has since routinely been branded by donors, the NGO community, scholars and even governments as a ‘poverty-driven activity’ (Banchirigha, 2006; Childs, 2008; Yakovleva, 2007). This label provides an entry point for investigating and at times unravelling aspects of the sector’s social dimension, including its child labour ‘problem’ (e.g., Hilson, 2010; Maconachie and Hilson, 2016; Potter and Lukiya, 2016), gender element (Buss et al., 2017; Hinton et al., 2003) and linkages with subsistence agriculture (Hilson, 2016; Kamlongera, 2011; Maconachie and Binnie, 2007). The UN Global Mercury Project\textsuperscript{4} was instrumental in raising awareness of the social dynamics of ASM across a range of developing countries and in sub-Saharan Africa in particular, including Guinea, Mozambique, Sudan, Tanzania, and Zimbabwe. But the region’s governments have (Engwicht, 2018; Geenen and Verweijen, 2017; Hilson, 2018; Kinyondo and Huggins, 2019; Lanzano, 2018; Vogel et al., 2018; Yankson and Gough, 2019) struggled to manufacture the ideas that have emerged from interventions such as the GMP and the growing body of literature on ASM and livelihoods in sub-Saharan Africa more generally (Hilson, 2010; Geenen and Verweijen, 2017; Vogel et al., 2018; Lanzano, 2018; Engwicht, 2018; Yankson and Gough, 2019; Kinyondo and Huggins, 2019) into policies and regulatory frameworks that accurately reflect the realities faced by the sector’s operators and which are capable of facilitating the formalization of their activities.

In its Guidance Document, the Secretariat makes very comprehensive suggestions on how to achieve this, explaining that it ‘may include reforming the legal status of ASGM as well as the formulation of policies among a variety of agencies and institutions (mining, education, health, labor, environmental management, finance, social services, etc.) that address the different dimensions of ASGM activities’ (UNEP, 2017, p. 6). It identifies several priority undertakings, including developing a stakeholder engagement plan, organizing cooperatives, reviewing laws, and developing financing schemes for operators. But whilst the ‘steps to facilitate the formalization or regulation’ of ASM or to correct this problem may appear to be straightforward, the evidence (Hentschel et al., 2001; Hilson et al., 2018a; ILO, 1999; Van Bockstael, 2014) points to the region’s governments implementing regulatory and policy frameworks that have created and/or which are perpetuating this informality. Specifically, despite rhetoric which may suggest that governments in sub-Saharan Africa recognize that ASM is, indeed, largely poverty-driven and is an indispensable source of income in countless poor sections of the region, paradoxically, most have implemented regulations that require prospective licensed operators to pay sizable fees that are beyond their budgets and to navigate complex bureaucracies in order to submit their applications for permits. Throughout sub-Saharan Africa, the mounting costs and bureaucracy linked to registration have fuelled the growth of unlicensed ASM activities: over 99 percent of those engaged in the sector across the region could be operating informally.

In the past, most African governments were unmoved by criticism of their approaches to licensing ASM. They continue to be in a behave in ways which suggest that they are oblivious to the informal problem they have been complicit in ‘creating’, routinely dispatching the military and police to remove what they brand as illegal operators from mineral-rich lands (Hilson, 2017; Osei-Kojo and Andrews, 2016). Are the requirements placed by the Secretariat on regulators and the pressures they now face as a result of ratifying the convention enough to orchestrate wholesale changes in approaches toward legislating and supporting ASM in more humane ways sub-Saharan Africa? Will these demands engineer a much-needed shift away from policies and laws that have, for the better part of four decades, stifled the formalization of ASM in the region? The ways in which ratifying rent-seeking African governments respond to suggestions on how to craft their NAPs promise to be the most intriguing development moving forward. On the one hand, there is revenue at stake for which governments that have ratified the convention are no doubt eyeing – specifically, funds that have been made available by the Secretariat to assist countries with producing their NAPs and for implementing technical programs aimed at transitioning mine operators away from using mercury altogether (Table 1).

On the other hand, the current orientation of regulatory and policy frameworks for mining has positioned many host governments to earn significant amounts of revenue in the form of royalties, taxes and additional fees that are generated from interventions such as the GMP and the growing body of literature on ASM and livelihoods in sub-Saharan Africa more generally (Hilson, 2010; Geenen and Verweijen, 2017; Vogel et al., 2018; Lanzano, 2018; Engwicht, 2018; Yankson and Gough, 2019) into policies and regulatory frameworks that accurately reflect the realities faced by the sector’s operators and which are capable of facilitating the formalization of their activities.

\textsuperscript{3}Article 7, Paragraph 2 of the Convention.

\textsuperscript{4}The Global Mercury Project was a multimillion-dollar intervention commissioned by UNIDO in the early-2000s to raise awareness and to eliminate the use of mercury in the artisanal and small-scale gold mining sector.
and support ASM for decades because, again, the type of information and level of detail required demands that sweeping changes be made to existing regulatory and policy frameworks in place for the sector.

On the subject of women engaged in ASM across the region, which is the focus of this paper, there are several issues in need of investigation. A poor understanding of ASM’s gender dimension means that without radical changes to policy and laws, host governments will likely struggle to satisfy even the most basic of the Secretariat’s demands in this area, foremost ‘Seek[ing] out under-represented groups (women, youth, impacted communities, etc.) to participate in consultations’ (UNEP, 2015, p.57), and ‘[developing] effective risk communication strategies targeted at vulnerable groups, such as children and women of childbearing age, especially pregnant women’ (p. 60).

2.2. Concern 2: the executing agency

A second cause for concern is the quality and ‘capabilities’ of the institutional frameworks being hastily pieced together across sub-Saharan Africa to adequately respond to the demands of NAPs, a point briefly touched on by Hilson et al. (2018a,2018b). In each ratifying country, there is an Executing Agency or organization which ‘can be a national institution, an external partner, or some combination of these’ but ‘having in place the external executing partners is seen here as crucial for governments keen on establishing the necessary managerial and technical teams to execute the project’ (NRDC, 2015, p.12). Inputs and guidance from organizations such as the National Resources Defence Council and UNITAR, therefore, have been invaluable.

