National Action Plan

FOR THE REDUCTION AND EVENTUAL ELIMINATION OF **MERCURY** USE IN ARTISANAL AND SMALL-SCALE **GOLD MINING** IN NIGERIA





NATIONAL ACTION PLAN FOR THE REDUCTION AND EVENTUAL ELIMINATION OF **MERCURY** USE IN ARTISANAL AND SMALL-SCALE **GOLD MINING** IN NIGERIA

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ABBREVIATIONS AND ACRONYMS

AGC	Artisanal Gold Council
ASGM	Artisanal and Small-Scale Gold Mining
ASM	Artisanal and Small-Scale Mining
Au	Gold
BAN	Basel Action Network
BCCC-A	Basel Convention Coordinating Centre for Training and Technology Transfer for the African Region, Nigeria
BOI	Bank of Industry
BRS	Basel, Rotterdam and Stockholm Conventions
CASFU	Competent Authority – Seafood Unit (Ministry of Fisheries)
CBN	Central Bank of Nigeria
CDA	Community Development Agreement
CHEW	Community Health Extension Workers
CMR	Central Motor Registry
CSO	Civil Society Organizations
CPI	Commodities and Produce Inspectorate Department
Dip Con	Diplomatic Conference
DOC	D-Oiled Cake
DPR	Department of Petroleum Resources
ECOWAS	Economic Community of West African States
EEE	Electrical and Electronic Equipment
EHOs	Environmental Health Officers
EIA	Environmental Impact Assessment
ERGP	Economic Recovery and Growth Plan
FCCPC	Federal Competition and Consumer Protection Commission
FCT	Federal Capital Territory
FID	Factory Inspectorate Division
FDI	Foreign Direct Investment
FEPA	Federal Environmental Protection Agency
FGD	Focus Group Discussions
FMARD	Federal Ministry of Agriculture and Rural Development
FMEnv	Federal Ministry of Environment

FMF	Federal Ministry of Finance
FMITI	Federal Ministry of Industry, Trade and Investment
FMJ	Federal Ministry of Justice
FMLE	Federal Ministry of Labour and Employment
FMoH	Federal Ministry of Health
FMO	Federal Mines Officer
FMST	Federal Ministry of Science and Technology
FMWA	Federal Ministry of Women Affairs
FOTE	Friends of the Environment
FRSC	Federal Road Safety Corps
g	Gram
GDP	Gross Domestic Product
GEF	Global Environment Facility
HFA	Health Facility Assessments
Hg	Mercury
HSE	Health, Safety and Environment
ICCON	Institute of Chartered Chemists of Nigeria
IDD	Industrial Development Department
INC	Intergovernmental Negotiating Committee
IPAN	Institute of Public Analysts of Nigeria
kg	Kilogram
KI	Key Informant
KII	Key Informant Interviews
km	Kilometer
LASEPA	Lagos State Environmental Protection Agency
LAWMA	Lagos State Waste Management Authority
LGA	Local Government Area
LPFO	Low Pour Fuel Oil
m	meter
M&E	Monitoring and Evaluation
MAN	Miners Association of Nigeria
MAN	Manufacturers Association of Nigeria
MCO	Mining Cadastre Office
MDAs	Ministries, Departments and Agencies

MEAs	Multilateral Environmental Agreements
MEC	Mines Environmental Compliance
MI	Mining Inspectorate
MIA	Minamata Initial Assessment
MID	Mines Inspectorate Department
MINDIVER	Mineral Sector Support for Economic Diversification Project
MIREMCO	Mineral Resources Management Committee
MMSD	Ministry of Mines and Steel Development
MoU	Memorandum of Understanding
MSME	Micro Small and Medium Scale Enterprises
MSF	Médecins Sans Frontières
MTD	Motor Traffic Division
N	Naira
NAFDAC	National Agency for Food and Drug Administration and Control
NAP	National Action Plan
NARICT	National Research Institute for Chemical Technology
NCCM	National Committee on Chemicals Management
NCDC	Nigeria Centre for Disease Control
NCH	National Council on Health
NES	Nigerian Environmental Society
NESREA	National Environmental Standards and Regulations Enforcement Agency
NEMA	National Emergency Management Agency
NEITI	National Extractive Industries Transparency Initiative
ng/m3	Nano-grams per cubic meter
NGSA	Nigerian Geological Survey Agency
NGO	Non-Governmental Organization
NIMASA	Nigerian Maritime Administration and Safety Agency
NMMA	Nigerian Minerals and Mining Act 2007
NPA	Nigerian Port Authority
NPF	Nigerian Police Force
NPC	National Population Commission
NOSDRA	National Oil Spill Detection and Response Agency
NSE	Nigerian Stock Exchange

NSG	National Steering Group
OHS	Occupational Health and Safety
PAGMI	Presidential Artisanal Gold Mining Development Initiative
PC&EH	Pollution Control and Environmental Health
PHC	Primary Healthcare Centre
PPE	Personal Protective Equipment
QL	Quarry Lease
RHA	Regional Health Authority
RMRDC	Raw Materials Research and Development Council
SAICM	Strategic Approach to International Chemicals Management
SDGs	Sustainable Development Goals
SON	Standard Organization of Nigeria
SRADev	Sustainable Research and Action for Environmental Development
SMC	Sound Management of Chemicals
SMDF	Solid Minerals Development Fund
SMMRP	Sustainable Management of Mineral Resources Project
SSML	Small-Scale Mining License
STDs	Sexually Transmitted Diseases
STIs	Sexually Transmitted Infections
SWM	Solid Waste Management
TCC	Technical Coordinating Committee
TLS	Transfer Loading Station
TOR	Terms of Reference
TWG	Technical Working Group
UCH	University College Hospital, Ibadan
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Research
USD	United States Dollar
U.S	United States
USEPA	United States Environmental Protection Agency

WAMASON	Waste Management Society of Nigeria
WEEE	Waste Electrical and Electronic Equipment
WEP	Women Environmental Programme
WGINA	Working Group for the Implementation of NAP on ASGM
WIMN	Women in Mining Nigeria
WHO	World Health Organization
WOA	Whole Ore Amalgamation

Foreword

Mercury-dependent Artisanal and Small-scale Gold Mining (ASGM) is the largest source of mercury pollution on Earth. Mercury emissions from tailings and vaporized mercury exceed 1000 tonnes each year from ASGM. The health effects on the miners are dire, with inhaled mercury leading to neurological damage and other health issues. The communities near these mines are also affected due to mercury contamination of water and soil, and subsequent accumulation in food staples such as fish. In Nigeria, unregulated artisanal and small-scale mining operations account for over 90% of solid mineral extraction with confirmed mercury use during gold extraction in several regions, posing acute and chronic health risks for vulnerable populations - particularly women and children.

Nigeria signed the Minamata Convention on Mercury on 10 October 2013 to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds, and proceeded to conduct an initial mercury assessment within its territory in 2015. The outcomes of the studies revealed amongst others that the ASGM sector is a major user and emitter of mercury and therefore requires special attention. Consequently, a proposal for the development of a National Action Plan (NAP) on the use of mercury in the Nigerian Artisanal and Small-scale Gold Mining (ASGM) sector was initiated in 2016 to comprehensively address the continued use of mercury and other related issues in the sector in line with Article 7 of the Minamata Convention on Mercury.

The project was approved by the Global Environment Facility (GEF) in 2016 and its implementation commenced in July 2017 with the overall objective of improving national capacity and capability for the management of mercury in the ASGM sector. The project was implemented by the United Nations Industrial Development Organisation (UNIDO) and jointly executed by the Federal Ministry of Environment (FMEnv), Ministry of Mines and Steel Development (MMSD) and Federal Ministry of Health (FMoH), supported by World Health Organisation (WHO) through a multi-stakeholder National Steering Group (NSG).

This plan was developed in line with the guidance set forth in Annex C of the Minamata Convention on Mercury and UNEP Global Mercury Partnership template. It

includes among other things, steps to facilitate the formalization or regulation of the ASGM sector, strategies to promote the reduction/elimination of mercury use in ASGM activities, a public health strategy on mercury exposure for miners/mining communities and comprehensive workplan.

The Federal Government of Nigeria is committed to the successful implementation of the plan and will employ a multi-stakeholders mechanism for its implementation, incorporate it into the national development plan for sustainability, ensure its regular update and implement related actions to gradually phase out mercury use for the protection of the populace and development of the sector.

Dr. Mohammad Mahmood Abubakar
Honorable Minister of Environment



Preface

Nigeria became a signatory to the Minamata Convention on 10 October 2013. The treaty has a phased approach to reduce, and where possible, eliminate mercury use in key industrial sectors. Provisions of the Convention include deadlines established for supply sources and trade, mercury-added products and manufacturing processes in which mercury or mercury compounds are used. Because Artisanal and Small-Scale Gold Mining (ASGM) sector is a major source of mercury release and environmental pollution, Article 7 of the Convention requires countries with more than insignificant use of mercury in ASGM operations to develop a National Action Plan (NAP) in order to reduce or eliminate the use of mercury and mercury compounds within three years of the treaty entering into force.

To fulfil this requirement of the convention, it became very pertinent that baseline information is obtained on the use of mercury and production of gold in the Nigeria's Artisanal and Small-scale Gold Mining sector. The Nigeria's ASGM sector like most others in the developing countries, is most often informal and not very well regulated. This characteristic feature of the sector lends way to insufficient data on the ASGM sector in the country. Through ASGM baseline survey, data was generated that formed the basis upon which the National Action Plan (NAP) on Mercury in the ASGM Sector in Nigeria was developed to provide relevant information on the following thematic areas:

a. The scope of mercury in the ASGM sector.
b. An inventory of quantities of mercury used and practices employed in the sector.
c. An assessment of the health impact of mercury use in ASGM.
d. Baseline consumption of mercury and other harmful chemicals, including cyanide.
e. An assessment and cost-benefit analysis of technically available and economically feasible techniques and technologies to replace the use of mercury.

The fund for the execution of the field survey was provided by the Global Environment Facility (GEF) and managed by UNIDO. In carrying out the baseline surveys, the Ministry of Mines and Steel Development (MMSD) worked with the Nigeria's Federal

Ministries of Environment and Health in conjunction with the World Health Organization (WHO). MMSD is the top Federal Government institution that is responsible for the administration and regulation of the Nigeria's mining sector - providing the necessary direction and leadership through relevant policies, engagements; and providing relevant information to enhance investments in the Nigerian mining sector.

Since assuming leadership position in the Ministry, I have never hidden my earnest desire to improve the lots of the artisanal and small-scale operators in the country. In this regard, I have supported initiatives that engender improved formalization of the sector. Formalization of the subsector has been aptly captured as priority in our road map for the growth and development of the Nigerian Mining industry. The document therefore supports our drive to engender improved ASM sector leading to sustainable mining activities devoid of applications of hazardous chemicals - especially mercury - in the extraction of gold, non-use of child labour in artisanal and small-scale gold mining amongst others.

As we strive to revamp the ASM in Nigeria into becoming a leading light in the efforts of the present administration to diversify the economy through creation of sustainable job opportunities for our teeming youths, I encourage the use of this document by all stakeholders towards creating a safer working environment for Nigerian gold miners.

Arc. Olamilekan Adegbite
The Honourable Minister,
Ministry of Mines and Steel Development,



Acknowledgement

This National Action Plan for the reduction and eventual elimination of mercury use in Artisanal and Small-scale Gold Mining (ASGM) in Nigeria is the outcome of a close collaboration between the Federal Ministry of Environment (FMEnv), Ministry of Mines and Steel Development (MMSD), Federal Ministry of Health (FMoH), United Nations Industrial Development Organisation (UNIDO), World Health Organisation (WHO) and many experts in the field of mining and chemicals management.

The Federal Ministry of Environment, on behalf of the Federal Government of Nigeria, expresses her profound gratitude to the Global Environment Facility (GEF) for approving the project and providing financial support for its execution, and UNIDO for the technical support and guidance all through the project implementation. We acknowledge the valuable contributions, advice and consistent support of Dr. Jean Bakole (Representative and Director, UNIDO Regional office Nigeria and West Africa), Ms. Rodika Ivans (Project Manager, UNIDO), Mr. Oluyomi Banjo (Environment Expert, UNIDO), Dr. Edwin Isotu Edeh, (National Consultant Public Health, WHO) and members of the project's National Steering Group (NSG) chaired by Professor Percy Onianwa.

We appreciate the efforts of national stakeholders that created time to critically review the document inspite of the COVID-19 pandemic and related challenges.

Our sincere appreciation also goes to the project teams from the FMEnv, MMSD and FMoH for their hardwork and diligence in the successful execution of the project.

This document highlights national priorities in the ASGM sector and every necessary resource would be mobilized for its implementation.



Sharon Ikeazor Esq.
Honourable Minister of State, Environment



EXECUTIVE SUMMARY

1.0

Executive Summary

Mercury is a naturally occurring element contained in many minerals and is found throughout the world. Mercury is released to the environment from natural sources and processes and as a result of human activities. Human activities have increased the mobilization of mercury into the environment, raising the amounts in the atmosphere, soils, fresh waters and oceans. Anthropogenic mercury emissions and releases; current and legacy are the major contributors to increased mercury levels and exposure.

Emissions associated with artisanal and small-scale gold mining account for almost 38% of the global total, and are the major contributors to the emissions from South America and Sub-Saharan Africa (UNEP 2018).

The use of mercury in artisanal and small-scale gold processing is a global problem and this was confirmed from the UNEP's 2002 global mercury assessment (updated in 2013). The global campaign to stop the use of mercury started in 2010 with negotiations of a treaty to eliminate mercury in the environment. The treaty was ratified by 147 Governments at the fifth session of the Intergovernmental Negotiating Committee (INC) on mercury, in Geneva, Switzerland on 19th January, 2013, after a series of INC meetings. This treaty named the "Minamata Convention on Mercury" was adopted on 10th October, 2013 at a Diplomatic Conference (Conference of Plenipotentiaries), held in Kumamoto, Japan. Its overall objective is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. The Convention entered into force in August 2017. As of 30th June, 2020, the Convention has 128 signatories and 122 Parties including Nigeria.

Minamata Convention and the Nigerian Process

To provide a structured process to enable Nigeria undertake a situational analysis and a basis for subsequent work, towards implementation of the Convention; a Minamata Initial Assessment (MIA) report was developed in 2012. The report highlighted Artisanal and Small-scale Gold Mining (ASGM) Sector as a major focal area to reduce and eventually phase out mercury use in Nigeria. Based on this

finding, and in line with Article 7 of the Minamata Convention on Mercury, which requires countries with more than insignificant ASGM and processing activities in their territories to develop and implement a National Action Plan in accordance with Annex-C of the convention, Nigeria submitted a proposal to the Global Environment Facility (GEF) to undertake a project titled, "NATIONAL ACTION PLAN (NAP) ON MERCURY USE IN THE NIGERIAN ARTISANAL AND SMALL-SCALE GOLD MINING SECTOR". GEF approved the project for funding in 2016, and the project execution began in July 2017. The project implementing Agency was the United Nations Industrial Development Organisation (UNIDO); and the Executing Agencies were Federal Ministry of Environment (FMEnv), Ministry of Mines and Steel Development (MMSD) and Federal Ministry of Health (FMoH), supported by World Health Organization (WHO). The overall goal of the Nigeria's NAP for ASGM is to reduce and, where feasible, eliminate the use of mercury in the ASGM sector; reduce environmental degradation; and protect human health for environmental sustainability.

Several activities took place towards the accomplishment of the project. These activities included national ASGM baseline data gathering through extensive fieldwork and field studies, information gathering and stakeholders' engagement at seminars and workshops in the main ASGM States and administrative locations like Niger, Osun and Zamfara States, as well as the Federal Capital Territory; between October, 2018 and June, 2020.

The Nigeria's NAP Report provides details of a national overview of the country; including country profile data and statistics, solid mineral deposits, national baseline analysis of the ASGM sector and previous experiences in addressing the challenges in the sector. These challenges include among others untoward impact towards miners and several vulnerable groups like women, children and the like; who are ancillary workers in the mining sites. The report also provides steps to facilitate the formalization of the sector, strategies to promote reduction/elimination of mercury use in ASGM activities, a public health strategy on mercury exposure for miners/mining communities and a comprehensive workplan.

ASGM National Overview

An overview of the country including the country profile data and statistics; solid mineral deposits, national ASGM distribution and a national baseline analysis of the ASGM sector is given in the NAP. The NAP undertook an ASGM geographical distribution study that included details of ASGM sites estimates from the major ASGM States - Niger, Osun, Zamfara, including Kaduna, Kwara, Nasarawa and Kebbi. The studies included a gold mining methodology and processing workflows information. From the national ASGM Sector baseline analysis, it is estimated that over 260,000 miners are directly involved in ASGM in Nigeria. Considering how highly mobile artisanal and small-scale miners are, this figure is not a precise estimate. And based on a general notion that for every person directly engaged in ASM, an additional 3 to 5 persons are indirectly supported economically; hence, the estimated number of persons indirectly dependent on ASGM in Nigeria is over 1,500,000 persons. There are presently numerous challenges in the sector; including, environmental

degradation from ASGM and the health impacts of mining practices using mercury. The health impact survey and the public health priorities assessment undertaken during the preparation of this NAP highlighted the poor state of the miners and health infrastructure in all the ASGM sites. High health hazard indices were recorded in all the sites.

Mercury Trade and Demand in Nigeria's ASGM Sector

Official data on mercury import into Nigeria is not readily available. However, informal and illicit movement of mercury from across neighbouring West African countries into Nigeria on syndicated links is not uncommon. Mercury used in the Nigeria's ASGM sector comes mostly from neighbouring West African countries. There are also reports of mercury coming from other sectors within Nigeria.

Findings from the field indicated that occasional illicit supplies come from other sectors, such as health (hospitals), industry and power, to the ASGM operators. According to some of the gold dealers, mercury is supplied through the Republic of Benin into Lagos, Nigeria. Supplies also come through the Republic of Niger to Kano State. Almost all the dealers interviewed admitted that the bulk of mercury supplies comes from West African countries, such as Ghana, Niger Republic, Mali and Burkina Faso.

The dealers were reluctant in disclosing information on the mercury trades generally, but they agreed that occasionally, some quantities of mercury do come to them from other sources within Nigeria, such as hospitals. A bottle of mercury was being sold at 6000 Naira (US $16.21) during the field work.

Institutional, Legal and Regulatory Status of ASGM in Nigeria

The legal framework governing mining activities, their environmental and health impacts is implemented primarily by three federal agencies namely the Ministry of Mines and Steel Development (MMSD), the Federal Ministry of Environment (FMEnv) and the Federal Ministry of Health (FMoH).

The MMSD is responsible for identifying the nation's solid minerals, advising government on the formulation and execution of laws and regulations guiding the various stages of prospecting, quarrying, and mining; and handling sale and consumption of solid minerals in the country, through the issuance of permits, licenses, leases and collection of rents, fees and royalties while FMEnv administers the country's environmental protection law through the National Policy on Environment (2001) which was updated in 2016 and the National Environmental Standards and Regulation Enforcement Agency (NESREA) Act and the Regulations pursuant. The Federal Ministry of Health is responsible for the formulation and implementation of policies related to health. The NAP fully reviews existing legislations relevant to ASGM activities in Nigeria.

Formalization of ASGM in Nigeria

The MMSD has been spearheading the actualization of the national agenda to formalize artisanal miners' activities into a formally recognized subsector contributing to the national GDP. One of the ways MMSD is implementing the ASM formalization

policy is formation of miners into registered mining cooperatives and quarry associations for purposes of ease of administration and regulations. But despite the efforts to formalize the miners, the result has not been very encouraging. As at the time of writing this report, there were 1,410 artisanal mining cooperatives registered with the Ministry of Mines and Steel Development. Out of the total cooperatives registered by the MMSD, only 8% representing 118 cooperatives have valid mineral titles (SSML or QL) over their area of operation, whilst 92% of the registered cooperatives operate without any mineral title. The registered cooperatives are further facilitated to acquire small-scale mining lease to cover their area of operations. The NAP interrogates the leadership and organizational structure of the ASGM sites towards providing approaches for formalisation

Economics and Goals of ASGM in Nigeria

With the current national administration's intention of diversifying the economy through mining, the MMSD has developed a Roadmap for the Growth and Development of the Nigerian Mining Industry since 2016 and it identified gold as one of the country's seven strategic minerals with a positive projection of an increase in mining's contribution to the GDP from 0.33% in 2015 to 7.0% in 2031. Following from this, its efforts have been directed to increasing the national revenue from gold, in form of royalties, four-fold from 7.17 million naira in 2017 to 30.3 million naira in 2019. As reported, gold production increased from 37.6kg in 2017 to 158.82kg in 2019. This increase is relatively low considering that the present survey estimates that about 16,000kg of gold are produced annually by the ASGM sector. Due to the unsustainable worst practices in the use of mercury in the production of gold from ASGM, Nigeria is making concerted efforts to eliminate the use of mercury in ASGM and establishing national mercury reduction targets along with strategies to increase mercury-free gold production from ASGM with markedly reduced mercury exposure by the miners. In fact, the national goals are to export 6,000kg of ASGM-produced gold to the international market via markets that utilize mercury-free gold by 2030 and to produce 50% of gold without the use of mercury or other toxic substances. Similarly, it is intended to reduce environmental exposure level of miners down to 50% of current level of full exposure (100%) of miners, by 2028.

Priority Goals, Objectives, Reduction Targets and Implementation Strategies

In order for Nigeria to meet its obligations under the treaty, a range of actions needs to be taken to address the many aspects of the anthropogenic use of mercury. These actions include among others, making the necessary regulatory and administrative arrangements for effective implementation of the Convention at the national level. The NAP delineates the goals set by the Government of Nigeria for eliminating or drastically reducing mercury use in the ASGM sector in Nigeria, and sets up strategies and actions to achieve the goals. In addition, the Minamata Convention on Mercury is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds and it includes *inter alia* promoting the use of sustainable alternatives and best available techniques and environmental practices in ASGM; providing for the control and phasing out and/ or phasing down of Mercury in all processes, etc. Hence, a set of national activities to be implemented to attain the main objectives designed to achieve set goals have also

been enunciated in an action plan for achieving the NAP.

The goals, as listed, include to:

I Formalize the ASGM sector through establishment of an enabling legal and regulatory framework and organized group of ASGM miners representing the needs of the sector including -;
   a. Building and strengthening institutional capacity of ASGM support institutions; and
   b. Enhancing cooperation and partnership at all levels among miners, public authorities, industry sector, NGOs, Academic Institutions, and other stakeholders.

ii Integrate informal ASGM activities into the formal economic system by ensuring that miners get value for their toils and government gets commensurate revenue from the sector

iii Reduce and eventually eliminate the environmental and social impacts of ASGM including mercury emissions and releases to the environment such that the use of mercury and other hazardous chemicals are reduced and gradually phased out with introduction of viable and affordable alternative technologies and necessary framework devised for creation of jobs and improvement of quality of lives in ASGM host communities.

iv Strengthen Extension Services, community education and dissemination of Improved Mining Technologies.

v Protect vulnerable populations from mercury exposure.

These goals have been set and strategies for achieving them are delineated and provided in an action plan for implementation over a ten-year period.

The objectives to achieve these goals include to;

i Establish an effective regulatory, institutional and policy framework.

ii Eliminate unsafe practices in ASGM sites.

iii Migrate to viable and sustainable mercury-free practices or technologies.

iv Reduce ASGM-associated environmental hazards; including mercury emissions/pollution, land degradation and ecosystem contamination.

v Effectively reduce mercury use in the ASGM sector, based on the quantities determined by the baseline data from the Nigeria MIA report, through the elimination of inefficient and unsafe practices; such as, but not limited to, open-burning of mercury amalgam without using retorts, flame hoods, etc., and by migrating to reduced or mercury-free practices or technologies.

vi Achieve health safety and improvement at ASGM sites.

vii Develop and promote the safe handling and long-term storage of excess mercury coming from the ASGM sector, which may include but not limited to mercury suppliers, dental shops, gold dealers, reclaimed tailings, etc.

The National Action Plan for the reduction and eventual elimination of mercury use in Artisanal and Small-scale Gold Mining in Nigeria focuses on activities considered achievable by the appropriate government agencies in partnership with all concerned and interested stakeholders within the speculated time frame. The Action

Plan is composed of an in-depth and articulated texts for short, medium to long-term activities, as well as Action Table that covers the full period of activities from 2021 to 2030.

The Plan includes proposed evaluation mechanisms/strategies for effective Monitoring and Evaluation. Based on the *Action Plan,* the Department of Pollution Control and Environmental Health (PC&EH) of the Federal Ministry of Environment (FMEnv) - the Designated National Authority for the Minamata Convention matters in Nigeria will play the coordination role in its implementation, in cooperation with the Ministries of Mines and Steel Development (MMSD), the Federal Ministry of Health (FMoH) and other relevant ministries, institutions and Civil Society Organizations (CSO) according to their mandate and responsibilities.

NAP Evaluation Mechanism

In order to review the effectiveness and efficiency of the action plan implementation, the FMEnv and all stakeholders shall establish one main evaluation mechanism for reviewing the achievements on the set objectives and the programs of work that are related to reduction and elimination of the use and release of mercury in ASGM in Nigeria. It is proposed that the Department of PC&EH of the FMEnv will establish a Working Group for the Implementation of NAP on ASGM (WGINA). This Working Group will be periodically meeting to assess the operational system for executing the NAP's projects' activities. However, the Department of Pollution Control and Environmental Health shall play the coordination role in conceptualization, design/formulation, project proposal development for implementing the program of works identified in this plan, getting necessary approval, implementation and organizing technical and other relevant meetings.

The Monitoring & Evaluation (M&E) will be a continuous process done, periodically, within the ten-year period of the implementation of NAP's activities.

Financial Mechanism for Implementation

Finally, a proposed financial plan/budget is articulated for funding the key activities of the Plan.

NB: At the time of writing this report, the official exchange rate between the Naira (N) and the United States dollar ($) was 370/1.

INTRODUCTION AND BACKGROUND

2.0

Introduction and Background

Mercury is a natural element contained in many minerals and found throughout the world. Mercury is also present as an impurity in many other economically valuable minerals, in particular the non-ferrous metals, and in fossil fuels especially coal. It exists in several forms: elemental (metallic) mercury, inorganic mercury compounds, and, methylmercury and other organic compounds.

Mercury is released into the environment from natural sources and processes and as a result of human activities. Once it enters the environment, mercury cycles between air, land, and water, until it is eventually removed from the system through burial in deep ocean or lake sediments and entrapment in stable mineral compounds.

Human activities have increased the emission and release of mercury into the environment, raising the amounts in the atmosphere, soils, fresh waters and oceans. Anthropogenic mercury emissions and releases, current and legacy, are the major contributors to increased mercury levels and exposure in the environment.

Emissions associated with artisanal and small- scale gold mining account for almost 38% of the global total and is the major contributor to the emissions from South America and Sub-Saharan Africa. (UNEP 2018).

For many communities worldwide, dietary consumption of fish, shellfish, marine mammals, and other foods is the most important source of methylmercury exposure. Exposures to elemental and inorganic mercury mainly occur in occupational settings (including artisanal and small-scale gold mining) or via contact with products

containing mercury. This remains a high concern for vulnerable groups including some indigenous populations and other populations with high dietary or occupational exposure to mercury (UNEP 2018).

Ecological effects of mercury exposure include: death, reduced reproduction, delayed growth and development and, abnormal behaviour of plants and animals.

2.1 UNEP ACTIVITIES LEADING TO THE ADOPTION OF THE MINAMATA CONVENTION ON MERCURY

The UNEP's 2002 Global Mercury Assessment report, which was updated in 2013 and 2018, following the request of the UNEP Governing Council (decision 21/5) and based on governments' concern about mercury as a global pollutant, provided justification and widespread recognition that the nature and behaviour of mercury in the environment, including its abilities for long-range transport in the atmosphere, persistence, and ability to bio-accumulate in the ecosystem leading to significant adverse effects on both human health and the environment, are of global concern requiring globally coordinated actions (UNEP 2018).

In order to address these concerns posed by mercury, UNEP established a mercury programme based on the mandate by governments, and this was further strengthened in 2005 and 2007 with the initiation of the UNEP Global Mercury Partnership to take action on the most pressing aspects of anthropogenic releases of mercury. In February, 2009, the governing council of UNEP decided to develop a global legally binding instrument on mercury and requested the UN Environment to convene an Intergovernmental Negotiation Committee (INC) beginning in 2010.

The INC held five sessions from 2010 to 2013 to discuss and negotiate a global agreement on mercury (Nigeria actively participated in these sessions); the treaty text was agreed by one hundred and forty-seven (147) governments on 19th, January, 2013, in Geneva, Switzerland, and the Convention was adopted and opened for country signatures at the Diplomatic Conference of Plenipotentiaries on the Minamata Convention on Mercury held in Kumamoto and Minamata, Japan, from 7th to 11th October, 2013. The Minamata Convention entered into force on 16th August, 2017, and as of 30th June, 2020, the Convention has 128 signatories and 122 Parties. Nigeria signed the Convention on 10th October, 2013, and ratified on 1st February, 2018, thereby becoming the 88th Party to the Minamata Convention.

The overall objective of the Convention is to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds

The Convention was adopted to control emissions and releases and promote the use of alternatives and best available techniques and environmental practices across a wide range of products, processes and industries where mercury is used, released or emitted, and provides for the control and phasing out and or phasing down of mercury and mercury added products (UNEP 2013).

Mercury is released into the atmosphere, soil and water from a variety of sources. As a result, the Convention includes, in part, measures to control the supply and trade of mercury, phase-outs of certain products and processes that use mercury, control measures for air, land and water emissions and releases, waste management requirements, actions to address contaminated sites, and steps to reduce, and where feasible eliminate, mercury use in artisanal and small-scale gold mining. Health aspects are addressed in a stand-alone article (Article 16) to emphasize the importance of the impact of mercury from various sectors to human health, as well as in other articles where specific engagement with the health sector is needed. The Convention also includes measures for technical exchange and international support.

The treaty necessitates Parties to develop and execute an implementation plan, taking into account its domestic circumstances, for meeting the obligations under the key provisions of the Convention.

2.2 NIGERIA'S EFFORTS TO ADDRESS MERCURY AND IMPLEMENT THE MINAMATA CONVENTION

The Federal Government of Nigeria, prior to the ratification of the Minamata Convention, had made efforts to ensure the reduction, and where possible, elimination, of mercury use in industrial applications, processes and products.

In 2007, Nigeria joined the UNEP Global Mercury Partnership in four thematic areas viz:

I Artisanal and Small-scale Gold Mining (ASGM)
ii Mercury releases from coal combustion
iii Mercury in products, and
iv Mercury releases from the cement industry

In 2011, Nigeria collaborated with UNEP and the United States Environmental Protection Agency (USEPA) to convene and host in Lagos, Nigeria an "Anglophone West Africa Regional Awareness Raising Workshop on Mercury in ASGM." The workshop provided an opportunity for stakeholders to assess mercury-related issues in ASGM communities and initiated a dialogue on the broader range of issues associated with mining in the region. The workshop agreed that immediate measures to reduce mercury use must be taken, as consumption and releases are projected to increase.

In 2012, a National Mercury Inventory was undertaken using the UNEP's Toolkit (level 1) for identification and quantification of mercury releases. The result indicated that major mercury releases in Nigeria came from the use and disposal of mercury-

containing products, waste incineration and open waste burning, primary metal production (excluding gold production by amalgamation), oil and gas production, in addition to production of other materials. The inventory provided a critical national baseline data on individual mercury release sub-categories.

To ensure an integrated national approach and programme for the sound management of chemicals including mercury, a multi-stakeholders National Committee on Chemicals Management (NCCM) was established in 2012, with the overall objective to promote and coordinate a coherent, coordinated continuous and cost-efficient approach to the management of chemicals across all sectors necessary to protect the environment, human and animal health in Nigeria.

2.3 NIGERIA'S MINAMATA INITIAL ASSESSMENT

Nigeria participated actively in all the INC meetings and processes that led to the adoption of the Minamata Convention on Mercury text in 2013. Following Nigeria's signing on to the Convention, a National Minamata Initial Assessment (MIA), aimed to strengthen national decision-making toward ratification of the Minamata Convention on Mercury and build national capacity towards its implementation, was carried out between 2015 and July 2017, with technical and financial support from GEF, UNIDO

> The MIA report highlights implications of the assessment results for Nigeria as a Party to the Convention with regards to the relevant articles of the Convention and identified seven (7) priority areas for immediate action. The development of ASGM NAP was one of the priority areas.

2.4. INITIAL ASSESSMENT OF ARTISANAL AND SMALL-SCALE GOLD MINING IN NIGERIA

The outcome of the assessment showed that the amalgamation of mercury for beneficiation of gold ores is widespread with its attendant environmental and health impacts. It, therefore, identified the development of ASGM NAP as one of the priority areas to reduce, and where feasible eliminate, the use of mercury in the ASGM sector. The development and implementation of the NAP will result in the following outcomes:

- Elimination of worst practices of mercury amalgamation
- Training miners in the use of alternative processing techniques that minimize or eliminate mercury emissions and releases
- Protection of vulnerable populations from mercury exposure
- Minimization or elimination of mercury emissions and releases into the environment

2.4.1 Preliminary Environmental and Health Assessment for the ASGM Sector

The largest anthropogenic source of mercury to the global atmosphere is ASGM. During the ASGM process, miners add elemental mercury to large quantities of sediment or soil in order to create gold-mercury amalgam that separate gold from the remaining geological host material. Miners then heat the amalgam using a blowtorch or similar device to separate the mercury and gold, exposing themselves to mercury vapor and releasing mercury to the environment. Following amalgam heating, mercury can deposit into aquatic ecosystems. There, anaerobic microorganisms can convert mercury to methylmercury $[CH_3Hg]^+$, a potent neurotoxin that rapidly accumulates in aquatic food webs. A high concentration of $[CH_3Hg]^+$ in fish poses serious human health risks, especially to pregnant women and children.

