

Public Health Strategy

Towards a National Action Plan for Reduction/Elimination
of Mercury Use in Artisanal and Small-Scale Gold Mining
(ASGM) in Nigeria
(Draft)



Federal Ministry of Health

Supported by





Table of Contents

1. Introduction	4
1.1 Background	4
1.2 NAP Activities and the Health Sector in Nigeria	4
1.3 Purpose of the Strategy	6
1.4 Scope of the Strategy	7
1.5 Process for Developing PHS	7
2. Mercury Exposure, ASGM and Human Health	8
2.1 Health Risk from Mercury Exposure.....	8
2.2 Health Situation Assessments on ASGM	8
2.3. Institutional Capacities to Address Health Challenges in ASGM.....	11
2.4 General Health situation in ASGM Communities.....	11
2.5 Organization of Health System Institutions for ASGM	13
2.6 Technical Structure to Diagnose, Monitor and Treat ASGM-related Health Conditions in Nigeria....	14
3. Public Health Strategic Priorities.....	15
4. Monitoring and Evaluation	24
Reporting Progress	24
5. References	26
6. Contributors.....	27
ANNEXES.....	29
Recommendations.....	29

1. Introduction

1.1 Background

In 2013, Nigeria became a signatory to the Minamata Convention and the Article 7 of the convention highlights the need for reduction and elimination of Mercury. The Minamata Convention on Mercury is an international environmental treaty designed to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds (UNEP, 2013). Artisanal And Small-Scale Gold Mining (ASGM) sector is the highest source of mercury emission in the environment and this called for the development of the National Action Plan (NAP) on Mercury in Nigeria (Persaud & Telmer, 2015; Veiga, Maxson, & Hylander, 2006). Paragraph 3 (a) of article 7 of the Minamata Convention on Mercury obligates each Party that has more than insignificant ASGM in its territory to develop and implement a national action plan (NAP) in accordance with annex C to the Convention. A NAP must include a public health strategy on the exposure of artisanal and small-scale miners and their communities.

The World Health Assembly Resolution 67.11 recognizes the role of health ministries in supporting the implementation of the Convention and calls upon WHO to provide technical support in this regard. The Federal Ministry of Health (FMOH) has conducted public health and institutional assessments on ASGM, noted key findings and recommendations, staged a discourse with stakeholders and selected key priorities for implementation. A number of recommendations at different levels of intervention, i.e. individual, community and institutional level which emanated from the assessments conducted by FMOH guided the selection of public health interventions within this NAP.

1.2 NAP Activities and the Health Sector in Nigeria

NAP activities' in Nigeria has experienced significant success. This process is being supported by the United Nations Industrial Organization (UNIDO) with funding from the Global Environment Facility (GEF). In co-executing the health component, WHO provided the desired technical guidance and support to the Federal Ministry of Health (FMOH) to ensure the health components of the NAP activities is being implemented in Nigeria.

FMOH/WHO participated in the National Steering Group activities from inception. An Inception workshop was held on Wednesday, 19th July 2017 at Rockview Royale Hotels, Wuse II, Abuja. The

objective of the workshop was to present the NAP project and implementation workplan to relevant stakeholders in order to sensitize and get their buy-in on the project.

The first National Steering Group coordination meeting was held on 16th November 2017 at Rockview Hotel Classic, Abuja. The meeting approved the project workplan and identified consultant for the project. The second National Steering Group coordination meeting was held on 16 August 2018 at Rockview Hotel Classic, Abuja.

A workshop on data gathering for the national comprehensive analysis of the ASGM sector to support the development and implementation of a road map and reduce mercury emission and releases in Nigeria was organized by the Ministry of Mines and Steel Development at Rockview Hotel Classic, Abuja on 12th January 2018. A stakeholders meeting for the development of framework for environment and health activities in Nigeria by the Federal Ministry of Health and the World Health Organization (WHO) was also held at Rockview Hotel Classic, Abuja on 29th June 2018.

Field studies and activities in ASGM sites in Niger and Osun states for data collection were conducted by the MMSD between August 2018 and February 2019.

Conclusion of study protocols, and the processing of ethical clearance with WHO headquarters in Geneva for the commencement of field activities by WHO/FMOH. FMOH/WHO conducted preliminary field visits to communities and health care providers in selected ASGM locations in Niger State for logistics coordination in preparation for field activities between September-December 2018. On Tuesday 18 December 2018, an Information Sharing and Dissemination Workshop on the development of a NAP on the use of mercury in the Nigerian ASGM sector was held in Abuja, Nigeria. The health sector was adequately represented where a presentation titled an “Overview and Methodologies of the Rapid Health Situation Assessment and Development of Public Health Strategy on ASGM” delivered. FMOH conducted public health assessment for the development of National Action Plan on Mercury use in the Nigerian ASGM sector in Niger and Osun States from 13th to 30th March 2019. On 9th -10th October, 2019 WHO/FMOH coordinated a health sector workshop on ASGM to presented findings of assessment, developed and validate a public health strategy (PHS).