It is rather the selection of the institution in-country which is potentially problematic. As the Minamata Convention was conceived to reduce emissions of, and minimize exposure to, mercury, on the surface, working with national environmental ministries or their equivalents would appear to be the logical move. But are these ministries equipped to address, comprehensively, the gender-related concerns that the Guidance Document raises, if at all? The Guidance Document, very importantly, acknowledges that women do play an important, albeit largely unclear, role in ASM, in the process underscoring why more research on this topic and greater coordination among ministries is needed:

In general, women play a much larger role in ASGM communities than in large-scale mining...[but] Due to lack of research and documentation, it is difficult to determine the exact extent of women’s involvement in ASMG over the years...Women’s roles in ASGM vary between and within countries, depending on the proximity to villages or homes and the mineral being mined. Because of their traditional role as transporters and processors of materials, women are not often identified as miners. Their involvement is often invisible as they are usually found in the household; therefore there may be a significant discrepancy between the estimated and actual numbers of women involved in the ASMG...The roles both women and men play can have different social, environmental and economic implications, these may have dangerous implications for women specifically. [NRDC, 2015, p. 68]

In sub-Saharan Africa, however, women’s issues typically fall within the remit of ministries of gender or their equivalent and more broadly, into the category of social development and livelihoods. Is the expectation that national environmental protection agencies and their equivalents will engage women employed in ASM and design programs for them?

As indicated, the Secretariat, recognizing the enormity of this challenge, is pushing for host governments to ‘consider the formation of an executing body, or working group, that will guide the NAP development through all its phases and ensure that there is proper project planning and management throughout the process’. Such a unit, it explains, ‘should include members from different governmental ministries or departments, including local government representatives, and interact with other relevant agencies as appropriate’ (p. 21). In Ghana, the case study examined in this paper, a Minamata Convention Implementation Committee was established, following lengthy discussions at the joint inception workshop for the development of the country’s Minamata Initial Assessment and NAP on ASM, 25–27 January 2017. But whilst there were representatives from the Ministry of Women and Children Affairs in attendance, significantly, this organization is not part of the country’s 13-membership Minamata Convention Implementation Committee (Table 2).

When the orientation of the institutional frameworks in place to regulate ASM in sub-Saharan Africa is considered, however, it becomes even more clear why women’s concerns are unlikely to be properly accounted for in NAPs. Throughout the region, policymaking and

### Table 1
NAP funding and execution in selected African countries*

<table>
<thead>
<tr>
<th>Country</th>
<th>Implementing Organization</th>
<th>Amount (US$)</th>
<th>Executing Agency or Executing Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burkina Faso</td>
<td>UNIDO</td>
<td>500,000</td>
<td>The General Directorate of Environmental Preservation and Sustainable Development under the Ministry of Environment, Green Economy and Climate Change (MEGEC); Artisanal Gold Council (AGC)</td>
</tr>
<tr>
<td>Gabon</td>
<td>UNIDO</td>
<td>500,000</td>
<td>Centre National Antipollution (CNAP) under the Ministry of Forest, Environment and Protection of Natural Resources (MEFPRN); Artisanal Gold Council (AGC)</td>
</tr>
<tr>
<td>Ghana</td>
<td>UNIDO</td>
<td>500,000</td>
<td>Environmental Protection Agency (EPA) Natural Resources Defence Council (NRDC) World Health Organization</td>
</tr>
<tr>
<td>Madagascar</td>
<td>UNIDO</td>
<td>500,000</td>
<td>Ministry of Environment, Ecology, Sea and Forests of the Republic of Madagascar</td>
</tr>
<tr>
<td>Moramanga</td>
<td>UNIDO</td>
<td>500,000</td>
<td>Ministry of Mineral Resources (MIREM); Ministry for Coordination of Environmental Affairs (MICOA); Ministry of Health (MISAU); World Health Organization (WHO)</td>
</tr>
<tr>
<td>Nigeria</td>
<td>UNIDO</td>
<td>500,000</td>
<td>The Federal Ministry of Environment (FMEN); Department of Pollution Control and Environmental Health (PCEH); Ministry of Mines and Steel Development (MMSD); Department of Artisanal and Small-scale Mining; World Health Organization (WHO)</td>
</tr>
<tr>
<td>Burundi, Central African Republic of Congo, Kenya, Eswatini, Uganda, Zambia, Zimbabwe</td>
<td>UNEP</td>
<td>4,000,000</td>
<td>The Africa Institute; UNEP Chemicals and Ministries of Environment of participating countries</td>
</tr>
<tr>
<td>Guinea, Niger</td>
<td>UNEP</td>
<td>1,000,000</td>
<td>CASE</td>
</tr>
<tr>
<td>Mali, Senegal</td>
<td>UNEP</td>
<td>1,000,000</td>
<td>Artisanal Gold Council</td>
</tr>
<tr>
<td>United Republic of Tanzania</td>
<td>UNEP</td>
<td>500,000</td>
<td>Vice President’s Office, Division of Environment, URT</td>
</tr>
</tbody>
</table>

Table 2
An Overview of Ghana’s Minamata Convention Implementation Committee.

<table>
<thead>
<tr>
<th>Ministries/Entities</th>
<th>Responsibilities / Areas of Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ministry of Environment, Science, Technology &amp;</td>
<td>• Environmental laws, issues, and regulations</td>
</tr>
<tr>
<td>Innovation</td>
<td>• Environmental impacts</td>
</tr>
<tr>
<td>2. Environmental Protection Agency</td>
<td>• Promoting alternatives to mercury in ASGM</td>
</tr>
<tr>
<td>3. Ministry of Lands and Natural Resources (Minerals</td>
<td>• Statistics and data on ASGM</td>
</tr>
<tr>
<td>Commission)</td>
<td>• Mining sector laws and regulations (including formalization of ASGM)</td>
</tr>
<tr>
<td>4. Ministry of Finance</td>
<td>• Geological surveys</td>
</tr>
<tr>
<td>5. Ghana Health Service of Ministry of Health</td>
<td>• Economic importance of ASGM</td>
</tr>
<tr>
<td>6. Ministry of Information</td>
<td>• Formalization of ASGM sector</td>
</tr>
<tr>
<td>7. Ministry of Trade and Industry</td>
<td>• Market-based mechanisms for reducing mercury use</td>
</tr>
<tr>
<td>8. Ministry of Employment and Labour Relations</td>
<td>• Funding for NAP process</td>
</tr>
<tr>
<td>9. Ministry of Justice and Attorney General (Attorney</td>
<td>• Identification of impacts of ASGM on health of miners, ASGM communities, and vulnerable population groups</td>
</tr>
<tr>
<td>Generals Department)</td>
<td>• Public health strategies related to ASGM and integration of such strategies into wider health sector programming</td>
</tr>
<tr>
<td>10. Ghana Revenue Service/Customs Division</td>
<td>• Health promotion, advocacy and awareness raising activities including in communities</td>
</tr>
<tr>
<td>11. National Development Planning Commission</td>
<td>• Detecting, monitoring and managing mercury intoxication among affected populations</td>
</tr>
<tr>
<td>12. Ghana National Association of Small Scale Miners</td>
<td>• Strategies for community outreach and stakeholder involvement</td>
</tr>
<tr>
<td>(GNASSM)</td>
<td>• Mercury trade</td>
</tr>
<tr>
<td>13. Friends of the Nation</td>
<td>• Formalization</td>
</tr>
<tr>
<td></td>
<td>• Market-based mechanisms for reducing mercury use</td>
</tr>
<tr>
<td></td>
<td>• Formalization of ASGM sector</td>
</tr>
<tr>
<td></td>
<td>• Labour standards, regulations and enforcement, including strategies to eliminate child labour</td>
</tr>
<tr>
<td></td>
<td>• Occupational safety</td>
</tr>
<tr>
<td></td>
<td>• Drafting enforcement protocols and regulations for implementation, including customs</td>
</tr>
<tr>
<td>14. Border Control</td>
<td>• Border Control</td>
</tr>
<tr>
<td>15. Sustainable development coordination plan and</td>
<td>• Reach out to local governments</td>
</tr>
<tr>
<td>implementation</td>
<td>• Formalization of ASGM sector</td>
</tr>
<tr>
<td></td>
<td>• Reach out to miners</td>
</tr>
<tr>
<td>16. Ghana Revenue Service of Minerals and Energy</td>
<td>• Provide insight into legal and illegal mercury trade, gold market dynamics, and barriers to formalization</td>
</tr>
<tr>
<td>Commission</td>
<td>• Drafting enforcement protocols and regulations for implementation, including customs</td>
</tr>
<tr>
<td></td>
<td>• Organise and conduct consultations with government ministry officials and other stakeholders as well as initial research on the ASGM sector, and produce consultation summaries</td>
</tr>
<tr>
<td></td>
<td>• Facilitate regular meetings of a stakeholder group, host a midterm drafting meeting of the ASGM working group, and create a draft National Action Plan that will serve as the basis of intensive engagement and vetting with key mining communities</td>
</tr>
</tbody>
</table>

