A Golden Opportunity:

Scoping Study of Artisanal and Small Scale Gold Mining in Zimbabwe

THE CHAMBER OF MINES OF ZIMBABWE

pact

SUBMITTED TO

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Foreword

Dear reader,

We all rely on stereotypes to make sense of the world around us. The problem, of course, is that stereotypes aren't always accurate.

Many people believe that the typical artisanal gold miner in Zimbabwe is a single, migratory man in his early 20s who has no education, gambles away his money, and is likely to contract HIV. But the picture of the miners who participated in this study is rather different. In fact, mining is carried out by men, women, youth and children. The average miner is older and married with more children than non-miners in their community. They have more formal education, and earn and save more money than non-miners. And despite assumptions about lifestyles, miners are no more likely to be HIV-positive than non-miners.

Another common perception is that artisanal miners always exist in conflict with large scale miners and the two sectors are "sworn enemies". Instead, there is significant potential and appetite for co-existence, collaboration and working together amicably. In Zimbabwe today there is great willingness to enable such synergies to flourish.

These are just some of the facts we can now put in writing — an important step forward as we plan interventions to improve and formalize small-scale gold mining to the benefit of all stakeholders across the mining sector. Zimbabwe's artisanal miners – both men and women - need technical, social and environmental support and our results show that they are likely to make good use of such support. They need safer working conditions and business development skills to maximize the potential benefits of mining, and health support to minimize the risks of their work. Their families and communities must gain lasting benefit from the efficient and effective use of the natural resources around them.

Thank you for reading this report. I hope it provides the solid foundation for interventions that will deliver prosperity through partnership across Zimbabwe's mining sector.

Mark Viso
President and CEO
Pact

Acronyms

AFSM	Austrian Foundation for Small Mines
AGC	Artisanal Gold Council
AMP	artisanal mining permit
AP	approved prospector
ASM	artisanal and small-scale mining
ASMO	artisanal and small-scale mining organization
BSAC	British South Africa Company
CAR	Cordillera Administrative Region
CBZ	Commercial Bank of Zimbabwe
CI	confidence interval
CID	Criminal Investigation Department
CIO	Central Intelligence Organization
COMZ	Chamber of Mines Zimbabwe
CSO	civil society organizations
CSR	corporate social responsibility
DFID	UK Department for International Development
DMP	Draft Minerals Policy
DP	Digital Preservation
DRC	Democratic Republic of Congo
EFT	ethical and fair trade
EIA	environmental impact assessment
EMA	Environmental Management Agency
EPO	exclusive prospecting orders
ESG	environmental, social, and governance
EU	European Union
FDI	foreign direct investment
FGD	focus group discussions
FIFA	first-come, first-assessed
FPR	Fidelity Printers and Refinery
GCECU	Gold Compliance and Enforcement Coordinating Unit
GDF	Gold Development Fund
GDP	gross domestic product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Federal Enterprise for International Cooperation)
GMMDT	Gold Mining and Minerals Development Trust
GMP	Global Mercury Project
GSZ	Geological Survey of Zimbabwe
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Corporation)
HDI	Human Development Index

Hg	Mercury
IIED	International Institute for Environment and Development
ILO	International Labour Organization
IMR	Institute of Mining Research
ITDG	Intermediate Technology Development Group
JOC	Joint Operations Committee
JORC	Joint Ore Reserves Committee
KII	key informant interview
LBMA	London Bullion Market Association
LSM	large-scale mining
LSMO	large-scale mining organization
M&E	monitoring and evaluation
MAB	Mining Affairs Board
MCIMS	Mineral Cadastre Information Management System
MEWC	Ministry of Environment Water and Climate
MGB	Mines and Geosciences Bureau
MHCW	Ministry of Health and Child Welfare
MIL	Mining Investment Loan
MMA	Mines and Minerals Act
MMCZ	Minerals Marketing Corporation of Zimbabwe
MMMD	Ministry of Mines and Mining Development
MMSD	Mining, Minerals and Sustainable Development
MOD	Ministry of Defence
MOF	Ministry of Finance and Economic Development
MOLG	Ministry of Local Government
MOSMECD	Ministry of Small and Medium Enterprises and Cooperative Development
MoWAGCD	Ministry of Women Affairs, Gender and Community Development
MRCZ	Medical Research Council of Zimbabwe
MSC	most significant change
MSME	micro, small, and medium enterprise
NAC	National AIDS Council
NBE	National Bank of Ethiopia
NGO	nongovernmental organization
NRB	Natural Resources Board
NSSA	National Social Security Authority
OPIC	Overseas Private Investment Corporation
OSH	occupational safety and health
PMMC	Precious Minerals Marketing Company
RBZ	Reserve Bank of Zimbabwe
RDC	Rural District Council
RJC	Responsible Jewellery Council

RSI	repetitive stress injuries
SADC	South African Development Community
SAESSCAM	Service for the Assistance and Supervision of Artisanal and Small-Scale Mining
SAZ	Standards Association of Zimbabwe
SGBP	state gold-buying program
SI	statutory instrument
SMC	Shamva Milling Centre
SNV	Stichting Nederlandse Vrijwilligers (Foundation of Netherlands Volunteers)
SSM	small-scale mining
SSMAZ	Small-Scale Miners Association of Zimbabwe
UBC	University of British Colombia
UL	Underwriters Laboratory
UNECA	United Nations Economic Commission for Africa
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VAT	value-added tax
WASH	water, sanitation, and hygiene
WCIF	Workers Compensation Insurance Fund
WHO	World Health Organization
ZASMC	Zimbabwe Artisanal and Small-Scale for Sustainable Mining Council
ZB	Zimbank
ZESA	Zimbabwe Electricity Supply Authority
ZETDC	Zimbabwe Electricity Transmission and Distribution Company
ZIMASCO	Zimbabwe Mining and Smelting Company
Zim-Asset	Zimbabwe Agenda for Sustainable Socio-Economic Transformation
ZIMRA	Zimbabwe Revenue Authority
ZINWA	Zimbabwe National Water Authority
ZMF	Zimbabwe Miners Federation
ZNA	Zimbabwe National Army
ZPA	Zimbabwe Panners Association
ZRP	Zimbabwe Republic Police
ZSM	Zimbabwe School of Mines
ZWRDT	Zimbabwe Women Rural Development Trust

Converting Between Grams and Ounces

1 gram of gold	=	0.03215 troy ounce of gold
1 troy ounce of gold	=	31.1 grams of gold

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Executive Summary

In Zimbabwe, it is estimated that artisanal and small-scale mining (ASM) provides a direct livelihood for more than one million people—critical in a country grappling with high unemployment. Consensus is growing among key ASM stakeholders that the government's policy shift toward increasing economic emphasis on ASM gold creates both an immediate need and an important opportunity to formalize the ASM sector.

The Scoping Study

With the support of the UK Department for International Development (DFID) and the United States Agency for International Development (USAID), Pact conducted a scoping study of the ASM sector on behalf of the Chamber of Mines of Zimbabwe (COMZ) and the Ministry of Mines and Mining Development (MMMD). It was envisioned that such a study would illuminate the dynamics of gold production, gold processing, the gold trade, and sector regulation and would provide an important perspective on challenges to, and opportunities for, formalizing and integrating ASM with large-scale mining (LSM). The scoping study utilized qualitative and quantitative methods of data collection with the help of mobile technology. It was carried out in two administrative districts, Shurugwi and Kadoma, both major mining areas; target groups comprised male and female artisanal miners of all ages, as well as small-scale miners, large-scale miners, millers, gold traders, and government officials.

Six hundred twenty-eight respondents participated in the scoping study; 30 percent were female and around 40 percent were from surrounding communities and were not engaging in mining activities. This 40 percent comprised a comparison group. Of respondents engaging in mining, around 70 percent were working on mines with a certificate of registration and a valid annual operating license (i.e., engaged in fully formal operations) and 20 percent were working in unregistered mines, without a valid operating license (i.e., in informal operations). The remaining 10 percent were operating on registered claims that were not licensed (i.e., partially formal operations). Seventy percent of miners were unskilled.

Background

Artisanal and Large-Scale Mining in Zimbabwe Over Time

Zimbabwe has a long and interesting ASM history, which includes the vertical movement over the last century of many mining operations from small in scale to medium and large in scale. Following this period, over the past three decades, there was exponential growth in the population of artisanal and small-scale miners, fueled by record unemployment, high commodity prices, and a decline in agricultural activity due to droughts and economic downturn.

The Government of Zimbabwe has interacted with ASM in myriad ways over these 30 years: from ignoring the growing sector during the 1980s to becoming a global leader in engaging the sector during the 1990s (via pro-poverty interventions such as legalizing gold panning and stabilizing gold prices). During the early 2000s, against the background of deteriorating economic conditions, the government sought to increase the flow of gold to its official buyer, Fidelity Printers and Refiners (FPR), and offered low-interest equipment loans, liberalized gold buying, and provided technical support through MMMD. Although these interventions succeeded in boosting the production of gold, most of it ended up on the informal market, and the government responded with fury in the form of Operation Chikorokoza Chapera, which effectively criminalized ASM and adversely affected many legitimate small-scale miners and custom millers. In recent years, the government has begun to reconsider formalization of ASM.

The government's evolving stance on ASM has affected the interactions of nongovernmental organizations (NGOs) and donors with the sector, as revealed by the lack of any involvement during the 1980s, by the many different projects introduced during the 1990s, and by NGO and donor reluctance to directly engage the sector in the years

that it was illegal. Current positive government policies have spurred today's growing focus on ASM. During the 1990s, the organization now known as the Deutsche Gesellschaft für Internationale Zusammenarbeit (German Federal Enterprise for International Cooperation, or GIZ—then known as Deutsche Gesellschaft für Technische Zusammenarbeit, the German Technical Corporation, or GTZ) focused on environmental rehabilitation, while the Austrian Foundation for Small Mines (AFSM) provided soft loans and grants, and Practical Action, an NGO, set up the Shamva Milling Centre (SMC). The SMC was a success, hailed in literature and emulated in other countries, although it ended after being handed over to an inadequately prepared and under-resourced local association. Some successes were recorded by GTZ's project, but it did not last long without GTZ presence. The AFSM financing project struggled with high administrative costs, low reimbursements, and complex ASM borrowing requirements.

Over the years, the LSM sector has interacted with ASM in various ways. In some instances, LSM facilitated police repression of ASM activities. Other engagements have been positive, although these have typically involved relationships with ASM developed by individual mines and companies in isolation rather than industry-level initiatives. These relational interactions have varied from tributing agreements, in which partial concessions are effectively subcontracted to ASM actors, to the provision of technical support. Examples of mutually beneficial relationships include Dalny Mine's provision of claims to ASM miners and Redwing Mine's authorization of ASM mining in old waste dumps. Banks and other private entities have provided loans and participated in gold trading.

Artisanal and Small-Scale Mining, Women, and the Environment

Previous studies and reports have estimated that more than one-third of artisanal miners are women. The Pact scoping study found that only 11 percent of artisanal miners in the two target areas were women. The government has encouraged women to engage in small-scale mining, and several organizations represent women miners' interests. Although the existence of child miners has been cited as a major challenge in many countries, this has not been the case in Zimbabwe, as seen both in the literature and in the Pact study. That said, quantifying an illegal activity presents challenges, so the true levels of child labor are hard to ascertain. Importantly, although the number of children engaged directly in ASM may be small, those who are present are heavily engaged.

Environmentalists have been among the leading critics of ASM formalization due to the high level of environmental degradation caused by mineral extraction and the impact of mercury use in ASM. Although the scoping study did not focus on it, wide use of mercury was observed, often in open-air amalgamation; the few alternatives were generally found to be unappealing to miners.

The Policy Framework

Zimbabwe's legal and policy framework for mining is generally burdensome, with more than 40 acts of parliament regulating mining operations. ASM is directly affected by 24 of these acts and by the statutory instruments that fall under them. The principal regulatory act is the Mines and Minerals Act (MMA), specifically Chapter 21:05m, which neither recognizes ASM nor differentiates between LSM and small-scale mining (SSM). The MMA's silence on ASM puts those engaged in it at a disadvantage; these individuals not only lack LSM's levels of financial and technical resources but also are ill-informed on the mining law's various requirements. LSM operators' financial and technical strength allows them to access land through exclusive prospecting orders (EPOs) and add value to the land by detailed exploration. Coupled with in-depth feasibility studies, this allows them to project long-term goals, devising economic strategies that ultimately benefit them.

Statutory instruments (SIs)—for example, the explosives regulations in Chapter 10:08 of 1989; Mining (Managements and Safety) Regulations (SI 109 of 1990) and Mining (Health and Sanitation) Regulations (SI 182 of 1995)—exemplify legislation where ASM regulation on the ground falls far short of what is needed. The MMA is old, and it has become difficult to marry it with policies meant to stimulate growth within the mining industry and advance the nation socioeconomically. These policies include Zim-Asset; the Draft Minerals Policy; the National Budget Statement pronouncements on taxes; and the various new strategies announced by the Minister of Mines in his November 2014 statement to the press.

Zimbabwe is one of only six countries with a state-controlled gold market. The Gold Trade Act (Chapter 21:03) singles out the Reserve Bank of Zimbabwe (RBZ), through FPR, as the nation's sole gold buyer. ASMs are charged 3 percent mining royalties on gold; a 3 percent presumptive tax was recently removed. Millers deem the cost of annual licensing (US$8,000) too high, and fewer than half comply. To ensure compliance across the entire gold mining and trading sector, it is imperative to rationalize the costs of compliance.

Scoping Study Findings

Gold flow within Zimbabwe was described in the Pact scoping study as being composed of a complicated network of many players. Some gold was found to end up in the formal market via FPR. Other material was reported to go to the informal market. Up to two-thirds of surveyed miners said they sold to the formal market. Other stakeholders expressed varying ideas as to the proportion of ASM gold flowing to the informal market, with estimates ranging between 10 and 90 percent. Almost half of miners were unaware of the FPR price for gold, but only 35 percent were unaware of the informal price for gold—suggesting that miners engage more often with informal traders than in the formal system. That said, 65 percent of miners asserted that they sold their gold on the formal market (i.e., to FPR and millers), nearly twice the 35 percent who admitted to selling on the informal market (i.e., to traders, claim owners, and sponsors). Thus, it can be estimated that between 35 and 50 percent of miners sell their gold on the formal market, with 130 kilograms (about 287 pounds) going to FPR each month. By extension, an estimated 130 to 240 kilograms (about 529 pounds) of gold reaches the informal sector each month. The reasons are several: the informal market pays higher prices than the formal[1]; the formal market levies high regulatory fees; selling at FPR gold-buying centers is inconvenient; transporting gold is risky; and there is insufficient enforcement of existing regulatory requirements with regard to artisanal gold production and sales.

Scoping Study Recommendations

To formalize ASM gold mining and trading, Pact recommends the following interventions for Phase 2 of the "Formalizing Artisanal Gold Mining and Trading in Zimbabwe Project":

Theme 1: Business and Economic Development

Component 1: ASM–LSM Collaboration

This component addresses the issue of integration between ASM and LSM to form one mining industry, which COMZ has championed. LSM will allocate to ASM ore bodies of a scale that is uneconomical for industrial extraction but suitable for smaller-scale exploitation. The project intends to provide an environment conducive to accessing claims that are in the long-term plans of LSM on tribute agreements. Relationships will be established on a business/contractual basis with a plan for mutual profitability and with minimum standards set in terms of operational, safety, and environmental parameters.

Component 2: ASM Services

This component is aimed at transforming the fractured relationship that currently exists between millers and ASMs into one that is mutually beneficial based on provision of services. This component will pilot ways in which services can be delivered to artisanal and small-scale miners as part of their formalization and integration into the mining sector. The project will seek to transform selected mills into service centers where more efficient, environmentally

1 Gold prices can be found at http://goldprice.org/. Sponsorship is when a financier, who has no claims of his or her own, injects money for daily operations at a particular ASM site, in the expectation of being repaid with interest, after a period of time, in the form of gold.

sensitive milling takes place and where miners' gold recovery is improved. This project component builds on the successes achieved by other projects in ASM service centers but will avoid their pitfalls.

Theme 2: Environment, Health, and Gender

Component 3: Mercury Abatement

The upcoming ratification of the Minamata Convention on Mercury, which proposes significant reduction in the use of mercury by 2020, poses both threats and opportunities. Artisanal and small-scale miners have expressed concern that the proposed reduction in mercury availability will undermine the sector's viability. Certainly, decisions such as to ban mercury must be made after careful consideration, lest the impact on ASM be severe and drive miners into illegal activities, at the mercy of the informal market, with reduced returns, and potential exposure to mercury used clandestinely, with dramatically increased risks to health. Zimbabwe's participation in the Minamata process requires a comprehensive, inclusive national action plan if it is to be successful.

Component 4: Women in Mining

Although gender issues are integrated into all project components, the needs relating to the integration of women into the mining sector are such that gender warrants a specific component to ensure that sufficient resources and attention are dedicated to bringing about discernible change.

Theme 3: Policy

Component 5: Policy and Learning

All project components will deliver results that can influence policy; some will rely on adjustments to policy for their success. The components will generate learning points and results that are essential to inform decision makers and to provide the evidence base for effective advocacy.

Please note that precise activities in Phase 2 will be funding dependent.

chapter 1

Introduction

This report presents and analyzes the results of a scoping study that Pact conducted on artisanal and small-scale mining for gold and gold trading in Zimbabwe between September and December 2014. The study was Phase 1 of the "Formalizing Artisanal Gold Mining and Trading in Zimbabwe Project"; study results will be utilized to plan an intervention that can contribute to the formalization of Zimbabwe's ASM sector. As a follow-up to the scoping study, project Phase 2 comprises a pilot program that will test the recommendations for ASM formalization.

Pact's consultations with Zimbabwean civil society, private sector mining companies, financiers, banks, multilateral and bilateral donors, and the government point to a clear appetite at many levels for legitimizing ASM on the spectrum of mining activity in Zimbabwe. Indications are that initiatives that focus on formalizing ASM gold mining and trading will have the requisite political support. Specifically, the government priority is to bring ASM into the mainstream supply chain to capture the value of the gold and other minerals that are now leaving the country illegally. Zimbabwe has set a target of formalizing 100,000 miners, an ambitious goal.

Information given in this report is based on the best and most reliable data that the Pact team was able to obtain in the time available. Miners, traders, and others associated with artisanal mining are often reluctant to share information for a range of reasons, including: possible illegal status; suspicion as to why they are being asked; reluctance to disclose personal information to strangers or to let others know about what they might have that is worth stealing; and fear of increased taxation or reprisals. This report's subject matter is highly sensitive, and many individuals hesitated to discuss details of illegal gold mining and trading lest they implicate themselves or their colleagues. The full identity of all individuals who provided information for this report has been kept confidential.

Pact upholds and respects Zimbabwe and international legislation regarding artisanal mining and mineral trading. However, Pact is also aware that creating a climate of fear in the mines without providing positive interventions to address the root causes of illegal activity is likely to increasingly inhibit ASM formalization.

Recommendations in this report are proposed in good faith based on analysis of the dynamics observed in the gold mines, processing facilities, and trading points in Zimbabwe's Midlands; on Pact knowledge of best practices in the mining sector; on previous experience in ASM; on knowledge of and commitment to improving the lives and the economic and legal status of artisanal miners; and on what Pact considers to be responsible, effective, and practical.

Pact's overriding commitment is to support the Government of Zimbabwe and the artisanal and small-scale gold miners and traders to transform the sector dynamics to benefit all involved and to contribute to Zimbabwe's long-term prosperity.

Background

Estimated to provide a direct livelihood for more than a million Zimbabweans and presumed to support several million dependents, ASM is an important livelihood generator in a nation where unemployment is high. Artisanal and small-scale miners produce gold, chrome, copper, tantalite, diamonds, and other minerals, which are then sold on local, regional, and international markets. Since January 2014, ASM has been decriminalized in Zimbabwe, and formalizing the sector and drawing the flow of gold into legal trading channels has become a priority for the government. Among mining stakeholders, there is consensus that ASM decriminalization signals a fundamental turning point in national policy and has created both an immediate need and an important opportunity to formalize the ASM sector.

In addition, the government's five-year economic blueprint, Zim-Asset (Zimbabwe Agenda for Sustainable Socio-Economic Transformation),[1] identifies a number of policy goals that could potentially, if effectively implemented, produce additional synergies, generate additional political buy-in to proposed reforms, and contribute to the success of the follow-up to the scoping study: the pilot program that constitutes Phase 2 of the "Formalizing Artisanal Gold Mining and Trading in Zimbabwe Project."

Statement of the Problem

Typically labor intensive, ASM provides more employment than LSM and in many countries is a key to rural development.[2] As the sector has been seen to both alleviate and exacerbate poverty, the United Nations (UN) has emphasized that ASM strategies should be rooted in rural development plans. There exists a correlation between a country's human development index (HDI) and the proportion of its workforce involved in ASM.[3] Simply put, the number of ASM workers is directly proportional to a country's poverty level. The effects of ASM are complex and dynamic.

Many factors challenge the ASM sector, contributing to low productivity and exacerbating a vicious cycle of poverty among miners. Hentschel, Hruschka, and Priester (2003) articulated those challenges as common global attributes of ASM (and their list is here expanded with Pact's perspective).

Table 1: Attributes common to all artisanal and small-scale mining.

Attribute	ASM common attributes
Geological	Lack of appropriate ore bodies. Lack of information about these ore bodies.
Technical	Labor intensiveness of the processes used. Time required, wastefulness, and inefficiency of the processes. Lack of access to low-cost, appropriate technology.
Legal	Discouraging investment climate. Illegality of ASM. Lack of social security. Contradictions among different legal acts and instruments.
Human Resources	Unskilled labor force. Use of child labor. Lack of written contracts. Poor health and safety standards and dangerous practices. Social dependencies. Bad social image of mining. Subsistence economy. Lack of knowledge of economic principles, credit, and finances. Gambler mentality.
Marketing	Access to the market only via intermediates. Market barriers and regulations. Low bargaining power for miners on price.
Financial	Difficulties in low-cost preparation of feasibility studies. Uneconomical investment decisions. Lack of bookkeeping and financial management of operations. Fluctuating mineral prices and commodity demands.
Organizational	Lack of representative organizations. ASM seasonality. Difficulty of coordination and cooperation due to mines' remoteness and scatter.
Gender	Marginalization of women—limited access to resources, roles, prices, etc. Victimization of women —targeted arrests, harassment by male counter-parts and gold dealers.
Environmental	Air and water pollution. Soil erosion. Destruction of agricultural land. Deforestation due to use of timber in mines and charcoal. Failure to rehabilitate the land after mining activities. Mercury and cyanide contamination.

(Source: Hentschel, Hruschka, and Priester, 2003.)

These challenges abound in Zimbabwe's ASM sector, which is largely informal, with poor working conditions.

Scoping Study Aim and Objectives

The aim of the scoping study (Phase 1 of the "Formalizing Artisanal Gold Mining and Trading in Zimbabwe Project") was to establish an understanding of Zimbabwe's ASM gold mining and trading environment. Study objectives were to:

- Understand and map the actors, production levels, mineral flows, economics, constraints, and political economy of gold.
- Identify opportunities for one or more interventions to formalize production of and trading in ASM-produced gold.
- Assess prospects for policy reforms to support formalization of artisanal and small-scale miners.
- Fully understand: the challenges to, and opportunities for, any pilot program; potential key roadblocks; requirements for initial and long-term success; and ways to manage and interact with influential stakeholder groups.
- Develop a framework for the mining sector that facilitates cooperation among different scales of mining and fosters a positive policy and economic context that incentivizes legal mining, processing, and trading.
- Develop plans to integrate artisanal, small-scale and industrial mining in productive relationships.

Key Questions

The scoping study sought to answer the following questions:

- What is the history of ASM gold in Zimbabwe, in terms of enablers for and barriers to improving the sector?
- Who are the key players in Zimbabwe ASM gold, and what roles do they play?
- What is the estimated quality and quantity of gold produced by ASM in Midlands province?
- What opportunities exist to create a viable and formalized ASM gold sector in Zimbabwe? What are the gaps?
- What is the legal and policy environment for ASM in Zimbabwe?
- What is needed for ASM gold mining and trading in Zimbabwe to become better, safer, and more productive (i.e., more efficient and more effective) and to deliver sustainable benefits?

Notes

1 **Zim-Asset** was crafted to achieve sustainable development and social equity anchored on indigenization, empowerment, and employment creation that will be largely propelled by judicious exploitation of the country's abundant human and natural resources. This results-based agenda is built around four strategic clusters that will enable Zimbabwe to achieve economic growth and that will simultaneously reposition

2 **African** Union and Economic Commission for Africa, Economic Report on Africa 2009: Developing African Agriculture through Regional Value Chains (Addis Ababa, Ethiopia: United Nations Economic Commission for Africa, 2009), http://www.uneca.org/sites/default/files/publications/era2009_eng_full.pdf.

3 **M.** Hoadley and D. Limpitlaw, "The Artisanal and Small-Scale Mining Sector and Sustainable Livelihoods," Mintek Small-Scale Mining Conference, Nasrec, Johannesburg, September 9, 2004, Book of Proceedings: 1–9, http://womin.org.za/images/impact-of-extractive-industries/women-and-artisanal-mining/M%20Hoadley%20and%20D%20Limpitlaw%20-%20ASM%20and%20Sustainable%20Livelihoods.pdf.

chapter 2

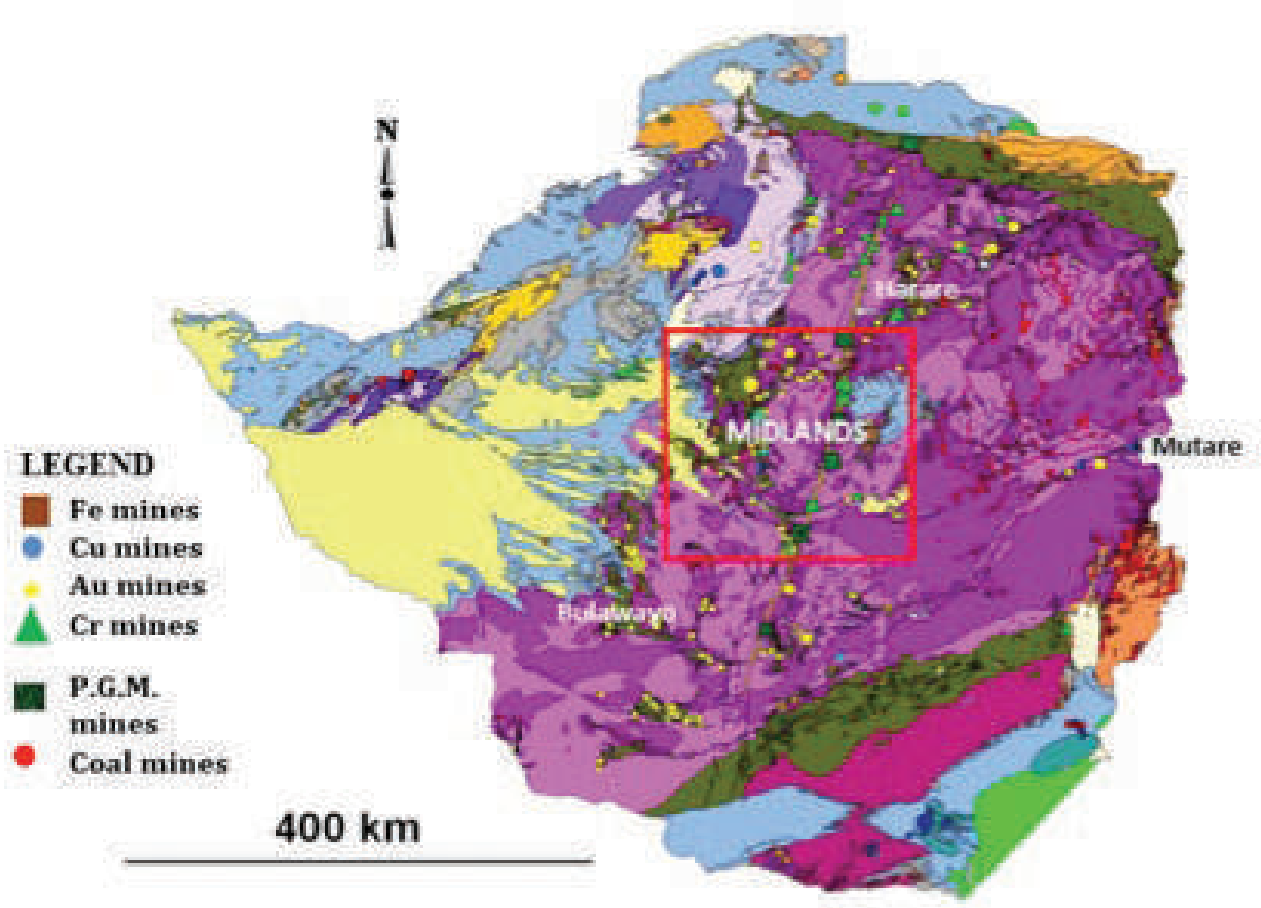
Conceptual framework

Technical background

The field work for the scoping study was carried out in the Midlands and Mashonaland West provinces, which COMZ suggested as potential pilot areas based on the concentration of ASM miners, the presence of member companies, and the relatively easy access from Harare.

The highest density of Zimbabwean LSM and ASM gold mines are in these two provinces. Within their borders, the greenstone belts shown on the geological map of Zimbabwe (Figure 1) are widespread, comprising 35 percent of the country's greenstone belts. Consequently, most gold produced in Zimbabwe from specifically ASM operations is believed to come from Kadoma, Kwekwe, and Shurugwi. These areas were the focus of study activities.

Figure 1: Geological map of Zimbabwe.



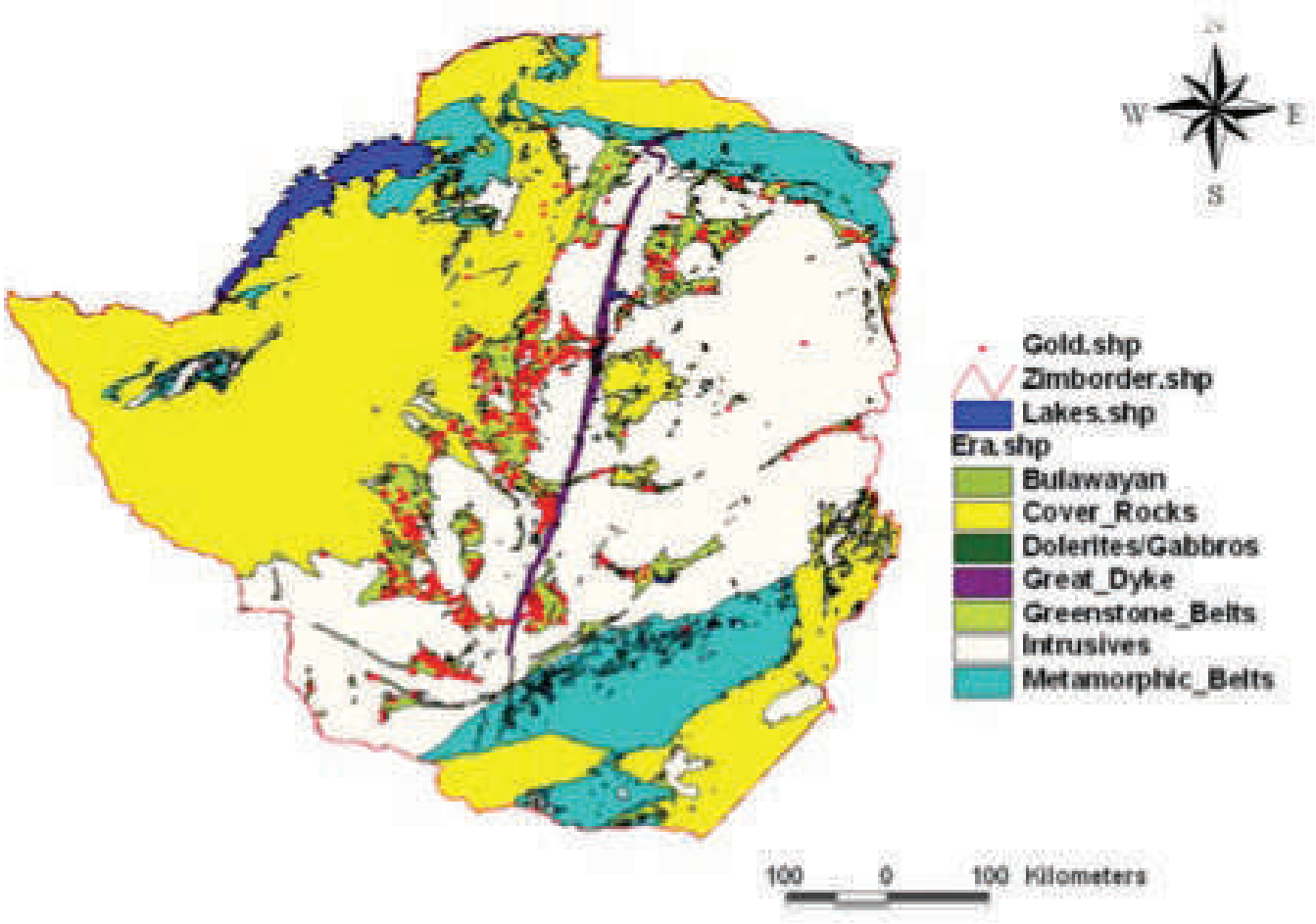
(Source: Geological Survey of Zimbabwe, GSZ.)

Mineralization of Gold in Zimbabwe

Zimbabwe's Archean craton, which forms the country's central plateau, consists of greenstone belts, granites, and granitic gneisses. Most gold mined in Zimbabwe is from this area, specifically the greenstone belts. Minor quantities have also been obtained from the younger, Proterozoic rocks. Zimbabwean gold is found in two types of environments: in-situ rock, here referred to as bedrock deposits (i.e., hard rock), and alluvial deposits in streams and rivers, as fine gold nuggets and dust eroding from primary sources (i.e., bedrock deposits). Mineralized bedrock gold deposits fall into two categories: strata-bound and non-strata-bound.

Strata-bound deposits in Zimbabwe include gold hosted in iron formations, mineralization in banded sulfides, and deposits in volcanoclastic and clastic formations. Non-strata-bound deposits consist of mineralization hosted in veins and shear zones. Vein-type gold deposits appear in quartz, carbonates, and minor sulfides. Pyrite is ubiquitous throughout the greenstone belts, and chalcopyrite relatively widespread. Arsenopyrite and pyrrhotite are common in veins hosted by mafic rocks, with arsenopyrite most prevalent in granitic terrains (Figure 2).

Figure 2: Geological rovinces map showing gold occurrences on Archaean Greenstone Terrain.



The Archaean greenstone belts and their geological formations not only host gold and silver but also hold considerable iron ore, nickel, copper, cobalt, and podiform chromite, as well as chrysolite asbestos (in the Mashaba igneous complex), limestone, pyrite, and antimony.

Historical Background

Artisanal mining has reportedly been practiced for hundreds of years in Zimbabwe—since precolonial times. Miners still rely on many of the simple ore extraction methods used by indigenous precolonial and early colonial miners. At the beginning of the 20th century, most mining activities were carried out manually or artisanally. As late as 1908, more than 70 percent of the country's mines were classified as "small workings."

By 1988, however, only 20 percent of the country's gold mines were classified as small, based on annual ore tonnage (up to 50,000 tonnes or about 55,115 tons). This downward trend in artisanal mining reversed during the 1990s and 2000s, a result of the drop in gold prices, the collapse of the agricultural sector due to drought, the implementation of a land reform program, and the layoff of public sector workers during structural adjustment programs.

This document refers throughout to "tonnes," known in the United States as "metric tons"—to be distinguished from US "tons." One metric ton is the equivalent of approximately 2,204.6 pounds, or 1.1 tons.

Hollaway articulates the inverse relationship between the rise of ASM and the decline of the economy in Zimbabwe: "The [ASM] sector [grew] in leaps and bounds during the last 20 years [between 1980 and 2000], fueled by many factors, including the economic decline that led to high unemployment as a result of retrenchments and drought during the 1980s. Prior to the droughts of the 1980s and that of the early 1990s, panning was primarily a dry-season activity. The upsurge in gold panning during the 1982, 1992, and 1994 agricultural seasons is directly attributable to drought."

In 1993, at a UN conference on ASM in Harare, the Harare Guidelines on Small-Scale Mining were promulgated and became an exemplary illustration of forward-thinking governmental approaches to poverty-reduction-oriented development assistance to ASM workers. These guidelines have been heralded as a useful model around the world and referenced in literature on ASM across Africa.

Government InterventionsFrom the 1990s until 2006, the Zimbabwean government formulated several interventions to support ASM activities and to improve delivery of gold to FPR. These interventions included: stabilizing gold prices; establishing the Gold Mining and Minerals Development Trust (GMMDT); launching Operation Chikorokoza Chapera; and forming the Mining Investment Loan Fund.

Gold Pricing

At various points during the early 1990s, the Government of Zimbabwe kept gold prices for small-scale miners at favorable rates to minimize smuggling, incentivizing miner legalization and registration. In fact, the government even had a special "support price" for gold that small-scale miners sold to the RBZ during the 1990s, a price sometimes higher than international market prices. This pricing policy was devised both to encourage industry growth and to increase government gold collection.

Gold Mining and Minerals Development Trust

The RBZ launched the GMMDT in 2001 to improve gold production and stem leakages (i.e., smuggling). The vision was that the GMMDT would lend to gold miners, promote environmentally friendly mining methods, assist in environmental rehabilitation, advocate for balanced mining legislation, and finance the establishment of milling centers. The president of Zimbabwe supported the GMMDT.

When regulations on the gold trade (specifically, gold-buying permits for concession areas) were enacted the following year, GMMDT was granted four gold-buying concession permits in Harare, Bulawayo, Kwekwe, and Mutare mining districts. Buying gold from these concessions became the GMMDT's core business, despite the fact that gold buying was not an objective of the trust at its inception. The activities of GMMDT and other permit holders were the main reason for the peak in ASM gold delivery to FPR in 2004. The GMMDT was abruptly dissolved by Dr. Gideon Gono when he became the Reserve Bank governor. Gold trade regulations were also repealed, and policy did an about-face.

Operation Chikorokoza Chapera

By 2006, Zimbabwe was deep into a recession characterized by hyperinflation, high unemployment, poor agricultural conditions, and political instability. Mining had remained one of the country's few viable industries and faced unprecedented pressures to contribute more to the treasury and to the GDP. The RBZ insisted that gold miners sell their gold to the FPR at a tiny fraction of the actual international gold price—sometimes even as little as one-thirtieth of the equivalent international price when calculated at informal market exchange rates. As a result, most ASM-produced gold was traded on the informal market.

The government criminalized ASM by repealing SI 275/1991 (see Chapter 3) and

put up requirements that all toll elution operators be registered. In 2006, a week before Christmas, the government launched a nationwide crackdown on ASM miners and gold traders to enforce these policy changes.

Interestingly, gold prices were climbing internationally at this time, and December is traditionally the peak month for ASM gold production.

The police confiscated gold, ore, and equipment while bulldozing what was arbitrarily deemed substandard workers' housing and destroying or confiscating miners' meager household possessions in the process. The crackdown, code named Operation Chikorokoza Chapera, suppressed virtually all ASM operations and led to the arrest of at least 32,000 miners within the first few months of 2007.

Through its Carslone Corporation subsidiary, the RBZ confiscated stockpiles of ore from ASM operators and set up mills to process the gold. The miners were never compensated for the recovered gold. The mills are now defunct.

As immediate consequences of Operation Chikorokoza Chapera, unemployment increased, crime and nighttime ASM activities escalated, and riverbed gold panners turned to hard-rock reef mining in remote forest areas to evade the police. Some miners were imprisoned for as long as five years for illegal possession of gold.

Dr. Sam Spiegel, lecturer in international development at the University of Edinburgh, explains Operation Chikorokoza Chapera's three long-term implications as:

- **Environmental Impact Assessments as a barrier to formal ASM:** Environmental degradation caused by ASM operations was a key rationale for the crackdown. After the enactment of the Environmental Management Act in 2002, the government imposed a uniform Environmental Impact Assessment (EIA) for all mining operations, regardless of scale. This EIA was fiercely contested by members of the Zimbabwe Miners Federation (ZMF) and the Zimbabwe Panners Association (ZPA) to no avail. To resume operations after the crackdown, miners had to comply with EIA requirements. Two in particular effectively created a barrier to entry to ASM: A consultancy report had to be produced, at an approximate average cost of US$4,000, and artisanal and small-scale miners had to pay a fee to the government.
- **Increased inequality in accessing licenses:** Some artisanal miners were not licensed but operated on a relationship of trust with registered gold millers. The crackdown compromised these relationships. Although many miners were willing to become registered, the government hiked the registration fees to a point that made it almost impossible for artisanal miners to operate legally.
- **Lack of foreign donor support and rural governance support:** ASM's criminalization put an end to the donor support of the 1990s. Since 2006, rural district councils (RDCs) have received no support from donor agencies or the central government to regulate and manage risks associated with ASM. Civil society reports continued reluctance to engage around the once-sensitive topic of mining.