Fig 1.1 A cross-section of NAP stakeholders at the end of ASGM Information Sharing and Dissemination Workshop held in Abuja in December, 2018 development



Fig 1.2 90 – Minute Opening Session on Public Health Assessment on ASGM. held in Minna



Figure 1.3 Health Sector Workshop on development of Public Health Strategy held in Abuja, October 2019

1.3 Purpose of the Strategy

In recognition of the human health and environmental impacts of ASGM, in particular resulting from the use of mercury amalgamation in the gold extraction process, the Minamata Convention obligates the development of public health strategies on the exposure of artisanal and small-scale gold miners and their communities to mercury.

The PHS aims to:

- addresses coverage of health in the wider NAP development process,
- gives an overview of current health situation in ASGM communities,

- provide vital information about public health implication of exposure to mercury, and
- proposes a framework for priority health interventions for implementation in Nigeria.

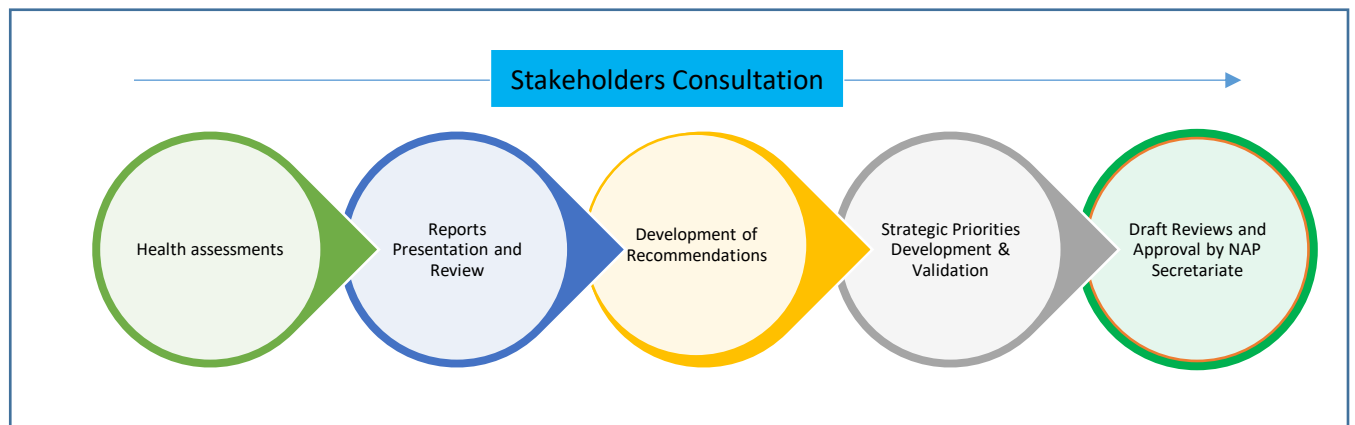
1.4 Scope of the Strategy

The PHS gives overview of current health situation in ASGM communities, vital information about public health implication of exposure to mercury, and proposes a framework for successful implementation of priority health interventions. This document is useful for parties and persons responsible for health sector in Nigeria. This includes all relevant stakeholders comprising Federal, State Ministries of Health, Local Governments as well as their applicable agencies, relevant private sector companies, Non-Governmental Organisations (NGOs), development partners, donor agencies, research institutions and civil society groups.

The document also seeks to address current overlaps and streamline the roles and responsibilities of stakeholder in order to maximize the benefits of investments in health to reduce and eliminate mercury use.

1.5 Process for Developing PHS

The process adopted for the development of the PHS was participatory and inclusive with the FMOH driving the process, with guidance from WHO and supported by NAP Stakeholders. The Development Process is as follows:



2. Mercury Exposure, ASGM and Human Health

2.1 Health Risk from Mercury Exposure

ASGM contributes to human exposure to mercury including other related hazards of public health importance. These hazards can be categorized into chemical (e.g. mercury, cyanide, arsenic, lead), biological (e.g. water- and waste-related diseases, sexually transmitted infections), biomechanical (e.g. traumas, overexertion), physical (e.g. noise, low oxygen levels) and psychosocial (e.g. drug abuse, stress, fatigue) hazards (IIED, 2004).