regulatory responsibilities for this sector, including those related to the environment and human health, are rarely the province of national environmental protection agencies. They are rather, and long have been, tasks carried out by national mining ministries or agencies: in Sierra Leone, the National Minerals Agency; in Liberia, the Ministry of Mines and Energy; in Madagascar, the Ministry of Mines and Strategic Resources; in Tanzania, the Ministry of Energy and Minerals; and in Ghana, the Minerals Commission. Yet, despite sectoral expertise being concentrated in these mine ministries and agencies, as Table 2 indicates, because, again, of the rationale behind the convention’s implementation (i.e., the elimination of mercury use), it is the national environmental protection agencies or their equivalents that have typically been recruited as the executing partner.

Again, these agencies generally have no regulatory responsibilities for ASM, apart from the rare instance where a prospective licensee is asked to complete an environmental impact assessment, as seen in countries such as Sierra Leone, Liberia and Ghana. In these cases, this only applies to a specific category of licensee (the permit allowable to the more mechanized operation) for which the law demands completion of comprehensive environmental impact assessments and other environmental plans. Even in these isolated instances, where national environmental protection agencies do have some regulatory responsibilities for ASM, as laws only apply to licensed operators, their interaction with the sector is minimal because, and as already explained, so few people manage to secure the permits needed to legitimize their activities in the eyes of the law. This begs the question: how can officials based at these agencies adequately nuance ASM’s gender dimension in NAPs if their level of understanding of the sector’s activities, particularly those found in the informal economy, is virtually non-existent? This includes the sector’s demographics, the geological terrain which miners work, and levels of production – crucial gaps in knowledge which several experts have argued must be bridged if appropriate strategies and policies are to be designed (Hentschel et al., 2001; Hilson and Maponga, 2004; World Bank, 2019).

2.3. Concern 3: An impoverished research agenda

The level of detail Executing Agencies must capture in order to satisfy the demands that come with ratifying the Minamata Convention is significant. In the case of the sector’s gender dimension, the toolkit produced by UNEP (O’Neill and Telmer, 2017), Estimating Mercury Use and Documenting Practices in Artisanal and Small-scale Gold Mining (ASGM): Methods and Tools, summarizes very succinctly the phenomena requiring analysis, in the process providing a glimpse of the data that need to be collected and evaluated:

Approximately three million women and children are involved in the global primary ASGM workforce. Women may work as miners, mine owners, cooperative members, or community leaders, among other mining-related roles. The role of women in the ASGM mining workforce varies between and within countries. Despite the critical role that women play in mining and in many mining communities, and the importance of artisanal mining as a livelihood and opportunity for rural women, relatively little gender aggregated data has been collected on the ASGM sector. There remains a paucity of information on women in ASGM mining… Gender disaggregation of data is essential when documenting community population, community leaders, and extraction and processing workforce. This information is needed to design intervention strategies that clearly account for the health and needs of women. In this light, it is also important to record the roles of women robustly… [p. 23]
It is unclear, however, exactly how – at least in sub-Saharan Africa – governments intend on going about gathering these data, given the ways in which they have traditionally regulated ASM activities and their general perception of the sector’s operators. These have been, and will continue to be, formidable barriers to nuances and unpacking critically specific issues such as gender, articulating more clearly how informality has shaped it, and more broadly, obtaining the specific information the Secretariat expects to be captured. But a lack of knowledge has not stopped governments from submitting proposals for funding, beginning with requests (for between US$50,000 and US $250,000) to the call for the ‘First Round of Applications’, issued by the Minamata Convention’s Specific International Programme. In their proposals, applicants such as the Government of Ghana were expected, inter alia, to explain ‘How the project responds to gender considerations’, despite – and as already indicated – not having ministerial representation for women’s issues on its Minamata Convention Implementation Committee.

Collaborations forged with external partners such as UNITAR and international NGOs will no doubt bring valuable expertise to the table and help to bridge important gaps in knowledge. But are the demands being placed on ratifying countries, when considering the specific Executing Agency being called upon, unrealistic? The concern in the case of sub-Saharan Africa is twofold. First, of the countries that have ratified the convention, most have, to date, generally approached the ASM formalization challenge quite antagonistically, their refusal to implement user-friendly policies yielding, repeatedly, inappropriate regulatory frameworks. Second, there seems to be an expectation that, despite lacking the requisite expertise and experience needed to comprehensively address the specific tasks required of them in their NAPs, these governments are being asked to nuance issues, such as gender in ASM, which even academics have barely explored. In the absence of a body of literature that asks important questions about the state of ASM, which even academics have barely explored. In the absence of a body of literature that asks important questions about the state of ASM, the focus and composition of which have remained virtually unchanged for nearly four decades. It offers sparring little guidance to governments in sub-Saharan Africa brainstorming ideas on how, in line with Annex C (point J) of the Minamata Convention, to go about devising ‘Strategies to prevent exposure of vulnerable populations, particularly children and women of child-bearing age, especially pregnant women, to mercury used in ASM’. Specifically, the focus of a large proportion of research continues to be contamination: work which seeks to determine levels of methylmercury concentrations in various environmental media and in human populations found in and around ASM communities. The efforts made by social scientists over the past two decades (e.g., Fisher et al., 2009; Hilson, 2010; Luning, 2014) to popularize how, throughout sub-Saharan Africa, ASM is linked to agriculture, how the sector’s growth is associated with poverty, and details about its child labour ‘problem’ and gender dimension, seem to have had very little impact on research being carried out on mercury. A cursory glance at the literature reveals as much: that the most recent research conducted on mercury contamination at ASM sites in sub-Saharan Africa (Bose-O’Reilly et al., 2017; Nyanza et al., 2019; Steckling et al., 2014) draws near-identical conclusions to, and therefore does little to advance conclusions drawn in, pioneering studies conducted by the likes of Ikigura and Akagi (1996); Ikigura et al. (1997) and Van Straaten (2000) in Tanzania and Zimbabwe over two decades ago.