At a Senate hearing in September 2007, then Minister of Mines and Minerals Development, the Hon. Amos Midzi, distanced himself from Operation Chikorokoza Chapera: "The issue of makorokoza lies on the RBZ, because at the end of the day it has the responsibility to determine prices.... Illegal gold panners will not stop [and] we cannot stop illegal gold mining."

Compared to such other approaches as economic incentives, command and control instruments are easier for the government to use. The command and control approach, although at times limited by a poor administrative base, provides a basis for enforcement; violators can be prosecuted. However, although effective in stamping out illegal mining by the use of force, Operation Chikorokoza Chapera failed to effect the meaningful change that the government envisioned—that is, a greater number of legal mining operations with output channeled to FPR. At the time, the RBZ was the most powerful government institution in gold mining and trading, and it was felt that in pushing for Operation

Chikorokoza Chapera it had overreached its mandate. The operation had little support from the MMMD and almost none from the Ministry of Environment, Water, and Climate (MEWC), and was not well thought out. The policy had unintentionally incentivized the informal gold trade the government had sought to halt. Realizing that it could not stop ASM and that criminalization precluded ASM gold sales to FPR, the government reversed the policy in December 2013.

Mining Investment Loan Fund

The MMMD created the Mining Investment Loan (MIL) Fund, to be administered by the Mining Affairs Board (MAB), to offer a variety of cash loans tailored to the needs of small-scale miners. At the time it was established, the fund stood out as a rare example of an entity that could integrate sector-specific training and credit delivery to miners. It was heralded as well worth emulating in other African countries.

However, hyperinflation crippled the fund, which amounted in 2006 to around Zim$2 million —a paltry amount that was barely adequate to capitalize four mines at Zim$500,000 each. Accusations of corruption within the MIL Fund program intensified in 2006.

Decriminalization

In December 2013, the Minister of Finance announced that beginning on January 1, 2014, ASM would no longer be a criminal activity. However, this was a policy statement, not backed by any legislation. On the ground, arrests of artisanal miners ceased, but the number of security officials at major mining sites and all milling sites increased beginning in July 2014. These security officials represent the Joint Operations Committee (JOC)—the Army, Air Force, Central Intelligence Organisation (CIO), and police. FPR has indicated that deliveries of gold have increased since JOC deployment, as miners are now afraid to sell their gold in the informal sector.

Development Projects

Promulgation of SI 275/1991 created a space for mining-oriented development linkages in the 1990s. Among those conducted for ASM were:

GTZ-Funded Rehabilitation Pilot Project

Following enactment of SI 275/1991, equipment manufacturers made several attempts to develop gravity separation equipment that would be more appropriate to gold panning conditions. GTZ funded a project, supervised by the University of Zimbabwe's Department of Mining Engineering, to demonstrate the benefits of using sluice boxes and rehabilitating mined areas in small-scale gold

mining regions. The pilot project, undertaken at two sites in Zimbabwe along the Manyuchi and Insiza rivers, demonstrated that river bank mining as legislated could be undertaken both economically and in an environmentally sustainable manner.

During the project, mined-out material from one section of the river bank was used to backfill another section. The miners removed gold-barren topsoil and subsoil, then treated the underlying gold-bearing rubble horizon in sluice boxes. The rubble was used to fill the base of the preceding pit and topped by surface tailings, subsoil, and then topsoil. Revegetation occurred naturally when the rainy season arrived. Most importantly, the project showed that the cost of repairing the river bank could be covered by the value of the gold that the panners produced.

The sluice boxes achieved fairly high productivities, at 4 tonnes (about 4.4 tons) per man-shift. The main drawback was that a minimum ore grade of 0.25 grams per tonne was required to justify the capital investment, which was between US$10,000 and US$15,000 per 20-person panning group. However, leaving behind material with a grade of less than 0.25 grams per tonne would soon attract illegal panners.

The rehabilitation pilot project showed that legally registered panners, when provided with the necessary capital, could rehabilitate mined areas and recover gold economically. However, the viability of the rehabilitation depended on capital input to support the procurement of equipment. There was no such capital support, either from the government or the private sector.

The chief lesson of this site-specific intervention was that low-cost technology would permit even grades lower than 0.1 grams per tonne to be panned economically. The legal stipulation that river bank mining could be carried out down to only about 1.5 meters (5 feet), coupled with the high minimum grade required for profitability, meant that considerable gold-bearing ore would be left behind, even after rehabilitation—encouraging illegal mining, which would likely occur without rehabilitation.

The Mining, Minerals and Sustainable Development Project

Commissioned by the International Institute for Environment and Development (IIED) in 2000 and carried out between 2000 and 2002, the Mining, Minerals and Sustainable Development (MMSD) project studied more than half of the worldwide ASM population as part of its country research studies. One major finding was that, together with Bolivia, Burkina Faso, Ghana, Mali, Papua New Guinea, and Tanzania, Zimbabwe had the most socially and economically important ASM sector and the largest percentage of its population involved in ASM (omitting consideration of the Democratic Republic of Congo, which was increasingly dependent on ASM at the time). Zimbabwean ASM activities were seen to be largely temporary, fueled by recession. The study estimated that there were 350,000 artisanal miners, 153,000 of them women and children.

Austrian Foundation for Small Mines

The AFSM provided financial and technical assistance to miners—initially to chromite miners but later to gold producers as well. The attempt to provide soft loans and grants to small-scale miners failed due to three factors:

- Loan requirements so complex and inflexible that an ordinary small-scale miner within the target group could not comply.
- Limited chance of getting any money back for redistribution.
- Much higher administrative and management costs for AFSM associated with disbursing the loans than the capital provided by the funder.
- As a result, setting up a sustainable revolving loan scheme failed.

Shamva Mining Centre

The SMC was developed as an idea by Practical Action, GTZ, and other NGOs in 1989 and was developed further during the early 1990s. Practical Action partnered with the MMMD and the Small-Scale Miners Association of Zimbabwe (SSMAZ) in implementing the project. Supporting donors included GTZ, the UK's DFID, and the European Union (EU). Stichting Nederlandse Vrijwilligers (SNV; Foundation of Netherlands Volunteers) assisted in establishing Shamva Training School for women miners. Project objectives were to:

- Provide a sustainable, commercially viable custom milling facility for small-scale gold miners in the Shamva area, and improve miners' incomes.
- Create jobs.
- Train miners in health, safety, and sustainable mining methods.
- Share and disseminate lessons and experiences on the project locally and internationally.

A key SMC project concept was that central milling facilities could help bring illegal mining into a legal framework and create a more centralized, organized, and easily regulated way of processing gold. It

was believed that this could help control mercury usage and facilitate access to more advanced technology that would raise incomes. Training was provided to small-scale miners to improve their skills in mining methods, geology, mine pegging, environmental management, health and safety, and business planning and management.

At the time of its construction, many heralded the SMC as the most significant support service ever provided for SSM. As a widely cited example of an international donor-funded project to set up a gold-processing mill for ASM, and heralded in 2002 as a "best practice in SSM" by the UN Economic Commission for Africa (UNECA), Shamva was initially viewed by researchers as a proactive step toward improving environmental management and economic efficiency by sharing technology.

Key Success Factors

- The SMC project addressed a real need of small-scale miners for improved access to processing technology. The SMC's custom milling services made a difference to the livelihoods of artisanal and small-scale miners. In the early phase of SMC operations, incomes rose by up to 30 percent.
- An RBZ presence at the SMC, and the fees miners paid to have their ore processed, were directly related to the price they received for their gold. Thus, the service was both affordable to miners and profitable to the SMC.
- All key stakeholders collaborated during the project's initial stages.

Problems Encountered

Over the long term, multiple problems affected execution of the SMC's development vision:

- **Unexpectedly high demand for the milling services:** At its inception, the SMC was expected to serve about 43 miners within a radius of 50-kilometers (31 miles). By 1995, services had proved so effective that more than 150 miners were using them. The catchment area had widened to 200 kilometers (124 miles). By the end of the decade, the actual demand for SMC ore processing had exceeded "500 small-scale operations." Waiting times for ore processing stretched up to six weeks. SMC failure to meet demand led to disappointment among miners; they reverted to the amalgamation process that threatened human health and the environment. Hilson argues that better initial research by SMC development agencies would have more accurately predicted community needs and thus prevented problems (e.g., excessive demand). The executive committee that ran the mill after handover ultimately set a minimum for the amount of ore that miners had to bring to be eligible to use the facility. Those with less than 10 tonnes (about 11 tons) had to wait until a slack period to have their ore milled. Poorer artisanal miners—the individuals for whom the SMC was established—could no longer benefit from the program. The executive committee was composed of a group of "established" small-scale miners who were "not concerned" about poorer miners. Over time this led to underutilization and then abandonment.
- **Lack of government support:** The national government was blamed for insufficient support for the SMC project.
- **Hasty transfer of management:** Foreign donors and government actors were too quick to transfer SMC management to a local miners' association, according to some critics.
- **Poor business decisions by the SSMAZ executive committee on SMC operations.** This was the SMC's single biggest problem. In January 1999, the committee decided that it had built sufficient capacity to run the center without external assistance. No competent, experienced manager was appointed to succeed the Practical Action manager. By June 1999, the center had serious cash flow problems. In January 2001, the committee decided to lease the center to a local Shamva miner.

SMC lessons and experiences were widely shared and disseminated, and the model was replicated in other African countries with support from donors and international agencies such as the World Bank.

Similar centers have been created in other parts of Zimbabwe, Burkina Faso, Mali, and Tanzania.

Lessons learned

- Dreschler argues that development agencies must rethink the necessity of handing over commercial projects to producer associations. Producers may well be better off to leave commercial project management to qualified, experienced managers while they enjoy an efficient, competitively priced service.
- Great care has to be taken in working with associations to ensure that a few powerful members do not monopolize program benefits for their own individual gain.
- Government agents, donors, and foreign experts need to be more sensitive to the complexities of miners' organizational structures in their programming.
- Technology unlocks the potential for small-scale miners to run viable mines. Access to SMC processing facilities enabled miners to increase their productivity and improve the viability of their mines, until management problems emerged in 1999.
- Small-scale miners, like any other entrepreneurs, need a complete package of business development services to thrive and grow. In addition to technology and information about mining methods and sustainable environmental management, they require business planning and management skills and access to credit and profitable markets.

Private Sector Interventions

Bank Loans

Banks such as ZB (formerly Zimbank), Barclays, and the Commercial Bank of Zimbabwe (CBZ) have offered loans to small-scale miners amounting to less than Zim$300,000 per miner—not enough to get a miner into production. This has contributed to the poor success rate of the loan schemes. But with their minimal collateral, the miners have not been able to borrow more.

Barclays Bank as a Gold Buyer (1980–1987)

Between 1980 and 1987, Barclays Bank was the sole buyer and exporter of gold in Zimbabwe. The bank's gold-buying center in Harare, run by four people, handled gold transactions of all amounts down to 5 grams (0.17 ounces)—a small amount but the minimum amount that can be confidently measured using the specific gravity method. To sell gold, all a miner needed was a claim registration; a significant portion of Barclays' clients were small-scale miners. The bank stopped buying gold when the two senior employees of the gold-buying unit left to start their own businesses, leaving a void in the unit. For the next two years, with South Africa still under apartheid, the Government of Zimbabwe shipped gold to Australia for refining. This continued until FPR was set up in 1989.

Early coexistence

One major benefit of the legalization of gold panning under SI 275/1991 was the creation of opportunities for LSM and ASM to coexist. Some large mining houses recognized the need to integrate gold panners into their programs so as to minimize environmental damage. Integration came in different forms:

- **Education programs:** To inform panners about better gold-recovery methods and good environmental management.
- **Access to claims:** At Dalny Mine, panners signed an agreement with mine management that gave them access to claims owned by Dalny and allowed them to access water for panning from the mine's pipeline—improving productivity and

ensuring that panning would occur at specific sites.

- **Permission to rework old dumps:** This happened at Redwing Mine in Penhalonga, and the mine processed miners' concentrates to recover gold. This eliminated the need for mercury, as the mine took responsibility for the marketing of the recovered gold and then deducted processing charges before paying the panners.
- **Investment in education:** At both Dalny and Redwing mines, management invested in educating the panners on the dangers of using mercury.

ZimAlloys Scheme

During the late 1990s, ZimAlloys began a tributing system which had an exemplary environmental management component. In the ZimAlloys scheme, the company deducted Zim$20 per tonne (about 1.1 ton) of chrome received from a supplier as an ‘‘environmental rehabilitation charge." When the miner successfully rehabilitated the operation, he or she was given Zim$35 per tonne purchased. A quick evaluation by Dreschler of this scheme shows that it would cost the miner about Zim$25 per tonne mined to rehabilitate the mining site. The same job would cost ZimAlloys Zim$50 per tonne mined. And so, by doing rehabilitation, the miner was gaining Zim$10 per tonne and ZimAlloys was saving Zim$15 per tonne.

Farvic Mine Model

Farvic Mine is a gold mine near West Nicholson in Matabeleland South. Defunct for 50 years, the mine was taken over in 2003 by Farvic Consolidated Mines (Pvt) Ltd. It comprises 260 claims—10 of them in use and the other 250 under exploration. Aware that artisanal and small-scale miners were viewed as the enemy during Operation Chikorokoza Chapera and that LSM had provided the transport necessary to arrest these miners, company managing director Harry Greaves recognized the need for Farvic to come to their assistance. Accordingly:

- **Understanding needs:** Farvic met with artisanal and small-scale miners to find out their needs: access to good quality drinking water and to geological services.
- **Geological services:** Farvic provided these free to miners. Since the company needed the geological information for its own planning, it was a win-win situation.
- **Access to mine laboratory:** Farvic subsidizes the charges to miners for its use.
- **Tribute agreements:** Farvic established tribute agreements that allow miners to work legitimately and hold bullion. This tribute system allows miners to mine down to 50 meters (about 165 feet) below the surface. The normal tribute system does not specify the depth to which a tributor can mine.
- **Support for growth:** Farvic helps miners move vertically: Mr. Greaves cited one miner who managed to buy a pick-up truck with his mining proceeds.
- **New stamp mill:** Farvic set this up and made it freely accessible to miners; it was then handed over to two managers. (However, many miners still prefer to use other mills, which offer equipment leases allowing them to save time and money.) Farvic Mine does not lease out equipment.

The objectives of the Farvic model of integration with ASM are:

- To legitimize the small-scale/artisanal mining sector.
- To eliminate the use of mercury.

Mr. Greaves believes the company has achieved only 5 percent of what could be done for area ASM. A key lesson is that eliminating mercury use is complex and will require multistakeholder engagement. Although the Farvic model has not yet addressed this, it is seeking a viable alternative means of separating free gold from concentrates. The Farvic model has been emulated by New Dawn mining in its integration project at Golden Quarry Mine.

ZIMASCO

The Zimbabwe Mining and Smelting Company (ZIMASCO), a chrome mining

and smelting company, employs contract managers, who manage tribute holders. In so doing, managers identify miners working on high-grade ore bodies, whom the company can assist with equipment. ZIMASCO transports the ore from mining sites to its processing plant and pays tribute holders based on tonnage (of both ore and waste). ZIMASCO awards bonuses when a tribute holder delivers ore of better grade than expected and charges a penalty for grades lower than expected. In addition, the company leases out equipment for environmental rehabilitation.

ZIMASCO used to purchase equipment and personal vehicles as part of its capital expenditure. However, it prefers a tribute system because compliance with the MMA and statutory instruments is transferred to the tribute holder. In the case of taxes and payments, ZIMASCO pays RDC levies, makes returns to the MMMD, and pays a royalty to ZIMRA. The tribute holder pays fees for the Environmental Management Agency (EMA), fees for the National Social Security Authority (NSSA), and presumptive tax to the Zimbabwe Revenue Authority (ZIMRA). ZIMASCO has encountered successes and challenges with the tribute system, which include:

Challenges

- **EMA requirements:** EMA used to require one EIA for the entire ZIMASCO operation but now requires an EIA for each claim, as this increases EMA revenue.
- **Illegal trading in chrome:** Chinese operators of local chrome smelters are buying chrome ore from ZIMASCO tribute holders. Although the Chinese pay less than ZIMASCO, they pay in cash, which the miners prefer.
- **Capacitating the miners:** The company is currently not financially able to provide assistance to as many miners as it would like to.

Successes

- **Empowerment of indigenous Zimbabweans given access to mining claims:** This activity is conducted under a MMMD syndication system, where up to six people can form a syndicate led by one representative (the staking agent). Any intended empowerment of indigenous Zimbabweans is a success in line with Zim-Asset and all other previous economic blueprints.
- **Community relations:** They have improved.
- **Mineral recovery maximized:** There are different operating scales for differently graded ore bodies.

Tetrad Bank as a Gold Buyer (2011–2013)

Former Minister of Finance Tendai Biti liberalized the gold-buying sector in 2009, and for the first time, anyone could buy gold and export it, provided a gold-buying license and/or an export license was obtained from the MOF. Tetrad Bank held a gold-buying license and set up gold-buying units at its branches in Harare, Kadoma, and Kwekwe. Although the Kadoma branch was the first to be established, the Harare branch became the busiest, as gold miners preferred to travel to Harare to sell their gold, then purchase inputs on the same trip. At its peak in December 2011, the bank was buying more than 50 kilograms (about 110 pounds) of gold a month.

With a minimum of 10 grams (about 0.32 ounces), the bank used specific gravity to ascertain the gold's purity. Tetrad charged 8 percent tax on all gold remitted. In addition, the bank collected, on behalf of ZIMRA, a 5 percent presumptive tax on unregistered miners or those without tax clearances. Tetrad initially bought gold at the world price equivalent, less 8 percent (or 13 percent for unregistered miners). Tetrad would then sell the gold at the world price equivalent to FPR, where it was refined. The price that Tetrad paid miners was directly proportional to the quality of the gold (i.e., 87 percent gold received a price of 87 percent of the price for pure gold—that is, 99.99 percent gold). However, because FPR would hold onto the gold (and thus onto payment) for a week, the bank's financial analysts decided to use weekly fixes to

account for the risk—in other words, they fixed the price of gold for a week. The bank attempted unsuccessfully to obtain a gold exporting license and even appealed the government's decision in court.

A former Tetrad Bank employee estimated that miners were bringing 20 percent of their gold output to Tetrad Bank, on average. This established a record of their official gold sales and thereby allowed them to "avoid harassment from officials from the Criminal Investigation Department (CID), EMA, and FPR" when inspections were conducted. Not long before Tetrad shut down its gold-buying unit, the bank considered giving out loans based on the "sponsorship" model common in ASM in Zimbabwe. But miners stated that although Tetrad had no pricing advantage over FPR, its service was faster and more efficient.

The bank opened its gold-buying unit when gold prices where on an upward trend, and it made money speculating on the gold price. The model worked well until early 2013, when gold prices began a downward spiral that put the bank's gold-buying unit out of business by April 2013—months before the gold market liberalization was reversed by Minister of Finance Patrick Chinamasa in December 2013.

Most-Significant-Change Stories

Insights from the most-significant-change stories are interspersed throughout the report. This section's stories are redacted versions of the top three:

Miner from Chakari, Kadoma

When this miner started mining in 1990, the sector was very good. But he has seen many changes. During the 1990s, there were no informal gold buyers, and miners traveled to Harare to sell their gold to FPR. During the same period, Dalny Mine provided assistance to miners in the form of water. But that mine closed and the assistance ceased. During the early 2000s, law enforcement agents came to the mines soliciting bribes. Over all that time, the MMMD provided no support to miners. When the economy went into meltdown and unemployment grew, many people came to work in the mines. The miner would like to see improvements to the ASM sector: new miners should be capacitated; the government should change its policies and regulations; EMA should take a different stance and not just collect money and bribes; LSM in surrounding areas should help with knowledge and equipment; service centers should be set up; electricity should be made accessible in the rural areas where most mines are found; and FPR should relocate to Chakari, because miners have no time to travel to Kadoma. All this, he said, would enable the production of large amounts of gold.

Former RBZ Official, Kadoma

According to this official, Zimbabwe's gold mining and trading sector entered a remarkable period in 2004, when a gold-buying center for FPR was established in Kadoma. The gold market was liberalized, and buyers worked on a 5 percent commission. The RBZ had a lot of mines at the time and could buy all available gold. Close to the end of 2004, the RBZ governor set limits on how much could be spent, feeling that current spending levels were fueling inflation and devaluing the national currency. The limit on gold buying that prevailed from late 2004 to 2006 spurred the rise of the informal gold market. Gold delivery to FPR dropped drastically, and the RBZ financial intelligence team spurred the creation of Operation Chikorokoza Chapera, meant to abolish informal gold mining and trading. The brutal treatment of most informal miners and traders under this campaign was all to the detriment of the national economy. The informal market was contributing more than 50 percent of the total national gold output. In 2004, its contribution was 17 tonnes (about 18.7 tons) of gold; successive years saw a continuous and dramatic decline until, in 2013, only 939 kilograms (about 2,070 pounds) were delivered to FPR. In the RBZ's opinion, if the sector is ever going to revive, the government must bring back the Gold Development Fund (GDF).

In the past, much gold was close to the

surface and easy to extract. Now miners have to go deeper, increasing the risk of mine flooding—in fact, flooding has become common. As a result, miners are in dire need of pumps and compressors. In addition, mill commissioning costs are high; for example, Zimbabwe Electricity Supply Authority (ZESA) charges US$3,000 for labor, US$11,000 for a transformer, and US$4,800 per kilometer (0.621 mile) for wire. Most of all, for ASM to realize more gold flow through RBZ, taxes need to be reduced. LSM rates—for example, in royalties—are exactly the same as those paid by financially disadvantaged artisanal and small-scale miners. And there are too many government bodies controlling ASM, all siphoning off what little money the miners possess. Taxes are being charged by RDC, EMA, ZIMRA, MMMD, FPR, Zimbabwe National Water Authority (ZINWA), and NSSA. ZIMRA imposes a 9.5 percent tax on every transaction. RDC requires payment of US$100 per single stamp on a mill. After collecting its own "exorbitant" taxes from miners, FPR enjoys a 15 percent rebate when gold is sold to the Rand Refinery in South Africa—in effect taking a total of 25 percent of miners' revenues. As a result, a considerable parallel market has emerged. Government measures to ensure that all gold comes through FPR have been futile. Police officers at every mill can be easily bribed to permit gold to leave. Politically influential people perpetuate the illegal trading and smuggling.

The Story of a Driller, Shurugwi

This driller, who acquired his experience and skills in LSM, now provides services to the few artisanal miners who can afford him. In the face of a stalled economy and falling gold prices, business opportunities for him and his fellow drillers have thinned out, not just within ASM but also in LSM, and most exploration work has been shelved.

Key Successes, Failures, and Lessons Learned during ASM Evolution

The government's approach to ASM has gone through several stages over the past three decades, yielding key lessons. First, ignoring the sector, as was done during the 1980s, encourages the proliferation of informal activity and, in a sense, lets market forces determine gold prices—to the benefit of miners, as more gold buyers enter the sector and competition increases. The large, unregulated economic sector thus created is a fertile environment for illegal exploitation of the nation's natural resources—a scenario that was realized during the early 1990s.

Secondly, ASM legalization should take a holistic view of mining, processing, and trading. SI 275/1991 focused on environmental protection and gold trading, without much consideration for production. To ensure that laws are effectively implemented, it is also very important to capacitate the government agents who are custodians of the law. RDCs were ill equipped to enforce SI 275/1991.

Government reliance on gold to generate foreign currency reserves has historically made the RBZ Exchange Control Office the most important government agency in the gold mining sector. The government-sanctioned, concurrent use of multiple international currencies within Zimbabwe made the mandate of this office obsolete, but it continues to wield legal power. In considering the future of the sector, it is important to note that if a single local currency once again becomes the sole legal tender, the office's influence and power will be restored—including its power to determine the local price of gold. This will have an impact on gold flows, but the direction (positive or negative) and the scale of the impact will depend on competition with the informal market and the cost of doing business. In the 2015 national budget statement, the Minister of Finance and Economic Development reiterated the government's stance that a multicurrency system will be maintained until 2018.

The Government of Zimbabwe has liberal-

ized the gold-buying sector twice. First, in 2002, it licensed private gold buying but tightly controlled exports. Lessons learned during this period include the fact that an aggressive approach to gold buying helps encourage miners to sell their gold on the formal market. FPR received its highest-ever delivery of gold from the ASM sector in 2004; approximately 17 tonnes (about 18.74 tons). Another key lesson was in relation to tribal dynamics in rural areas and political offices: GMMDT appointed gold buyers with Shona-sounding names in Bulawayo Mining District, a predominantly Ndebele region, and local political leadership resisted them.

Operation Chikorokoza Chapera underlined the inadequacy of command and control mechanisms as a sole response to the proliferation of illegal ASM activities. Although effective to some extent, these methods should be used in a manner that respects human rights and in a pre-existing environment of adequately enabling laws and policies, well-capacitated government regulatory agencies, and government support for formal actors. The introduction of EIAs was a progressive move to protect the environment, but it has proved a barrier to livelihood formalization, because the costs of conducting an EIA and having it regularly reviewed are beyond the reach of most miners.

It is imperative that attention be paid to lessons learned from prior ASM developmental projects. GTZ learned that the possibility of unintended consequences should be thoroughly evaluated, and that making compliance too expensive or difficult incentivizes illegal mining. The AFSM, attempting to provide soft loans and grants, was compromised by low repayment rates and program administration costs higher than the total grants and loans given. Requirements for obtaining loans should also be simple enough for ordinary miners to manage.

Great care has to be taken in working with associations to ensure that a few powerful members do not monopolize benefits for individual gain. It is important to be sensitive to the complexities of miners' organizational structures in programming. One positive and now-proven lesson is that technology unlocks the small-scale miners' potential to run viable mines (although the minerals will not necessarily be sold on the formal market unless the interventions focus on formalizing the whole chain, from mine to market). Finally, small-scale miners—like other entrepreneurs—need a complete package of business development services to thrive and grow. In addition to technology and knowledge of mining methods and sustainable environmental management, they require skills in business planning and management as well as access to credit and profitable markets.

International Practice in Regulating ASM Gold and Facilitating Coexistence of ASM and Industrial Mining

Zimbabwe is at a crossroads in the management of its gold sector. Two challenges lie ahead: first, how to encourage artisanal gold miners and informal traders to mine and sell legally; second, how to draw on meaningful productive relationships among miners at all scales, from artisanal to industrial, to produce more jobs for Zimbabweans. This report scopes different models for both goals that have been successfully implemented internationally and that may serve as inspiration as Zimbabwe plans its future. This section of the report covers two areas:

- Gold sector regulation, the diversity of practices, and real-world examples to relay key lessons learned globally in improving the quantity of artisanal gold entering formal trading chains.
- Coexistence among miners working at all scales, from artisanal to large scale, including opportunities and operational challenges and examples of diverse coexistence and production practices.

Methodology for International Comparisons

The research for this section of the report was desk-based, relying primarily on publicly available literature, nonpublic documents shared with Pact, and interviews

with subject matter experts. Because of the sensitivity of some of the content, reports and observations were often shared with Pact on the condition that they not be made public. Confidential reports and sources are clearly marked as such in referencing them.

Two guiding questions were the basis for this section of the report:

- What are "good practice" examples in countries that have successfully increased the flow of gold into legal chains of custody? The examples provided here focus primarily on approaches in increasing the quantity of gold in legal supply chains and not necessarily approaches that incentivize the "greener," more responsible mining on which other studies may focus.
- What are other examples of successful coexistence between ASM and industrial miners? Guiding questions ask what motivated these coexistence relationships, what were the enabling policy environments, and what key lessons have been learned?

International Practice Regulating Artisanal and Small-Scale Mining

More than 70 countries around the world host artisanal and small-scale gold mining. Most have struggled to regulate the sector and, in particular, wrestled with how to tax it and encourage legal trade into formal channels. This challenge is compounded by a number of issues, such as:

- **Insufficient power by the state:** Many states lack the power to both consistently enforce laws and stop smuggling.
- **Gold's portability:** Gold is easy to smuggle because—like precious stones—it is a high-value, high-density commodity and it is easy to hide.
- **Rural source:** Gold ASM often occurs in rural regions without a large state presence, and the benefits of eliminating the smuggling may not warrant the expense of staffing to a level required for effective monitoring.
- **Absence of long-term interest and commitment:** Most government-initiated programs for supervision of gold ASM follow cycles of engagement and disengagement after an early program champion moves on or the reality of ongoing regulation costs become apparent.
- **Informal trading part of complex economic webs:** In some of these contexts, the gold facilitates flows of other products, both legal and illegal. As a result, there are often entrenched practices and strong vested interests that resist change.
- **Formal gold markets challenged:** They often struggle to compete against informal markets, which may offer higher prices, mobile buyers, ready liquidity, informal financial services (e.g., loans, advances, payments even on bad production days) and where long-term trading relationships may develop between producer and buyer over time. Changing these dynamics is challenging.

Accordingly, for many artisanal and small scale miners, the local informal 'gold shop' is the first step in an often circuitous gold supply chain. There are an estimated 50,000 gold shops serving the ASM gold sector worldwide. The Artisanal Gold Council's Dr. Kevin Telmer explains:

> *[The shops] process raw gold or gold-mercury amalgam and then buy the raw gold product from miners at a price that is typically based on the London fix… Some shop owners will also refine the gold to close to 24 k purity (>99%) before selling it to the next level up in the supply chain…Gold from shops moves downstream in the supply chain to regional buyers and financiers and eventually to an international dealer and into the international marketplace as jewelry or bullion.*

Whether this process happens within a country's legal framework depends on a number of practical incentives; these are discussed below in further detail.

Perhaps unsurprisingly given this context, there have been only 11 examples of state-run buying programs over the last three decades: in Bolivia, Burkina Faso, Colombia, Côte d'Ivoire, Ethiopia, Ghana, Kyrgyzstan, Philippines, Tanzania, Venezuela, and Zimbabwe. Of these, only six continue (including Zimbabwe's), and five have folded as a result of an unsustainable financial approach or corruption, or for

other reasons.

Differing State-Buying Regime Structures

Buying systems are typically structured in one or more of the following ways:

- **State-run buying centers:** These centers, in gold, state-run gold-buying programs, or SGBPs, are set up and miners instructed to sell their gold at a fixed price according to purity of the material and, usually, based in some part on the daily rate at the London Bullion Market Association (LBMA). The SGBP works as a state-run monopoly.
- **State contracts with intermediaries:** In some countries, the state contracts with approved intermediaries to operate in regional mining districts to extend and improve the reach of the state monopoly.

To date, most state-organized buying regimes have been motivated primarily by economic rather than social factors, with the express goals of boosting either the government's central gold reserves or the amount of hard currency held by the state. An SGBP can also serve as a locus for taxing ASM-produced gold, though it is likely already taxed at various points before reaching the SGBP. Lastly, in theory, state-centered buying systems could incentivize legality; the system can be a leverage point for reinforcing good ASM governance and the state's regulatory powers up the supply chain. When buying gold, the state can demand documentation of the source mine. However, lack of true and prolonged monitoring and enforcement capacity and the typical scenario of widespread illegal mining often prevent utilization of this potential tool. Lack of SGBP financial competitiveness and lack of understanding of existing mining and trading dynamics further doom most efforts. In short, simply setting up systems does not guarantee their success. In addition, requiring legality as a condition for selling to the SGBP means that illegal miners must either resort to fraudulent documentation and smuggling into legal chains or—without recourse to official channels—must turn to informal market participants, usually numerous, who are willing to buy from them. State-imposed buying monopolies were tried in Bolivia, Colombia, Côte d'Ivoire, Ghana, and the Philippines, and they failed in almost all cases (except the Philippines), primarily because they were unable to compete over time with informal traders.

In practice, for SGBPs to work, buying regimes must confront the ASM Holy Trinity: price, convenience, and social relationships (including debt), as explained below.

Competitive Factors: Price, Convenience, and Social Relationships

Price

On price, Ethiopia has found success in offering above-market prices to attracting gold of all origins to its coffers. Kenya and Tanzania have previously tried such systems. Kambani writes:

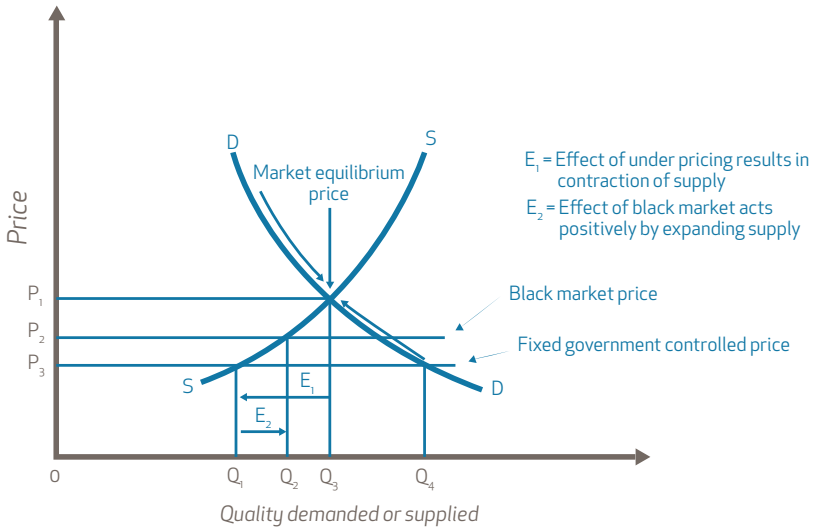
> *Kenya solved its gold smuggling problem by paying a market price plus a 20 percent premium as an export incentive.... In Tanzania, with the introduction of measures to pay competitive prices to those on the informal market, there was a dramatic increase in the amount of gold declared through the Central Bank.*

The same strategy has had mixed results in other countries. In Colombia, the model collapsed when the state was forced to sell a significant portion of its gold reserves to defend the value of its currency on international markets because of its external debt burden. In other cases, including Ghana and the Philippines—the state buying program notwithstanding—informal gold traders made inroads over time by offering close to international prices. Further, in recent years in Colombia and Ecuador, informal markets have been able to offer above-market prices because organized crime and drug cartels use the gold for money laundering. Informal traders may or may not eventually sell to the state, or they may make use of cross-border smuggling networks.

The chart below (Figure 3) shows the effects of price fixing in SGBP.

Related to price is the currency in which the gold is traded and the speed with which miners are paid. SGBPs commonly pay in

Figure 3: The effect of underpricing in SGBPs.1



local currency. Where local currency is overvalued, informal traders become more appealing if they offer foreign currency (e.g., US dollars or similar). In all cases, informal traders become more attractive to the state because of the close price comparison, and especially because they are often willing to pay in cash, immediately, and with no paperwork required.

In Focus: Ethiopia

Gold mining is Ethiopia's second-largest earner of foreign exchange, after agriculture. Launched in 2008, its SGBP is operated by the National Bank of Ethiopia (NBE) and pays 105 percent of the LBMA global gold spot price. This high price is then forced upon the domestic jewelry industry; manufacturers are no longer allowed to buy directly from artisanal and small-scale gold miners and instead are required to buy only from the NBE and its authorized agents. For goldsmiths, the minimum purchase requirement from the government is 250 grams (about 8.82 ounces), and bars come imprinted with the NBE seal. The policy appears to trade off the competitiveness of Ethiopian jewelry on the international market for a greater flow of gold into NBE coffers. The program appears to be increasing the country's stock of hard currency.

In the interest of improving participation, the main partner, the Commercial Bank of Ethiopia, has regional branches and buying capacity in Assossa, Hawassa, Jimma, and Mekelle.

Banks are sensitive to miners' needs for immediate payment and typically pay 90 percent of what they owe within 24 hours and the remainder within a month. A service charge of 2 percent of the transaction is levied to cover air-transport charges to collect the gold from mining regions.

The buying system appears to be attractive for miners—evidenced by regular reports of inbound smuggling from neighboring countries seeking to take advantage of the higher gold prices available in Ethiopia.

In recent years, new systems such as FairMined, Fairtrade, Better Gold Initiative, and others, have emerged that service what are called international 'ethical and fair trade' (EFT) markets. To incentivize participation, these privately operated systems pay a higher price for gold to participating ASM organizations (often cooperatives) that comply with their high standards for production and trading. EFT standards usually cover such issues as extraction, occupational health and safety, environmental management, processing methods (e.g., whether mercury is used), transparency and democratic governance within the ASM organization (ASMO), and the like. EFT organizations' guidelines are usually more stringent than applicable mining laws and typically offer a suite of supports to ASMOs in the form of technical coaching, precertification audits and postaudit assistance, export-route support, financing facilitation (i.e., help finding additional sources of financing without necessarily providing it), etc.

In exchange for meeting these high expectations, successful EFTs offer ASMOs good prices and a stable relationship. For example, although Fairtrade's ASM standards are among the world's highest, the minimum guaranteed price is 95 percent of the LBMA trading price. To encourage even greater levels of "responsible mining," it also offers an Ecological Fairtrade Premium on top of the minimum price. Several studies have shown that a portion of western consumers are willing to pay slightly more for products that come with the guarantees that Fairtrade's logo signifies. The downside of EFT systems is that setting them up takes time, effort, and investment up front, which ultimately slows the pace of potential scale-up. That said, nearly all EFT systems are looking for additional ASGM production sites for their product pipeline.

Convenience

Convenience is another reason that a miner would or would not sell into a formal system. The challenge to most state-run buying systems is making themselves convenient for miners and taking on the role of local gold traders, who are able to travel to remote mine sites for a quick, minimum-hassle transaction. Security of transporting gold over distances, plus the opportunity cost of losing mining time, all

deter miners who want easy access to their buyers. Liquidity can also be in an issue in some countries, where sending cash to remote buying counters can be problematic. Further delays can ensue if the official buying counter uses an assay system that either slows the transaction or retains partial payment for the product pending assay results, either or both of which may be unpopular with miners.

Some buying programs, opting to use approved intermediaries to serve this role, have faced two challenges: choosing effective intermediaries and keeping their loyalty.

If a buying program is too centralized and does not have enough offices well located in mining regions, it risks losing the miners as partners and having to rely on local and regional traders. This has been the case in Bolivia, Colombia, Ghana, and the Philippines. A similar situation may eventuate if gold purity and quantity standards are too high; those who can capitalize on economies of scale will be the ones selling into the official system. Other gold might seep out of the country in other ways or be sold to traders who send it elsewhere or, if prices are sufficiently attractive and tax burdens not discouraging, into the formal system.

In Focus: The Philippines

The Philippines' SGBP was established during the early 1980s, and by 1991, the government began requiring all ASGM to sell to the country's national buying program. The system was created to offer better prices to miners in an antipoverty effort and to deter them from selling to the informal market.

Buying stations share office space with regional government offices, which saves costs. When miners or intermediaries want to sell gold to the government, the seller is responsible for bringing the gold to the buying office. Gold sellers are limited to 10 kilograms (about 22.0 pounds) of gold per day. Once the gold arrives, it is preliminarily assayed on the spot. World market prices are calculated, minus a small processing charge, and 99 percent of the fee is paid on the day of the sale. Final assaying is done subsequently, and the remaining money is paid within two weeks.

Potential sellers must register with the system, furnish a copy of their ID and residence card, and provide bank account information. For each batch of gold delivered, sellers must deliver a letter stipulating whether the gold is from recycled sources or from ASM.

Challenges

Sellers are responsible for ensuring that the gold contains no mercury amalgam (of any quantity) and is free of slags (i.e., contaminants such as metal oxides). Although such high technical requirements mean that the SGBP receives only refined gold, they prevent ordinary miners from accessing the system.

In addition, the number of buying stations is limited. A 2012 study identified only five in all of the gold-rich Philippines—not only due to cost constraints but also because of the challenges of sustaining security at buying stations in mining areas. Maintaining a minimum number of buying centers keeps program operational costs and risks low. However, the program's structure strongly reinforces the participation of traders, giving them a dual role: refining the gold, then transporting it securely to buying stations. World prices continue to make the system attractive relative to the informal market, and it was widely regarded as a relative success until 2008, when the government levied an excise tax of 2 percent at the point of sale and a 10 percent creditable withholding tax. This small change altered the calculus of gold sellers and the appeal of the informal market. SGBP gold purchases declined more than 75 percent in a single year, from 7,166 to 1,722 kilograms (about 15,798 to 3,796 pounds) —at a time that world gold prices were on the rise. Gold is

presumed to have been easily redirected to China, Korea, Indonesia, and Malaysia.

