Situational Analysis on Safety, Health and Environment in the Development Minerals Sector

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ACP-EU Development Minerals Programme. Implemented in Partnership with UNDP

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About the ACP-EU Development Minerals Programme: The ACP-EU Development Minerals Programme is an initiative of African, Caribbean Pacific (ACP) Group of States, coordinated by the ACP Secretariat, financed by the European Commission and United Nations Development Programme (UNDP) and implemented by UNDP. This €13.1 million capacity building program aims to build the profile and improve the management of Development Minerals in Africa, the Caribbean and the Pacific. The sector includes the mining of industrial minerals, construction materials, dimension stones and semi-precious stones.

Cover photo: A woman crushes rock at Laroo stone quarry without protective equipment (2019).

Contents

ACRONYMS

ASM	**Artisanal and Small scale mining**
DGSM	Department of Geological Survey and Mines
DMM	Development Minerals Mining
PPE	Personal Protective Equipment
PLEXII	Platform for Extractive Industries Information
SHE	Safety, Health and Environment
MEMD	Ministry of Energy and Mineral Development
EIA	Environmental Impact Assessment
MOH	Ministry of Health
VSLA	Village Savings and Loan Association
SACCO	Savings and Credit Cooperative Organisation

INTRODUCTION

The ACP-EU Development Minerals Programme is a three-year, €13.1 million capacity building program that aims to build the profile and improve the management of Development Minerals (industrial minerals; construction materials; dimension stones; and semi-precious stones). The program is an initiative of the African, Caribbean and Pacific (ACP) Group of States, financed by the European Union and the United Nations Development Programme (UNDP), and implemented by UNDP. In Uganda, UNDP is implementing the project in collaboration with the Ministry of Energy and Mineral Development.

The project involves building capacity in 40 ACP countries, with more extensive support provided to six focus countries: Cameroon (Central Africa); Guinea-Conakry (West Africa); Uganda (East Africa); Zambia (Southern Africa); Jamaica (Caribbean); and Fiji (Pacific) to: (i) Enhance employment and incomes, including employment and incomes of women; (ii) Improve the policy and regulatory environment; (iii) Minimize environmental impacts on communities ; (iv) Address individual and community rights and preventing conflict; (v) Ensure decent working conditions and (vi) Facilitate South-South cooperation and cross-country learning.

In Uganda, the project seeks to strengthen the capacity of key stakeholders such as the small scale private sector, associations, chambers, public institutions, civil society and others to enhance the management of mining operations through observing national and international Health, Safety and Environment (HSE) Standards in the sustainable management of Development Minerals.

Africa Centre for Energy and Mineral Policy (ACEMP) was thus tasked to undertake analysis and develop knowledge products for the Development Minerals sector in Uganda including a Minimum Operating Standards Toolkit (MOST) for Safety, Health and Environmental Management. ACEMP reviewed all relevant documents with specific attention to current Safety, Health and Environment (SHE) risk mitigation and management provisions and existing stakeholder capacity gaps in the Development Minerals sector. The capacity gaps were grouped into i) institutional framework capacity gaps; ii) Artisanal and Small scale Miners SHE capacity gaps; iii) stakeholder capacity needs and barriers to utilization of regulatory framework and responsible best practice provisions for effective management of SHE issues in the Development Minerals sector in Uganda. Detailed specific actions related to each area are laid out. This situational analysis was done as a precursor towards developing the MOST for Safety Health and Environment Management in the Development Minerals sector.

BACKGROUND & SCOPE

Developing this situational analysis involved conducting an investigation of latent and manifested stakeholder capacity gaps in the management of SHE dynamics within the operating context of the Development Minerals sector in Uganda. This included understanding the legal framework regulating the extraction and business of Development Minerals, the key actors in the Development Minerals value chain, their operating context, key challenges and capacity gaps. This information gave ACEMP grounds to propose actionable measures in enhancing the capacity of key actors in improving SHE management in the Development Minerals sector, as well as some proposals on how the existing regulatory framework can be strengthened to support the sustainable development of the sector.

The geographical scope of this investigation covered the Districts of Kampala, Wakiso, Kalungu, Bushenyi, Kasese, Mukono, Buikwe, Jinja, Gulu, Moroto and Tororo. Twenty one (21) mining sites involved in the extraction, processing and trade of stone aggregates, sand, clay, dimension stones, limestone and murram were visited. The selection of these minerals for this study was guided by UNDP project staff and originated from the UNDP Baseline Assessment of Development Minerals in Uganda reports. See Table 1 below.

Table 1: Mineral Commodities, Study Districts and Mining Sites

District	Mining Site	Mineral Commodity
Buikwe	Nangunga, Namulesa, Nakatabya	Sand, Stone aggregates
Bushenyi	Bulamba 1, Mpaama	Stone aggregates, sand
Gulu	Laroo, Bardege	Stone aggregates
Jinja	Walukuba, Nabukosi	Stone aggregates and sand
Kalungu	Lweera, Mwota/Lukaya	Sand
Kasese	Kabukero, Kiyenje, Nyamwaba	Stone aggregate, murram
Moroto	Rupa	Marble
Mukono	Kasenge, Mbalala, Kijo-Kasokoso	Stone, Sand
Tororo	Akolodong, Osukuru	Sand, Limestone
Wakiso	Kasanje	Clay

Source: Primary data

APPROACH & METHODOLOGY

Qualitative and quantitative approaches of data collection were used. These included:

a) Desktop review of relevant literature and legal frameworks.

This study started with a review and analysis of available information on ASM activities in the Development Minerals Sector in Uganda and the existing policy, legal and regulatory framework. The UNDP Baseline Assessment of Development Minerals in Uganda reports were relied on heavily for this review.

b) Stakeholder identification and study site selection.

This phase involved identifying the active Development Minerals stakeholders basing on the above literature, specifically the UNDP Baseline Assessment of Development Minerals in Uganda reports. The stakeholders identified through purposive sampling included:

- Existing ASM Associations
- Active ASM sites
- Local Government Officials
- Community members in mining areas
- Development Partners

c) Data collection.

Acquisition of primary data involved interacting with respondents during field visits between 23rd January and 15th February 2019. These interactions were through Focus Group Discussions and Key Informant Interviews. Fieldwork commenced with identifying of the informants and consultations with the District Authorities, the mining communities, Local Council leaderships, ASM associations where available as well as the local people and miners involved in the mining activities at the sites visited. Further grassroots consultations were made subsequently by the research teams with specific stakeholders, especially at the selected ASM sites. This involved:

- Interviewing ASM association representatives, mine site chairpersons, and landlords in the active mining areas;
- Focus Group Discussions with ASMs in the respective districts ; and
- Informant or expert interviews with purposively sampled stakeholder representatives, including Chief Administrative Officers (CAOs), Natural Resources Officers, Commercial Officers and representatives from the Ministry of Energy and Mineral Development, among others.

In total 10 focus group discussions were conducted using semi structured questionnaires with fair representation of men and women. A total of 23 individual Key Informant Interviews were conducted using semi-structured questionnaires. The interviews achieved fair representations of gender and age and provided a deeper insight and analysis into the Development Minerals sector.

d) Site visits/observation

The researchers conducted site visits with a view of assessing the physical evidence of data especially on SHE. During the visits, observation was used hand in hand with in depth interviews. Pictorial data was also collected at the respective sites visited.

e) Report compilation

All the information collected has been put together to constitute this report. The qualitative data from interviews was transcribed, organized into sub-themes and presented as a narrative. The researchers only considered information that was relevant for answering the research questions. Pictures and any other evidence from the observation have been presented in the report as evidence.