In Nigeria, most miners live near the mining sites with the women and children. The water bodies that the community draws cooking and drinking water from are heavily contaminated during mining activities.

The MIA then made a number of tentative recommendations from the initial assessment, including:

- Promoting low-cost and low-tech mercury capture (for examples- retorts and fume hoods) for prevention of releases and recycling of mercury.
- Creating strong incentives for the formalization of the ASGM activity, e.g. the Government to purchase produced gold at prices slightly above market prices, tax exemptions for ASGM miners, free and easily obtainable mining licenses requiring retort use, etc.
- Relevant government regulatory agencies to propose emission standards to limit mercury and other toxic pollution.
- Strengthening national monitoring and enforcement programmes to ensure that up-to-date emission controls are in place.
- Developing national safety guidelines to protect the populace from the cumulative long-term health impacts of low-level mercury exposure.
- Reviewing EIA guidelines to include mercury abatement techniques.

2.5 RATIONALE FOR THE DEVELOPMENT OF THE NAP

Article 7 of the Minamata Convention on Mercury requires countries with more than insignificant ASGM and processing activities in their territories to develop and implement a National Action Plan in accordance with Annex C of the Convention, submit the plan to the secretariat not later than 3 years after entry into force of the Convention for it and provide a review every 3 years of the progress made in meeting its obligations under the Article.

Although Nigeria is endowed with deposits of gold in commercial quantities, the country does not have a full-scale gold mining sector; artisanal and small-scale miners carry out majority of the gold mining activities in the country. A preliminary assessment of mercury releases in Nigeria was carried out in 2012 using the UNEP Toolkits and the result revealed that, mercury use in ASGM is more than insignificant. Based on this discovery, Nigeria notified the Secretariat of the Minamata Convention

on Mercury that the country had more than insignificant ASGM activities in its territory and applied to the Global Environment Facility (GEF) for the funding of a project on the development of a National Action Plan (NAP) on reducing mercury use in the Nigerian ASGM sector. Approval for the project was granted in February, 2016, and implementation arrangement was finalized with UNIDO in June, 2017.

> Elements of the NAP as contained in Annex C of the Convention include national objectives and reduction targets, steps to eliminate worst practices and promote mercury-free methods, steps to facilitate the formalization or regulation of the ASGM sector, series of strategies such as public health strategy on the exposure of miners and their communities to mercury, additional strategies to achieve its objectives and schedule for implementation of the NAP.

2.5.1 The Nigerian NAP Process

The Nigerian NAP project was implemented in line with the contract document and approved workplan. A multistakeholders' approach was employed to implement the project to ensure a successful outcome. The process is summarized as follows:

i. Establishment of a National Project Office

The facilities used for the Minamata Convention Initial Assessment (MIA) in Nigeria project was used for the implementation of the National Action Plan on Mercury Use in the Nigerian Artisanal and Small-Scale Gold Mining (ASGM) Sector Project.

ii. Identification of National Steering Group members and Development of Terms of Reference (TOR)

National Steering Group members were identified and Terms of Reference (TOR) for National Steering Group were developed to define its purpose and working arrangement. A seven-member group was identified, comprising of relevant stakeholders.

iii. Inauguration of National Steering Group (NSG)

The National Steering Group for the Nigerian NAP project was inaugurated by the Honourable Minister of State for Environment, Mr. Ibrahim Usman Jubril, represented by the Permanent Secretary, Federal Ministry of Environment, Dr. Shehu Usman Ahmed, on 18th July, 2017, at the Honourable Minister's Conference room, Federal

Ministry of Environment Headquarters, Mabushi, Abuja.



Plate 1. *The Permanent Secretary, Federal Ministry of Environment, representatives of UNIDO and UNITAR with some members of the NSG after the inauguration ceremony*

iv. Project Inception Workshop

The inception workshop on the Nigerian NAP project was held at the Rockview Royale Hotel, Wuse II, Abuja, on Wednesday, 19th July, 2017. 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.



Plate 2. *The Permanent Secretary, Federal Ministry of Environment in a group photograph with participants at the inception workshop*

v. NSG Project Coordination Meetings

Project coordination meetings were held all through the project to give updates on the activities undertaken by the executing agencies, appraise the progress in project implementation, review draft NAP before further review by national stakeholders, and provide guidance in order to ensure a successful project outcome.



Plate 3. *Some NSG members at a project coordination meeting*

vi. Stakeholders Information Sharing and Dissemination Workshop

The information sharing and dissemination workshop on the Nigerian NAP project was held on Tuesday, 18th December, 2018, at the Barcelona Hotels, Abuja. The objective of the workshop was to create a platform for information exchange between the executing agencies and relevant stakeholders on the outcomes of field visits to some ASGM sites, strategies for conducting the rapid health situation assessment, development of public health strategy on ASGM, and progress made in the implementation of the project by the executing agencies.



Plate 4. *Group photograph of some participants at the workshop*

vii. Organisation of Training Workshop on Data Gathering for the National Comprehensive Analysis of the ASGM Sector

The workshop was held at the Rockview Hotel Classic, Abuja, on 12th January, 2018, and it aimed to support the development and implementation of a roadmap to reduce mercury emission and releases from ASGM in Nigeria.

viii. Organisation of Stakeholders Meeting for the Development of Framework for Environment and Health Activities in Nigeria

The workshop was held on 29th June, 2018, at the Rockview Hotel Classic, Abuja. The objective of the workshop was to commence stakeholder interaction and awareness for the development of priorities and strategies for the health component of the NAP.

ix. Field Studies and Activities in ASGM Sites for Data Collection by the MMSD

Field surveys were carried out focusing on States determined from the review of literatures on the geology and gold mineralization in Nigeria, where gold deposits occurred and ASGM activities have been reported. To this end, the following states were studied: Kebbi, Zamfara, Kaduna, Niger, Kwara, Nasarawa and Osun States. However, Niger, Osun, and Zamfara States were selected for detailed field survey, based on the high level of ASGM activities in the States and limitation of time and prevailing security problems in most States in northern Nigeria. Consultations with Federal Mines Officers (FMOs), ASM officers, known gold miners and States' chairmen of Miners Association of Nigeria (MAN), enabled decisions on the ASGM sites surveyed in the respective States. ASGM sites selected for study were those that were active and have intense ASGM activities currently going on.

x. Public Health Assessment for ASGM In Selected Mining States

Public Health Assessment and surveys were conducted in selected mining communities in Niger and Osun States of the nation.



Plate 5. *Health Sector Workshop on development of Public Health Strategy held in Abuja, October 2019*

NEXT STEPS AFTER FIELD WORK

xi. Development of Draft NAP

A consultant with vast experience in chemicals' management and ASGM issues at national and international levels was employed to develop the NAP with the outcomes of the executing agencies' activities.

xii. Internal Review of Draft NAP by FMEnv and UNIDO

The draft NAP was reviewed by the FMEnv project team and UNIDO Nigeria on January 23rd, 2020, at the UNIDO Nigeria regional office, Abuja. This was done to identify and correct deficiencies in the document, to further improve its quality, prior to the review by the NSG.



Plate 6. *FMEnv Project Team and Mr. Yomi Banjo (UNIDO) at one of the meetings*

xiii Convening a 2-Day Mini Retreat for Executing and Implementing Agencies to Review the Draft NAP

A two-day mini retreat for executing and implementing agencies to review the draft NAP was held on 26-27 February, 2020, at UNIDO Nigeria regional office, Abuja.



Plate 7. *Participants at the mini retreat*

xiv. Joint Meetings of Project Executing and Implementing Agencies to Finalize Project Completion Plan

Three joint meetings of project executing and implementing agencies were held at the UNIDO Nigeria regional office, Abuja, and via skype on 17th June, 2019, 14th January and 17th April, 2020, to give updates on project implementation and finalize completion plan.



Plate 8. *Representatives of Executing and Implementing Agencies*

xv. Review of Draft NAP by NSG

The NSG reviewed the draft NAP developed by the project consultant three times to improve the content quality before subjecting it to national stakeholders for further review.

xvi. Review, Validation and Adoption of the NAP by National Stakeholders.

The NAP was further reviewed and validated by national stakeholders on 30th June and1st July, 2020.



Plate 9. *Stakeholders at NAP Validation Meeting*

NATIONAL OVERVIEW

3.0

National Overview

3.1 COUNTRY PROFILE



Figure 1. *Map of Nigeria showing the States of the Federation and the Federal Capital Territory (FCT)*

3.1.1 Summary of Country Profile Data for the Federal Republic of Nigeria

No of States	36
No of L.G.A	774
Capital	Abuja
Area	923,768 km2 (2014)
Land boundaries	4,047 km (Benin 652 km, Cameroon 773 km, Chad 87 km, Niger 1,497 km)
Coastline	853 km
Climate	Equatorial in the south, tropical in the centre, arid in the north.
Natural Resources	Natural gas, petroleum, tin, gold, iron ore, coal, limestone, niobium, lead, zinc
Land Use	Arable land: 33.02%, permanent crops: 3.14%; other: 63.84% (2005)
Irrigated land	2,820 km2 (2003)
Natural hazards	Periodic droughts; flooding
Environmental issues	Soil degradation; rapid deforestation; urban air and water pollution; desertification; chemical and hazardous waste pollution, oil pollution - water, air, and soil; loss of arable land; rapid urbanization
Geography note	The Niger River enters the country in the northwest and flows southward through tropical rain forests and swamps to its delta in the Gulf of Guinea
Population	190,000,000 (NPC, 2019)
Administrative divisions	36 States and I Federal Capital Territory
Age structure	0-14 years: 42.79%, 15 -24 years: 19.48%, 25 -54 years: 30.65%, 55-64 years: 3.96 %, 65 years and over: 3.1% (2016 est.) Growth rate 2.7% (2010 -2015)
Infant mortality	71.2 deaths/1,000 live births (2016 est.)
Life expectancy	52.6 years - female: 52.0 - years male (2010-2015)
Fertility rate, total (live births per woman)	5.7 children born/woman (2010 -2015)
Ethnic groups	More than 250 ethnic groups; Hausa and Fulani 29%, Yoruba 21%, Igbo (Ibo) 18%, Ijaw 10%, Kanuri 4%, Ibibio 3.5%, Tiv 2.5%
Religions	Christian, Muslim and indigenous beliefs
Languages	English (official), Hausa, Yoruba, Igbo (Ibo) fulfude
Literacy	Definition: age 15 and over can read and write, total population: 59.6% - male: 69.2%, female: 49.7% (2016 est.)
Independence	1 October 1960 (from UK)
GDP	Purchasing power parity: $469 billion (2015 est.)
GDP real growth	4% (2015 est.)
GDP - per capita	Purchasing power parity - $6,400 (2015 est.)
GDP composition	Agriculture: 20.3%, industry: 23.6%, services: 56.1% (2015 est)

3.1.2 Natural Resources

Nigeria's primary natural resources consist of natural gas, petroleum, tin, iron ore, coal, limestone, niobium, lead, and zinc (Table 1). Nigeria has proven oil reserves of 36.2 billion barrels, the tenth largest reserves in the world. Proven natural gas reserves are estimated at 182 trillion cubic feet, the seventh largest reserves in the world and the largest in Africa. The country also has an abundance of arable land.

Table 1. *Nigerian State and Natural Resources Present*

S/N	Mineral	States of Occurrence
1	Iron	Kogi, Nassarawa, Enugu, Kaduna, Katsina, Zamfara, Kebbi, and Oyo
2	Gold	Osun, Kwara, Kogi, Niger, Kaduna, Kebbi, and Zamfara
3	Tin	Plateau, Kano, Bauchi, Nasarawa, Kaduna, Ekiti, Cross River, and Kogi
4	Niobium	Plateau, Kano, Bauchi, Kaduna, Kwara, Cross River, and Ekiti
5	Tantalite	Plateau, Kano, Kogi, Kaduna, Kwara, Cross River, Ekiti, Taraba
6	Manganese	Kaduna, Katsina, Kebbi, Niger, Zamfara, and Cross River
7	Lead	Cross River, Ebonyi, Imo, Benue, Nasarawa, Plateau, Taraba, and Zamfara
8	Zinc	Cross River, Ebonyi, Benue, Nasarawa, Plateau, Taraba, and Zamfara
9	Copper	Plateau, Zamfara, Nasarawa, Kano, Bauchi, and Yobe
10	Nickel	Kaduna
11	Chromiium	Zamfara, Katsina, Kaduna. And Kogi
12	Titanium	Bauchi, Cross River, Kaduna, Katsina, Nasarawa
13	Tungsten	Bauchi, Kaduna, Kano, Nasarawa, Niger, and Plateau
14	Molybdenum	Kano and Plateau
15	Bismuth	Kaduna
16	Silver	Kano, Ebonyi, and Plateau
17	Platinum	Niger
18	Barite	Benue, Cross River, Ebonyi, Nasarawa, Adamawa, Plateau, and Taraba
19	Gypsum	Adamawa, Edo, Gombe, Ogun, Sokoto, Yobe, Ebonyi, and Imo
20	Rock Salt	Benue, Ebonyi, Nasarawa, Akwa Ibom, Cross River, and Imo
21	Kaolin	Akwa Ibom, Anambra, Bauchi, Bayelsa, Ekiti, Imo, Katsina, Kebbi, Kogi, Ogun, Ondo, Plateau, and Rivers
22	Bentonite	Bornu, Yobe, Edo, Kogi, and Ogun
23	Diatomite	Yobe and Borno
24	Phosphate	Ogun, Sokoto, and Imo
25	Limestone	Abia, Benue, Cross River, Ebonyi, Gombe, Kogi, Ogun, Sokoto, and Borno
26	Shale	Benue, Cross River, Ebonyi, Edo, Gombe, Kogi, Ogun, and Sokoto
27	Marble	Edo, FCT, Kogi, Kwara, Nasarawa, Oyo, and FCT
28	Talc	Osun, Kaduna, Kogi, Niger, and Oyo
29	Gemstones	Bauchi, Kaduna, Kogi, Nasarawa, Niger, Ogun, Oyo, Plateau, and Taraba
30	Zircon	Plateau, Kano, Bauchi and Nasarawa
31	Feldspar	Ekiti, Bauchi, Bornu, FCT, Kwara, Nasarawa, Kaduna and Kogi,
32	Mica	Ekiti, Kogi, Kwara, Nasarawa and Oyo
33	Lithium	Ekiti, Kaduna, Nasarawa, Niger and Zamfara
34	Fluorite	Bauchi, Ebonyi, Plateau, Taraba, and Benue
35	Silica Sand	Abia, Delta, Jigawa, Kano, Lagos, Ondo and Rivers

S/N	Mineral	States of Occurrence
36	Kyanite	Niger and Kaduna
37	Corundum	Plateau and Adamawa
38	Dolomite	Kogi and Edo
39	Magnesite	Adamawa and Zamfara
40	Trona	Bornu, Yobe, Adamawa, and Bauchi
41	Clay	All States
42	Uranium	Cross, River, Bauchi, and Taraba.
43	Coal and Lignite	Abia, Akwa Ibom, Adamawa, Anambra, Bauchi, Benue , Cross River, Delta, Ebonyi, Edo, Enugu, Gombe, Imo, Kogi, Nasarawa, and Ondo.
44	Bitumen	Ondo, Ogun, Lagos, and Edo

3.1.3 Mining and Minerals

Nigeria has abundant deposits of solid minerals, including barites, coal, columbite, gemstones, gold, graphite, gypsum, kaolin, marble, iron ore, salt, soda, sulfur, tantalite, tin, and uranium.

> Nigeria is endowed with a large variety of solid minerals in commercial quantities and up to thirty-three different solid minerals have been identified (NEITI).

Nevertheless, the mining industry, which exported significant amounts of coal and tin until the 1960s, has declined as publicly controlled infrastructure has deteriorated and the petroleum industry has grown in importance. Today, mining accounts for only 1 percent of gross domestic product and is a minor employer. Mining suffers from extremely low productivity and high production costs; and Nigeria is currently seeking to reinvigorate its mining industry through privatization and deregulation.

3.2 NIGERIA'S PREVIOUS EXPERIENCES IN ADDRESSING ASGM

Nigeria has made considerable effort to tackle the problem of illegal mining in the country by collaborating with donor agencies to establish a sustainable programme that aims to use formalization approach and remove barriers to; safe practices, investment opportunities, low productivity and inadequate technological capacity in order to minimize the health, environment and economic impacts of ASGM.

Although the constitution mandates the government to “protect and improve the environment and safeguard the water, air and land, forest…” (Constitution of the Federal Republic of Nigeria, 1999, 2020), Nigeria's legislation does not have a Chemicals Act.

The Federal Government of Nigeria prior to the ratification of the Minamata Convention on Mercury has made efforts to ensure the reduction, and where possible elimination of mercury use in industrial applications, processes and products.

3.2.1 Projects Towards Formalisation of ASGM in Nigeria

There are official projects of the Government specifically aimed to formalize and upgrade Artisanal and Small-scale Mining (ASM) including Artisanal and Small-Scale Gold Mining (ASGM), and also, to address the health and environmental impacts of mercury use. Some of the projects were self-funded while some were undertaken in close collaboration with donor agencies.

Between 2005 to 2006, the erstwhile Sustainable Management of Minerals Resources Project (World Bank assisted) instituted a Micro Grant Scheme for ASM sector. The scheme aimed to foster formalization of the sector by incentivizing operators to formalize their operation by organizing themselves into registered mining cooperatives as one of the conditions to access assistance from the scheme. Although many operators formed mining cooperatives in the bid to benefit from the scheme, most were however not successful as they failed to meet other conditions.

Lesson learned: Ensuring that relevant stakeholders are identified and worked with during project activities, address barriers and improve miner's access to ongoing and future schemes

Following the lead poisoning incident which occurred in Zamfara State during which several lives (especially of children < 5 years) were lost due to exposure to lead poisoning; the Federal Government of Nigeria through the Federal Ministries of Environment, Health and Mines & Steel Development initiated projects that led to the curbing of the lead poisoning in Zamfara State. One of such projects was the “Safer Mining Programme” that led to the introduction of mercury free technologies for gold amalgamation processes through the application of wet milling and Igoli technologies. However, processing centres and extension service outposts built as

part of the programme's activities in three locations in Zamfara state were not embraced by artisanal gold miners, as they were not adequately sensitized about the effectiveness of the technologies over extraction by use of mercury amalgamation technique. The sustainability of the project was not properly factored into the project during the planning. Thus, the management and use of the facilities was not sustained; and this left them unused and dilapidated.

> Lesson learned: Sustainability of future projects should be appropriately factored during the planning phase

Prior to the above, the cleanup and remediation of lead contaminated sites, treatment of affected people (especially children) and safer mining advocacy and training in Bagega village (Zamfara State) and Shikira (Niger State) were undertaken from September 2010 – March 2011.

The Environmental Law Institute, in 2014, conducted a study on ASGM in Nigeria and published a report titled: *Artisanal and Small-Scale Gold Mining in Nigeria: Recommendations to Address Mercury and Lead Exposure.* The report examined the ASGM activities in Zamfara State with special focus on the inherent dangers in the use of mercury and challenges in the enforcement of the existing law for the formalization of ASGM. The project drew attention to preponderance of the use of mercury by artisanal gold miners and opined that efforts should also be directed to addressing it even as the lead poisoning was being tackled. This study brought to the fore the need for comprehensive researches on ASGM in Nigeria as lack of reliable data impeded development of effective policies. The report also provided several sector reform that could be considered for improving ASGM sector in Nigeria.

With reoccurrence of lead poisoning in parts of Niger state, Northcentral Nigeria, *Médecins Sans Frontières* (MSF) in conjunction with Nigerian Government, spearheaded a multidisciplinary/multisector intervention project which commenced in June 2015 with the goal to reduce excess mortality and morbidity associated with environmental lead contamination through decreased exposure, remediation and treatment. The project resulted in drastic reduction and cessation of mortality and morbidity incidences due to lead poisoning.

3.2.2. Studies on Mercury use in ASGM

National mercury emission and release inventory was undertaken in 2012 and 2015 in relevant sectors, including the ASGM, to know the extent of emissions and releases of mercury from these sectors for the development of roadmaps and priority setting for the future.

The assessment results are as detailed in the Minamata Convention on Mercury Initial Assessment Report For Nigeria (June 2017)

There are few other investments and studies in artisanal gold mining by international NGOs. For instance, PACT International implemented a Direct Aid Project in Zamfara State for the purpose of introducing mercury free technology through knowledge sharing on the fabrication of mini forges for use in smelting of concentrated gold ore using borax and soda ash as fluxes. The organization conducted several training programmes for artisanal gold miners in Zamfara state to promote the adoption of mercury free technologies. The project was not adequately promoted amongst the ASGM operators in the state leading to large proportion of stakeholders not aware of the project. In addition, adequate commitment was not provided by MMSD to support the sustainability of the project.

Lesson learned : It is important that relevant stakeholders are involved in the development and implementation of projects

A major factor to the poor performance of the project was failure of the technology to produce the envisaged result during demonstration, as some of the local materials used malfunctioned. This was not lost on the miners.

Lesson learned: Due diligence should be performed on all proposed technology to ensure selection of a viable and affordable one that can easily adapt to obtainable condition while still retaining its efficiency

The demonstration of the application of the technology needed to be done severally at different locations followed by consistent sensitization to adequately convince the miners to begin to adopt the process.

3.2.3 Programmes for ASGM in Nigeria

As mentioned earlier, Nigeria joined the UNEP Global Mercury Partnership in 2011 in four (4) thematic areas, including Artisanal and Small-Scale Gold Mining. The overall goal of the Partnership is to protect human health and the global environment from the release of mercury and its compounds by minimizing and, where feasible, ultimately eliminating global, anthropogenic mercury releases to air, water and land.

Furthermore, in 2011, Nigeria in collaboration with the United States Environmental Protection Agency (USEPA) and the UNEP organised an Anglophone West Africa Regional Awareness-Raising Workshop on mercury in ASGM. The workshop provided an opportunity for stakeholders to consider how to tackle mercury-related issues in artisanal and small-scale gold mining and to initiate a dialogue on the broader range of issues associated with such mining.

In 2015, Nigeria prioritized the diversification of the Nigerian economy by engendering accelerated development of the non-oil sectors of the economy including the mining industry. The Government developed the Economic Recovery and Growth Plan (ERGP), which identified mining as one of the key areas to diversify the economy. In keying to the new Government's policy, a roadmap for the growth and development of the Nigerian Mining Industry was developed in 2016. The roadmap identified gold as one of the Country's "7 Strategic Minerals", and gave a projection for mining's contribution to the GDP (at 0.33% in 2015) to 7% by the year 2031. Government plans to build the capacity of the Artisanal and Small-Scale Miners through the provision of extension services and actively drive the formalization of ASMs in the next couple of years. The ability of relevant agencies to meet these targets has become doubtful because the implementation of the activities recommended in the document has become relatively slow; due largely because of paucity of fund.

> Lesson Learned: Clear strategies to establish sustainable finance for national plans and programmes is key to achieving set national goals and objectives

Recently, the Government of Nigeria initiated a programme called National Gold Purchase Scheme. This was designed to promote the production and refining of gold for purchase by the Central Bank of Nigeria (CBN) under a Federal Gold Reserve Treasury Scheme. The scheme is aimed at facilitating formal gold production, trade and exports; to ensure regular payment of royalties and taxes. The project is a collaboration with the Government and private sector to promote a sustainable gold supply chain structure. The scheme is funded through a Presidential Artisanal Gold

Mining Development Initiative (PAGMI). The pilot phase of PAGMI was flagged off in Yauri Local Government Area of Kebbi state on February 22, 2020.

Further to the Government's desire to formalize the ASM sector, a Memorandum of Understanding (MoU) was signed by Nigeria and Bank of Industry (BOI) for the management of a N5 billion fund in support of Artisanal and Small-Scale Miners in the country. Under the arrangement, Nigeria contributed N2.5billion. Counterpart contribution from BOI put the total fund earmarked for support of the growth of certified artisanal mining cooperatives and small-scale mining firms to N5billion. Under the scheme, a certified artisanal scale mining cooperative can access loan ranging from N100,000.00 to N10million, while a small-scale mining firm can access between N10million and N100million in mining equipment purchase.

Presently, the World Bank is supporting Nigeria with a credit facility worth US$150,000,000.00, to develop the country's mining sector for economic diversification through the Mineral Sector Support for Economic Diversification Project (MINDIVER). The project has the following development objectives:

- To improve the attractiveness of the Nigerian mining sector, as a driver for economic diversification, for long-term private sector investment in the exploration and production of minerals.
- To create a globally competitive sector capable of contributing to wealth creation, providing jobs and advancing social and human security.

3.3 GEOGRAPHICAL DISTRIBUTION OF ASGM

In Nigeria, occurrence of gold is associated with a geologic formation known as the Schist Belt. The formation is a component of distinct suites of rock of Nigerian Basement Complex shown in Figure 2. The Schist Belt is made up of metasedimentary and metavolcanic rocks including low grade, metamorphic rocks. The belt trends from the northwest down to the south western part of Nigeria. Nigerian gold deposits occur in two different forms: as primary mineralization associated with veins bodies of quartz in the basement rocks(load) and alluvial deposits which are found in present river channels and in older buried placers.

Nigerian gold deposits occur in two different forms: as primary mineralization associated with veins bodies of quartz in the basement rocks(load) and alluvial deposits which are found in present river channels and in older buried placers.

Gold occurrences in Nigeria has been associated with the Schist Belt-a metamorphic rock formation belonging to the Nigerian Basement Complex rock. The rock trends from the North western part of Nigeria down to the southwest axis.

Owing to this fact, the bulk of ASGM activities are concentrated in the States where this rock formation occurs viz. Kebbi, Zamfara, Kaduna, Niger, Kwara, Kogi (west), FCT, Kano, Katsina and Osun States.

States with high ASGM operations are Zamfara, Kaduna, Niger, and Osun States

Recently, there were reports of gold occurrences in areas outside the hitherto known areas e. g. Bauchi, Taraba, Adamawa, Cross River, Nasarawa, Ekiti and Oyo States. However, majority of ASGM operations are done in four major States: Zamfara, Kaduna, Niger, and Osun States (Figure 3). Figure 4 shows the classification of regions with gold into high, medium and low level in the country.

Primary gold deposits occur mostly within quartz veins in the host rock. Artisanal miners often target the veins by digging and chiseling out the gold ore. The pit is often demarcated into partitions with a given group of miners working on each of the partition. Others work in pits dug in the outcrop portion of the host rocks. On the other hand, secondary gold deposits are mined by panning along riverbanks including ancient river channels. Primary gold deposits in Nigeria have been determined to occur in association with heavy metals such as lead, arsenic, copper, etc.

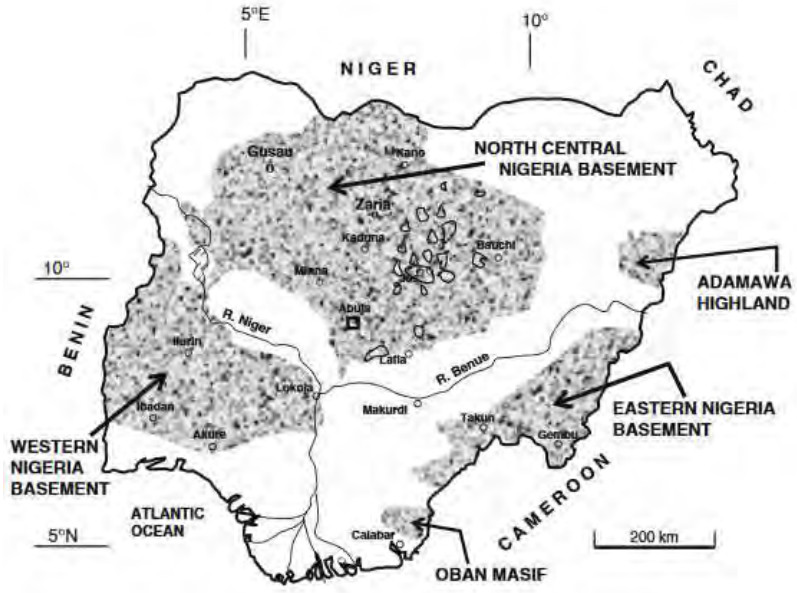

Figure 2. *Nigeria Basement Complex Geology (Obaje, 2009)*

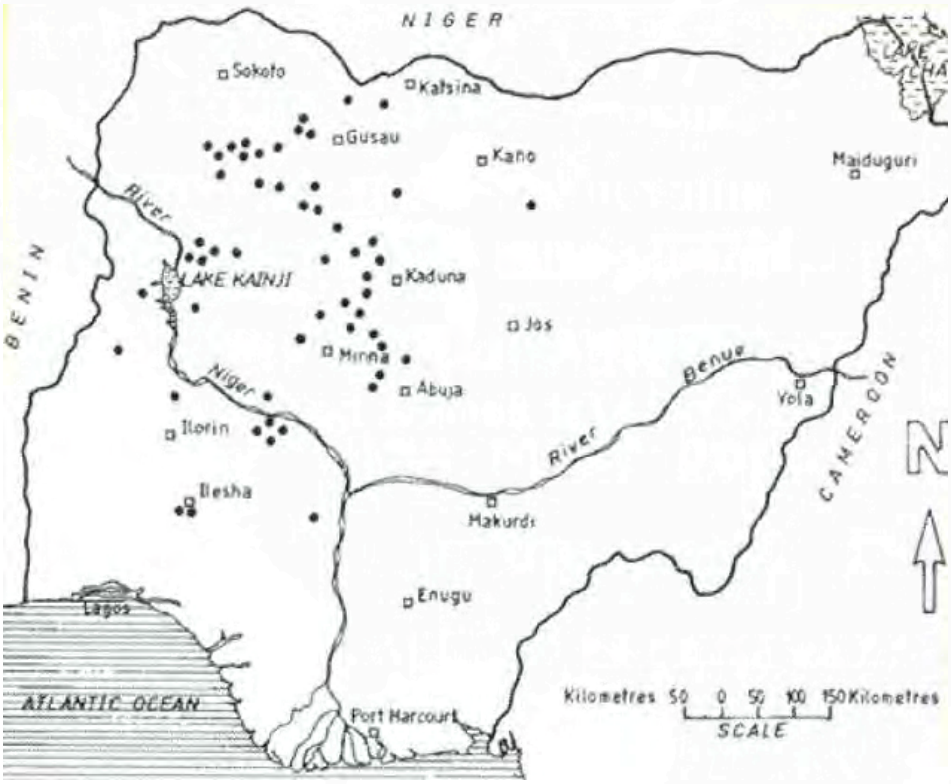

Figure 3. *Locations of Gold Occurrence in Nigeria.*

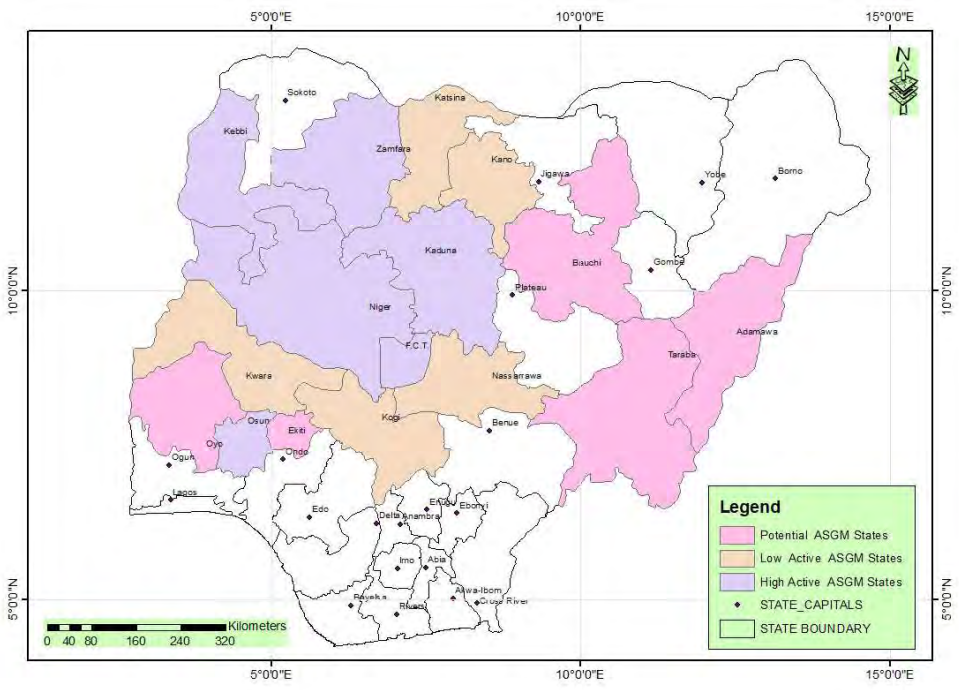

Figure 4. *Indicates states with actively high ASGM operations, low ASGM operations and potential ASGM activities.*

3.4 GOLD MINING AND PROCESSING INFORMATION

3.4.1 Extraction Methods

Open Pit

The method adopted by miners in most of the sites is open pit mining which is typical of extraction of gold ore that occurred in vein near the earth surface. The method involved massive and manual excavation of land by miners, using very rudimentary tools, such as: digger, shovel, monday hammer, chisel, head pan, and spade to reach the gold bearing veins. The direction of the excavation is governed by the orientation of the vein. The quarzitic gold bearing vein in some places is about 1m to 1.5m wide. The maximum depth of the pit reached at one location was 33m and in some places along the floor of the pit were demarcations made of sacs filled with dug out earth materials. Each of the partitions, measured roughly 2m in length, is usually worked by 5-10 men. The mines were clearly constructed without recourse to standard best practices. Hence, miners exposed themselves to risk of rockfalls, because of possible slope failures, as shown in Plate 10.



Plate 10. *Shakwata Open Pit Gold Mine*

3.4.2 Mining Method: Alluvial/Stream Bed Panning

In some of the sites, panning of stream bed sediments was done directly on the river channels or at the banks of the rivers. River sediments are usually shoveled into a head pan and panned directly inside the river. The rivers also serve as source of drinking water for the people. Because the river is seasonal, mining activities are predominant at the location during the dry season.