Social relationships

The last common factor in determining whether gold is sold into legal trading chains is financing. Artisanal gold is often effectively "owned" even before it comes out of the ground because of prefinancing and other debt relationships that miners have with local traders or financiers. Because of the risky nature of mining, securing funding is a constant challenge for most ASM producers, and buyers often prefinance miners by loaning them money against future production or in exchange for miners' agreement to sell at preferential prices. Where loans are made as an investment in a site's production, security can be placed on site to prevent theft. In areas such as Côte d'Ivoire, well-established trader norms specify that only those who have prefinanced a site may buy from it. In places like Colombia, organized crime has been known to resort to coercion to prevent ASGM from accessing SGBPs.

However, it would be wrong to frame these relationships in a purely negative manner. As explained by Professor Gavin Hilson, "Middle men fill the gaps that are left by the absence of formal services." The ASM sector is vastly underserved by formal financial services. This is for a range of reasons, including the often illegal/informal nature of activities, the mobility of the sector, the lack of geological data for long-term mine planning, lack of business planning, lack of collateral (including regulations that prohibit the claim being used as security for a loan), and remoteness from infrastructure. Faced with such challenges, miners will turn to any willing source to obtain the financing necessary for their operations. Although these creditor-debtor relationships may be exploitative, they may also have a range of important, positive features: lenient repayment terms, availability of extra credit even when production is low, and provision of food, medication, or other essential items.

Tradeoffs

Taking the above realities into account, some SGBPs have opted to make tradeoffs. For instance, they have loosened the requirements placed on gold sellers, whether miners or traders. However, in Ghana and the Philippines, a resulting no-questions-asked policy undermined attempts to formalize ASGM, because the point of leverage (i.e., the SGBP) was sacrificed in the interest of increasing the flow of legal gold into the state-run system. States adopting this approach have faced criticism:

- Ghana was criticized for disjointed sector governance in prioritizing gold sales over issues of pervasive mercury use and environmental damage for which illegal ASM was blamed.
- Ethiopia was accused of tolerating inbound smuggling from other countries that would allow traders to access Ethiopia's higher gold prices.
- Critics say the Philippines' mining and fiscal policies have contradictory goals, and the latter undermines the former.

Additionally, a no-questions-asked policy goes against the international trend toward due diligence and traceability, because gold has been labeled a "conflict mineral" in Section 1502 of the Dodd-Frank Act, signed into law in the United States by President Barack Obama in 2010. If current trends become global expectations, a SGBP that adopts a no-questions-asked policy could be excluded from some international trading opportunities.

Ways Forward

Based on the experiences of other countries, there are a number of ways buying programs can become the preferred destination for miners' gold:

- **Pay quickly:** Same-day payment makes the system competitive with the informal market.
- **Pay in cash.** Do not rely on bank account transfers. Not all miners are well served by the formal banking system.

- **Reconsider minimum quantities:** Alternatively, consider ways to be flexible on minimum quantities with known clients.
- **Ensure that any assay system used is quick and easy:** It should pay the majority of the price on deposit of the material.
- **Extend banking services:** Where feasible, make them available (e.g., flexible financing and microloans) to known customers. Informal market financiers gain great power by prefinancing ASGM operators.
- **Strive for convenience:** That goes for both in location and in transactions. The mobility of informal market buyers is a buying advantage. If buying centers are not in mining districts, those traders will dominate selling.
- **Be inclusive:** Adopt a policy of inclusiveness and incentives that provides mechanisms and motivations for informal actors to become part of the system. If left outside the system, they may well become spoilers. If engaged, they may be a fundamental part of ensuring the system's success.
- **Address the business environment:** Create a viable, profitable space for formal trading and to remove barriers to entry.
- **Don't use SGBPs to enforce mining standards.** This is difficult. SGBP programs and those designed to raise standards should synergize, but SGBPs are most effective at attracting gold when there are few demands on sellers.
- **Harmonize:** Adjust tax and royalty systems in consonance with those of neighboring countries to reduce the ease and likelihood of tax evasion.

Good Practices in ASM–Industrial Mining Coexistence and Production Relationships

Despite the fact that both artisanal and small-scale miners and industrial miners are both on the spectrum of the mining sector, there is typically much reluctance by industrial mining to engage ASM, much less share land or facilities. There are myriad legal, operational, and reputational challenges from the LSM perspective, and the advantages are usually considered only through a community relations lens rather than from a commercial perspective. The section of the report that follows first outlines and discusses the practical challenges, then highlights examples of coexistence and productive relationships that are considered internationally to be good practice.

Basic Practical Challenges

A number of basic practical challenges thwart coexistence of the ASM and LSM sectors:

- **Legal risks:** Legal liability is a concern—for instance, if there were to be an incident or accident. The challenge can be even more basic, such as when the law itself forbids coexistence (e.g., in DRC).
- **Reputational risks:** Artisanal mining can entail a host of challenges, from environmental management to child labor concerns. Due diligence can also be a concern in terms of knowing all the actors involved in an ASM operation. Exposure to these risks can be a reputational concern for a company.
- **Commercial risks:** Management could be concerned about delays due to "distracting" projects or damage to equipment if it is mishandled.
- **Operational risks:** There is the possibility that permitting artisanal mining could open the floodgates to other local requests or demands on industrial miners; these can be seen as daunting.
- **Security risks:** Companies may be concerned that ASM on their site creates an opening for illicit or criminal activity and, further, that disagreements between ASM and LSM workers have the potential to end with violence.
- **Competitive risks:** There could be concerns that ASM and industrial miners could be competing for the same resource. Further, by allocating land to ASM, companies may have to downgrade the resource they have declared to the market, which could have an impact on their valuation.

- **Shareholder acceptance:** Communicating the value of coexistence relationships to shareholders may prove a challenge.

As the *Working Together* handbook, published by the World Bank's International Finance Corporation, commented: "The relationship between large-scale mining companies and the artisanal and small-scale mining sector is often poorly understood and has been troubled by a general mismatch of expectations, which has led to mistrust and conflict in some cases."

Aside from the above, a legal context can entail additional risks, such as the potential for changes in tax frameworks and local content requirements. Shifting political and legal contexts add short- and long-term financial risk and uncertainty to a company's planning and operations and can affect how deeply involved a company is willing to be in community relations; foreseeing a brief horizon, the

company may choose not to invest at all or opt to invest only in short-term corporate social responsibility (CSR) programs that lack quality.

Lastly, fluctuating gold prices can mean not only financial ruin for gold companies—for example, if the price of gold falls below the cost to produce it. The changing prices can also upend existing agreements. With increases, there may be a marked influx of ASMs expecting to access part of the concession without having been involved in the original negotiations or the systems design. An industrial mining company could break an agreement with local ASM producers if it is sold to another company with different strategies.

Key Opportunities

Although it is perhaps easiest and most natural to focus on the risks of ASM-industrial mining coexistence, there are opportunities as well. For example:

Legal and compliance risks

- Risk mitigation through direct engagement.
- Influencing favorable policy change by demonstrating good practice.

Reputational risks

- Engagement programs' measurable contribution to development.

Commercial risks

- Creation of new commercial opportunities through compliance with standards such as those of the Responsible Jewellery Council (RJC), or participation in sourcing programs. Example: Eurocantera (Honduras).

Operational risks

- Strengthened social license to operate.
- Utilization of the entire concession, not only the sections that are viable for industrial exploitation, yielding more efficient mining operations.
- Increased engagement of local residents, reducing security costs.

Examples of Coexistence

A few examples of success in ASM-industrial mining coexistence are notable. Typically, they fall within the following seven categories.

Coexistence by Tolerance

In Venezuela, the Placer Dome Company's Las Cristinas mine has pursued a policy of tolerance for ASGM on their concession. They have engaged in limited formalization assistance and interventions on mercury and safety issues.

In Ghana, Goldfields adopted a live-and-let-live approach; ASM was tolerated as long as the miners did not interfere with

company activities. The initiative was effective only briefly; company leadership made a strategic change, deciding to mine once-marginal resources on a concession.

Many other industrial operators appear to have adopted the same tolerance strategy in Ghana (from AngloGold Ashanti to Newmont Ghana).

Coexistence by Technical Assistance or Mentoring Relationships

Salvador Mondlane, Jr., writes, "For ASM operations, mentorship facilitates technology and skills (both entrepreneurship and specialized skills) transfer, at low cost, allows small-scale miners access to working capital, promotes legal, environmental and regulatory requirements compliance, and improves the overall working of ASM due to the adoption of best practice." One real-world example is the Benguet Corporation's Acupan Contract Mining Project in the Philippines. The company assists ASM gold producers to identify locations to mine and helps them with start-up operations, mine site planning, and implementation monitoring, then buys the ore they produce and sells the refined gold to the Philippines' Central Bank. In some ways, the company has taken on the roles of adviser, middleman, and financier. The project is small and observers have questioned its scalability. Hinton (2003) provides some warning on technical assistance programs. She recommends that they be equally simple or more so, demonstrably better in mining efficiency, and delivered in culturally sensitive and appropriate ways, and they should facilitate quick recovery of materials. Otherwise, she says, they are unlikely to be adopted.

Subcontracting Relationships (including tributing) promoting Coexistence

Improved relationships with SSM groups can result when the groups are engaged for core and noncore functions (e.g., contracting for ore recovery, transport services, or security).

In some contexts, a tributing system is a common form of a subcontractor relationship, usually an arrangement between an industrial LSM site and ASM units, which essentially lease part of the concession. The ASM unit typically pays a share of production proceeds, and the industrial LSM operation will often, but not always, require the ASM units to use the industrial mine's processing facilities—thereby profit sharing—as a condition of the arrangement. This system occurs in many places, including Zimbabwe.

Coexistence via Shared Facilities Programs

See the Eurocanteras example, below.

In Focus: Eurocantera, Honduras

Eurocantera is an industrial gold company based in Honduras and owned by Europe-based Goldlake Group. Goldlake operates three mines, all in Honduras and Argentina. The Honduran Eurocantera site is in central Honduras, in Olancho district's Lepaguare Valley, about 2.5 hours from Tegucigalpa, the country's capital. The concession comprises about 4,249 hectares (10,500 acres) containing an alluvial gold deposit. The company has 27 full-time employees, uses semimechanized methods, and contracts ASM labor through production agreements with ASM cooperatives in nearby towns (Figure 5). Processing is done by gravimetric concentration only. [2]

Artisanal and small-scale miners were active on the site before the company secured rights to the concession in 2006. Before the partnership, miners used sluices and panning but suffered significant losses as a result of the rudimentary methods. Eurocantera took the following steps:

- **Adopted a policy of inclusion versus exclusion:** "Rather than exclude the informal groups—often made up of family members—from the concession and make an already hard way of life more difficult, Eurocantera decided to find a way to incorporate them into the mine's business model."

- **Assisted miners with formalization and self-organization:** The ASM cooperative had been operating in a legal gray area. Eurocantera arranged legal assistance for the cooperative to become fully recognized and fully legal under Honduran law.

- **Focused on preserving livelihoods and the environment:** After a company-commissioned EIA by international consultants revealed the potential for a net positive impact on the local ecology, the project was developed as a zero-waste mine. Now, the mine is "a zero-waste site" that will leave behind "a larger indigenous forest on closure than [the company] found when it arrived." Critics could raise the question as to the quality of the forest cover.

The partnership between the company and the ASM cooperatives works this way: ASM cooperatives achieve agreed-upon standards for OSH, labor, human rights, and environmental protocols. In exchange, Eurocantera invests in the cooperatives' mining efficiency—mechanization, process improvements, and access to in-country smelting facilities and eventually to its refinery in Italy. Erzurumlu et al. (2012) describe the precise interventions:

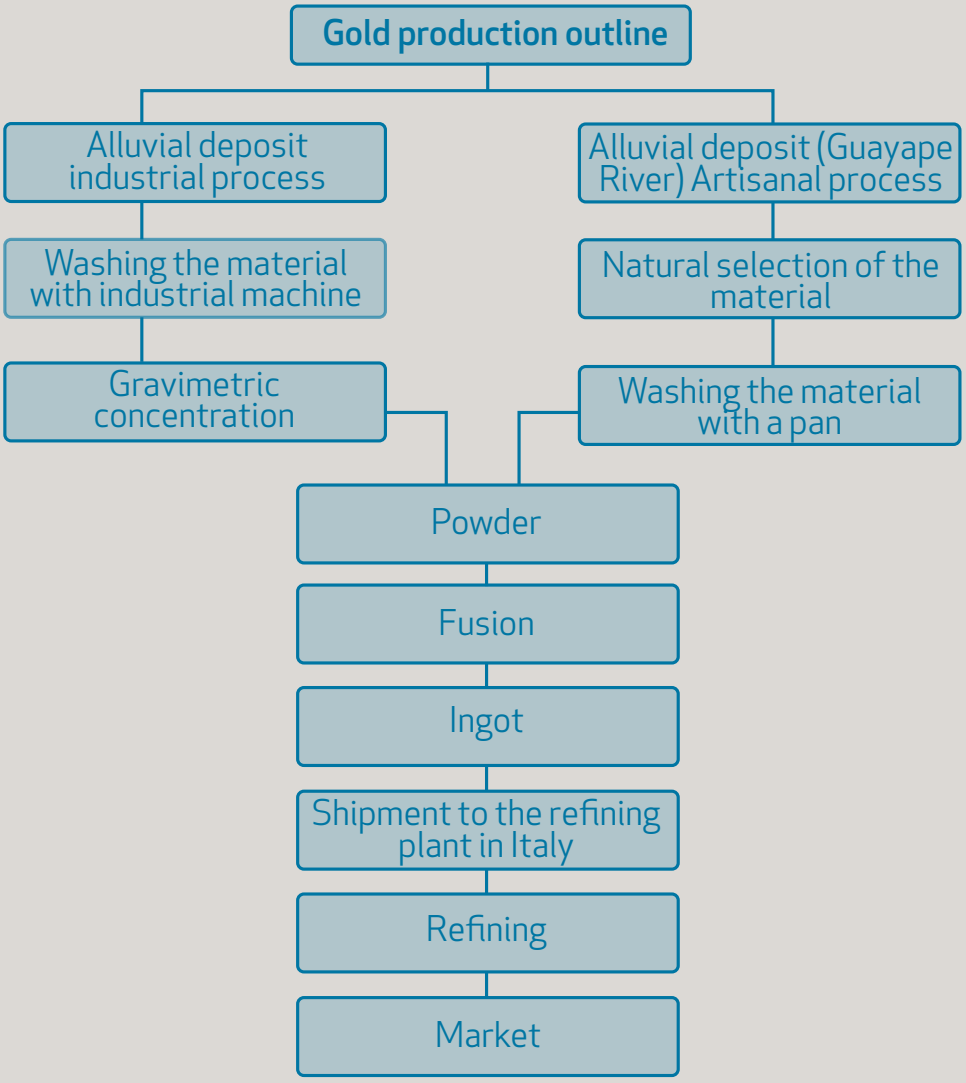
> *Some of the technological improvements were simple yet highly effective, introduced after observing how the miners worked physically. Eurocantera introduced the use of mats and channels, which trapped heavy particles, to replace the panning technique and also to keep workers out of the water as much as possible. Eurocantera developed a heavy particle concentration mineral separation technology (HPC-10 ExtracTec) and built a machine that allowed cost-effective gravity separation of materials with differing densities. Workers used the machine at the river. The company purchased an excavator for the workers, who had been mostly searching the surface because they could not dig deep into the river bed where alluvial gold had settled. The excavator could easily dig out the earth, and workers could filter the soil with river water. Eurocantera trained people to operate the machinery and did not charge the cooperative for this service. If bad weather stopped operations, unused machine hours were at Eurocantera expense. The only costs to the cooperative were maintenance and diesel fuel.... The new technology and organized workforce improved gold extraction efficiency. Each work area on the river was better utilized.... Eurocantera's agreement with the cooperative enabled mining groups to manage revenue from gold sales and minimize risks. The cooperative integrated the local workforce with the mine's production system and productivity targets. In case of low production, Eurocantera absorbed expenses without charging the cooperative. The extraction process built by Goldlake for the cooperative reached a daily capacity of 100 grams. Local miners who operated inside the mine concessions supplied almost one-third of Goldlake's daily output of 450 grams.*

Eurocantera invested about US$35,000 for the HPC-10 ExtracTec, US$25,000 for the collection truck, and US$500 for channels and mats, and paid US$53 per hour for cooperatives' ongoing use of the excavator.

- The company is a member of the RJC. Membership comes with market access to elite jewelers for supplier members who meet RJC's rigorous certification standards.

- Eurocantera's mine now supplies "responsibly produced" gold to Cartier. Cartier purchases the mine's entire production and pays a "social premium" to ensure this high standard of gold production; the premium is used to benefit ASM communities. According to Eurocantera's Web site, two-thirds of gold production at the Lepaguare Valley site is via its industrial methods, and one-third is from its on-site ASM producer partners.

The independent auditing firm UL (Underwriters Laboratory) provides the third-party auditing required for RJC certification.

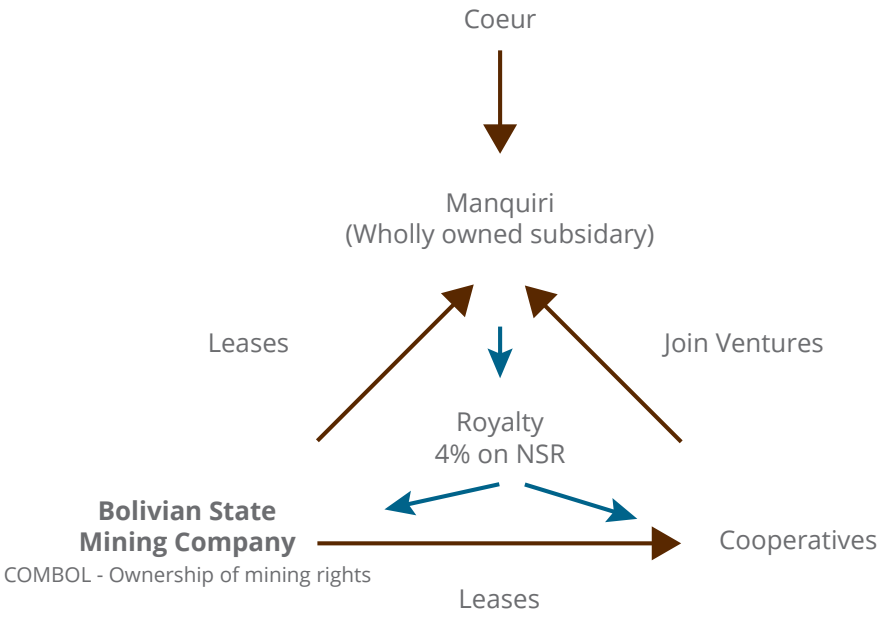


Source: GoldLake Group, Eurocantera

Joint Venture Relationships promoting coexistence

An LSM company can partner with ASM groupings in a joint venture. For example, in Bolivia, the Coeur d'Alene Mines Corporation (the world's largest publicly traded primary silver producer) works via joint venture with organized ASM cooperatives representing 15,000 local artisanal miners (Figure 4). This arrangement was inspired by Bolivia's unusual legal framework, which made the Bolivian national mining company the owner of all mines in Potosi through a nationalization process during the 1950s. The government then leased the mining rights to the alluvial gravel deposits to local ASM cooperatives. "The cooperatives in turn have subleased their mining rights to Coeur's subsidiary, Manquiri, through a series of joint venture contracts.... Coeur has been proceeding with its capital investment in the project at a measured pace." The pace reflects Bolivia's political situation. Its investments in the country had been insured by the US government's Overseas Private Investment Corporation (OPIC), which covers private sector investments in politically risky countries against such events such as "expropriation, political violence, or currency inconvertibility."

Figure 4: Structure of the Coeur Mine's joint venture relationship with ASM cooperative partners at the Manquiri Mine, Bolivia.



Buying Programs supporting coexistence

On several industrial sites in Katanga province, DRC, Pact has facilitated arrangements where an industrial producer buys from local ASM organizations operating on or around their concession. One example was the Kulumaziba River copper tailings deposit in Kolwezi, where Anvil Mining purchased hand-sorted copper ore from 6,000 ASMs (both men and women), who worked in the river bed. The system was managed by government agents from the DRC service for ASM, Service for the Assistance and Supervision of Artisanal and Small-Scale Mining (SAESSCAM), with 200 traders (or négociants) purchasing the material for reselling to the company. A structured relationship was established, with representatives from all parties involved in consultation. The company paid the official taxes, via the local banking system, on purchase of the material from the miners. As

the river bed was safe, there were few issues around occupational safety and health (OSH) to consider. During the life of the project, there were some security incidents, but far fewer than if the company had tried to keep miners off the approximately 3.73 miles (6 kilometers) of riverbed. The project eventually ended when the river bed was effectively mined out and the miners moved to other sites.

Corporate-led Formalization and Professionalization Programs	Donor- and NGO-Led programs
Components depend on the context and ASMO level of professionalization, but may include: Geological support. Licensing assistance. Access to financing. Professionalizing from artisanal mining to small-scale mining. Organizational development (e.g., help setting up cooperatives or small businesses). Taxation. Attaining regulatory compliance.	Formalization programs. Cooperative formation assistance. Technical capacity-building programs. Mercury reduction programs. Microcredit or other loan programs, or small-grant programs. Certification programs, such as Fairtrade and FairMined. Beneficiation programs, such as lapidary training initiatives. ASM–LSM coexistence programs. Environmental remediation training programs. Alternative or supplementary livelihood approaches.

Table 2: Components of ASM engagement programs by type.

Good Practices

Although the Eurocantera case is generally considered successful, some observers have noted that the area is not considered an "acute ASM hotspot" like some other contexts, such as Ghana and Tanzania. Key features of Eurocanteras:

- The program has stood the test of time.
- The program adopted a formalization component that put the company on firm legal ground in ethical markets, where full legality of all operators is a common requirement (e.g., with FairMined, Fairtrade, and RJC).
- Both LSM and ASM groups have a stake in smooth operations. Because the company and its contractors share facilities and depend on one another, meaningful cooperation can be achieved.

In Focus: Gran Colombia Gold, Colombia

Gran Colombia Gold is a medium-scale industrial gold and silver
mining company, based in Canada but with mines in Marmato, Segovia, and Zancudo, Colombia (Figure 6). It is Colombia's largest gold and silver producer. The company has 21,400 hectares (about 52,880 acres) of mineral titles in Colombia; these are estimated to contain reserves of 5 million troy ounces of gold at an average production grade of 9.3. Around 3.42 tonnes (110,000 ounces) of gold were produced in 2013. Gran Colombia plans to increase production to 6.22 tonnes (200,000 ounces) soon. Gold mining is done underground. The company reports that in Segovia, ore grade is 15.3 grams per tonne and compares it to the 1 gram per tonne global average.

Figure 6: Mining concessions owned by Gran Colombia Gold.

Gran Colombia describes its relationship to artisanal miners as "integrating artisanal miners into our mining operations" via business contracts with local ASM organizations (both cooperatives and companies). The partnership works this way:

- Participants comply fully with local employment and mining laws and with Gran Colombia's rules and procedures.
- ASM cooperatives and companies work within the company's mine plan and deliver all ore to Gran Colombia's processing facility.
- In exchange, the company offers benefits to the ASM organizations, , including buying their gold. It uses a formula based on the quantity of recovered gold and the US dollar spot price.
- To improve working conditions, the company provides financial and technical training on topics such as mercury reduction (below).
- Gran Colombia Gold contributes to social security pensions for each miner employed.

Under these arrangements, the company works with approximately 20 ASMOs on its Colombian concessions; these agreements involve nearly 4,000 artisanal workers, with a number of favorable outcomes (Table 3).

eASM & Communities	Government	Gran Colombia
OSH and access to training improved. Pension benefits paid to more than 3,000 miners, translating to increased benefits for 12,000 people (assuming that each miner is directly supporting three people). Community health outcomes improved, because of the mercury elimination. Regular, predictable payments made to miners, translating to improved livelihoods, families' ability to plan expenditures, and miners' ability to open bank accounts and access business loans. Four jobs created indirectly for each job on the concession.	Job creation increased and local economies expanded. Entrepreneurism encouraged locally because of readily available opportunities. Tax and royalty revenue increased because of the coexistence; the formalized activities, which may previously have been criminal, have yielded new taxes and royalties for the government. Environmental outcomes improved. A 2014 study4 estimates mercury reduction of 15 tonnes (16.5 tons) due to coexistence operations. Mining-related criminal activities reduced: A public company's management of mining operations fills a void that a criminal organization might otherwise occupy.	Security costs reduced because of the expanded presence of local artisanal workers. Community relations improved.

Table 3: Outcomes of Gran Colombia gold partnership with ASM organizations. ,

One of the company's signature initiatives involved a multistakeholder partnership with the University of British Colombia (UBC), the UN Industrial Development Organization (UNIDO), the Environmental Agency of Antioquia (CORANTIOQUIA), the Secretary of Mines of Antioquia, and the School of Mines of the National University of Colombia in Antioquia. Antioquia was labeled the world's most polluted place in 2010 because of its pollution by mercury. Per year, the town of Segovia alone was releasing 22.4 tonnes (about 24.7 tons) of mercury into the environment. Mercury consumed (and lost) by entables (privately run processing facilities) in the five Antioquia municipalities was estimated to range between 73 and 110 tonnes (80.4 and 121.2 tons) in 2010. The company participated in a mercury reduction program focused on technical solutions, but—even more important—it supported the program's success by its willingness to buy ore from local artisanal miners. These miners began avoiding the highly polluting entables and instead sold to Gran Colombia and the region's new mercury-free processing facilities, ostensibly either because of their higher efficiencies or because of the terms of Gran Colombia contracts. Recoveries at area entables processing gold using amalgamation were less than 40 percent—and typically as low as 25 percent.

Good Practices

The Gran Colombia Gold case appears to be a good-practice model of building positive, practical, and productive relationships with local miners in the context of an ASM hotspot. In particular, Gran Colombia's use of contracts with specific benefits appears to have facilitated increased government tax and royalty collections; allowed miners to benefit from higher incomes from improved gold recovery; and reinforced the multistakeholder partnership's efforts to reduce mercury use by serving as an attractive local ore buyer.

Ways Forward

For concession partnerships to work, a number of stakeholders must come together in a highly coordinated fashion. For this component, Garrett (2014) reminds us that "groups of stakeholders have different capabilities that they can bring to partnerships, which can aid more effective implementation."

Table 4: Tasks to complete at the beginning of any partnership.

	Legal framework and governance	Health and safety, Environment	Social Issues	Formalization and professionalization
Government	Update regulations to ensure that preferred options are both legal and administratively straightforward. Update laws to support ASM certification initiatives.		Consider adopting the Voluntary Principles for Security & Human Rights.5	In context analysis, consider and prioritize issues related to formalization, such as: Permitting. Regulatory compliance (e.g., OSH, environment). Taxation and legal trade.
Companies	Create enforcement agreements with local and national authorities, including coordination meetings and escalation scenarios. Develop productive relationships with ASM to create conditions for peaceful coexistence and potentially for the attainment of international mining and market standards. Seek and support government actions to support positive coexistence relationships.	Decide on site-level minimum safety standards for any ASM site, objective measures for compliance, and clear repercussions for violations. For gold, provide mercury reduction support. This can be delivered by independent consultant experts or in partnership with a qualified institution, such as a university or environmental NGO. Create achievable environmental minimums and procedures, considering miners' prevailing education levels.	Consider the gravity and scale of issues relating to systemic drivers of poverty in the area, child mining issues, and direct and indirect effects of mining on gender. Consider inviting NGOs and donor partners with expertise in these areas to collaborate with local officials. Create agreements with ASMO partners and traditional leaders (if applicable) regarding influx scenarios and levels of responsibility.	For companies, seek and support appropriate national laws, policies, and government action on ASM.6 For coalition or individual actors, develop a national partnership on ASM–LSM coexistence. For companies, lend technical support to help miners reach legal requirements.

Ultimately, the keys to success include achieving the tasks outlined (Table 4), as well as:

- Creating a clear vision of desired achievements and key indicators of success.
- Understanding ASM producers' sore points on costs, incentives, and constraints (e.g., debt relationships).
- Including a mix of short- and long-term steps.
- Incorporating financial sustainability into the project design (i.e., how the project will sustain itself over time).
- Undertaking ongoing democratic engagement with ASMOs.
- Finding a facilitator or project manager who is trusted by all ASMO partners.
- Ensuring that company staff have adequate buy-in and are rewarded for project success.
- Advocating for an enabling regulatory environment and influencing policies that threaten progress.

Chapter 2 notes

1 **Stephen** Metcalf and Samuel J. Spiegel, Global Mercury Project Activities in Zimbabwe 2002–2007: Project EG/GLO/01/G34—Removal of Barriers to Introduction of Cleaner Artisanal Gold Mining and Extraction Technologies, Final Report (UNIDO, 2007), http://iwlearn.net/iw-projects/1223/reports/zimbabwe/activities-in-zimbabwe-2002-2007-final-report.

2 **In** Zimbabwe, "panning" refers not just to the physical activity of panning (i.e., filtering gold from sand using a pan and water) but also to the process of disrupting riverbanks and riverbeds with shovels and other methods.

3 **John** Hollaway, "Lessons from Zimbabwe," 2000.

4 **Beatrice** Labonne, "Small- and Medium-Scale Mining" Natural Resources Forum, 18 (1994): 13–16, doi: 10.1111/j.1477-8947.1994.tb00868.x.

5 **Jennifer** J. Hinton, Communities and Small-Scale Mining: An Integrated Review for Development Planning (Washington DC: World Bank, 2006), http://www.eisourcebook.org/cms/June%202013/CASM,%20an%20Integrated%20Review%20for%20Development%20Planning.pdf.

6 **Interview** with O. Masiiwa, Director of Inspectorate, RBZ, by N. Mukwakwami and S. Mawowa, September 29, 2014. Due to the RBZ's discretion to fix exchange rates at the time, it was able to buy gold in local currency at prices that seemed to be above international prices—when, in fact, the local currency was overvalued.

7 **Bernd** Drechsler, Small-Scale Mining and Sustainable Development within the SADC Region (London: MMSD, 2001).

8 **Interview** with P. Singo, Project Manager, Sustainable Artisanal Mining, by N. Mukwakwami, November 3, 2014.

9 **Samuel** J. Spiegel, Formalisation Policies, Informal Resource Sectors and the De-/Re-Centralization of Power: Geographies of Inequality in Africa and Asia (Bogor Barat, Indonesia: Center for International Forestry Research, 2012), http://www.cifor.org/fileadmin/subsites/proformal/PDF/RSpiegel1212.pdf.

10 **Toll** elution is the process of recovering gold from the carbon used during cyanidation.

11 **This** was during a period of rising gold prices. The recent boom in gold prices occurred while artisanal mining was criminalized.

12 **"Chikorokoza** chapera" means "artisanal mining is over" in Shona.

13 **Stephen** Metcalf and Samuel J. Spiegel, Global Mercury Project Activities.

14 **Samuel** J. Spiegel, Formalisation Policies.

15 **Artisanal** miners.

16 **Parliament** of Zimbabwe, Senate Hansard 17, no. 6 (September 12, 2007): 15–21.

17 **Approximately** US$19,800.

18 **Samuel** J. Spiegel, Formalisation Policies.

19 **This** is equipment that separates free gold from the rest of the ore by their relative movement in response to gravity and one or more other forces (e.g., centrifugal forces, magnetic forces, buoyant forces). Due to gold's high specific density (i.e., it is very heavy), it is much more resistant to motion in a viscous medium such as heavy media, water, or air.

20 **Gravity-based** troughs that use water for concentrating gold from crushed gravel or sands.

21 **Eight** hours of one person's labor.

22 **Lower** than the average grades in Zimbabwe.

23 **Oliver** Maponga and Clay F. Ngorima, "Overcoming Environmental Problems in the Gold Panning Sector through Legislation and Education: The Zimbabwean Experience," Journal of Cleaner Production 11 (2003): 147–157, http://www.unites.uqam.ca/gmf/globalmercuryforum/files/articles/africa/Zimbabwe%20ASM%20JCP%202003%20Maponga.pdf.

24 **Thomas** Hentschel, Felix Hruschka, and Michael Priester, Artisanal and Small-Scale Mining: Challenges and Opportunities (London: World Business Council for Sustainable Development, 2003), http://afrim.org.ph/IDLS/files/original/94db37ffd394f7786a06f03b5ccf9c69.pdf.

25 **Bernd** Drechsler, Small-Scale Mining and Sustainable Development.

26 **At** the term it was known as the Intermediate Technology Development Group (ITDG).

27 **Samuel** J. Spiegel, Formalisation Policies.

28 **Demarcating** the boundaries of a mine claim.

29 **Gavin** Hilson, "What Is Wrong with the Global Support Facility for Small-Scale Mining?" Progress in Development Studies 7 (2007):235–249, doi:

30 **Richard** Svotwa and E. M. Bugnosen, "Shamva Mining Centre Demonstration Project: An Example of International and Local NGO Collaboration Progress and Problems to Date," presentation at the United Nations Interregional Seminar on Guidelines for the Development of Small and Medium-Scale Mining, Harare, Zimbabwe, February 11–19, 1993.

31 **Bernd** Drechsler, Small-Scale Mining and Sustainable Development.

32 **Gavin** Hilson, "What's Wrong with the Global Support Facility."

33 **Ibid.**

34 **Samuel** J. Spiegel, Formalisation Policies.

35 **Alex** Mugova, "The Shamva Mining Centre Project," presentation at the Workshop on Artisanal and Small-Scale Mining, London, November 19–20, 2001.

36 **Bernd** Drechsler, Small-Scale Mining and Sustainable Development.

37 **Approximately** US$6,000.

38 **Bernd** Drechsler, Small-Scale Mining and Sustainable Development.

39 **Ibid.**

40 **Interview** with H. Greaves, Managing Director, Farvic Consolidated Mines, by N. Mukwakwami, August 14, 2014.

41 **Interview** with ZIMASCO employee, by N. Mukwakwami, M. Kanoyangwa, and P. Mudzwiti, October 15, 2014.

42 **Reports** of production and labor statistics made monthly to the MMMD.

43 **Sponsorship** is when an individual or organization purchases all inputs for ASM miners and then is given a share in the output (usually between 25 and 30 percent). The expenses incurred by the sponsor are deducted from the proceeds before the net profits are shared.

44 **Interview** with former Tetrad employee, by D. Kisyombe, S. Wawowa, and N. Mukwakwami, October 3, 2014.

45 **The** rate of repayment on government equipment loans was zero.

46 **Kevin** Telmer, "Fifty thousand gold shops in the world's artisanal gold supply chain," Artisanal Gold Council (blog), http://www.artisanalgold.org/publications/articles/fifty-thousand-gold-shops-in-the-world-s-artisanal-gold-supply-chain

47 **Ibid.**

48 **The** five that have closed are: Burkina Faso, Colombia, Côte d'Ivoire, Kyrgyzstan, and Tanzania, per confidential report, 2012. Two countries have programs starting up; these include Mongolia and Cameroon.

49 **Stephens** M. Kambani, "Key Issues in Illegal Mining and Marketing in the Small-Scale Mining Industry," in The Socio-Economic Impacts of Artisanal and Small-Scale Mining in Developing Countries, ed. Gavin Hilson (Lisse, The Netherlands: Swets & Zeitlinger BV, 2006).

50 **Ibid.**

51 **Confidential** report, 2012.

52 **Stephens** M. Kambani, "The Impact of Policy Changes on Small-Scale Mining in Zambia," in Socio-Economic Impacts, 48. In his review of historical data, Kambani notes that systems liberalization has occurred in such countries as Zambia but that smuggling persists, indicating that price is not the only factor.

53 **Stephens** M. Kambani, "Key Issues," 50.

54 **Confidential** report, 2012.

55 **Robert** E. Grosse, Drugs and Money: Laundering Latin America's Cocaine Dollars (Westport, CT: Praeger Publishers, 2001); Cecilia Jamasmie, "Colombian Gold CEO Involved in $970m Laundering Case Arrested," January 22, 2015, Mining.com, http://www.mining.com/colombian-gold-ceo-involved-in-970m-laundering-case-arrest

56 **Cristina** Villegas, Philipp Griedl, and Angela Jorns, Gold Mining and Conservation: A Situational Analysis and Response Plan in Ecuador (ASM-PACE Program, 2013). The ASM-PACE Program is a joint initiative of the global conservation organization WWF and Estelle Levin Ltd. Unpublished.

57 **Ibid.**

58 **Stephens** M. Kambani, "Key Issues"; also observed by Cristina Villegas, Gold Mining and Conservation. In Ecuador, when Villegas interviewed informal gold miners, they said did not sell into the official state system for two reasons: There was no buying office in the area they were mining; and—more importantly, when they had sold to the government in the past, it took them weeks to get paid. They said they preferred to be paid immediately and did not want to wait.

59 **Ayele** Yelibenwork, "Commercial Bank of Ethiopia to Buy Gold from Artisan Miners" (Addis Ababa, Ethiopia: 2Merkato.com Web site, September 30, 2011), http://www.2merkato.com/news/energy-and-mining/376-commercial-bank-of-ethiopia-to-buy-gold-from-artisan-miners.

60 **Mahlet** Mesefin, "Ethiopia: Artisanal Gold Fails to Outshine Expectations This Time," All Africa, January 15, 2012, http://allafrica.com/stories/201201191096.html.

61 **Ibid.**

62 **Cristina** Villegas, Philipp Griedl, and Angela Jorns, Gold Mining and Conservation.

63 **Gavin** Hilson, "' Constructing' Ethical Mineral Supply Chain in Sub-Saharan Africa: The Case of Malawian Fair Trade Rubies," Development and Change 45, no. 1 (2014), 55–78, doi: 10.1111/dech.12069.

64 **Stephens** M. Kambani, "Key Issues"; and a confidential source.

65 **Confidential** source.

66 **.Confidential** source. Ghana's Precious Minerals Marketing Company (PMMC), which buys only large quantities of gold, was cited as an example. Miners were forced to sell to middlemen instead of directly to the SGBP.

67 **Stephens** M. Kambani, "Key Issues." Kambani discusses the well-known issue of tax evasion and its contribution to whether a miner or trader will use the formal system. In an interview, a confidential source described rampant tax evasion in Mongolia and the Philippines to avoid the 7 to 10 percent tax and royalty payments by the respective central banks. In sum, if taxes are too high, miners may avoid them by using informal markets.

68 **Confidential** source.

69 **Confidential** source.

70 **Stephens** M. Kambani, "Key Issues," 44.

71 **Simon** Gilbert, Massaran Traoré, and Gavin Hilson, in press, Facilitating Innovation in Artisanal Diamond Mining and Trading in Côte d'Ivoire: A Scoping Study (2015).

72 **Confidential** source.

73 **Personal** communication, April 2015.

74 **Confidential** source.

75 **Unpublished** 2013 review of Ethiopia's gold policies.

76 **Confidential** source.

77 **Confidential** source.

78 **Personal** communication between Cristina Villegas and Professor Gavin Hilson, November 2014.

79 **Communities** and Small-Scale Mining (CASM), CommDev, International Council on Mining and Metals (ICMM), Working Together: How Large-Scale Mining Can Engage with Artisanal and Small-Scale Miner (CASM, CommDev, and ICMM, 2010), http://www.icmm.com/document/789.

80 **Personal** communication between Cristina Villegas and Professor Gavin Hilson, November 2014.

81 **Multiple** sources, including: CASM, CommDev, and ICMM, Working Together; and Nicholas Garrett, A Corporate Strategy Approach Towards Sustainable ASM/LSM Co-Existence, PowerPoint presentation at the Mining Investment Indaba, February 4, 2014, http://www.globaldialogue.info/IGF%20Regional%20Meet-

ing%20-%20RCS%20A%20corporate%20strategy%20approach%20towards%20sustainable%20ASM%20LSM%20co-existence%20-%20Nicholas%20Garrett.pdf.

82 **Nicholas** Garrett, "Corporate Strategy Approach."

83 **Nina** Collins and Lynda Lawson, Investigating Approaches to Working with Artisanal and Small-Scale Miners: A Compendium of Strategies and Reports from the Field: IM4DC Action Research Report (St. Lucia, Queensland: Centre for Social Responsibility in Mining, Sustainable Minerals Institute, University of Queensland, July 2014), http://im4dc.org/wp-content/uploads/2013/09/Collins-ASM-FR-Completed-Report.pdf.