AN OVERVIEW OF THE DEVELOPMENT MINERALS SECTOR IN UGANDA

(a) Geographical Location, Scale and Commodity Types

Development Minerals constitute the oldest historically mined commodities in Uganda. In the ancient Bunyoro Kitara Kingdom, pottery using clay can be traced as far back as the 13th century with the 'Banyabindi' people who would move around the empire in search of clay for pottery, a skill that is said to have originated from their ancestors[1].

The largest production of Development Minerals in Uganda is carried out by ASMs, accounting for an estimated USD 350 million in 2015 or 83% of national production. Production of clay bricks, sand, stone aggregate, dimension stone, kaolin, salt and pozzolana is estimated to directly employ approximately 390,000 Ugandans, with women constituting 44% of the workforce[2].

Since then, Development Minerals have been traditionally used across Uganda as building and construction materials and more recently as industrial minerals in factories. They can be categorised as:

(i) Construction materials: Including stone aggregates, sand, clay and limestone

(ii) Dimension stones namely slates, marble and granite

(iii) Industrial minerals namely gypsum, salt, vermiculite, bentonite, diatomite and kaolin

(iv) Semi-precious stones like garnet, tourmaline, emerald and ruby.

A description of the major development minerals in Uganda is given in Table 2 below:

Table 2: Major Development Minerals in Uganda

Commodity	Description
Clays	Most Ugandan clays are of sedimentary origin and well-suited to moulding and production of ceramics such as bricks, pots, culverts and floor and wall tiles. Many clays assessed in Central Uganda are "fire clays" suitable for production of refractory (high temperature resistant) bricks. ASM extraction of ball clays takes place in and adjacent to streams, rivers and wetlands, particularly in close proximity to urban centres. Other common clays include bentonite which is used for medical purposes, cosmetics and

[1] Benard Kaahwa "Uganda's pottery culture". The Daily Monitor, Accessed February 20th 2019 https://www.monitor.co.ug/artsculture/Reviews/Uganda-s-pottery-culture/691232-2623324-pvklnt/index.html.

[2] UNDP (2018). Baseline Assessment and Value Chain Analysis of Development Minerals in Uganda.

	drilling; and kaolin which is used in the ceramics industry and in pharmaceuticals.
Sand	Sand occurs similarly and often adjacent to clay deposits in and on the margins of wetlands throughout the country as well as on lake shores, with extraction most intensive along Lake Victoria south and east of Kampala.
Stone aggregates	Stone aggregates are stones that are crashed within specified size ranges in order to meet the requirements of the construction sector, mainly for use with cement and sand in the production of concrete. ASM extraction favours slightly softer, weathered rock, whereas large-scale extraction, which uses more sophisticated technology, favours harder rock such as granitoids. ASM extraction of rock for use in stone aggregates in Uganda is primarily of quartzite, slate quartzite, sandstone, phyllite, pozzolanic ash and to a lesser extent granodiorite, granite and gneiss.
Dimension stones	Dimension stones refer to slabs or blocks produced from natural stones that meet basic dimension requirements (length, width, thickness, shape) and suitable for use as rough or cut tiles, countertops, table tops and similar applications. In the case of ASM, the majority of dimension stones in Uganda are produced at stone aggregate sites, with only a tiny fraction of sites dedicated solely to dimension stones. Only a small percentage of ASM produced dimension stones are cut into tiles – most are sold 'rough'.
Pozzolanic Ash	A type of volcanic ash, pozzolanic ash (pozzolana) produces a strong, chemical resistant cement and reduces requirements for costlier limestone. Exploited deposits are found on the western and to a much lesser degree, eastern flanks of the Great Rift Valley in Kabarole and Rubirizi Districts, respectively, as well as in Kapchorwa on the slopes of Mount Elgon in Eastern Uganda.
Gypsum	Gypsum is a relatively soft sedimentary rock that is in high demand, mainly as it comprises about 5% of cement. The only known deposit occurs at Kibuku in Western Uganda (Bundibugyo District), where 300-400 tonnes per annum (tpa) were previously produced by artisanal miners and sold to Hima Cement Ltd.
Salt	Salt deposits are located in Western Uganda at Lake Katwe and Lake Kasenyi in degazetted areas within Queen Elizabeth National Park in Kasese District, and at Kibiro in Hoima District. All current production is at an ASM level.
Semi-precious gemstones	Semi-precious gemstones (e.g. opals, labradorite) have been reported to occur in the Karamoja Sub-region where geologic conditions are conducive to such occurrences.
Agro-	Agro-minerals are rocks with potential to provide essential nutrients or favourably

minerals	amend chemical or physical conditions of soil. Deposits occur in Eastern Uganda (phosphates at Sukulu and Bukusu and vermiculite at Namekhara) while potassium enriched volcanic rocks occur throughout Western Uganda (Kabale, Kabarole Districts) and under-explored occurrences of diatomite and zeolites are found in the north.

Source: ***Market Study and Value Chain Analysis of Selected Development Minerals in Uganda (2017)***

(b) Policy, Legal and Institutional Framework

(i) Background

Until 2018, the mining sector had been governed by the 2003 Mining Act of Uganda which was obsolete and not strategically positioned to address new and emerging issues in the mining sector. Key among those issues was a growing acceptance by political actors, the private sector and development partners that 'construction materials' be gazetted as minerals and regulated as such (more details on this below). These views were galvanised by reports[3] that these materials had the potential to contribute as much as 5% to Uganda's GDP.

(ii) The Constitution of Uganda

Uganda's Constitution, under Article 244 (5) states that the definition of "mineral" *does not include clay, murram, sand or any stone commonly used for building or similar purposes.* While the intention of the framers of this constitutional provision appear to have been to protect and ring-fence 'domestic' exploitation of these minerals or substances from regulation with the exclusion of 'commercial' exploitation of the same, the intention seems to have been ousted with exclusion of the same from the definition of minerals. This implied that commercial exploitation of these materials could not transform into additional revenues for Government given that there was no legal basis for levying taxes and other fees on their extraction. Section 39 of the Constitution of Uganda provides for a right to work under satisfactory, safe and healthy conditions.

(iii) The Mining and Minerals Policy of Uganda, 2018 (MMPU)

The new Mining and Minerals Policy of Uganda (MMPU) 2018 seeks to rectify some of these anomalies. Among its objectives, it seeks to organize and legislate for artisanal and small scale mining in Uganda and promote and protect Health, Safety and Environment in the mining industry.

Some of its intended actions include:

[3] UNDP (2018). Baseline Assessment and Value Chain Analysis of Development Minerals in Uganda.

- Legislate and regulate the commercial exploration, development and exploitation of substances excluded from the definition of minerals in article 244 (5) of the Constitution of 1995 as amended in 2005;
- Establish a framework for licensing, regulation and monitoring of ASM

With the approval of the new MMPU 2018 by Uganda's Cabinet in May 2018, the Ministry of Energy and Mineral Development's DGSM in collaboration with the Ministry of Justice has since embarked on the review of the Mining Act 2003 to align it with, among others laws and policies, the MMPU 2018.

(iv) The Mining Act 2003

Uganda's Mining Act 2003 does not recognise ASM which creates a perception that ASMs, the largest contributor to production of Development Minerals in the country, are operating illegally. It should be noted that the interpretation section of the Mining Act, 2003 recognises construction materials though it falls short of providing for their regulation. This can be largely attributed to the constitutional exclusion and failure to recognise Development Minerals as minerals in Uganda's Constitution.