For mercury, the factors that determine whether health effects occur and, if so, the extent of severity, include: (i) type of mercury; (ii) dose of exposure; (iii) age or developmental stage of the exposed individual; (iv) duration of exposure; and (v) route of exposure (inhalation, ingestion or dermal contact). The most sensitive developmental stage is the fetal stage; methylmercury exposure in the womb can result from a woman's consumption of mercury contaminated fish and shellfish and can adversely affect a fetus's growing brain and nervous system. The primary health effect of methylmercury is impaired neurological development. Therefore, cognitive thinking, memory, attention, language, and fine motor and visual spatial skills may be affected in children who were exposed to methylmercury as fetuses. Another vulnerable group is people who are regularly exposed (i.e. chronically exposed) to high levels of mercury, such as miners who are occupationally exposed (WHO, 2019)

A study commissioned by WHO of mercury biomarkers in human populations between 2000 and 2018 suggests that all populations worldwide are exposed to some amount of mercury and there is great variability in exposures within and across countries and regions (WHO, 2019).

2.2 Health Situation Assessments on ASGM

During the preparatory stages of the health situation and institutional assessments, a study protocol was submitted to the National Health Research Ethics Committee (NHREC) of the Federal Republic of Nigeria in 2019. On the 10 December, 2018, NHREC approval was given for the "Assessment of public health challenges in Artisanal Small-scale Gold Mining (ASGM) communities

and the local health system’s readiness to respond in Nigeria” with Approval Number NHREC/01/01/2007-10/12/2018. In line with international and national best practices for conduct of health research, the assessment had also received WHO Ethic Review Committee’s (ERC) approval with Protocol ID: ERC 0002925.

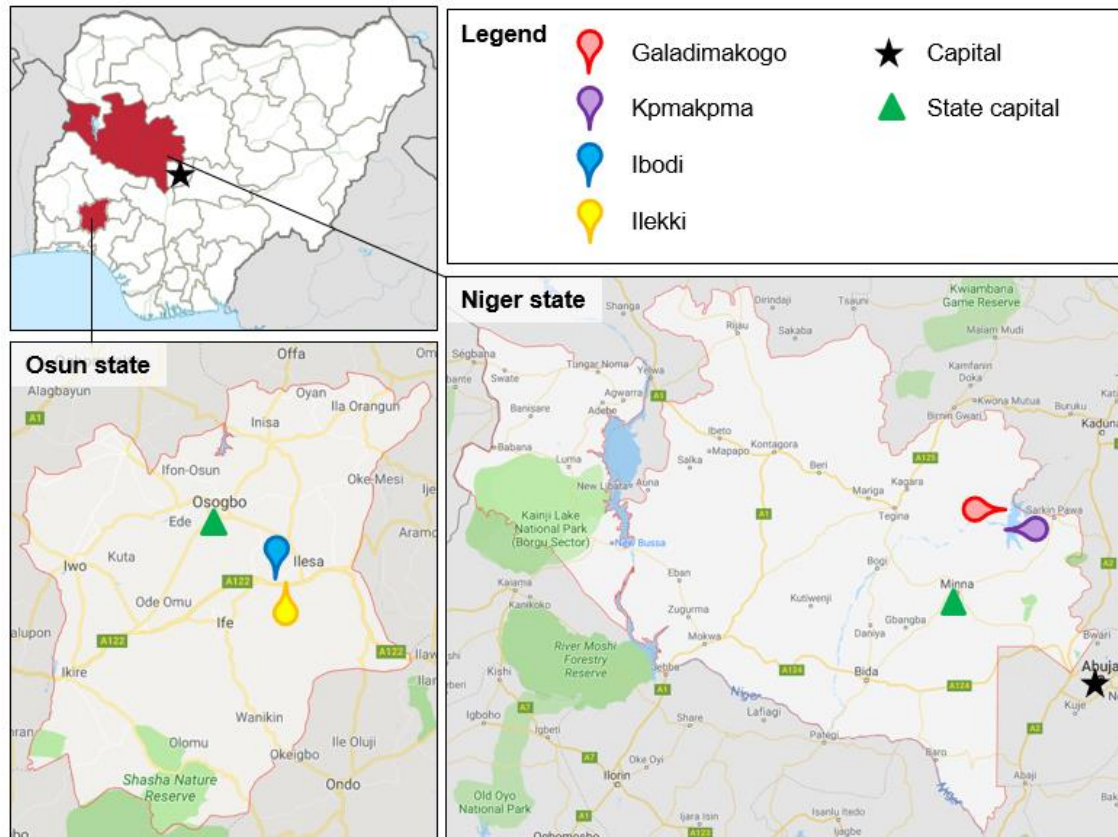


Fig 2.1. Nigeria’s ASGM sites Studied for Health Surveys and Assessment Field work