84 **Ibid.**

85 **Ibid.**

86 **Salvador** Mondlane, Jr., ASM and LSM Relationship (Nairobi: United Nations Environmental Programme, n.d.), http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/ASGM/Presentations_Forum/Day%202/ASM_LSM_relationship.pdf. Mondlane described a situation whereby an industrial mining company could "adopt" . . . "several SSM companies and [provide] them with technical and business support, including guaranteeing their borrowings from commercial financial institutions. The SSM companies [would be] expected to graduate to fully fledged businesses over a given period, normally five years, after which the LSM Company [would] adopt another company."

87 **Isabelo** Velez, Benguet Corporation's Acupan Contract Mining Project: Mining in Partnership with the Community, presented at Community and State Interests in Small-Scale Mining: Sharing Experiences from the Asia-Pacific Region (workshop), Manila, Philippines, June 7–12, 2005, http://asmasiapacific.org/wp-content/uploads/2014/07/Velez2005_BenguetCorporations.pdf.

88 **Ibid.**

89 **Nicholas** Garrett, "Corporate Strategy Approach."

90 **Nina** Collins and Lynda Lawson, Investigating Approaches.

91 **Salvador** Mondlane, Jr., ASM and LSM Relationship.

92 **Responsible** Jewellery Council (RJC), Building Responsible Jewellery Supply Chains: Impacts Report (n.p., June 2014), http://www.responsiblejewellery.com/files/RJC-Impacts-Report.pdf.

93 **Ibid.**

94 **Ibid.**

95 **Ibid.**

96 **Sinan** Erzurumlu, Marty Anderson, and Assheton S. Stewart-Carter, Goldlake/Eurocantera Case Study, 2012 (Wellesley, MA: Babson College, 2012), http://www.goldlake.it/public/Goldlake_EurocanteraUKCover.pdf.

97 **Cartier** [home page]. http://www.cartier.com/maison/commitments/cartier-and-corporate-social-responsibility/resources-excellence/gold-12160.

98

99 **Responsible** Jewellery Council, Building Responsible Jewellery Supply Chains.

100 **Goldlake** Group, "The Projects: Eurocantera" (Gubbio, Italy, n.d), http://www.goldlake.co.uk/The_projects/Eurocantera.aspx.

101 **PR** News Wire, "Coeur Clarifies Bolivia Investment," May 2, 2006, http://www.prnewswire.com/news-releases/coeur-clarifies-bolivia-invest

102 **Ibid.**

103 **Ibid.**

104 **Nicholas** Garrett, Artisanal Mining and Conflict Financing in Eastern Democratic Republic of Congo (DRC); Coping, Conflict, and Shadow Economy Actors and the Impact of the 'Conflict Minerals' Campaign (Berlin: Freie Universität Berlin, 2014),

105 **http://www.diss.fu-berlin.de/diss/servlets/MCRFileNodeServlet/FUDISS_deri**

106 **Oseas** García, Marcello M. Veiga, Paul Cordy, Osvaldo E. Suescún, Jorge Martin Molina, and Monika Roeser, "Artisanal Gold Mining in Antioquia, Colombia: A Successful Case of Mercury Reduction," Journal of Cleaner Production 90 (March 2015): 244–252, doi: 10.1016/j.jcle

107 **Ibid.**

108 **Gran** Colombia, "Production at a Glance," http://www.grancolombiagold.com/files/images/Visual-Capital.jpg.

109 **Gran** Colombia, "Artisanal Miner Partnership Model," http://grancolombiagold.com/sustainability/Artisanal-Miner-Partnership-Model/default.aspx.

110 **Ibid.**

111 **Ibid.**

112 **Oseas** García et al., "Artisanal Gold Mining in Antioquia." Until recently, this worked as follows: "Miners were paid based on sampling and chemical analyses of the ore brought to the company's processing plant. Gran Colombia pays the miners for 55 to 60 percent of the gold content in the ore indicated by their analyses. . . . Recently [Gran Colombia Gold] changed their policy and [is] paying 45 percent of the gold content in the ore due to the recent reduction of the international gold price."

113 **Oseas** García, et al., " Artisanal Gold Mining in Antioquia"; Gran Colombia, "Working Together," http://grancolombiagold.com/files/Working%20Together%20final.pdf.

114 **Gran** Colombia 2014b. "Artisanal Miner Partnership Model", http://grancolombiagold.com/sustainability/Artisanal-Miner-Partnership-Model/default.aspx.

115 **Gran** Colombia, "Working Together."

116 **Ibid.**

117 **The** program included international visits to demonstration processing facilities in Ecuador (facilities funded by the US Department of State) by the owners of entables and selected miners from Antioquia. Practical classes were delivered by UBC on: grinding for gold liberation; gravity concentration using a centrifuge; flotation of gold and copper minerals; oxidation processes for sulfides, including bacterial leaching; methods to remove mercury before cyanidation; and use of activated carbon to extract gold from solution; cyanide destruction with peroxide; gold

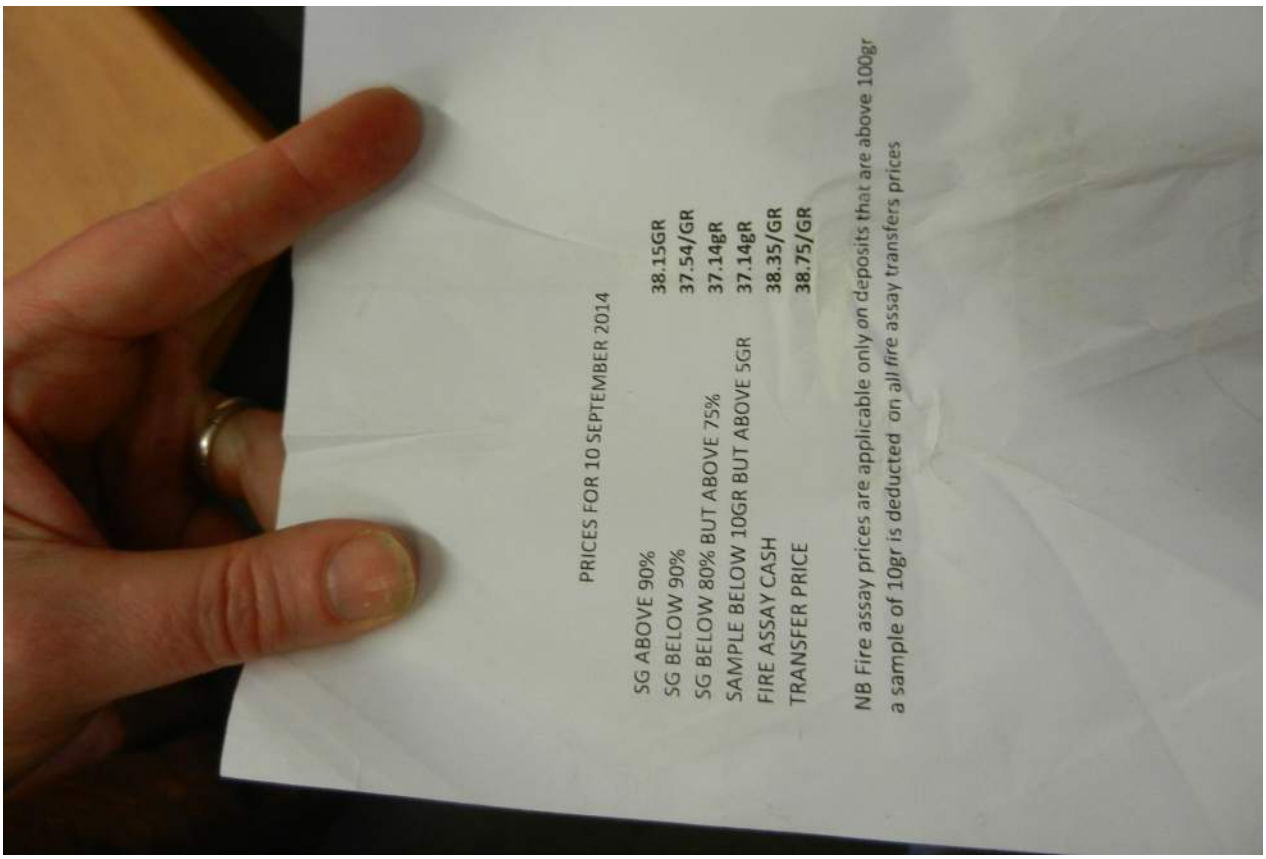
refining with nitric acid; chemical analyses of gold and cyanide; tailings management; and water recycling. These options were accompanied by socially oriented courses focused on cooperative organization, mining operations' relationship with local communities, and business management. Oseas García et al., "Artisanal Gold Mining in Antioquia." Almost 40 mercury-free processing facilities using concentration and cyanidation were installed through this partnership program.

118 **Oseas** García, et al., "Artisanal Gold Mining in Antioquia."

119 **The** World Bank is experimenting in a convening role in Tanzania to coordinate such a partnership, and it will be an important initiative to watch for practical guidance and lessons learned.

120 **Nicholas** Garrett, "Corporate Strategy Approach."

121 **Multiple** sources, including Nicholas Garrett, "Artisanal Mining and Conflict Financing."



chapter 3

Legal and policy review

Legal framework

Current mining law in Zimbabwe, based on the Canadian mining law system, was first introduced at the turn of the 20th century. This so-called free mining system is a colonial relic based on the first-come, first-assessed (FIFA) principle and was intended to attract European settlers. The free-access traits of this system can be identified within many sections of the MMA, and these traits greatly reduce government authorities' ability to exercise their administrative and discretionary powers.

In 1896, the British South Africa Company (BSAC), led by Cecil John Rhodes, was given a mandate to administer Zimbabwe and consequently owned all the mineral rights, with a few exceptions. Anyone who wanted to mine had to purchase the rights from BSAC.

In 1923, the mineral rights were sold to the government, and all applicable rules were taken over by government. As a result, Zimbabwe mineral resources are held today by the Government of Zimbabwe as the trustee and custodian. However, on the issue of state ownership and exploitation of strategic resources, there is a clear conflict between the state's role as an operator and its role as a regulator, responsible for creating an enabling environment.

The Mining Code refers to the whole of the comprehensive set of rules, regulations, and procedures issued by the Government of Zimbabwe to regulate prospecting, exploration, and exploitation of minerals within the limits of national jurisdiction. In Zimbabwe, the MMA is the principal piece of legislation governing the minerals industry and

forms part of the Mining Code. It overrides all other acts affecting mining and is the country's most powerful act in the area of natural resources management.

Mines and Minerals Act, Chapter 21:05 of 1961

This act vests ownership of all minerals in the president. A wide-ranging piece of legislation, it contains regulations for prospecting for claims, working them, maintaining health and safety, and abandonment of claims. Several amendments have served to attract foreign direct investment (FDI) by enabling participation in LSM. The act has been utilized as a template for mining legislation in other countries, including South Africa and Angola, which are reviewing their mining regulatory and policy systems as of January 2014.

Implementation of the act has disadvantaged SSM and ASM operations: High licensing fees impede artisanal and small-scale miners' ability to obtain EPOs or to register claims—in particular, in areas of rich gold deposits—because these are already "owned" by LSMOs, whose huge capital base enables them to hold onto large tracts of land for periods exceeding 10 years. Artisanal and small-scale miners have to wait for the claims to be forfeited to access them. In most cases, artisanal and small-scale miners end up registering claims on the periphery of these tracts, where the mineral deposits are of low value.

A key challenge in implementation of the MMA has been the cadastral system. Under it, the MMMD maintains an outdated registry of claims, which has led to numerous disputes over ownership of claims, as new claims may be made on top of existing claims. The fact that the cadastre is not computerized makes it impossible to manage returns or pay payment of claim maintenance fees by miners. The treasury is thus shortchanged in terms of revenues due from the sector. As a result of conflicts over boundaries and lack of adequate mapping, artisanal miners often deliberately encroach on and initiate illegal mining on legally registered claims.

Sections of the mineral and mining act that directly affect ASM activities

- Prospecting Section: Anyone aged 18 or older who is a permanent resident of Zimbabwe or a resident's agent may acquire one or more prospecting licenses.
- Mining Claims Section: A holder of a prospecting license may peg claims and register them for the purpose of mining. The size of each precious metal7 claim is 500 meters by 200 meters (about one-third mile by one-eighth mile). A block of up to 10 such contiguous claims can be registered as a single "mining location."
- Mining Lease Section: The holder of a mining location or contiguous registered mining locations may make written application to the mining commissioner8 to obtain a mining lease for the defined area where those locations are situated. The holder of a mining lease has the exclusive right to mine any deposit or mineral that occurs within the vertical limits9 of the lease.
- Section on Claim Disputes: Clauses in Sections 20, 23, and 24 state that the first person to peg a claim has greater rights than any subsequent pegger.
- Section on Maintenance of Mining Rights: The claim owner must pay an annual fee to the MMMD to maintain the rights.
- Section on Transferring Mining Rights: The law allows the sale of mining rights and requires that the MMMD be informed of any such sale within 60 days of the transaction.
- Tribute Agreements Section: The law allows an owner of a claim to lease it to another party as a tribute. The tributor must then apply to the MMMD for registration of a notarial deed embodying the terms of the agreement.

Because the MMA does not segregate scales of mining, an artisanal miner and a large-scale miner are equal before the act. This equality has made the act largely unsuitable for regulating ASM. Recognizing this problem, the MMMD attempted to regulate ASM with a statutory instrument, the Mining (Alluvial Gold) (Public Streams) Regulations.

Mining (Alluvial Gold) (Public Streams) Regulations: 1991 Statutory Instrument Number 275

By the early 1990s, an estimated 100,000 Zimbabweans were involved in ASM,[1] most of them panning in rivers. A 1993 study estimated that alone, 60 kilometers (37.2 miles) of the Dande River

were under gold panning.[2] A later study estimated gold-panner density along the Dande to exceed 100 people per kilometer (0.621 mile).[3]

The then-Minister of Mines and Mining Development, Chris Anderson, was quoted as saying that it was "high time the [gold] panners are recognized as part of the informal sector" and that they should be "encouraged to sell their gold to the RBZ," which should pay them a price higher than the market rate "to prevent them from selling to the informal market."[4]

The MMMD responded boldly by promulgating the Mining (Alluvial Gold) (Public Streams) Regulations in 1991, which recognized and regulated a sector that had become too significant to ignore in terms of size, socioeconomic and environmental effects, and general regional importance. The regulations were intended to stem the trend toward illegal gold panning and to capture potential losses of gold into the parallel market. Protecting rivers from siltation and other environmental ills was an expressed goal.

At the time, it was envisioned that the regulations would formalize gold panning activities by removing an important structural constraint to the growth of the sector by according it legal status and incorporating it into national development policies. In the process, it was hoped, conditions would be created for sustainable resource utilization at the local level.

This statutory instrument enlisted RDCs, the mining commissioner, the inspector of mines, the police, the RBZ, and the Department of National Parks and Wildlife as enforcers. The MMMD must have seen these institutions as key stakeholders in artisanal mining—RDCs as the main administrators of rural areas, the RBZ as the sole buyer of gold in the country, and the mining commission as the department that would grant mining claims. The inspector of mines and the police would enforce the regulations, while the Department of National Parks and Wildlife was roped in because so much panning occurred in national parks.

SI 275/1991 empowered local authorities to control and regulate small-scale alluvial gold mining by making it RDCs' responsibility to enforce the regulations.[5] SI 275/1991 served to control extraction of gold from public streams at the local level, as well as the marketing of panned gold—a good indication that the ministry understood the need to regulate the entire gold value chain in order to formalize the activity. RDCs were given the right to apply for special grants[6] for particular streams from the permanent secretary for mines and mining development or a mining commissioner, who would consult with the Department of Natural Resources.[7]

After acquiring the special grant, the RDC would demarcate a public stream into sections of 50 meters (about 165 feet), in consultation with the mining commissioner.[8] The regulations required that mining take place only in the river bed and at least 3 meters (about 9.8 feet) from either bank.

Environmentally degrading activities such as undercutting[9] and excavations deeper than 1.5 meters (about 4.9 feet) were prohibited. All mined-out areas had to be backfilled and the recovered gold sold to the RBZ or its agents. The environmental regulations were insufficiently enforced, a fact that came into the spotlight during the

early 1990s, following the 1987 publication of the Brundtland Report, which introduced the term "sustainable development."[10] Environmentalists criticized SI 275/1991 for not being strong enough on environmental issues. One issue cited was that RDCs were not required to consult with any water-resource management body before applying for special grants.[11] Maponga and Mutemererwa (1995) refute the regulations' functionality as being "difficult to enforce" and "in direct contradiction with the Natural Resources Protection Regulations of 1991."[12] This suggests that the law's environmental components were enforced insufficiently, if at all. The regulations' marketing components were unintentionally scuttled by FPR policies during that time, policies that were geared to promoting LSM and that did not recognize ASM as a significant source of gold.

Despite protestations and the promulgation of the Environmental Management Act of 2002, the Mining (Alluvial Gold) (Public Streams) regulations stood until 2006, when they were repealed and ASM was criminalized. The reason stated for repeal was that they promoted environmental regulations at the expense of the ASM sector. However, key informant interviews (KIIs) have suggested that the growth of the informal market and the shunning of FPR by ASM producers led policymakers to believe that, through SI 275/1991, the ASM sector was free to produce gold and sell it on the informal market—without benefiting the state. The repeal faced no objections from RDCs or the RBZ, who had failed to enforce the regulations.

The key causes for the failure of SI 275/1991 to fully address gold mining and trading by artisanal and small-scale miners lie in the two institutions that were responsible for its enforcement. The SI's environmental restrictions made it difficult for RDCs to be effective (as did its unclear reluctance to register ASM sites), and FPR's policies during that time unintentionally scuttled the law's attempts to formalize trading.

Rural District Councils

RDCs had shown "limited" enthusiasm, and their reluctance to enforce the regulations may have stemmed partly from ignorance of the long-term benefits of monitoring ASM activities.[13] In 2003, intense gold panning was taking place in about 30 RDCs, and special grants should have been sought for all—yet only nine were issued. Theoretically, this was an issue of capacity (i.e., lack of development-planning knowledge and lack of willingness to enforce the law), compounded by RDCs' perception that they did not directly benefit from ASM activity. Despite legislation, panning was never fully recognized as a formal economic activity and did not receive much-needed support from formal structures within the country.

RDCs also felt that the clause regulating mining depth and proximity to river banks was impractical, thinking that panners would still work these areas (making them hard for RDCs to police) and would have less incentive to operate legally.

Reserve Bank of Zimbabwe

When SI 275 was in force, the RBZ, through its FPR subsidiary, only accepted gold deposits of 50 grams (about 1.76 ounces) and above. FPR contends that this was because 50 grams is the minimum quantity that can be tested for purity. However, the minimum discouraged gold panners and other small-scale miners producing smaller amounts of gold from selling through this channel—the sole official channel. The few miners who did market their gold through FPR also had to contend with the lag between leaving their bullion and being paid (which was by a crossed cheque[14]). Payment could take up to two weeks—a fact that encouraged artisanal and small-scale miners to sell through the informal market when they were hard-pressed for cash. Because of RDCs' reluctance to obtain special grants, most panners were operating illegally and could not sell their gold through the official channels.[15]

Ministry of Mines and Mining Development

While the MMMD had promulgated

SI 275/1991 for RDCs to enforce, it also issued its own gold panning licenses. The availability of both central and local government licenses led to confusion, especially in the rural districts where there was overlap.

The significance of SI 275/1991 was such it gave local government officers—for the first time—autonomous licensing powers in the gold extraction sector. When district governments were empowered in the context of minerals development, the colonial legacy of central government control, and the domination of a small number of decision makers, was overturned. Also overturned were the colonial policies that forbade independent gold extraction by black African workers.[16]

Despite its many flaws, SI 275/1991 provided artisanal miners with an opportunity to spend less time evading law enforcement and more time working on operational, environmental, economic, and marketing efficiency. The decision to repeal the regulations was accompanied by a decision to register all toll elution plant operators, a move to tighten control of the gold production chain. The police swiftly moved in to enforce the decision through Operation Chikorokoza Chapera (page 132).

Mines and Minerals Amendment Bill

In November 2007, an attempt to amend the MMA—the Mines and Minerals Amendment Bill— was tabled, and as of May 2015, signs are that it will never be enacted. But the bill provides insights into legislative changes that may lie ahead.

First, the bill differentiates between large-scale miners and small-scale miners. A small-scale miner is defined as a miner who, in any mining location or combination of mining locations, employs fewer than 100 persons; has an installed electrical or mechanical power capacity of fewer than 7.5 megawatts; and annually produces or processes fewer than 30,000 metric tons (about 33,069 tons) of ore and mining waste as a result of mining operations.

The bill includes an interesting clause on environmental management, stating that small-scale miners will have the option of either establishing their own environmental rehabilitation funds or contributing toward a fund established by a financial institution or a trade body; if they do not exercise any of these options, they will have to contribute to the Environment Fund, established by the Environmental Management Act. A similar requirement did not succeed in Sierra Leone.

Another proposed change to the MMA is the requirement that the Minister of Mines and Mining Development select one member of the MAB from a panel of at least three names submitted by an association that, in the minister's opinion, represents the interests of small-scale miners in Zimbabwe. This proposed change would mean that artisanal and small-scale miners would have some representation in discussions that affect them.

Other Statutory Instruments under the Mines and Minerals Act

SI 109/1990, Mining (Management and Safety) Regulations of 1990

SI 109/1990 regulates the appointments of mine managers and the safety of mining operations. These regulations are, however, one-size-fits-all for all scales of mining operations, despite the fact that ASM operations usually cannot afford to appoint a mine manager or adhere to rigorous safety requirements. The government also lacks the capacity to perform its duties fully with regards to inspections of mining operations. However, one of the stated goals of the recent restructuring of the MMMD is to ensure safety at all registered mines; consequently, quite a large number of graduate trainee engineers have been recruited recently.

SI 72/1989, Chapter 10:08, Explosives Regulations

These regulations deal with the licensing

of mine blasters and the use, storage, transport, and manufacture of explosives. Although some ASM operations use explosives, most of these operations acquire explosives on the informal market and neither hold blasting licenses nor employ licensed blasters.

SI 329/2002 and SI 178/2006, Mines and Minerals (Custom Milling Plants) Regulations

Requiring registration of every custom milling plant, these regulations were enacted in 2006, when artisanal mining was criminalized as a way to seal leakages of gold from milling sites into the informal market. The milling licenses are valid for one calendar year and must be renewed thereafter. Millers have complained that the license fee is too high, and indications are that many millers operate without licenses. In addition to paying the license fee, millers are required to obtain an EIA certificate.

Table 5: Other acts that affect the artisanal and small-scale mining sector

Legislation or Policy	Scope of law or policy (What does it say?)	Other laws or policies it interacts with		Regulatory Institutions
Environmental Management Act of 2004, Chapter 20:27	The act provides for the sustainable management of natural resources and protection of the environment; the prevention of pollution and environmental degradation; the preparation of a national environmental plan and other plans for management and protection of the environment; the establishment of an EMA.	Parks and Wildlife Act [Chapter 20:14]; Rural District Councils Act [Chapter 29:13]; Income Tax Act [Chapter 23:06] (all proceeds collected as carbon tax are given to EMA); Criminal Procedure and Evidence Act [Chapter 9:07]; Regional, Town and Country Planning Act [Chapter 29:12];	High	MEWC; National Environment Council; EMA, led by the Director General
Zimbabwe National Water Authority Act of 1998 (Chapter 20:25)	This act established ZINWA, which manages the country's water resources and charges for providing water and related services. ZINWA also collects a water levy.	Water Act (1976) Amended	Low	MEWC
Rural District Council Act of 1996 (Chapter 29:13)	RDC functions include formulating and enforcing bylaws, determining and collecting rates and levies, local development, providing social services, and environmental conservation.	Traditional Leaders Act of 1998 (Chapter 29:17); Communal Land Act (Chapter 20:04) of 1981	High	Ministry of Local Government (MOLG)
Mining (General) Regulations) Government Notice 247 of 1977	This SI addresses the use of indigenous wood and timber; indicator beacons and Digital Preservation (DP) pegs; roads, railway, tracks, and inaccessible ground; preservation of mining rights and payment by miners of a "designated mineral" levy; payment of landowners; and preservation of works.	Environmental Management Act (Chapter 20:27) of 2002	High	MMMD
Mining (Health and Sanitation) Regulations, SI 182/1995	This act regulates the provision of mine health and sanitation facilities. It is rarely applied to ASM, because facilities are nonexistent, and ASM are usually not penalized when they fail to provide facilities for workers.		High	MMMD; MHCW; EMA
Gold Trade Act (Chapter 21:03) of 2006	Current legislation (Gold Act Trade Chapter 21:03) singles out the RBZ, through FPR, as the country's sole buyer of gold. RBZ dictates the price of gold.	MMA	High	MOF; FPR under RBZ
Gold Trade (Gold-Buying Permits for Concession Areas) of 2002	The stated objective of these regulations was to tighten loopholes in the mining, processing, and trading of gold and other minerals by establishing concessions.	MMA	High	MOF; FPR under RBZ

Key Policies

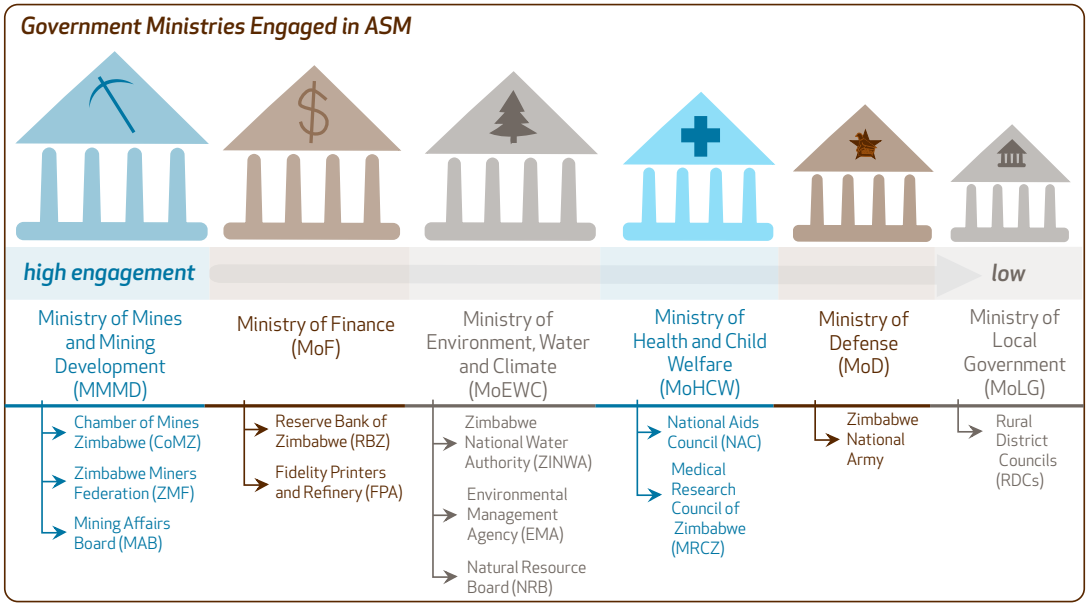
Artisanal Mining Permits

Artisanal mining permits (AMPs) were introduced on November 18, 2014, as a mitigation measure to curb the sale of gold into the informal market and its subsequent smuggling; this was announced by Minister of Mines and Mining Development, the Hon. Walter Chidhakwa. The measure allows "anyone" interested in dealing with gold to buy gold and sell it to FPR. This is a welcome move for ASM gold producers, because these AMPs are free, issued at gold service centers, FPR sites, and licensed millers' offices. Thus, as long as they have an AMP, ASM gold producers can easily sell their gold to FPR; AMPs could mark a milestone in the formalization of ASM operatives as a form of licensing of artisanal miners. AMPs could also bring order to the small-scale gold sector and rechannel all gold in the hands of informal and unregistered miners to FPR.

The State's Role in Regulating ASM Operations

Six government ministries engage directly with ASM. The MMMD, overseeing the mining industry, liaises with other ministries, including: the MOF on the minerals tax regime; the MEWC on environmental management systems; the Ministry of Health and Child Welfare (MHCW) on occupational health and safety; the Ministry of Defence (MOD) on defining strategic precious minerals and state security; and the MOLG on engaging councilors and traditional leaders, who are in contact with ASM communities at grassroots level. The MMMD is the ministry most engaged with ASM. During the scoping study, it was constantly observed that lack of coordination and information sharing among ministries contributes to the challenges they face both individually and collectively. This disorder is compounded by the lack of a national mineral policy that could provide ministries with strategic guidance and that could guide much-needed coordination.[17] Ministries and institutions have different levels of engagement and influence with ASM (Figure 7).

Figure 7: Ministries engaging with artisanal and small-scale mining.



Zimbabwe has no official national mineral policy document, and a concise strategic mineral plan that would guide policy over the next 50 to 100 years remains to be put in place. However, government has taken bold steps and in October 2013 came up with a Draft Minerals Policy (DMP) with guidelines built around a broader mining vision and the aspirations of the Government of Zimbabwe.

Draft Minerals Policy

Of the policy's six goals, three have a direct impact on ASM:

- **Prescribe procedures for mineral lease procurement:** The process should be is transparent, fair, honest, cost-effective, and competitive.
- **Implement a mineral fiscal regime:** It should optimize returns to the asset owner (the state) while remaining attractive for investments by operators. The draft policy explicitly states that taxes, tariffs, and fees that "add to the cost of mining" will be minimized to encourage "the optimal extraction of the resource and to discourage 'high-grading.'"
- **Facilitate small- and medium-scale mining:** Do this via measures such as support for mechanization.
- **The DMP is progressive in that it recognizes three tiers of mining:** large-scale, small-scale, and artisanal. Although it is still to be adequately determined how the government distinguishes between small-scale and artisanal mining, if at all, the DMP states that a new law, the Minerals Development Act, will be formulated and that it will cater for exploration licenses and ASM prospecting licences, ASM leases, and mining leases on a use-it-or-lose-it principle.[18] The DMP calls for the backing and enabling of sustainable ASM activities to create employment, generate income, and help reduce poverty in rural areas. This would be done by rebuilding the ASM support "golden triangle": finance, marketing, and technical assistance.

The DMP includes a provision to "establish mechanisms for the arbitration of competing land-use options." This is critical, as gold is predominantly found in rural and periurban settings, where indigenous communities engaging in agricultural activities often clash with migratory artisanal miners, who frequently degrade farming land and fail to rehabilitate it. Additionally, the DMP calls for establishment of a functional, user-friendly national mineral cadastre information management system (MCIMS), which will go a long way toward minimizing land-use conflicts and claim disputes. The DMP, however, remains a draft, and government is currently informed by the five-year economic blueprint, Zim-Asset.

The stated goal of Zim-Asset is to achieve sustainable development and social equity anchored in indigenization, empowerment, and employment creation. The policy lists two of its outputs as: eight provincial gold processing and buying centers; and the registration of 500 syndicates (i.e., 2,500 registered small-scale miners). Although the policy uses the term "small-scale miners," government is actually directing its efforts toward artisanal mining (highlighting the government's lack of clarity over the distinction between artisanal and small-scale mining). Zim-Asset calls for formalization of small-scale miners (but is silent on artisanal miners). However, the process is limited to syndication or formation of cooperatives.

Recent ASM Policy Pronouncements

On November 14, 2014, the Minister of Mines and Mining Development, the Hon. Walter Chidhakwa, released a press statement entitled "Measures to Increase Gold Production and Effectively Account for Sales to FPR in the Short, Medium, to Long Term." The minister focused on both small-scale and large-scale gold producers and identifies three factors that have negatively affected the viability of gold mining—namely:

- Strict regulatory requirements.
- Numerous mining taxes.
- Stringent environmental regulations.

He also identified challenges that have hindered deliveries to FPR, including:

- Sustained decline in international gold prices since January 2013.
- Endemic smuggling of gold to neighboring countries, whose illegal buyers are getting a premium estimated at 14 percent.[19]
- High regulatory fees and levies.
- The inconvenience of selling gold at FPR gold-buying centers.
- Lack of effective enforcement of existing regulatory requirements with regard to artisanal gold production and sales. The current enforcement operations are fragmented, uncoordinated, and inconsistent.

To address these and other challenges, the minister outlined short-, medium-, and long-term measures:

Short-Term Measures

- **Establishment of a Gold Compliance and Enforcement Coordinating Unit (GCECU):** This will comprise representatives of the MMMD, MOFED, RBZ, Office of the President and Cabinet, Zimbabwe Republic Police (ZRP) Minerals Unit, MOLG, EMA, and ZIMRA. GCECU will report directly to a Body of Permanent Secretaries.
- **Establishment of gold service centers:** The first will be jointly funded by the Minerals Marketing Corporation of Zimbabwe (MMCZ) and FPR, and established at St. George's in Zhombe.
- **Establishment of mobile gold-buying units:** This is aimed at small-scale miners, who may find it difficult to travel to FPR buying centers. In addition, FPR has been asked to extend its operating hours to make them more convenient to producers.
- **Introduction of artisanal mining permits** (page 173).
- **Registration of milling plants:** The Zimbabwe Electricity Transmission and Distribution Company (ZETDC), the national electricity supplier, will be required to ensure that custom millers are registered and licensed before connecting them to the grid.
- **Accounting for gold output in the small-scale sector:** The use of consumables (i.e., water, cyanide, and electricity) will be monitored to estimate the amount of gold produced by each small-scale miner. In an interview, former Minister of Finance Tendai Biti stated he had once sought to engage an international firm to do similar accounting for large-scale mines.
- **Technical capacity building:** The MMMD ordered the Zimbabwe School of Mines (ZSM) to develop programs to provide technical training to small-scale miners. In addition, MMMD and EMA are embarking on an outreach program to educate small-scale miners on methods of improving gold production in a sustainable manner.

Medium- to Long-Term Measures

- User-friendly EMA guidelines: The MMMD is engaging EMA with the goal of devising environmental guidelines for artisanal and small-scale miners that will ensure a balance between ASM viability and environmental management.
- Review and rationalization of EMA, RDC, and electricity charges: The MMMD is engaging the MOF with a view to standardize charges by various RDCs and EMA.

The press release states that FPR is receiving an estimated 2 tonnes (about 2.2 tons) a year from the small-scale sector. The minister believes that an additional 5 tonnes (about 5.5 tons) per year can be generated. "If each miller delivers 2 kilograms of gold to FPR per month, more than 300 millers will produce 600 kilograms x 12 months = 7.2 tonnes per year—effective mobilization of an additional 5 tonnes per year."

This is of concern because it is similar to the justification made by former RBZ governor Dr. Gideon Gono for Operation Chikorokoza Chapera, estimating that gold worth US$50 to US$60 million was being smuggled out of the country each month. One key informant revealed that the governor had arrived at this figure after being misinformed by an overzealous individual seeking a gold-buying license that there were 1.5

million artisanal and small-scale miners in Zimbabwe, each of whom recovered 5 grams (about 0.176 ounces) of gold a day.

Such generalizations build expectations that might not be realized—expectations that do not account for the numerous factors that affect Zimbabwean gold production.

Economic Costs of Gold Mining and Trading

As of the time of research, the following were the costs involved with mining and trading formally and those involved with operating in the gray sector.

Fiscal Regime and Taxation

FPR charges a group of taxes on the gold it receives, namely:

- Royalty.
- FPR's own charge, covering transportation, insurance, cash, overheads, and profit margin.

These all contribute toward what is effectively a tax levied on anyone bringing gold to FPR.

Royalty

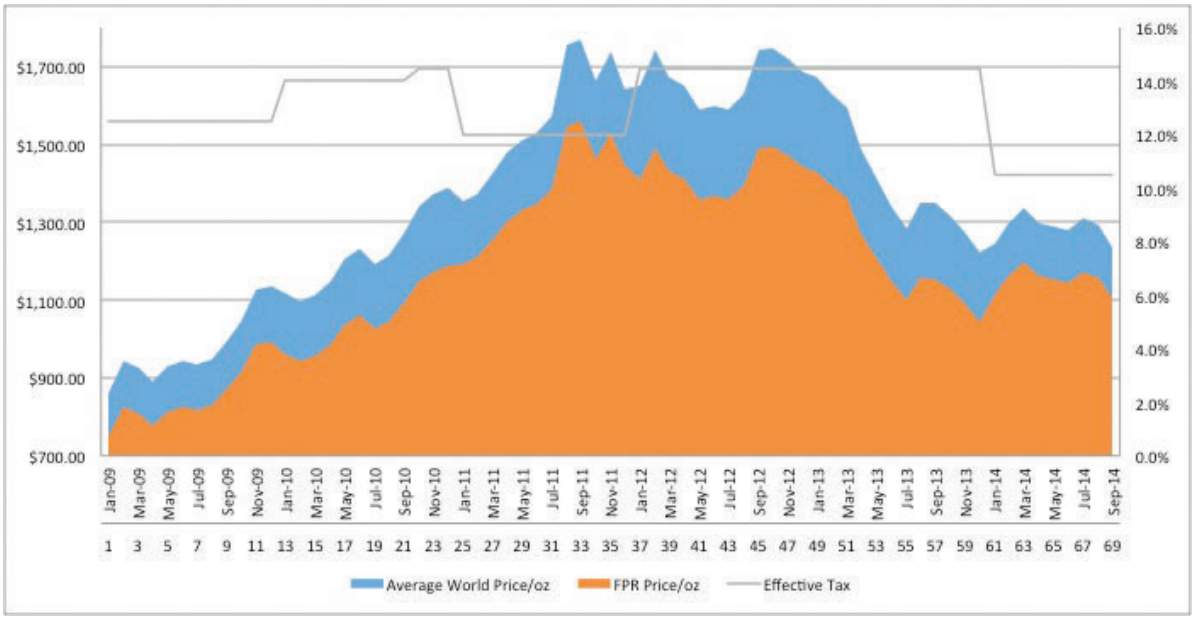
The royalty on gold in Zimbabwe is a tax paid to the central government for extraction of mineral rights to which it has full ownership rights and it is charged ad valorem (i.e., as a percentage of gross revenue). LSM is charged a 5% royalty and ASM is charged at 3%. Previously, the minerals royalty was an allowable deduction[20] in the determination of taxable income. This had been the case since the introduction of mining royalties in 2004. However, since January 1, 2014, the mineral royalty is no longer deductible in determining taxable income. This has largely affected the LSM sector.

Presumptive Tax

In 2009, a presumptive tax was introduced on all informal businesses, including ASM (Figure 8). Initially, the tax was at 5 percent of revenue; it was revised down to 2 percent in January 2011. The presumptive tax was scrapped beginning October 1, 2014.

Figure 8: The Impact of the Effective Tax Rate (Royalties, Taxes, and the FPR's Charge) on Gold Price Offered to ASM.

Figure 8: The impact of the effective tax rate (royalties, taxes, and the FPR's Charge) on gold price offered to ASM.



Costs of Operating Formally

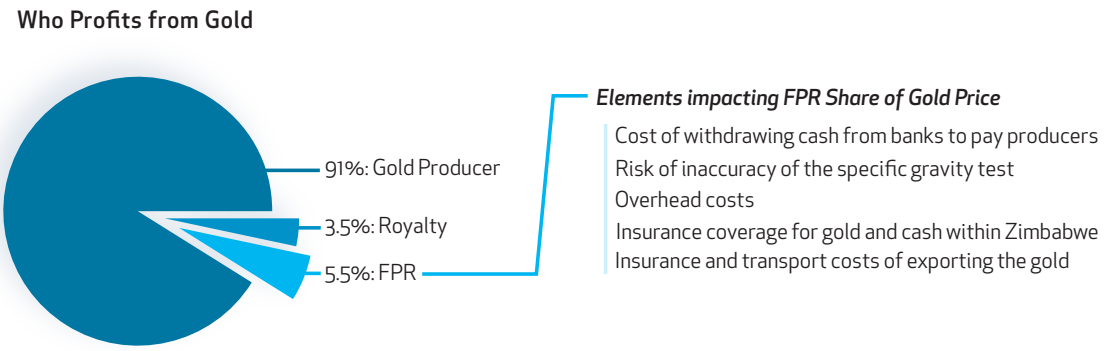
Aspiring miners who want to follow the letter of the law and obtain all certifications required to operate a small-scale mine have to go through 13 procedures. These will take at least 158 days and cost US$3,220—14 times a mine worker's monthly minimum wage. To obtain the equipment necessary to start up mining operations, the miner will require a no less than US$12,300.

To obtain legal authorization to operate a custom mill requires going through 17 procedures. These will take 271 days and cost US$12,300—and that is even before starting construction. The construction of a mill—consisting of a stamp mill and a ball mill—would cost a further US$68,250, bringing the total cost of starting up a custom milling operation to US$80,550.