This oversight is very visible in Ghana. Despite significant analysis of ASM’s growing economic importance in the country and the demographic and organizational dynamics of its activities, very few fresh ideas on mercury and the ways in which it is handled in the sector have been debated here since the first contamination analysis, commissioned by UNIDO in the townships of Japa and Dumasi, were carried out nearly two decades ago (Rambard, 2003). The concern extends to the Minamata Convention on Mercury and the ways in which it is handled in the sector have been debated here since the first contamination analysis, commissioned by UNIDO in the townships of Japa and Dumasi, were carried out nearly two decades ago (Rambard, 2003). The concern extends to the Minamata Convention on Mercury Initial Assessment Report for Ghana (Government of Ghana, 2018) which, in addition to referencing a host of outdated studies (e.g., Hogarth et al., 2016; Kwaams-ansah et al., 2010), conveys the wrong messages and showcases questionable evidence to build cases in support of specific actions being taken to combat mercury pollution in the country’s artisanal and small-scale gold mining regions. It begins with the idea that Ghanaians become exposed to the mercury used in gold mining through consumption of fish, within the tissues of which it accumulates in methylated form. This concern was raised in the section of the document headed ‘4.2.4 Consumers of Fish’. Studies (e.g., Tschakert, 2010), however, have shown that, contrary, many populations found in communities located near mine sites do not become contaminated via this route because they are consuming fish caught from the ocean, not the river species that typically contain elevated concentrations of mercury in their tissues.

The state of mercury-ASM research is even more disappointing when the ideas dominating donor-led debates on the sector are taken into consideration. Whilst in the case of sub-Saharan Africa, these ideas rarely facilitate the design and implementation of policies and programs that are user-friendly and accurately reflect the realities of ASM, organizations such as the World Bank, United Nations Economic Commission for Africa and the International Labour Organization have regularly published documents which suggest that their officials are at least thinking dynamically about issues such as the sector’s links with poverty and the backgrounds of those who choose to engage in its activities. Nearly two decades ago, Jennings (2003) summarized what can be considered a timeline for ASM support, explaining how the focus of regulatory and policy strategies in the sector has changed since the 1970s:

Essentially futile attempts to define and compartmentalize small-
scale mining in the 1970s were followed by a technical, productivity-linked approach in the 1980s, and by a broader socio-economic approach that involved environmental concerns in the early-1990s. A focus on poverty, gender and child labour issues, culminating in sustainable livelihood and community issues, was the approach at the turn of the century...

Research on mercury in ASM, however, has failed to spawn much of a social dimension, or a body of work that uses findings from scientific investigations to engage populations. It furthermore avoids asking important questions such as how aware are host communities of environmental issues? and how have their personal circumstances driven them to this work and how have they compromised their health in pursuing it? These are question which governments that have ratified the Minamata Convention and are, as a result, bound to developing NAPs, must answer if they are to have any hope of phasing out mercury from the sector.

When mapped on to the timeline constructed by Jennings (2003), aside from an abbreviated period when alternatives to mercury and emissions-reducing technologies such as retorts, shaking tables and other gravitational methods5 were being developed and tested, it becomes clear how the thinking of most scholars and donors today is little different to the ‘technical, productivity-linked approach [which dominated] in the 1980s’. This has especially been the case in sub-Saharan Africa, where the pioneering analysis conducted on retorts and attempts made to distribute more efficient technology to ASM groups in the 1990s in the likes of Zimbabwe, Ghana and Tanzania (Hilson and Potter, 2003; Hollaway, 1991; Maponga and Ngorima, 2003) failed to spawn a much-needed second phase of social research that builds on the foundation laid by this technical work. The result – at least in the case of sub-Saharan Africa – has been the emergence of two bodies of literature on ASM which generally do not speak to one another: 1) this highly-technical work on mercury; and 2) the growing collection of analyses mentioned earlier that do cover in some detail particular aspects of the social dimension of mercury use in the sector.

This disconnection also explains why research conducted in the region on women and mercury in ASM has remained stagnant. It has mostly emphasized exposure and contamination levels, verified through the sampling of breastmilk, blood and urine (Niane et al., 2015; Nyanza et al., 2019, 2014). The next section of the paper builds on this foundation, drawing on findings from ongoing research being conducted in the Eastern Region of Ghana. It provides a flavour of the types of questions which Executing Agencies should be seeking answers to in order to better position themselves to determine ‘How the project responds to gender considerations’. In doing so, it seeks to invigorate interest in research on the social dimension of women’s exposure to mercury in ASM communities in sub-Saharan Africa.

3. Women and mercury in Ghana’s ASM sector: Some guiding questions for African NAPs

The literature is not entirely devoid of insights on women’s exposure to mercury. There are papers in the development studies literature which zero in on women’s experiences in ASM communities. This body of analysis focuses mostly on the conditions of women’s workplaces, in many instances suggesting that cultural norms determine heavily the roles they play in the sector (e.g., Bashwira and Cvcelier, 2019; Bashwira et al., 2014; Brotem and Ba, 2019). The bulk of material produced on women in ASM to date focuses on sub-Saharan Africa, drawing on experiences from countries such as Ghana, Mali and DR Congo, a large share of which were presented in a recent review assembled by Hilson et al. (2018b). Substantially less work has been undertaken to explore, specifically, the effects of mercury on women working in ASM (Hinton et al., 2003; Niane et al., 2015; Nyanza et al., 2019). Of what has been undertaken, most underscores further the health-related impacts of methylmercury contamination, providing some idea of how those working are at risk.