Fig 2.2 ASGM site in Osun State



Fig 2.3 Session with a ASGM Community during field work

During the study, two ASGM sites in each Niger and Osun states were visited in March 2019 for a rapid health situation assessment. Zamfara could not be included due to challenge of insecurity. Findings shows that the ASGM communities were diverse in their population composition from sites with mostly locals, where also women and children are working in mining, to sites with mostly non-locals. The health issues reported by artisanal and small-scale gold miners and by health care providers living and working in ASGM areas were largely concordant. However, miners and community members described a wider array of different symptoms as compared to health care providers. Overall, risks were often recognised by miners but risks were almost always secondary to the economic gain (often equalled to survival since mining is believed to be the only economic and occupational opportunity). Consequently, PPE use was very low with main reasons stated being inconvenience and affordability. The capacity and readiness of the health system is limited in terms of staff with sufficient training, offered services, diagnostic abilities, treatment options and referral (including emergency) infrastructure.

2.3. Institutional Capacities to Address Health Challenges in ASGM



2.4 General Health situation in ASGM Communities

A myriad of health risks and effects of ASGM as described by key informants (KIs) of health situation assessment conducted are in the table below:

Table 1: Health risks and effects of ASGM

Leading themes	Specific issues
Occupational hazards	<ul style="list-style-type: none"> Falling in pits by humans (including children) and animals Collapsing pits Land slides Inhalation of dust (leading to pneumonia, silicosis) Accidents and injuries Carbon monoxide intoxication from water pump machine in pit Excessive work and exhaustion Extreme heat and cold Vibration Falling stones
Environmental health hazards	<ul style="list-style-type: none"> Dirty environment No safe drinking water Open defecation Faecal-oral infections Smoke from burning waste and refuse in ASGM communities causes respiratory problems and allergies
Vector-related hazards, animals	<ul style="list-style-type: none"> Malaria

	<ul style="list-style-type: none"> • Mining is creating stagnant water bodies that become breeding sites for mosquitoes • Spread of Lassa fever
Chemical hazards	<ul style="list-style-type: none"> • Mercury exposure: inhalation and direct contact • Cyanide exposure • Lead exposure
Social and livelihood hazards	<ul style="list-style-type: none"> • Not enough food • Killings for economic gain • Kidnappings for economic gain
Community exposures	<ul style="list-style-type: none"> • Same instruments used to mine and process food • Tailings are used for building houses • Children eat from hand to mouth while soil is contaminated with mercury • Drinking water is polluted with heavy metals • People are bothered about the noise from milling machines
Health effects	<ul style="list-style-type: none"> • Symptoms of swollen legs when they stand in the waters/ponds up until the knees (pedal oedema) • Swollen face • Eye ball changes • Carbon-monoxide poisonings • Injuries: puncture injury in legs, cuts in feet, rocks falling on heads • Drug abuse: leading to overdosing, accidents • STIs • Head aches • Dizziness • Body pains • Stiffness • Stomach pains • Malaria • Mental disorders • Pneumonia • Finger nails falling off • Diarrheal diseases: typhoid fever, dysentery, cholera

The table below summarizes the health issues mentioned different population groups in ASGM Communities in Nigeria.

Table 2.2: Common Health issues in ASGM Communities by population Groups

Population group	Common health issues
Children	<ul style="list-style-type: none"> • Malaria • Fever • Convulsions • Vomiting • Conjunctivitis • Oral health
Women	<ul style="list-style-type: none"> • Abdominal pain

Elders	<ul style="list-style-type: none"> • General body pain, back pain • Fatigue • Reduced eye sight • Typhoid fever • Ulcers (stomach) • Hot legs • Reduced sensitivity of skin
Non-miners	<ul style="list-style-type: none"> • Ulcers (stomach, chest) • Typhoid fever • Malaria • Back pain, join pain, knee pain • Hypertension • Appendicitis • Hernia
Farmers	<ul style="list-style-type: none"> • Farm materials cuts, herbicides mis-management. They use it before it rains and it washes away. And people drink • Ingestion of insecticide and organophosphates leading to poisonings

2.5 Organization of Health System Institutions for ASGM

General responsibilities of key institutions (FMOH, National Council on Health), are described in the health act. However, ASGM relevant functions are not included, whereas a mandate to address health hazards in ASGM communities has not been defined.

The national health care system builds on the three tiers of primary (local), secondary (state) and tertiary (federal) health care. The country being divided into 774 Local Government Areas (LGA) and further divided into 9'565 political wards. Below the wards, every cluster of villages is to contrive a health post and each ward is to operate a health centre.