To obtain a connection to the electricity grid, aspiring custom millers must complete four administrative steps that take at least 17 days. Millers are often expected to purchase their own materials for the power installation, including transformer, wooden poles, insulators, conductors (electrical cable), bolts, and nuts. The estimated cost of this material is US$13,000.

Legally, FPR is the sole buyer of gold in Zimbabwe, and it makes a number of charges against the gold it buys—namely, tax and its own fee. The fee is also broken down to show how FPR arrives at the fee (Figure 9).

Figure 9: Breakdown of the fees FPR charges on the gold it buys and FPR's share as a percentage of total gold price.



Miners incur several taxes and payments during operations (Table 6.). For example, they are charged a royalty of 3 percent on all gold they sell. Small-scale miners who are registered for tax purposes at ZIMRA also pay an income tax and remit income taxes on behalf of their employees. A carbon tax is charged by EMA for the use of generators, and an EIA review fee of US$250 is charged every quarter. Payments are also required: Miners pay an annual US$250 license fee to MMMD, a fee of 5.5 percent of gold sold to FPR, and a unit tax to the RDC in an amount that varies from district to district. Additionally, small-scale miners remit NSSA payments on behalf of their employees. A detailed analysis of these taxes and payments is provided in Annex 7.

Millers and elution plant operators incur a

royalty of 3 percent of gold sold, income tax, value-added tax (VAT), and carbon tax. They also remit income taxes and NSSA payments on behalf of their employees and, as a business incentive, often remit VAT for their customers. In addition, millers and elution plant owners pay an annual license fee of US$8,000 and a fee of 5.5 percent of gold sold to FPR as well as a fee for an EIA review, discharge license fees to EMA, and a unit tax to the RDC, the amount of which varies from district to district. These taxes and payments are discussed in full in Annex 7.

Table 6: Fines charged to ASM operators by different government agencies.

TYPE OF OFFENSE (OPERATING WITHOUT)	OFFICIAL FINES (US$)	UNOFFICIAL PAYMENTS (US$)
Imposed by the MMMD		
Mining Registration	$500	
Blasting and Explosives Storage License	Closure	$300
Imposed by the EMA		
EIA Certificate	$500	
Protective Wear	$200	
Blasting and Explosives Storage License	Closure	$300
Imposed by the ZRP		
Ore Removal Permit	$50	
Transporting Gold Ore after Hours	$50 per encounter	

Costs of Operating Informally

There is no universal procedure for informal miners to gain access to mining ground. In some areas, authorities such as chiefs, headmen, or political party officials charge unofficial rents.

Generally, financial start-up costs are very low for informal miners. Most do not legally own mining claims or explosives and need only a pick and a shovel to dig. They transport their ore to milling companies at an approximate cost of US$60 per 15 kilometers (about 9.2 miles).When the gold source is alluvial, they do more sieving than digging and do not need to go to the miller.

Environmental and social costs may be high due to shaft accidents (normally not reported to the police); fights resulting from the lack of proper channels to settle disputes; dangers from abandoned shafts and gullies; and the destruction of the environment because of miners' tree cutting. During the Pact scoping study, it was reported that operational safety standards and the climate of corruption were such that if a colleague were to be trapped by a collapsed shaft, others would just run away for fear of being victimized by the police.

A number of reports from miners described the actions of agents working outside their official mandates, behaving in ways that were neither authorized nor endorsed by the agencies involved. For example, miners reported victimization by ZRP raids and fines of about US$200. They reported in some cases bribing ZRP officers using gold they had mined in order to avoid disruptions to their work. CID Minerals, Gold Section, was reported to be the most aggressive, levying fines as high as US$500 to illegal miners. EMA may levy charges ranging between US$200 and US$500, if the miner does not comply with environmental and safety standards. In case of accidents, bribes of about US$20 to US$100 have to be paid to doctors to treat the patient. It should be noted that these

Notes

1 **"Gold** Panning Along Public Streams Now Legal," The Insider, December 31, 1991, http://insiderzim.com/gold-panning-along-public-streams-now-legal/. The earliest recorded estimate of ASM population is found in a newspaper article, which quotes Giles Munyoro of the Small-Scale Miners Association as saying there were about 100,000 panners in the country.

2 **P.** Wolff, Riverbed and Alluvial Mining in Zimbabwe (Harare: University of Zimbabwe, 1993).

3 **Richard** Svotwa and C. Mtetwa, The Environmental Impact of Small-Scale Mining in Zimbabwe (Harare: Intermediate Technology Development Group, 1999).

4 **Sokwanele,** "Pillage and Patronage: Human Rights Abuses in Zimbabwe's Informal Gold-Mining Sector," This Is Zimbabwe (blog), http://www.sokwanele.com/thisiszimbabwe/archives/486.

5 **N.** Zwane, David Love, Zvikomborero Hoko, and Dennis Shoko, "Managing the Impact of Gold Panning Activities within the Context of Integrated Water Resources Management Planning in the Lower Manyame Subcatchment, Zambezi Basin," Physics and Chemistry of the Earth 31 (2006): 848–856; and Gavin Hilson, A Contextual Review of the Ghananian Small-Scale Mining Industry (London: Imperial College Centre for Environmental Technology, 2001), http://pubs.iied.org/pdfs/G00722.pdf.

6 **A** special grant is a license granted by granted by the Minister of Mines and Mining Development to a person or organization wishing to mine or prospect within an area reserved against prospecting or pegging.

7 **Section** 3, Subsections 2 and 3.

8 **Section** 4, Subsection 2.

9 **Excavating** the banks from beneath, thereby causing them to collapse.

10 **Gro** Harlem Brundtland, Our Common Future: Report of the World Commission on Environment and Development (Oslo: United Nations, 1987), http://www.un-documents.net/our-common-future.pdf.

11 **Oliver** Joseph Maponga and Anderson Mutemererwa, Management of Natural Resources and Environment in Zimbabwe: The Case of Gold (Geneva: United Nations Conference on Trade and Development, UNCTAD, 1995).

12 **Oliver** Joseph Maponga and Anderson Mutemererwa, Management of Natural Resources, 22. These regulations were repealed by the Environmental Management Act of 2004.

13 **Oliver** Joseph Maponga and Clay F. Ngorima, "Overcoming Environmental Problems."

14 **A** crossed cheque is a cheque that has been marked to specify an instruction about the way it is to be redeemed. A common instruction is to specify that it must be deposited directly into an account with a bank and not immediately cashed by a bank over the counter. By using crossed cheques, cheque writers can effectively protect the cheques they write from being stolen and cashed.

15 **Bernd** Drechsler, Small-Scale Mining and Sustainable Development.

16 **Samuel** J. Spiegel, Formalisation Policies.

17 **Ndumo** Peter Mutsinya, Mining Law and Mining Related Legislation: Insights (Harare: self-published, 2013).

18 **The** stated objective of this government policy is to attain "effective and efficient allocation and management of mining titles, as well as active exploration of minerals" by discouraging holding onto concessions for long periods while not using them. The use-it-or-lose-it principle will allow serious investors (both local and international) and/or more players to be involved, thus accelerating growth in certain sections of the minerals industry.

19 **The** informal gold trading in South Africa (SA) and its pricing mechanisms have a significant impact on informal gold trading activities in Zimbabwe. This is primarily through gold prices that are often times higher than the World Gold Price. The SA informal trading sector is able to offer such prices due to a value-added tax (VAT) rebate of 14 percent on scrap gold (gold that is sent to a refiner to be melted down and recycled), which jewelers are able to claim by disguising ASM gold as scrap gold.

20 **Section** 15(2) (f) (iii) of the Income Tax Act before it was repealed on January 1, 2014.

chapter 4

Results of Field-Based Research Studies

Field Research Methodology

Study Design

The scoping study used a mix of qualitative and quantitative data collection and analysis. Quantitative data was collected via individual questionnaires administered using cutting-edge mobile technology for improved data quality and real-time availability. Qualitative data was collected using individual and group interviews with a variety of respondents. To corroborate the information collected, data and methods triangulation was used, with multiple data sources and data collection methods to facilitate exploration and help gain an in-depth understanding of perceptions, trends, and dynamics within and among various ASM gold mining stakeholders.

Respondent and Site Selection Criteria

Study sites were Kadoma and Shurugwi districts in the Mashonaland West and Midlands provinces respectively. Varied stakeholders were interviewed, including artisanal miners (men, women, and youth), small-scale miners, large-scale miners, mine owners and operators, millers, traders, government officials involved in mining, health workers, teachers, and environmental regulatory authorities, as well as representatives of miners' associations, civil society organizations (CSOs) working in gold mining sector, the police force, and relevant training and research institutions.

The scoping study also identified and interviewed respondents from neighboring, non-mining communities. This group of respondents was chosen to compare the socioeconomic position of mining in relation to alternative livelihoods within communities. Pact identified the comparison group from communities whose livelihoods were independent of gold mining and/or trading.

Sampling Method

The sample for the ASM socioeconomic baseline survey was 1,184 respondents in all for the quantitative data collection and 34 for qualitative data collection.

Calculating Sample Size

In determining the sample size, the baseline survey used the following sampling formulas:

$$= X^2NP(1 - P) \div d^2(N - 1) + X^2P(1 - P)$$

Where:

s = required sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size.

P = the population proportion (assumed to be 0.5 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (0.05).

Table 7: Sample distribution for the ASM socioeconomic baseline survey.

Respondent group	Estimated population	Proposed Sample size (95 percent CI)	Actual Sample size (95 percent CI)	Response rate
Miners	500,000	384	354	92%
Comparison Population	500,000	384	275	72%
Millers and Traders	200	132	47	36%
Government Officials	500	218	75	34%
TOTAL	1,000,700	1,118	751	67%

Sampling Procedure

The mining sites were chosen using simple random sampling. A list of mining sites in Kadoma and Shurugwi provinces was created and a random sequence generator software[1] generated a random sequence of numbers. The random numbers were applied to the list of mining sites and the first 14 were selected (the number of mining sites agreed upon as a maximum by Pact and COMZ).

At the 14 mining sites, the scoping study used systematic random sampling to identify respondents. The data collection team first determined the total number of ASMs and millers in the selected mining

Figure 11: Data collectors using mobile technology to collect quantitative data at an alluvial mining site in Kadoma.

sites, from miners' information available from associations and mine owners. The number of miners and millers was divided by the sample size, which was calculated by statistical procedures for a 95

percent confidence interval (CI) sampling, as outlined above, in order to obtain a sampling interval. Once the sampling interval for each mining site was determined, the team identified a starting point in sampling, in collaboration with mine owners and operators, and continued counting and identifying respondents based on the determined sampling interval.

Data Collection Methods

Quantitative Data Collection

Structured questionnaires were used to collect data on mining methods, production levels, and miners' health and socioeconomic status, as well as equipment and tools used in ASM, needs, service availability, and taxation and payments. Questionnaires were administered using mobile technology. Pact has extensive experience using it for data collection, and it has previously been successfully used in Africa for research and program monitoring. Mobile survey software and existing cellular networks provided an electronic platform for data collection and transmission using software developed by Mobenzi Researchers[2] for basic mobile phones. Surveys were automatically uploaded to the host computer as they were completed. In areas lacking mobile network coverage, completed surveys were stored securely in the survey phones. Completed stored surveys were automatically uploaded into the host server upon reaching an area with network coverage.

Five questionnaires were developed to collect data from miners, mine operators, and millers: a household questionnaire, a millers and traders questionnaire, a gold price questionnaire, a government questionnaire and a tax and payments questionnaire.

The household questionnaire was administered to 628 miner and non-miner heads of household with a focus on their economic activities. This questionnaire sought information about: gold mining practices; membership in associations; mining methods, tools, and equipment; production levels; income and expenditures in relation to economic activities conducted; household economic and food security; respondents' general well-being; and

respondents' assessment of regulatory authorities. Child labor and occupational health and safety were also covered.

Another questionnaire was administered to mine operators, owners, and millers on mining practices; inputs; tools, equipment, and materials used in mining; production levels; the legal framework; taxes and payments related to gold mining and trading; transportation routes; gold-trading points; and the political economy of gold. Needs, opportunities, and recommendations for formalizing ASM gold mining were also explored by this questionnaire.

Altogether, the scoping study's five questionnaires had a total of 1,184 respondents.

Qualitative Data Collection

Interview guides for semistructured KIIs and focus group discussions (FGDs) were used to explore the needs, trends, opportunities, challenges, and interactions within ASM gold mining and trading. The survey collected information from 21 key informants and conducted eight FGDs. Respondents for the KIIs and FGDs are profiled in Table 8.

Table 8: Respondents for key informant interviews and focus group discussions.

KII PARTICIPANTS	FGD PARTICIPANTS
MMMD	Artisanal miners—men and women
COMZ	Parliamentary Portfolio on Mining and Energy
Zimbabwe miners' associations	Millers and traders—men and women
Zimbabwe millers' associations	RDCs
EMA	Local and community health workers
ZIMRA	Teachers
Leaders of NGOs and CSOs involved in the gold sector	Traditional leaders
Zimbabwe School of Mining	
Zimbabwe Institute of Mining Research	
NSSA	
Police	
Ministry of Finance and Economic Development (MOF)	
Fidelity Printers and Refinery	
LSM	

Most-Significant-Change Methodology

Given Zimbabwe's rich history in ASM development and the leadership role it previously played in ASM across Africa, the team chose the "Most-Significant-Change" (MSC) method to learn from the people who had seen the sector's growth, decline, mainstreaming, and marginalization over the years.

From a sample of artisanal miners, gold traders, and government officials from regulatory and other monitoring agencies, the survey collected three stories on any topic.

All participants were asked to describe their background and experience in the sector, the changes seen over the years, their opinion as to the key drivers of that change, barriers and enablers to progress, and their vision of the future. The MSC storytellers consisted of:

- Artisanal miners who had been in the sector for at least 20 years.
- Gold millers and traders who had been in the business for at least 20 years.
- Retired government officials who served in gold mining regulatory authorities for not less than 20 years.

Data Analysis Methods

Quantitative Data Analysis

Quantitative data was downloaded from the Mobenzi platform into Excel format, imported into SPSS v.20, and cleaned by running frequencies of key variables to identify missing values and outliers, with identified outliers deleted or labeled as missing information. Where corrections could not be made in Excel; missing values were replaced with a series mean, generated using the SPSS transform function. Clean data was then analyzed for frequencies, percentages, and cross tabulations. Frequency tables and charts or graphs were used to visualize the data in the report. Independent T-test was used to test the statistical differences observed in the dataset for some key variables of interest. Multiple regression analysis explored the relationships among variables.

Qualitative Data Analysis

Qualitative data was transcribed from audio to text, then translated from Shona to English as appropriate. The team then read the transcripts for general understanding, depth, credibility, and usability of information collected, noting issues of interest and emerging concepts. With the broader content understood, the transcribed documents were imported from Microsoft Word into MAXQDA v.11 for coding. Codes were developed based on categories and themes from the interview guides and added to as ideas arose during the analysis. Code frequencies were generated and exported to Excel, and the coded segments combined by parent codes (i.e., themes). Data interpretation was informed by these themes and by comparing findings with the literature to highlight divergence or concurrence. The code book was developed, with codes charted, briefly described, frequency of occurrence noted, and reference cited (i.e., where the codes were found in the raw data).

Data Quality Assurance

The mobile technology used for data collection has built-in skip logic to limit data errors and ensure data quality—including, importantly, restrictions that allow respondents to answer only relevant questions, and controls that prevent data collectors from wrongly entering text in place of numbers or vice versa. The software also prevents data collectors from skipping questions that either lack skip logic or are premarked as mandatory; data collectors must provide an answer to each question before moving to the next.

All data collectors were assigned unique identifier codes to facilitate tracking and error correction. The data manager and project officer for monitoring and evaluation (M&E) did regular random data quality checks throughout data collection. The mobile platform also permitted the central computer to communicate instantly via SMS messages to prompt data collectors to rectify data errors while still on the ground. Progress toward daily data collection targets was shared with team leaders in the field.

Data security protocols were observed. All data was encrypted to maintain confidentiality and secure data. Passwords and a firewall restricted access to the Web interface. Completed questionnaires could not be accessed or retrieved from phones to secure data in the event of a phone theft or loss. The audio of the qualitative information was securely kept under the supervision of the scoping study lead and could be accessed by authorized personnel only. The audio was

deleted immediately after the final report was written and disseminated. The transcribed data was kept for project records. Respondent names were not attached to any dataset.

Data Validation

To validate the reported results, survey respondents and mining stakeholders reviewed survey findings, and a professional peer review through the Zimbabwe Institute of Mining research team ensured feedback on analysis and interpretation of results in order to prevent errors, misrepresentations and misinterpretations and to improve the report's quality. Validation took place in January 2015 in Shurugwi and Kadoma provinces.

Ethical Considerations

In research, ethical concerns can relate to the relationship between science and society, professional issues, and treatment of research participants.[3] Although specific guidelines steer scientific and empirical research in the social sciences, care must be taken to ensure that the inquiry does not negatively affect research subjects, to protect researchers' intellectual property rights, and to promote innovation and the advancement of knowledge. In social science research, the dilemma lies in balancing scientific methods of collecting empirical evidence and with practices to minimize potential risks and harm to survey participants.[4]

In undertaking this scoping study, ethical issues were carefully considered so as to protect survey participants' rights during the scientific inquiry, and a number of protocols were observed.

Ethical Clearance

Survey tools and protocols were submitted to the Medical Research Council of Zimbabwe (MRCZ) for professional peer review to ensure that the study would not in any way cause harm or entail risks to participants and that intellectual property rights were protected and innovations promoted and safeguarded. Field data collection commenced only after MRCZ review and approval

Noncoercion of Respondents and Informed Consent

It was critical that all respondent participation be voluntary and that refusal to take part entailed no consequences. Per MRCZ advice, informed consent was solicited from quantitative survey participants only verbally and affirmations recorded in the mobile technology before an interview continued. Where consent was not given, the mobile technology closed the survey instantly.

Confidentiality of Participants' Information

Participants were assured that all collected information would be kept securely and used solely for the study. Direct quotes are anonymous. Participants were assured that their conversations with data collectors would be deleted as soon as the information was written into a final report, and that the discussion notes would subsequently be stored as electronic written notes, with no voice recording kept after the final report was written and disseminated.

Nonjudgment and Respect for Human Dignity

At all times the data collection and survey team sought to maintain a nonjudgmental attitude toward survey respondents. The study team sought to limit prejudice, to understand the ASM gold mining and trading industry, and to interpret results with a balanced view that respected respondents and their dignity even when data collector or survey team views differed. Data collectors were trained to refrain from personal observations on respondents' information.

Child Protection

Pact works to promote the well-being of children, and Pact staff, partners, vendors, and contractors are required to adhere to the organization's child protection principles and at all times safeguard the well-being of children. Children were not part of the ASM baseline study because they are a "vulnerable" group and unable to give consent. The omission of children from the study was not intended to underplay issues relating to child labor and the presence of children at mining sites. Rather, the survey team solicited information on children in mining through observation and data triangulation rather than from children themselves. All data collectors and survey team members were trained on child protection and required to sign Pact's child protection policy before commencing field work.

Training of Data Collectors

Before starting data collection, all data collectors were trained on research ethics to ensure adherence to appropriate procedures. The training drew upon the Belmont report, Ethical Principles and Guidelines for Protection of Human Subjects of Research.[5] Lessons were also drawn from the guidelines of other research ethics committees, notably the National Research Council of Zimbabwe. Safety and security in mining sites was also covered in the training to ensure that data collectors could at all times assess risks and avoid injury and harm, both to themselves and to respondents.

Dissemination of Results

ASM scoping study results were first disseminated to key stakeholders in the sector in Zimbabwe. Artisanal miners, millers, traders, and regulatory authorities in Midlands province were given an opportunity to hear the results at meetings and asked to validate findings as an accurate reflection of the issues they were facing and the information they had provided. These meetings were held before findings were shared with other stakeholders.

Further dissemination meetings were then held in Midlands and Harare. The scoping study findings report was also provided to the Government of Zimbabwe, notably the MRCZ and the MMMD, for their consideration, their recommendations, and, where possible, their collaboration in putting the recommendations into action. Dissemination to various other interested parties took place as a part of broader information sharing and to add to the existing body of knowledge on the subject. Pact and COMZ will seek to disseminate survey findings in international forums to the mining industry. Such forums will include peer-reviewed publications and conferences, as appropriate.

Study Limitations

Quantitative data collection focused only on the Midlands and Mashonaland West provinces, in particular Kadoma and Shurugwi mining districts, on advice from COMZ. Because the survey team was able to visit only a random selection of sites (rather than every mining site in the province), every effort was made to ensure good representation in the sampling so results could be meaningfully extrapolated.

Despite the survey team's ethical clearance and a letter of support from the permanent secretary of MMMD, local administrative challenges, particularly in Kadoma District, limited the team's ability to collect data as per proposed sampling within the time frame.

Research Findings

This section describes the research findings on the demographic and socioeconomic situation of artisanal and small-scale gold miners and traders in Zimbabwe; provides information about gold mining production, processing, and trading; and outlines the legal and regulatory framework for artisanal and small-scale gold mining and trading, their environmental impact, and related child labor issues. The descriptive results are triangulated with qualitative information from the KIIs and FGDs to broaden the picture. Data in tables include frequency and percentages in brackets.

Demographic Information

In the scoping study, the household questionnaire had 628 respondents (M = 442, F = 186), including 354 miner households and 274 non-miner households (the comparison). Of miners, 89 percent were male and 11 percent female—a proportion far below the 30 percent estimate recorded by Drechsler (2001). In the comparison group, 53 percent were women and 47 percent men. The scoping study results showed miners to be less likely to be divorced or widowed than non-miners. The average age of miners was 39, slightly older than the average age of non-miners, 37. There was no statistical difference between the average number of children (4.8) for miners and non-miners.

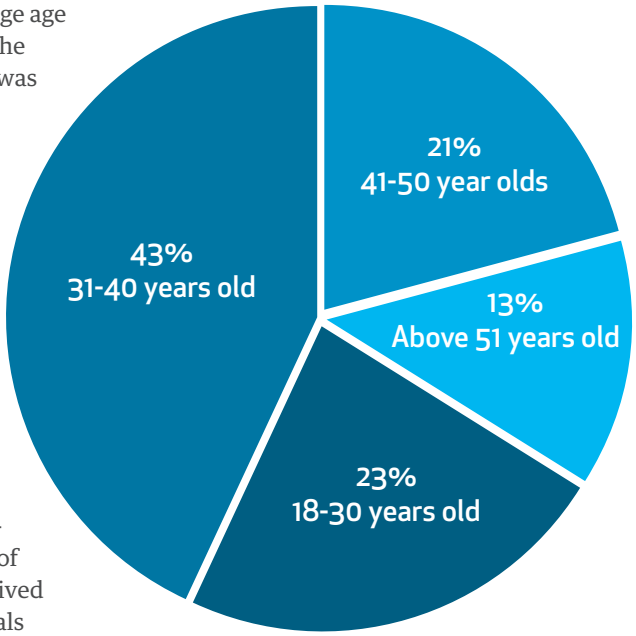
Miners interviewed in this survey were better educated than non-miners. Three-quarters of miners had completed secondary school, compared to 69 percent of non-miners. Both groups had much higher statistics for secondary-school completion than the national average of employed Zimbabweans (29 percent[6]). No difference existed between the proportion of miners and non-miners who had received tertiary education, with few individuals (0.03 percent) in each group having done so. Three percent of miners had no education.

Most miners were married (78 percent of men, 62 percent of women)—dispelling the notion that most miners are single young men. Only 18 percent of male miners surveyed were single. Only 5 percent and 2 percent were divorced or widowed, respectively. None of the male miners reported having been widowed, though 4 percent were divorced. Of miners who responded to the survey, 1 percent were children (age 18 or under). However, this proportion is less indicative of levels of child labor than reflective of Pact's child engagement and protection policies (page 128).

Of the miners, 70 percent were engaged in ore extraction, 5 percent were hoisters, 3 percent were crushers, and 10 percent performed other duties. Other roles outside of actual mining were reported by up to 2 percent of respondents.

In addition to the miners, 47 millers or traders responded to the millers/traders questionnaire. Of those, 13 percent were women and 87 percent men. The proportion of millers by age range is shown below (Figure 12).

Figure 12: Proportion of millers by age range.



Mapping Actors, Production, and Mineral Flows

Key Players in Artisanal and Small-Scale Gold Mining in Zimbabwe

Gold Mining

To understand the characteristics of ASM, the survey looked at various issues– including legal status of the artisanal and small-scale mines, miners' membership in associations, and reasons for nonmembership pertaining to working conditions as determinants of production effectiveness and efficiency. Information was collected about the mining calendar and miners' work schedules, training, skills, and experience in the sector. Finally, information was collected about gold production: tools used in gold production, quantities of ore extracted, gold yield per ton of ore, processing, inputs and consumables involved in production, and closing gold mining operations. This section presents findings on the abovementioned issues and, where relevant, presents tests of the significance of the findings.

Stakeholders involved in the different phases of ASM are identified below (Figure 13 and Figure 14).

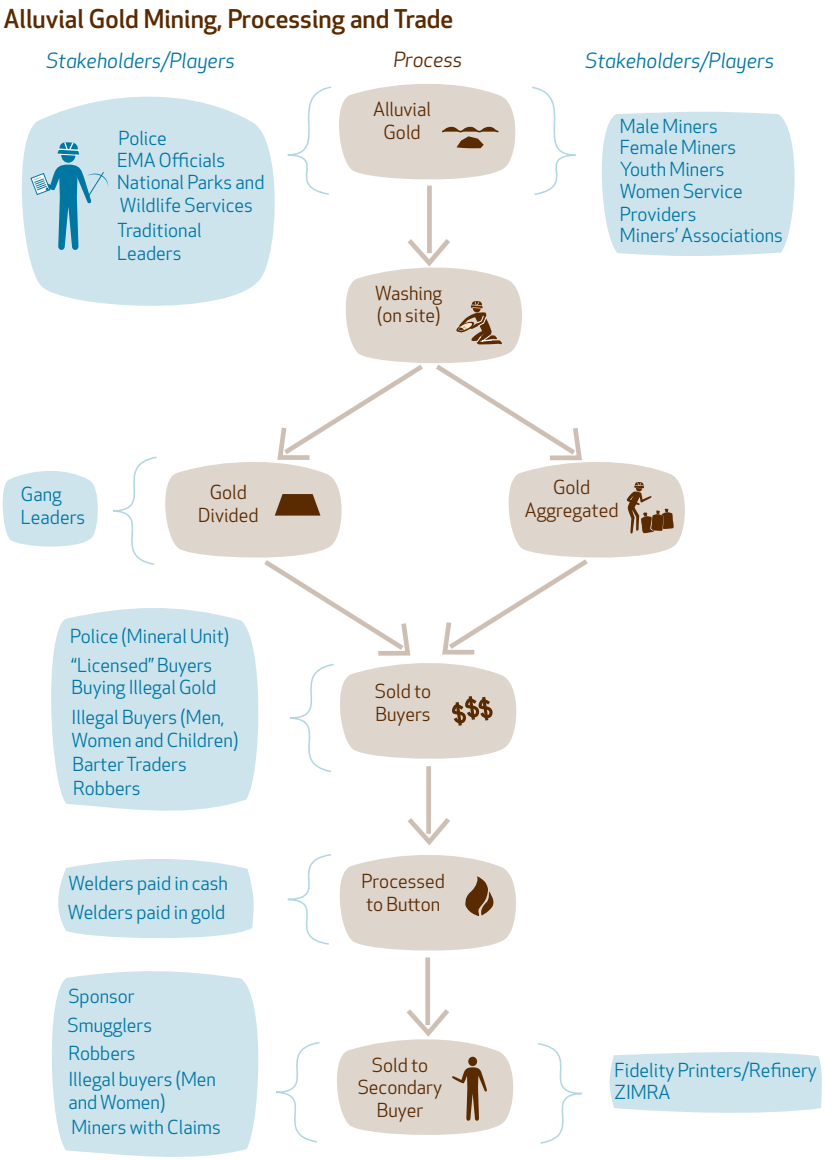


Figure 13: Stakeholders involved in alluvial mining.

Figure 14: Stakeholders in hard-rock mining.

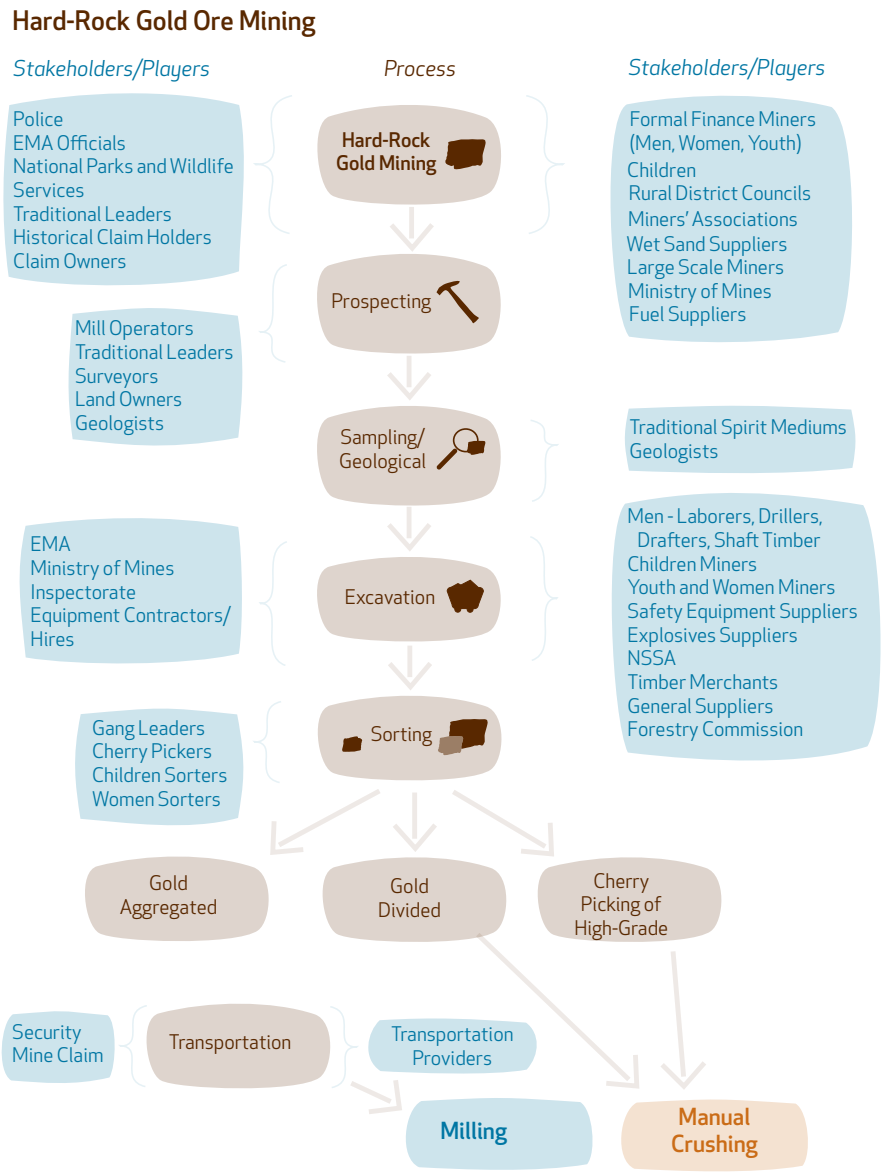


Figure 15: Typical ASM mine shaft.

Legal and physical status of the mines

Most miners work on registered claims with valid licenses. Of mining activities, 81 percent are hard-rock mining, 13 percent are alluvial, and 11 percent are a mix of hard-rock mining and alluvial mining operations.[7] Some 22 percent involve retreatment of dumps. Consistent with ASM in other countries, alluvial mining consistently lags in legalization. The predominant sources of water in mining areas is machine-drilled wells (11 percent) and hand-dug wells (77 percent). Just under half of miners abandon operations without any reclamation; a quarter of them backfill, and 15 percent fence off pits, demonstrating the need to raise awareness of the long-term environmental impacts of abandoning mine sites without reclaiming them.

Membership in associations

The survey looked at the membership of miners' and millers' associations as one form of formalization or organization within ASM and gold trading. For the miners who reported not belonging to a miners' association, the survey sought to understand why. More than 80 percent of miners (both men and women) said that there were no miners' associations in Shurugwi. It is also worth noting that 7 percent of women in Kadoma reported gender discrimination as a reason for nonmembership in a miners' association. Other reasons were given by men and women in Kadoma: lack of awareness or knowledge of how associations operate or the benefits of membership; lack of transparency and trust within organizations; lack of opportunities to join, including restrictions by mine owners; lack of interest; and lack of time or money for membership.

Work schedules

To understand miners' commitment to the sector, the survey asked about the mining calendar, the length of time that miners had been mining, and how long they planned to stay in mining. Mining was shown to be a year-round activity for around 70 percent of men in both study areas. For women, a significant disparity was seen between study areas. In Shurugwi, 70 percent of

women mined throughout the year, while 13 percent mined seasonally, working during the dry season. In Kadoma, 27 percent and 42 percent of women were full-time and seasonal miners, respectively. It was also interesting to note that 15 percent of women in Kadoma reported mining only during the rainy season, a period that most miners considered the most difficult, dangerous, and costly because of the potential for flooding of mining shafts and the need to pump water out of the shafts. Responses about the mining calendar by district and respondent sex are summarized below (Figure 16).

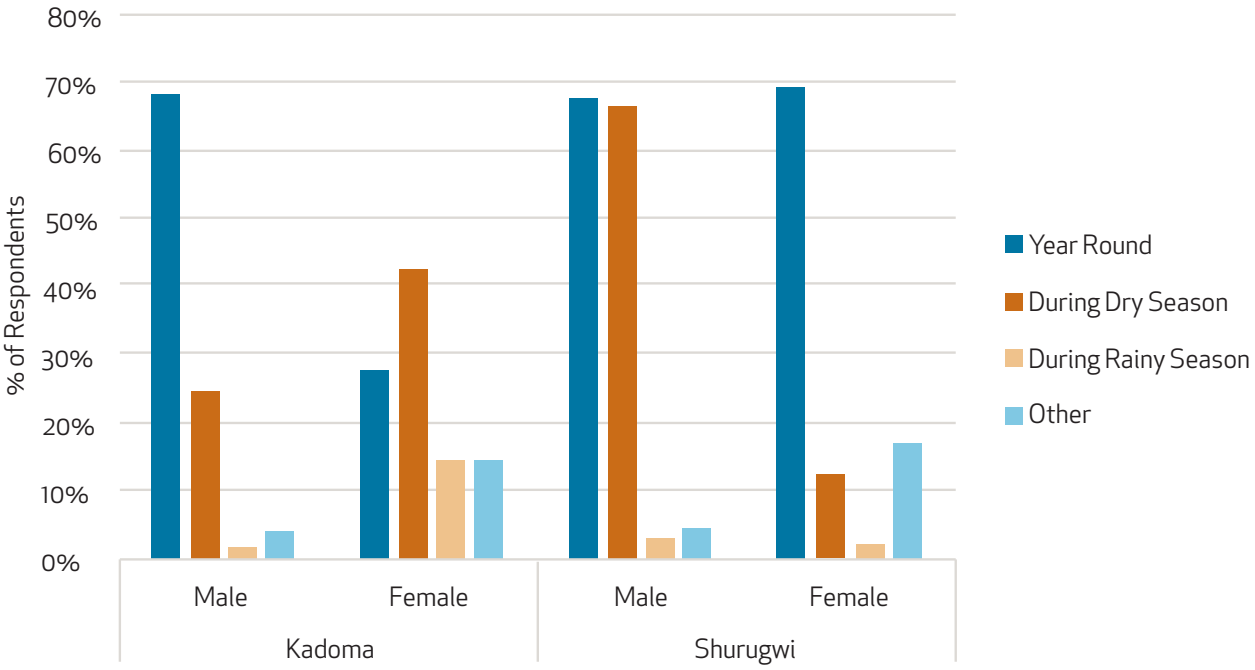


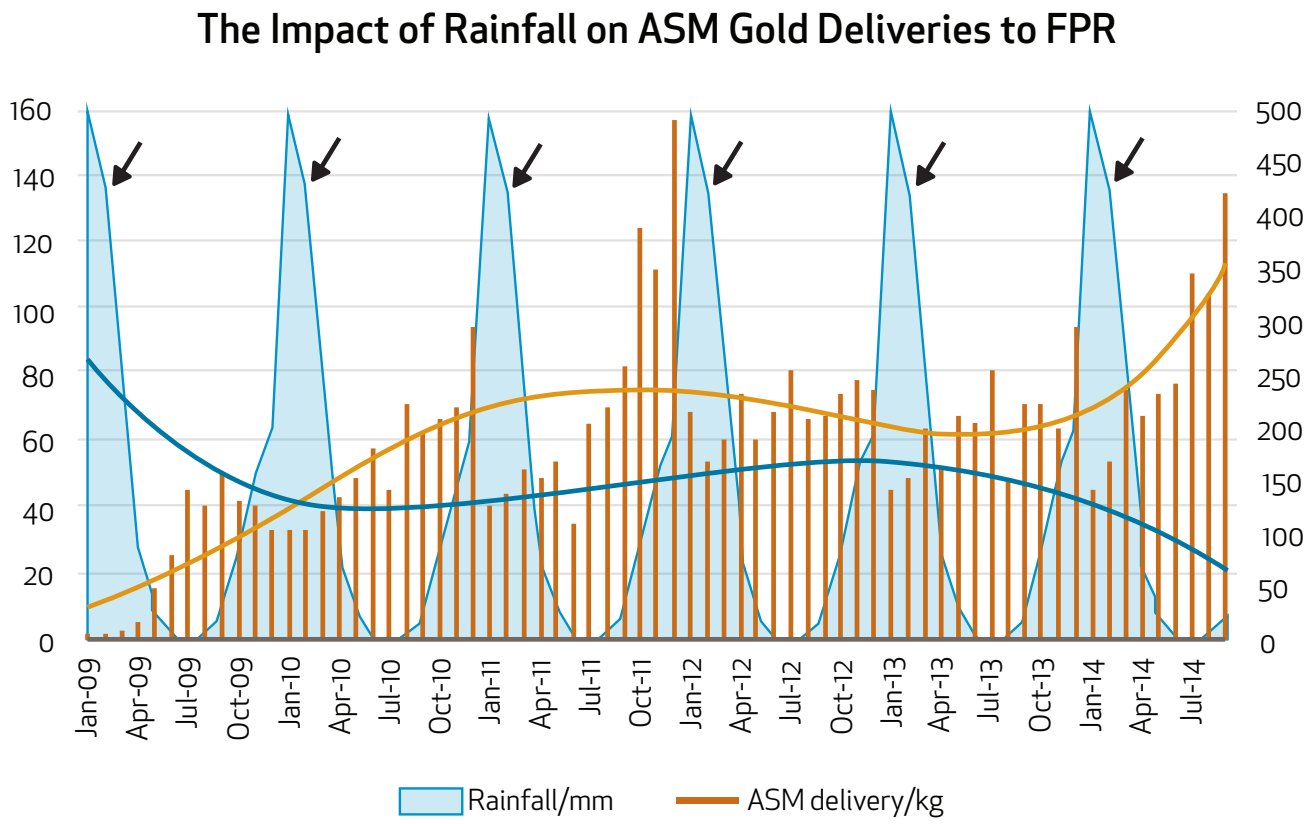
Figure 16: Mining calendar disaggregated by location and sex.

Impact of Rainfall on Artisanal and Small-Scale Mining

Many key informants mentioned the adverse effect of rainfall on ASM output. Using the average rainfall for Zimbabwe between 1900 and 200910 and comparing it to ASM deliveries to FPR between January 2009 and September 2014, a moderate correlation could be seen ($r = 0.3$).

The coefficient of determination is 0.09, meaning that only 9 percent of the variation in ASM gold deliveries could be attributable to variations in rainfall. Although this might seem minimal, a closer look reveals that the impact of rainfall was concentrated in just one month, January, whose deliveries represent 8.3 percent of deliveries for the year. (Note that 9 percent and 8.3 percent are statistically equivalent with a 95 percent degree of certainty.) This is confirmed by the significant decline in ASM delivery every January,11 as shown by the black arrows in the graph next page (Figure 17).

Figure 17: Impact of rainfall on gold deliveries to FPR.



Inquiries into miners' work schedules showed that miners generally work beyond the 40 to 45 hours per week prescribed by labor laws. More than half of all miners reported working between 41 and 60 hours per week, and a fifth of miners reported working between 61 and 100 hours a week. Around a quarter of miners reported not having time limits but working until targets were met.