But these studies and reviews, whilst insightful, have failed to ignite scholarly interest in ASM’s social dimension and women’s involvement in the sector more broadly, possibly because of the sizable spacing between their publication, which has made identifying trends and common ideas challenging. The more significant shortcoming with both bodies of work mirrors that of the wider ASM literature: the failure to adequately contextualize findings and explain how they are relevant to broader debates on development, in this case, those applicable to sub-Saharan Africa. To avoid having women’s exposure to mercury in ASM siloed and treated as a standalone concern, greater interrogation of the region’s broader development debates will be required, as well as identification of topical concerns which this issue ‘speaks’ to, in order to ensure that it receives as much visibility as possible.

If the goal is to devise ‘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’, as Annex C of the Minamata Convention states, important questions concerning the backgrounds of the female miners profiled and the nature of their work must first be answered. To help bridge this gap, this section of the paper draws on findings from ongoing research being conducted in the town of Akwatia, Ghana’s epicentre of diamond mining activity for 100 years. Here, the depletion of rough diamonds has led many residents to ‘branch out’ into artisanal and small-scale gold mining activities in a bid to supplement their earnings (Hilson, 2010). Some people have simply started mining for gold on the very plots from which they have long extracted diamonds; others have migrated to neighbouring towns, such as Kobriso and Kibi, where informal artisanal and small-scale gold mining is now widespread. The discussion that follows uses data from 25 semi-structured interviews conducted, over multiple visits between July 2018 and June 2019, with selected female miners based in Akwatia. The aim of this work was to ask questions which, it was believed, if answered, would help to inform the design of strategies capable of minimizing women’s exposure to the mercury being used to amalgamate gold. All of the women interviewed reside permanently in Akwatia and, at the time the research was carried out, were between the ages of 28 and 60, although most had been engaged in ASM full-time for between two and eight years. These interviews were conducted face-to-face in Twi, recorded, and later translated and transcribed into English. Every interview lasted between 30 and 60 minutes and began with miners being asked to state their age, and share details about their education, family backgrounds, and their reasons for entering mining. Each woman was then asked to provide details about the roles they play and the challenges they face at the mines, as well as questions which it was believed would provide a fuller picture of their awareness of mercury’s toxicity.

The discussion that follows presents two questions which emerged from the findings from this research. Each is intended as a rallying point for ratifying countries working to formulate and incorporate into their NAPs, strategies ‘to prevent the exposure of vulnerable populations’ – specifically, women.

3.1. Why artisanal and small-scale gold mining?

Whilst it may seem obvious, the first question that requires answering is: ‘Why artisanal and small-scale gold mining?’ To be in any position to do so, the demographics and backgrounds of the populations in question must first be studied carefully, and views on how ASM supports their livelihoods and why individuals have pursued work in the sector altogether, solicited. With this information on hand, governments are better equipped to design policies and support services for vulnerable groups such as women. The analysis that follows does this for the women interviewed in Akwatia.

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5 There are several alternatives to mercury amalgamation that have emerged over the years. Most of these are chemical-free (see Vieira, 2006).
3.1.1. The livelihoods dimension

Why are women in all corners of sub-Saharan Africa turning to ASM for work despite the obvious health and safety risks, foremost exposure to methylmercury? For more than two decades, the general explanation given for ASM’s rapid growth (Barry, 1996), particularly in sub-Saharan Africa, has been poverty. Whilst scholars have, over this period, challenged what has become known as the ‘poverty-driven narrative’ in ASM circles (e.g., Fisher et al., 2009; Verbrugge, 2015), there still seems to be broad agreement that personal hardship and household-level poverty has led thousands of people to turn to the sector for their livelihoods, in the process, fuelling its rapid growth. The findings from this study are by no means exceptional and simply reinforce this position: that women in Akwatia and more broadly, Ghana, have pursued work at artisanal and small-scale gold mines because there are few alternative income-earning opportunities.

What consultations with these women helped to underscore is the importance of finetuning interventions to meet the needs of specific groups engaged in ASM. But most NAP guidance documents barely broach the poverty issue in ASM, and certainly fall short of offering any explanation about its link to mercury use. One of few exceptions is the NDRC’s Developing National Action Plans for Artisanal and Small Scale Gold Mining: A Step by Step Guide for Countries Applying for Support under GEF Enabling Activities for the Minamata Convention on Mercury (NDRC, 2013). This document very crucially underscores the importance of formalizing ASM. It explains that ‘Formalization is seen by many as an important step for the ASM sector to harness its potential as a tool for poverty alleviation and improvement of working conditions while helping to overcome social and environmental challenges, since a more formal ASM sector will enable outreach not only on mercury management but also on the full range of social, environmental, and economic development issues related to ASM’ (p. 38–39). Conversely, the heavily relied upon Guidance Document barely mentions poverty, let alone acknowledges it as a driver of ASM’s growth.

In the present study, the findings from interviews with women helped to construct a more nuanced picture of the poverty fuelling their participation in ASM and, by extension, why they willingly risk exposing themselves to methylmercury. Of the 25 female miners interviewed, only seven reported being married with a husband; all have children, the majority between two and five in number, although some have as many as 11; and apart from four, none have much education beyond a primary level nor any technical training. Desperate to secure incomes to cope with the ‘triple burden’, these women have pursued work in the artisanal and small-scale gold mining sector, which does not discriminate when it comes to skills. It is an unrivalled employment engine which creates jobs for a range of people, from individuals with technical expertise through to those with very few skills, such as the women interviewed in Akwatia. The ease with which these women have been able to transition into this work reinforces claims long made about ASM having ‘low barriers to entry’ (Buxton, 2013): how in the most extreme of cases, ‘one can start gold mining with a pick, a chisel and a shovel’ (Chipangura, 2017, p.127).

The impoverished backgrounds of these women, their lack of skills and low levels of education, and the shortage of alternative income-earning opportunities available overall could explain why, during interviews, all dismissed the dangers inherent with ASM work and appeared content with their jobs. One went as far to describe work at artisanal and small-scale gold mines as a ‘[a] lucrative job’. The following excerpts from other interviews provide an idea why these women, most of whom would otherwise be engaged in petty trading for menial income, appeared so grateful to be working in ASM:

...it is a good job like I said earlier; how would I have been able to pay my loan if I had not mined? Judging from all these people I take care of I cannot just sit idle and not work. I need to use my hands to work very hard to take care of my six children and the others that have been placed under my care.7

Mining was what kept my family going, since I am the main breadwinner of my family, taking care of my 10 children and my old-aged mum as well. This is a heavy burden on me because there is no support from anywhere...When I go to the mines I am able to save about GHc 50.00 a day so I keep all that for the week and I try to send my mother GHc 200.00 or even more for the upkeep of my children. My firstborn is 17 years and is now in senior high so I use that same money to pay for his fees, his and his other siblings because in the end I want them to be university graduates just like other people. Just because I did not attain proper education does not mean I should deprive them of a higher education.8