(v) The NEMA Act

There are other laws that have a strong bearing on the Development Minerals Sector. For example, the NEMA Act regulates the management of swamps and wetlands where the bulk of sand mining takes place. NEMA has been persistently accused of not monitoring sand mining activities sufficiently which has allowed companies involved in sand mining to abuse the environment. According to the Act, NEMA can revoke permits of entities that fail to comply with their regulations.

(vi) The Sand Mining Regulations 2018

Persistent complaints by Parliament and other parties have caused NEMA to develop a Sand Mining Regulations. The Regulations ban mining in lake basins and on riverbanks, while restricting the use of dangerous technologies that have the potential of leaving permanent damage to the environment. This development is particularly important for artisanal and small scale sand miners who have been in constant conflict with established and well-capitalised mining companies that use sophisticated equipment like dredgers to mine sand.

(vii) The OSH Act

This Act came into force in 2006. Although the Occupational Safety and Health Act, No. 9 of 2006 guarantees that all public and private workplaces, enterprises, companies, organizations adhere to safety and health measures, the mining sector in Uganda continues to be characterized by inadequate enforcement and compliance to occupational health and safety standards.

The Act establishes the Department of OSH (DOSH) with the following objectives:

- To minimize occupational accidents, diseases and injuries at work places.
- To promote good health of the worker at the workplace.

- To promote good working conditions.
- To promote construction of safe and healthy workplaces.
- To promote awareness of occupational safety and health among workers, employers and the general public through training.

The mining sector generally does not have specific established OSH requirements followed by the mineral rights holders with regard to employers and employees in the mining industry. The mineral rights holders are only required to comply with the Occupational Health and Safety Act 2006. Despite government efforts to improve safety and health of all workers in the country through funding enforcement of OSH activities, limited impact has been registered due to inadequate enforcement of the Act.

Artisanal miners continue to work in sub-human environments due to a number of reasons such as the lack of well trained and facilitated inspectors to fully inspect mining areas to ensure application of OSH requirements, no sensitisation and trainings of miners on the required OSH standards, mining work places aren't registered and certified, lack of coordination between NEMA and Ministry of Gender Labour and Social Development (MGLSD) before approving of EIAs, etc.

SAFETY, HEALTH AND ENVIRONMENT MANAGEMENT IN THE DEVELOPMENT MINERALS SECTOR

Because Uganda's Development Minerals sector is dominated by ASMs, it is largely informal, labour-intensive- utilizing little or no machinery, with little regard for SHE standards. Artisanal mining of Development Minerals is generally done with rudimentary tools such as hoes, spades, shovels, chisels and pick-axes. Most mining is done at a subsistence level, with miners only able to make enough money to sustain themselves and their families for that particular working day.

Four types of mining operations typically exist in Development Minerals:

i) Surface 'pit' mines which are common in murram and sand mining areas as well as some stone aggregate sites. They are shallow pits normally on soft ground as shown in the picture below taken at Bardege stone quarry in Northern Uganda (Gulu District)

ii) Open cast mining which is rather rare but is found in some ASM stone aggregate quarries where deep pits have been created by prolonged excavation of rock over time as shown in the picture below taken at Laroo stone quarry in Northern Uganda. The budding road construction sector in Uganda has particularly led to an increase of open cast quarries where contractors use explosives to break rocks.

iii) Alluvial mining is common at clay and sand mining sites in wetlands and lake shores as shown in the picture below taken at Mwota sand mining site in Kalungu District. The trend is commonly practiced by ASMs because they lack capital to purchase mechanised equipment.

iv) Mechanised mining which involves use of sophisticated machinery like motorised boats, bucket dredgers as in the picture below taken at Seroma Limited, crushers, conveyor machinery and wheel loaders are used. Because of the scale of mining, such operations are closely monitored by NEMA. As a result, the proprietors tend to be strict on SHE issues with their workers as well as environment management.

Apart from the medium and large-scale mining sites run by companies, Development Minerals ASM sites in Uganda are generally dangerous, unsafe and prone to a range of hazards depending on the mineral commodity being mined at the site.

Mining is considered by ILO as one of the most unsafe human activities. Leading types of accidents in the mines include injuries from falling objects and collapsing walls. Other occupational health hazards in mining include exposure to intense heat, vibration, dust, fumes, Repetitive Stress Injury (RSI), intense noise, and other hazards.

The illustration below shows the common injuries and ailments encountered by miners in Development Minerals sector. No medical examinations were conducted in the course of this investigation. The illustration only represents injuries and ailments as reported by the miners according to their knowledge of the mining work they engage in, the hazards and risks involved and what impact they believe those hazards and risks are having on their bodies and general health. These safety and health issues are later discussed in greater detail.

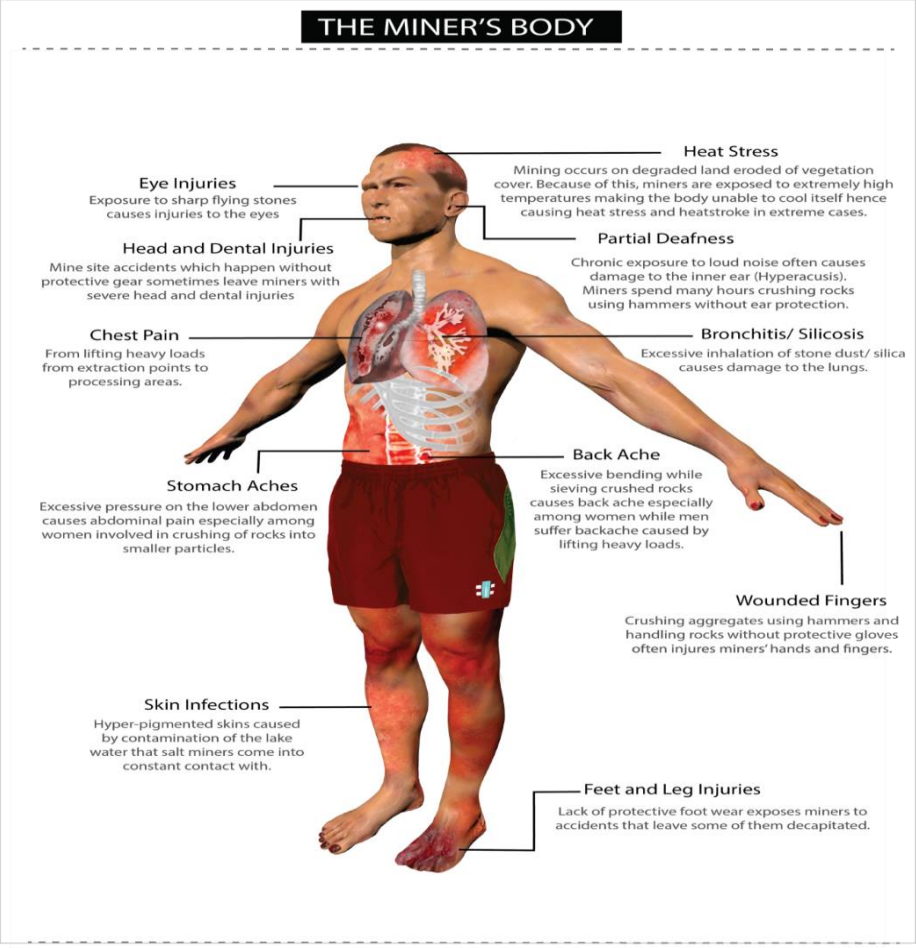


Figure 1: A miner's body showing common illnesses and injuries associated with mining of Development Minerals

Accidents and Injuries

Accidents are very common at ASM sites. They are caused by human factors, technical factors in the case of equipment and work environment factors[4] depending on the location of the mine site and the mineral commodity involved.