Primary Health Care (PHC), is meant to deliver an Essential Package of Health Services (EPHS), a minimum standard of health care. EPHS is divided into three service delivery modes: family-focused, community-based services, population-oriented, schedulable services and individually oriented clinical services.

Primary Health Care (PHC) is to administer basic medical needs of preventive, curative, promotive and rehabilitative nature. Services provided in local clinics should include:

- Immunization
- Supply of vitamins
- Family planning
- Prenatal care including preventive measures towards mother-to-child transmission
- Integrated management of childhood illness (IMCI)
- Integrated Community Case Management of Childhood Illness (ICCM)
- Nutrition programmes

Secondary Health Care is provided on the state/district level and includes specialized services that can't be covered on the primary local level:

- General medical services
- Minor surgery

- Paediatric care
- Obstetrics
- Specialized laboratory service
- Diagnostics
- Blood bank
- Rehabilitation
- Physiotherapy

Tertiary Health Care is specialized and attends to medical cases of high complexity. Teaching hospitals and other specialized medical clinics are typically the facilitators of this service at the federal level.

2.6 Technical Structure to Diagnose, Monitor and Treat ASGM-related Health Conditions in Nigeria

The Nigeria Centre for Disease Control (NCDC) leads the preparedness, detection and response to infectious disease outbreaks and public health emergencies. The NCDC's Directorate of Public Health Laboratory Services manages the national and regional reference laboratories. This also coordinates the Central Public Health Laboratory in Lagos, a campus of the National Reference Laboratory and a WHO-designated reference lab for the diagnosis of Measles, Rubella, and Yellow Fever. The Directorate maintains and manages the network of other collaborating laboratories, spread across regions of the country.

This strategy suggests implementing three-tier laboratory capacities in accordance with the health care system approach and in line with established standard operating procedures of the NCDC .

At the time of developing this strategy many ASGM sites are located in very remote areas which typically do not have access to Primary Health Care Facilities equipped with technical and laboratory equipments for diagnosis of heavy metal poisons and ASGM related illnesses. Mercury specific diagnosis or related other symptoms possibly occurring amongst ASGM communities are conducted at teaching hospitals or state general hospitals with such diagnostic capacities.

3. Public Health Strategic Priorities

Priority 1

Increased awareness in the health sector and ASGM communities on the dangers of mercury and its compounds

Strategic Objective	Strategy	List of Activities	Responsible	Monitoring Indicators	Y1	Y2	Y3	Y4	Y5
1. To Improve knowledge of stakeholders of on the dangers mercury use in ASGM	Engagement with key stakeholders to understand the problem and support strategy implementation.	1. Conduct advocacy visits to political, religious and community leaders.	FMOH, SMOH, LGPHD, NCDC, NPHCMA	Advocacy visited conducted.	X	X	X	X	X
	Development of Practical Educational Materials to be implemented by Local Health Care Workers	2. Plan and conduct conferences, workshops, seminars at national, state and local government levels		Number of conferences, workshops, seminars held.		X		X	
	Sensitization of the Chronic Long Term effects of Mercury			Minutes of town hall meetings	X				

	<p>with culturally appropriate Messages</p> <p>Promotion of New Technical Intervention (can decrease exposure if used correctly)</p>	<ol style="list-style-type: none"> 3. Plan and carry out town-Hall meetings 4. Engage various specialties of health workers in dialogue at all levels 5. Identify and engage a brand champion at all levels 6. Design, develop, test, produce and distribute IEC materials in English, local languages, Pidgin English 7. Develop a schedule for regular dissemination of Radio Jingles, TV adverts, SMS messages, short plays, role plays for elimination of mercury. 8. Collaborate with relevant agencies responsible for banned of the use of illicit drugs and 		<p>Number of dialogues conducted.</p> <p>Brand champions identified and used.</p> <p>Number of IEC materials developed and disseminated.</p> <p>Number of messages disseminated</p> <p>Number of collaborative awareness activity conducted</p>	<p>X</p> <p>X</p>	<p>X</p>	<p>X</p>		
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		prosecute illicit drug traffickers for awareness creation.							
2. Build capacity for sustainable communication activity at all tiers of government and among other stakeholders to effect behavioral change	<ul style="list-style-type: none"> Communication/training plan Conduct capacity Building capacity at the primary health care level among EHOs and health educators 	<ol style="list-style-type: none"> Identify health related programmes on media platforms for use in information dissemination Minimum number of lecturers/instructors at institutions trained 		Number of health-related programmes identified	X		X		X
				Number of EHOs/health educators trained				X	X

Priority 2

Generation of evidence through data gathering and chemical Surveillance to support implementation of health initiatives