Plate 11. *Gold Panning of River Sediments*

The operation involved a simple process whereby miners use hoes to scoop river sediments into a head pan with water and begin the panning, i. e. circular and back and forth movement of the pan, with the aim of settling down gold grains and silts at the bottom of the pan. Heat is applied to the concentrate to vapourize the water and dry the silts. The dry silts are then blown off leaving the grains of gold behind. Whilst some miners would take this mixture home for heating, others would rather complete the process at the mine site. The process does not require the use of mercury.

3.4.3 Gold Ore Processing Techniques

Gold ore processing requires significant quantity of water which explains the location of the processing centres close to the streams. Various activities such as gold ore crushing, sluicing and panning including trading of gold, mercury and other chemical reagents take place at the area. The gold ore is usually bagged and brought from the mine pits to the processing points.

Very coarse gold ore is first broken down (crushing) into smaller pellets on a hard iron slab using hammer. The pellets size ore are then ground into fine grains in a milling

machine under a wet condition in some places and in dry condition in other places. The gold ore pellets are shoveled into the milling machine with continuous stream of water. The pulverized materials, which are now fluidized, flow down from the milling machine along the sluice box which is lined with fibrous carpet.

Sluices are normally inclined at an angle to allow desired flow rate such that gold grains alongside heavy particles settle out on the fibrous carpet. The mixture is then washed out from the carpet on to a basin. The next process is panning, which allows the miners to concentrate the gold grains albeit with other heavier sediments. This process relies on the difference in specific gravity between gold and the gangue minerals (unwanted sediments and minerals). It involves panning, wherein circular or back-and-forth shaking of the concentrate and water in a pan causes the gold grains and unwanted sediments to concentrate in layers at the bottom of the pan, whilst the lighter gangues are decanted away.

To separate the gold from the sediments, miners add some quantity of mercury to the concentrate and begin to knead the mixture in a pan. Mercury amalgamates with the gold (leaving behind the unwanted sediments) to form an amalgam of mercury and gold. In all the sites that use mercury, miners perform this process using bare hands.

The tailings are normally thrown away together with the process water and some mercury retained in the sediments. Part of this water infiltrates the soils while the remainder flows down to the stream. Gold is liberated by application of heat to the amalgam which causes the mercury to vapourize into the atmosphere, leaving behind a sponge of gold (Plate 12). The heating of the amalgam is done in the open air by the miners. Recycling of mercury which would reduce the amount of mercury released into the environment, is never done at all the sites visited. This process is shown in Figure 5.

To separate the gold from the sediments, miners add some quantity of mercury to the concentrate and begin to knead the mixture in a pan.

The gold sponge could be sold to the gold merchants at this stage, however, the sponge, could still be refined further to enhance the purity of the gold and its price. Further refining is usually done by the gold merchants at other locations; including homes. The average purity of gold mined in Nigeria is between 21-23 karat.
Whole ore amalgamation was not the practice in any of the mines visited; rather, concentrate amalgamation was the common practice.

The price of a 92g bottle of mercury was between N6,000.00 to N10,000.00 at the time of visit to the mines (Plate 13).

At the time of visit to the mines, the price of a 92g bottle of mercury was between N6,000.00 to N10,000.00 ($16.21 - $27.02).



Plate 12. *Gold Amalgam*



Plate 13. *Bottle for Measuring Mercury for Sale.*

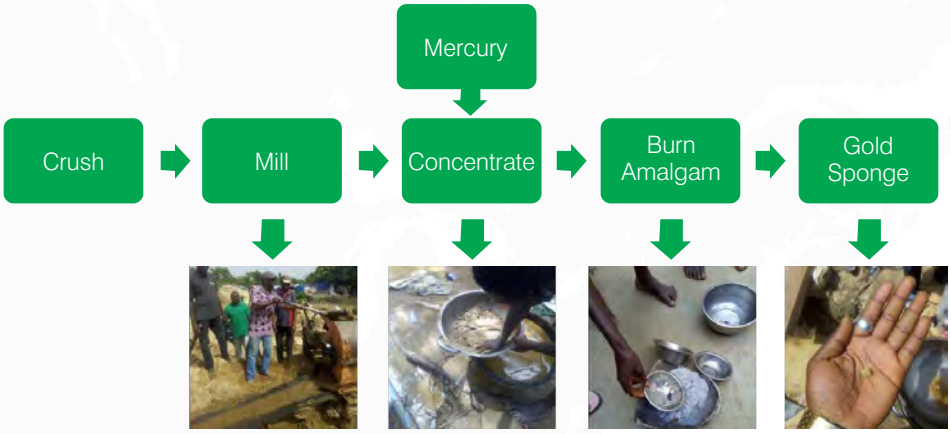

Figure 5. *Gold Ore Processing Workflow*

3.4.4 New Processing Techniques And Foreigners Participation

In some of the sites visited, it was noted that some foreigners also engage in artisanal gold mining activities. The Burkinabe were the major foreigners who engage mostly in reprocessing of tailing left behind by their Nigerian counterparts. Use of cyanide is popular amongst the foreign nationals working in Niger and Zamfara States. The cyanide is used to process the tailings left after the sluicing. The tailings are sold to the foreigners who have the skills and knowledge about the use of cyanide. Interestingly, these foreigners who are mostly Burkinabe and Malians and, recently, the Chinese would not share the knowledge and skills with the local miners.

The use of cyanide is popular amongst the foreign nationals to process the tailings left after the sluicing in some gold mining States of Nigeria

Lesson learned: Government to take action and control the use of cyanide in order to protect human health and the environment

There is a form of mutual understanding between the two groups. Although, the Burkinabe would not disclose their processing techniques to their Nigerian counterparts, they are not given the tailings for free. Therefore, they purchased the tailings, which otherwise would be discarded as waste, from the Nigerians. According to some of them, they have their sponsors in Burkina Faso who collects the gold they recover and pay them in return. The cyanide is brought from Burkina Faso; it costs N40, 000.00 per 25litres.

ASGM IN NIGERIA- NATIONAL SECTOR BASELINE ANALYSIS

4.0

ASGM in Nigeria- National Sector Baseline Analysis

4.1 Summary of Field Studies and Activities in Selected ASGM Sites

4.1.1 Method of Data Collection in Selected ASGM States: A careful review of literatures on the geology and gold mineralization in Nigeria, revealed the States in Nigeria where gold was found and ASGM activities were reported. It was based on this information that ASM officers, Environmental officers, Federal Mines Officers (FMO), States Chairmen of the Miners Association of Nigeria (MAN), Federal and Local Environmental health authorities, Health care providers at peripheral health facilities in ASGM areas and relevant stakeholders of the respective States were interviewed to ascertain the level of ASGM activities, mercury use and security situation; in order to determine States and ASGM sites for survey.

The result of the various interviews provided the basis for the selection of Niger, Osun and Zamfara States for field survey and data collection on ASGM. The ASGM sites selected for field study within these States were the ones with active and intense ASGM activities currently going on. Osun State was selected for survey, despite the seemingly lack of use of mercury by artisanal gold miners in the State to gain insight into gold production from ASGM and support the national gold production estimate. In all the artisanal mining sites visited in Osun State, mercury was not found to be in use. Miners explained that the use of mercury was not necessary, as the nature of gold found in Osun is such that is not amenable to the use of mercury. Some of the miners believed that the small-scale mechanized Chinese mines use mercury, as they reported seeing mercury in some of the mines previously worked and abandoned by Chinese companies. There is a need for more in-depth studies of the ASGM in Osun State, especially in view of uncooperative attitude of the Chinese-run small-scale mechanized gold mining firms during the field survey. Data were also provided by ASM officers and leaders of ASGM sites workers in States, such as Kaduna, Kebbi, Nasarawa, and Kwara, where field studies were not possible. Five ASGM operators in each of the States were randomly interviewed to further ascertain the validity of the information provided by the ASM officers.

Various research tools were used to collect primary data at the ASGM sites. The data collection methods and tools used for the health assessment were document review,

key informant interviews, focus group discussions, health facility assessment, and direct observations.

With the assistance of the ASM officers and cooperation of MAN members, key informants were identified. The informants were:

- Agents to gold dealers,
- Members of host communities, who also works in ASGM site,
- Members of staff of traditional rulers,
- Leaders of mine workers.

The key informants were selected because of the vast knowledge they possess about ASGM operations in their areas, in terms of ASGM site's organization, operational modalities, and information on the leadership of the sites visited, after being sensitized to the nature and importance of the exercise. Meetings were also arranged with the gold dealers' association members, leaders of ASGM sites, women miners, and agents. The meetings provided opportunities to reconcile information obtained from the analysis of questionnaires and observations made during field visits. These stakeholders were selected because of the massive influence they have on ASGM activities in their various States.

The target participant groups and health facilities are highlighted in Table 2.

Table 2. *Target participant groups and health facilities*

Key informant interviews	Focus group discussions	Health facility assessments
▪ Local government officials ▪ Local health authorities ▪ Local environmental (health) authorities ▪ Health care providers at peripheral health facilities in ASGM areas ▪ Community leaders ▪ ASGM community leaders ▪ Civil society organizations working on ASGM-related issues	▪ Artisanal and small-scale gold miners ▪ Family members of miners ▪ Community members in surrounding communities of ASGM sites (excluding leaders)	▪ Nearest public, primary health care facilities serving ASGM communities ▪ Referral hospital for the primary health care facilities

In Niger State, 17 ASGM sites were surveyed directly. Data (which was complemented by quantitative measurements) from another 29 sites were provided by the ASM officers and miners who were interviewed. Four (4) members of MAN provided key information on the ASGM activities in Niger State. Leaders at the ASGM sites surveyed in Niger State were also interviewed. In total, 73 questionnaires were completed and returned by ASGM operators who were randomly selected in the State.

In Zamfara State, 5 ASGM sites in Jabaka, Maru LGA, were surveyed. The sites were not active at the time due to security risks. There have been serious security breaches in Zamfara State due to activities of bandits and kidnappers. This has smothered the intensity of ASGM activities in Zamfara State. However, through focus groups discussions and questionnaire analysis, data were generated from 58 ASGM locations in the State. In Zamfara State, 5 members of mine workers' union provided information about the ASGM situations. 10 leaders of ASGM groups were interviewed, whilst 8 focus groups discussions were held, involving a total of 56 miners.

Data were obtained indirectly from 23 ASGM locations in Kaduna State through information provided by the ASM officer in charge of Kaduna State. This was also corroborated by interviews with team leaders or leaders of local miners. In Kwara State, the ASGM locations were surveyed by the State's ASM officer, who provided the data on the 3 active locations in the State. Similarly, data on the 3 active locations in Nasarawa State were provided by the ASM officer in charge of the State, who surveyed the sites. Data were obtained from 6 active ASGM locations in Kebbi State by the ASM officer in charge of the State. Through the ASM officers in Kebbi, Kaduna, Nasarawa, and Kwara States, a total of 275 questionnaires were completed and returned. In addition, informations were provided by ASGM operators that were randomly interviewed in each States.

In Osun State, those interviewed included four gold dealers, 4 gold dealers' agents, 2 landowners, 2 State Government officials, and 1 supervisor of a small-scale gold mining firm. A total of 152 questionnaires were administered to randomly selected artisanal gold miners across 34 artisanal and small-scale gold mining sites spread across the 7 gold-producing Local Government Areas in the State. An average of 5 questionnaires were administered per site.

In administering the questionnaires, the trained project personnel took into cognizance that most of the artisanal miners were illiterates, and so, where applicable, completed the questionnaires as the respondents provided answers to the questions. In all, five hundred (500) questionnaires were administered to ASGM operators, through which data on basic sectoral profile of ASGM sites, mercury use, mining sites and impact on human health and the environment, socioeconomic and legal status, education/healthcare opportunities, and influence of other stakeholders near ASGM sites were elicited. The data provided in the questionnaires were analyzed in the context of the information derived during several discussions held with respective interest groups as stated previously, as well as physical measurements carried out in the field. The meetings provided opportunities to reconcile information obtained from analyzing questionnaires, measurements and observations made during field visits.

Operational modalities in each of the ASGM location visited were carefully noted including photographing relevant site activities or important environmental features caused by mining activities. Physical measurements were carried out in some locations to determine average weight of bags of gold ores mined at the site by

counting the number of miners per pit to determine the average number for the site; counting the number of groups of miners working per pit and the number of active pits in the site; counting the number of gold ore bags milled by each active machine to determine an average number for the site; and counting the number of active machines in gold ore processing pointing locations.

Also determined, was the average daily quantity of gold produced per group/pit at the site. Summation of quantities of gold produced per pit, by groups or machine, provided each site's estimates of quantities of gold produced and mercury used to produce the gold. The value of annual gold produced at each ASGM site was determined by multiplying the average price of gold sponge (for the State) by the quantity of gold (in gram) and number of yearly active mining days. Similarly, the annual gold produced at the site was determined by multiplying the site's daily gold production (in gram) by the number of yearly active days. To determine the mercury/gold ratio (Hg:Au), the method recommended by the Artisanal Gold Council was used. At any ASM site where mercury is used, the mass of the sponge (obtained after heating the amalgam) is subtracted from the mass of the amalgam. The difference in mass is the mass of mercury lost to the atmosphere. The Hg:Au ratio is then determined by dividing the mass of mercury lost to the atmosphere by the mass of sponge. The daily quantity of mercury used at each ASGM site was then determined by multiplying the mercury to gold ratio by the daily gold production for the site. The summation of the sites' estimates of the quantities of the annual gold mined and mercury used provided each State's estimates and, by extension, the national estimates.

Earning per capita for each ASGM site was computed by dividing the annual value of gold production (N or USD) by the number of ASGM workers. Miner's earning per month was calculated for each ASGM site by dividing the earning per capita by the number of months in a year (12). Each State's Miner's Earning per capita (N or USD) was derived by dividing the annual value of Au production by the number of miners in the State. The national estimate of miners' earning per capita (N or USD) was determined as the average of each state's miners earning per capita. Similarly, the national average for miner's earning per month (N or USD) was calculated as the average miner's monthly earning for each State.

The population of ASGM workers at each ASGM site was estimated based on observation and perception of the leaders and miners interviewed at each of the sites visited. In addition, estimations provided by the leaders of Miners Association of Nigeria and ASGM operators on sites not visited during the survey (which were also corroborated by States' mines officers - FMO and ASM officers), were combined to get the estimated State's populations.

Each State's estimate of the population of ASGM workers was determined by adding the population in each State's ASGM sites. It was based on this that the national estimate of individuals directly engaged in ASGM activities was computed as the sum of each State's estimates. The number of individuals who are indirectly dependent or engaged in ASGM activities in the country was determined by the summation of each

State's estimates. Instructively, the number of individuals who are indirectly engaged in ASGM activities for each State was determined by the product of each State's ASGM population by 5. This is based on the conclusion that for every ASM worker, there are 3-5 individuals who are indirectly dependent on him or her. The dependents include taxi drivers, gold and other minerals buyers and refiners, shops, bars, food stalls and restaurants, local markets, equipment suppliers and farming inputs.

With respect to the health assessment conducted in Niger and Osun States, table 3 shows the study sites investigated for health survey in the country. Furthermore, a total of 21 KIIs, 14 FGDs and 6 HFAs were conducted in the two ASGM sites as shown in Table 3.

Table 3. *Study Sites investigated for health survey in the country*

State	Local Government Area	Administrative post (state capital)	Mines	Obs
Niger	Shiroro	Minna	Galadimakogo, Kpmakpma	Site 1
Osun	Atakunmosa West	Oshogbo	Ilekki, Ibodi	Site 2

Table 4. *Sample sizes*

	State		
	Niger	Osun	Total
Key informant interviews			
Government officials (regional or federal)	3	–	3
Environmental authorities	1	1	2
Health care providers	4	2	6
Traditional leaders	3	2	5
ASGM community leaders	2	1	3
Civil society organizations	1	1	2
Total KIIs	**14**	**7**	**21**
Focus group discussions			
Miners	4	3	7
ASGM community members (non-miners)	3	3	6
Mixed miners and non-miners	-	1	1
Total FGDs	**7**	**7**	**14**
Health facility assessments	**4**	**2**	**6**

4.1.2 Data Gathering and Interpretation During Niger State Fieldwork

The data gathered during the survey showed that more than 58,000 individuals were directly involved in ASGM mining operations in the State. Estimated daily gold production and mercury used by the ASGM sector in the State were found to be about 10,800g and 13,000g respectively. This gives about 2,300kg and 2,800kg of gold and mercury produced and used annually by ASGM sector in the State, based on 212 active working days (table 5). The method adopted by miners in most of the sites is open-pit mining, which is typical of extraction of gold ore that occurs in a vein near the earth's surface. Direct panning of streambed sediments was also witnessed at few sites. Gold ore processing requires a significant quantity of water, which explains the location of the processing centers close to the streams. Various activities such as gold ore crushing, sluicing, and panning, including trading of gold, mercury, and other chemical reagents, takes place at the mining sites. In most processing sites, mercury was used for gold processing to form the amalgam, which was later burnt openly and caused vaporization of mercury. Recycling mercury, which generally reduces the amount of mercury released into the environment, was never done at all the sites visited. At the time of visit to the mine, the price of a bottle of mercury weighing 92g was between N 6,000 and N10,000. *The details of computations of estimates of gold and mercury in Niger State are provided in appendix B.*

4.1.3 Data Gathering and Interpretation During Osun State Fieldwork

Although the fieldwork was intended to obtain data on the use of mercury in the ASGM communities, it was discovered that none of the artisanal gold mining sites in Osun State used mercury: miners explained that the use of mercury was not necessary, as the nature of gold found in Osun is such that is not amenable to the use of mercury.

However, information gleaned from the interview granted by one of the supervisors indicated that the small-scale mechanized gold mining site operated by the Chinese uses mercury to process alluvial gold ore although this was not confirmed during the survey.

There is a need for more in-depth studies of the ASGM activities in Osun State, especially in view of the uncooperative attitude of the Chinese-run small-scale mechanized gold mining firms during the field survey.

Findings from the survey indicated that about 21,000 individuals were directly involved in ASGM in the State. The activities of these individuals resulted in daily gold production of about 8,000g. The estimated active working days for ASGM operators in the State is 241days. This gives an estimated annual gold production from ASGM operation as 1,922.53kg (Table 5). Mercury use in the State was not reported due to reasons previously explained. *The details of computations of estimates of gold and mercury in Osun State are provided in appendix C.*

4.1.4 Data Gathering and Interpretation During Zamfara State Fieldwork

The annual ASGM gold production in Zamfara State is estimated at 8,600kg, while the annual mercury use by the sector is estimated at 8,700kg. The estimates were based

on 212 active working days (table 5). *The details of computations of estimates of gold and mercury in Zamfara State are provided in the appendix D.*

4.1.5 Data Gathering and Interpretation for Kaduna, Kwara, Nasarawa and Kebbi States

It was estimated that about 2,000kg, 600kg, 100kg and 500kg of gold are produced in all the artisanal mining sites annually in Kaduna, Kwara, Nasarawa and Kebbi States, respectively.

Similarly, about 3,000kg, 500kg, 150 kg and 600kg of mercury are respectively used annually in ASGM operations in each of Kaduna, Kwara, Nasarawa and Kebbi States. *The details of computations of estimates of gold and mercury in Kaduna, Kwara, Nasarawa and Kebbi States are provided in the appendix E and F.*

Table 5. *Summary of ASGM Baseline Estimates across the gold mining States*

	Niger State	Zamfara State	Osun State	Kaduna State	Kwara State	Nasarawa State	Kebi State
Annual Au Prod. (kg)	2,297.18	8,608.12	1,922.53	2,476.09	355.66	116.60	484.22
Annual Hg Use (kg)	2,797.12	8,782.24	0.00	3,257.08	497.92	151.58	581.07
Annual Au Value (N)	21,823,216,036.57	81,777,124,648.00	18,264,028,350.00	23,522,899,688.00	3,378,766,960.00	1,107,700,000.00	4,600,104,896.00
Annual Au Value (US$)	58,917,969.86	220,780,574.10	49,308,931.83	63,506,748.62	9,121,941.04	2,990,550.76	12,419,289.68
Active working days (November to June)	212	212	241	212	212.00	212	212.00
Average price of gold/g (N)	9,500	9,500.00	9,500.00	9,500.00	9,500.00	9,500.00	9,500.00
Exchange Rate (US$1.00 = N370.40)	370.40	370.40	370.40	370.40	370.40	370.40	370.40
No of Workforce	58,429	133,492	20,557	33,803	2,281	2,850.00	7,600

NB: Use of mercury was not observed in any of the ASGM sites in Osun State during the field survey. There was a report that some mechanized small-scale operators use mercury, but this was not ascertained during the survey.

4.2 FINDINGS AND RESULTS OF THE NATIONAL BASELINE ANALYSIS OF NIGERIA'S ASGM SECTOR

The results of the national baseline analysis of the Nigeria's artisanal and small-scale gold mining (ASGM) sector were based on the scoping studies carried out in ASGM locations spread across active artisanal gold mining States of Niger, Osun, Kaduna, Zamfara, Kwara, Nasarawa and Kebbi. The scoping study led to visits to 35 ASGM sites in Osun State, 17 in Niger State, and 5 in Zamfara State.

Data were also collected from ASGM sites in Kwara, Kaduna, Nasarawa and Kebbi States (Figures 6-11). Information on reports of potential ASGM activities in States outside the hitherto known areas such as Bauchi, Taraba and Adamawa States in the

north-eastern part of Nigeria, and Oyo and Ekiti in the south-western part were noted for future assessment. Table 5 gives a summary of ASGM baseline estimates across the gold mining States

Findings from several studies (including the NAP studies) of the sector have indicated that ASGM has become a veritable livelihood strategy available for teeming underemployed and unemployed individuals in the rural areas of States with significant ASGM activities in Nigeria. As noted, Artisanal and Small-scale Mining (ASM), including ASGM, is deeply rooted and having low entry barriers has enabled relatively a large proportion of the rural population to easily take up jobs in the sector in order to escape poverty. ASGM in Nigeria has, therefore, become an attractive source of income to many impoverished Nigerian peasants, some of whom alternate ASGM occupation with farming activities. In areas where ASGM has become a part of the community culture, women generally undertake ASGM work in the off season (dry season), where they pan river sediments for gold. In the rainy season, they revert to farming and agriculture. This is particularly common in Niger State where women participate directly and actively in ASGM through engaging in panning and washing of sediments for gold in alluvial deposits. They do not migrate like most men, but restrict themselves to mining at community streams during dry seasons and revert to farming in the rainy seasons.

Protecting vulnerable groups

Lesson learned:

- Sensitize and encourage miners to switch to alternative livelihood especially during rainy season
- Periodic creation of awareness on the harmful effect of mercury on human health (especially the vulnerable groups) and the environment
- Collaboration with authorities responsible for child protection and education.

In Zamfara State, women assist their husbands to break gold ores that are brought home from the mines. However, young girls are commonly seen at ASGM sites especially in Zamfara and Kaduna States, where they engage in providing ancillary services such as selling of foods and other articles. Most men in the rural villages earn relatively poor income to adequately cater for their mostly large families. Pressed by poverty and insufficiency of family income, women and children become naturally involved in ASGM operations to augment the resources of the families.

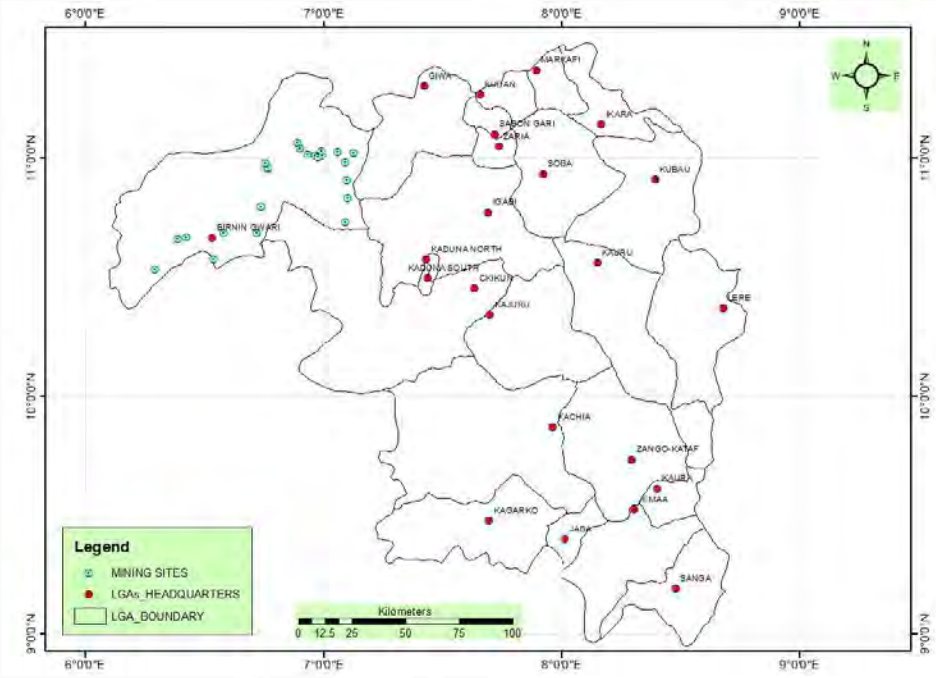

Figure 6. *ASGM Sites in Kaduna State*

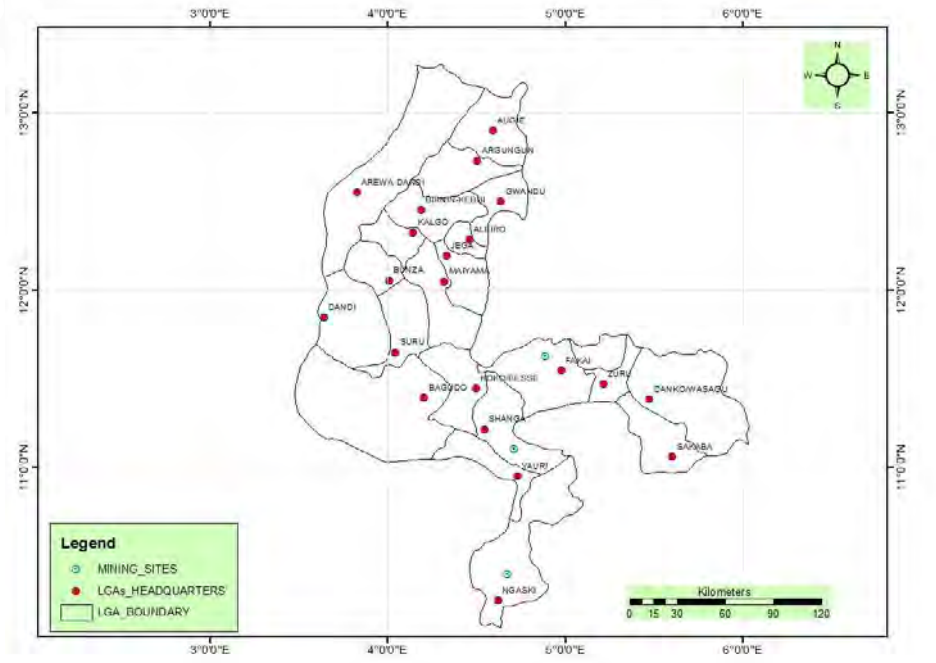

Figure 7. *ASGM Locations in Kebbi State*

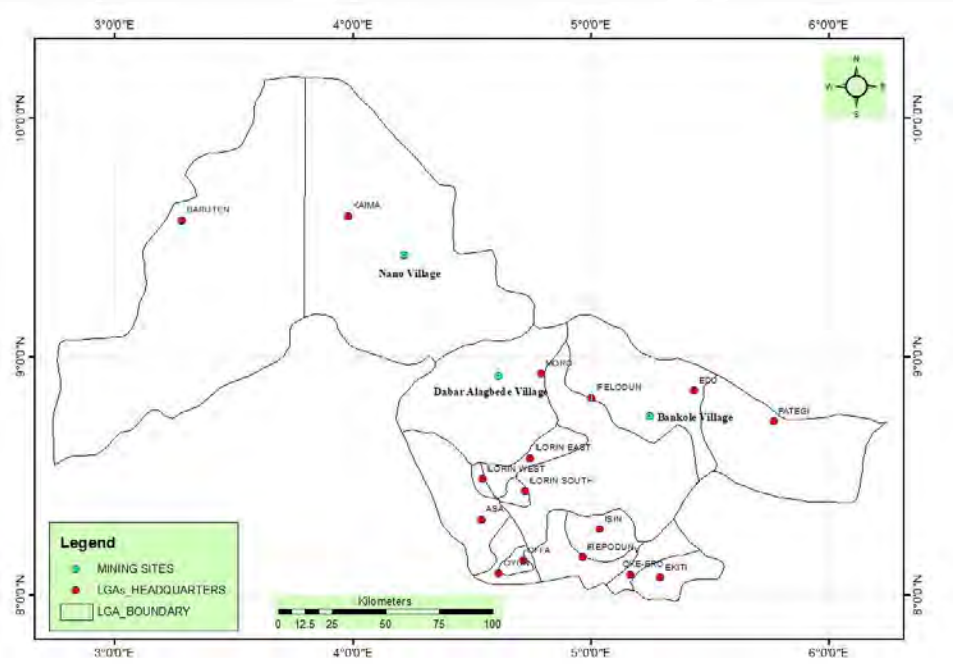

Figure 8. *ASGM Locations in Kwara State*

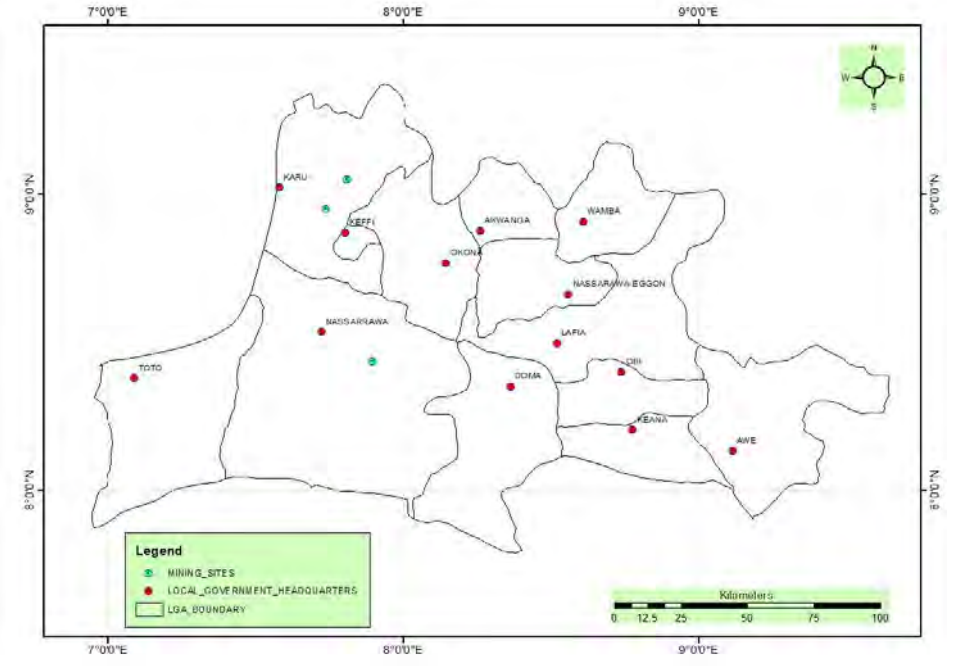

Figure 9. *ASGM Locations in Nasarawa State*

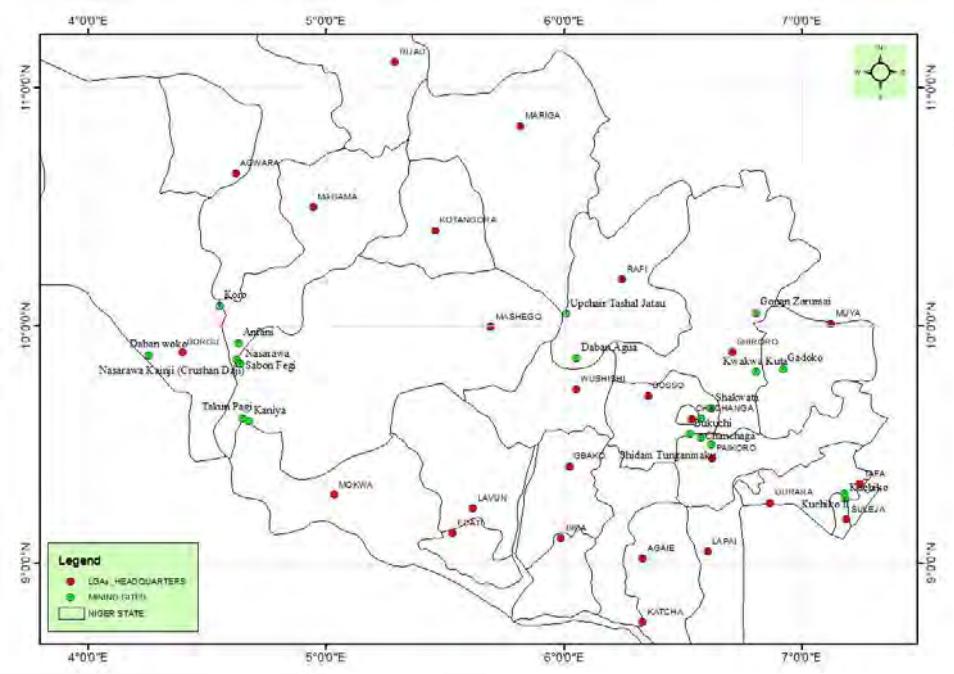

Figure 10. *ASGM Sites in Niger State*

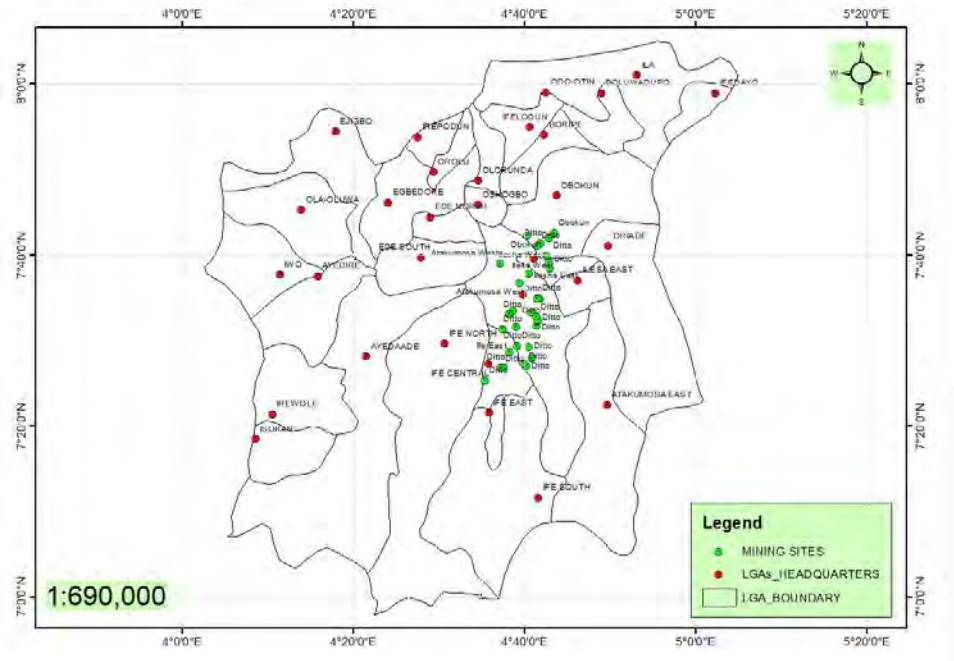

Figure 11. *ASGM Locations in Osun State*

4.2.1. ASGM Workforce

During the fieldwork activities, artisanal miners were observed carrying out various forms of mining operations and mineral ore processing. In most of the primary ore deposit mining, women were mostly not involved. This was attributed to the strenuous and tedious nature of the mining process, as well as religious beliefs that restrict women from entering the pits. In some cases, women believed that mining was an occupation reserved for men and were afraid to expose themselves to the risks of serious body injuries associated with the job. However, women were involved in the breaking/crushing of ores into pellets. Currently in Niger State, women are actively involved in panning of river sediments for gold which does not require digging. In general, women provide ancillary services such as selling of foods and other provisions. There was a noticeable involvement of children in most mines in Niger, Zamfara and Kaduna States.