Artisanal andSmall-Scale Miners' training, skills, and experience

In terms of their skills[8] in mining work, 70 percent of miners reported that they were unskilled. Of miners who reported this, more than 4 percent reported having learned mining by training from their colleagues in the mines, although more than half had had no training of any sort. Only 6 percent reported having received any formal training.

Around three-quarters of miners had been

working in their current mine for three years or fewer, while 9 percent had been working in the same mine for more than 10 years. One-tenth of miners who reported having been in working the same mine for more than 10 years had received training from their colleagues in the mine.

Overall, 65 percent of miners expressed their commitment to mining by reporting that they would stay in mining for as long as mining exists.

Table 9: Miners' training, skills, and experience in gold production.

		Training received for your role							
		Professional training	Vocational training	Training on the job by others at the mine	Training by a 3rd party project	Training by government agents	No training	Other	Total
Skills in relation to mining	Geologist	1	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0(0.0)	0 (0.0)	1 (03)
	Mining engineer	2 (7.4)	1 (9.1)	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4(1.1)
	Technician	2 (7.4)	0 (0.0)	3(1.9)	0 (0.0)	0 (0.0)	0(0.0)	0 (0.0)	5(1.3)
	Certified blaster	3(11.1)	5 (45.5)	4 (2.5)	0 (0.0)	3(23.1)	0(0.0)	0 (0.0)	15(4.0)
	Driller	2(7.4)	0 (0.0)	13(8.2)	0 (0.0)	1(7.7)	12(7.6)	0 (0.0)	28(7.4)
	Driver	1 (3.7)	0 (0.0)	3(1.9)	0 (0.0)	1 (7.7)	0 (0.0)	0 (0.0)	5(1.3)
	Equipment operator	4(14.8)	0 (0.0)	10(6.3)	0 (0.0)	2(15.4)	1 (0.6)	0 (0.0)	17(4.5)
	Administrator	4(14.8)	0 (0.0)	6 (3.8)	0 (0.0)	0 (0.0)	0(0.0)	0 (0.0)	10(2.7)
	First aid	2(7.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (7.7)	2(1.3)	0 (0.0)	5(1.3)
	No skill	4(14.8)	1 (9.1)	106(67.1)	3 (50.0)	5 (38 5)	140(89.2)	3 (60.0)	262 (69.5)
	Other	2 (7.4)	4 (36.4)	12(7.6)	3(50.0)	0 (0.0)	2(1.3)	2 (40.0)	25(6.6)
Total		27 (100)	11(100)	158(100)	6(100)	13(100)	157(100)	5(100)	377(100)
Time in your current job	0-6 months	6(22.2)	3 (27.3)	61 (38.6)	2(33.3)	7 (53.8)	59(37.6)	3 (60.0)	141 (37.4)
	7-12 months	3(11.1)	2(18.2)	25(15.8)	1(16.7)	0 (0.0)	23(14.6)	0 (0.0)	54(14.3)
	1-3 years	12(44.4)	2(18.2)	29(18.4)	1(16.7)	2(15.4)	36 (22.9)	0 (0.0)	82(21.8)
	4-5 years	4(14.8)	0 (0.0)	16(10.1)	0 (0.0)	1 (7.7)	15(9.6)	1 (20.0)	37 (9.8)
	6-10 years	1 (3.7)	1 (9.1)	11(7.0)	1 (16.7)	2(15.4)	13(8.3)	1 (20.0)	30(8.0)
	More than 10 years	1 (3.7)	3(2.7)	16(10.1)	1 (16 7)	1 (7.7)	11(7.0)	0 (0.0)	33(8.8)
Total		27 (100)	11(100)	158 (100)	6(100)	13(100)	157(100)	5(100)	377(100)

Mineral-Sector Activities

To establish production statistics for ASM, the scoping study team collected information on types of mining activities carried out in the study areas and on equipment and tools used in production, including ownership of and consumables for the equipment and tools. Other data was collected on the length of time taken for production, quantity of ore and of gold extracted per ton of ore, and other minerals mined in the area.

Miners were asked about the mineral-sector activities happening in their area; summaries are below (Table 10).

Mining activities in the area		District				Overall Total
		Kadoma		Shurugwi		
		Male	Female	Male	Female	
Mining activities	Alluvial gold mining	6 (32.0)	6 (30.0)	8(5.6)	4 (13.3)	24 (6.4)
	Hard rock gold mining	120(64.9)	5 (25.0)	94 (66.2)	21 (70.0)	240 (63.7)
	A mix of alluvial and hard rock gold mining	5(2.7)	1 (5.0)	21 (14.8)	0 (0.0)	27 (7.2)
	Retreating of dumps	1 (0.5)	1 (5.0)	1 (07)	0 (0.0)	3 (0.8)
	Gold processing (manual crushing, sluicing, amalgamation)	3(1.6)		4(2.8)		7(1.9)
	Gold processing (machine crushing, milling, amalgamation)	17 (9.2)	2 (10.0)	3(2.1)	0 (0.0)	22 (5.8)
	Gold trading	33(17.8)	3 (15.0)	9 (6.3)	2 (6.7)	47 (12.5)
	Gold jewelry making	0 (0.0)		1 (0.7)		1 (0.3)
	Other activities	0 (0.0)	2 (10.0)	1 (0.7)	3 (10.0)	6(1.6)
		185 (100)	20 (100)	142 (100)	30 (100)	377 (100)

Table 10: Mineral-sector activities.

Figure 18: A semimechanized mine site.

The survey showed that in Kadoma and Shurugwi, 64 percent of activity was hard-rock gold mining, 13 percent gold trading, and 7 percent alluvial gold mining. In addition, 29 percent of miners reported that additional types of minerals apart from gold were mined in their areas. Three-quarters of miners reported chrome, and one-quarter reported platinum. Iron was reported by 2 percent of respondents and copper by 1 percent; 2 percent reported that other minerals were mined.

The most common production method reported was high-grading of ores, as it was seen to be more economical for miners because of the high gold-recovery ratio per ton of ore. Rubble processing was another method, reported by a miller in Kwekwe. Rubble is fresh ore available on the surface generally of low grade (probably as a result of sorting). Another method reported was processing the tailings, "what has been left over from the previous mine (i.e., what they call German shafts)." The respondent continued, "If you find a shaft that was previously mined by Germans, you are most likely to find something that was left behind."

Most ASM operations seemed to have had short development timelines (i.e., the time taken to produce gold-bearing ore, starting from the day the miners begin digging the shaft). Sixty-five percent of respondents reported that it took less than a month to produce gold-bearing ore, while a quarter of miners said one to two months, 9 percent reported three to five months, and a small minority, 1 percent, reported a longer timeline.

However, time frames vary, depending on the site. A key informant interview with a sponsor in Kadoma revealed that it is hard to tell how long it takes to produce gold: "Most operations you can spend three months digging, because [you] are in the exploration phase. At times, [you] just come across a lump of gold in one dig. Sometimes you can go for months without finding gold ore and at times [it takes] just a few hours."

Figure 19: A compressor used by ASM miners.

There is an undeniable need for geological exploration in ASM to increase operational efficiency; this exploration must reach beyond already well-known gold-rich areas. Although most miners were seen to work on rich ore bodies—evidenced by the 65 percent who find gold within a month—they are still operating blind.

A mix of equipment was reported, with pickaxes, spades, and hammers and chisels the most commonly used. No respondents were found to be using sluice boxes, and very few were using bulldozers, scrappers, or Chilean/round mills. Most equipment belonged to mine owners (55 percent) and sponsors (15 percent); miners themselves own only 13 percent of equipment (Figure 20). Nonetheless, about half of equipment service is conducted by the miners themselves (47 percent) and in nearby towns (16 percent). The miners assessed two-thirds of the equipment as mainly old but still in fair working condition; 8 percent of equipment was new and in good working condition. Major inputs were explosives, diesel, lubricants, and drill bits. Mercury was more commonly used by miners than cyanide.

It was also reported that tools used in mining were the property of mine owners (35 percent), millers (6 percent), and miners (33 percent). Of equipment and tools, sponsors owned 16 percent, while 8 percent were rented (Figure 20). Most advanced equipment (i.e., compressors, pumps, jackhammers) belonged to mine owners, sponsors, or, to a lesser extent, millers. These data imply that if an equipment purchase or loan program is to be embarked on, these are the players to partner with to ensure that the equipment reaches its intended beneficiaries.

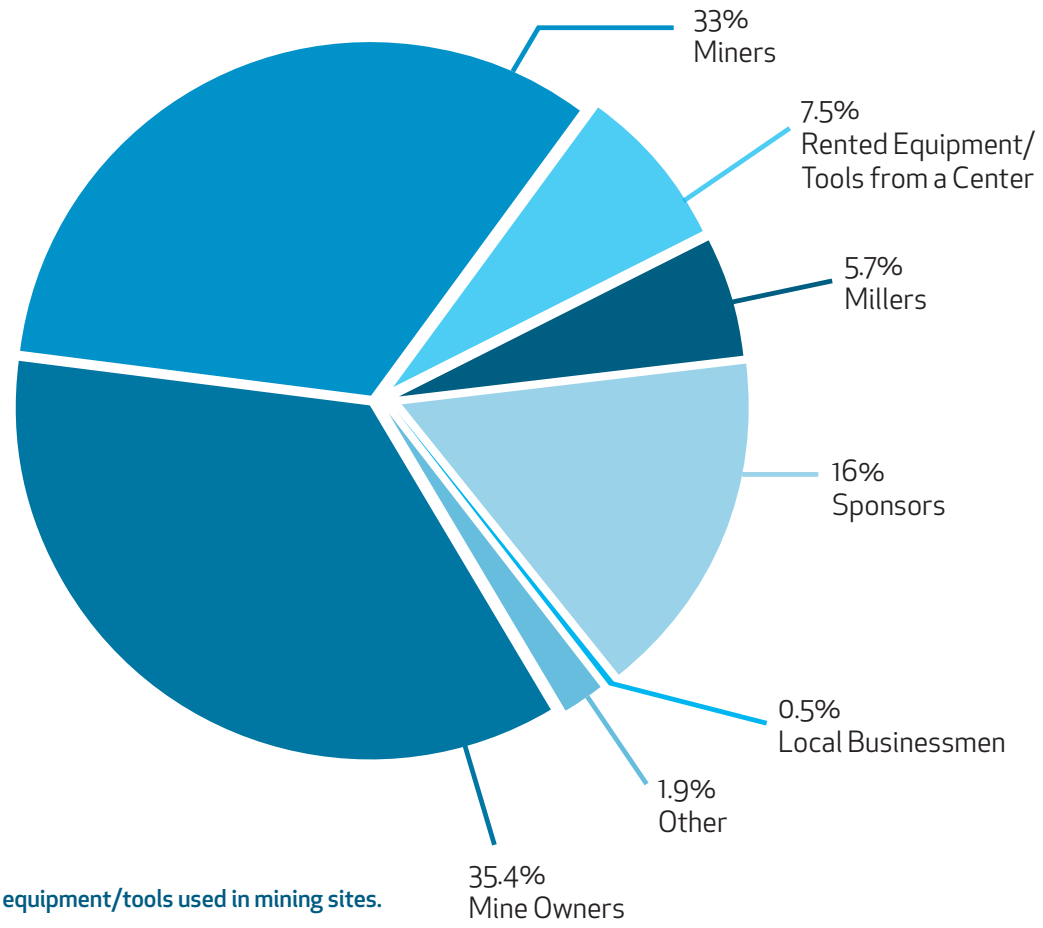


Figure 20: Owners of equipment/tools used in mining sites.

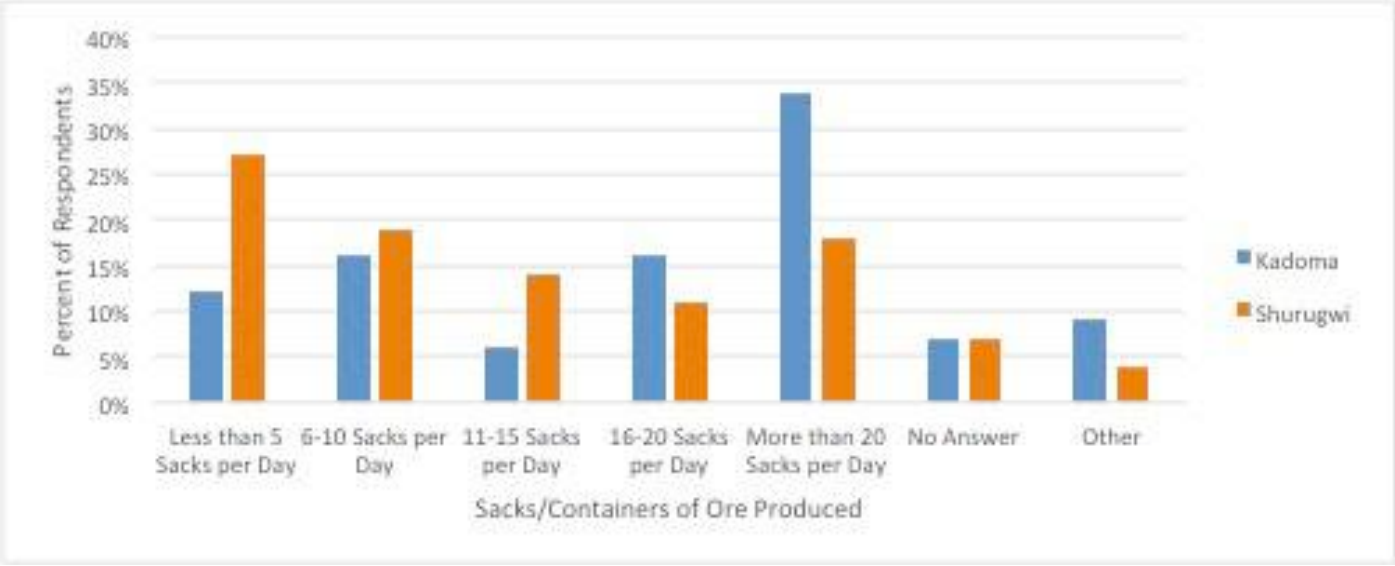
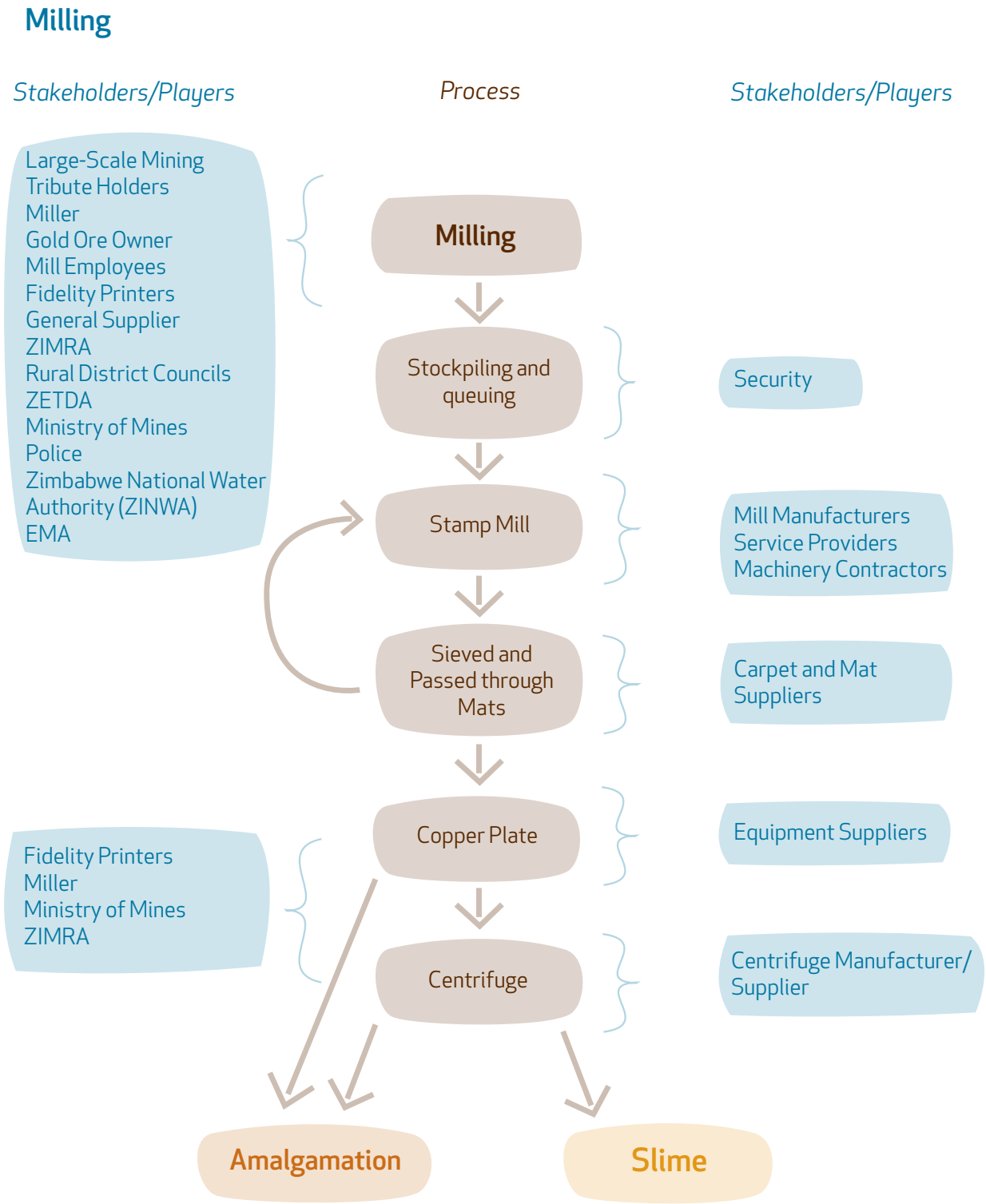


Figure 21: Gold-bearing ore produced by miners per day.

Gold Processing and Trading

Stakeholders identified as being engaged at different stages of gold processing and milling are shown below, alongside the process with which they are associated (Figure 22):

Figure 22: Milling flow diagram and stakeholders involved in milling.



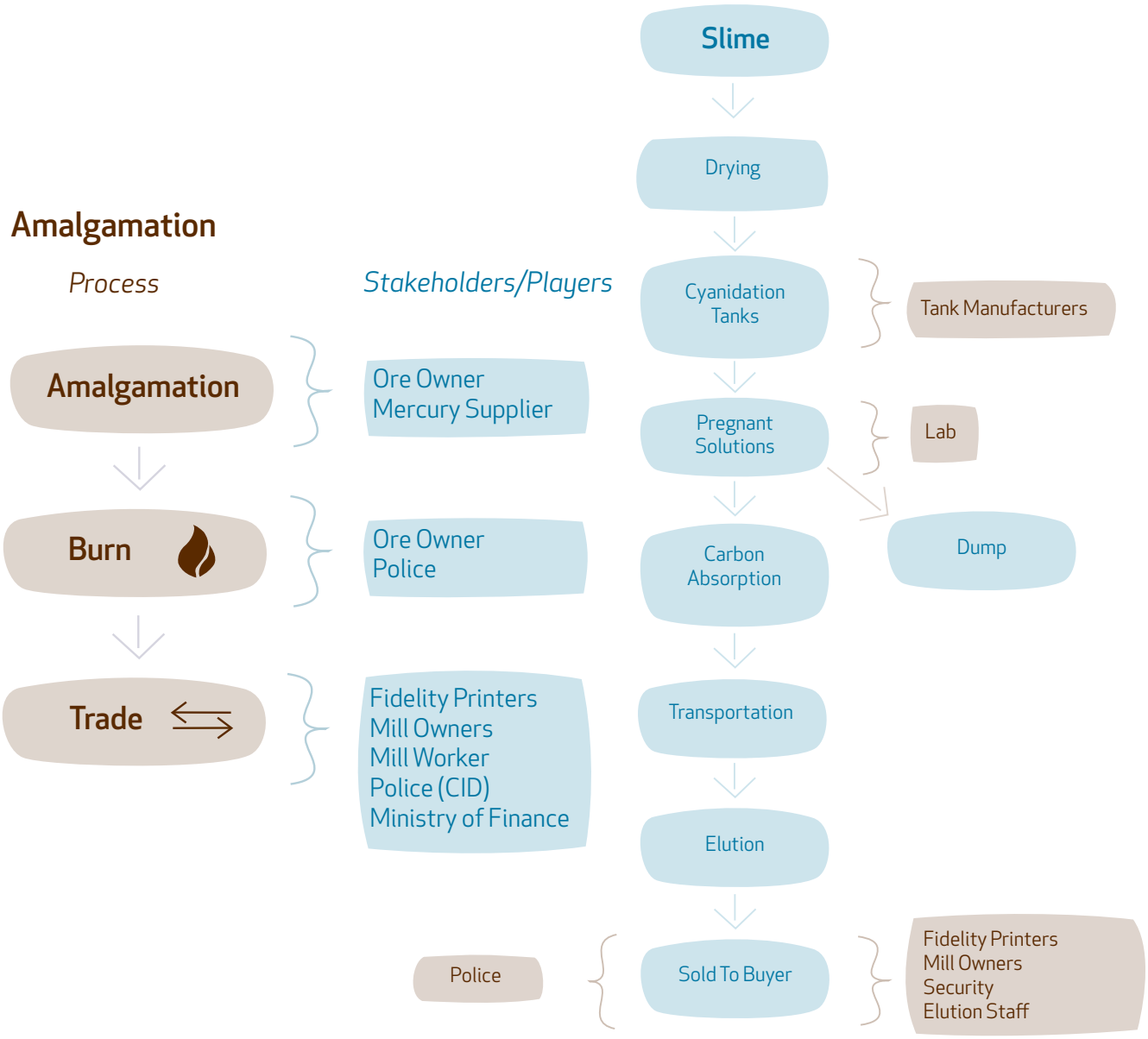

Amalgamation
Process
Stakeholders/Players
Amalgamation
Ore Owner
Mercury Supplier
Burn
Ore Owner
Police
Trade
Fidelity Printers
Mill Owners
Mill Worker
Police (CID)
Ministry of Finance
Slime
Drying
Cyanidation Tanks
Tank Manufacturers
Pregnant Solutions
Lab
Dump
Carbon Absorption
Transportation
Elution
Police
Sold To Buyer
Fidelity Printers
Mill Owners
Security
Elution Staff

Figure 23: A stamp mill.

Milling

The responses to the millers' questionnaire revealed that 87 percent of milling sites were registered; 13 percent chose not to answer this question. Forty-five percent of millers reported having valid licenses; 55 percent chose not to respond. In two different FGDs, millers deemed the cost of annual licensing (US$8,000) too high, and less than half comply. To ensure compliance across the gold mining and trading sector, it is imperative to rationalize the cost of compliance.

Milling Work Schedule

About 89 percent of millers reported milling throughout the year, while 9 percent milled only during the dry season. As noted, gold output was seen to fall drastically during the rainy season, and nearly a tenth of millers reported halting activities. This fall in production was caused by flooding of the shafts and the exodus of seasonal miners to engage in farming.

To shed light on gold production, millers were asked about the type of processing carried out at their sites. Almost 90 percent of gold processing was reported to consist of milling. Shown below (Figure 24) is the proportion of millers by the type of gold processing conducted at their sites.

FGD respondents also talked mostly about gold milling, a process that was reported to involve recovering free gold using separators and then smelting that free gold and sending it directly to FPR. Another process, secondary to milling, was vat leaching, where gold is dissolved using cyanide and caustic soda; absorbed by carbon; eluted from carbon using pressure and heat from boilers; then smelted to yield pure gold, to send to FPR.

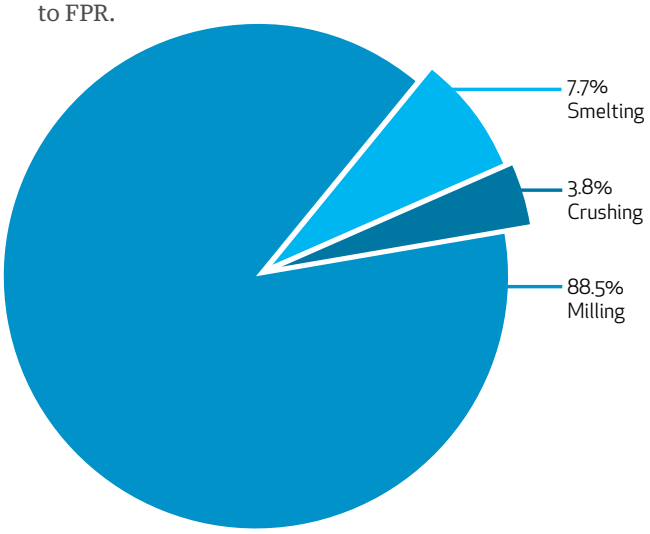


Figure 24: Types of Gold Processessing at Sites of Surveyed Millers

Estimates of ASM Gold Production

Capacity of Containers Used in ASM

To quantify gold production, miners were first asked to provide information on the number of sacks or containers of gold-bearing ore they extracted from a shaft in a day, as well as the capacity of these sacks or containers. This information was used to determine the quantity of gold-bearing ore they extracted daily. Most miners (72 percent) reported using sacks with a capacity of less than 50 kilograms (about 110 pounds); a fifth of miners reported using sacks or containers with a capacity of between 50 and 100 kilograms (220 pounds); and 5 percent of miners reported using sacks or containers with a capacity of more than 500 kilograms (1,102 pounds).

Quantity of Gold-Bearing Ore Produced

Just under a fifth of the miners (18 percent) reported producing fewer than five sacks of ore per day, while a similar proportion (17 percent) produced between six and 10 sacks a day. Just under a tenth of miners (9 percent) reported producing 11 to 15 sacks daily, while 14 percent produced 17 to 20 sacks. More than a quarter of the miners (27 percent) reported that they produced more than 20 sacks of ore per day. Considering the capacities of the sacks reported, it can be deduced that miners in Kadoma and Shurugwi produce on average between 400 kilograms and one tonne (between 882 and 2,204 pounds) of gold-bearing ore per single shaft in a day.

Frequency of Taking Ore for Milling

To further understand the average quantity of gold produced by ASM per month, the survey collected data on the average quantity of gold-bearing ore that miners typically take to the mill per single visit, as well as the average number of visits made per month for the purpose of milling gold ore. Findings were that approximately 53 percent of miners took more than 5 tonnes (about 5.5 tons) of ore per visit to the miller, while 29 percent took between 3 tonnes (about 3.3 tons) and 5 tonnes of ore (5.5 tons). Thirty-eight percent of miners reported visiting mill sites for gold processing twice a month, while 32 percent visited once a month. Below are details (see Table 11: Quantities of Ore Taken to Milling Per Month.Table 11), disaggregated by district and by respondent type.

Table 11: Quantities of Ore Taken to Milling Per Month.

Quantities of ore taken to milling per month		District				
		Kadoma		Shurugwi		
		Miners	Millers	Miners	Millers	Total
Ore transported to the mill per visit	Less than 1 tonne	4 (2.3)	0 (0.0)	16 (11.4)	2(15.4)	22(6.2)
	1-2 tonnes	18(10.5)	1 (3.0)	14 (10.0)	2(15.4)	35(9.8)
	3-5 tonnes	45(26.3)	10(30.3)	47 (33.6)	3(23.1)	105 (29.4)
	More than 5 tonnes	104(60.8)	16(48.5)	63 (45.0)	6(46.2)	189 (52.9)
	No answer		6(18.2)		0 (0.0)	6(1.7)
		171 (100)	33(100)	140 (100)	13(100)	357 (100)
Frequency of transport of ore to miller per month	Once	55(32.2)	3(9.1)	53 (37.9)	3(23.1)	114 (31.9)
	Twice	65(38.0)	12(36.4)	53 (37.9)	5(38.5)	135 (37.8)
	Three times	21 (12.3)	9(27.3)	15 (10.7)	2(15.4)	47 (13.2)
	Four times	10 (5.8)	4(12.1)	9(6.4)	0 (0.0)	23(6.4)
	More than 4 times	20(11.7)	5(15.2)	10(7.1)	3(23.1)	38 (10.6)
Sub - Total		171 (100)	33(100)	140 (100)	13(100)	357 (100)

Quantity of Gold Recovered from the Ore

Miners were asked how much gold they obtain on average from a ton of gold-bearing ore. Eighty percent of respondents reported that they recovered less than 30 grams (about 1.06 ounces) of gold per ton of gold-bearing ore, while a tenth of respondents chose not to respond to this question.12 The Global Mercury Project in Zimbabwe in 2003 reported 5 to 15 grams (about 0.176 to 0.529 ounces) per ton.

Quality of Gold Recovered from the Ore

Miners and millers were asked about the quality of gold that was produced. Forty-three percent reported 76 to 90 percent purity, and 21 percent reported 91 to 95 percent purity. A quarter of respondents chose not to answer this question. The quality of gold produced as measured by percentage of pure gold is below (Figure 25).

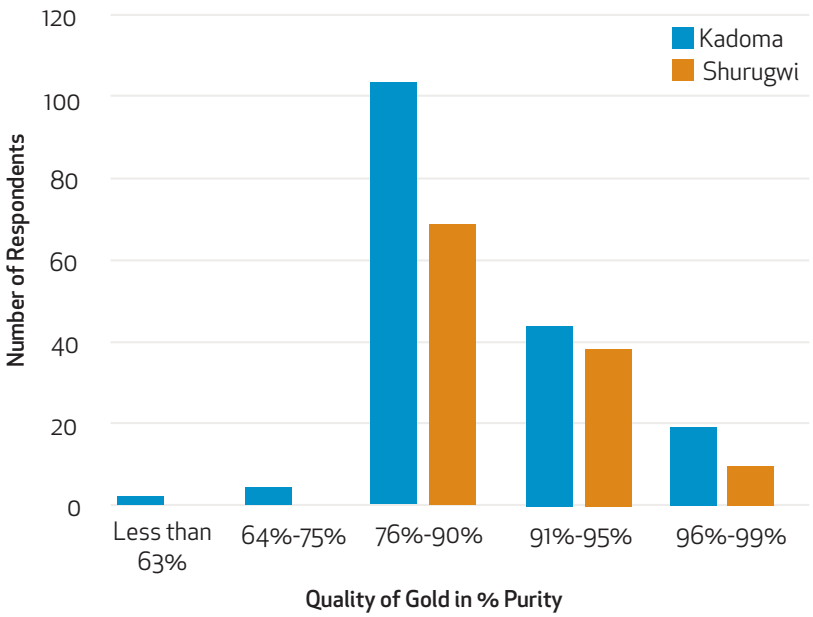
In the FGDs, production was reported to vary from miner to miner. Some might mill once or twice a month, usually a load of 10 to 20 tonnes (about 11 to 22 tons) per mill visit. A tribute holder reported that the highest yield ever produced was about 100 grams per 7 tonnes (about 3.53 ounces per 7.7 tons). ZASMC, on the other hand, reported an average yield of 20 to 50 grams (about 0.70 to 1.76 ounces) per person per month. A representative of the MMMD felt that grades of gold were falling, noting that 100 grams (about 3.53 ounces) per load of approximately 2 to 5 tonnes used to be seen but that it seemed that, on average, "These days they hardly ever get to that level."

A representative of FPR reported an average monthly collection of 130 kilograms (about 287 pounds) of gold nationwide from January to April.

> *There has been a government program to shake people a bit,13 and out of that program, we have seen up to 350 kilograms a month. Maybe there is still more. It's difficult to quantify what is on the informal market. My own estimation, judging from what I have seen around, it should be plus or minus 600 kilograms a month. I would rather come nearer to 500 kilograms a month.*

A miller reported production averaging 15 grams (about 0.53 ounces) per tonne, particularly for those who are processing the rubble collected on the surface. In terms of the quality and grade of gold produced, the FPR representative reported quality varying between 85 to 98 or 99 percent.

Figure 25: Quality of gold produced.



Membership of Millers' Associations

The reason most millers (60 percent) do not belong to associations is that there are none in their vicinity. About 17 percent called membership too expensive, while 23 percent had other reasons, including seeing no value in membership. As reported by one miller, "They milk [you for] money and they do nothing."

Gold Trading

Most miners and gold traders measured the quality of gold by specific density testing; quite a few performed acid tests and fire assays. A tenth claimed to measure quality by simply observing the gold. It was interesting to note that almost half of miners were unaware of the FPR price for gold, while only 35 percent were unaware of the informal price, suggesting that miners were engaging more frequently with informal traders than within the formal system. Sixty-five percent of miners stated that they sold their gold on the formal market (to FPR and millers), while 35 percent admitted to selling on the informal market (i.e., traders, claim owners, and sponsors). It can thus be estimated that between 35 percent and 50 percent of miners sell their gold on the formal market (which translates to the 130 kilograms or approximately 287 pounds of gold that FPR is receiving a month). The estimate of gold making it to the informal sector is thus between 130 kilograms and 240 kilograms (about 529 pounds) of gold per month.

Other stakeholders had varying opinions as to the proportion of gold that ended up in the informal market, compared to the gold that made it to the formal market. At one end of the spectrum, a sponsor speaking about the relative proportions of gold that went to FPR and the informal market, reported, "In terms of small-scale miners, and considering human tendencies, I would say that 10 percent goes to the government and 90 percent goes out of the country." A miller had a different opinion: "Up to about three months ago, Fidelity was getting half the gold, but of late I think they are getting 90 percent of the gold and the price on the informal market seems to be the same as that of Fidelity, or lower, and the number of informal market players seems to be dropping."

Gold flow within Zimbabwe was reported to be composed of a complicated network of many players. Some gold was described as ending up in the formal market via FPR, other material in the informal market.

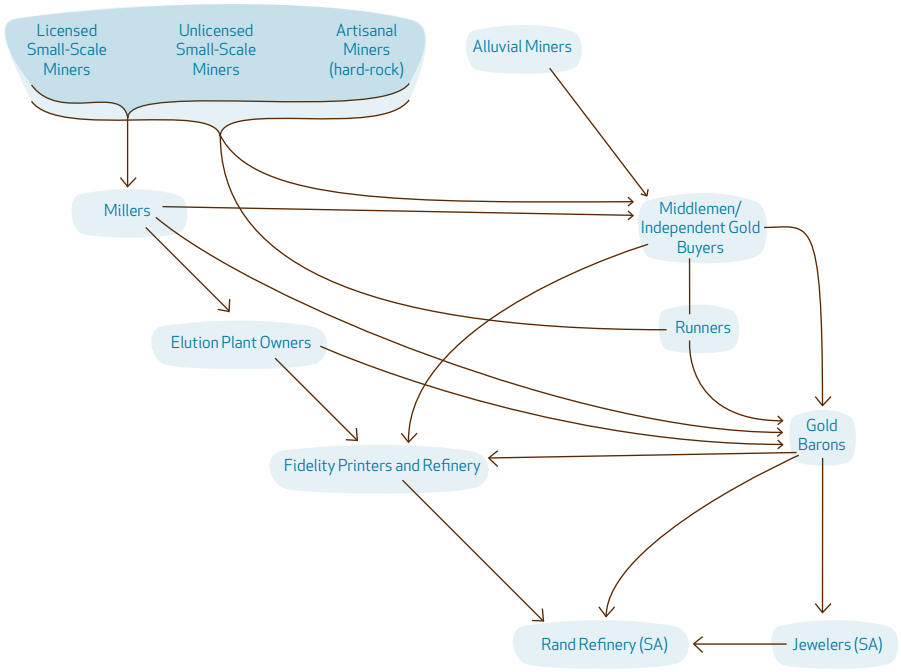


Figure 26: Flow of minerals within Zimbabwe.

The "gold barons" in Figure 26 are the major buyers of gold outside the formal market, operating from the large towns, mainly Harare. They were described as employing runners, who would buy gold for them and also would buy gold from independent informal traders. There seem to be not more than five gold barons in the country, three of them featuring repeatedly in KIIs. One respondent estimated that there were as many as 15 runners and middlemen operating in Chegutu, a town with a population of around 50,000.[9]

Runners are quasi-employed agents. One described receiving around US$10,000 to buy gold and said he would buy as much as 200 grams (about 7.05 ounces) of gold on a good day—4 to 5 kilograms (about 8.8 to 11 pounds) in a good month. He noted that the country's top gold baron had "thousands" of runners. The gold baron would cover transportation costs while the runner would receive US$0.50 per gram of gold. The runner revealed that he was buying gold at US$35.80 whereas FPR was buying at US$36. However, because of taxes and charges levied by FPR, its price to miners would effectively be US$32.75. On the day of the interview, the world price of gold was US$38.26 per gram; the informal sector was buying gold at 6.4 percent less than world price, while FPR was buying at 14.4 percent less than world price. However, the world price is set for 99.999 percent gold, and 95 percent gold was globally priced at US$36.38. The runner also revealed that millers used to be a major seller to the informal market but had ceased this activity since the deployment of security officers to mining and milling sites in July 2014.

In interviews, miners commented on how profits were shared among stakeholders in gold production. First, they reaffirmed that claim owners take as much as 50 percent of the gold, an amount the miners felt was unfair. "We are not comfortable paying 50 percent to the claim owner. At times we get gold ore from as deep as 70 meters (about 230 feet), then take a load of 5 tonnes (about 5.5 tons) to the mill. From the little we get, we can't even buy protective clothing for ourselves. We just accompany the mine owner or sponsor to the mill," complained one miner during a FGD. The unfairness of the sharing of gains was also communicated by gold traders; one informal trader from Kadoma reiterated, "It's unfair for the miners. The guys who go underground get less, yet they stay in the bush and live in hard conditions, compared to the mine owner, staying at home doing nothing; the miners get the lesser stake." The same issue was taken up by women miners in Kadoma, who felt it was unfair that they had to undertake such hard, tiring work in exchange for less than half what mine owners earn.

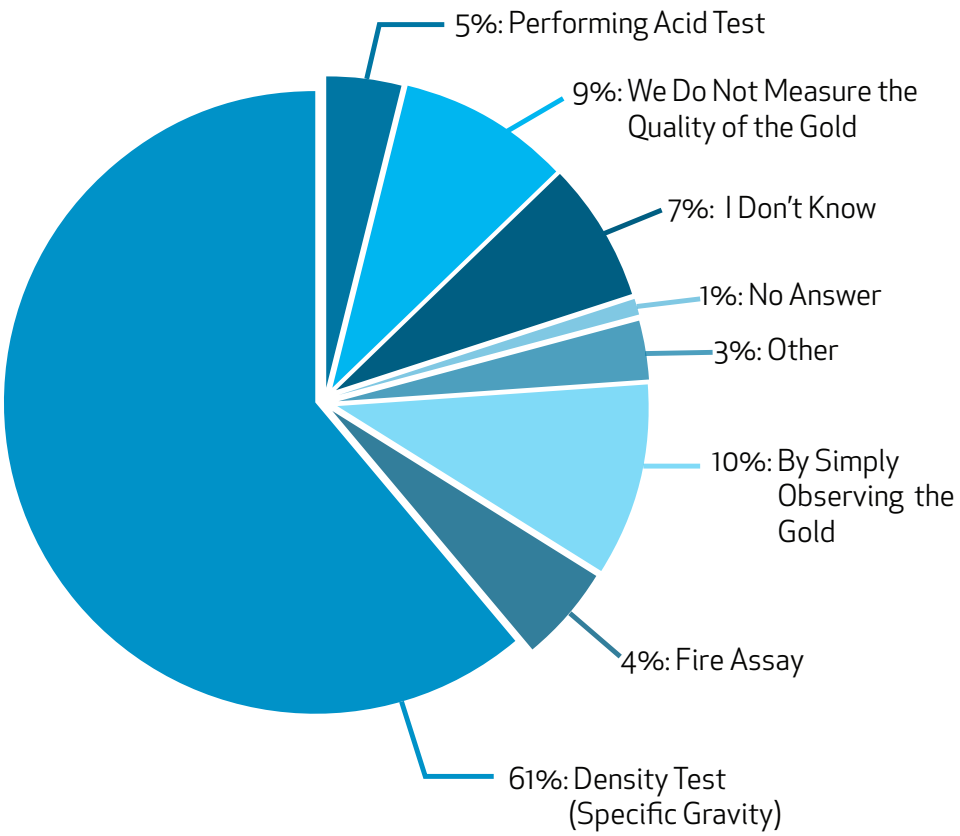
A miller noted that normally millers who sponsored mining do so on the condition that miners come to their mill to have their ore processed. The miller would recover the residual gold in the waste material after milling as a means to recover the money used for sponsorship.