I was a carrier, though the job was difficult I was happy to do it because it paid well and I didn't have any stress paying bills and taking my children through school...my children have been able to complete senior high among others...9

In Ghana, however, government officials have rarely taken the time to study the backgrounds of the sector’s participants, which has led repeatedly to the design and implementation of inappropriate policies and interventions. The latest fixation is alternative livelihoods, an idea which first gained popularity over two decades ago when Ghana’s large-scale mining companies, in a bid to bring to a halt the illegal ASM activities proliferating on their concessions, banded together and launched a series of agricultural-based activities. These ‘alternatives’ were seen by mine managers and the government at the time as ‘work’ capable of discouraging people from engaging in illegal ASM activities but without much oversight, support and guidance on where to market crops, quickly proved to be precisely the opposite. This, however, has not discouraged the Government of Ghana from making alternative livelihoods a centrepiece of its multimillion-dollar Multilateral Mining Integrated Project (MMIP).10 The same World Bank officials who, over two decades ago, were so instrumental in drawing attention to how ASM’s growth is linked to poverty (Barry, 1996), have pledged US$30 million in support of the MMIP. In the background documents, they avoid emphasizing too heavily the link between the growth of informal ASM activities and hardship in the country, seemingly convinced that ‘providing viable alternatives to illegal mining’ is a tangible solution to what they describe as the country’s ‘illegal mining problem’. This is despite the gold price being even higher and therefore ASM being even more enticing than at the time of the disastrous experimentation in this area by the country’s large-scale operators.

In Akwatia, it is unclear how women could even be integrated into such activities. Here, the artisanal and small-scale Gold mining activities on which they now depend are the alternative livelihood. To what extent have these dynamics been considered by the Minamata team in Ghana? Can substitute employment be found for these vulnerable women? What lessons have been learned from past experiences?

3.1.2. Implications for Ghana’s NAP

What should the Minamata team in Ghana take stock of when devising ‘strategies to prevent exposure of vulnerable populations’? The most important takeaway is the importance of understanding the mindsets of the women who engage in ASM, whose life struggles have

7 Interview, Female Miner 9, Akwatia.
8 Interview, Female Miner 20, Akwatia.
9 Interview, Female Miner 4, Akwatia.
contributed to their resilience and led them to appreciate their work, irrespective of the dangers it may present. Not surprisingly, these experiences have influenced their attitudes toward mercury, which begs the question: why would individuals willingly subject themselves to such a danger?

Whilst few scholars have attempted to answer this question explicitly, two explanations are discernible from the literature, although neither fully applies to the present investigation. The first is the view that those engaged in ASM simply have minimal knowledge of mercury’s health-related impacts. It can take a significant amount of time for mercury to methylate and bioaccumulate to toxic levels in the natural environment, and for individuals to feel the effects of this poisoning, by which time they may associate it with something else. Several reviews (e.g., Sana et al., 2017; Soemarwoto and Ellen, 2010) have, indeed, suggested that miners may simply be unaware of the dangers associated with mercury use; studies conducted in Tanzania (Charles et al., 2013) and Suriname (Duijves and Heemskerk, 2014) confirm this to be the case. The second, and more likely, explanation is, in light of the ‘growing awareness of mercury pollution since the early 1970s’ (Jønsson et al., 2013, p.61), that individuals working at artisanal and small-scale gold mines elect to ignore the dangers. Studies conducted in other areas of Ghana (Armah et al., 2016; Styles et al., 2010), Colombia (Webster, 2012) and the Amazon Basin (WWF, 2018) have drawn this conclusion.

The female miners interviewed in Akwatia fall into their own camp or a separate category. On the one hand, all interviewees seemed aware that mercury posed a danger to their health, although most could not explain why. Typical responses included ‘with the mercury if you fail to wash your hands after coming into contact with it I hear there are lots of effects, it is very poisonous’,11 and ‘I hear when one inhales it poses some health risk on themselves but aside that I have no idea what else mercury does to people’.12 Certain women, however, appeared to be fully aware of the dangers:

All I know is that mercury is not good when one gets exposed to it! I heard when it flows in the water that we use on the sites and a woman bathes with it she would be exposed to all kinds of diseases so all I can say is mercury is not good and that it poisons several risk.13

According to doctors it has very severe side effects. Then also I know mercury is really not good for the environment. I know that even in crop production and farming when mercury finds a way to touch the surface of the land it travels slowly in the depths of the land and destroys everything on it, the crops get affected and its growth becomes retarded and even with our water bodies it gets affected and whoever drinks from it is susceptible to high risk diseases.14

I’ve heard stories about how people have had cancer because they were exposed to mercury; personally, I don’t even go near because I’m really scared of what exposure to mercury could possibly do to my health.15

On the other hand, there seemed to be no sense of urgency among interviewees to learn more about the toxicity of methylmercury and potential exposure pathways at sites. The lengthy methylation time, along with the health effects of mercury not manifesting immediately and miners’ desperate need for income, has likely contributed to their apathy, an attitude detectable in almost every interview. One explained that, as a result, ‘most of the time we even do not wash our hands at the sites and we eat with those same hands we used in the mercury handling’, seemingly unphased by the broad consensus that ‘all these lands put us at a high risk of mercury poisoning’.16 It may also explain why some interviewees appeared unsure about the seriousness of the health threat posed by mercury. One argumentatively claimed that ‘it is alleged that it [mercury] destroys the land and crop but I have no idea how true this information is’.17 Another, when asked if she knew about the environmental hazards posed by mercury, replied: ‘I have no idea entirely’18

For Ghana’s Executing Agency, therefore, the initial task when identifying appropriate ‘Strategies to prevent the exposure of vulnerable populations’ – specifically, for these women – would be to recognize their plight and when designing policies, taking into account their day-to-day struggles, reasons for mining and their attitudes toward mercury. This can be summarized as follows: being vaguely aware of mercury being hazardous but electing not to take action due to the lack of visible evidence that points to it being a threat, and a result, viewing the economic gains from mining being a more immediate concern and taking priority. This leads to a second priority question, which concerns the type of work women undertake and how this potentially exposes them to mercury.

3.2. What work is being undertaken?

A second, very basic, guiding question that must be answered is: what types of work are vulnerable groups such as women undertaking? A detailed knowledge of the nature of the tasks undertaken by different groups of people in the sector and the specific locations of this work on sites vis-à-vis the organizational structures of operations is essential if appropriate policy measures and educational programs are to be designed for vulnerable populations. This is especially important in the case of women, whose involvement in ASM is, as indicated, ‘often invisible’. Consequently, their ‘voices are largely absent from political decision-making’ (Hinton et al., 2003, p. 185). This section of the paper uses data from the research to underscore why women being ‘invisible’ is so significant in the context of mercury usage at small-scale gold mines in sub-Saharan Africa. It furthermore takes stock of how the details of this ‘invisible work’ must be accounted for when designing and drafting plans and programs linked to NAPs specifically for educating women about the toxicity and appropriate handling of methylmercury.