- **Human Factors:** These are accidents that are solely a result of human error, poor judgement and weak capacity.
- **Technical Factors:** Malfunction or misuse of machines and equipment at LSM and MSM mining sites. Hand tools at ASM sites fall under this category.

[4] Ministry of Energy and Mineral Development, SMMRP Project (2008). Small scale mining handbook.

- **Work Environment Factors:** Arising from a working environment that is hostile, non-supportive, unhygienic or disorganized and does not support a culture of safety.

Accidents and injuries were found to be commonest at stone aggregate ASM sites. This is largely because the rock is hard to break and miners were more vulnerable to malfunctioning tools and equipment.

Table 3 below shows common accidents and injuries at ASM sites across the entire value chain.

Mineral Commodity	Activity	Common Accidents	Associated potential illness
Stone Aggregate	Heating Rocks	Hand Burns, Cuts from firewood	Wound infection
	Blasting	Body injuries from flying rocks, burns from misfires and premature blasts.	Wound infections, Physical disabilities
	Excavation	Body injuries (sometimes death) from collapsing walls, rock falls	Wound infections, blindness, and physical disabilities.
	Drilling (at MSM/LSM sites)	Hand and wrist injuries	Physical disabilities
	Breaking	Eye injuries from splinters, Cuts on hands	Eye infections, blindness.
	Hauling	Falls, Back sprains and Head injuries	Physical disabilities, immobility.
	Crashing	Eye, hand and finger injuries	Eye infections, loss of sight, wound infections.
	Sieving	Eye injuries from dust particles	Eye infections, loss of sight, wound infections.
	Loading	Back injuries, Cuts on hands	Wound infections, physical disabilities.
Sand	Scooping (in lake)	Feet injuries, drowning	Tinea Pedis (Athletes foot), fungal infections, Immersion Foot Syndromes disease.
	Digging (in swamps & forests)	Feet injuries, snake bites, body injuries from collapsing walls &	Tinea Pedis (Athletes foot), fungal infections,

		subsidence[5]	Immersion Foot Syndromes disease.
	Rowing to Lake shore	Wrist and Back sprains	Physical disabilities
	Loading	Back sprains, cuts on hands	Physical disabilities, wound infections.
Limestone	Digging	Hand and feet cuts	Wound infections
	Loading in Kiln	Hand cuts	Wound infections
	Burning in Kiln	Burns from excessive heat	Skin infections
	Packing	Hand Cuts	Wound infections
	Loading	Back sprains	Physical disability
Marble	Wedging	Eye injuries from splinters	Eye infections, blindness
	Heating	Burns	Blisters, infections
	Breaking	Eye injuries from splinters	Eye infections, blindness
	Crashing	Eye, hand and finger injuries	Eye infections, blindness, physical disabilities

Source: Primary Data

Mine Site Hazards and Risks

A hazard is a source, situation, or act with a potential for harm in terms of human injury or ill health, or a combination of these. Therefore, a hazard can be anything present in the workplace that has the potential to cause an injury to workers, either a work accident or an occupational disease. Risk, on the other hand, is the combination of the likelihood of an occurrence of a hazardous event or exposure and the severity of injury or ill health that can be caused by the event or exposure[6].

[5] The gradual caving in or sinking of an area of land.

[6] *British Standard Institutions, Occupational health and safety management systems (2007)*

Main hazards and risks at ASM sites fall under seven groups: physical, mechanical, ergonomic (related to body position), sanitation, intoxication, chemical and electrical hazards[7].

i) Physical hazards:

A physical hazard can be defined as an agent, factor or circumstance that can cause harm with or without contact. These include dust, noise, heat stress, vibration and collapsing walls and pits.

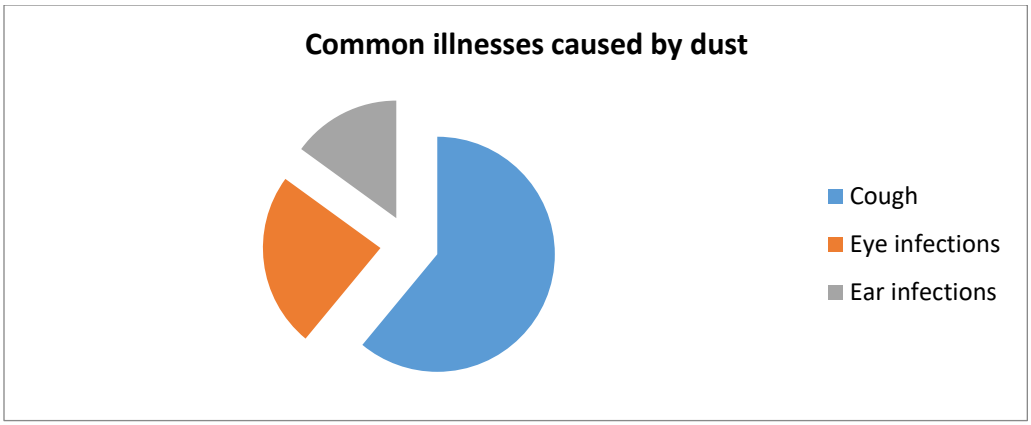
- **Dust**

This is the commonest hazard at ASM, MSM and LSM mine sites. Dust is created at all levels from extraction, processing and transportation through blasting, digging, excavating, crashing, sieving, packing and loading. Miners at all ASM sites that were visited during this study complained of excessive dust.

Dust does not only affect the ASMs directly involved in the mining operations. It is easily carried by wind and ends up polluting the surrounding environment. The study team encountered a case in Osukuru Sub-County, Tororo District, where the local ASMs' limestone processing operations are affecting the nearby communities. In another case, a secondary school is involved in a conflict with Tororo Cement over dust that is emitted by its factory located near the school. The District Authorities asked the Tororo Cement Management to grow trees around the factory perimeter to trap the dust particles and install precipitators to suck the dust. There are reports however that the precipitators consume a lot of electricity and are hence switched off at night by the factory Management.

Long term exposure to dust can cause severe health complications ranging from respiratory diseases like cough, asthma and bronchitis, silicosis (in the case of silica containing rocks), eye and ear infections, and in extreme cases, lung cancer. Sixty one (61) percent of the respondents in focus group discussions reported experiencing recurrent cough, 24% suffered from persistent eye infections while 15% had ear infections they believed had been caused by excessive dust intake. There was no evidence of miners using ear plugs or masks to protect themselves against dust, although most women miners wore scarves, head bands and hats to protect their hair from dust.

[7] [7] *Ministry of Energy and Mineral Development, SMMRP Project (2008). Small scale mining handbook.*



Source: Primary Data

- **Noise**

Hundreds of people at one mine site simultaneously using hammers and other manual tools to break rocks into aggregates can result into excessive noise. Repeated or long-term exposure to loud noise leads to hearing loss. Noise is especially common at large processing centres. At the Laroo stone quarry in Gulu, with a population of over 6oo people, more than half of the respondents reported suffering hearing loss because of excessive noise. There was no evidence of miners and workers using any protective equipment to shield themselves from noise.