Strategic Objective	Strategy	List of Activities	Responsible	Monitoring Indicators	Y1	Y2	Y3	Y4	Y5
1. To identify key stakeholders for improved data generation,	Identify and consult key stakeholders	1. Consult relevant partners and stakeholders.	FMOH	Number of stakeholders consulted	X	X	X		

management and use		<ol style="list-style-type: none"> 2. Schedule and conduct advocacy Visits 3. Conduct Data planning meetings 		<p>Number of advocacy visits held</p> <p>Number of minutes of data planning meetings.</p>		X	X	X	X
2. To conduct epidemiological mapping of mercury/heavy metal exposure to ASGM communities.	Community mapping	<ol style="list-style-type: none"> 1. Identification of mining sites in ASGM States. 2. Identification of Health Facilities and mapping access in mining communities. 3. Conduct Vulnerability Capacity Assessment (VCA) 4. Conduct pilot Health Impact Assessment (HIA) in selected states. 	FMOH,FMENV,NPHDA, NCDC, SMOH, LPHD, NBS, NESREA, NEMA, FMARD, Poison Control Centres, academia, Relevant MDAs, CBOs, CSOs & NGO's	<p>Map of Mining sites</p> <p>Map showing relationship between mining sites with health facilities.</p> <p>Report of VCA</p> <p>HIA report</p>		X	X	X	

<p>3. To strengthen capacity for surveillance, diagnosis and reporting heavy metal associated diseases and conditions.</p>	<p>Deployment of Data Gathering Solutions and supportive Tools</p>	<ol style="list-style-type: none"> 1. Identification of Data capturing methods 2. Updating disease reporting list on DHIS/IDSR Software 3. Training of Personnel on mercury/heavy metal Diagnosis and Supportive Supervision 4. Procurement of data collection tools, phones and software. 5. Establishment of heavy metals laboratories and linked to poison centres 6. Procurement of heavy metal analyser 	<p>FMOH, SMOH, LPHD, other relevant MDAs</p>	<p>Data capturing tools identified</p> <p>Reporting list on DHIS/IDSR updated</p> <p>Number of participants trained, report and list of participants</p> <p>Tools procured</p> <p>Laboratories established an linked</p> <p>Number of analyzers procured and distributed</p>	<p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p>	<p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p>	<p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p>	<p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p>	<p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p>

		7. Data Analysis and dissemination of findings		Publication of findings				X	X
	Strengthening of Monitoring and Evaluation	Procurement of vehicles	FMOH, SMOH, LPHD, other relevant MDAs Relevant MDAs Local Health Facility staff Local Government Staff	Monitoring vehicles procured and used.				X	X

Priority 3

Strengthen coordination in the Health System to prevent, eliminate or manage mercury and heavy metals exposures

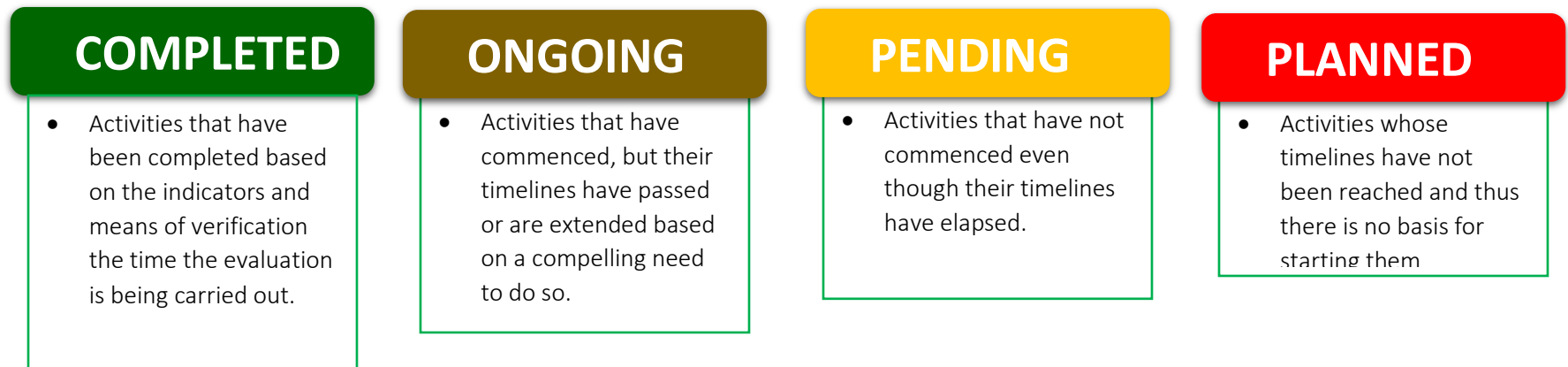
Strategic Objective	Strategy	List of Activities	Responsible	Monitoring Indicators	Y1	Y2	Y3	Y4	Y5
1. To set up a structure to oversee issues of mercury/heavy metals in the health sector	Establish a technical working group to coordinate mercury and other ASGM specific issues at national, states and local government levels.	Formation of a national steering group to coordinate ASGM, mercury issues in the public health sector.	FMOH SMOH NPHCDA NCDC	National Steering Committee set up in the health sector	X	X			