It is estimated that over 260,000 miners are directly involved in ASGM in Nigeria. The figure was realized based on observations from the ASGM sites visited during the survey and data provided from the various discussions and analysis of data provided by the ASGM stakeholders. Based on a general notion that for every person directly engaged in ASM, an additional 3 to 5 persons are indirectly supported economically, the estimated number of persons indirectly dependent on ASGM in Nigeria is 1.3 million persons. The estimated number of direct and indirect ASGM workers are broken down according to States in Table 6. It is difficult to provide the exact number of miners engaged directly or indirectly in ASGM activities in Nigeria. This is largely attributed to the informal nature of ASGM activities that does not keep formal records or register with authorities. Data obtained were derived mainly from observations and estimates provided by operators and leaders of various groups and associations. The number of workforce for different States in Nigeria showed the following trend; Zamfara > Niger >Kaduna > Osun > Kebbi > Nasarawa > Kwara (Figure 12).

Table 6. *Estimates of Numbers of ASGM Workers in Nigeria.*

S No.	State	No. of Miners directly Involved in ASGM	No. of Miners indirectly Involved in ASGM
1	Niger	58,429	292,145
2	Zamfara	133,492	665,780
3	Osun	20,557	102,745
4	Kaduna	33,803	169,015
5	Kwara	2,281	11,405
6	Nasarawa	2,850	12,750
7	Kebbi	7,600	38,000
	Total	**259012**	**1,291,840**

Source: MMSD field survey 2019

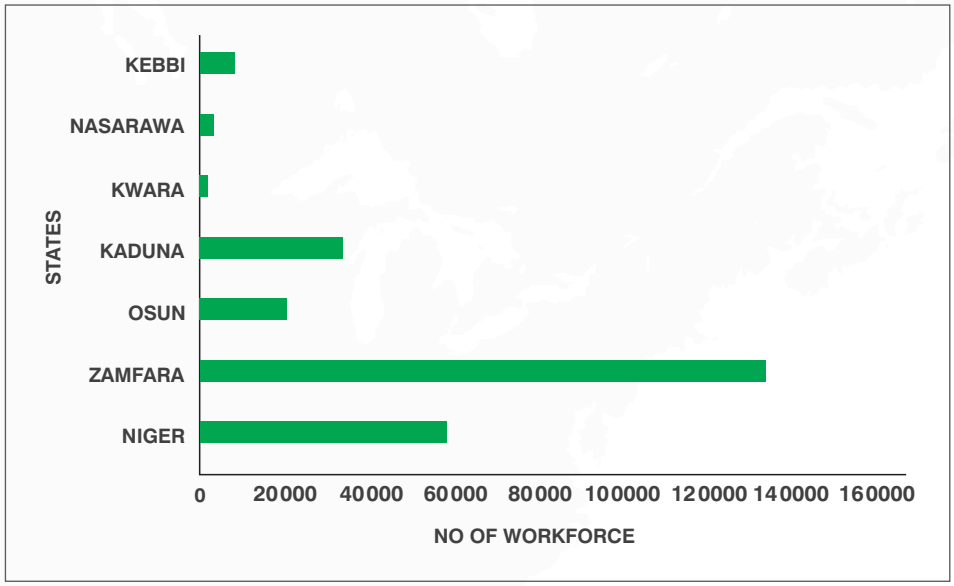

Figure 12. *Number of ASGM Workforce Per State in Nigeria*

4.2.2 Economic Aspects of ASGM

As practiced in most countries in Sub Saharan Africa, ASGM activities in Nigeria are carried out informally in remote areas. The rural areas are characterized by availability of large lands for agriculture, low population density, little or no technology, labour intensive and subsistence farming, high poverty levels, and predominantly illiterate population. The continued migration from rural to urban areas in the country is not unconnected to the poor quality of life in the rural areas, characterized by low standards of living, absence of infrastructure (such as electricity, good roads and health facilities), illiteracy, malnutrition, wide spread diseases and low life expectancy. Generally, all the ASGM locations visited during the fieldwork are in villages where standards of living is low, and people generally live in severe poverty. For instance, most locations in Osun State are characterized by situations where over 60% of rural dwellers have limited or no access to good roads, electricity and most of the basic quality life facilities. The high unemployment situation in Nigeria, and in the rural areas particularly, is a major pull factor drawing people into ASGM sector. Besides, the high value and demands for gold in the international market also draws a lot of people into taking up jobs in the ASGM sector.

Findings from the studies indicated that ASGM has become very lucrative in the rural areas. Our findings show that 74% of ASGM workforce earn more than the national minimum wage (N30,000.00 or USD81.08) (Tables 7 and 8). However, it is instructive to note that the computation assumes that miners earn regular income; but, in reality, most miners are actually living from hand to mouth, as the bulk of the money generated through their hard work amounts to little after the dealers have deducted their investments on the miners. In most cases, the dealer buys off all the gold extracted by the workers at an agreed price per gram. But before payment is made, the dealer ensures that all his investments are recovered from the miners. After

deductions, the miners are left with little as income. Usually, dealers grant loans to miners to keep them working, pending when they start winning gold. Also, the dealers make other payments such as acquiring the land, settling community leaders and providing relevant materials (like mercury, fuel to power water pumps, crushers/milling machines, etc.).

Table 7. *National ASGMs' Earning per Capita*

S No.	State	> national minimum wage (%)	<national minimum wage (%)	Earning per capita (₦)	Earning per month (₦)	Earning per capita (US$)	Earning per month (US$)
1	Niger	38.20	61.80	343,688.58	28,640.71	927.88	77.32
2	Zamfara	58.12	41.88	614,145.19	51,178.77	1,658.06	138.17
3	Osun	97.51	2.49	888,803.75	74,066.98	2,399.58	199.96
4	Kaduna	87.38	12.62	695,882.01	57,990.17	1,878.73	156.56
5	Kwara	100.00	0.00	1,481,265.66	123,438.80	3,999.10	333.26
6	Nasarawa	100.00	0.00	434,384.26	36,198.69	1,172.74	97.73
7	Kebbi	34.21	65.79	605,276.96	50,439.75	1,634.12	136.18
National Averages		**73.63**	**26.37**	**723,349.49**	**60,279.12**	**1,952.89**	**162.74**

The highest and lowest income per capita States were Kwara and Niger, respectively (Figure 13).

Clearly, the Federal Government of Nigeria is losing a lot of revenue from ASGM sector due to the high-level of informal and illicit activities in the sector. Analysis of the State Disaggregated Mining and Quarrying Data published by the National Bureau of Statistics for 2018 showed that the total gold reported produced from all the nations' 36 States and FCT was only 62.07 kg of gold. However, MMSD reported 72.07kg as produced in 2018 and 158.82 kg in 2019. Table 9 shows data on the States' official gold production reported and the estimated informal gold production based on the fieldwork, while Table 10 shows revenue from gold in form of royalty and fees in gold-producing States in Nigeria. The yearly revenue from gold in gold producing States in Nigeria are shown on Tables 11.

Lessons Learned: Undertake comprehensive assessments to ascertain why government's efforts to formalize and establish an effective gold buying center have yielded little result.

Table 8. *Analysis Per Capita Income of ASGM Workers by States*

S No.	State	Miners who earn above national minimum wage (%)	Miners who earn below national minimum wage (%)	Miners' Earning per capita (₦)	Miners' earning per month (₦)	Miners Earning per capita (US$)	Miners' earning per month (US$)	No. of Miners directly Involved in ASGM	No. of Miners indirectly Involved in ASGM	Annual Gold Production Estimates (kg)
1	Niger	38.20	61.80	373,499.74	31,124.98	1,008.37	84.03	58,429	292,145	2,297.18
2	Zamfara	57.98	42.02	612,599.44	51,049.95	1,653.89	137.82	133,492	667,460	8,608.12
3	Osun	97.48	2.52	888,457.87	74,038.16	2,398.64	199.89	20,557	102,785	1,922.53
4	Kaduna	87.38	12.62	695,882.01	57,990.17	1,878.73	156.56	33,803	169,015	2,476.09
5	Kwara	100.00	0.00	1,481,265.66	123,438.80	3,999.10	333.26	2,281	11,405	355.66
6	Nasarawa	100.00	0.00	388,666.67	32,388.89	1,049.32	87.44	2,850	14,250	116.60
7	Kebbi	34.21	65.79	605,276.96	50,439.75	1,634.12	136.18	7,600	38,000	484.22
National Averages		**73.61**	**26.39**	**720,806.91**	**60,067.24**	**1,946.02**	**162.17**	**259,012**	**1,295,060**	**16,260.40**

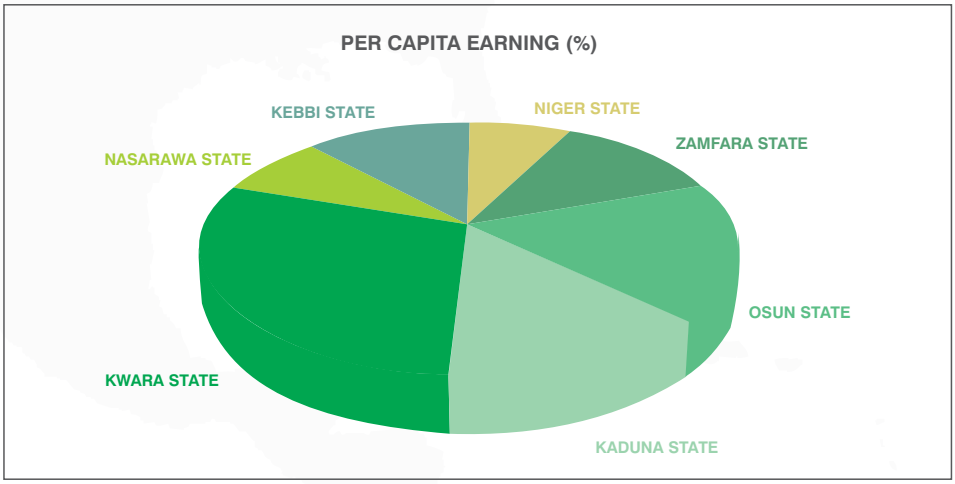

Figure 13. *State's Miners' Earning Per Capita*

Table 9. *Data on Official Reported and Study Estimates of Gold Production Per State*

S No.	State	2018 Official Reported Gold Production (kg)	Estimated Gold Production (kg).
1	Niger	5.43	2,297.18
2	Zamfara	15.84	8,608.12
3	Osun	39.11	1,922.53
4	Kaduna	0.00	2,476.09
5	Kwara	0.00	355.66
6	Nasarawa	0.00	116.60
7	Kebbi	0,30	484.22
8	Kano	3.32	0.00
	Total	64	16,260.40

Source: Department of Mines Inspectorate, Ministry of Mines and Steel Development, (2020) and Field Studies

Table 10. *Revenue (Royalty and Fees) in Naira from Gold 2017-2019*

S/N	STATE	2015	2016	2017	2018	2019
1	Osun	400,000	300,000	470,000	764,000	2,762,057.14
2	Niger	379,506	1,195,000	3,034,430.8	11,650,000	3,782,356.19
3	Zamfara	-	1,604,000	741,687.50	850,000	489,828.57
4	Kebbi	648, 000	40,000	170,000	116,586	245,592.38
5	Kano	-	75,600	64,000	206,676	81.190.5
6	Plateau	-	54,000	-	-	2,889,066.7
7	Nasarawa	-	--	-	100,000	-
8	Oyo	-	50,000	30,000	40,000	-
9	FCT	-	-	2,670,000	-	20,001,748.6

Source: Department of Mines Inspectorate, Ministry of Mines and Steel Development, (2020)

Table 11. *National Revenue from Gold in Form of Royalty and Fees from ASGM in Nigeria*

Year	Royalty (Naira)	Gold (Ounce)	Gold (gram)	Gold (Kg)
2015	1,427,506	264.35	7, 494.32	7.49
2016	3,318,600	614.56	17,422.78	17.42
2017	7,170,118.30	1,327.80	37,642.50	37.64
2018	13,727,262	2,542.09	72,067.04	72.07
2019	30,251,840.18	5,602.19	158,819.41	158.82

Source: Department of Mines Inspectorate, Ministry of Mines and Steel Development, (2020)

NB: a) All Gold are produced in the ASGM Sector
b) Royalty Rate = N5,400/ounce
c) 1 Ounce = 28.3g
d) 1g = 0.001 kg

Although the Federal Government, in collaboration with Bank of Industry (BOI), established N5 billion fund to support artisanal and small-scale miners in the country, findings indicated that none of the few ASGM registered entities has been able to access credit facility from the fund. The main reason for the difficulties the ASGM operators face in accessing the fund is the high rate of informality in the sector. Most of the ASGM activities are informal and operate without requisite mineral titles and standard financial record keeping. These, amongst other requirements, grants an operator access to credit facility from the fund.

Lesson learned: Formalise the ASGM sector and strengthen miner's access to Credit

During the period between 2010 and 2015, the Federal Government of Nigeria, through the safer mining programme, built extension services outpost stations in Zamfara and Niger States. The outposts were meant to provide training and education to artisanal gold miners. Currently, they are not functional because of security challenges. There is no social welfare scheme available exclusively for ASGMs in any part of Nigeria thus miners depend wholly on their earnings from the mining fields. In the off-season period, many miners switch to farming as an alternative means of livelihood. Most ASGM communities in Nigeria lack access to social amenities.

Lesson learned: Improve miners' access to basic amenities

The nearest general hospitals are more than 40km to most ASGM communities. Although some communities are located within 2km of health centres, ironically, the centres are mostly in dilapidated states and lack qualified health workers.

Physical measurements to determine the ASGM site estimates of quantity of gold produced were mainly based on the recommended techniques provided by Artisanal Gold Council (AGC). From the analysis of the sites' estimates in different States, estimates of gold and mercury productions per State were extrapolated to produce national estimates of 16,260.40kg of gold produced by Nigeria's ASGM sector. Analyzing the recent publication of the National Bureau of Statistics on the Disaggregated Mining and Quarrying Data for 2018, it is clear that government was missing out on important revenue accruable from the ASGM sector, as the report showed that out of the 36 States and FCT, only 64 kg of gold was officially reported as produced, as against the estimated 16,260.40kg being produced by the sector. The total amount in naira and dollar was estimated to be 154,473,840,578.57 and 417,046,005.88, respectively.

The contribution of gold production and amount from each State are presented in Figures 14 and 15. On the face value, it could be easily concluded that ASGM has become very lucrative, at least to rural Nigerian populations. Analysis of the earning per capita of the ASGM population shows that about 74% of ASGM workforce earn more than the Nigeria's national minimum monthly wage (N30,000.00 or USD81.08). A typical artisanal and small-scale gold miner earns an average of N60,279.12 (USD162.91) on an earning per capita of about N723,349.49 (USD1,954.99). Unfortunately, an average gold miner is still impoverished, living a life of misery, entrapped in what has been variously described in literature as poverty trap. Most often, miners/labourers are indebted to the dealers, who continue to provide their daily needs through periods when no gold is won. The dealer must, therefore, retrieve all his debts as soon as the miners begin to win gold. This leaves the miners with little money to take care of their personal and family needs. Or as Hilson (2012) puts it, "the

vicious poverty cycle renders the miners incapable of even pursuing alternative, less arduous employment. In many cases, the miners are hired and are paid an agreed daily or monthly payment, which is independent of the quantity of gold won by the miners. The dealers make all the profits as they mop up all gold from the field through their agents. Further refining of the gold sponges is done by the dealers' agents at various goldsmiths' shops where the purity of gold is improved to between 21-23 karat. Refined gold is sold per karat from N500.00 upwards, depending on the international market, which the dealers monitor through the internet.

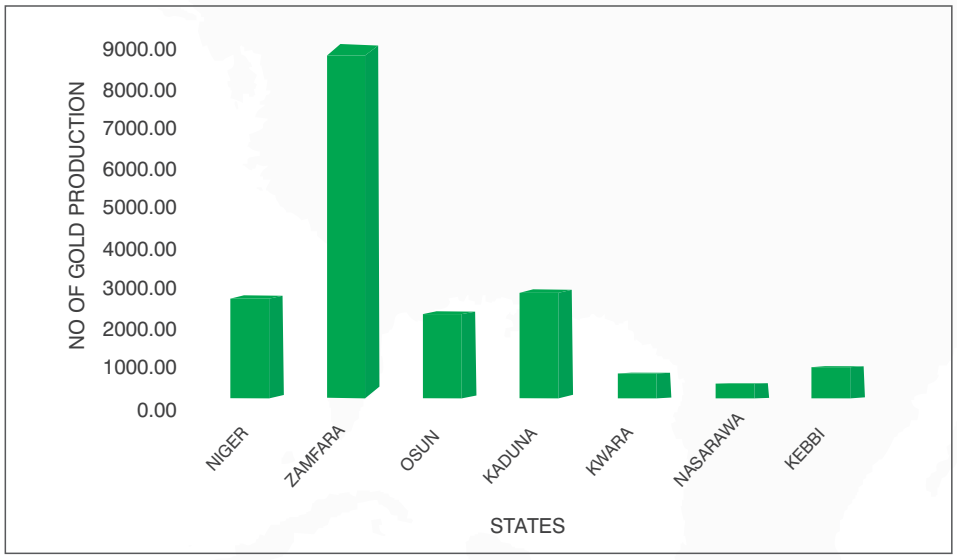

***Figure 14**. Gold Production Per State*

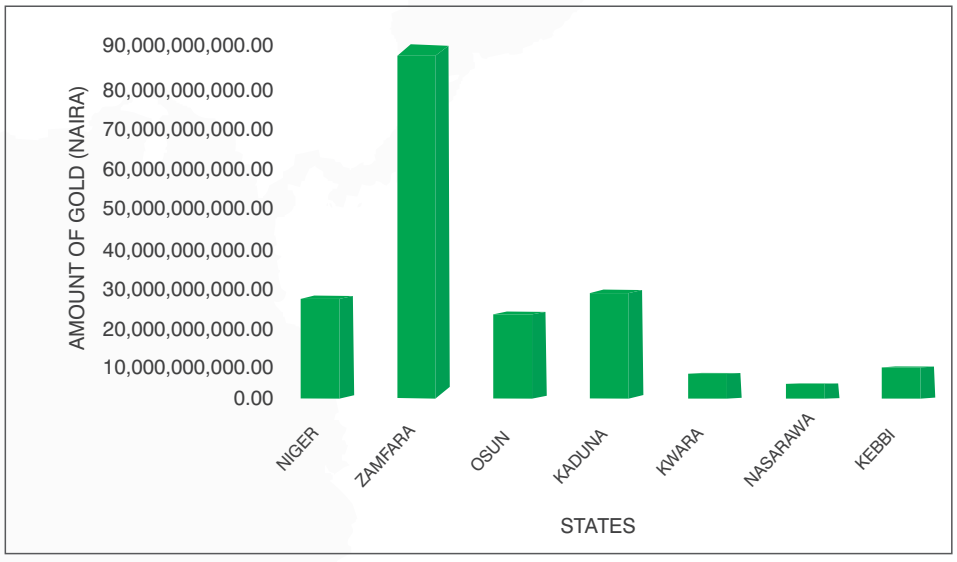

***Figure 15.** Amount of Gold Production per State in Naira*

4.3 MERCURY USAGE IN THE ASGM SECTOR

Mercury is commonly used by artisanal and small-scale gold miners in Nigeria. The supply of mercury is readily available to miners who use it to extract gold from the ore concentrate. In Nigeria, whole ore amalgamation is not the usual practice. In none of the ASGM locations visited was whole ore amalgamation witnessed. The usual practice adopted by the miners is to concentrate the gold grains and unwanted ore particles washed out from the fibrous carpets in sluicing pool. To separate gold from the dirt, a desired amount of mercury (usually starting from a capful from the bottle shown in Plate 13) is added to the concentrate (mixture of gold grains and dirt). Using bare hands, miners knead the mixture (concentrate and mercury) long enough to allow the mercury to amalgamate with the gold grains. The amalgam is wrung in a piece of cloth to rid it of excess mercury. No effort is made at this stage to recover the excess mercury from the process water. The amalgam is placed in a stainless dish over burning firewood to burn out mercury from the amalgam. This is done mostly at the mining or processing sites and in the open air. Again, no attempt was made at all the locations visited to capture the mercury vapour from escaping to the air.



Plate 14. *Burning Amalgam in Open Air to produce Gold Sponge*

From observing these processes in several sites in different ASGM States, estimates of quantities of mercury used at ASGM sites were computed and extrapolated to get ASGM sites and, the States and national estimates of quantities of mercury being used in the ASGM sector.

In virtually all the States in Nigeria where gold is mined by artisanal and small-scale miners, mercury is used to extract gold, except in Osun State. Table 12 shows the estimates of quantities of mercury used with corresponding estimates of gold produced annually in major gold-producing States (State estimates) together with the national estimates. The details of computations of different sites' estimates are provided in the Appendix.

Table 12. *Annual Estimates of Mercury Use and Gold Production Per State.*

#	States	Annual Estimate of mercury used in ASGM sector (kg)	Annual Estimate of Gold produced in ASGM sector (kg)	Mercury/ Gold Ratio
1	Niger	2,797.12	2,297.18	1.2:1
2	Zamfara	8,782.24	8,608.12	1.0:1
3	Osun*	-	1,922.53	-
4	Kaduna	3,257.08	2,476.09	1.3:1
5	Kwara	497.92	355.66	1.4:1
6	Nasarawa	151.58	116.60	1.3:1
7	Kebbi	581.07	484.22	1.2:1
	National Estimates	**16,067.01**	**16,260.40**	

**In Osun State, artisanal gold miners processed gold ore without the use of mercury; although, the use of mercury by small-scale mechanized miners is being investigated.*
Source: MMSD, 2020.

INSTITUTIONAL, LEGAL AND REGULATORY STATUS OF ASGM IN NIGERIA

5.0

Institutional, Legal and Regulatory Status of ASGM in Nigeria

The legal framework governing mining activities and their environmental and health impacts is implemented primarily by three federal agencies –The Ministry of Mines and Steel Development (MMSD), The Federal Ministry of Environment (FMEnv), and The Federal Ministry of Health (FMoH).

The MMSD is responsible for identifying the nation's solid minerals, advising the government on the formulation and execution of laws and regulations guiding the various stages of prospecting, quarrying, and mining; and handling sale and consumption of solid minerals in the country, through the issuance of Permits, Licenses, Leases and Collection of rents, Fees and Royalties. FMEnv, on the other hand, administers the country's general environmental protection law through the National Policy on Environment (2001) and the National Environmental Standards and Regulations Enforcement Agency (NESREA) Act and the Regulations pursuant. The Federal Ministry of Health is responsible for the formulation and implementation of policies related to health.

5.1 INSTITUTIONAL FRAMEWORK FOR MINING ACTIVITIES AND ITS ASSOCIATED ENVIRONMENTAL AND HEALTH IMPACTS IN NIGERIA

5.1.1 Ministry of Mines and Steel Development (MMSD)

The Ministry of Mines and Steel Development (MMSD), and its Agencies, is charged with formulating, disseminating and implementing related policies on mining, providing information and knowledge to enhance investment in the sector, regulating operations in the solid minerals sector, and generating appropriate revenue for the government.

5.1.2 Federal Ministry of Environment (FMEnv)

The mandates of the Ministry are to:

1. Prepare a comprehensive National Policy for the protection of the environment and conservation of natural resources, including procedures for environmental impact assessment of all developmental projects, and towards the overall goal of sustainable development;
2. Prepare, in accordance with the National Policy on Environment, periodic master plans for redevelopment of environmental science and technology and

advise the Federal Government on the financial requirements for the implementation of such plans;

3. Prescribe standards for and make regulations on hazardous chemicals and wastes, water quality, effluent limitations, air quality, atmospheric protection, ozone layer protection and noise pollution;

4. Advise the Federal Government on National Environmental Policies and Priorities, the conservation of natural resources and sustainable development and scientific and technological activities affecting the environment and natural resources;

5. Promote cooperation in environmental science and conservation technology with similar bodies in other countries and with international bodies connected with the protection of the environment and the conservation of natural resources;

6. Cooperate with Federal and State Ministries, Local Governments, statutory bodies, academia and United Nations agencies on matters and facilities relating to the protection of the environment and the conservation of natural resources; and monitor and enforce environmental protection measures.

Within these mandates, the FMEnv is the Designated National Authority for the implementation of chemical related Multilateral Environmental Agreements (MEAs) including the Minamata Convention on Mercury. The Ministry coordinates all activities relating to chemicals management and, with the Federal Ministry of Health, co-chairs the **National Committee on Chemicals Management (NCCM)** that ensures cooperation and collaboration for the sound management of chemicals, including mercury, in Nigeria, across participating agencies, organisations and stakeholders. A **Technical Coordinating Committee (TCC)** advises the NCCM on all technical matters relating to chemicals safety and management.

The Ministry also controls and manages the disposal of obsolete hazardous chemicals and wastes. It gives technical support to State ministries and Agencies of Environment to promote management of hazardous chemicals and waste, collects data on hazardous chemicals and wastes for information dissemination, and maintains national hazardous chemicals and waste data bank. It collaborates with relevant National, Regional and International Agencies and NGOs on chemicals management programmes in consultation with all stakeholders, and initiates fund, coordinates and promotes research activities on hazardous chemicals and waste management in the environment in collaboration with relevant stakeholders.

The **National Environmental Standards and Regulations Enforcement Agency (NESREA)** was established as a parastatal of the FMEnv by an Act of parliament in July 2007. The NESREA Act repeals the FEPA Act Cap F10LFN 2004. NESREA is charged with the responsibility of enforcing all laws, guidelines, policies, standards and regulations on environment in Nigeria. It also has the responsibility to enforce compliance with provision of international agreements, protocols conventions and the treaties on the environment.

The Agency also has the responsibility of enforcing biodiversity conservation and sustainable development laws, as well as liaising with relevant stakeholders within

and outside of Nigeria, on matters pertaining to enforcement of environmental policies, regulations, laws and standards.

The (NESREA) Act of 2007 is the embodiment of laws and regulations focused on the protection and sustainable development of the environment and its natural resources. Section 7e of the Act mandated the Agency to enforce compliance with regulations on the importation, exportation, production, distribution, storage, sale, use, handling and disposal of hazardous chemicals and waste other than in the oil and gas sector.

5.1.3 Federal Ministry of Health (FMoH)

The Federal Ministry of Health is to assess the short- and long-term health impact of chemicals and provide expertise for treatment of people exposed to chemicals. The Ministry formulates, disseminates, promotes, implements, monitors and evaluates health policies of the Federal Government of Nigeria, using the National Health Act, and collaborates with the National Council on Health (NCH), States and Local Governments, the Private Sector and Civil Society Organizations in formulating health policies. It is the coordinating body of the Federal Government on issues of health.

Other institutions relevant for mining activities and its environmental and health impacts in Nigeria are as follows:

5.1.4 Federal Ministry of Science and Technology (FMST)

This Ministry is to facilitate the development of science and technology apparatus to enhance the pace of socio-economic development of the country through appropriate technological inputs into productive activities in Nigeria. The ministry has an important role to play in the choice of alternative technology for ASM in Nigeria. The Ministry is also responsible for the formulation, dissemination and implementation of related policies on technology.

5.1.5 Federal Ministry of Labour and Employment (FMLE)

This Ministry is concerned with occupational health and safety issues related to the use and handling of chemicals at the workplace. The Ministry conducts workplace monitoring to ensure safe working environments for workers. Due to its important position, it has great influence on the safety of workers in Nigeria. The Factory Inspectorate Division (FID) of the Ministry identifies and controls the hazards of exposure to chemicals and other labour associated risks to workers in the workplace.

5.1.6 Federal Ministry of Industry, Trade and Investment (FMITI)

This Ministry is statutorily responsible for formulating and implementing policies, programmes and incentives for industrial development of the country, including chemical industries. The Ministry carries out its mandate through its relevant departments and agencies including: i. Industrial Development Department (IDD), ii. Commodities and Produce Inspectorate Department (CPI); iii. Standards Organisation of Nigeria (SON); iv. Federal Competition and Consumer Protection Commission (FCCPC)

5.1.7 Federal Ministry of Justice (FMJ)

The Ministry is generally concerned with the development of laws and regulations with respect to ASGM and chemicals management in the country. The Ministry is also

responsible for the formulation, dissemination and implementation of related policies.

5.1.8 Federal Ministry of Finance, Budget and National Planning

The ministry is responsible for the formulation, dissemination and implementation of related policies on finance. It provides financial assistance to relevant institutions to implement national programmes, proactively determines and efficiently advises on matters relating to national development and overall management of the economy for positive growth. It also ensures that plans and policies are properly implemented by all relevant stakeholders.

5.1.9 Other Sectors Relevant to ASGM Activities in Nigeria:

a. ACADEMIA AND RESEARCH INSTITUTIONS: e.g. Basel Convention Coordinating Centre for Training and Technology Transfer for the African Region; Federal Ministry of Environment-University of Lagos Linkage Centre for Excellence for Environmental Human Resources Development; the National Research Institute for Chemical Technology (NARICT).

b. NON-GOVERNMENTAL ORGANISATIONS: e.g Nigerian Environmental Society (NES), Global Rights, Women Environmental Programme (WEP), Waste Management Society of Nigeria (WAMASON), Friends of the Environment (FOTE), Women In Mining.

c. PROFESSIONAL ORGANISATIONS: These bodies dedicate themselves to the interest of the members, to a point of being registered trade unions and function to standardize, unify, monitor quality, promote research, further education, along with updating the skills of practicing professionals. E.g. Institute of Public Analysts of Nigeria (IPAN), Institute of Chartered Chemists of Nigeria (ICCON).

d. BUSINESS AND TRADE (EMPLOYERS) ORGANISATIONS: Miners Association of Nigeria (MAN), Manufacturers Association of Nigeria (MAN), Gold Buyers & Sellers Cooperative Union.

e. MANAGEMENT OF ACCIDENTS AND EMERGENCIES: The management of mining/mercury related accidents and emergencies are undertaken jointly by relevant MDAs vested with core mandates. The National Emergency Management Agency (NEMA) has the mandate to respond to accidents and emergencies, in close collaboration with relevant agencies e.g. Nigeria Centre for Disease Control (NCDC).

5.2 EXISTING LEGISLATIONS RELEVANT TO ASGM ACTIVITIES IN NIGERIA

Nigerian Minerals and Mining Act 2007

Some of the highlights of the Nigerian Minerals and Mining Act 2007 that impact on ASM activities include:

- **Ownership and Control of Minerals:** - The ownership of all mineral resources within the territorial space of Nigeria is by this Act vested in the Federal Republic of Nigeria. Towards this end, the Act prohibits unauthorised exploration and exploitation of minerals. Right to explore and/or mine mineral deposits or trade minerals is conferred on individual, corporate body or a mining cooperative that has been awarded relevant permits by the MMSD to do so.

- **Legality of ASM:** - The rights to participate legally in the Nigeria mining sector by ASM operators are derived from sections 47, 48, 49, 51 and 52, which variously provide that artisanal miners could be granted appropriate permits to operate legitimately as registered, licensed and performing mining cooperatives. The rights include the following: Reconnaissance Permit, Exploration Licence, Small-scale Mining Lease, Quarry Lease, and Water-use Permit. All the rights are issued by MMSD.