- **Heat stress**

Clearing of vegetation at mine sites has left the ground exposed to sun which has left miners vulnerable to heat stress on sunny days. None of the ASM mine sites that were visited had a shelter for miners to take a break from the sun on hot days. At some sites like in Laroo, some workers had taken the initiative to put up temporary shelters made out of cloth but they were not very effective against the scotching sun as well. Heat stress can cause extreme thirst, faintness, dry skin, headaches and dizziness.

- **Collapsing walls**

This is the most lethal of all the hazards miners face in the Development Minerals sector. There were reports of serious injuries and deaths caused by collapsing walls in the past 12 months (2018). Such accidents are most common in murram quarries due to poor excavation techniques. Miners undercut steep pit walls and do not apply stabilisation techniques like benching which leaves the walls vulnerable to carve-ins. In 2018 alone, there were 4 fatalities in Kasese District, 1 in Gulu District and 1 in Bushenyi District.

Table 4: Casualties from collapsing walls in 2018

Site Location	Mineral Commodity	No. of fatalities
Karambi Sub-County, Kasese	Murram	3
Kiyenje Quarry, Kasese	Murram	1
Laroo stone quarry, Gulu	Stone aggregate	1
Mpaama stone quarry, Bushenyi	Stone aggregate	1

Source: Primary data

- **Vibration**

This hazard is prevalent in MSM and LSM Development Minerals sites where workers use hand-held machinery such as pneumatic drills and pick hammers that cause vibration. Prolonged use of this equipment has an effect on the operators' hands and arms which can lead to Vibration White Finger or numbness disease[8].

[8] Ministry of Energy and Mineral Development, SMMRP Project (2008). Small scale mining handbook.

ii) Mechanical hazards

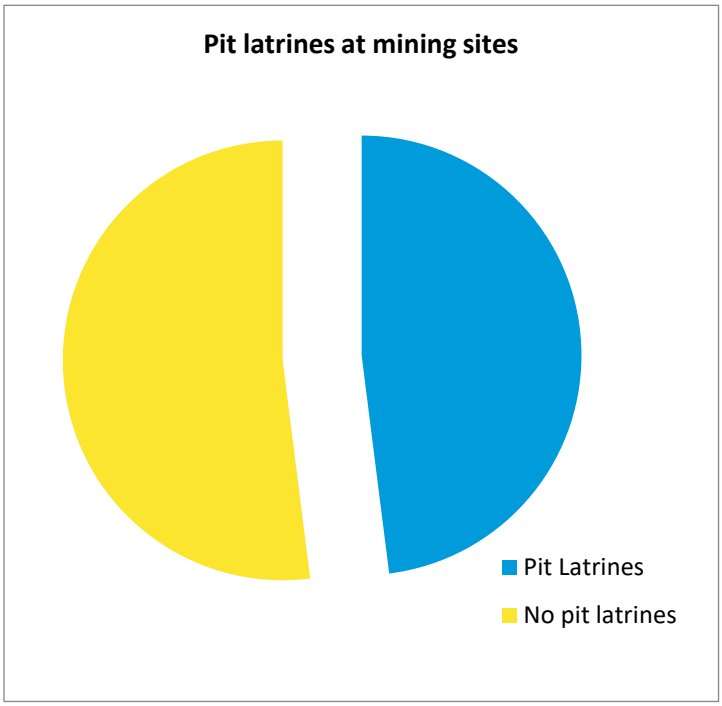
These relate mainly to equipment and malfunction of mining tools. Injuries occur when equipment and tools are not used properly during the mining process. However, mechanical hazards can also include flying rock splinters. Common accidents under this category include loss of limbs, fingers, toes, eyes and teeth injuries. These accidents are common in stone aggregate and dimension stone sites because of the nature of the minerals involved. Particularly in Gulu, miners expressed concern on the poor quality of tools like hammers and chisels available on the market that easily break, occasionally causing injuries.

iii) Ergonomic hazards

These are injuries to muscles and bones (muscle-skeleton disorders) arising from awkward work postures, repetitive movement during crashing and loading of minerals, excessive manual handling of heavy loads during haulage and poor body positioning. Such hazards include back pains, shoulder and chest pains as well as persistent limb pain. These hazards are spread across the entire value chain and therefore affect the miners and workers equally. For example, the men who are involved in the extraction and haulage of heavy rocks reported suffering chest and back pains just like the women who were involved in crashing and sieving rocks.

Figure 2: A woman at Laroo Mining site in Gulu District poorly postured as she fills acontainer with aggregates

iv) Sanitation hazards



Such hazards relate to mine sites that lack basic sanitation facilities like pit latrines, water points with hand-washing stations. Such mine sites tend to be hotspots for diseases like cholera, diarrhoea, typhoid and others. In a few cases, mining of Development Minerals takes place on community land near homesteads and miners are able to use domestic sanitation facilities of their colleagues who live nearest to the mines. Where the mine sites are located far from homesteads, the miners have built their own pit latrines although water for washing hands remains a challenge at some sites (See Table 5). Of all the ASM mining sites that were visited, 52% lacked pit latrines. Of the 48% that had pit latrines on site, 67% did not have water for washing hands. At Bulamba 1 stone quarry in Kasese District, which has a population of about 60 people, the miners confessed to using nearby bushes as toilets. Some of them however claimed that they did not need pit latrines because they go hungry all day and "eating habits determine how frequently one uses a pit latrine."

Table 5: Sanitation facilities at ASM sites

District	Mining Site	Number of Miners by site	Pit Latrine (Y/N)	Water (Y/N)
Buikwe	Nangunga	12	N	N
	Namulesa	40	N	N
	Nakatabya	7	N	N
Bushenyi	Bulamba 1	60	N	N
	Mpaama	51	Y	Y
Gulu	Laroo	>600	Y	Y

	Bardege	300	Y	Y
Jinja	Walukuba	14	Y	N
	Nabukosi	28	Y	Y
Kalungu	Lweera (Mechanised Medium Scale Mining Site)	13 workers	Y	Y
	Mwota/Lukaya	23	N	N
Kasese	Kabukero	166	Y	N
	Kiyenje	18	N	N
	Nyamwaba	11	N	N
Moroto	Rupa	>2000	N	N
Mukono	Kasenge	35	Y	N
	Mbalala	>400	Y	Y
	Kijo-Kasokoso	9	N	N
Tororo	Akolodong	26	N	N
	Osukuru	45	Y	Y
Wakiso	Kasangye	37	N	N

Source: Primary Data

v) Intoxication hazards

These relate to miners working under the influence of alcohol and other substances like marijuana which impair their brains. The result is that the involved miners can cause accidents either to themselves or their fellow miners. Although no alcohol tests were carried out during the course of this study, the study team observed littered emptied alcohol sachets at mining sites in Kasese, Bushenyi, Kalungu and Moroto which is evidence of alcohol consumption at those sites. Respondents acknowledged alcohol consumption by miners and workers during working hours but could not name a single accident that could have been caused by an intoxicated man or woman at the mine site.

(c) Environmental Pollution and Destruction

There is massive pollution and environmental destruction at ASM mine sites. Many ASM leaders perceive good environment management as an extra cost in terms of time and finances and hence do

not put the necessary environment protection measures in place. Key environment issues at ASM sites and their potential impact are listed in Table 6.