Another issue noted in terms of gold flow was the question of where the artisanal miners would obtain the money to finance their mining activities. Because few formal sources of finance connected to the formal market were available, miners had to access informal financing, which would usually come with conditions that had no connection to FPR, or consideration for it. In essence, the miners felt that FPR was tasked to collect gold that it did not itself produce and thus it was inevitable that significant proportions of gold escaped this formal channel. It was important that the FPR mandate and the reason for deductions made are clearly spelled out as part of any future formalization project's awareness raising.

The scoping study collected data on the gold trade from artisanal and small-scale miners and millers, including information on recent sales of gold and on sale locations and quantities and quality of gold sold and the ways in which miners and millers would estimate the grade of gold. Other information collected was on the price of gold paid by the formal buyer, FPR, compared to the informal market.

Miners and millers were asked whether they had made a recent gold sale, with "recent" defined as within the preceding three months. One hundred percent of millers and informal gold traders interviewed had done so. In addition, around 73 percent of miners and mine owners had also sold

Figure 28: Ways of estimating the quality of gold.



gold during the three months preceding the survey. Other respondent groups who reported having sold gold included mine operators, team leaders, suppliers of goods and services, and transporters.

Most respondents made gold sales in small quantities of less than 10 grams (about 0.35 ounces) and quality of less than 50 percent. Gold of higher quality was sold in large quantities, albeit by smaller percentage of respondents.

The quality of gold sold was mainly estimated by density test (i.e., specific gravity test), according to 61 percent of respondents; a tenth of respondents simply observed the gold while a further tenth did not estimate the quality of their gold. An additional 7 percent of respondents did not know how to measure the quality of the gold they sold. FPR revealed that most miners and millers who sold their gold to FPR prefer to use the density test over the more accurate fire assay, which takes longer—in gold trading, miners often prioritize expediency over a potential marginal increase in revenue. In streamlining gold buying, any future formalization project should ensure that transactions can move quickly through any proposed transaction systems. How respondents described estimating the quality of gold is presented below (Figure 28).

Overall, of 64 percent of the respondents who reported having sold gold during the preceding three months, the gold transaction location was primarily into formal channels (FPR, 28 percent; mill, 35 percent). Miners also reported having sold to a gold trader in town (17 percent), at the mine (6 percent), and at other places (13 percent). Of those who reported selling in "other places," they explained these include illegal or informal buyers, to a visiting buyer, in a local area or near the mill or in the compound, or in town, to a claim owner, or to a profitable buyer.

Data on gold price in both formal and informal markets was collected, and a comparison was made to understand the price differences from the perspective of both millers and miners.

An informal gold buyer reported during a KII that prices of informal market traders in town ranged from US$27 to US$30 per gram of gold. On the day of the interview, the world price of pure gold was US$1,231 per ounce or US$39.58 per gram, making 85 percent pure gold (the weighted average grade of gold reported by respondents) US$33.64 per gram. The key informant also revealed informal market buyers having cash at all times—favorable for miners, who favored quick payment over slightly higher prices. The informant also reported that miners were given the straight weight price, based on the actual weight of the gold — bought at a lower price than gold measured by specific density test. The informal gold trade environment was also reported to operate on the barter trade system. So, for instance, a miner in need of explosives could obtain them in exchange for gold. Some barter trades involved the exchange of gold for food, with miners agreeing to pay upon producing gold.

The formal system via FPR offered a competitive price for the gold bought. FPR, however, made 5.5 percent deductions from the cash paid, so the net price received was lower than the price offered. The discount was broken down as follows (Figure 29 and Figure 30):

Figure 29: Share of the revenue of all gold produced.

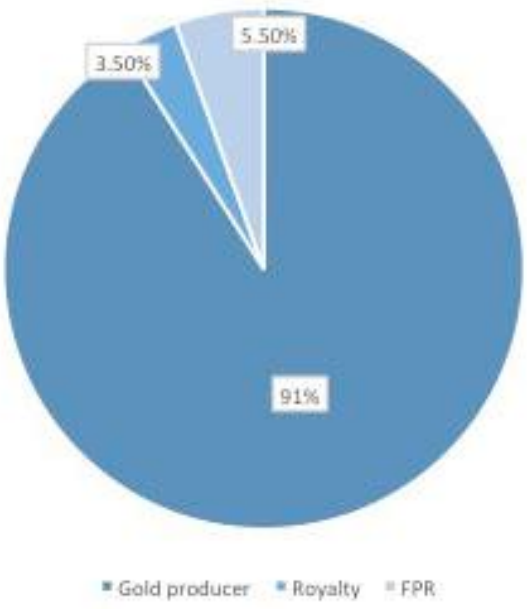


Figure 30: FPR's share as a percentage of total gold price.

Illegal Trade

Multiple informants suggested that a key destination for Zimbabwe's gold was South Africa. A senior FPR official explained how the informal market managed to offer better prices than the formal market: Gold would be bought in South Africa by a recovery works plant[10] under the guise of its being scrap metal. Informal traders would then obtain a 14 percent tax rebate from South Africa's tax revenue authority. One miller's explanation of the mechanics of the informal market corroborated. "A documentary I saw said that in South Africa, SARS [the South Africa Revenue Service] gave a rebate of 15 percent and then smelted its gold and said they had made jewelry."

Multiple respondents reported during KIIs that sponsors usually sold their gold to the informal market because it offered better prices. "Most sponsors do not sell to Fidelity; they have their own buyers who are either in South Africa or Harare."

It was further emphasized that illegal trading is happening in towns, as the risk of robbery is high in the bush.

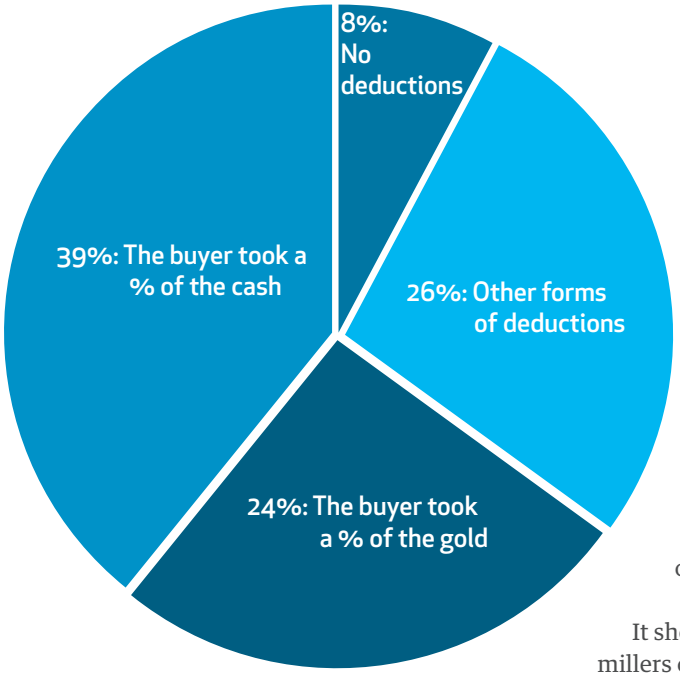
An informal gold buyer explained, "Normally I don't take my gold to Fidelity. It's good only for people who have claims, not for us. Because normally I am being sponsored by someone. He comes and gives me US$10,000,[11] and then buys gold from me. I get on average 50 cents for each gram as profit."

Both MMMD and FPR agree on the challenges presented by the informal market. "[It] will always be there, and miners will use it as long as informal market prices are slightly above Fidelity's." FPR stresses that illegal buyers' prices are similar to FPR's but that the informal market capitalizes on the fact that no taxes are levied. A sponsor in Kadoma reiterated the point. "The industry prefers the informal market for one reason: pricing. There is less going to government and more going to the [gold sellers] because of pricing and tax." In addition, the fact that illegal miners exist and that FPR will buy gold only from registered miners suggests that the illegal market will always have business from illegal miners.

Table 12: Factors in determining where gold is sold.

FACTOR	DESCRIPTION
Time	This has been shown to be the prime factor—miners want to sell their gold as quickly as possible.
Price	Miners want a higher price for their gold.
Location	Miners and millers prefer to travel the shortest possible distance to sell their gold. Locations such as Harare are appealing; because mining inputs there cost less than elsewhere, the traveling serves two purposes: selling gold and buying inputs. Miners and millers balance convenience against the opportunity cost of being away from the mine and losing productive time.
Legality	Illegal miners and millers have no access to the formal market and have no choice but to sell to the informal market.
Relationship with a Prefinancing Sponsor	Miners often obtain working capital from third parties, who may have the right of first refusal to buy the gold.
Liquidity	The less cash a miner has, the more urgent his need to quickly sell his gold.
Security	Miners want to sell their gold where they will feel secure, without threat of theft or robbery of either their gold or their money.
Barter	In a few instances, miners prefer to exchange gold for goods or services.

Figure 31: Deductions made on earnings from gold sales.



Taxation and Payments

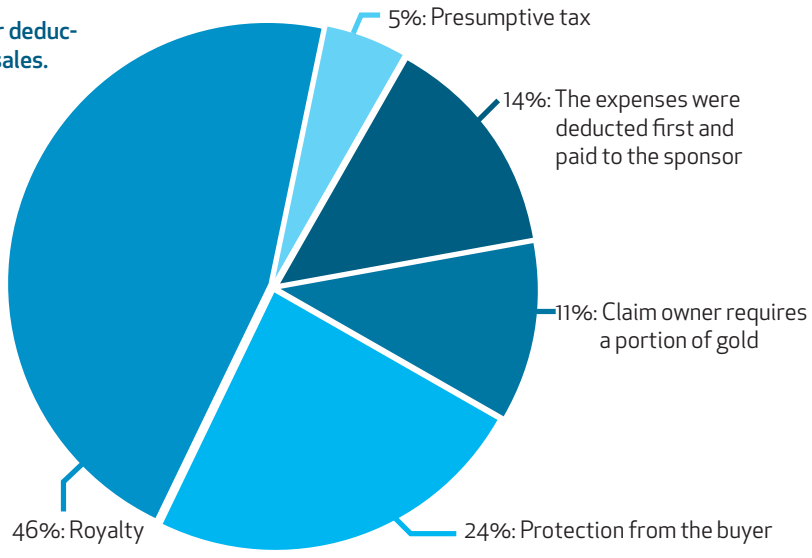
The scoping study also collected information to understand the tax levied and deductions made after the sales of gold in both the formal and informal markets. Around half of respondents (52 percent) revealed that deductions were made when gold was sold; the other half (48 percent) said that no deductions were made. Of deductions made, 20 percent were attributable to milling and transport costs, 12 percent to food and operational costs, and 10 percent to royalty payments. The royalty was stated in either monetary form, between US$50 and US$70 per transaction; in kind, as gold (i.e., claim owner, sponsor, or buyer deductions of between 1.7 and 15 grams, or 0.06 and 0.53 ounces); or—in one case—as wheelbarrows of gold-bearing ore.

It should be noted that although millers officially are tasked with collecting the royalty, presumptive tax, and FPR charges on behalf of FPR, some millers collect them but do not remit to FPR or do not collect at all, so as to incentivize miners to come to their mills.

Deductions made in gold transactions are summarized above (Figure 31).

Respondents revealed that half of deductions are in the form of tax, with 46 percent citing royalty and 5 percent citing presumptive tax. A quarter of deductions were made for the purpose of getting protection from the buyer. Claim owners were reported as being responsible for 11 percent of reported deductions, which they collected as a rent for mining on their claims. Deductions made after gold sales fall into five main categories (Figure 32).

Figure 32: Reasons for deductions made from gold sales.



Gender Issues in ASM

Although this report has made an attempt up to this point to address some gender issues, this section focuses on the specific study findings as to respondents' perspectives on women's participation in mining, the proportion of women taking part in gold mining and trading, and women as leaders of mining associations. The section also presents information on gender-based decision making for household income expenditure.

The ASM sector creates important opportunities for impoverished women to find nonfarm employment. Women frequently turn to ASM to supplement their incomes, often seasonally. They may be less visible around mines, so estimates may not count them. Thus, the number of women in mines may be even higher than is believed.

Literature indicates that women may constitute up to half of Africa's ASM workforce,[12] with variation from country to country (Table 13).

Table 13: Women working in artisanal mining in africa.

COUNTRY	NUMBER OF WOMEN	PROPORTION OF WOMEN (PERCENTAGE)
Burkina Faso	90,000	45
Ghana	112,500	45
Guinea	70,000	70
Kenya	80,000	80
Malawi	6,000	10
Mali	200,000	50
Mozambique	60,000	30
South Africa	500	5
Tanzania	375,000	25
Uganda	90,000	60
Zambia	18,000	30
Zimbabwe	250,000	50

(Source: Hayes, 2008.)

In this scoping study group, women constituted 11 percent of miners in target areas. In comparison, women constituted 53 percent of the comparison group. In other words, the study showed a proportion of female miners significantly lower than the above-stated estimate of 50 percent of miners. The study also revealed that a third of respondents didn't know the proportion of women participating in ASM mining, while more than half said that only a few women participate in ASM.

Roles for Women in Artisanal and Small-Scale Mining

Women carry out a full range of activities within ASM, at mining sites, in the mineral trade, and in the provision of support services. At mining sites, women dig, crush, and pound rocks, wash and sort material, carry out processing such as amalgamation of gold, and transport materials. Women also provide services to mining areas, including catering, sales of goods, and sex work.[13] In the Cocoase Camp at Tarkwa in Ghana, risks associated with underground mining were given as justification for women carrying gold ore and water and pounding rocks rather than digging.[14]

The scoping study revealed women miners predominantly engaging in actual mining activities (83 percent), panning or washing ore (7 percent), and gold trading (5 percent). There is some division of labor; few women engage in blasting, hoisting, and drilling.

The study showed a clear difference in the opinions of men and women on the issue of women in mining. Sixty-three percent of women in Kadoma and 47 percent of women in Shurugwi reported that women's role in mining is essential, compared to 25 and 23 percent of men in those areas, respectively. On the other hand, 47 percent of men in Kadoma and 41 percent of men in Shurugwi felt that women's role in mining was not important, versus 14 and 22 percent of women in those areas. It is important that any future project be sensitive to these perceptions so as to engage communities' women leaders in any gender-oriented interventions.

Although women occupy powerful positions in ASM in some cases (e.g., as millers, mine owners, and gold traders), most women occupy a distinctly marginal role in the management of SSM operations worldwide. They are rarely identified as miners in their own right and only sporadically attain the same decision making positions as their male counterparts—positions such as concession owners, mine operators, dealers and buying agents, and equipment owners.[15]

Respondents were asked whether they were comfortable with women playing leadership roles in mining associations and other bodies. Women responded more positively than men. Baseline data showed 83 percent of women in Kadoma and 90 percent in Shurugwi to be comfortable with other women taking leadership roles, in contrast to men; 61 percent of those in Kadoma and 59 percent in Shurugwi reported comfort with women in leadership roles. All supervisors and blasters that took part in the survey were men, and most blasters (94 percent) were men—illustrating women's lower skill levels and concomitant lower likelihood of landing leadership positions.

The study sought to understand the reasons for discomfort among respondents who reported being uncomfortable with women in leadership. Forty-two percent said that, according to their cultural norms, women were not expected to engage in mining, a third felt that women did not know the mining sector well enough, and about a fifth felt that women were too preoccupied with household chores to be leaders.

No women were taking part in ore processing, neither in amalgamation nor in the cyanidation process. This result stood apart from artisanal mining activities in Burkina Faso and Mali, where, according to a study initiated by the World Bank, women were found to constitute approximately 45 percent of the ASM workforce and to conduct 90 percent of mineral processing activities.

Gender Discrimination in Artisanal and Small-Scale Mining

Women in ASM suffer different forms of discrimination. Economically, they are often required to surrender high-value products. USAID reported that in Siguiri in Guinea, men typically take control of 80 percent of the profits generated by the women who work alongside them doing the same tasks.[16] Women often do not receive financial rewards equal to men's.[17] One reason for such low payment could be the ''unskilled'' nature of the work they are seen to perform.

There is a relationship between levels of technology use or mechanization and the number of women employed in ASM. Typically, women work in less mechanized ASM operations. As the mechanization increases, the number of women involved drops.[18] This may be due to assumptions that women do not have the technical skills or cultural "suitability" to operate machinery, or it may be due to the formalizing of work structures in more mechanized operations, which focus on recruiting men. It may also be that as income-generation opportunities improve, men dominate while women are relegated to older and less well-paid activities. Another contributing factor may be that women have greater difficulties accessing capital to purchase equipment.[19] In Tanzania, a woman must have her husband's permission to apply for a loan.[20]

Culturally, women are discriminated against wherever there are cultural barriers to women's involvement in artisanal mining. For example, in N'tulo, Mozambique, women are not allowed to work at mine sites because they are believed to attract

Figure 33: Female miner cooking outside her tent.

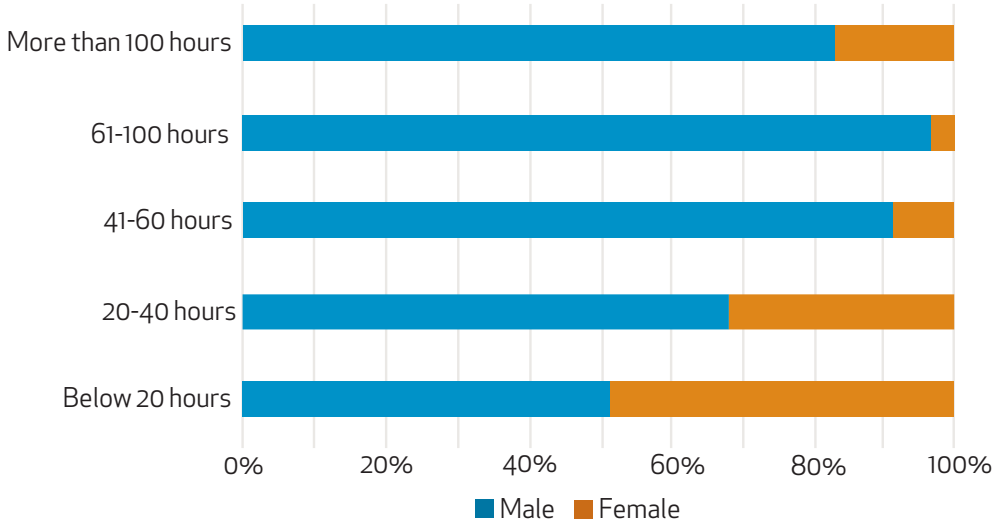
bad spirits; they are only allowed to sell food and beer. In Manica, Mozambique, women are not allowed to dig trenches, but they are permitted to transport ore to processing sites and wash it. Financially, women are also discriminated against: In a study conducted by USAID in 2000 in Siguiri, Guinea, women and men work side by side washing gold from the lateritic soil. For every five calabashes (a large carrying container) of ore that women wash, male intermediaries (buyers) receive the profits from four—women retain one.[21]

Risks for Women in Artisanal and Small-Scale Mining

The Zimbabwean government, through the Ministry of Women Affairs, Gender and Community Development (MoWAGCD) set up a women in mining program with the aim of promoting participation of women in the total mining value chain. The ministry facilitated the establishment of the Women in Mining Apex Board, which has structures from national to district levels. As of May 2015 this board was working with the MoWAGCD and the MMMD to resuscitate women's service centers. Seven centers are operational.[22] The MoWAGCD has held four mining capacity building workshops to facilitate the transformation of women miners' businesses from informal to formal; 260 women were trained, and 1,005 women were subsequently mobilized to venture into SSM.

In addition, the Zimbabwe Women Rural Development Trust (ZWRDT), an NGO with more than 500 members (more than 100 of them miners) operating mainly in the Midlands and Matabeleland provinces, helps women increase their participation in SSM. Pact's scoping study found that women were more likely to be members of a miners' association (19 percent) than men (11 percent). Twelve percent of women identified gender discrimination as a reason why they were not members of an association.

Figure 34: Comparison of weekly working hours between men and women miners.



Women and Informality

Pact's scoping study found that women were more likely to operate on unregistered land or in informal operations (35 percent) than men (19 percent). Women working on registered claims were more likely to work on claims without a valid license (28 percent) than men (20 percent). Of men, 13 percent received a monthly salary, compared to 7 percent of women. This discrepancy could be explained by several factors:

- Women were less skilled than men—86 percent of women and 68 percent of men reported themselves as being unskilled.
- Women were more likely to work fewer hours per day at the mine than men: 34 percent of women, compared to 8 percent of men, work fewer than 7 hours a day at mining. This could be because most women have household responsibilities in addition to their mining work. The comparison of working hours that men and women commit to mining is below (Figure 34).
- Women were less likely to work in teams: Only 55 percent worked in teams, compared to 85 percent of men. However, when they did, women tended to work in larger teams than men (regardless of the gender of other team members).
- Women were less likely to work year round than men: Only 52 percent of women reported doing so, compared to 69 percent of men. Of women, 26 percent engaged in mining only during the dry season, compared to 27 percent of men.

Over a period of years, women spent less time at a single mining site than men; a smaller proportion of women (6 percent) than men (9 percent) had spent more than 10 years at one site, while 41 percent of women, compared to 36 percent of men, had spent fewer than 6 months at one site. This could reflect the overall trend of women spending less time in mining than men.

Such an assertion is strongly supported by the fact that although women reported having had shorter commitments to a single mining site, they had also worked on fewer mining sites over their lifetime. Only 17 percent of all miners surveyed were working on their first mining site, while 45 percent of women were working on their first mining site. Additionally, only 4 percent of women had worked on more than 10 mining sites, compared to 11 percent of men. Only 55 percent of women planned to stay in mining for as long as possible, compared to 66 percent of men.

In FGDs, women revealed that most women borrowed tools and equipment. "We borrow the tools that we use from other people, and during the process, some of the tools get broken, and we have to buy new tools or repair the tools. But we usually do gravel mining, and we do not need compressors and jackhammers," one FGD participant stated.

Children in Mining

Gold mining is dangerous work for children. Yet tens of thousands of children are found working in the small-scale gold mines of Africa, Asia, and South America. Children who engage in ASM come from various family situations and are of various ages and are often first introduced to the mines when they accompany a parent to work. The children's labor might start out as a side activity but grow in significance with age, and over time, the family comes to depend on the supplemental income to cover household or discretionary items or school (if a school is nearby).[23]

Under international and domestic law, the Zimbabwean government is obligated to protect children from violations of their rights, including the worst forms of child labor, including commercial sexual exploitation and mining. At an international level, Zimbabwe is bound by the ILO Convention No. 182 on the Worst Forms of Child Labor, the African Charter on the Rights and Welfare of the Child, the Children's Act, the Labour Act, and the Domestic Violence Act.[24]

Children's Roles in Mining

Children's roles in mining vary considerably by location, by mineral, and with the child's age and gender. For example, in DRC tin mines, mining tasks for younger children are typically less rigorous than those for adults. Children often engage in lighter surface digging or in the transport, sorting, or washing of minerals and the selling of goods to fellow workers; as they enter adolescence, they take on progressively more adult roles.[25] In Tanzania, children are involved in every phase of the mining process in small-scale gold mines. They dig and drill in deep, unstable pits during shifts of up to 24 hours. They transport heavy bags of waste material and gold ore and are involved in manually crushing the ore into powder and the subsequent amalgamation.[26]

Child miners work long hours. Nearly 50 percent of respondents in a DRC study reported that children over the age of seven worked eight or more hours a day, and 78 percent of respondents affirmed that children between 15 and 17 worked more than eight hours a day.[27]

In Pact's scoping study, only 5.3 percent of miners reported being assisted by children in their mining activities. Children between 15 and 18 years worked on average 2.38 days per week and 4.13 hours per day, while children between 10 and 14 worked an average 1.13 days per week and 3.13 hours per day. Children under 10 worked 0.75 days per week and 0.81 hours per day. These data are below the average rate of child involvement in child labor in Zimbabwe, which the United Nations Children's Fund (UNICEF) estimates at 13 percent. A global child labor index for 2012, released in late 2013 by Maplecroft, an international risk analysis firm, ranked Zimbabwe among the 10 worst performers, out of 197 countries surveyed worldwide, for the frequency and severity of its reported child labor incidents.[28]

Risks for Child Miners

In addition to emotional, behavioral, and developmental risks presented by mine work, children are more susceptible to health risks and mining hazards than adults.[29] Like adults, children suffer from the effects of noise and vibration, poor ventilation and lighting, exhaustion and overexertion. But children are particularly vulnerable to exposure to dust and chemicals because their bodies are still developing. The result can be serious respiratory conditions (e.g., silicosis), constant headaches, hearing and sight problems, joint disorders, and various dermatological, muscular, and orthopedic ailments and wounds that jeopardize the children's mental and physical health over the long term.

The harmful effects of mining on children include its impact on the enjoyment of their rights to health, education, and protection from violence and abuse.[30]

Girls working at mine sites are particularly vulnerable to early sexual debut or pregnancy.[31] Girls at and around mining sites are at risk of sexual harassment, including

Figure 35: Miners' children collecting drinking water from a makeshift stream designed to channel water to the mine site.

pressure to engage in sex work. As a result, girls can become victims of commercial sexual exploitation and risk contracting HIV and other sexually transmitted infections.[32]

Children who work in mining sometimes miss out on important educational opportunities and experiences. In some cases, mining causes children to skip classes or drop out of school. Mining can also impact students' time and motivation for study.[33] In mining communities in Mozambique, most children go to school in the morning and in the afternoon join their parents at the mine site—although it is also reported that children skip classes or leave school in order to work at mines.[34]

Zimbabwe has made great strides in meeting the Millennium Development Goal of universal primary education. The ZimStat Multiple Indicator Cluster Survey for 2014 showed that females between the ages of 15 and 24 had a higher literacy rate (92 percent) than their male counterparts (86 percent). The same study showed more girls enrolled in primary schools in Zimbabwe than boys, with the Gender Parity Index measured at 1.01. The primary school completion rate was 98 percent for girls and 97 percent for boys. There were increasingly more girls of secondary-school age in school (63 percent) than boys (52 percent), with a Gender Parity Index of 1.17 and an annual growth of 1.15 percent.

As outlined in the demographics section (page 190), more non-miners (74 percent) had children of school-going age than miners (68 percent). Miners' children were more likely to be in school than non-miners' children, with boys more likely to be in school than girls. Truancy to engage in mining was low for the children of both miners and non-miners. Pact's scoping study found 79.4 percent of boys and 75 percent of girls of school-going age regularly attending school. The data from Kadoma indicates more girls of school-going age who were not enrolled in or attending school (12 percent for miner households and 14 percent for non-miner) compared to non-miner boys (5 percent for miner households and 4 percent for non-miners). In Shurugwi, non-miner children were more likely not to be enrolled in or attending school (25 percent of boys, 19 percent of girls) compared to the children of miners (17 percent of both boys and girls). School enrollment and attendance for girls and boys are below, disaggregated by mining and non-mining households (Table 14).

To further look into children's school attendance, a composite indicator, "children's school attendance," was developed by computing children of school-going age currently enrolled and attending by the frequency of attendance in a regular school week over a period of one school term. The indicator was assigned four levels of

Children school attendance		District				
		Kadoma		Shurugwi		
		Miners	Non-Miners	Miners	Non-Miners	Total
Boys school attendance	Regular attendance	99 (90.8)	40 (93.0)	56 (73.7)	87 (68.5)	282 (79.4)
	Moderate truancy	2(1.8)	1 (2.3)	7(9.2)	4(3.1)	14(3.9)
	High truancy	1 (0.9)	0 (0.0)	0 (0.0)	3 (2.4)	4(1.1)
	Not attending school	7(6.4)	2(4.7)	13(17.1)	33 (26.0)	55(15.5)
Total		109 (100)	43(100)	76 (100)	127(100)	355 (100)
Girls school attendance	Regular attendance	95 (82.6)	33 (80.5)	60 (69.8)	88 (69.8)	276 (75.0)
	Moderate truancy	4(3.5)	1 (2.4)	11 (12.8)	8 (6.3)	24 (6.5)
	High truancy		0 (0.0)		5 (4.0)	5(1.4)
	Not attending school	16(13.9)	7(17.1)	15(17.4)	25(19.8)	63(17.1)
Total		115(100)	41 (100)	86 (100)	126(100)	368 (100)

Table 14: Children's school attendance.

disaggregation levels:

- Regular attendance: This was defined as registered and attending school regularly (five school days per week).
- Moderate truancy: This was defined as registered and attending school an average of three school days per week.
- High truancy: This was defined as registered in school but attending irregularly (two school days per week).
- Not attending school: This group comprises children who are reported as not attending school.

Regular school attendance characterized 79 percent of boys overall, 75 percent of girls; 16 percent of boys were not attending school, compared to 17 percent of girls. For the remaining children, truancy was either high or moderate.

When asked whether children had missed school over the last four weeks to help their parents in mining or non-mining work, 92 percent of respondents said "no," 4 percent said "yes," 2 percent chose not to answer, and 2 percent said they had no children. Those who said "yes" were asked how regularly they helped their parents with work; 44 percent said rarely, 31 percent said the children missed school sometimes, and 25 percent said children missed school often (Figure 36).

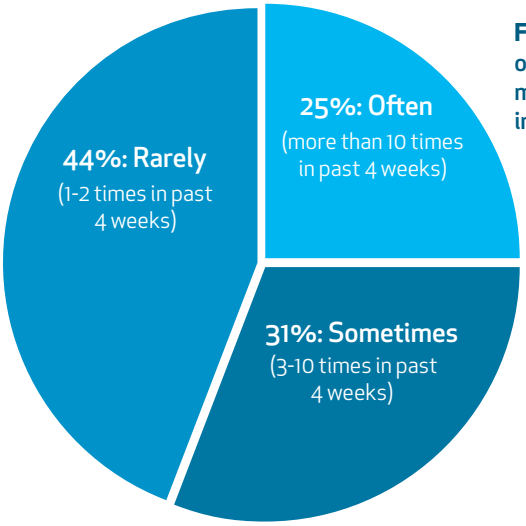


Figure 36: Proportion of children reported missing school for work in mining.

During FGDs in Shurugwi, women reported that Shurugwi generally receives average to below-average rainfall, which makes it difficult to depend on agriculture for livelihood. Parents are often unable to provide the basic necessities for their children, and it is against this background that children are forced to drop out of school to work as gold panners in areas where alluvial gold is accessible. Some children go panning to help support their family if their parents are sick or too old to work or to themselves engage in mining activities.

Miners reported that child labor in mining was negatively affecting children's education. Very few children in remote areas (e.g., Chakari) are reported to finish their O-levels. Chironde Secondary School and

the school at Nyamakare were reported to have recorded zero percent O-level pass rates. A FGD with teachers revealed that pupils engaged in part-time gold panning in order to contribute to their families as well as to pay for their education. One teacher reported that children as young as 12 were involved in illegal gold mining. Young girls were reported to have engaged in providing services to male gold panners (e.g., selling food and beer), rather than being involved directly in mining.

When asked whether they would want their children to be miners, miners' responses were negative. One reported, "Personally, I wouldn't encourage my child to be an artisanal miner, considering all the associated heartaches." On the other hand, mining tended to be associated with lack of education; miners reported that children's involvement in mining will depend on the investment their parents have made in their children's education. They said that if children were uneducated, they would have to be miners.

Children's work in mining was affecting aspects of their social life. Teachers reported that school children who engage in gold mining "end up abusing drugs" and so enforcing discipline became a challenge. Teachers also commented that children engaged in gold mining may also engage in early sexual relationships, putting them at risk for teen pregnancy, exposing themselves to sexually transmitted infections, and putting themselves at risk for HIV infection. (However, no evidence points to higher HIV prevalence among ASM than among those pursuing other economic activities.) School dropouts were reported to be on the increase, as young boys were turning to gold panning. Other effects of child mining include exposure to violence and prostitution. In Shurugwi, it was reported that young girls were often victims of sexual violence or rape.

Women miners' FGDs revealed that some children worked with older people while others worked in all-child groups, where the children were usually 13 or 14 years of age. Some children attend school by day and go to the mines after school, but in the end, once they start earning money, they soon end up thinking it better to go panning than to go to school.

Women miners further explained that children would start panning because they had seen other children of their age making money from it, creating peer pressure for nonworking children to start earning their own money. Children as young as Grade 5 were reported to be conversant with gold mining and trading, able to tell whether ore contained gold, to pan alone, and to negotiate with gold buyers.

Table 15: Baseline family expenditure surveys, 2006 and 2014.

	GMP BASELINE SURVEY (2006)	PACT BASELINE SURVEY (2014)
Family Expenditure	68 percent of income	78 percent of income
Investment in Other Income-Generating Activities	10 percent of income	22 percent of income

Livelihoods

Miners reported earning most of their income from mining activities. Most miners surveyed were sole breadwinners (70 percent), though non-miners were also their families' only income earner (54 percent). The spending behaviors of miners and non-miners were quite similar, with their largest expenditures being on their families' upkeep and for settlement of debts. However, miners were naturally more likely to invest more in mining activities, though investments in other income-generating activities were similar for the two groups. Mining fees and taxes made up a small expense for miners.

The main alternative income-generating activity for miners was farming, with small trade, gardening, and livestock significant. Of all miners, 56 percent invested in other income-generating activities, compared to 60 percent of non-miners. These are significant proportions considering that only 12 percent[35] of employed Zimbabweans engage in other income-generating activities.

In 2006, the Global Mercury Project (GMP) conducted a baseline survey in Kadoma-Chakari and found different results than this survey (Table 15)

It is interesting to note that the GMP baseline survey identified farming as the most common other income-generating activity among miners. One point of departure is the GMP finding that many miners were also engaged as mill workers (because mill operations were done throughout the year); this was not observed by the Pact scoping study.

Miners saved more money (US$60.28 per month) than non-miners (US$32.51 per month), probably because they earn more, on average. The GMP baseline survey found that, to a large extent, artisanal miners' wages were much greater than the wages of their rural agricultural counterparts (farmers)—often five times as high. This corroborates Pact findings showing miners spending more on their families and still saving twice as much as non-miners.

The FinScope Consumer Survey 2011 found that although 38 percent of Zimbabweans were served by formal banking institutions, 40 percent were excluded from both formal and informal financial products and services. In rural areas, 51 percent of the adult population was financially excluded; only 12 percent of the rural adult population used commercial banking services. Of Zimbabwe's adult population, 27 percent kept their savings at home rather than using formal financial savings products.[36]

In 2012, the Ministry of Small and Medium Enterprises and Cooperative Development (MOSMECD), in conjunction with FinMark Trust and the World Bank, embarked on the FinScope Micro, Small and Medium Enterprise (MSME) survey. This survey found 2.8 million MSME in Zimbabwe, 57 percent of them financially included but only 18 percent accessing credit, savings, or insurance from formal financial institutions.

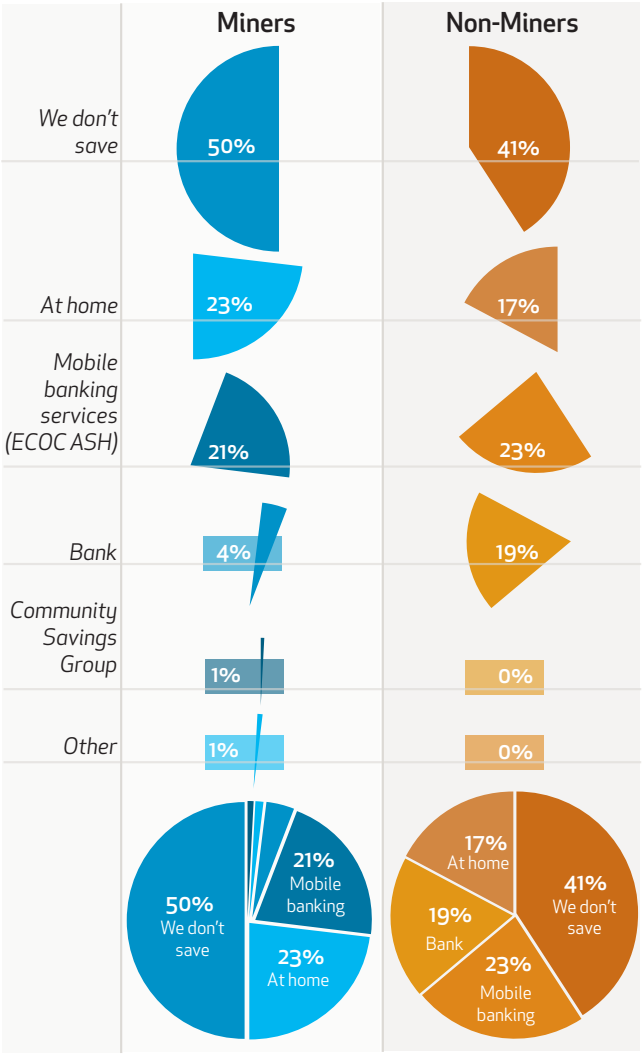
Women (both miners and non-miners) had a higher likelihood of saving monthly than men.[37]

Findings from the Pact survey were compared to findings from these two surveys and this study. Miners are compared to rural individuals while millers are compared to MSME.

Table 16: Comparison of Pact scoping study findings and the two Finscope survey findings.

2011 FINSCOPE SURVEY	PACT SCOPING STUDY FINDINGS	
	MINERS	NON-MINERS
12% of rural adult population uses commercial banking services	4.1 % of miners save money in a bank	3.9% of non-miners save in a bank
27% of Zimbabwe's adult population keeps savings at home	24.5% of miners keep savings at home	20.4% of non-miners keep savings at home
	20.7% of miners save money using mobile banking services	11.8% of non-miners save money using mobile banking services
2012 FINSCOPE MSME SURVEY FOR ZIMBABWE	MILLERS	
57% of MSME use commercial banking services	19% of millers save money in a bank	
72% of Zimbabwe's 2.8 million MSME save at home	17% of millers keep savings at home	
	23% of miners save using mobile banking services	

Figure 37: A Comparison of How Miners and Non-miners Save Money.



Most respondents to the survey were unbanked. Half of miners and 41 percent of millers did not save monthly, underscoring the significant proportion of players who made only a sustenance from ASM and who also needed financial management training. For those who were saving monthly, mobile banking was more popular than commercial banks. Miners struggled to access loans from financial institutions; millers tended to have better access. According to one miller, a former banker, "Banks are not willing to invest in mining, as it is too risky and they don't understand it. They will however invest in the processing and give loans to millers." Millers were five times more likely than miners to save their money in a bank. Miners and millers also reported saving money at home, which put the savings at a higher risk of being spent or lost. The places where miners and millers kept their savings were compared (Figure 37).

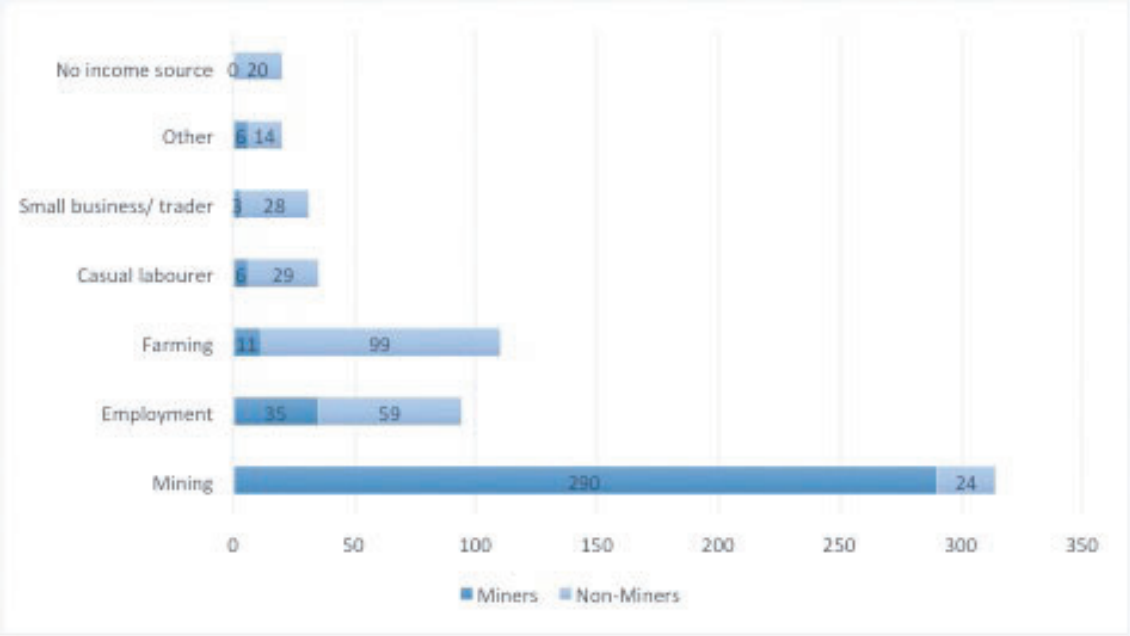


Figure 38: Comparison of the main source of income between miners and non-miners.