- **Supports and Promotion of ASM:** - Section 34 of the mining Act established the Solid Minerals Development Fund (SMDF). The fund is specifically mandated by section 34, subsection 2 (d & e) to finance the provision of extension services to registered and performing ASM operators in pursuant to section 91, and fund the provision of infrastructure in mines land. The fund is administered by SMDF, which is an agency under MMSD.

- **Provision of Extension Services to ASM Cooperatives:** - Section 91 of the Act required MMSD to provide extension services to duly registered ASM cooperatives.

In summary, the Nigerian Minerals and Mining Act 2007 recognizes ASM and provides formation of mining cooperative as prerequisite for artisanal miners to access a special title: small-scale mining lease. Artisanal miners under legal cooperative with valid mineral title are qualified to receive support in the form of extension services and other assistance from MMSD.

5.3 NIGERIA MINERALS AND MINING REGULATIONS 2011

The Mining regulations were developed to entrench a coordinated and regulated mining sector. Key features of the regulations, as they relate to ASGM sector, concern ASM formalization in sections 230 to 232, where guidelines are provided for registration of artisanal mining cooperatives, qualification for access to extension services and registration of Mineral Buying Centres. Section 48 disapproves ASM operators from extensive use of toxic chemicals, use of more than 50 workers in typical workday, operating underground workings of more than 7m below the earth surface, among others. Section 151 provides, inter alia, strict adherence (of miners) to safety procedures at mines and proper sanitation at mining camps. Section 196 (subsections 1 and 2) requires that the quantity of any hazardous liquid store used by miners should be managed properly to avert damage to land, water, cultivations, plants and animals. Other aspects of the Regulation cover issues regarding small-scale mining leases under which ASGM operates.

5.4 NIGERIAN MINERALS AND MINING POLICY

The policy is aimed to provide requisite direction in the development of the Nigerian mining and metals sector. The policy clearly supports the private sector to drive the mining sector by restricting the role of government to that of administrator/regulator. The policy recognizes the ASM as a subsector of the Nigeria Mining sector and provides as one of its major thrust policy, promotion of small-scale mining and formalization of informal mining activities.

5.5 FEDERAL ENVIRONMENTAL LAWS, POLICIES, AND REGULATIONS WITH IMPACT ON MINING SECTOR.

In addition to complying with requirements from the Minerals and Mining Act, mining operations must comply with environmental law implemented and enforced by the Federal Ministry of Environment.

5.5.1 The Environmental Impact Assessment Act, 1992 (as amended by EIA Act CAP E12 LFN 2004)

Under the Environmental Impact Assessment Act, 1992, the Federal Ministry of Environment must complete pre-construction review of activities raising environmental concerns. No activity falling under the mandatory list provided in the act, including mining activities in new areas exceeding 250 hectares, in addition to ore processing (including concentrating for gold), can be executed without an EIA.

Under this Act, EIAs must include a description of the activity, the potential affected environment, and the practical alternatives, along with an assessment of likely or potential environmental impacts, identification and description of mitigation measures, and an indication of gaps in knowledge. Mining-specific requirements include a surface infrastructure plan (including water pollution management), and surface water, groundwater, and air pollution analysis. The Act expressly prohibits the commencement of, inter alia, mining development projects without an approved EIA statement by the Federal Ministry of Environment.

5.5.2 The National Environmental Standards and Regulations Enforcement Agency (NESREA) Act, 2007

The Act is the embodiment of laws and regulations focused on the protection and sustainable development of the environment and its natural resources. With respect to mining, the FMEnv, through NESREA, passed the following mining related regulations in 2009:

- National Environmental Regulations, 2013 S. I. No. 33: - ensures prevention of environmental degradation occasioned by quarrying and blasting of mineral ores and rocks.
- National Environmental Regulations, 2009 S. I. No. 31: - pursues the utilization of efficient and cleaner technology to minimize pollution from the mining of coal, industrial minerals and processing of ores.
- National Environmental Protection Regulations, 1991 S. I. No. 8: - requires mining firms to ensure detoxification of effluent chemicals by installing antipollution technology and make provision for further treatment of effluents to meet the maximum limits prescribed.
- National Effluent Limitation Regulations.

- National Environment Protection (Pollution abatement in industries and facilities producing waste) Regulations (1991).
- The Harmful Waste (Special Criminal Provisions Etc.) Decree 1988, Decree No. 42.

5.6 INTERNATIONAL LAWS

The Government of Nigeria is signatory and/or Party to some relevant international protocols, treaties, agreements and conventions. Many of these are under the coordination of the Federal Ministry of Environment. Three international environmental agreements are implicated by ASGM, namely: The Minamata Convention on Mercury, the Basel Convention on Transboundary Movement of Hazardous Waste, and the Strategic Approach to International Chemicals Management (SAICM).

5.6.1 Minamata Convention on Mercury

The Convention seeks to reduce mercury pollution across many sectors, including ASGM, by prohibiting trade of certain mercury-added products and by requiring national plans to reduce anthropogenic mercury emissions.

5.6.2 Basel Convention on the control of transboundary movement of hazardous wastes and their disposal

The Basel Convention controls the transboundary movement of hazardous wastes. Impetus for the Convention developed after the 1988 toxic waste incident in Koko, Nigeria, that spurred the development of Nigerian Environmental Law. While ASGM practices are not directly regulated under Basel, technical documents do call for the education of artisanal miners, treatment of mining residue, and environmental remediation of mining sites. Basel also regulates the intrastate storage of wastes that contain mercury. Under the Convention, the generation of mercury waste should be reduced to a minimum, taking into account social, technological and economic aspects. Countries must also provide adequate disposal facilities to ensure environmental sound management. Under these two provisions, appropriate storage and management practices hold the potential to prevent mercury use, including in ASGM activities.

5.6.3 Strategic Approach to International Chemicals Management (SAICM)

The Strategic Approach to International Chemicals Management (SAICM) is a policy framework for international action to advance the sound management of chemicals. It aims to encourage governments and other stakeholders to address chemical safety more effectively in all relevant sectors as agriculture, environment, health, industry and labour and ensure that by the year 2020, chemicals are produced and used in ways that minimize significant adverse acts on the environment and human health. The framework is currently being re-negotiated for a post 2020 era. Since adoption, various activities have been undertaken by the Nigerian Government to implement the initiative in Nigeria. One of the projects implemented "Establishing an Institutional Framework and Strengthening of National Capacity within an Integrated National Programme for the Sound Management of Chemicals and Implementation

of SAICM in Nigeria" has enabled a strong and dynamic collaborating mechanism within the overall national chemicals management programme.

5.7. STATES ENVIRONMENTAL LAWS AND POLICIES

Nigerian states possess the authority to enact environmental laws that are not preempted by conflicting laws passed by the National Assembly. However, Nigeria has a constitutional provision that enumerates an exclusive legislative list that vests legislative power solely in the National Assembly, including with respect to mines and minerals. Therefore, the Minerals and Mines Act of 2007 and its regulations would preempt most state regulation of ASGM, with some exceptions. All Nigerian states have environmental agencies and environmental laws. These state agencies act under the principle of cooperative federalism, where states have concurrent authority over most environmental matters, subject to regulations promulgated by the Ministry of Mines and the Ministry of Environment. State agencies often monitor and enforce the EIA process, conduct surveys, engage in outreach, and issue permits.

Lesson learned: Specific amendments or additions to the mining, environmental and health laws and regulations in line with stakeholders recommendations are imperative

FORMATION OF COOPERATIVES AS A FORM OF FORMALIZATION OF ASGM IN NIGERIA

6.0

Formation of Cooperatives as a Form of Formalization of ASGM in Nigeria

The MMSD spearheads the actualization of the national agenda to formalize artisanal miners' activities into a formally recognized subsector, contributing to the national GDP. One of the ways MMSD is implementing the ASM formalization policy is formation of miners into registered mining cooperatives and quarry associations for purposes of ease of administration and regulations. The registered cooperatives are further facilitated to acquire small-scale mining lease to cover their area of operations. Instructively, registration with ASM department confers on the cooperative a certificate of recognition. The certificate of registration given to registered cooperatives or small-scale mining firms does not suffice for Small-scale Mining License (SSML) or Quarry Lease (QL). However, experience from the field indicated that some ASGM operators erroneously take the ASM certificates as SSML. Whilst many other seem not to understand why they should have both ASM certificate and SSML at the same time. The certificate issued to registered cooperatives serves as a recognition of its readiness to formalize. The department has as its duty to facilitate the effort of the cooperatives to access SSML afterward.

Registered cooperatives/firms are required by the provisions of the Mining Act to acquire valid SSML or QL to mine legally. Dealers who trade on gold are also required to set up mineral buying centres for precious metals. Presently, the formalization of ASM starts with artisanal miners organizing themselves into formal cooperatives. The cooperatives then proceed to acquire Small Scale Mining Lease (SSML) from Mining Cadastre Office (MCO). An individual could also apply and obtain SSML or QL just as incorporated companies and associations, provided they meet the requirements stipulated in the Mining Act.

Thus, lease holders for SSML or QL fall into four main categories:

- Companies (corporate body),
- Cooperatives
- Individuals (citizens of Nigeria); and
- Associations.

The licensing procedure for ASGM firms is as shown in Figure 16.

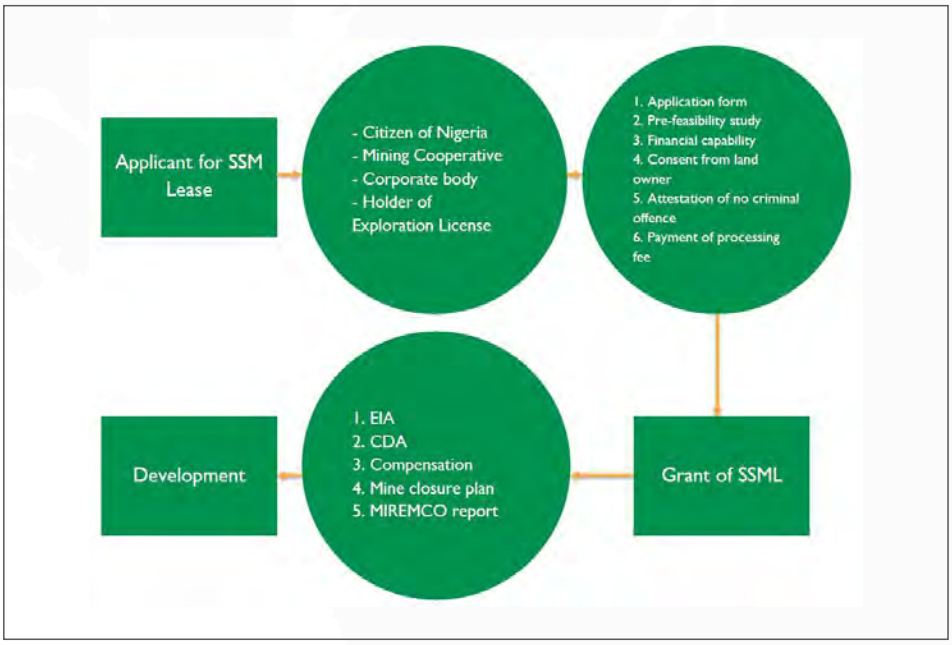

Figure 16. *ASGM Licensing Procedure.*

As prerequisite to obtaining SSML to mine gold at small-scale level, a registered artisanal mining cooperative or individual operator can submit application for SSML to MCO after obtaining and completing the necessary application forms from MCO, completing a prefeasibility study, showing evidence of having financial and technical capability to operate a mine, providing a letter of consent which have been duly sworn to by land owner(s) and showing evidence or attestation of no criminal offence. On acquiring the SSML, the title holder shall prior to commencement of mine development submit to MEC, an Environmental Impact Assessment Report (EIA), Community Development Agreement (CDA), Compensation report to landowner(s) or property owner(s), Mine Closure Plan and MIREMCO report.

Opinions collected from various stakeholders suggested that the licensing procedures are too cumbersome and expensive for artisanal miners to bear and are therefore a major impediment to ASGM formalization.

As an incentive to boost artisanal mining operators into forming registered cooperatives, MMSD has rolled out different programmes. Under the erstwhile World Bank assisted Sustainable Management of the Mineral Resources Project, many cooperatives were formed in a bid to qualify to access grant from the project's Micro

Grant Scheme for ASM and Mining Communities. Presently, Nigeria in collaboration with BOI has floated a 5-billion Naira Fund for ASM development. Artisanal miners can only qualify to access loan facility from the fund as registered and performing mining cooperatives with small-scale mining lease. Registered cooperatives also stand the chance to benefit from the extension services programme which are yearly facilitated by MMSD.

Despite the efforts to formalize mining activities, the result has not been encouraging. As at the time of this report, there were 1,410 artisanal mining cooperatives registered at MMSD. Out of the total registered cooperatives, only 8% (representing 118 cooperatives), have valid mineral titles (SSML or QL) over their area of operation; whilst 92% of the registered cooperatives operate without any mineral title. From the records obtained from MMSD, there were 138 registered artisanal gold mining cooperatives. Similarly, only very few of the registered cooperatives have valid mineral titles to legally mine gold in the country. 94% of the registered artisanal gold mining cooperatives operate without titles; whilst 6% have valid title to mine gold at small-scale level.

Based on the findings from various literature and interactions with relevant stakeholders and miners at ASGM locations, the factors hindering effective formalization of ASM (including ASGM) across the country can be summarized as follows:

i Ignorance of the policies and legal requirements on the part of artisanal miners.
ii Complicated licensing application process and centralization of mining cadastre services in the Federal Capital Territory (FCT).
iii Inadequate resources available to relevant officials to physically identify prospective mining cooperatives before registration.
iv Formation of phantom mining cooperatives to illicitly profit from government incentives for ASM formalization.
v Prohibitive cost of carrying out EIA and difficulties in fulfilling other requirements as required by law.
vi Perception that formalizing implies payments of taxes, fees, charges and royalties.
vii Traditional belief of rural people that land belongs to the owners. According to the constitution, all lands are vested in the state government.
viii Interference of traditional authorities through collection of illegal levies from miners.
ix Fear that ease of movement from one mining location to a new rich site will cease.
x Lack of cooperation between the three tiers of government and community authorities.
xi Undue delays on the part of government to process title applications.
xii Absence of law enforcement officials due to remoteness of mining areas.
xiii Lack of adequate logistical support for MMSD officials to carry out regular monitoring and supervisory activities at mine locations.

LEADERSHIP AND ORGANIZATIONAL STRUCTURE OF ASGM SITES

7.0

Leadership and Organizational Structure of ASGM Sites

Different organizational arrangements exist at different ASGM locations in Nigeria. Some sites are owned by cooperatives, comprising10 – 20 members, who engage miners/labourers to work on their sites. Others are owned by individual dealers who engage agent/site supervisors to oversee activities at the sites on behalf of the gold dealer. Most ASGM sites have well developed labour management and conflict resolution mechanisms, together with security systems that are quite distinct and unconnected with the government authorities. It should be noted that most ASGM sites have differing organizational operational structures of the mining operations which have ensured peaceful coexistence amongst the host communities. The organizational structures have engendered some form of mutual respects in the relationships between the ASGM miners, respective local authorities and security agents occasionally. These are independent of the presence or absence of mineral titles granted by government.

The organizational operational structure consists of the main dealers, sub dealers, agents to the dealers or sub dealers and the miners (labourers). The dealers are at the top of the pyramid, while the agents are at the mid-level command. The agents are the eyes of the dealers at the ASGM sites. At the bottom are the labourers, who are the actual miners and are like the pawns (being exploited) in the system.

There are some independent players who are known as the 'free floaters' and the 'see and buys'. As the cliché implies, the 'see and buys' owe their allegiance to nobody, but simply buy gold from any miner who is willing to risk his life to sneak out some gold from the mine.

And lastly are the landowners. These are the major players in the mining of gold, for example, in Osun State. Hierarchical arrangement indicating the positions of the players is shown in Figure 17.

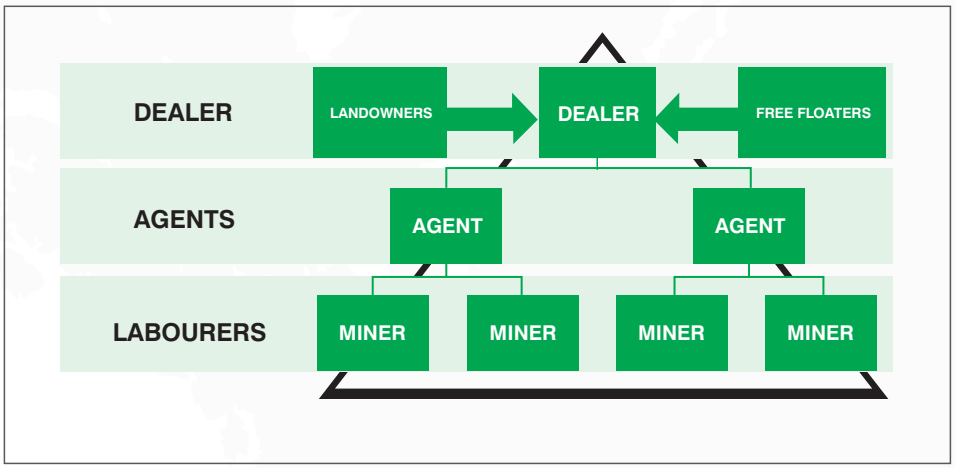

Figure 17. *Hierarchical Structure of Players in ASGM in Osun State as example.*

7.1 THE FREE FLOATERS

These are like freelance scouts who bring information about gold occurrences and businesses to the dealers for a fee. The free floaters approach the dealers with information of the presence or occurrence of gold on a farm or in a field and gets paid by the dealers for the information. The dealers go ahead to meet the landowners to strike an agreement, which will require them to pay the landowners an agreed amount (usually between N50,000 ($138.89) to N100,000 ($277.78) to lease and use the land for exploration for a period of time.

Depending on the wishes of the dealers, the period of sampling and exploration mining could be extended for another week at additional cost to the dealers. When gold is found on the piece of land, the dealers and the landowners go into a 12-18 month lease agreement, which includes the dealers paying the landowners a negotiated amount of money, in addition to paying for each economic tree that may be found on the land.

The fees charged for economic trees vary according to the species of tree. In Osun State, rubber trees attract the highest fee. The fee payable per economic tree is shown in Table 13. When the agreement is concluded, with all payments made, the landowners grant their consent to the dealers. The dealers, through their agents, mobilizes the miners/labourers to the site.

Table 13. *Monetary Compensation Rate for Cash Crops.*

S. No	Tree type	Price per tree (₦)	Remarks
1	Cocoa (Theobroma cacao)	30,000.00	
2	Rubber (Hevea brasiliensis)	50,000.00	
3	Kola nut (Cola acuminata)	30,000.00	

Note Cocoa is the most common tree in the site

7.2 THE GOLD DEALERS

The dealers are the biggest players in the gold mining business in Nigeria. They are the sponsors, and at the same time the buyers of gold. They mop up the daily gold productions from the sites through their agents. They also buy off gold from the see-and-buys. They export to the international gold dealers and sellers.

This study found that the dealers sponsor all the activities in the ASGM sites from the very start by paying the free floaters, offsetting the costs of sampling activities, leasing and/or purchase of land, and compensating the landowners for the loss of economic trees. In return, he/she becomes the exclusive buyer for every gram of gold that is mined from the land he/she leases, at an agreed rate usually between N8,000 ($22.22) and N11,000 ($30.56) per gram.

In most cases, the dealers have more than one ASGM sites, sometimes as many as 10 mining sites. The dealers either sell to other richer dealers or export their product abroad through land borders, as was revealed by one of the dealers interviewed. It is important to note that the dealers are hardly present at the mining sites.

7.3 THE GOLD DEALERS' AGENTS

The agents are the eyes of the dealers in any ASGM site. They work for the dealers to monitor and supervise the labourers to prevent theft or illegal movement of gold out of the site. Agents are provided with money by the dealers and therefore are responsible for buying-off of the gold from the labourers on site at a negotiated rate.

The entire gold production of the day in any site is sold to the agents. The agents in turn give to the dealers all the gold purchased and get commissions (negotiated amount usually N2,000 ($5.56)) on every gram of gold supplied. The agents also lend money to the miners for their upkeep when productivity is low. The agents usually deduct the borrowed money before paying the labourers' wages.

7.4 THE MINERS (LABOURERS)

The labourers are like pawns in the grand scheme of the entire gold production and supply chain. They bear the physical brunt of the production challenge. They are up and already on site as early as 6 am and remain on site untill 6pm each work day. Labourers make up the manual workforce at ASGM sites and the largest group of people within the sector. They are committed to a given gold dealer, under whose site they must remain and work.

Under no condition will they sell whatever gold extracted for the day to any other person other than the agents of the dealers. They usually sell between N8,000.00 ($22.22) to N11,000.00 ($30.56) per gram of gold, depending on what they agreed before the mining commenced. However, often, the miners/labourers are entirely dependent on the dealer, who continues to provide their daily needs through periods when no gold is won. Through this arrangement, miners are always indebted to the dealers. The dealers must retrieve all his debts any time the miners strike any gold. This usually leaves the miners with little money to take care of their personal and family needs.

It is very dangerous for a miner to take gold (mined) from the site to another dealer. However, there are sites, especially those worked by local and indigenous people, in which miners could sell their gold to anyone who offers a better price. Especially along riverbeds, where women mostly mine, gold (mined) from such sites are sold to whoever offers the best price. Sometimes, the miners take their gold to the gold market to sell. These gold markets are common in Niger and Kaduna States, unlike Osun State and other States.

The dealer's agent ensures that the miners work without conflict, ensures security and productivity. Usually, when there are conflicts, the leaders of the miners and their agents intervene to resolve issues.

There are ASGM sites that have existed for a long period of time, but continue to operate informally. These sites are usually worked by local people, as against migrant workers. They have over time developed organized structures of management through unions and support systems.

However, some newly developed mining sites called Rush ASGM sites also exist. Some of these were found to have sprung up in the last three months, but they quickly recognize the imperative of having systems in place for dispute resolution and are quick to develop their own appropriate leadership structures within the workforce to help them maintain peace and better prices for their mined gold.

Miners are usually responsible for their own health and safety, although, in some cases, the dealer intervenes when serious accident occurs. Miners work on sites with their own equipment. They are never provided with Personal Protective Equipment (PPE) nor made to adhere to any Occupational Health and Safety (OHS) procedure. The miners work in groups, ranging from 2 to15 men per pit, in a given ASGM site.

7.5 ASGM/STATE LEVEL SITUATION: MINERS' COOPERATIVES AND ASSOCIATIONS

Several ASGM organizations exist at the State level. The associations are often registered officially at the Corporate Affairs Commission (federal institution responsible for regulating the formation and management of companies in Nigeria) and are basically established to protect the interests of miners or their members. Commonly, there is the Miners Association of Nigeria (MAN) which has chapters in most of the States.

There are others, such as, the Nigerian Union of Mine Workers (which purportedly represent mine workers' interests), Small-Scale and Artisanal Miners Association of Nigeria, Women in Mining in Nigeria, and Gold Dealers Association of Nigeria.

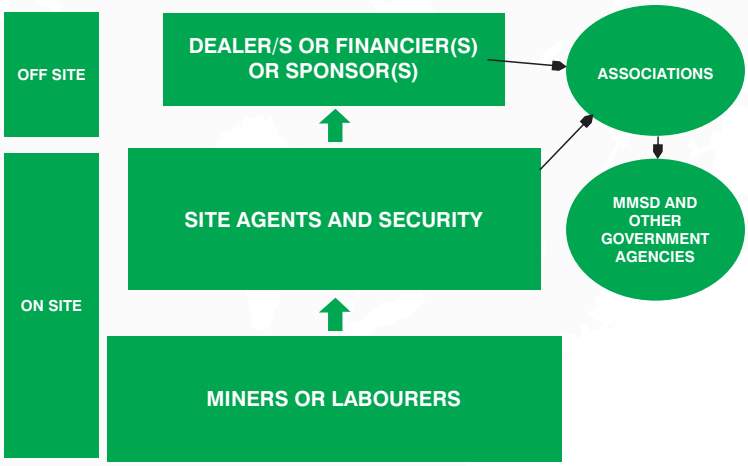

Figure 18. *Typical ASGM Site Organisational Structure in Nigeria.*

Interactions with some leaders of the different associations reveal that the associations are formed to address the needs of members and give them a voice. In gold mining States, gold dealers' association tends to be more active, although there could be several associations existing in the same State. It is commonly observed that most miners (labourers) do not usually belong to associations. Findings indicated that they are often not aware of the existence of the associations. Others deliberately do not wish to register with any association because they believe that their interests will never be protected and that the associations exist to prey on members.

On the other hand, it is found that most operators and dealers, both licensed and non-licensed, as well as other members of society who may not own a mining site nor work in mines, are members of most associations. The associations relate with relevant authorities on behalf of members and mostly do not operate at mine sites, as shown in Figure 18. Findings from the field indicated widespread notion amongst miners at site level operations that the management of various associations are never practising miners, but elites who use their influence in government to hijack incentives meant for the real operators.

Lesson learned: Government to ensure that mining operators have unhindered access to incentives and technical assistance

However, experience from the ASGM sites indicated a wide information/knowledge gap on government policies between the labourers/miners at site level operations and the associations who liaise with the government.

Lesson learned: Sensitise miners on government's relevant policies and regulations on ASM and Environment

Commonly, the workforce at site level are ignorant of relevant government policies and regulations. Association members are always in the know of government policies and programmes and take advantage to position themselves or their cronies to obtain incentives that are provided from time to time. This situation prevents ASM workforce from benefiting from most technical assistance the government provides. e.g. MMSD organizes yearly training workshops for miners as part of its extension service programme, but findings from the sites indicated that none of the miners have heard of the programme.

The outline of the organizational structure at most of the ASGM sites is as depicted in Table 14.

Table 14: *Structural Organisation and Levels in the ASGM Sector*

Personnel	Characteristics	Example	Organisation Structure
Dealers/ sponsors/ financiers	Dealers are both formal and informal. Normally off site, running site through agents or security. Little direct involvement with physical operation.	Small-scale lease holder. Owner of informal ASGM site. Owner of Mineral Buying Centre.	Run as a business venture, may not be an indigene to the area of the site
	Cooperative may be formal (registered) or informal (not registered). Indigenes of community working on community lands or river channels.	Cooperative	Community run; either one or several cooperatives on a site.
			Labourers: not necessarily linked to the local community – group together and get lease on the land from traditional ruler or the landowners.
		Community	Direct involvement, overall permission for each group or individual working on site comes from community rather than any of above.
Dealers' Agents	Based on site in a Supervisory capacity. Might work with a team of security.	Site Manager	Work for/with the site dealer/financier. On formal sites – permanent member of staff

Personnel	Characteristics	Example	Organisation Structure
Chairman of labourers at individual sites	Overall co-ordination of labourers' groups.	Chairman/ chairwomen	Member of labourer groups. Coordinates between labourers and management/agents/dealer be it a company, cooperative, community, individual etc.
Labourers	Casual staff. Migrant or Indigenes. Low level formal training. Might be a member of a site labour union if present.	Work in groups.	Mixed sex

By the provisions of the Nigerian Minerals and Mining Act, artisanal mining cooperatives are required to mandatorily acquire Small-Scale Mining Licence (SSML) to legally mine gold (or any other minerals) in any part of the country. The different typology of artisanal gold mining cooperatives with valid Small-scale Mining License (SSML) are shown in the Table 15.

Table 15. *Distribution of Mineral Titles (SSML) across Cooperatives, Individuals & Companies.*

#	States	No. of Cooperatives with SSML for Gold	No. of Cooperatives with SSML for other Minerals	No. of Individuals & companies with SSML for Gold	No. of Individuals & companies with SSML for other Minerals	Total No. of SSML
1	Abia	0	0	0	14	14
2	Adamawa	0	3	8	25	36
3	Akwa-Ibom	0	0	0	7	7
4	Anambra	0	14	0	23	37
5	Bauchi	0	5	5	73	83
6	Bayelsa	0	0	0	0	0
7	Benue	0	2	0	40	42
8	Borno	0	0	0	0	0
9	Cross River	0	4	0	27	31
10	Delta	0	6	0	22	28
11	Ebonyi[9]	0	-	-	-	-
12	Edo	0	3	0	43	46
13	Ekiti	0	13	0	8	21
14	Enugu	0	2	0	9	11
15	FCT	0	0	0	13	13
16	Gombe	0	3	0	17	20
17	Imo	0	2	0	26	28
18	Jigawa	0	4	0	6	10
19	Kaduna	0	10	15	235	260
20	Kano	0	3	0	94	97
21	Katsina	0	5	19	15	39
22	Kebbi	1	0	16	18	35
23	Kogi	0	4	11	55	70
24	Kwara	0	0	8	20	28
25	Lagos	0	0	0	11	11
26	Nasarawa	0	3	10	94	107
27	Niger	4	0	80	32	116

[9] The data on SSML in the State was not listed.

#	States	No. of Cooperatives with SSML for Gold	No. of Cooperatives with SSML for other Minerals	No. of Individuals & companies with SSML for Gold	No. of Individuals & companies with SSML for other Minerals	Total No. of SSML
28	Ogun	0	3	1	56	60
29	Ondo	0	7	0	6	13
30	Osun	0	2	27	32	61
31	Oyo	0	1	14	86	101
32	Plateau	0	3	0	80	83
33	Rivers	0	0	0	10	10
34	Sokoto	0	3	1	7	11
35	Taraba	0	0	2	45	47
36	Yobe	0	0	0	8	8
37	Zamfara	3	5	39	10	57
		8	**110**	**256**	**1267**	**1641**

Source: 2018 Inventory of Minerals titles, Nigeria Mining Cadastre Office, 2018

7.6 INVOLVEMENT OF TRADITIONAL INSTITUTIONS

The traditional rulers and community heads usually have influence on ASGM activities in their domains. Often dealers consult the community heads before the commencement of mining activities. This is needed, especially when the dealers are coming from different places into the community, to engender harmonious working relationship with members of the community. The consultations with the chiefs enable miners to acquire a form of social license, which normally comes at a certain cost to the miners.

In some cases, the village heads were found to be directly involved in gold mining activities, having agents who ensure that returns are brought to him. With the support and backing of the community leaders, ASM operators relate with the communities with relative ease.

> Lesson learned: Traditional Institutions are key to achieving an effective formalization in Nigeria and thus must be factored into the formalization process

7.7 ARTISANAL MINERS AND MINERAL TITLE HOLDERS' RELATIONSHIP

The relationship between the artisanal mining operators and mineral title holders does not seem to be very cordial. In some cases, conflicts ensue when miners invade a leased area without the authorization or consent of a title holder. In this scenario, the title holder usually engages security agents to try to stop the miners. On the other hand, dealers or an artisanal gold mining group could strike a deal with the title holder,

in which case the title holder settles the chiefs and the security agents from the commissions he receives from the miners.

Most often, it was discovered that many large mining and small-scale mining lease holders possess little capacity, in terms of finance and technical competence to mobilize to site for mining operations. Most of the time, they hold on to their title whilst looking for partners. The lack of activities on the lease area creates an opportunity for artisanal gold miners to operate.

MERCURY TRADE AND DEMAND

8.0

Mercury Trade and Demand

Official data on mercury import into Nigeria specifically for use in ASGM sector is not readily available. However, informal and illicit movement of mercury from across neighboring West African countries into Nigeria on syndicated links is not uncommon. Mercury used in the Nigeria's ASGM sector comes mostly from neighboring West African countries. Findings from the field indicated that occasional illicit supplies come from other sectors such as health (hospitals) or power sectors to the ASGM operators. Further studies are needed to fully understand the trading mechanism and supply chain of mercury trade in Nigeria. This has also been suggested by Hilson, Zolnikovb, Ortizc and Kumahd (2018) who opined that mercury and Chinese-manufactured ASM technologies that are arriving in Lomé, the capital of and a duty-free port in Togo find their way into other West African countries. Similarly, World Bank (2016) noted that in Togo, import of mercury exceeded the local demands for mercury which explains why countries such as Togo, Kenya and South Africa serve as trading hubs for mercury in their respective regions. The report further noted that, though Nigeria registered import of about 40 tonnes of mercury (between 2010-2015), the expected consumption for ASGM exceeds the imports; thus suggesting that the gap is filled by mercury informally imported from other west African countries. This supports the observations from the field survey where it was found that Chinese technologies were commonly being used (and in some cases) operated by Chinese nationals in Osun state. Although there was general reluctance amongst the miners to discuss mercury trades but some of the gold dealers revealed that mercury is supplied to Nigeria's ASGM operators through the Republic of Benin into Lagos (Nigeria) and from Republic of Niger into Kano (Nigeria). The dealers also posited that bulk of the mercury entering Nigeria comes from the West African countries of Benin, Ghana, Niger Republic, Mali and Burkina Faso thus supporting the position of Hilson, Zolnikovb, Ortizc and Kumahd (2018), that the abundant gold-rich terrain of West Africa "has created markets for opportunistic merchants who sell and distribute equipment and supplies of mercury, and has stimulated mass movements of capital and labour both within countries and across borders". In Nigeria (as reported also in Burkina Faso), mercury wholesalers and retailers are also gold traders and mercury is supplied to guarantee a flow of gold. The gold buyers sell mercury to miners, linking the price they will pay for the recovered gold directly to the supply of mercury. As

noted elsewhere in other West African countries, findings from the survey indicated that mercury entering Nigeria through porous borders are transported the same way as other illegal goods.

As ban by the European Union (in 2011) and the US (in 2013) on both export of formal and informal mercury trade is still subsisting, mercury supply to West Africa has been linked to imports from China, Hong Kong, India, Indonesia, Singapore, Vietnam and Turkey into Togo. Whereas Togo itself has almost no ASGM sector, the large amount of mercury it receives each year, is believed goes to meet the demand of 80% mercury demand of the ASGM sectors in the Economic Community of West African States (ECOWAS) region.

DEMOGRAPHIC AND SOCIAL INFORMATION ON ASGM COMMUNITIES

9.0

Demographic and Social Information on ASGM Communities

In a typical Nigerian setting, men are commonly the leaders/heads of the family and by extension the community. Generally, men are to lead and provide for the family and as a result of this, women traditionally do not have access to land and property, especially in most rural areas. This was evident in the ASGM communities where leadership positions were found to be dominated by the menfolk.