Deforestation and Wetland Degradation in the Development Minerals Sector

The Development Minerals sector is leaving a huge environmental footprint in the production of some minerals, largely limestone and clay and to a lesser extent, stone aggregates. According to the MEMD Uganda Bio Mass Strategy, ASM lime production consumes 270,000 tonnes of wood and 75 tonnes of charcoal annually. Producing a tonne of lime requires 1.5 tonnes of wood. Clay bricks on the other hand are estimated to consume about 6 million tonnes of wood[1]. No statistics were found on the use of firewood to heat and break rocks in the artisanal stone aggregate industry. Production of lime and clay bricks involves burning the raw material in firewood powered kilns which consume huge quantities of firewood and by implication has a direct impact on forests. Brick making is also one of the most serious threats to wetlands in Uganda today. Excavation involves clearing of vegetation and leaves behind big holes, which greatly hinder movement of people and livestock. Sometimes, fires are sparked off in the burning process which disrupts the wetland

Information Box 1:

Figure 3: A miner heats up a rock in Kabale District

TABLE 6: Key environmental issues in mining and their impacts

Key issues	Potential impact
Clearing of land and depleting vegetation	Loss of tree and forest cover which accelerates soil erosion, deprives livestock of grazing land as well as land for agriculture.
Abandoned pits and trenches	Pitfall (injuries to human and livestock)
Soil erosion	Loss of arable land and reduction in agricultural production
Solid waste including plastic waste	Pollution of land and water, a danger to livestock
Air pollution from dust	Respiratory diseases
Stagnant water in abandoned pits	Proliferation of mosquitoes, death traps for children, wildlife and livestock.
Poor sanitation and hygiene	Can cause cholera, dysentery and typhoid to miners and surrounding communities
Noise	Hearing impairment

Source: Primary data

Information Box 2:

An example of best practice: Backfilling of wetlands to restore vegetation

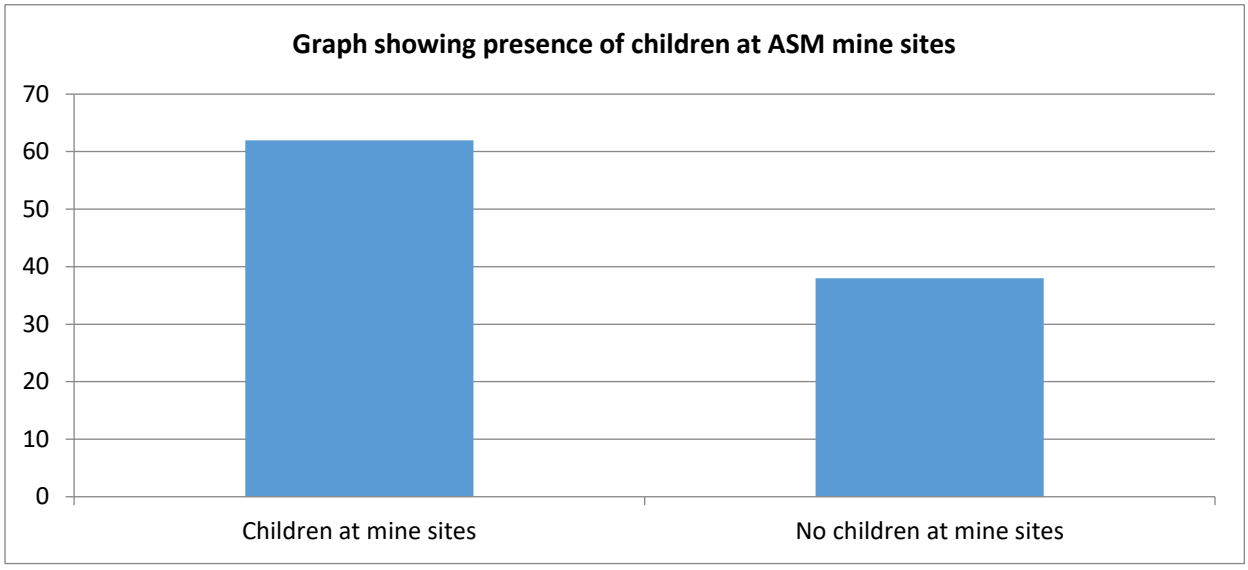
At the Seroma Lweera sand mining site in Kalungu District, backfilling is done to restore the excavated area and fill it up with new vegetation to restore the ecosystem. Grass locally called *Nakasagazi* is cut from virgin areas within the mining site and ferried to the excavated areas and spread all over. According to the site Manager, it takes three months for the grass to fully grow back to its original states. The area is considered fully restored in 3-4 years and the sand mining can resume.

(d) Children in Mining

Only 38% of the sites that were visited did not have any children on site. Generally, miners in Development Minerals do not consider it a hazard to let children access mine sites. While at some sites the children just accompany their parents and do not really engage in work, cases where children are actively engaged in mining and processing are many. Some work with their parents although most work on their own. Boys and girls are equally affected. The girls normally do the lighter work of cooking, looking after infants at the sites and crashing smaller rocks; while the boys do the heavy lifting, like transporting rocks from the pit to the processing areas.

Figure 4: A father and his son at Bardege mining site in Gulu crushing a rock for aggregates

A female respondent at Bulamba 1 quarry in Bushenyi said she brings her four children to work because she has no one to leave them with at home. The other women in the group shared her explanation.



Source: Primary Data

Figure 5: A boy at Buramba Mining site in Bushenyi District excavating rocks

Existing Measures to Avoid, Protect and Mitigate

Over time, ASMs involved in Development Minerals have developed their own rudimentary ways of avoiding, protecting themselves and mitigating against the hazards and risks presented above. Their methods may not be as effective especially in the event of a severe accident, but they work. Some of these techniques are briefly summarised below. In the last column are suggestions on what more ASMs can do to improve SHE at mine sites.

Table 7: Local ASM initiatives to avoid, protect and mitigate

Hazard/Risk	Avoid	Protect	Mitigate	What else can be done
Dust	None	Use of handkerchiefs as nose masks	Spraying water around working areas	Use PPE like dust masks
Noise	None	None	None	Use PPE like ear plugs, ear muffs or canal caps.
Heat stress	Some miners do not work in the afternoon	• Constructing work shelters, wearing caps/head gear • Drinking lots of water to stay hydrated	• Planting trees for shade in abandoned pits • Taking regular breaks from the sun	
Collapsing walls	Safe excavation techniques	• Use of hard hat, foot wear • Using structural supports on steep walls	• Benching • Suspending work in rainy seasons	• Continually observe working ground and vicinity for cracks • Scale loose rock from pit walls • Avoid undercutting rocks
Flying rocks	None	Use of eye goggles, gloves, foot wear and hard hats	• Ensuring hand tools are sharp and in	• Keep people away from working/blasting areas