2. To strengthen legal and institutional frameworks for effective and integrated health sector action.	Review and updating of national health policies to include mercury and other ASGM health related issues.	<ol style="list-style-type: none"> 1. Support the legislation on reduction/elimination on the health effect of mercury use. 2. Review existing policies to promote financing of ASGM health related issues. 	FMOH	<p>Legislation supported</p> <p>Number of policies reviewed.</p>	X	X	X	X	X
3. To build capacity for improved integrated service delivery at all levels	<ul style="list-style-type: none"> • Have a standard operating procedures (SOPs) for improved service delivery. 	<ol style="list-style-type: none"> 1. Organize national workshops, conferences at federal, states and local government levels. 2. Develop SOPs at national, disseminate to states and local government levels. 	FMOH SMOH	<p>Workshops and conferences organized.</p> <p>SOPs developed</p>			X	X	X
4. To strengthen capacity and building of existing Health Care Workers on signs and symptoms of mercury/ heavy metal poisoning	<ul style="list-style-type: none"> • To weave the existing systems into an integrated platform and bridge gaps where they exist. 	<ol style="list-style-type: none"> 1. Employ professional health care workers trained as first respondent to ASGM specific health issues at the health facility. 2. Establishment of health care facility around communities where mining is being done or taken place 	FMOH SMOH NPHCDA NCDC FMEEnv EHORECON	<p>Healthcare workers recruited</p> <p>Health facilities established.</p>			X	X	X

		5. Carry out environmental sanitation and hygiene improvement campaigns in mining communities		Number of campaigns conducted		X	X		X
		6. Conduct periodic occupational health and safety training associated for miners		Numbers of miners trained		X	X		X

4. Monitoring and Evaluation

The PHS has activities, indicators, means of verification, time frame, and responsible stakeholder(s). The monitoring and evaluation plan will be based on the existing fields in the strategy. The strategy will be evaluated on the NAP Workplan. All activities will be adjudged to be either completed, ongoing, pending, or planned



Reporting Progress

The report of the evaluation will be based on the priority of the strategy. For each goal, the proportion of activities under each goal that are classified as completed, ongoing, pending, or planned will be documented. Annual evaluation will be conducted by National Steering Committee to be constituted in the first year of implementation while the end of year evaluation will be conducted by an independent consultant at the end of the year.

5. References

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6. Contributors

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ANNEXES

Recommendations

A number of recommendations are formulated below at different levels of intervention, i.e. individual, community and institutional level. This comprehensive but non-exhaustive list of recommendations can guide the selection of public health interventions within the NAP in Nigeria.

Recommendations at individual level:

- *Practice of alternative activities such as farming and fishing, especially during the rainy season, can represent an alternative income source, promote self-subsistence and avoid risks related to mining during the rainy season (e.g. collapsing pits, slippery terrain).*
- *The use of individual PPE is recommended to protect from injuries:*
 - *Solid shoes: Solid shoes (sneakers or more solid with profile) can protect from falls due to slipping and injuries due to rough ground and falling rocks as well as protect to some extent against animal bites (snakes, scorpions).*
 - *Hats, helmets: Headgear can protect from sun, diminish the impact of hits and minimize the risk of injuries due to falling rocks.*
 - *Protective glasses: Eye protection for rock breaking activities.*
 - *Gloves: Hand gloves when handling rocks and metal.*
 - *Masks: Protection from inhalation of dust and mercury fume.*
- *Adaptation of safer mining approaches to minimize risks:*
 - *Building of safer underground shafts through reinforcement of pits with (wooden) scaffolding or similar.*
 - *Ensuring oxygen supply in underground shafts.*
 - *Use of retorts when burning mercury amalgam.*
 - *Safe disposal of mercury and cyanide tailings.*
- *Environmental management and hygiene:*
 - *Avoid pollution of the environment by spilling mercury contaminated water and tailings into rivers used by communities for drinking, irrigation and other activities. These could be discharged at a designated area only to minimize introduction into the environment and accumulation in food chain.*
 - *Reclamation of land after use such as filling pits to avoid falls of humans and animals or stagnant water bodies that promote mosquito breeding.*
 - *Avoid open defecation at mining sites and environment. Practice defecation in designated sanitary latrines.*
- *Understand the importance and value of personal health:*