Drawing from observations of ASGM activities at various sites, interactions with stakeholders and miners and, analysis of over 500 questionnaires administered to operators, it became clear that ASGM is dominated by men. Many of the men work as miners/labourers where they engage in virtually all activities along the ASGM value chain. Men are generally involved in digging, haulage and crushing/milling of gold ores. They are also engaged in processing of milled ore and provision of ancillary services; such as welding, transportation, equipment supplies, trading in gold and mercury, etc. The menfolk dominates the gold market and are mainly the dealers and agents who control operations at the ASGM sites, providing security at sites and settling disputes.

The dominant occupation in most of the communities where ASGM activities takes place is agriculture. With very limited livelihood options, many people in the communities get involved in ASGM activities to provide for their already impoverished families. ASGM activities, therefore, serves as another source of employment for the men in most ASGM communities. Also worthy of note is that most men in this rural communities earn relatively low income, which could be inadequate to cater for their usually large families. This factor, in many instances, leaves women and children, who are already pressed with poverty, with no choice than to get involved in ASGM activities, in order to augment the resources of their families.

Due to the tedious and strenuous nature of the ASGM operations, the few women who directly participate in ASGM activities are concerned with less physical activities such as manual crushing of ores for further milling. In Niger State where there is substantial involvement of women, their activities are common in alluvial environments where they engage mostly in panning of sediments for gold. Panning of

river sediments, according to the women, is relatively easy and less tasking than digging and breaking gold bearing veins. On the other hand, other women provide ancillary services such as catering, at the ASGM camps. It was observed that there were more women involvement in direct mining activities in Niger State than in any other State (Table 16).

Table 16. *ASGM workers demographic for some selected sites (Source Nigeria Rapid Health Situation Assessment Report 2020)*

State	Niger		Osun	
ASGM Site Name	Galadimakogo	Kpmakpma	Ibodi	ilekki
ASGM worker demographics	Men: 300+	Men: 300	Men: 700	Men: 800
	Women: ~200	Women: 250	Women: 0	Women: 0
	Children: ~150	Children: 100	Children: 0	Children: 60

Although there seemed to be no barrier for women to participate in ASGM in Osun State, it appears that they were not just interested as they perceive it as male occupation. In Niger State, women have been known to participate in gold panning activities as part of traditional family occupation. They do not migrate like the men but restrict themselves to mining at community streams during dry seasons and revert to farming in the rainy seasons.

Child labour is predominant in most of the communities, especially in Niger and Zamfara States. The major reason for this, as observed during the survey, is because most of the communities do not have basic educational facilities for the children; and where they have, it is either in deplorable conditions or kilometers away. This made it easy for mothers who want to mine to go to the mines with their children, to help at work, instead of leaving them at home. On the average, some of them have basic primary school education, while majority of them are school dropouts. Health care services are mostly far away from these communities or not adequate, while they know nothing about environment and health and safety. They basically work without protection, and are not wary of the negative effect of land degradation on human health and the environment.

Lesson learned: Improving rural infrastructure and empowering women through education would help to address child labour engagement in mining.



Plate 15. *Children with a Consultant working in an ASGM Site in Niger State, 2018*

The rise in criminal activities in Zamfara, Katsina, Kaduna and recently in Niger States have caused untold hardship to the people, ASGM communities, and the general population. It has further escalated the poverty situations in the affected States as it has led to loss of rural livelihoods/income.

This, to a large extent, is not unconnected with the huge money involved in illicit artisanal and small-scale gold mining activities, which has contributed in attracting criminal elements to ASGM States making them haven for criminality and armed bandits. It is therefore, no surprise that banditry, kidnapping and other criminal activities have become prevalent in Zamfara, Kaduna, Katsina and part of Niger States. The criminal activities in these States have made ASGM so dangerous in the last three years that the federal government was compelled to impose a ban on mining activities in Zamfara State. However, indications from the survey were that mining did not entirely stop in the State despite the challenges. Unfortunately, some of these criminal elements are finding their ways into some other gold mining States such as Niger and Osun .

Table 17. *Social impact according to key informants (Source RHA 2020)*

Leading themes	Specific issues

Social issues, including crime, drugs, alcohol and prostitution	▪ There is happiness because of gold discovery
	▪ Increase in substance abuse:
	  ▪ A lot of miners consume drugs, are addicted to drugs
	  ▪ Drugs are believed to give them more strength
	  ▪ Drugs such as Indian hemp, smoking herbs
	▪ Increase in alcohol consumption
	▪ Increase in insecurity and crime:
	  ▪ Fights in communities
	  ▪ Aggressions against women, including rape
	  ▪ Thieves, bandits, killings, robbery, petty stealing
	▪ Increase of prostitution: females from other areas in-migrate and local women engage in transactional sex
	▪ In sites where miners are in-migrants, they are very mobile and can disappear quickly after having committed a crime

Non-locals, in-migrants	▪ Influx of in-migrants is promoted by mining activity ▪ Host community is poorly prepared to host many in-migrants ▪ Separation of work flows between locals and foreign groups, which avoids language misunderstandings ▪ Cyanidation is not yet done by Nigerians; foreigners practice it, e.g. from Mali and Burkina Faso ▪ In-migration leads to overpopulation ▪ The population growth has outpaced the development
Inequalities	▪ Farmers are not compensated for mining on their land ▪ Communities have limited financial benefits from mining activities ▪ Miners are better off ▪ Miners, companies, associations and sponsors benefit from ASGM, not the community as a whole
Social cohesion	▪ Mining disrupts the community cohesion ▪ There is a lack of trust among community members ▪ Nomadic nature of miners hampers building of community sense
Living conditions	▪ Vibration causes houses to crack ▪ Overcrowding ▪ Living outdoors

It was also observed that there is a substantial involvement of foreign nationals in the Nigeria's mining sector. This could be attributed to the relatively weak border surveillance and free movement of nationals of ECOWAS member states. Absence of records in ASGM sites makes it difficult to ascertain the actual number of foreign nationals but their presence were confirmed as some of them were met at the sites. As a matter of fact, the foreign nationals who are mainly from Burkina Faso, Mali, Niger, Ghana, and Benin are introducing the use of cyanide in the Nigeria's ASGM sector, similar to the way they introduced the use of mercury some couple of years back. They have managed to form alliance with their Nigerian counterparts who allow them to buy tailings they do not need. The tailings are reprocessed by these foreign nationals using cyanidation method to extract more gold. The involvement of these nationals was mentioned in some discussions as a possible cause for the escalation of conflict and criminalities presently being witnessed in some of the major gold mining States in Nigeria.

Need to strengthen national monitoring and enforcement at boarders to curtail illegal entry of migrants

9.1 AGE DISTRIBUTION OF SAMPLED ASGM OPERATORS

During the fieldwork, over 500 questionnaires were administered to ASGM operators at different ASGM sites and gold market areas. Findings from the analysis of the questionnaires showed that appreciable involvement of children aged (<18years) in ASGM activities were close to 19% of those sampled (Figure 19). In Nigeria, persons under 18 years of age are considered as children. This age group are commonly seen in Niger, Zamfara and Kaduna States. Their activities ranged from milling, washing and panning of milled gold ore to digging and hauling of ores out of the pits. There are cases where very young children perform mercury amalgamation and burning of amalgam.

In Osun State, child labour is rarely seen. The locals are generally not involved in ASGM activities as the workers are migrant workers who came from the North-western region of Nigeria. Most of the migrant workers often do not migrate with their children. In Niger State, young girls accompany their mothers to work at ASGM sites especially in panning river sediments. Girls also assist their mothers to hawk food, water and soft drinks at large ASGM camps.

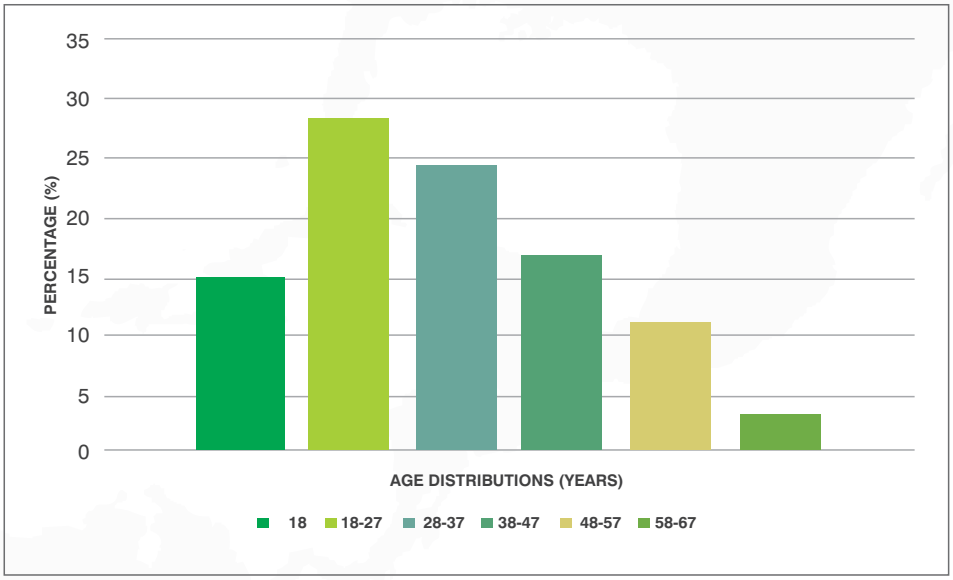

Figure 19. *Age Distribution of ASGM Operators.*

Generally, young men aged 18 – 37 years dominate operation at ASGM sites. They are the ones who perform most of the physically tasking part of the ASGM value chain; such as digging and chiseling out hard ore from primary deposits. They also haul out debris from mine shafts and pits. Where applicable, they also transport sacks of gold ore from the mining point to processing areas. Although, there are miners amongst those between ages 38 and 67 years old too, most of the agents and gold dealers belong to this age group. Those of them in the age bracket of 48-67 years are rarely seen at the ASGM sites; they are mainly the dealers and buyers of gold. They provide the resources for the other groups to carry out site level operations.

9.2 MARITAL STATUS OF ASGM OPERATORS

The ASGM Mining sites status survey investigated the marital status of the miners. It was discovered that a total of 68% of the ASGM operators were married. Majority of the miners are from the northern part of Nigeria where most people marry much earlier and with more wives per man than in the south. Twenty-five (25%) of the population were single while operators who were divorced were 2%. Widowed operators were found to be 5% of the respondents (Figure 20).

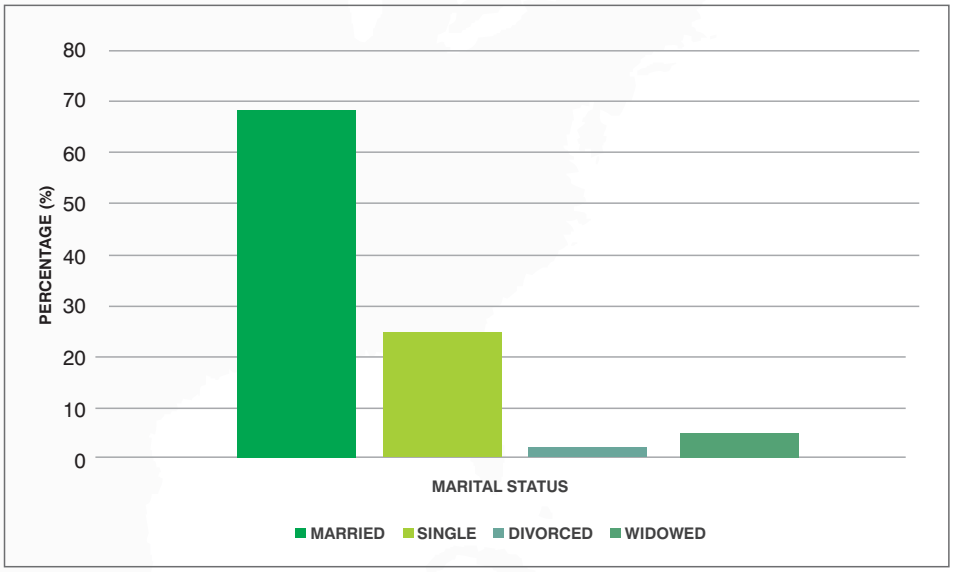

Figure 20. *Marital Status of the ASGM Operators*

9.3 LEVELS OF EDUCATION AMONG ASGM OPERATORS

Cross section of operators in the ASGM sectors were requested to provide their level of formal education. Results indicated that most of the operators at the ASGM site have little formal educational background. About 40% indicated that they were educated at primary school level. Interviews with some of the miners revealed that not all the miners who indicated having attained some form of formal education completed the level. On the other hand, 29% professed to have had some form of secondary education. It was found that the few who professed to have acquired tertiary education operate at the higher level of the ASGM sector. Most of the dealers and traders in mercury and gold fall in this category (Figure 21). A relatively large proportion of the ASGM workers, representing about 19%, have not experienced formal education but have had some Islamic education. Many female operators are in this category.

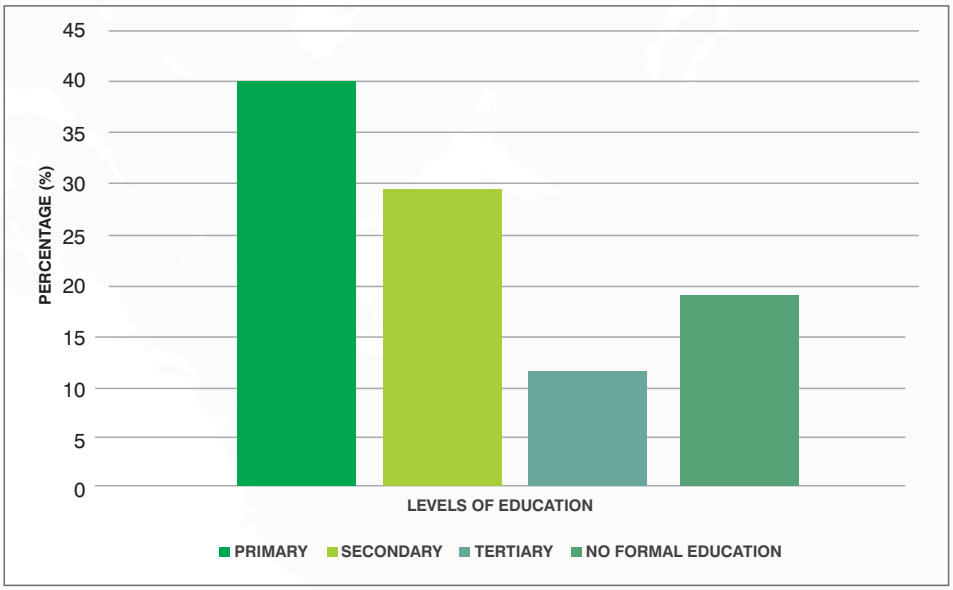

Figure 21. *Level of Education Among ASGM Operators*

9.4 ENVIRONMENTAL, OCCUPATIONAL SAFETY AND HEALTH AWARENESS

Drawing from interactions with ASGM operators, it was found that whilst most of the dealers are aware of adverse environmental impact of ASGM, many at the site level operations appeared to be unaware of inherent dangers of unsustainable mining on the health of workers and the environment. Most operators believed that the land would naturally take care of itself as they saw no point in trying to reclaim or restore the land after stoppage of mining operations. Many of the miners were found to be aware of lead poisoning which resulted from ASGM activities in Zamfara and part of Niger States in 2010 and 2015 respectively. However, that did not discourage them from the ASGM activities. Virtually all the miners interviewed believed that mercury does not present any health risk to the miners. They however, mostly agreed that the only harmful material known to them is the cyanide which many have witnessed to have caused death of animals and fishes.

Lesson learned: Continuous sensitization of miners and communities in local language on the Environment, Occupational Safety and Health

Assessment of the questionnaires indicated that all the miners especially those at the site level operations have never had any form of training with regards to environmental management, Occupational Health and Safety in ASGM operations. Accidents have been reported to occur quite often in virtually all the sites visited. All the different strata of operators in the sector affirmed willingness to be trained to improve their skills and knowledge on the extant HSE best practices in ASGM.

Miners unanimously expressed willingness to adopt different processing techniques other than use of mercury if the new technology is user friendly and affordable.

ENVIRONMENTAL DEGRADATIONS DUE TO ARTISANAL GOLD MINING

10.0

Environmental Degradations Due to Artisanal Gold Mining

Table 18 summarizes the environmental impacts perceived by KIIs and focus group participants. It is structured into leading themes and specific issues

Table 18. *Environmental impacts according to key informants*

Leading themes	Specific issues
Environmental degradation	▪ No environmental control of mining activities ▪ Degradation of the land due to mining activities ▪ Abandonment of land after activity ▪ No reclamation of the land after termination of activity ▪ Erosion of land ▪ Land becomes infertile, left with no nutrients ▪ Land becomes only arable again after ~5 years ▪ Destruction of farm land ▪ Collapsing terrain ▪ Streams are eroded, increasing in size because of mining within streams ▪ Land excavations increase chances of earthquakes and other natural disasters
Use of mercury	▪ The use of chemicals is dangerous to animals, humans and environment ▪ No precautions are taken to dispose of mercury safely
Contamination of soil	▪ Contamination of soil through chemicals ▪ Chemicals make soil “soft” and crops will not grow anymore
Contamination of water	▪ Contamination of water through chemicals (heavy metals) ▪ Water to wash gold is further used for irrigation ▪ Pit holes are filled with water and people use as drinking water ▪ Humans and animals drink contaminated water ▪ Stress on water sources because of water depletion ▪ Open defecation leading to faecally contaminated waters that are also used for drinking ▪ Stream water is polluted with sand and chemicals
Contamination of air	▪ Contamination of air through burning of mercury amalgam ▪ Open defecation also led to intense air pollution

Some obvious environmental impacts of ASGM in all the sites visited are discussed below:

10.1 LANDSCAPE DEGRADATION

The first obvious impact of ASGM in the sites visited is land degradation in the form of

gullies and abandoned mine pits that characterised the mining areas where pits deface the landscape adjacent the river. Miners do not backfill the pits. "According to them, the land would take care of itself".

10.2 DEFORESTATION

Deforestation result from sudden influx of people over an area whenever gold is discovered. Usually, ASGM activities commence after massive clearing of existing vegetation in some of the areas visited (Plate 16). The clearing also provides rooms for construction of shanties for miners' habitation and other ancillary activities. Abandoned mine pits are synonymous with all ASGM sites in Nigeria. With the belief that the land will always take care of itself, abandoned or mined out ASGM sites are left unrestored. There is usually no plan for reclamation and restoration of mined-out areas as miners move on to newer or reworked sites. These adverse impacts on humans and ecosystem was observed to be poorly addressed and the financial impact to rehabilitate the abandoned sites are huge on the Federal Government. Majority of abandoned pits remain unmapped, unaccounted for and unsafe. They are a burden to the host communities. Most farmlands were littered with both active and abandoned pits, thereby making the farmlands unsuitable for farming purposes.



Plate 16. *Deforestation for the Purpose of Mining*

10.3 POOR SANITATION AND HYGIENE

Without any infrastructure to service such number of people in a small land area, waste management is bound to be problematic. It is, therefore, no surprise that sanitation and personal hygiene were poor in some of the mining camps. Open defecation was common in all the sites visited. In most cases, solid waste generated by the population found their way eventually to streams which incidentally are the major sources of drinking water for the host communities.

10.4 RIVER SILTATION AND BANK EROSION

Artisanal gold mining in most of the sites has led to massive river siltation. In some of the rivers, tailings from the crushed and milled gold ore washed down the river. Where panning was being done right inside the river or at the bank, massive siltation as well as bank erosion occur (Plate 17). Alluvial mining of river bed and banks are common and has caused massive siltation, to the extent that the river channels were clogged with sediments.



Plate 17. *Stream Siltation due to Artisanal Gold Mining of Steam Bed*

10.5 AIR POLLUTION

Dry ore milling is done in the dry season because of non-availability of water. Dry milling produces metal rich dust particles that are easily inhaled by mine workers and the host communities. Grinding of gold ore which is known to be associated with heavy metals such as lead increases the mobility of chemical elements and surface area for chemical reaction. There are strong possibilities of pollutions of the immediate environments in some of the host communities due to dispersal of heavy metals laden dust particles.

At some sites, interviewed members of the community, complained of dust pollution which is a direct consequence of dry milling of gold ore by the artisanal and small-scale gold miners. However, they admitted that the dust pollution was not so severe to result to conflict especially when members of the community were benefiting from the employment opportunities and social amenities the camp was providing; e.g. an

ASGM and processing camp provided an electricity transformer, which they share with the rest of the villagers in Nasarawa Kainji, Niger State (Plate 18).



Plate 18. *Dry Milling of gold ore resulting to emission of heavy metals laden dust.*



Plate 19. *An electric powered milling machine in Nasarawa Kainji, Niger State.*

10.6 WATER POLLUTION

Another source of concern is the inappropriate use of mercury in the areas. Due to large dependence on water by the artisanal gold miners for washing of ore, most processing activities are done at flood plains and beside streams. Because mercury recycling technology is non-existent, 100% of used mercury in all the ASGM sites goes into the environment through discharge of tailings and process water into

streams, infiltrations of discarded mercury into the soils and emission into the atmosphere through open burning of mercury amalgam right at the ASGM sites and during refining in goldsmith shops. First, the mercury, when mixed with ore concentrate, is partly lost with tailings where it mixes with soil, water bodies and air. This occur through infiltration, solution and evaporation respectively. Water bodies in the ASGM areas could be impacted heavily when mercury forms methylmercury which is a major source of organic mercury in humans and other organisms. The artisanal miners also perform open burning of amalgam thus exposing themselves to mercury vapour through inhalation.

Tailings which resulted from comminution and processing of gold ore are dumped around the sites and can wash down to the streams. No doubt, the tailing contains mercury and liberated metals which could cause metal enrichments in water bodies, soils and groundwater system. In most of the ASGM sites in Niger and Zamfara States, the tailings are sold to the Burkinabes who reprocess them with cyanides to recover more gold.

Findings revealed that some communities have had conflicts with some groups of artisanal gold miners whom they accused of using dangerous chemicals on their streams. It was reported that the chemicals were found to have led to deaths of fishes and other aquatic lives. Further investigation revealed that the chemical was cyanide. The conflicts are not frequent and are normally settled amicably by the community leaders.

Also adjoining most of the processing sites are farmland where crops like rice are planted. It was observed at some sites that waste water which consist of mercury were used as irrigation for these farms (Plate 20). This action will not only pollute the soil but also the crops and invariably will not be fit for consumption.



Plate 20. *Rice Farm being irrigated with mercury polluted water in ASGM site in Shakwata, Niger State*

HEALTH INFORMATION

11.0

Health Information

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, which might be explained by the fact that: (i) miners/community members do not go to the health facility for all health issues; (ii) the description of health issues might differ between community members and medical personnel; and (iii) the health care providers have limited capacities to recognize and diagnose all health symptoms correctly. However, there is a marked difference between health issues reported by miners as compared to other ASGM community members that do not mine. Miners more often reported issues linked to their occupational risks whilst community members more often described health issues characteristic for rural settings in sub-Saharan Africa.

Health risk perceptions in artisanal and small-scale gold miners identified occupational hazards (e.g. falls, carbon monoxide intoxication, accidents), environmental health hazards (e.g. unsafe sanitation, unsafe drinking water), vector-related hazards (e.g. animal bites, malaria), chemical hazards (e.g. uncertainty about effects from chemicals) and social and livelihood hazards (e.g. drugs, insufficient food). Moreover, miners mentioned fears such as being arrested for illegal activities, being attacked by herders or being affected by 'bad spirits'. These fears and concerns were not raised by KIs; but "living in fear" evidently poses a significant stress on miners. There was also a difference between miners from Niger and Osun States. A different pattern of health risks was reported in Niger State, more often linked to occupational and chemical hazards. In Osun State, most frequent health risks were related to environmental and vector-related hazards. Overall, risks were often recognized by miners but were almost always secondary to the economic gain (often equaled 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.

Tables 19-22 summarizes Health risks and effects of ASGM according to key informants. Detailed information is provided in the Rapid Health Situation Assessment Report as referenced in the bibliography.

Table 19. *Health issues according to key informants*

Population group	Common health issues
All ages	▪ Malaria ▪ Fevers ▪ Diarrheal diseases, typhoid fever ▪ Schistosomiasis ▪ Yellow fever ▪ Vomiting ▪ Body pains ▪ Pneumonia ▪ Road traffic accidents ▪ Headaches ▪ Malnutrition ▪ Skin rashes ▪ Appendicitis
Children	▪ Stomach pains ▪ Headaches ▪ Convulsions ▪ Coughing ▪ Fevers ▪ Malaria ▪ Diarrheal diseases

Frequent health issues as reported by participants from the FGDs varied among the different population groups (Table 20).

Table 20 *Health issues according to focus group participants*

Population group	Common health issues
Children	▪ Malaria ▪ Fever ▪ Convulsions ▪ Vomiting ▪ Conjunctivitis ▪ Oral health
Women	Abdominal pain
Elders	▪ General body pain, back pain ▪ Fatigue ▪ Reduced eye sight ▪ Typhoid fever ▪ Ulcers (stomach) ▪ Hot legs ▪ Reduced sensitivity of skin
Non-miners	▪ Ulcers (stomach, chest) ▪ Typhoid fever ▪ Malaria ▪ Back pain, join pain, knee pain ▪ Hypertension ▪ Appendicitis ▪ Hernia
Farmers	▪ Ingestion of insecticide and organophosphates leading to poisonings

Table 21. *Health risks and effects of ASGM according to key informants*

Leading themes	Specific issues
Occupational hazards	▪ 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
	Specific issues
Environmental health hazards	▪ 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	■ Malaria ▪ Mining is creating stagnant waterbodies that become breeding sites for mosquitoes ▪ Spread of Lassa fever
Chemical hazards	▪ Mercury exposure: inhalation and direct contact ▪ Cyanide exposure ▪ Lead exposure
Social and livelihood hazards	▪ Not enough food ▪ Killings for economic gain ▪ Kidnappings for economic gain
Community exposures	▪ 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	▪ Symptoms of swollen legs when they stand in the waters/ponds up until the knees (pedal oedema) ▪ Swollen face ▪ Eyeball changes ▪ Carbon monoxide poisonings ▪ Injuries: puncture injury in legs, cuts in feet, rocks falling on heads ▪ Drug abuse: leading to overdosing, accidents ▪ Sexually transmitted infections ▪ Headaches ▪ Dizziness ▪ Body pains ▪ Stiffness ▪ Stomach pains ▪ Malaria ▪ Mental disorders ▪ Pneumonia ▪ Fingernails falling off ▪ Diarrheal diseases: typhoid fever, dysentery, cholera

Table 22. *Health risks and effects according to focus group participants*

FIELD STUDY FINDINGS

Leading themes	Specific issues
Occupational hazards	▪ Traumatic falls potentially leading to death ▪ Falling into pits ▪ Carbon monoxide intoxication ▪ Low oxygen levels in pits
Environmental health hazards	▪ Drinking dirty (unsafe) water ▪ Drinking water from mining pits
Vector-related hazards, animals	▪ Snake bites, scorpion bites ▪ Exposure to mosquito bites and malaria ▪ Schistosomiasis because of working in water
Chemical hazards	Due to the harmful effects of chemicals; ● They work outside of the village ● They burn some equipment after use
Social and livelihood hazards	▪ Prostitution ▪ Drugs (Indian hemp, Tramadol, Codeine) used to suppress fear of pits and other risks ▪ Insufficient food: lack of food, lack of money to buy food, preoccupation with mining instead of farming and preparing food ▪ Eating of animals that are contaminated with chemicals
Fears	▪ Attacks from herders who see the environmental degradation as a distortion of grazing land ▪ Fear of arrest from government as their activities are classified as illegal ▪ Fear of evil, bad spirits: a place with gold is prohibited to work at and inhabited by the bad spirits ▪ Mental health disorders from bad spirits ▪ Security concerns
Health effects	Joint pains, muscle pains, neck pains, back pains, general body pain ▪ Lacerations ▪ Headaches ▪ Stomach pains, stomach ulcers ▪ Traumas: head injuries from stones crumbling into pits, puncture wounds ▪ Colds ▪ Malaria ▪ Diarrheal diseases: typhoid fever, dysentery ▪ Cough ▪ STIs ▪ Swollen legs ▪ Extensive shivering (~1 hour) with cough, running nose and headache ▪ Fingernails painful, falling o ▪ Stiffness in fingers, hardening of palms ▪ Postural deformity ▪ Eye problems (losing sight, itching, dust in eyes) ▪ Dizziness ▪ Skin rashes ▪ Meningitis caused by contact with miners

Leading themes	Specific issues
Gender differences (health ffects in women)	▪ Small injuries on hands and feet from alluvial mining ▪ Postural hypertension ▪ Itching in intimate body parts ▪ Vaginal lesions ▪ Irregular menstruations (e.g. twice a month) ▪ Urinary tract health issues (e.g. painful urination) ▪ Vaginal discharge (black and white)

NATIONAL OBJECTIVES AND REDUCTION TARGETS

12.0

National Objectives and Reduction Targets

12.1 Introduction

The overall goal of the Nigeria's NAP for ASGM is to reduce, and where feasible eliminate, the use of mercury in the ASGM sector, reduce environmental degradation, and protect human health for environmental sustainability.

The text of the Minamata Convention presents a set of anticipated national objectives and reduction targets expected of Parties to the Convention towards global elimination and reduction of Mercury in the environment. However, before clearly highlighting the nation's objectives, goal and reduction targets, the problem statement has to be stated.

a. Problem Statement

The following problems were clearly discernible from the results obtained from the implementation of the enabling activities for a NAP on mercury in the Artisanal and Small-scale Gold Mining (ASGM) Sector in Nigeria:

I. The Nigeria's ASGM sector is highly informal and poorly regulated. Operators are clearly unwilling to formalize their operations, probably due to lack of acceptable incentives and that most of the artisanal miners do not have the ability to navigate the bureaucracies involved in acquiring a small-scale mining lease. Available records showed that only 8 gold mining cooperatives have SSML to legally mine gold in Nigeria.

ii. Use of mercury is predominant in Nigeria's ASGM sector. Although cyanide is not widely used by miners presently, where it is used, necessary precautions are not always taken to prevent leakage to the environment. There is also associated with the sector social and environmental problems caused by inability of miners to restore mined-out lands and migration, which disrupts socioeconomic and cultural balance of host communities.

iii. Mining wastes, including tailings, are not disposed in environmentally-friendly manner and are a major source of mercury pollution. The tailings in ASGM are released directly into the environment or further used.

iv. There is no document that systematically puts together ASGM-relevant guidelines and norms or identifies legal gaps.

v. Not all laws and policies are available to the public, as many documents exist only in hard copy.
vi. Relevant regulations and policies require regular update on emerging issues and accurate baseline.
vii. Inadequate inter-ministerial coordination and collaboration.
viii. Inadequate institutional capacities for mining, health and environmental issues related to ASGM.
ix. The lack of comprehensive baseline data hinders prioritization of government interventions.
x. Inadequate enforcement of mining and environmental regulations in ASGM sites. Coordinated action and enforcement between the key agencies is insufficient.
xi. The apex regulatory institutions responsible for formalizing the ASGM sector are poorly funded to regulate and formalize the sector. There is apparent lack of synergy with other institutions and tiers of government, which is militating against the proper regulation of the sector. Furthermore, there is wide information disconnect between government and the actual operators in the ASGM sites. Speculators and other purported representatives of the miners often hijacked information and incentives from government, thus depriving real operators from gaining important knowledge.
xii. Assessment undertaken in ASGM sites has shown that there is a high degree of contamination and degradation that requires urgent remediation.
xiii. The deleterious effects to the health of miners, especially the vulnerable population, are high, as inferred from outcome of field activities.
xiv. Access to health facility is limited; and where available, distance to mining sites is considerable. In most cases, the health facilities are not well-equipped to handle most of the health issues of the ASGM miners.
xv. A specifically developed protocol for cases of chemical emergencies does not exist. There is no definition of a chemical emergency. The amounts of mercury already polluting waterbodies may qualify as a chemical emergency. However, inadequate human resources, financial capacities and technical equipment prevent such an assessment.
xvi. Evidence from the fieldwork clearly showed that artisanal and small-scale gold miners in Nigeria are uneducated and had neither ever received formal training on gold mining, gold ore processing, occupational health and safety procedure or environmental protection. Personal Protective Equipment (PPE) is not used; mine accidents are therefore common in all the ASGM sites.
xvii. There is noticeable lack of social amenities in most ASGM host communities. Children (who ordinarily, are meant to be in school) are induced to join ASGM activities, both due to the benefits they stand to gain from the activities, and lack of operational schools in some of these communities. Use of child labour is rampant in the sector.
xviii. Access to financial facilities are hardly available to ASGM operators. Due to the chronic informality in the sector, operators are hardly able to secure loans from financial institutions and special funds.
xix. Gold and mercury trades are shrouded in secrecy, thus providing room for illicit business dealings that deprive the government of huge revenue from the ASGM sector.

xx. Access and information to sustainable chemical and processing alternatives that ought to be made available to ASGM miners are inadequate.

xxi. Promotion of complementary livelihood, such as farming, tailoring, small scale business, is low.

b. National Goals

In view of the foregoing problems, the national goal of the Federal Government of Nigeria is to effectively integrate ASGM into the formal economy and ensure environmental sustainability. This will require formalization procedures that must be inclusive of miners' views and effective in monitoring and enforcing regulations. It needs to:

- Formalize the ASGM sector through the establishment of an enabling legal and regulatory framework and organized group of ASGM miners representing the needs of the sector, such as -;
  1. Building and strengthening institutional capacity of relevant Ministries, Departments and Agencies responsible for the management of ASGM in Nigeria, and
  2. Enhancing cooperation and partnership at all levels among miners, public authorities, industry sector, NGOs, academic institutions, and other stakeholders.
- Integrate informal ASGM activities into the formal economic system by ensuring that miners get value for their toils and that the government gets commensurate revenue from the sector.
- Reduce and eventually eliminate the environmental and social impacts of ASGM, including mercury emissions and releases to the environment, such that the use of mercury and other hazardous chemicals are reduced and gradually phased out, with the introduction of viable and affordable alternative technologies and necessary framework devised for creation of jobs and improvement of quality of lives in ASGM host communities.
- Strengthen extension services and community education and dissemination of Improved Mining Technologies.
- Protect vulnerable populations from mercury exposure.

c. National Objectives

The objectives of the Nigerian National Action Plan (NAP), in line with the requirements of the Minamata Convention on Mercury, include:

- Eliminate unsafe practices in ASGM sites.
- Migrate to viable and sustainable mercury-free practices or technologies.
- Reduce ASGM-associated environmental hazards including mercury emissions/pollution, land degradation and ecosystem contamination.
- Effectively reduce mercury use in the ASGM sector, based on the quantities determined by the baseline data from the Nigeria MIA report, through the elimination of inefficient and unsafe practices, such as, but not limited to, open-burning of mercury amalgam without using retorts, flame hoods, etc. and by migrating to reduced or mercury-free practices or technologies.
- Achieve health safety and improvement at ASGM sites.