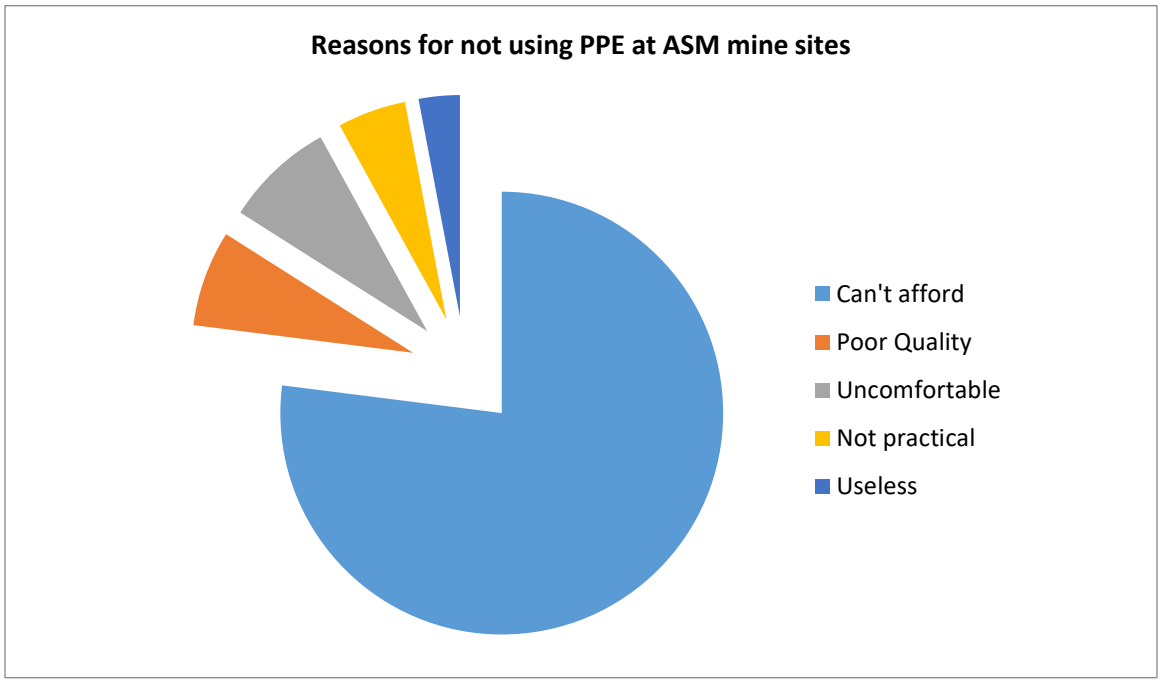
			good condition	
Ergonomic hazards	None	None	Taking scheduled breaks to relax the body	• Use wheel burrows for haulage to avoid heavy lifting • Avoiding twisted/crooked postures while working • Stretching regularly
Sanitation hazards	Constructing pit latrines, Converting some abandoned pits into latrines	Keeping mine sites clean and free of waste	Availing water for washing hands at sites	• Create mandatory handwashing stations near pit latrines • Keep cooking and dining facilities far away from sanitation facilities
Intoxication	Strict laws at the mine sites enacted by mine site leaders and landlords	None	Strict laws at the sites enforced by mine site leaders and landlords	Suspension or expulsion of habitual offenders by the mine site leaders.

Miners' Attitudes Towards PPE

All the ASMs that were engaged in the course of this study admitted to knowing the existence of PPE and the importance of being appropriately dressed for the job and prepared for any accidents. Only one group of sand miners in Wakiso District dismissed the need for PPE, claiming that they did not need life vests because "they are expert swimmers".

In the other study areas, however, respondents gave different reasons for not purchasing and adopting the use of PPE. More than three quarters (79%) reported that the PPE is very expensive to buy given their meagre earnings. Other reasons include:

- Poor quality gear that in the end becomes expensive because it is not long lasting
- The heat causes wounds when one wears gum boots
- Uncomfortable and inconvenient to work in
- Hard hats cause sweating and discomfort
- Not practical e.g. gum boots can't work in swampy areas
- Useless: Sand miners say they are expert swimmers so do not need PPE



Source: Primary data

The Buramba stone aggregate mine site was the only ASM site that had evidence of miners wearing PPE. Three full PPE sets were provided through a UNDP ACP-EU small grant that was obtained by Bushenyi District Local Government. The grant was used to conduct SHE awareness trainings at the district level; take 12 ASM representatives on a study tour of the Lake Katwe salt mines in the neighbouring Kasese District; and to procure some PPE units for the miners for demonstration and learning purposes.

The Bushenyi District Natural Resources Officer who is overseeing implementation of the grant informed the study team that the ASMs cannot afford any PPE. Although the 6 units were bought to encourage the miners to procure their own, the situation in not likely to change. At the Buramba mine site, all mining is for subsistence and the miners do not have any savings to spare to purchase PPE. For example, one is paid 200 shillings to crash stones that can fill a 20 litre plastic container. In a day, a person can manage to crash stones to fill not more than 10-12 containers. This means that that person's daily earnings would be in the range of 2000-2400 shillings. With this money, one can hardly sustain themselves and family, later on afford PPE.

Stakeholder Capacity and Gaps Analysis

The study team conducted an in-depth analysis of the capacities of different ASM stakeholders to either adopt, assist, enforce, train or implement SHE standards in the Development Minerals sector. Stakeholders were grouped into three categories: institutions that have a role in managing, regulating or developing the mining sector; ASM direct actors themselves and other stakeholders i.e. other actors that play a role in the sector but do not fall under Government Ministries, Departments and Agencies.

Generally, capacity gaps across the institutional stakeholders revolve around inadequate funding and staffing, an issue that probably cuts across all Government Ministries, Departments and Agencies. The other key issues across all the stakeholders include inadequate knowledge on OSH, corruption and a weak mind set towards building a culture of health and safety.

Table 8: Stakeholder Analysis in the Development Minerals Sector

INSTITUTION		
	ROLES AND RELEVANCE	**CAPACITY GAPS**
National Environment Management Authority (NEMA)	Environmental watch dog, approves EIAs, issues or revokes sand mining licenses.	• Understaffed • Underrepresented in mining regions due to lack of regional offices • Lacks financial resources to effectively monitor all Development Minerals operation in the country
National Forestry Authority	Custodian of all central forests and reserves in the country.	• Understaffed, under-resourced not on ground effectively • Some of the staff facilitate illegal logging to feed the Development Minerals sector
Ministry of Energy and Mineral Development	Statistics and data on ASM, Mining sector laws and regulations, formalization and regulating ASMs	• Weak institutional capacity to review existing laws and policies to give Development Minerals attention • Elite capture i.e. influential figures in Government and Private sector call the shots • Little Political will to fully formalize and regulate ASM due to conflict of interest with competing political interests
Directorate of Geological Survey and Mines	Mining Inspection, Training and Capacity building of ASMs	• Understaffed and underfunded to effectively monitor ASM operations • Have for long focused on high value minerals • Mining inspectors allocated huge regions which are impossible to monitor effectively • Lack training in Development Minerals which is relatively new concept

Ministry of Health	Identification and follow up of health hazards from mining, Public health strategies related to ASM.	• Not tuned to managing mining issues as it is not a traditional health risk • Local health facilities are not well resourced to handle emergencies in mining
Ministry of Gender Labour and Social Development	Custodian of the OSH Act, elimination of child labour, OSH regulations and enforcement.	• Weak implementation of OSH Act and related standards/guidelines • Under staffed and under-resourced • No capacity to monitor mining sector, more focus in the formal business sector e.g. manufacturing.
Ministry of Internal Affairs/Uganda Police	Enforcement by the Minerals Protection Unit	• No knowledge of mining, human rights and HSE • Weak institutional capacity that encourages corruption • No coordination with DGSM and MEMD • Conflicting mandate with Mining Inspectors • Lack of trust from the ASMs
ARTISANAL AND SMALL SCALE MINERS		
ASMs	Directly involved in mining operations.	• No technical knowledge in safe mining techniques • Poor attitude towards creating a culture of safety • No money to afford PPE • No training in OSH • Weak or non-existent leadership structures • Highly migratory and hard to monitor