3.2.1. Identifying pathways to exposure

Artisanal and small-scale gold mining activities are intensifying in all corners of sub-Saharan Africa. The need to determine, with greater precision, exposure pathways to methylmercury at sites, therefore, has never been more urgent. With the exception of perhaps work conducted by Nyanza et al. (2019) in Tanzania, few studies have been carried out with the explicit intention of identifying women’s exposure pathways to mercury and weighing in on the ways in which these are dictated by their work.

In some countries in sub-Saharan Africa, such as Tanzania and Zimbabwe, women’s exposure to mercury is direct through their handling of the liquid metal. In the former, there are accounts of women being ‘widely responsible for amalgamation pools in gold mining communities in both Geita and Kadoma’ (Spiegel et al., 2015, p.775). Similarly, in the latter, where the government has made a deliberate effort to empower female small-scale miners through the provision of loans and technology (Spiegel, 2009), many are directly exposed via smelting and the handling of amalgam (Rose-O’Reilly et al., 2017). In such cases, direct intervention is the most effective means of raising awareness among women miners, although few conform to the Minamata Convention’s ‘vulnerable groups’ label. Direct education and

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11 Interview, Female Miner 1, Akwatia.
12 Interview, Female Miner 7, Akwatia.
13 Interview, Female Miner 3, Akwatia.
14 Interview, Female Miner 5, Akwatia.
15 Interview, Female Miner 20, Akwatia.
16 Interview, Female Miner 3, Akwatia.
17 Interview, Female Miner 6, Akwatia.
18 Interview, Female Miner 3, Akwatia.
collaborative work aimed at developing alternative technologies, akin to what has already been carried out in both countries of late, is likely an appropriate strategy for engaging these women.

Whilst there is a small group of equivalent elite women miners in Ghana for whom similar policy treatment would appear to be the most plausible approach, none of the 25 interviewees fall into this category. Consistent with the observation that in sub-Saharan Africa, ‘Women typically work as panners, carriers, and processors as well as jewelry makers, cooks, and other service providers (including prostitutes) in and around mining sites’ (Tschakert and Singh, 2007, p.1305), each of the 25 interviewees reported carrying out mostly manual work at sites. Most, however, are susceptible to contamination through this work because, unknown to them, the ore they handle is laced with mercury. One explained, seemingly unaware of the irony, that ‘we just use our bare hands when handling the ore but we wear protective gloves when handling the mercury’.20

From the available evidence, very few women amalgamate gold and/or handle mercury directly in Ghana for extended periods. The challenge facing the Executing Agency and other parties tasked with crafting Ghana’s NAP, therefore, is identifying with greater precision the ways in which the tens of thousands of other women employed at the country’s small-scale gold mines – including those interviewed in Akwatia as part of this research – come into contact with mercury through their work. From the interview data, there are two recommended starting points for filling this gap in knowledge, the first being a more thorough analysis of how culture influences the roles and responsibilities of these women at sites. Several interviewees made repeated reference to how they were ‘not allowed’ or ‘not permitted’ to undertake certain tasks at sites because they are women. In the case of Akwatia, this list includes amalgamating gold and handling/supplying mercury. Whilst the rationale behind these ‘rules’ was not made clear during interviews, it is likely an additional chapter of what is now a burgeoning guidebook governing women’s participation in the small-scale gold mining sector. Rarely is a full explanation provided for a norm or rule: why, for example, in Niassa, Mozambique, women are not allowed to work at the mine site ‘because they attract bad spirits’, and are therefore ‘only allowed to sell food and beer’ (Dreschler, 2001, p.58); why in Mali, Guinea as well as Ghana, ‘Women rarely, if ever, work underground and seldom participate directly in the mineral extraction phase in surface mines – except when it involves scratching the surface with hoes or rakes, or panning in streams’ (ILO, 1999, p. 29); and why, in DR Congo, women are also not allow in a pit, on the grounds that it is believed to be ‘not good if someone else’s wife finds something valuable and unique movements onsite.

This leads to the second recommended starting point, which is determining the specific locations of women’s workplaces, as well as their movements onsite vis-à-vis amalgamation, burning stations and other areas where mercury is being handled. There are illustrative examples scattered throughout the literature which underscore why. It starts with waste rock or tailings, which are typically laced with mercury. In such cases, explain Weldegiorgis et al. (2018), ‘women are exposed to health risks such as brain, kidney and lung damage, particularly because it is women who often perform ore purification using mercury or cyanide and scavenge tailings where they encounter with chemicals such as cyanide’ (p. 4). At small-scale mines in Burkina Faso, however, the focus should be on the mining activities themselves because ‘approximately 90% of processing activities are conducted by women’ (Hinton et al., 2003, p. 618). The same applies to Mozambique but not due to a direct exposure to mercury through handling. It is rather because ‘in the mineral processing duties such as manually grinding, panning and amalgamation’, most (80 percent of women) are involved, and become exposed through ‘carrying sacks of ore down to the processing area and roasting amalgams in bonfires’ (Shandro et al., 2009, p. 528). The additional concern in Mozambique is where this processing takes place. As Drace et al. (2016) explain ‘Most miners in Mozambique do not burn in a centralized location downwind of the community’ but rather ‘often burn in their living quarters, in the presence of women and children, and near waterways’ (p.89). In Ghana, the routes women travel at sites should be carefully studied, as the ‘Head-loads of the materials are then carried (by women in most instances)’. A careful examination of these travels will reveal that women pass numerous places – waterbodies, tailings dumps, pits and ore piles – where they may knowingly or unknowingly come into direct contact with mercury. Each of the 25 women interviewed in Akwatia reported having her own workstation and unique movements onsite.

A more detailed knowledge of women’s movements and locations of work at small-scale gold mine sites, dictated at times by cultural dynamics and taboos, could facilitate easier identification of potential exposure pathways to mercury. Fig. 1 draws on the claims above and related anecdotes to depict visually how mobility and job-type are key determinants of women’s exposure to mercury in the Ghana context and the case of Akwatia in particular.

3.2.2. Implications for Ghana’s NAP

For the women interviewed in Akwatia, and others who carry out complementary work in other regions of Ghana, mercury is largely invisible: it is only seen at specific places, and often at particular times of the working day, if at all, despite being ever-present at sites. This

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20 Interview, Female Miner 12, Akwatia.