- Develop and promote the safe handling and long-term storage of excess mercury coming from the ASGM sector, which may include but are not limited to mercury suppliers, dental shops, gold dealers, reclaimed tailings, etc.

Generally, the objectives shall encompass the following:

a. Establish an effective legal, institutional and policy framework for the ASGM sector.
b. Build the capacity of the regulatory institutions to improve the present poor regulations and formalization of the ASGM sector.
c. Build the capacity of ASGM sector for improved gold mining and sustainable gold ore processing techniques that are devoid of inappropriate use of mercury, which will lead to progressive reduction in the quantity of mercury use and eventual elimination of mercury use in the sector.
d. Formalize the gold and mercury trade and supply chain (looking into international connections and cross border activities) to enable proper documentations of gold produced and mercury supplied and used per annum.
e. Implement environmental programmes to ensure the protection of the environment
f. Implement programmes to cause verifiable reduction in the use of child labour in ASGM sector and improvement in the living conditions in the ASGM host communities.
g. Significantly improve the abilities of formalized ASGM operators to access loan facilities from financial institutions and special funds.

The specific objectives to attain these goals include to:

- Update and, where necessary, develop and implement national policies and regulations that promote the improvement of ASGM and its allied sectors by 2024.
- Promotes the practice of alternative activities such as farming and fishing, especially during the rainy season, as that will represent an alternative income source, promote self-subsistence, and avoid risks related to mining during the rainy season (e.g. collapsing pits, slippery terrain).
- Put environmental and safety measures in place to protect miners and communities surrounding ASGM sites.
- Ensure that ASGM primary license holders or mine managers develop and implement Environmental Action Plans that also include safety measures to protect employees and prevent exposures in residential areas by 2025.
- Establish a formalized and organized group of ASGM miners with a national constituency and representing the needs of the ASGM sector, such as those existing for other industrial associations by 2025.
- Ensure at least 20 percent of miners' children are in school by 2025.
- Continous strengthening of relevant MMSD and FMEnv's staff capacity to manage the ASGM sector through training.
- Export 6,000kg of ASGM-produced gold to the international market via markets that utilize mercury-free gold by 2030.
- Produce 50% of gold without the use of mercury or other toxic substances by 2030.

- Reduce environmental exposure level by 50%, as against the current level of full exposure (100%) of miners to hazards of mercury use and other related hazards associated with ASGM by 2030.
- Develop and propagate sustainable alternative technology by 2026.
- Establish a sustainable sensitization programme effectively reaching out to miners on the hazard of mercury to human health and the environment /alternative livelihood and technology by 2024.
- Establish a sustainable collaboration to address social and health impact on the vulnerable group by 2024.

Some strategies to achieve these objectives include the establishment of activities within the NAP that will deal with or ensure:

- Interlink with health and community education,
- Formalization or regulation,
- Market access,
- Adverse environmental impacts mitigation,
- Addressing governance issues on environmental and social aspects within the NAP

NATIONAL MERCURY REDUCTION TARGETS

13.0

National Mercury Reduction Targets

a. Nigeria's national aim is to reduce mercury use in ASGM by 50% in 2030, through partial elimination of intensive and unsafe practices of mercury use, the adoption of mercury controls and capture technologies, and/or the adoption of mining techniques that do not require mercury use. However, due to the exigencies of current widespread mercury use in artisanal mining in several gold mining regions of Nigeria, it is considered that a phased-reduction target might be the option.

b. To this end, it is purposed to effectively reduce mercury use in the ASGM sector, based on the quantities determined by the baseline inventory, by 10% in 2024, 20% in 2027, and a further 20% by 2030, through the introduction of global best practices in the ASGM Sector.

c. It is projected that within the 1st year of publishing the NAP, the Nigerian government would have further holistically appraised the current situation with regard to determining the remote and immediate cause of the poor regulation and weak enforcement of the mining and environmental regulations. This will result to a new mechanism, including a possible amendment of the extant mining laws to guide the effective formalization of the sector going forward.

d. In the intervening period, between the 1st and 2nd year, MMSD and FMEnv shall be negotiating with Nigeria's neighbours and other members of ECOWAS whose nationals have influence in the Nigeria's gold and mercury supply chain, to foster cooperation to mitigate smuggling and other illegal cross-border activities.

e. A Technical Working Group (TWG) shall be formed in the 1st year and commissioned to spearhead the coordination and implementation of the NAP to achieve the national objectives and achieve the reduction targets.

f. From the 2nd year, through to the 9th year of the ASGM reform implementation, Nigeria's ASGM mercury use would have been progressively

reduced to at most 50%, and that more than 50% of the gold produced in the sector will be better captured in the national records.

g. Based on the outcomes of the appraisals of the sector in the 1st year, all stakeholders will be identified. A presidential directive or new legislation may be required to ensure that clear roles are assigned to various interest groups or institutions.

It is planned that the Technical Working Group (TWG) (with support from previously identified and engaged partners) would, between the 2nd and 5th year, implement project activities to:

I. Train all relevant government agencies and stakeholders in the ASGM sector to improve their capacities to execute activities to formalize the sector and introduce sustainable environmentally friendly technologies to the mine operators to ease the phasing out of mercury use in the sector.

ii. Strengthen the national monitoring and enforcement programme, through relevant training and improving relevant capacities.

iii. Improve coordination among institutions and stakeholders.

iv. Facilitate and enhance information exchanges between relevant sectors (mining, environment, health, welfare, education, agriculture, justice, private etc.), civil society and ASGM communities. This will help facilitate effective tackling of environmental, health, social and economic challenges associated with ASGM (including land use planning and conflict resolution)

v. Ensure a national organized approach for systematically registering artisanal mining cooperatives to address the barriers to miners establishing and registering cooperatives, so that miners can have easy access to receive extension services from government and also establish a strong foundation for government's formalization plan.

vi. Research, identify and consistently pilot-test sustainable mercury-free technologies to ensure a viable technology that can be easy for miners to transit and adapt to.

vii. Sensitize the ASGM stakeholders through workshops, advocacy visits to major stakeholders and opinion leaders.

viii. Educate miners about the environmental impacts of mining activities and the importance of environmental protection measures, as well as resources available to help them comply with environmental requirements.

ix. Establish demonstration sites of best practices for environmental protection to help educate miners.

x. Ensure adaptation of safer mining approaches to minimize risks.

xi. Strengthen extension services and the dissemination of improved mining technologies.

xii. Establish an effective royalty scheme for artisanal miners.

xiii. Improve access to international markets.

xiv. Strengthen access to formal credit in Artisanal and Small-scale Gold Mining.

xv. Undertake a comprehensive assessment of contaminated sites with a view to clean up and reclaim the sites

The TWG will ensure that various stakeholders are active to the implementation of their assigned roles to ensure that:

- Socioeconomic and environmental conditions in ASGM host communities are improved, in terms of improvement in health and education and environmental pollution, by promoting environmental management and hygiene; practice of alternative activities, such as farming and fishing, especially during the rainy season; increase environmental and health promotion activities for related issues particular to ASGM communities, such as substance abuse, STIs, water and sanitation, and occupational health, including on mercury and cyanide use; and increase security in ASGM sites.

- The use of child labour is reduced or outrightly eliminated in the sector, by collaborating with representatives from other sectors, such as education and civil society, and also ensuring increased school enrolment in ASM communities.

IMPLEMENTATION STRATEGY

14.0

Implementation Strategy

14.1 Strategies

a. Strategies to establish an effective legal, institutional and policy framework

i Assessment of existing policies and regulations that govern the sector, developing any new legal or regulatory authorities, as well as making necessary institutional and policy changes including clear delineation of roles of relevant agencies.

ii Strengthen relevant institution capacity including laboratories and research centers.

iii Conduct relevant training on ASGM, Minamata Convention and national obligations, monitoring and enforcement and other related topics.

iv Educating artisanal miners about their legal obligations and, where applicable, providing technical assistance to help them meet these obligations.

v Identification and involvement of all relevant stakeholders in the NAP implementation process

vi Partnering with academia and civil society, particularly in the areas of data collection and knowledge generation.

vii Strengthen coordination between FMEnv, MMSD, State environment and health ministries and other relevant organisations regarding mining, environmental protection, education of miners

b. Actions to eliminate worst practices

As indicated in Section 13 the major objectives of the Nigeria ASGM NAP are:

- To eliminate worst practices and
- To develop steps for the formalization or better regulations of the ASGM Sector in Nigeria

It is important to indicate that Annex C, Paragraph 1(b) requires that NAPs include actions to eliminate a set of four worst practices in ASGM:

- Whole ore amalgamation;

- Open burning of amalgam or processed amalgam;
- Burning of amalgam in residential areas; and
- Cyanide leaching in sediment, ore or tailings to which mercury has been added without first removing the mercury.

Whole ore amalgamation (WOA) occurs when miners add mercury to a large amount of the ore with little prior concentration. Fortunately, this is not reported to be practiced in Nigerian ASGM sector. The commonly used method is concentrate amalgamation. Open burning of concentrate amalgam is commonly carried out at the ASGM sites and further refining of gold sponge through heating is carried out in gold refinery shops.

Strategies to eliminate open burning of amalgam or processed amalgam in Nigeria's ASGM sector will include:

i Strengthen coordination between FMEnv, MMSD, state environment and health ministries regarding environmental protection from ASGM activities.

ii Effective monitoring and enforcement of environmental and mining regulations.

iii Partnering with development partners such as UNIDO, Artisanal Gold Council, etc. to develop appropriate technologies for gold extraction, suitable for different ASGM zones in Nigeria.
Research into the Nigeria's gold occurrences in various states to determine the most appropriate technologies to be effectively used in different States or regions in each State.

iv Continuous sensitization of the ASGM operators on the best ways to extract gold.

v Introduction of affordable and viable mercury free technologies and mercury recycling technologies such as use of retorts through persistent demonstrations at the ASGM sites, highlighting the superior advantages of the new technologies over the existing ones.

vi Sensitize ASG Miners, mining communities, including women on the effect of siting mining/gold processing sites close to residential area and dangers of burning of amalgam in residential areas.

vii Update existing regulation and policies on related emerging issues such as the use of cyanide.

c. Steps to facilitate formalization or regulation

Successfully formalizing artisanal miners could contribute to increased FDI, investments from large-scale mining companies, upstream and downstream investments, and increased FDI directly into the artisanal mining sector. Steps to facilitate effective formalization and regulation of the ASGM sector will include:

i Holistic appraisal of the current situation with regards to determining the remote and immediate cause of the poor regulation and weak enforcement of the ASGM formalization strategies and policy. This will result to a new mechanism including possible amendments of the extant mining laws to guide a more effective formalization and regulatory strategy going forward.

ii Relevant MDAs should ensure that the necessary regulatory framework is in place for ASGM efficient formalization, profit making from the sector; and, address all other pertinent issues.

iii Forming a collaborative synergy with identified stakeholders including other tiers of government, federal government institutions and national and international organizations to implement acceptable and easy formalization policy.

iv The option of decentralizing the cadastral office to reduce difficulties in accessing requisite ASGM permits, will be considered.

v Government to sensitize miners about the benefits of formalization.

vi Develop a training program for newly-formed cooperatives to help ensure they are operating effectively and safely.

vii Coordination and information sharing between relevant agencies to provide updates on any new cooperatives that have formed.

viii Information sharing to relevant stakeholder especially private sector to counter perceived political and security risks of operating in Nigeria is another area of concern.

ix Engaging the private sector and providing proper incentives for the private investments

x Addressing pricing and affordability issues and information gaps;

xi exploring government–private sector and NGO collaboration and partnerships;

xii Establishment of gold buying centers in strategic locations determined by distance from mining areas and existing market structures to break the holds of existing social hierarchies and the power of middlemen.

xiii Creating an enabling environment for ASGM supply chain actors to access formal mineral markets and access tax incentives.

xiv Streamline policies and practices across neighbouring countries to minimize the incentives to smuggle or to pursue ASGM in Nigeria including:

- Licensing procedures
- Taxation
- Prices offered by state-sponsored buying schemes
- Access to supply chain initiatives
- Laws and sanctions
- Law enforcement effectiveness
- The scope of ASM assistance programs

xv Strengthen border controls, including:

- Policing unauthorized ports and border crossings
- Tightening customs controls
- Initiating joint law enforcement investigations, including anti-corruption investigations

The formalization that will be implemented shall be inclusive of miners' views and shall be effective in monitoring and enforcing regulations. It will involve:

- Supporting the regulatory institutions through provision of capacity building in terms of training of staff, equipping of the institutions with necessary tools and logistics to implement.
- Legal frameworks that remove barriers to formalization and are supportive and accessible rather than punitive
- Streamlined licensing processes that make it easy, cost-effective and rewarding to obtain a licence

- Access to finance for miners, potentially using geological information as collateral for loans
- Technical and financial support to meet the licensing requirements and, once licensed, to continue to improve performance.

d. Strategies to promote the reduction of emissions, releases, and risks of exposure to mercury including management of contaminated sites

Strategies include:

i Use of public enlightenment campaigns in ASGM active States to reduce the use of inappropriate mercury use techniques.

ii Build the capacity of enforcement personnel in respect of monitoring and enforcement to conduct effective and regular monitoring of ASGM sites contaminated with mercury.

iii Organise regular Train-the-Trainer workshop on Nigeria's obligation to the Minamata Convention on mercury.

iv Provide education and adequate training to ASGM operators on alternative technology and its use.

v Periodic update of mercury inventory report.

vi Provide subsidized, affordable and viable mercury recycling technologies for distribution to ASGM operators while sourcing for sustainable financing from private sector.

vii Provide ASGM operators with necessary PPE and offer appropriate training on occupational health and safety procedures to operators.

viii Use government policies and regulations to curtail the supply, sales and diversion of mercury.

ix Development of guidelines on minimization of mercury emissions and releases.

x Build pilot gold ore processing centres inform of cluster centre in various ASGM areas for frequent demonstration of the use of better gold ore processing technologies. Subsequent to formalisation of the ASGM sector and sourcing of sustainable finance.

xi Conduct risk assessment of human exposure to mercury, proffer recommendations and implement necessary actions.

xii Comprehensive inventory of contaminated sites.

xiii Development of National guidelines for management of contaminated sites.

xiv Identification and promotion of best technology and practices to remediate contaminated sites

xv Pilot remediation of selected sites.

xvi Continuos monitoring and enforcement.

e. Strategies to managing trade and preventing diversion of mercury and mercury compounds.

I Train customs personnel and other enforcement agencies at the borders to identify mercury and it compounds.

ii Initiate negotiation with Nigeria's neighbours and other members of ECOWAS whose nationals have influence in the Nigeria's gold and mercury supplies' chain to foster cooperation to mitigate smuggling and other illegal cross

border activities.

iii Relevant agencies to collaborate with respect to control of mercury flow to the ASGM sector.

iv Consider introduction of certification system for dealers in mercury and mercury related compounds.

v Coordination and regular information sharing between the desk of the BRS and the Minamata Conventions.

f. Strategies to involving stakeholders in the implementation and continuing development of the plan.

Strategies include:

i Identify all relevant stakeholders in the implementation of NAP and establish a sustainable communication platform for meetings and information sharing.

ii Effectively communicate assigned roles to stakeholders towards implementing activities highlighted in the plan.

iii Employ transparency in the process especially in the reporting process

iv Provide relevant stakeholders with information on implementation progress.

v Periodic meeting of key stakeholders on progress achieved.

vi Incorporate the NAP into national development plan.

vii Provide sustainable financing for planned activities.

g. Strategies to increase awareness in the health sector and ASGM communities on the dangers of mercury and its compounds

i Engagement with key stakeholders to understand the problem and support strategy implementation.

ii Development of practical educational materials to be implemented by local health care workers

iii Sensitization of the chronic long term effects of mercury with culturally appropriate Messages

v Promotion of new technical intervention (can decrease exposure if used correctly)

vi Communication/training plan

vii Conduct capacity building at the primary health care level among EHOs and health educators

h. Strategies to generate evidence through data gathering and chemical surveillance to support implementation of health initiatives

i Community mapping

ii Deployment of data gathering solutions and supportive tools

iii Strengthening of Monitoring and Evaluation

i. Strategies to strengthen coordination in the health system to prevent, eliminate or manage mercury and heavy metals exposures

I Establish a technical working group to coordinate mercury and other ASGM specific issues at national, states and local government levels.

ii Review and update national health policies to include mercury and other ASGM health related issues.

iii Weave the existing systems into an integrated platform and bridge gaps where they exist.

j. Strategies to build capacity for effective prevention, detection and response to mercury and heavy metal poisoning.

i Increase knowledge and skills of health workers to improve access to ASGM related preventive and curative health services at all levels.

k. Strategies to prevent the exposure of vulnerable populations -

Strategies to prevent the exposure of vulnerable populations particularly children and women of child bearing age, especially pregnant women, to mercury being used in ASGM needs to be put in place to safeguard lives and protect the environment. Special attention should equally be paid to stopping inhalation of lead and silica rich dust etc. associated with ASGM. There is evidence that children are involved in performing both amalgamation and burning of amalgam putting them at a high risk of mercury exposure. Thus, strategies to prevent exposure of children to mercury should also consider strategies to eliminate child labor practices in ASGM. The NAP has a critical role to play in reducing children's work with mercury. Useful strategies to achieve these objectives include:

i Target outreach and awareness raising with community leaders and parents on the risk of children's work with mercury in ASGM.
ii Finding alternatives for parents such as increased educational opportunities and/or child care
iii Implementation of environmental and mining regulation prohibiting the use of mercury for child labor in mining, including strict penalties against employers.
iv Regular monitoring and inspection of mining areas by relevant government officials to prevent child labour and exposure of children to mercury and its deleterious health effects.
v Mainstreaming of child labor issues into ASGM Programmes and information sharing on child labour with relevant government and UN agencies.
vi The ministry of education should be made aware of the risk from mercury to childhood development and the need to consider support that would help to prevent children exposure to mercury.
vii Mercury should not be used near women of child bearing age, pregnant women and infants.

Some simple solutions planned for the reduction or elimination of mercury exposure includes the following:

i Mercury should be stored outside in a solid bottle with a tight-fitting lid.
ii Wearing of gloves when touching the amalgam.
iii Use of respirator with activated charcoal to prevent inhalation of mercury vapor.
iv Create a designated well-ventilated area where the amalgam will be burned and the equipment will be left (including work clothes).
v Use of retort
vi Use of wet milling instead of dry milling to avoid dust inhalation
vii Use of Personnel Protective Equipment (PPE)

viii Diagnose and treat people affected with mercury and the associated illness to stop the generational transfer of mercury and the associated illnesses.
ix Switch over to mercury free techniques.

Other strategies to prevent the exposure of vulnerable populations in ASGM include.

i Proffering solution to risks associated with the social environment such as drug, alcohol abuse, risky behaviours, conflicts, exploitation of women and children etc.

l. Strategies to providing information to artisanal and small-scale miners and affected communities

Strategies include:

i Engagement of trained translators to communicate directly to ASGM communities, especially the miners and women.
ii Use of short video and display to educate children on the effects of mercury use, including cyanide in mining.
iii Development of educational materials on mercury and impacts in ASGM communities.
iv Use of pictorial and visual methods in communicating to ASGM communities on the hazards associated with mercury use.
v Soliciting the supports of community and religious leaders in sensitizing the ASGM communities during community meetings, religious gathering and related programmes on radio and television.
vi Encourage ASGMs to form associations through which they can be approached by relevant institutions.

m. Strategies to sustainable financing

i Incorporation of mining and chemicals management issues, including the NAP into national development plans.
ii Development of multi-stakeholder financial approach and innovative fund-raising for environmentally sound ASGM activities.

n. Additional strategies including market-based mechanisms-

i The use of Market-Based (economic) Instruments Incentives such as tax and tariff waivers for implementation of alternative technologies, subsidized capital investment charges,
ii Strengthen existing institutional framework to effectively use market-based approaches in ASGM activities and management
iii Improve the registration process for licensed buying centers, by providing notice to applicants when their application is deemed incomplete, along with an explanation of the problems with their application.
iv Assist mineral buying centers in obtaining export permits to sell gold internationally.
v Support the establishment of additional licensed mineral buying centers near mineral processing sites to provide greater options to miners for selling their gold.

vi Government should provide price support to mineral buying centers to make them more competitive with unlicensed dealers.
vii Establish a government purchasing scheme to buy gold at an above-market price from licensed gold mining cooperatives.
viii Allow individuals to register for a license to purchase artisanally-mined gold.
ix Introduce fair trade certification for artisanally-mined gold.
x Strengthen miners' access to credit so that they are not obligated to accept predatory loans from middlemen for supplies and equipment.

ACTION PLAN

15.0

Action Plan

The Action-plan and schedules are based on the strategic objectives of the NAP outlined in section 14. A ten-year plan to achieve the goals of Nigeria's efforts at reducing and eventual elimination of mercury use in ASGM, and meeting with the obligations of the Minamata Convention is in place for implementation.

Table 23 shows the action plan for implementation over a ten-year period (2021-2030).

Table 23. *Action plan for the Different Phases*

Strategy	Actions	Activity lead	Timeline			Funding source	Activity cost (US$)	Expected results	Indicator
Establish an effective Legal, Policy and Institutional framework	Finalize Terms of Reference (TOR) and establish TWG for provision of technical guidance and implementation of reform plan	FMEnv, MMSD	Year 1-3	Year 4-6	Year 7-10	FMEnv, MMSD Development Partner	50,000	Multistakeholder team and TOR established	TOR, membership , reports of meeting and decision made, national progress reports
	Conduct a review and assessment of laws, regulations and policies governing the ASGM sector including but not limited to formalisation, chemicals and waste management, trade regulations, licensing gold buying and royalties to determine gaps and overlaps and make recommendations	MMSD, FMEnv				MMSD, FMEnv SMDF, Development Partners	500,000	Assessment of legal, policy and Institutional framework conducted	Recommendations to improve Legal, Policy and Institutional framework
	Update/develop relevant policies, law and regulations to address gaps and overlaps identified during the assessment	MMSD, FMEnv, FMOJ				MMSD, FMEnv SMDF, Development Partners	2,000,000	Policies, laws and regulations updated/amended/ developed	Number of new and amended laws, regulations and policies
	Preparation of training manuals/kits on the elaboration of national legislation/ policy and enforcement to be used by appropriate government agencies	FMEnv, MMSD				MMSD FMEnv SMDF, Development Partners	1,000,000	a. Kits procured b. Training manuals developed	a. Number of kits procured and b. Number of Organisations that accessed the training manuals
	Conduct assessment of barriers to effectively incorporate the issue of ASGM and chemicals management within the national sustainable	FMEnv, MMSD, finance, budget and planning				MMSD, FMEnv SMDF, Development Partners	200,000	Assessment of barriers to effectively incorporate the issue of ASGM and chemicals management	a. Recommendations to effectively incorporate relevant issues into national

Action plan for the Different Phases

Strategy	Actions	Activity lead	Timeline			Funding source	Activity cost (US$)	Expected results	Indicator
	development plan or agenda/ proffer recommendations /action							within the national sustainable development plan or agenda conducted	development plans b. Level of progress made to incorporate the issue of ASGM and chemicals management within the national sustainable development plan or agenda
	Conduct regular briefing with high level officials on the needs of the ASGM sector; prepare groundwork for legislative or regulatory solutions; initiate legislative or regulatory adjustments.	MMSD,FMEnv				MMSD, FMEnv SMDF	500,000	**a.** High level officials briefed on the needs of the ASGM sector b. Legislative or regulatory adjustments initiated	**a.** Number of high level officials briefed **b.** Number of legislative or regulatory adjustments initiated
	Strengthen national monitoring and enforcement programme (through but not limited to personnel training (customs, police, regulators etc), procurement of enforcement tools, upgrading of laboratories	FMEnv				FMEnv SMDF, development partners	1,000,000	National monitoring and enforcement programme strengthened	a. High level of compliance with related regulations b. Number of personnel trained c. Number of enforcement tools procured d. Number of laboratories upgraded with relevant equipment
Actions to Eliminate Worst Practices	To understudy gold ore mineralogical properties in parts of Nigeria.	MMSD, FMEnv				MMSD Budgetary allocation, private sector to be included in source of funding for all.	116,314.79	a.Textural classifications of gold ores in different ASGM areas in Nigeria. b. effective and efficient utilization of technologies	a. Number of ASGM clusters investigated. b. Identification of most appropriate technologies to be deployed at various

Action plan for the Different Phases

Strategy	Actions	Activity lead	Timeline			Funding source	Activity cost (US$)	Expected results	Indicator
								deployed to various ASGM clusters.	ASGM clusters.
	Conduct feasibility studies on selected, affordable and viable mercury free technologies	MMSD, FMEnv				MMSD & FMEnv	100,000	Study conducted to identify best affordable and viable mercury free technology	Best affordable and viable mercury free technology identified
	Negotiate with development partners to provide training on best practices to MMSD & FMEnv staff and ASGM operators.	FMEnv & MMSD. FMOH, FML&P				FMEnv & MMSD.	269,978.40	FMENV & MMSD are equipped with adequate knowledge and skills to train ASGM on better and best practices.	a. Number of FMENV & MMSD staff and ASGM trained. b. Number of training periods conducted. c. Number of ASGM clusters visited.
	Develop a grass root sensitization programme targeting ASGM communities and rural people including women to boost their knowledge of harmful effect of mercury	MMSD, FMEnv.				FMEnv & MMSD, External funding.	194,654.42	a. Miners and ASGM communities knowledgeable on the harmful effects of mercury. b. Women and children stopped engaging in handling or mercury both at home and ASGM sites.	a. Number of ASGM communities sensitized. b. Number of advocacy/sensitization activities carried out.
	Sensitisation of ASGM operators on mercury free technology and benefits	FMEnv , MMSD				FMEnv & MMSD.	180,000	ASGM operators knowledgeable on the harmful effects of mercury.	Number of ASGM operators
	Development of standards and guidelines for Environmentally Sound Management (ESM) of mercury in Artisanal small scale gold processing plants operations	FMEnv , MMSD				FMEnv , MMSD External funding.	250,000	Standards and guidelines for Artisanal small-scale gold processing plants operations developed and implementation commenced.	Number of guidelines applicable to Artisanal small-scale gold processing
	Provide financial and technical framework that will assist ASGM operators to transit from worst practices to minimize and zero-mercury mining practices/	MMSD, FMEnv				MMSD, SMDF & Development partners.	13,498,920.09	ASGM operators are formalized and are to acquire improved technologies for reduced mercury use and zero-	a. Number of reduced mercury use and zero-mercury technology put to use. b. number of ASGM

Action plan for the Different Phases

Strategy	Actions	Activity lead	Timeline	Funding source	Activity cost (US$)	Expected results	Indicator
	Introduction of affordable and viable mercury free technologies through persistent demonstrations at ASGM sites highlighting the superior advantages of the technologies over the existing ones.					mercury processes.	operators that can acquire financial and technical assistance.
	Establishment of long- term technical assistance for acquisition of necessary technologies and trainings to transit from worst practices to reduced mercury use and zero-mercury process	FMEnv , MMSD		FMEnv ,MMSD & UNIDO.	1,214,902.80	a. All relevant technologies are provided and set up in selected ASGM clusters. b. Facility management structure are established.	a. Number of clusters equipped with better/best practices. b. Number of sets of equipment and tools procured and installed.
Steps to Facilitate Formalization or Regulation	Appraisal of the implementation of the present ASGM formalization strategy to identify gaps and initiate corrective reforms.	MMSD, FMEnv, FMITI & ASGM reform management team		MMSD Budgetary allocation.	34,719.22	a. Challenges and gaps are identified. b. A modified ASGM formalization strategy is developed.	a. number of ASGM operators able to access financial/technical supports. b. ASGM reform strategy report produced.
	Review the institutional capacity required to implement ASGM formalization policy and identify resources required to enhance institutional capacity.	MMSD, FMEnv & ASGM reform management team		MMSD Budgetary allocation, SMDF and development partners.	800,000	Capacities of regulatory institutions are uplifted to deliver quality service and improved regulations.	a. Number of staff member trained. b. Number of resources provided for service delivery improvement.
	Initiate reform of existing ASGM funding facilities and gold market accessibility and trading.	MMSD, FMEnv, & ASGM reform management team		MMSD Budgetary allocation, SMDF and development partners.	1,889,848.81	Revenue accruable from the ASGM sector is improved.	a. number of ASGM successfully applied and received loans. b. Net percentage increase in the revenue accruable as revenue from ASGM production.

Action plan for the Different Phases

Strategy	Actions	Activity lead	Timeline	Funding source	Activity cost (US$)	Expected results	Indicator
	Streamline the licensing processes that make it easy, cost-effective, and rewarding to obtain a license. Consider decentralizing small to medium enterprises, cooperatives, and other models	MMSD		MMSD, and lined MDAs.	34,719.22	Formalizing ASGM becomes relatively easier with more than 80% of the operators under formal economic system, regulatory and legal framework.	a. Number of ASGM cooperatives having relevant permits. b. Number of ASGM cooperatives and small, medium-scale enterprises formed.
	Study and launching of an automatized and biometric system for the formalization and regularization process	FMEnv, MMSD,FMITI		FMEnv, MMSD,FMITI	120,450.04	Established automated system for formalization	Instructions for the use of automated set up
Strategies for promoting the reduction of emissions, releases, and risks of exposure to mercury.	Review the mercury inventory report and update with current data	FMEnv		FMEnv, development Partners	300,000	a. Review and update of inventory report conducted b. Current data on mercury emissions and releases available	a. Data on mercury used in ASGM b. Rate of increase or decrease in mercury emissions and releases
	Develop training module and train ASGM operators to transit to using techniques for reduced mercury use and zero-mercury process.	FMEnv, MMSD		FMEnv,MMSD, SMDF, development partners and lined MDAs.	150,719.22	a. Training module developed b. ASGM operators are armed with requisite skills and knowledge to access and operate suitable technologies to transit to reduced and zero-mercury processes.	a. Training module delivered for training of ASGM operator b. Number of ASGM operators trained.
	Development of guidelines for the management of heavy metals contaminated sites	FMEnv		FMEnv, SMDF, development partners	250,000	Guidelines for the management of heavy metals contaminated sites developed	Number of guidelines applicable to the management of heavy metals contaminated sites
	Identify and conduct environmental assessment of ASGM sites degraded and contaminated with tailings containing mercury/proffer recommendation .	FMEnv, MMSD		FMEnv, MMSD, SMDF, development partners and lined MDAs.	1,889,848.81	Environmental assessment of ASGM sites conducted	a. Number of sites where monitoring was conducted b. Level of degradation and mercury/lead pollution in relevant media

Action plan for the Different Phases

Strategy	Actions	Activity lead	Timeline			Funding source	Activity cost (US$)	Expected results	Indicator
	Conduct study on the best practices to remediate/reclaim contaminated/degraded sites	FMEnv				FMEnv, SMDF, development partners	100,000	Study on the best practices to remediate/reclaim contaminated/degraded sites conducted	a. Study report b. Mechanism for containing and/or reprocessing the tailings
	Develop and implement pilot project/s to remediate /reclaim contaminated /degraded sites	FMEnv				FMEnv, SMDF, development partners	5,000,000	Pilot project/s to remediate /reclaim contaminated /degraded sites implemented	Number of sites remediated/reclaimed
	Management of recovered mercury contaminated tailings /mercury	FMEnv				FMEnv SMDF, development partners	800,000	a. All contaminated tailings/mercury are re-processed and new contamination forestalled b. Recovered contaminated tailings/mercury are managed in an environmentally sound manner	a. Amount of contaminated tailings/mercury recovered b. Level of decrease in mercury emissions and releases
	Strengthen national monitoring and enforcement programme through but not limited to personnel training, procurement of enforcement tools, upgrading of laboratories	FMEnv				FMEnv, SMDF, development partners	1,000,000	National monitoring and enforcement programme strengthened	a. High level of compliance with related regulations b. No of personnel trained c. No of enforcement tools procured d. No of laboratories upgraded with relevant equipment
	Develop infrastructure for centralized and well-contained and managed gold ore processing centres	FMEnv, MMSD & ASGM reform management team				FMEnv, MMSD, SMDF, development partners and lined MDAs.	5,000,645	Infrastructure for centralized and well-contained and managed gold ore processing centres developed	Number of centralized contained gold ore processing points constructed.