Landlords	Owners of land on which mining takes place	• No technical knowledge in safe mining techniques • Poor attitude towards creating a culture of safety • No influence to enforce OSH • Driven my profit motive so do not follow up SHE issues
Host Communities	Live with/amongst/near the mining operations	• No technical knowledge on how mining affects their health • Due to poverty, are unable to follow up cases of pollution and environment degradation • They earn off the mining sector through providing services and hence cannot hold the ASMs accountable
Loaders and Transporters	The main link between ASMs and clientele	• Are not detached from ASM operations and do not care whether a mine site is observing SHE best practices or not. • No knowledge of SHE
LARGE AND MEDIUM SCALE MINING COMPANIES		
Private Sector	Members of the Chamber of Mines and Petroleum involved in medium and large scale mining operations, importers of mercury	• Driven by the profit motive and not willing to invest in implementing proper OSH/SHE guidelines • Do not conduct refresher course for employees on OSH
OTHER STAKEHOLDERS		
Non-Governmental Organizations	Involved in supporting artisanal and small scale miners through training, sensitization and advocacy	• Lack training in OSH • Most of their programs are short-lived and hence not sustainable • Driven by donor interests not community interests

		• Corruption, weak transparency and accountability
Development Partners	Support training, capacity building, research	• No knowledge of emerging trends in the sector that influence ASMs behavior and attitude • Lack in-depth knowledge of culture and customs that influence ASM
Resident District Commissioners	Government representative in mining sector	• No knowledge of mining, human rights and HSE • No coordination with DGSM, Minerals Protection Unit and MEMD • Lack of trust from the ASMs
Community Health Centres	First points of call for first aid and emergency services	• Lack equipment and facilities • Understaffed • Little training in mining sector specific accidents, illnesses and emergencies • No drugs
Local Politicians	Seen as points of mediation for mining conflicts	• Biased interests between representing communities or business interests. • Lack knowledge on conflict mediation, mining OSH
Media	Dissemination of information on the sector	• Not received training in mining sector related OSH • Not well facilitated to follow up cases
Village Microfinance Institutions	Capable of capital financing to mining groups	Not conversant with mining sector, perceive ASMs as a high-risk population.
Village Savings and Loan Schemes	Can pool resources from different miners and their groups that can be used implement OSH e.g. purchase of PPE.	Weak marketing skills to attract ASMs

Conclusions

Overall, there is little regard for SHE by artisanal miners in the Development Minerals sector in Uganda. Miners are aware of the dangers and risks in their work but lack a culture of personal and group safety at mine sites to minimise accidents and mitigate hazards and risks. There is a general belief among artisanal miners that their work is naturally dangerous and work related accidents or illnesses are inevitable. This thinking must be corrected through sensitising workers to adopt safe mining habits and avoid taking unnecessary risks.

Artisanal miners in the Development Minerals sector across Uganda have to deal with a tough choice every day: use some of their meagre earnings to invest in PPE and other SHE safeguards or use the money to sustain their households and leave safety and health issues to chance. Many miners inevitably pick the latter, disregarding the potential long-term cost of accidents and illnesses in the event that they are 'unlucky' and get injured. Injuries are expensive to treat and in an environment where there is no medical insurance, the affected family ends up much poorer.

The weak or even total lack of enforcement by the Government's OSH Department and the DGSM Mine Inspectors allows miners to operate in dangerous circumstances. In many of the districts visited, only the District Natural Resources Offices had some evidence of monitoring mine sites although they too are underfunded and hence their operations are limited. This leaves the artisanal miners to organise their sites by themselves and ensure SHE standards are implemented.

Recommendations

INSTITUTION	RECOMMENDATIONS
National Environment Management Authority (NEMA)	• Ensure effective monitoring of ASMs working in delicate wetland ecosystems • Gazette critically endangered wetlands as non-sand mining zones • Open up regional offices with adequate staff to effectively monitor all Development Minerals operations in the country
National Forestry Authority (NFA)	• Beef up forestry monitoring personnel in mining areas to reduce illegal logging of timber to feed the Development Minerals sector
Ministry of Energy and Mineral Development	• Support formalisation of ASM for efficient regulation and monitoring of mining activities in the Development Minerals sector. This support can be in form of financial grants to DGSM, awareness raising, mobilising and Mining legislative review. • Create incentives to encourage miners to use PPE and make it more affordable for them. These include waiving taxes on imported PPE destined for the mining sector, and giving incentives to business actors willing to set up special OSH shops in major mining regions. • Create designated Development Minerals ASM mining zones to create ownership amongst ASMs and avert conflict with MSM & LSM companies
Directorate of Geological Survey and Mines	• Conduct training and capacity building of Development Minerals ASM actors on SHE. Training should be based on 'practical theory' combined with the practical application of the theory, i.e. 'the doing'. Specific training programs can be established for ASMs that should focus on 'the doing' rather than just demonstrations. • Support the establishment of centres of excellence whereby current working places are supported to become mines of best practice so that other miners can observe the actual implementation of the theory. These should not be training centres as such, but operating mines that are implementing best SHE in mining practices. • Support mobilisation of ASMs into associations and build their leadership structures that are inclusive of women. All guidelines

	on OSH can then be passed through the leadership structures to the ASMs. • Beef up the inspectorate department with more staff and adequately resource is to monitor Development Minerals operations
Ministry of Health	• Apply the MOH Village Health Worker Model to ASM Groups and Associations where at least two miners (preferably male and female) at every ASM mine site receive first aid and basic health training. With basic drugs and supplies, trained women and men could provide services to fellow miners for a small payment, referring more serious cases to health facilities. • Train village health centre medical personnel in mining sector specific accidents, illnesses and emergencies • Equip and facilitate village health centres to be effective first points of call for first aid and emergency services
Ministry of Gender Labour and Social Development	• Secondment of a Dept. of Occupational Safety and Health (DOSH) Officer to DGSM to support the Mines Inspectors through basic training, co-development of programmes and co-implementation of inspections and grassroots training/advice.
ASMs	• Site managers or leaders can draft simple, easy to follow SHE rules that every worker on site is mandated to follow or else risk heavy punishment that may include expulsion from the site. Such SHE rules should be based on the miners' assessment of hazards and risks at their mine sites in particular. Some key topics areas for consideration include safe work procedures; safety, organisation and management; safety of tools and equipment; safety during transportation; and establishing emergency response plans. Site managers can also identify enthusiastic men and women to take on the roles of SHE supervisors and first aid providers.
Development Partners / Non-Governmental Organizations	• Institutional capacity building should be conducted for those institutions that are only beginning to interface with the Development Minerals sector. These include Ministry of Health, Ministry of Gender Labour and Social Development, Ministry of Internal Affairs, etc. Build capacity of institutions • Assist in the promotion of training programmes, i.e. short courses and best practice mines so that artisanal miners, supervisors, owners, and other associates of artisanal mining can immediately improve their technical skills in terms of safety and mining. • Support women in mining with facilities that can reduce the number of children in the mine sites. One facility can be a day-time

nursery where children can spend the day as their mothers work.

- Facilitate access to financing because lack of capital is an additional constraint to both investment in improved mining methods and improved profitability. Without good profits, PPE becomes very expensive for the miners. This financing can enable miners to acquire low-cost basic equipment which is easy to use, effective and environmentally safer.
- Encourage ASMs to form VSLAs or join SACCOs and give them the necessary basic training depending on their capacity and needs. NGOs can use their urban networks with banks, micro-finance institutions and other SACCOs to invite their representatives to such trainings to provide information on their products.
- Support the creation of District Development Minerals Forum comprising of different actors that can be a Community of Practice that meets periodically to assess the state of SHE in the Development Minerals sector in that district.
- Support relevant line Departments specifically DGSM with the financial resources to recruit more staff, open up more regional offices in order to effectively monitor ASM activities.

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