- *Adapting a safer and healthier lifestyle (including safer mining behaviours, personal hygiene, avoidance of substance abuse, practice safe sex, etc.) will avoid potential future health care costs.*
- *Understanding that personal health has a value and a price. Minimal income savings will allow to cover health care and avoid economic shocks.*
- *Maintain high sense of security consciousness to avoid conflicts with host communities and avoid attacks from gold thieves and armed herders.*

Importantly, individuals will face challenges to adapt safer mining measures if they imply financial efforts (even if minimal), are inconvenient or more time-consuming than the existing standard. Therefore, miners do need support in adapting safer and healthier behaviours through awareness raising, training and facilitation (e.g. bringing the PPE closer to them).

Recommendations at community level:

- *Separate all mining activities, including amalgam burning activities, from the community residential areas.*
- *Organise mining activities along traditional structures and use existing, traditional mechanisms for land use management and conflict management.*
- *Organise mining activities through mining associations proven functional and beneficial by other ASGM communities.*
- *Balance farming and mining activities in communities to ensure self-subsistence and balanced demand and supply of agricultural products.*
- *Creation of secondary markets that also promote safer mining such as locally sold PPE.*
- *Engaging in stakeholder exchanges with representatives from other sectors such as education, farming and fisheries, health and civil society. Cross-sector collaborations could help to tackle low school enrolment, low farming activity or health seeking behaviour and can increase advocacy for social and health issues within ASGM communities.*
- *Promote community cohesion in face of potential substantial in-migrant population.*

Similar to individuals, communities will face challenges in implementing certain recommendations. Institutional frameworks will be determinant in the success in implementing community-based recommendations.

Recommendations at institutional level:

- *Expand on existing and well-functional local, traditional mechanisms on land use management and conflict management.*
- *Organise mining activities through mining associations by scaling existing association models in the country that have proven functional and beneficial by affected stakeholders, especially affected ASGM communities.*
- *Increase accountability of mining associations with regards to:*
 - *Health promotion activities, including use of PPE, safer mining techniques and health insurance schemes*

- *Environmental hazard management*
- *Provision of first aid for work-related accidents*
- *Community engagement with regards to land use and conflict management*
- *'Corporate Social Responsibility' activities that return a proportion of the financial gain back into the community, also benefitting the non-mining community members*
- *Raise awareness on ASGM-related health issues at individual, community and institutional levels (including government, politicians and decision-makers, health sector, civil society sector and mining associations) through previously found effective means (e.g. radio, billboards, associations, NGOs, innovative technologies).*
- *Support individuals and communities in:*
 - *Using PPE*
 - *Adapting safer mining techniques, including seasonal mining*
 - *Diversifying economic opportunities in ASGM: farming, secondary markets*
- *Facilitate and enhance stakeholder exchanges between sectors (mining, environment, health, welfare, education, agriculture, justice, etc.), civil society and ASGM communities. This will facilitate to tackle environmental, social, livelihood (incl. land use planning and conflict) and health issues related to ASGM.*
- *Create community-based health insurance schemes in collaboration with community leaders and mining associations.*
- *Provide all health facilities in ASGM areas, including referral facilities, with the training manual for health professionals entitled "Health Issues in Artisanal and Small-Scale Gold Mining" developed by the Artisanal Gold Council (AGC), UNIDO and GEF.*
- *Enhance investments in training of medical staff on ASGM-related health issues, provision of medical equipment, infrastructure, diagnostic and treatment capacities in local health facilities and ensure effective referral systems to secondary and tertiary health structures.*
- *Promote appropriate HSB in ASGM communities where appropriate services are offered, including timely health seeking, avoidance of traditional medicine and self-treatment.*
- *Integrate ASGM-related health issues into routine data collection in the DHIS2 tool (e.g. symptoms of chronic mercury exposure, occupational background)*
- *Increase health promotion activities for health issues particular to ASGM communities such as substance abuse, STIs, water and sanitation, and occupational health, including on mercury and cyanide use.*
- *Legalising ASGM activities would help to:*
 - *Increase security in ASGM sites which are currently not covered by the executive legislative system (e.g. police). Increased security can reduce kidnapping and robberies in ASGM and increase miner's security*
 - *Properly plan and execute ASGM activities to minimize conflicts and risks (environmental, social, health)*
 - *Facilitate the creation of secondary markets (e.g. mining equipment, PPE)*
 - *Decrease mental stress to miners due to fear from the legislative system, insecurity, conflicts and the notion of bad spirits related to ASGM.*
 - *Recognize ASGM communities officially as a group with specific health risks as a first step to address those risks appropriately.*