Action plan for the Different Phases

Strategy	Actions	Activity lead	Timeline			Funding source	Activity cost (US$)	Expected results	Indicator
	Assist gold dealers and goldsmiths (operators of gold refinery) to transit to using mercury capturing tools to prevent emissions prior to introduction of alternative technology.	FMEnv, MMSD, & ASGM reform management team				FMEnv, MMSD, development partners and lined MDAs.	34,719.22	Mercury emission is reduced or eliminated in shops and residential areas.	a. Number of operators assisted to transit. b. Number of operators transited to using mercury capturing tools to prevent emissions.
	Developing guidelines and standards for Environmentally Sound Management (ESM) of handling, transportation, storage and stabilization of mercury waste in ASGM operations	FMEnv, MMSD				FMEnv, MMSD	230,450.99	Guidelines for ESM management of mercury waste developed	Effective management of mercury waste
Strategies for managing trade and preventing diversion of mercury and mercury compounds.	Investigate further the mercury supplies and flow system in Nigeria and how it is traded in the ASGM sector.	FMEnv, MMSD, & Federal Ministry of Trades & Investments				FMEnv, MMSD & Federal Ministry of Trades and Investments.	50,000	Reports and strategy for stopping illicit trades on mercury produced.	Framework and implementation plan for formalization of mercury trades and supplies developed.
	Establish cooperation with neighbouring countries to mitigate smuggling of gold & mercury and other illegal cross border activities.	FMEnv, Federal Ministry of Trades & Investment, Ministry of Foreign Affairs, Nigerian Customs Service and Nigeria Immigration Service.				FMEnv, Federal Ministry of Trades & Investment, Ministry of Foreign Affairs, Nigerian Customs Service and Nigeria Immigration Service.	269,978.40	-Cooperation with neighbouring countries to mitigate smuggling of gold & mercury and other illegal cross border activities established	a. Number of meetings held with neighbouring countries. b. Illicit cross border trades on mercury and gold are reduced to barest minimum. c. Increased contribution of the ASGM sector in the economy.
	Strengthen certification/licensing system to enable tracking of distribution of mercury and mercury related compounds in the country in ASGM.	FMEnv, MMSD & Federal Ministry of Justice				MMSD, FMEnv FMOH	134,989.20	Organized and formalized mercury trades and supply system established.	Standards for mercury flow and supply produced.
	Coordination and regular information sharing between the desk of the BRS and M Convention.	FMEnv				FMEnv and Development partners	150,000	Effective coordination between relevant chemicals related Conventions established	Level of fulfilment of obligation to the Conventions

Action plan for the Different Phases

Strategy	Actions	Activity lead	Timeline			Funding source	Activity cost (US$)	Expected results	Indicator
	Assess options for managing the excess mercury supply, including safe and secure long-term storage of mercury and mercury containing waste, and disposal of mercury	FMEnv				FMEnv and Development partners	100,000	Assessment for options for managing mercury supply, including safe and secure long-term storage of mercury and mercury containing waste, and disposal of mercury conducted	Level of decrease in mercury pollution
	Assess technologies to sequester excess mercury (amalgamation and stabilization) and facilities for safe long -term storage (above ground and below ground storage facilities).	FMEnv				FMEnv & development partners	100,000	Technologies to sequester excess mercury (amalgamation and stabilization) and facilities for safe long-term storage (above ground and below ground storage facilities) assessed	Level of decrease in mercury pollution
	Establishment of mercury stock storage facility	FMEnv				FMEnv & development partners	1,000,000	Mercury stock storage facility established	-No of storage facility - Level of decrease in mercury pollution
Strategies for involving stakeholders in the implementation and continuing development of the plan.	Conduct stakeholders' analysis to identify all relevant stakeholders: i. Assign roles; ii. Negotiate partnership terms; iii. Organize symposium, meetings, forum discussion with key sector's partners, NGOs, academia and local communities; iii. Provide incentives to participate in consultation sessions; and iv. Establish programme/ schedule for consultation meetings.	FMEnv, MMSD, d & ASGM reform management team				FMEnv, MMSD Development partners	500,989.20	Consultation platform and mechanism for feedbacks established for coordinated actions.	a. Number of stakeholders identified. b. Number of meetings/consultations performed.

Action plan for the Different Phases

Strategy	Actions	Activity lead	Timeline			Funding source	Activity cost (US$)	Expected results	Indicator
	v. Conduct biannual meetings with the NCCM/WGINA and discuss review implementation on NAP								
A public health strategy on the exposure of artisanal and small-scale gold miners and their communities to mercury	a. Comprehensive assessment of mercury exposure through health data gathering in the ASGM communities.	FMoH, FMEnv, MMSD.				FMoH, FMEnv, MMSD & development partners	134,989.20	Information on level of mercury exposure on ASGM operators and strategy to reduce or stop further exposure are developed.	a. Number of fieldworks visits performed. b. Reports produced. c. Number of ASGM communities assessed.
	b. Provide health promotion services in ASGM communities. c. Provide technical assistance to health care facilities in ASGM communities to develop treatment protocols	Federal Ministry of Health, MMSD, FMEnv, & development partners				Federal Ministry of Health, MMSD, FMEnv, & development partners	269,978.40	a. ASGM communities are aware of health risks associated with mercury exposure. b. Healthcare facilities in ASGM communities are knowledgeable and skilled to handle mercury-related health effects.	a. Number of health care personnel trained. b. Number of healthcare facilities upgraded to have treatment protocol. c. Number of ASGM communities aware of health risks associated with mercury exposure.
Strategies to prevent the exposure of vulnerable populations, particularly children and women of child-bearing age, to mercury used in ASGM.	Empower the women populations in alternative means of livelihoods to divert them from engaging in ASGM activities.	FMEnv MMSD, State government, LGA, FMoHFML&E,FMWA				FMEnv, MMSD, State government, FMoH, FML&E,FMWA	269,978.40	Less women and children are engaged in ASGM activities.	Number of women empowered.
	Improve accessibility to quality education in ASGM communities.	FMEnv, MMSD, State government, LGA				FMENv, MMSD & State governments	539,956.80	Educational facilities are improved to attract increase in number of new children to enroll.	a. Number of educational facilities upgraded. b. Number of children who enrolled in schools.
	Consider reviewing the mining laws and regulations to deter children's participation in ASGM activities.	MMSD, FMoJ				MMSD	300,997.84	Regulations to deter or stop use of child labour in ASGM are enacted and	Number of regulations made or revised.

Action plan for the Different Phases

Strategy	Actions	Activity lead	Timeline	Funding source	Activity cost (US$)	Expected results	Indicator
						enforced.	
	Carry out targeted outreach programme aimed at enlightening ASGM communities on negative impact of mercury and the risks of child labour.	FMEnv and MMSD,		MMSD FMEnv,, & development partners.	134,989.20	a. Number of outreaches programme conducted. b. Number of ASGM communities covered.	a. ASGM communities are enlightened about dangers of mercury and child labour. b. Child labour in ASGM is eliminated.
Strategies for providing information to artisanal and small-scale miners and affected communities	Identify the most appropriate means of communication specific to respective ASGM communities.	FMEnv, MMSD		FMEnv, MMSD & development partners.	134,989.20	ASGM communities are reached and sensitized through most appropriate communication channels.	a. Number of information, educational and communication material developed.
	Collaboration and regular meetings with community leaders, village heads and religious leader to enable effective dissemination of relevant information to miners and the community at large	FMENV, MMSD		FMEnv, MMSD & development partners.	500,000	Effective collaboration with community leaders, village heads and religious leader established	a. Number of meetings helds with community/religious leaders b. Level of access to communities
	Develop an outreach plan specific for affected ASGM communities, implement and encourage ASGMs to form associations	MMSD, FMEnv,		MMSD, FMEnv, & development partners	134,989.20	Outreach plan developed and implemented	a. Number of communities informed on ASGM related issues b. Number of ASGM association/cooperatives formed.
	Development of a communication strategy/platform for information dissemination	FMEnv, MMSD		FMEnv, MMSD	800,009.08	a. Effective communication platform installed b. Efficiency in inquires and feedback	Number of miners and stakeholders effectively using mobile app
Strategies for sustainable financing	Incorporate the NAP into National development plan	FMENV, MMSD		FMEnv, MMSD & development partners	100,000	NAP incorporated into National development plan	Level of access to sustainable finance
	Development of multi-stakeholder financial strategies and innovative fund-	FMENV, MMSD,		FMEnv, MMSD & relevant	100,000	Multi-stakeholder financial strategies and innovative	Level of access to finance

Action plan for the Different Phases

Strategy	Actions	Activity lead	Timeline	Funding source	Activity cost (US$)	Expected results	Indicator
	raising for environmentally sound ASGM activities			stakeholders and development partners		fund-raising for environmentally sound ASGM activities established	
Additional strategies including market-based mechanisms	Establish mechanism for implementation, monitoring, and enforcement: a. access formal mineral markets and tax incentives. b. border controls. c. incentives to enroll in gold and mercury certification protocol.	FMEnv , Federal Ministry of Trades & Investment, Ministry of Foreign Affairs, Nigerian Customs Service and Nigeria Immigration Service, NSE, FMEnv,		MMSD, FMEnv, & development partners	539,956.80	The ASGM sector is formalized to the point that enforcement is made strong with relevant laws and policies and motivated human resource.	a. Number of operators who become formalized. b. Number of operators who access markets. c. Number of policies made to control gold and mercury flow. d. Number of operators who are captured in the certification scheme.
	Establish government purchasing scheme to buy gold at an above-market price from licensed gold mining cooperatives.	MMSD		MMSD & development partners	2,200,000	Government purchasing scheme to buy gold at an above-market price from licensed gold mining cooperatives established	Level of organization in the ASGM sector

Note:
* Amount quoted are rough estimates and subject to change
* Different colours used are to differentiate timeline for each strategy
* Official exchange rate between the Naira (N) and United States dollar ($) at the time of writing the report was 370/1

EVALUATION MECHANISM

16.0

Evaluation Mechanism

Based on the *Strategic Plan outlined above for reduction and elimination of Mercury use in Artisanal and Small-Scale Gold Mining in Nigeria,* the Department of Pollution Control and Environmental Health (PC&EH) of the Federal Ministry of Environment (FMEnv) will play the coordination role in implementing this strategic plan, in cooperation with the Ministry of Mines and Steel Development (MMSD) and the Federal Ministry of Health (FMoH) together with any other relevant ministries, institutions and civil society organizations according to its mandate and responsibilities.

In order to review the effectiveness and efficiency of the strategic plan implementation, the FMEnv and all stakeholders, shall establish one main evaluation mechanism.

The evaluation is to be the total evaluation of the achievements of the strategic plan implementation that will be organized at the end of its implementation phase. Such evaluation can be made through holding a meeting or a workshop with participation from all cooperative partners, coordination partners, and all stakeholders to evaluate the total achievements as well as other positive impacts of this strategic plan. Key points for comparing achievements can be made, through updating such as: the trend of mercury use and release from ASGM; the status of miners understanding related to the use of mercury free alternative technologies; the institutional mechanism established for managing mining communities; as well as reviewing the achievements on the set objectives and the programs of work that are related to reduction and elimination of the use and release of mercury in ASGM in Nigeria.

The national plan's strategy and activities will be periodically evaluated with a view to assessing the overall impact of the implementation of various programmes and activities on the NAP objectives. In doing this, the evaluation mechanisms will be geared towards measuring, tracking achievements and constraints leading to delays. Furthermore, roles played by each actor in the implementation of NAP's project activities are assessed in terms of outputs, outcomes and results based on time frame and budgets allocated. This shall be done in order to take decisions on

whether to carry out review of roles played by the various players, facilitators and those accountable for various responsibilities in the implementation of the plan.

The Department of PC&EH of the FMEnv will establish a Technical Working Group (TWG) for the Implementation of NAP on ASGM (WGINA). This Technical Working Group (draft TOR attached) shall meet periodically to assess the operational system for executing the Action plan. The Department of Pollution Control and Environmental Health shall play the coordination role in organizing technical and other relevant meetings on planning implementation, planning formulation, or project proposal development for implementing the program of works identified in the plan.

Using self-evaluation as a major tool, the Working Group for the Implementation of NAP on ASGM (WGINA) shall meet periodically and this will afford the opportunity to review programmes, if need be, re-adjust or re-orient activities to ensure that objectives are realized as planned. This will be a continuous process done periodically within the ten-year period of the implementation of the Action plan.

The first evaluation is to be organized in the middle of year 2 or year 3 of the strategic plan implementation, with active participation from all relevant stakeholders to evaluate the outputs, identify the challenges, and set a direction for further implementation.

In the mid-term period of the NAP implementation, there would be need for an independent evaluation to be carried out. This will specifically be done to compare the level of performance with the achievement of the programme objectives. This will inform decisions to make possible modifications to the NAP implementation Plan.
The evaluation processes will as much as possible focus on the strategies and objectives whilst assessing the inputs committed by each actor, processes adopted in carrying out planned actions, immediate outputs of the actions performed, respective outcomes and impacts. A final terminal evaluation of the NAP project may be carried out with a view to deciding whether extended activities are needed to be done to achieve a complete success.

Table 24. *National Plan's Evaluation Mechanism*

Objective/target	Strategies	Indicators
To build the capacity of the regulatory institutions to enable improvement in the present poor regulations and formalization of the ASGM sector.	a. Appraisal of the current situation with regards to determining the remote and immediate cause of the poor regulation and weak enforcement of the ASGM formalization policy. b. Review the institutional capacity required to implement the	a. Greater understanding of the challenges militating against effective ASGM formalization. Availability of an appraisal report b. Percentage number of required institutions'

Objective/target	Strategies	Indicators
	recommended formalization policy and identify resources required to enhance the capacity for effective formalization. Supporting the regulatory institutions through provision of capacity building in terms of training of staff, equipping of the institutions with necessary tools and logistics to implement. c. Strategies for involving stakeholders in the implementation and continuing development of the plan: • Conduct stakeholders' analysis to identify all relevant stakeholders, • Negotiate partnership terms, • Assign specific roles to identified stakeholders, • Provide incentives to participate in consultation sessions; and • Establish programme/ schedule for consultation meetings.	staff that are trained. c. Percentage number of institutions that are provided with resources to implement the ASGM formalization activities. d. Improved understanding of the resources and logistics required by relevant institutions to implement ASGM formalization. e. Number of stakeholders and partnership agreements made to participate in NAP on ASGM.
To build the capacity of ASGM sector to adopt improved gold mining and gold ore processing techniques using reduced and zero-mercury processes leading to at least 50% reduction in mercury use and/or eventual elimination of mercury use in the sector before the end of implementation of NAP.	a. Actions to Eliminate Worst Practices. • Understudy gold ore mineralogical properties in parts of Nigeria. • Negotiate with development partners to provide training on better and best practices to MMSD & FMEnv staff and ASGM operators. • Provide financial and technical framework that will assist ASGM operators to transit from worst practices to minimal and zero-mercury mining practices. • Establishment of long-term technical assistance for acquisition necessary technologies and trainings to transit from worst practices to reduced mercury use and zero-mercury process. • Develop a grass root sensitization programme targeting ASGM communities	a. Greater understanding of the geographic distribution of gold ore in Nigeria according to textural properties. b. Identification of classes of technologies to be deployed at various ASGM clusters. c. Percentage number of MMSD & FMEnv staff and ASGM operators trained to use reduced and zero-mercury mining practices. d. Percentage number of ASGM operators assisted to transit to reduced mercury use and zero-mercury process e. Proportion of ASGM community members who became knowledgeable on the harmful effect of

	and rural people including women to boost their knowledge of harmful effect of mercury b. Strategies for promoting the reduction of emissions, releases, and risks of exposure to mercury. • Provide training programme to ASGM operators to transit to using techniques for reduced mercury use and zero-mercury process. • Identify ASGM sites with tailings contaminated with mercury. Develop infrastructure for centralized, effectively managed and environmentally friendly gold ore processing centres • Assist gold dealers and goldsmiths (operators of gold refinery) to transit to using mercury capturing tools to prevent emissions. • Legal and regulatory review that curtail pollution of natural resources, supply and diversion of mercury to ASGM sector	inappropriate use of mercury. f. Percentage of the national estimates of mercury reduced since implementation of NAP on reduction/elimination of mercury in ASGM sector. g. Percentage population of ASGM operators who have adopted reduced mercury and zero-mercury processes. h. Percentage of ASGM sites provided with centralized and well-contained and managed gold ore processing centres.
To formalize the gold and mercury trade and supply chain (looking into international connections and cross border activities) to enable proper documentations and traceability of gold produced and mercury supplied and used in the ASGM per annum to forestall informal practices.	a. Steps to Facilitate Formalization or Regulation. • Appraisal of the current situation with regards to determining the remote and immediate cause of the poor regulation and weak enforcement of the ASGM formalization policy. • Review the institutional capacity required to implement ASGM formalization policy and identify resources required to enhance institutional capacity. • Initiate reform of existing ASGM funding facilities and gold market accessibility and trading. • Streamline the licensing processes that make it easy, cost-effective, and rewarding to obtain a license to operate ASGM. Consider decentralizing small to medium enterprises,	a. Greater understanding of the gaps and challenges militating against effective ASGM formalization. b. The proportion of the existing regulations and guidelines modified to improve formalization. c. Number of international meetings with neighbouring countries held culminating to the production of binding international agreements on border controls on movements of mercury and mercury related compounds, gold and ASGM international migrant workers.

	cooperatives, and other models. b. Strategies for managing trade and preventing diversion of mercury and mercury compounds. • Investigate further the mercury supplies and flow system in Nigeria and how it is traded in the ASGM sector. • Establish cooperation with neighbouring countries to mitigate smuggling of gold & mercury and other illegal cross border activities. • Review existing laws to possibly introduce certification/ licensing system to enable tracking of the flow of mercury and mercury related compounds in the country in ASGM.	d. Proportion of ASGM operators formalizing their operations based on the new guidelines and regulations. e. A more popular ASGM policy, guidelines and regulations provided to improve formalization.
To implement programmes to cause reduction in the use of child labour in ASGM sector and improvement in the living conditions in the ASGM host communities.	a. A public health strategy on the exposure of artisanal and small-scale gold miners and their communities to mercury. • Comprehensive assessment of mercury exposure through health data gathering in the ASGM communities. • Provide health promotion services in ASGM communities. • Provide technical assistance to health care facilities in ASGM communities to develop treatment protocols b. Strategies for providing information to artisanal and small-scale miners and affected communities. • Identify the most appropriate means of communication specific to respective ASGM communities. • Develop an outreach plan specific for affected ASGM communities and encourage ASGMs to form associations c. Strategies to prevent the exposure of vulnerable populations, particularly children and women of child-bearing age, to mercury being used in ASGM.	a. Greater understanding of the level of mercury exposure to ASGM communities. b. Percentage number of ASGM communities are provided with information on adverse effects of mercury on childbearing women and children. c. Percentage number of ASGM communities that are assisted to access quality healthcare especially treatments for mercury poisoning. d. Proportion of ASGM communities that are linked to official communication channels for effective feedback mechanism. e. Proportion of ASGM operators who formed cooperatives/ associations or small-scale gold mining companies.

	• Empower the women populations in alternative means of livelihoods to divert them from engaging in ASGM activities. • Improve accessibility to quality education in ASGM communities.	f. Proportion of women in different ASGM communities empowered to undertake alternative livelihoods. g. Percentage number of educational facilities upgraded in different ASGM communities. h. Percentage number of children who enrolled in schools during the implementation of NAP
To significantly improve the abilities of formalized ASGM operators to access loan facilities from financial institutions and special funds.	Additional strategies including market-based mechanisms. a. Establish mechanism for implementation, monitoring, and enforcement leading to: • access formal mineral markets and tax incentives. • border controls. • incentives to enroll in gold and mercury certification protocol.	a. Percentage increase in the number of operators who: • acquired valid permit to operate legally. • can access loan facilities from financial institutions. • Obtain valid permits to trade on gold locally or for export. b. Percentage increase in the revenue generated from ASGM by government.

BUDGET FOR THE IMPLEMENTATION OF THE NAP

17.0

Budget for the Implementation of the NAP

The action plan in Section 15 clearly enunciates the required funding for each phase of the action Plan. It also indicates the planned source of the funds to be applied.

The action plan shows that over $47million will be required to successfully implement the activities for the reduction and eventual elimination of mercury use in artisanal and small-scale gold mining in Nigeria. The breakdown of the total amount needed is fully outlined in the action plan.

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Appendix

Appendix A

Draft Terms of Reference of the Working Group for Elimination of Mercury Use in ASGM in Nigeria (WGINA)

The followings are the terms of reference for the Working Group for the Implementation of NAP on ASGM (WGINA),

a. WGINA shall be constituted to include the representatives of different institutions who are parties to the development of the NAP on ASGM.
b. WGINA shall be empowered by high level authority (e. g. The President or her representative) to spearhead the coordination of the implementation of the NAP on ASGM activities to achieve the national objectives.
c. The President or her representative shall empower the Honourable Minister to receive reports from WGINA on the implementation of NAP on ASGM activities.
d. WGINA shall be reporting to the Honourable Minister ----------through the Director (PC&EH).
e. WGINA shall oversee the convening of stakeholder analysis for the determination of all relevant institutions and stakeholders that have influence on the success of NAP.
f. WGINA shall have the responsibilities to advise and recommend to the authorities when necessary, relevant vendors, contractors, and consultants to be engaged to execute or provide services or project activities under NAP on ASGM project.

The names and contact addresses of members of WGINA are:

I. Mr. Charles Ikeah -(Director, Department of Pollution Control and Environmental Health)- Federal Ministry of Environment, Nigeria.

ii. Mr. Olubunmi Olusanya (Director II, Department of Pollution Control and Environmental Health) – Federal Ministry of Environment, Nigeria.
iii. Mr. Patrick O. Ojeka (Director ASM) – Ministry of Mines and Steel Development, Nigeria.
iv. Mr. Olanrewaju Fatai (Deputy Director) – Federal Ministry of Health, Nigeria
v. Mrs. Oluwatoyin Olabanji (Chief Scientific Officer, Pollution Control and Environmental Health), Federal Ministry of Environment, Nigeria
vi. Mr. Nnamdi Anene (Assistant Chief Geologist) – Ministry of Mines and Steel Development, Nigeria.
vii. Mr. Oluyomi O. Banjo (Environmental Expert) – United Nations Industrial Development (UNIDO), Nigeria.
viii. Mr. Edwin Isotu Edeh, National Consultant, Public Health and Environment (PHE), World Health Organization Country Office | Abuja, Nigeria.
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x. Dr. Mary Odukoya (Associate Professor in Environmental Geochemistry and Medical Geology), University of Lagos, Nigeria.

Appendix B

Annual Baseline Estimates of Gold and Mercury in Niger State

S/N	ASGM Site	Hg:Au Ratio	Gold produced/day (g)	Mercury used/day (g)	Number of miners
1	Chanchaga Processing Site	1.3:1	56.94	74.02	200
2	Kaniya Proccessing Site	1.2:1	943.49	1,132.19	1,800
3	Nasarawa Kanji Processing Site.	1.3:1	833.28	1,083.26	3,000
4	Koro ASGM Site	1:1	624.86	624.86	6,732
5	Sabon Fegi Processing Site	1:1	728.83	728.83	2,500
6	Kuchicko Processing site	1.3:1	1,261.87	1,640.43	2,553
7	Kuchiko II Mining Site	1.3:1	155.80	202.54	2,500
8	Gadoko alluvial gold mine	Nil	32.00	0	55
9	Shidam Tunganmaku	1.3:1	83.70	108.81	151
10	Anfani Processing Site	1.3:1	855.60	1,112.28	12,000
11	Daban Woko	1.3:1	922.02	1,198.63	7,000
12	Dandanku	Nil	213.60	0	1,080
13	Daban Agua	1.3:1	160.63	208.82	201
14	Upchair Mining/processing site	1.3:1	300.67	390.87	561
15	Kwakwa Kuta	Nil	56.00	0.00	1,080
16	Gonan Zarumai	1.3:1	467.98	608.37	1,500
17	Shakwata	1.3:1	81.20	105.56	151
18	Shikira Mining Community	1.3:1	914.29	1,188.57	3,200
19	Danu ASGM sites	1.3:1	54.00	70.20	210
20	Pago ASGM sites	1.3:1	90.00	117.00	420
21	Yakila ASGM site	1.3:1	211.50	274.95	987
22	Mpape ASGM site	1.3:1	106.50	138.45	497
23	Ketearegi ASGM site	1.3:1	127.80	166.14	497
24	Elkabum ASGM site	1.3:1	14.40	18.72	56
25	Kafinkoro ASGM site	1.3:1	675.00	877.50	3,000
26	Zazaga ASGM site	1.3:1	500.00	650.00	5,000
27	Burum ASGM sites	1.3:1	363.80	472.94	1,498
			10,835.76	**13,193.95**	**58,429**

Appendix C

Annual Baseline Estimates of Gold and Mercury in Osun State

S/N	ASGM Site	Gold produced/day (g)	Mercury used/day (g)	Number of miners
1	Isotun (Ibodi)	181.20	0	453
2	Ileki (by Ijana Express Way)	20.00	0	25
3	Isireyun ASGM site	20.00	0	52
4	Akad Mining Co.	0.00	0	10
5	Ifewara ASGM site	9.60	0	18
6	Ifewara I ASGM site	42.90	0	198
7	Ifewara II ASGM site	0.00	0	55
8	Ifewara III ASGM site	0.00	0	8
9	Erinburo ASGM site	66.00	0	390
10	Ileki	45.00	0	150
11	Agawo Ngila (Store Axis)	17.50	0	35
12	Agawo ASGM site	36.00	0	210
13	Asegbo (via Ilesha) ASGM site	0.00	0	1
14	Itagunmodi ASGM site	0.00	0	1
15	Alaba ASGM site	61.20	0	102
16	Araromi ASGM site	17.50	0	75
17	Ibala ASGM site	311.60	0	820
18	Mowaje ASGM site	0.00	0	11
19	Erimokoje ASGM site	0.00	0	1
20	Ogunkeke ASGM site	0.00	0	1
21	Kajola Ubalare ASGM site	0.00	0	1
22	Iloba ASGM site	25.50	0	357
23	Orisunbare ASGM site	90.00	0	198
24	Idominasi ASGM site	5.00	0	25
25	Ideka Ijesa ASGM site	43.00	0	215
26	Iregun ASGM site	0.00	0	14
27	Ilaje Ile Abekok ASGM site	0.40	0	14
28	ENL, Muroko Road ASGM site	0.00	0	5
29	Arimoro ASGM site	2.80	0	40
30	Ijana ASGM site	400.00	0	120
31	Igun Ijesa ASGM site	15.00	0	75
32	Epe I ASGM site	42.30	0	94
33	Epe II ASGM site	37.00	0	74
34	Epe III ASGM site	6.30	0	14
35	Ibadai ASGM site	13.50	0	45
36	150 other active artisanal gold mining sites reported by Osun State MMSD officials.	6,468.00	0	16,650
		7,977.30	**0.00**	**20,557**

Appendix D

Annual Baseline Estimates of Gold and Mercury in Zamfara State

S/N	ASGM Site	Hg:Au	Gold produced/day (g)	Mercury used/day (g)	Number of miners
1	Dogon Rami-Aberi, Anka LGA	1:1	102.38	102.38	150.00
2	Bayangidandari-Aberi. Anka LGA.	1:1	1,390.46	1,390.46	5,600.00
3	Horo-Aberi. Anka LGA	1:1	881.28	881.28	1,500.00
4	Gona Moli	1:1	644.55	644.55	706.00
5	Dogon Sania	1:1	162.79	162.79	301.00
6	Loto Turawa and Environ	1:1	1,719.76	1,719.76	2,800.00
7	Daki Takwas, Gonar Kowa and Dankamfani. Anka LGA	1:1	2,369.47	2,369.47	3,002.00
8	Ruwan Kai, Gewaye and Tungan Duste. Anka LGA	1:1	3,100.032	3,100.03	4,100.00
9	Lamban Gudu, Ramin Maciji, Kware and Gidan Danhajiya. Anka LGA	1:1	3,884.976	3,884.98	4,100.00
10	Badagu and Daban Hoci. Anka LGA	1:1	3,275.496	3,275.50	3,987.00
11	Jabaka, Tsaula, Baraba, Kamfanin Madam and Yar Kaura. Maru LGA.	1:1	7,216.560	7,216.56	15,000.00
12	Kuyanbana, Maru LGA.	1:1	2,489.760	2,489.76	7,500.00
13	Kandara, Magamin Dindi and Wali. Maradun LGA.	1:1	695.268	695.27	560.00
14	Yandoton Daji and Santseya. Tsafe LGA.	1:1	406.080	406.08	500.00
15	Bagega Cooperative, Bagega	1.3:1	440.200	572.26	2,100.00
16	Dabarhankori, Bagega	1.3:1	588.000	764.40	2,500.00
17	Goronsalla, Bagega.	1.3:1	550.800	716.04	2,156.00
18	Young Miners, Bagega	1.3:1	742.400	965.12	1,236.00
19	Maidagwarwa, Anka LGA	1.2:1	608.400	730.08	1,236.00
20	Kanuma, Maru LGA	1.3:1	10.800	14.04	600.00
21	Dikwa Gulugu, Anka LGA	1:1	70.400	70.40	500.00
22	Kawaye 3, Anka LGA	1:1	161.820	161.82	9,000.00
23	Kawaye 2, Anka LGA	1:1	188.600	188.60	10,000.00
24	Kawaye 1, Anka LGA	1:1	147.900	147.90	1,000.00
25	Gadia Jaja, Zumri LGA	1:1	91.200	91.20	1,000.00
26	Kwali. Bukkuyum LGA	1:1	820.080	820.08	1,500.00
27	Gwashi-Kwali, Bukkuyum LGA	1:1	842.400	842.40	10,000.00
28	Gasawula-Kwali. Bukkuyum LGA	1:1	698.880	698.88	
29	Katsalle-Kwali, Bukkuyum LGA	1:1	701.480	701.48	12,000.00
30	11 other artisanal gold mining sites reported by ASM officers in Anka with average of 67 pits per site.	1:1	2,579.500	2,579.50	7,800.00
31	2 artisanal gold mining sites reported by ASM officer in Maradun with about 97 pits per site.	1:1	679.000	679.00	1,358.00
32	7 artisanal gold mining sites reported by ASM officer in Maru with about 36 pits per site.	1:1	882.000	882.00	3,200.00
33	9 artisanal gold mining sites reported by ASM officer in Gusau, K/Namoda, Tsafe, Bukkuyum, Zurumi, T/Mafara, and Tsafe with average of 100 pits per site.	1:1	1,461.600	1,461.60	4,500.00
			40,604.332	**41,425.67**	**133,492.00**

Appendix E

Annual Baseline Estimates of Gold and Mercury in Kaduna State

S/N	ASGM Site	Hg:Au Ratio	Gold produced/day (g)	Mercury used/day (g)	Number of miners
1	Kwaga Goldminers Multipurpose Cooperative Society, Birin Gwari LGA.	1.4:1	462.38	647.34	1,850
2	Guga Dan Tsauri Goldminers multipurpose co-operative society	1.4:1	544.32	762.05	1,781
3	Rema Goldminers Workers Union Association	1.4:1	272.24	381.14	1,566
4	Zaman Dagi Goldminers Multipurpose Cooperative Society	1.4:1	502.66	703.72	1,812
5	Tsohon Gari Goldminers Multipurpose Cooperative Society	1.3:3	918.72	1,194.34	2,101
6	Bugai Goldminers Multipurpose Cooperative Society	1.4:1	396.00	554.40	1,902
7	Sabon Gari Goldminers Multipurpose Cooperative Society	1.4:1	287.28	402.19	862
8	Sabuwar Abuja Goldminers Multipurpose Cooperative Society	1.2:1	936.32	1,123.58	1,351
9	Kamfani Goldminers Multipurpose Cooperative Society	1.4:1	433.75	607.25	1,751
10	Kungi Goldminers Multipurpose Cooperative Society	1.3:1	590.48	767.62	2,300
11	Yankan Dutse Mining Co-operative	1.2:1	638.40	766.08	2,151
12	Yanka Dutse Mining Co-operation II	1.4:1	698.40	977.76	1,241
13	Dogon Gona Village	1.3:1	209.38	272.19	560
14	Manini Village	1.2:1	564.48	677.38	780
15	Kakini Village	1.3:1	198.80	258.44	841
16	Marabar Kakini Village	1.3:1	216.00	280.80	651
17	Ungwarm Maje Village	1.3:1	172.80	224.64	648
18	Kwahu Village	1.2:3	351.12	421.34	721
19	Gwagwalada village	1.3:1	825.44	1,073.07	1,500
20	Lokoro Village	1.3:1	1,061.28	1,379.66	2,810
21	Kazai Village	1.3:1	435.60	566.28	2,700
22	Rafin Sanyi	1.3:1	270.72	351.94	912
23	Karangai Village	1.4:1	693.12	970.37	1,012
			11,679.69	15,363.58	33,803

Appendix F

Annual Baseline Estimates of Gold and Mercury in Kwara State

S/N	ASGM Site	Hg:Au Ratio	Gold produced/day (g)	Mercury used/day (g)	Number of miners
1	Dabar Alagbede	1.4:1	664.56	930.38	871.00
2	Bankole Village, Ifelodun LGA	1.4:1	373.24	522.54	711.00
3	Nano Village, Kaima LGA	1.4:1	639.84	895.78	699.00
			1,677.64	2,348.70	2,281.00

Appendix G

Annual Baseline Estimates of Gold and Mercury in Nasarawa State

S/N	ASGM Site	Hg:Au Ratio	Gold produced/day (g)	Mercury used/day (g)	Number of miners
1	Ungwan Pa'a & Uke, Karu LGA & Ikpakiya, Nasarawa LGA	1.3:1	550.00	715.00	2,850
			550.00	715.00	2,850

Appendix H

Annual Baseline Estimates of Gold and Mercury in Kebbi State

S/N	ASGM Site	Hg:Au Ratio	Gold produced/day (g)	Mercury used/day (g)	Number of miners
1	Nasarawa Cooperative, Mahupa LGA	1.2:1	1,784.06	2,140.88	2,600
2	5 ASGM sites in Yauri.	1.2:1	500.00	600.00	5,000
			2,284.06	2,740.88	7,600