21 Interview, Female Miner 21, Akwatia; interview, Female Miner 22, Akwatia.

22 Interview, Female Miner 9, Akwatia.

23 Interview, Female Miner 16, Akwatia.
helps explain why, for some, mercury is, as one woman explained, a topic her and colleagues have ‘heard stories about’ but because they do not see it regularly nor are able to study its behaviour in the natural environment, fail to comprehend fully how it impacts human health. For this woman, the story she is most familiar with is ‘how people have had cancer because they were exposed to mercury’. For the few interviewees who reported having handled mercury at sites, there is little, if any, effort being made to protect themselves. As one explained in an interview, when asked about protective gear, ‘no, we use our bare hands’, which she explained in her case was because she had ‘never heard any health implications related to the use of mercury’. In fact, the entire group of 25 women demonstrated very limited knowledge about how mercury is distributed at sites and how individuals become exposed to it, and showed very little interest in learning more about its health-related impacts. The ineffectiveness of seminars and workshops organized in the past across Ghana, under the guidance of donors such as GTZ, UNIDO and the World Bank, to raise awareness of the environmental and health-related impacts of mercury use at small-scale gold mines (see e.g. Aryee et al., 2003; Babut et al., 2003) has, understandably, been a source of frustration for the country’s policymakers. But for the women occupying the lowest rungs of the ASM labour hierarchy, such as those interviewed in Akwatia, the reasons why the messages being communicated at these events are not registering are quite clear.

For the Government of Ghana, going back to the drawing board and revisiting the meaning of ‘vulnerable populations’ may be necessary because – at least in the case of the women employed in the country’s small-scale gold mining sector – the definition is multifaceted. Studies such as Armah et al. (2016), which, from data drawn from interviews conducted in the Ghanaian gold mining hubs of Tarkwa, Prestea and Damang, concluded that ‘97% of female miners had low levels of knowledge of mercury-related health effects’, attribute the lack of precaution taken to protect the body from mercury to a poor understanding of how it methylates and why, in this form, it poses such a serious environmental threat. From the interview data retrieved in Akwatia, however, the explanation – at least for women – is much more nuanced. Apart from personal hardship and their need to accumulate income to cover household expenses likely leading to environmental concerns not being viewed as much of a priority, few of the women working in the sector know when and where they come into contact with mercury. Close analysis of their movements and locations of work at sites would, therefore, go a long way toward filling these crucial gaps in knowledge.

For the parties assembling Ghana’s NAP, this knowledge is a key to designing appropriate educational programs about mercury and the environment for women. With their survival mindset and very limited understanding of what mercury looks like and how it threatens human health, these women clearly require special policy treatment, even within the very programs being established under the auspices of the Minamata Convention specifically for ‘vulnerable populations’. A commitment to developing an improved understanding of their specific roles, locations of work and movements onsite is a logical starting point.

4. Concluding remarks

Countries that have ratified the Minamata Convention on Mercury must now produce a NAP but in sub-Saharan Africa, where host governments have struggled to formalize ASM, this promises to be an enormous undertaking. This, however, has not discouraged any of the region’s countries with sizable and dynamic artisanal and small-scale gold mining economies from ratifying the convention. But despite this enthusiasm, as this paper has shown, focusing on the experiences of women, in order to develop appropriate policies and educational strategies for just one ‘vulnerable group’, governments will need to deepen their understanding of the complexities of ASM communities, the organizational structures of operations and the roles played by the different actors who populate them.

Through a case study of Ghana, this article has raised more questions – particularly in the context of the capacity and drive of institutions – than provided answers concerning the ability of governments in sub-Saharan Africa to adequately nuance ASM population structures and map the sector’s labour hierarchies. Findings from this study were framed around two very basic questions, both of which should be answered before any action is taken to engage ‘vulnerable populations’, foremost women: 1) Why artisanal and small-scale gold mining, or why do individuals pursue work in the sector? and 2) What work is being undertaken, or what jobs are these individuals carrying out onsite? There

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24 Interview, Female Miner 16, Akwatia.
25 Interview, Female Miner 17, Akwatia.
are three important takeaway messages from this analysis, the first being the importance of using a ‘bottom-up’ approach to capture the details of the segments of ASM populations being targeted, including their motivations for pursuing work in the sector and their backgrounds. As findings from research conducted in Akwatia revealed, a large proportion of the women working in ASM occupy the lowest rungs of the sector’s labour hierarchy. Significantly, these are individuals who have very little direct contact with mercury. The messages preached at workshops which aim to educate individuals about the environmental and health-related impacts of mercury, therefore, are unlikely to reach them because for most, its amalgamating properties are unknown and are rarely, if ever, understood. Under the Global Mercury Project, a ‘training of the trainers’ approach was often used to educate miners about amalgamation. In countries such as Sudan, however, pre-existing frictions – in this case between the tribes of those conducting training and those receiving it – heavily compromised efforts (UNIDO, 2007). If a similar ‘training of the trainers’ approach would be pursued in Akwatia, the concern would be over relatability: why asking a small group of elites to engage individuals who barely have an education and may have never had a bank account is an inappropriate solution.

This leads to the second key takeaway, which is the importance of studying the locations of women’s workstations on and, their movements at, the hauling and washing of ore, for example, puts these women in contact with mercury at several locations in a given mining community. Information about these tasks is essential for policymakers to simplify messages to women in ways that resonate with their daily schedules and which will prompt them to take action to protect themselves.

The third and final takeaway is the importance of having the requisite expertise on hand to devise an appropriate NAP. It may seem to be an obvious undertaking but as explained, in most cases – including Ghana – the Executing Agency is a ministry of the environment or its equivalent. Yet, whilst the link with these agencies may seem ideal to the layperson, in countries such as Ghana, they have no real regulatory responsibilities for ASM. Moreover, and of particular importance to the analysis presented in this paper, they do not have any expertise on gender. The 13-institution Minamata Convention Implementation Committee cobbled together in Ghana to help oversee many of the tasks needed to complete the country’s NAP needs to be expanded urgently to ensure greater representation for gender-based rights. Until the necessary expertise is on board, the institutions tasked with producing a NAP will struggle mightily.

The challenge ahead promises to be enormous. But simply accepting that the ASM sector is made up of eclectic groups of people and that even the specific segments comprising its populations are highly-heterogenous in composition is certainly a step in the right direction.

CRediT authorship contribution statement

Gavin Hilson: Writing - original draft, Writing - review & editing, Visualization, Project administration, Resources, Conceptualization, Investigation, Formal analysis. Yanfei Hu: Writing - original draft, Writing - review & editing, Resources. Cynthia Kumah: Writing - original draft, Writing - review & editing, Visualization, Resources.

Declaration of Competing Interest

Authors Professor Gavin Hilson and Dr Yanfei Hu and Ms Cynthia Kumah confirm that there is no conflict of interest or involvement with an organization or entity with a financial or non-financial interest in the subject matter or materials discussed in this manuscript.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.envsci.2020.02.003.

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