Income and Expenditure

To understand miners' livelihoods, the scoping study collected data on main sources of income as well as on other income-generating activities, household expenditures for basic services, savings culture among miners, and household food security. The data was collected from miners and non-miners' households, with the latter as a comparison group provided to compare the social and economic status of miners and non-miners' families and thus to better understand mining's contribution toward local livelihoods.

The study revealed 58 percent of miners to be sole breadwinners, compared to 42 percent of non-miners. In both groups, for the married miners, most spending decisions were made by spouses jointly.

The data on households' main sources of income showed half of all mining families depend solely on mining. Among those who had supplementary sources of income, 22 percent farmed and 11 percent pursued small or petty trades. The chart below(Figure 38) compares the main sources of income for miners and non-miners.

How miners are paid for their work is summarized below (Figure 39). Sixty-four percent are paid in cash. Very few (2 percent) reported actually sharing the gold ore itself and processing it independently; 3 percent reported sharing the processed gold and selling independently. Fourteen percent of miners received a monthly salary, and 55 percent reported having control of all the minerals produced. Eleven percent reported other means of payment, including farmers who controlled all the money made, spouses who received money from their husbands' payments, and cash for services rendered (e.g., sale of explosives). The formal market works on a payment-in-cash basis, so any future project proposed should seek to incentivize miners who prefer to obtain their payment in forms other than cash.

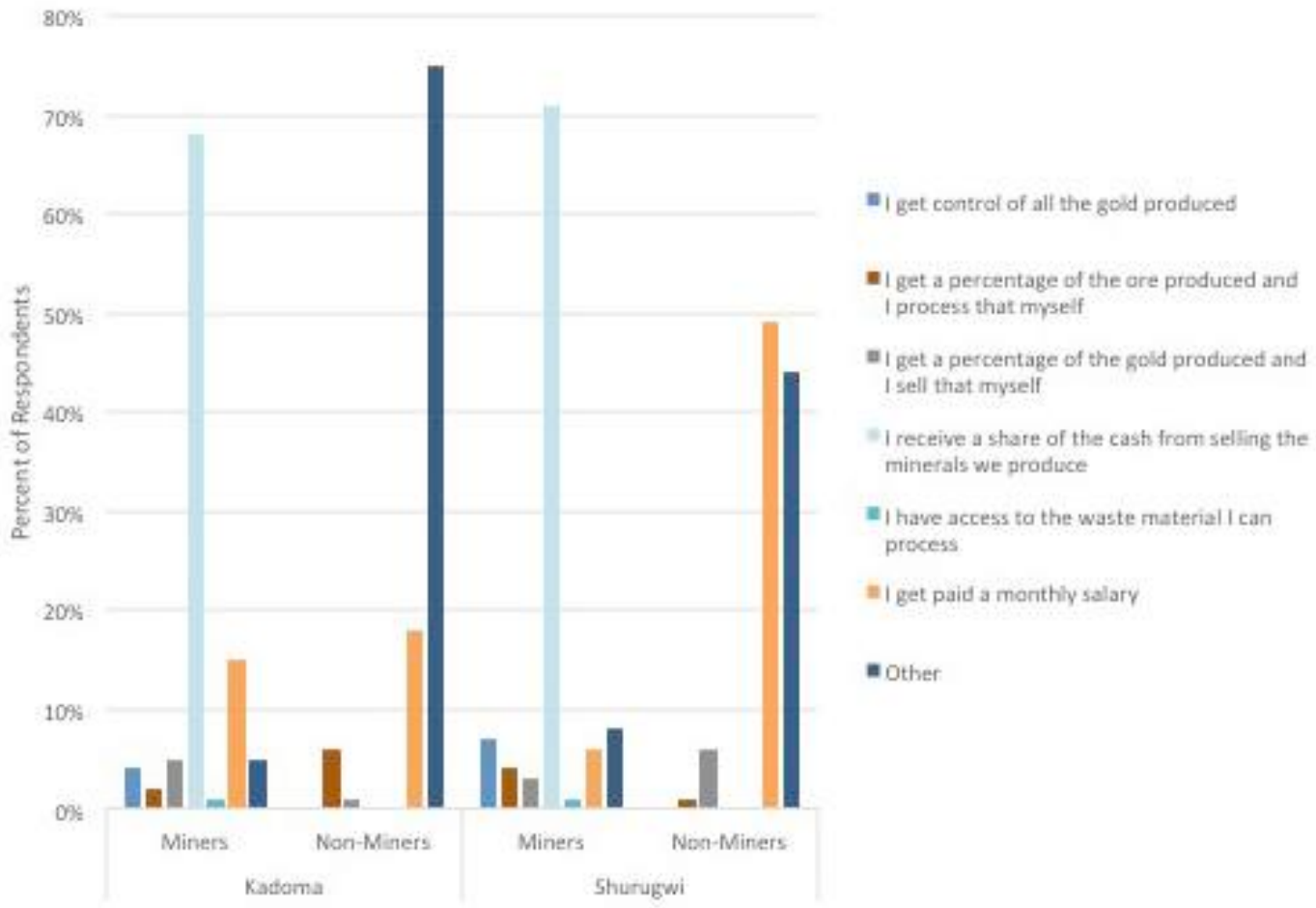
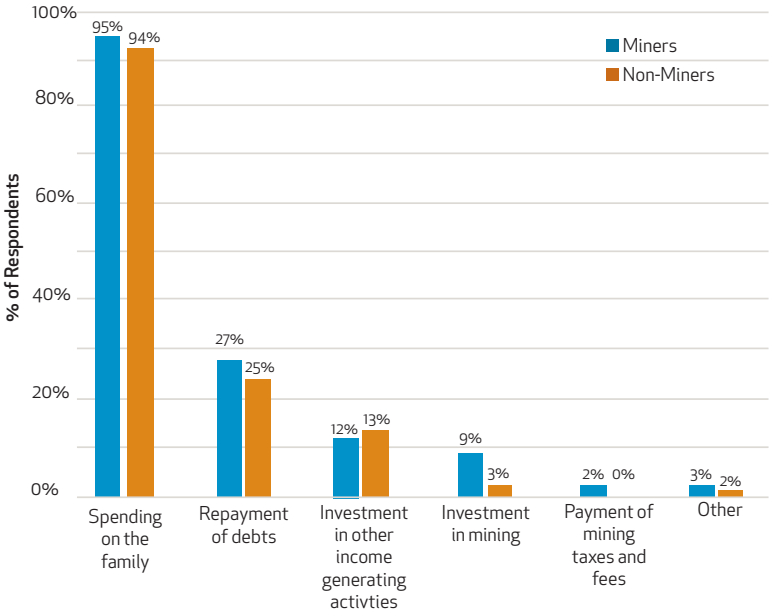


Figure 39: Modes of payment for work done.

Figure 40: Comparison of expenses by respondent type.



The survey compared how miners and non-miners reported spending their income. Both exhibited strong similarities in expenditures on their families, debt repayment, and investment in other income-generating activities. Miners spent more on mining taxes and payments and were more likely to invest in mining than non-miners (three times more likely). However, in a surprising result, miners were more likely to invest in other income-generating activities than in mining: 12 percent of miners said they invested in other income-generating activities, compared to only 9 percent who invested in mining, implying that some miners see mining as a cash-generating activity that provides capital for other income-generating activities that are either more profitable or are their preferred economic activities. This is shown below(-Figure 40).

Further inquiry into miner and non-miner income-generating activities revealed a strong correlation between the two groups (Figure 41).

Figure 41: Other income-generating activities.

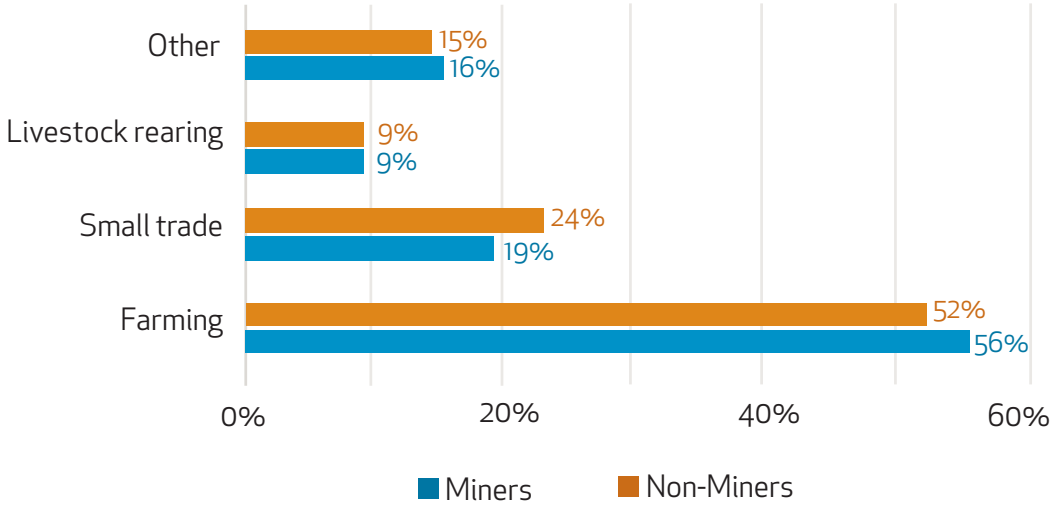
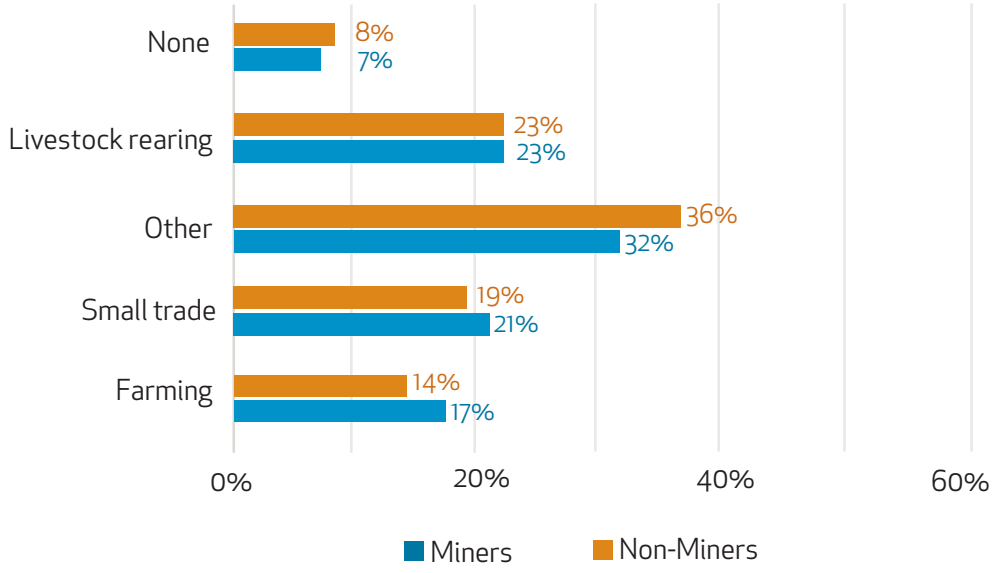


Figure 42: Income-generating activities that miners and non-miners would like to pursue.

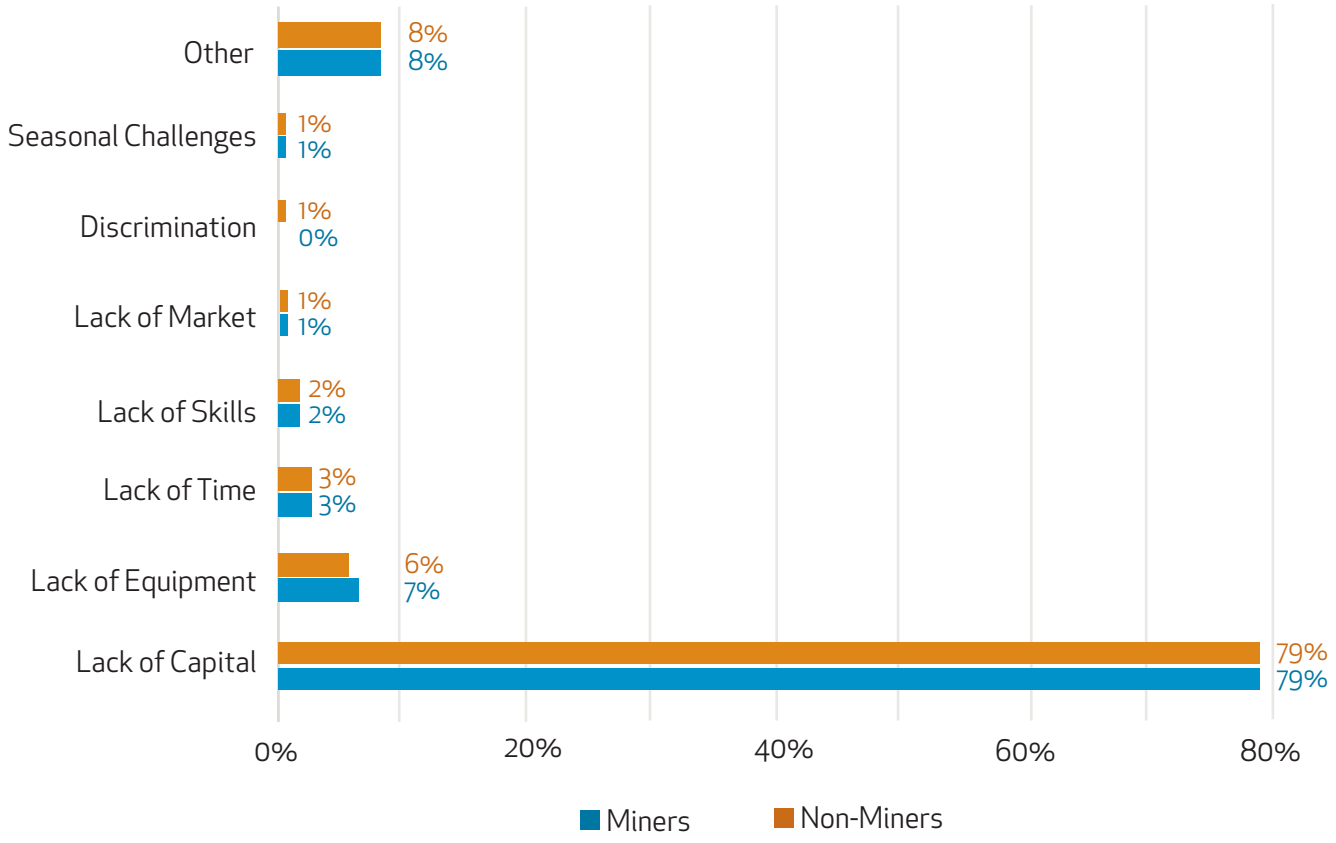


The study enquired as to other income-generating activities that miners and non-miners would like to pursue (Figure 42), capital permitting, and showed a strong correlation between miner and non-miner preferences. The results also revealed the perceptions as to the profitability and social acceptance of different income-generating activities: 72 percent of miners believed such activities would be more profitable than mining, while 14 percent believed they would be less profitable.

Miners and non-miners identified very similar constraints to pursuing their desired income-generating activities (Figure 43).

Data on household expenditures for basic services was collected as a proxy indicator for household income (Figure 44). This data included expenditure on food, health care, transport, communication, and entertainment. The survey also looked at average monthly savings among miner and non-miner households as proxy for income.

Figure 43: Miner and Non-miner constraints to pursuing desired income-generating activities.



Miners report spending marginally more than non-miners on food, children's education, transport, medical care, and communication. Miners also spend twice as much on entertainment than non-miners.

Miners also spent more on medical care than non-miners. This has been observed in other countries such as Tanzania. Miners tended to require a higher-than-average level of medical attention, and any future project relating to ASM should raise miner awareness of safety and health and include policy interventions to protect miners' health and safety. Women, both miners and non-miners, were found to spend more on medical care than their male counterparts.[38]

Household Food Security

To understand food security at household level, a composite indicator (food security) was computed using two indicators adapted from the Global Hunger Index HI.[39]. The survey food security indicator is the sum of all respondents who reported that in the 30 days preceding the study they or their family members had slept hungry due to lack of adequate food and, if so, the frequency of sleeping hungry during that period. The indicator food security is categorized as:

Food-insecure households (i.e., those who had slept hungry more than 10 times during the preceding four weeks).

Moderately food-insecure households (i.e., those who either reported sleeping hungry sometimes (between three and 10 times in the preceding four weeks) or sleeping

Figure 44: Comparison of Average Monthly Expenditures for Miners and Non-miners.

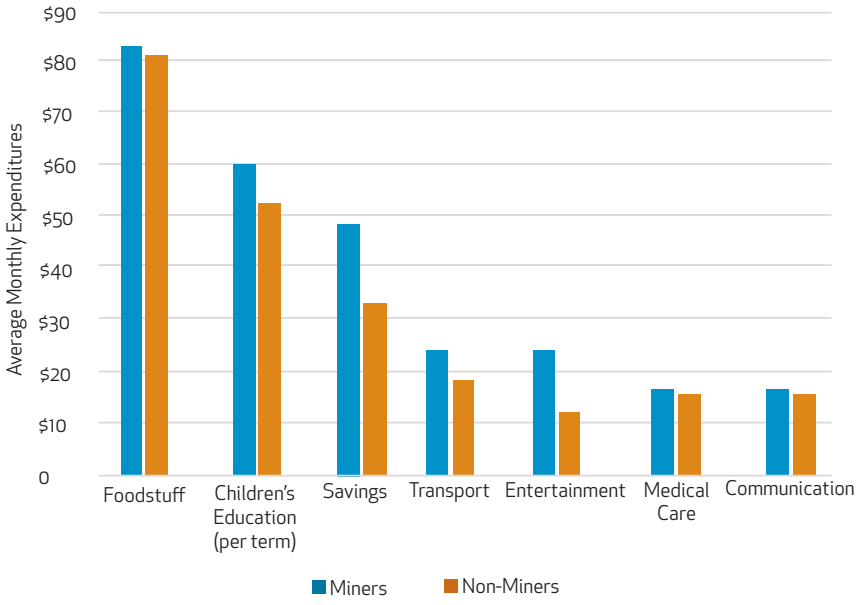
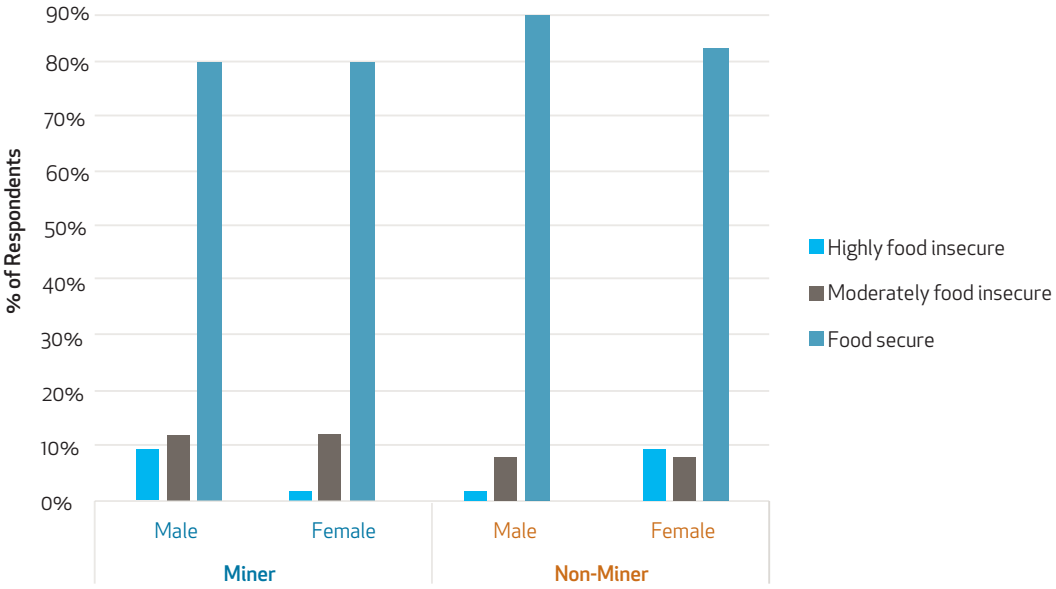


Figure 45: Household Food Security Disaggregated by Respondent Type and Sex.



hungry rarely (between one and three times in the preceding four weeks).

Food-secure households, comprising those who reported never to have slept hungry during the preceding four weeks.

The data from the food security indicator revealed that 85 percent of respondents were food secure, 10 percent were moderately food insecure, and 5 percent were food insecure (Figure 45).

Underscoring ASM's importance as a rural livelihood, non-mining households are more food insecure than mining households.[40] Miners were more likely to spend more on food than those who did not engage in ASM.

The average number of meals per day for various age groups among family members were asked about to better understand the potential effects of food insecurity on younger children being cared for by respondents.

Generally, young children from birth to age four living in a highly food-insecure household consume fewer than three meals a day. Considering that young children, particularly during their first year of life, need small but frequent nutritious meals for growth and development, further research is needed to understand infant feeding practices in those households and thus the potential risk for malnutrition and infant mortality in those families.

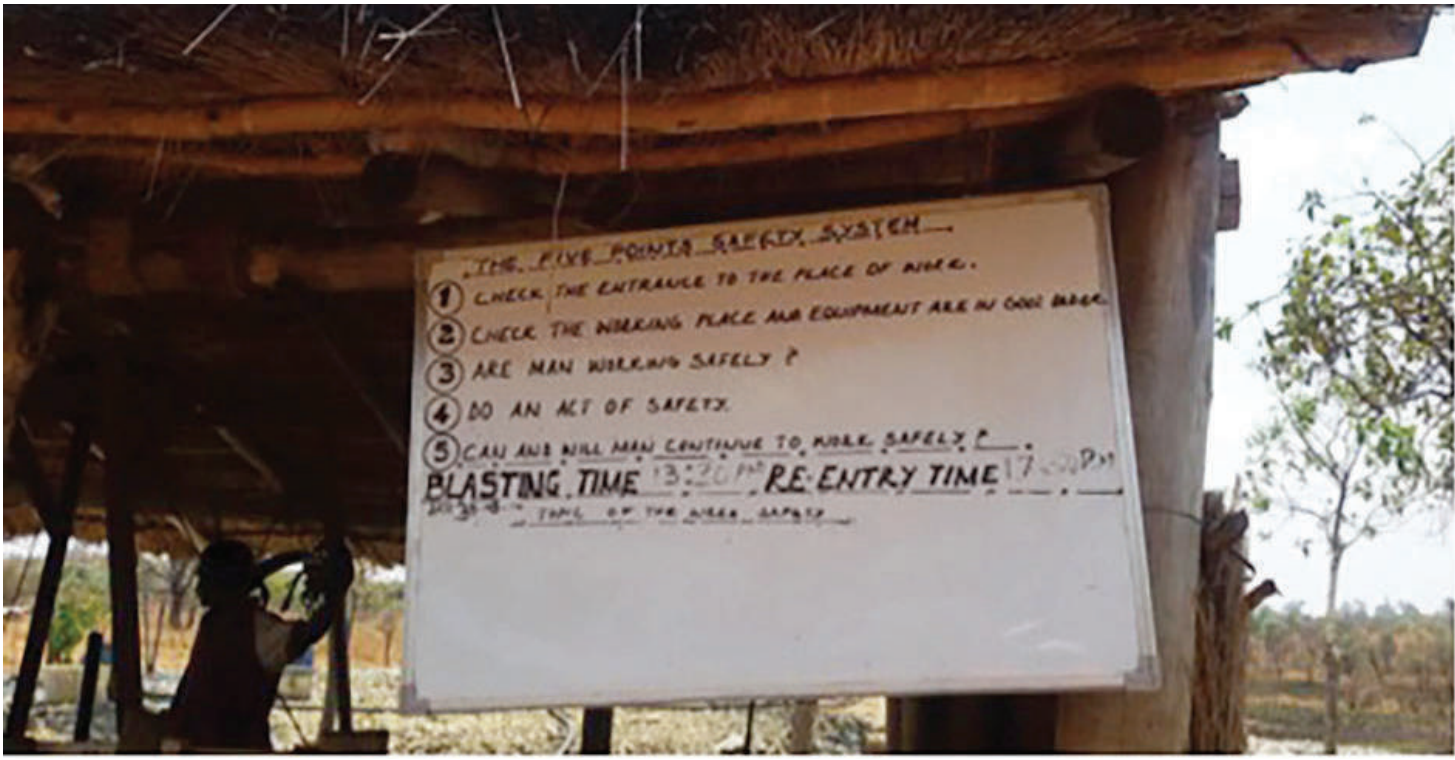


Figure 46: A safety sign at a mine in Shurugwi.

Safety, Health and Environment

Occupational Safety and Health

Unsafe Work Practices and Behavior

One of the most common OSH deficiencies in ASM is lack of awareness of the risks of mining coupled with lack of education and training.[41] Lack of skills and resources compound the situation, with the result that health and safety conditions are very poor. More than 20 people are killed in the sector in Zimbabwe every year, but because the operations are deemed illegal, neither the Mines Department nor the Chamber of Mines recognize these deaths as mine accidents or mine fatalities, and no data is collected or maintained. Most accidents occur when unsupported side walls and hanging walls collapse after undercutting.

Hentschel[42] underscored that the failure to use safety equipment was due to lack of awareness, lack of training, nonapplication of safety regulations, and illiteracy. The same study found that small-scale miners purchased their own safety equipment, including helmets, boots, gloves, and face masks. Women miners were particularly at risk, according to Bhagyalakshmi.[43] They did not have protective equipment, nor were they provided with these items, because they were involved only in ancillary work.

Many SSM operations are said to be lacking in applied safety regulations, reinforcement of mine safety requirements, awareness of the risks inherent in mining, and access to better equipment.[44] These factors lead to the higher health risks and poorer working conditions in SSM compared to those in formal and LSM. In fact, the incidence of accidents in small-scale coal mining in Africa has been found to be significantly higher than in large-scale mines.[45]

Comparing mining accidents between developed and developing countries, the ILO reported that the occupational fatality rate for SSM in developing countries was up to 90 times higher than in industrialized countries.[46] In the Philippines, based on the records of the Mines and Geosciences Bureau (MGB) in the Cordillera Administrative Region (CAR), fatal accidents in small-scale mines were higher than in large-scale mines.[47]

Men, women, and children alike are subject to work-induced injuries, ranging from broken bones to breathing problems caused by inhalation of fumes from equipment. Injuries are exacerbated by the limitations on available, government-funded health care; private health clinics are both expensive and nearly inaccessible to many rural residents.[48]

Constant exposure to airborne particulates makes miners vulnerable to systemic and respiratory diseases. Miners also suffer from musculoskeletal disorders, such as back pain. Among SSM activities is lifting materials—usually done by women—which can cause back pain and injuries.[49]

In the shafts, miners are exposed to immense heat, the potential for cave-ins, and the dangers of faulty machinery. Air is a critical commodity in the shafts, which reach deep underground and the poor air quality at depths causes respiratory problems for miners. Most workers do not use proper breathing apparatus.

Mine Accidents and Injuries

Mining is considered by ILO as one of the most unsafe of human activities. Leading types of accidents include: being struck by falling objects and suffocation from chemical fumes. [50] Other occupational health hazards in mining include potential for repetitive stress injuries (RSI) and exposure to intense heat, poor ventilation, vibration, dust, fumes, intense noise, and biological hazards. In underground mining, poor ventilation causes respiratory failure that can cause brain malfunction or even death.

Accidents among small-scale miners are mostly from rock falls and subsidence, use of poorly maintained equipment, and noncompliance with safety practices and protocols for wearing proper protective equipment. Erosion, suffocation, poisoning, explosion, and being trapped or buried are among the most common accidents.

Many miners use hammers and chisels to extract gold from the shafts, resulting in numerous hand, joint, and other musculoskeletal injuries. The few miners who do have access to machines use compressors and pumps, which are often well-worn, obsolete, and faulty, with emissions well out of line with regulatory standards.[51]

ASM mining accidents are prevalent and often go unreported because of the illegal nature of the operations themselves. The Pact scoping study found that 31 percent of miners had witnessed or been involved in an accident. Thirty-eight percent of miners cited the collapse of waste rock as the most common type of mining accident, while 9 percent cited machinery-related accidents. In a study done by researchers from the University of Brussels on occupational accidents in artisanal mining around Luputo in the Katanga area of DRC, it was found that in terms of OSH, ASM continues to be synonymous with mining accidents. In a sample of 180 miners, in the 12 months preceding the studies, 392 accidents occurred, affecting 72 percent of miners. Half the accidents were attributable to tools handling, and carrying heavy loads accounted for another 33 percent.

General Health

This study created a composite indicator "respondent's health status" out of two related indicators (i.e., respondents who reported having been too sick to participate in daily activities in the 30 days preceding the survey, and the frequency of occurrence of such incidence. The indicator is categorized as follows:

- **Chronic or recurrent illness:** Respondents report having been too sick to participate in daily activities in the preceding 30 days, occurring at least once every week.

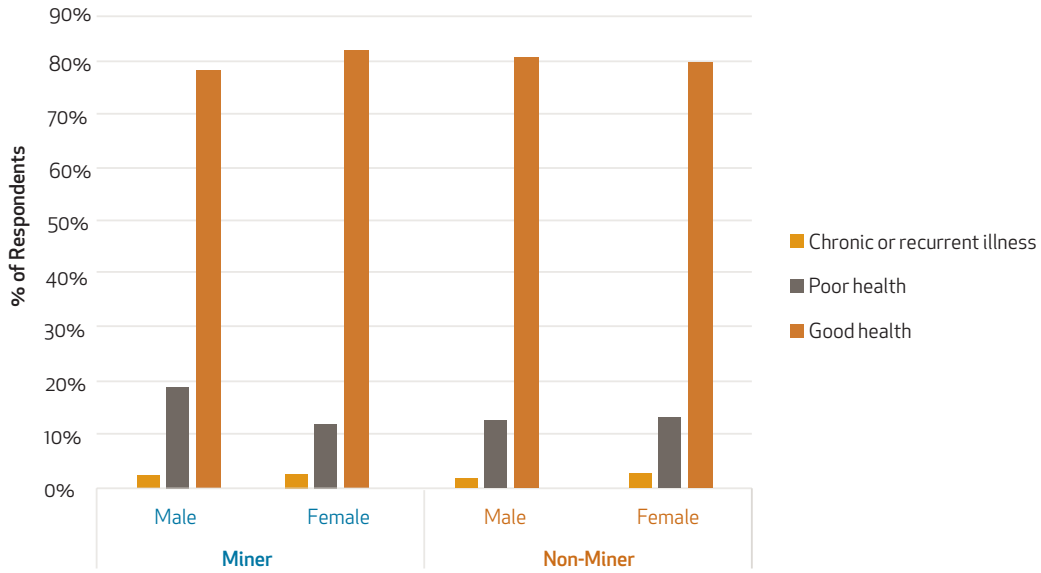


Figure 47: Respondents' health status.

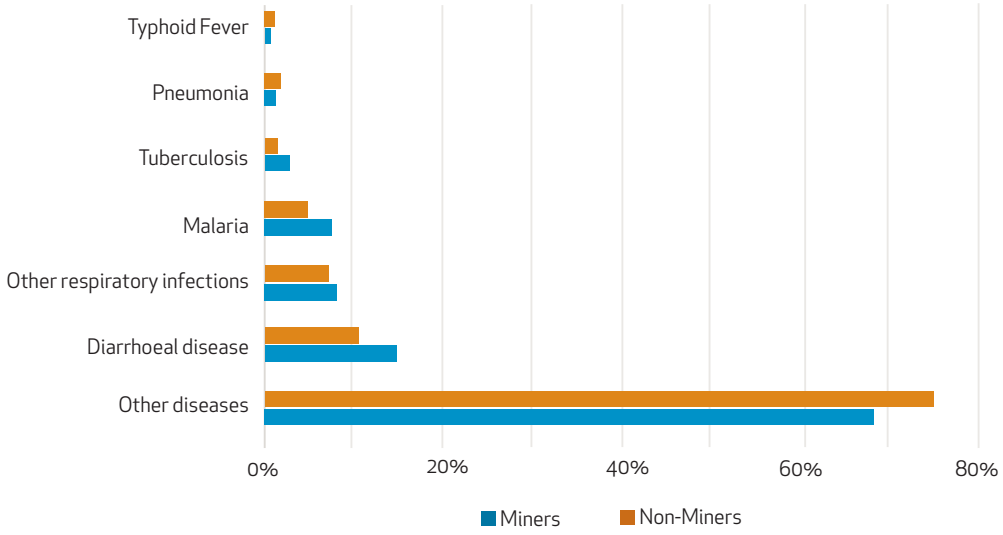
- **Poor health:** Affected respondents report having been too sick to participate in daily activities in the last 30 days, occurring once in a while.
- **Good health:** Respondents reported not having been too sick to participate in daily activities.

The Pact scoping study revealed that around 81 percent of respondents generally had good health. Around 17 percent had poor health and 2 percent were either chronically ill or had a recurrent illnesses. The results were the same for both men and women and from mining and non-mining households, with no statistically significant differences observed (Figure 47). This is contrary to assertions in the literature that women face higher health risks than men in ASM.

Incidences of recurrent and chronic illnesses were also explored in miner and non-miner households by asking respondents whether they had suffered from any of a number of listed diseases during the month preceding the survey. The survey found that miners were more likely to suffer from typhoid fever and pneumonia than non-miners but less likely to suffer from tuberculosis, malaria, or diarrheal disease. The most surprising result was that miners were less likely to suffer from respiratory disease than non-miners (Figure 48).

Respondents we also asked about HIV, including whether they had ever been

Figure 48: Comparison of common diseases suffered by miners and non-miners.



		District				
		Kadoma		Shurugwi		
		Male	Female	Male	Female	Total
Witnessed or involved in mining accident	Yes	55 (29.4)	7 (26.9)	53 (36.8)	5(16.7)	120(31.0)
	No	127 (67.9)	15 (57.7)	89 (61.8)	18(60.0)	249 (64.3)
	I don't know	1 (0-5)	4(15.4)	1 (0.7)	6(20.0)	12(3.1)
	No answer	4(2.1)	0 (0.0)	1 (0.7)	1(3.3)	6(1.6)
Total		187 (100)	26 (100)	144(100)	30 (100)	387 (100)
Frequency of mining accidents	At least once every week	0(0.0)		1 (0.7)		1 (0.3)
	At least once every month	4(2.1)	1 (3.8)	5(3.5)	0(0.0)	10(2.6)
	At least once every three months	20 (10.7)	2 (7.7)	7(4.9)	0(0.0)	29 (7.5)
	At least once every six months	29 (15.5)	4(15.4)	4(2.8)	1(3.3)	38(9.8)
	Rarely	72 (38.5)	9 (34.6)	70 (48.6)	8(26.7)	159 (41.1)
	No accidents	36 (19.3)	2 (7.7)	47 (32.6)	13(43.3)	98 (25.3)
	I don't know	19(10.2)	7 (26.9)	7(4.9)	6(20.0)	39(10.1)
	No answer	7(3.7)	1 (3.8)	3(2.1)	2(6.7)	13(3.4)
Total		187 (100)	26 (100)	144(100)	30 (100)	387 (100)
Most common type of mining accident	Drowning because of sudden flood	2(1.1)		2(1.4)		4(1.0)
	Tunnel or shaft collapse	27 (14.4)	1 (3.8)	23 (16.0)	3(10.0)	54(14.0)
	Collapse ofwaste rocks onto someone	81 (43.3)	14 (53.8)	47 (32.6)	6(20.0)	148 (38.2)
	Machine - related accident/injury	10(5.3)	1 (3.8)	20 (13.9)	5(16.7)	36(9.3)
	Explosives accident	4(2.1)		3(2.1)		7(1.8)
	Accidental falls into pits or shafts	18(9.6)	1 (3.8)	10(6.9)	0(0.0)	29 (7.5)
	Wildlife interactions (snakes or insects bites)	2(1.1)		2(1.4)		4(1.0)
	Assaults from other miners	9(4.8)	2 (7.7)	2(1.4)	0(0.0)	13(3.4)
	Burn	0(0.0)	0 (0.0)	2(1.4)	1(3.3)	3(0.8)
	Other	34 (18.2)	7 (26.9)	33 (22.9)	15(50.0)	89 (23.0)
Total		187 (100)	26 (100)	144(100)	30 (100)	387 (100)
Injured in a mining accident	Yes, minor injuries (cuts, bruises, sprains)	36 (19.3)	2 (7.7)	15(10.4)	0(0.0)	53(13.7)
	Yes, significant injuries (broken bones, concussion, major wounds)	12(6.4)	1 (3.8)	7(4.9)	1 (3.3)	21 (5.4)
	Yes. an injury which was so severe that it prevented the person from returning to work	1 (0.5)		0(0.0)		1 (0.3)
	No	138 (73.8)	23 (88.5)	122 (84.7)	29 (96.7)	312(80.6)
Total		187 (100)	26 (100)	144(100)	30 (100)	387 (100)

Table 17: Mining accidents.

tested for HIV and if so, when was the last time. Respondents who reported having been tested for HIV were asked whether they were willing to share their test results before being asked about their HIV status. Seventy-three percent of respondents had been tested for HIV, 59 percent of them in the past six months; 21 percent had the HIV test between six months and a year ago. Of those who had been tested for HIV, 90 percent of miners and 87 percent of non-miners were willing to share their test results. Of those who shared their results; 12.3 percent of miners and 12.2 percent of non-miners were living with HIV.[52]. This aligns with UNICEF estimates for Zimbabwe of an HIV prevalence of 13.7 percent. The Pact scoping study finding was contrary to others elsewhere, where mines, and often the nearby communities, are HIV hotspots.

On the issue of health education, women miners reported that none is available on HIV/AIDS, sexually transmitted infections, sexual and reproductive health, or family planning services. "Also there's no sanitary ware in the bush." There are reports of condoms being distributed, but

Figure 50: Comparing water sources in mining and non-mining households.

haphazardly. Routine HIV/AIDS counseling and testing is also available—for example, through the National AIDS Council (NAC).

Occupational Health

The Pact scoping study explored respondents' awareness of the health hazards of mining, including the effects of mercury and cyanide and symptoms related to or suggestive of mining-related illnesses and mining accidents. The data showed a generally high level of awareness (72 percent) of mining's potential health impact.

Miners were asked whether they knew about the health problems related to cyanide use. Fifty-four percent of miners did; 3.4 percent had faced such problems. In fact, 6.7 percent of miners had used cyanide at home—exposing families to the risks of cyanide poisoning.

Only 46 percent of miners knew about the health problems related to mercury, with men (56 percent in Kadoma and 41 percent in Shurugwi) appearing to be much more knowledgeable than women (39 percent in Kadoma and 17 percent in Shurugwi). There was higher awareness around mercury in Kadoma because of the GMP, conducted there a decade ago. Nearly 18 percent of respondents had burned amalgam at home, and only 11 percent had ever used a retort when burning mercury. Three percent had experienced the type of health problems that associated with mercury exposure.

Millers were also asked whether they knew of alternatives to mercury use in gold processing. The data showed that most (64 percent) did not, although several miners mentioned cyanide leaching and Gemini[53] tables as alternatives. Millers' responses on alternatives to mercury are below (Figure 49).

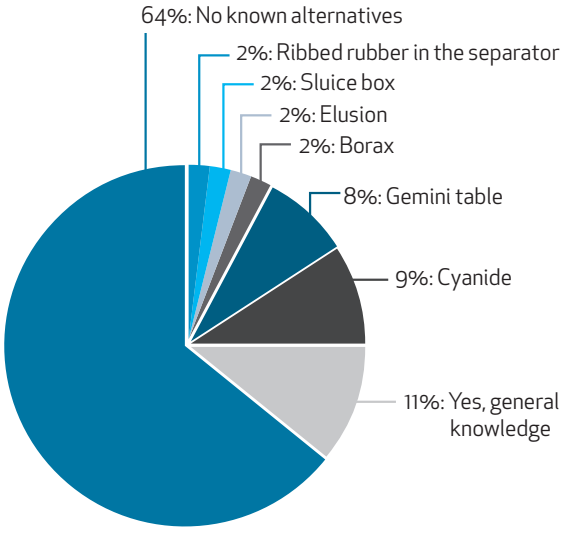


Figure 49: Millers' knowledge of alternatives to mercury use.

Respondents were asked whether, after working in mining, they had experienced any symptoms suggestive of mining-related effects. Twenty-three percent had experienced headaches, dizziness and blurred vision, and 12 percent had experience skin irritation and sores. Nearly 26 percent of respondents reported muscle pain and weakness.

The survey also explored mining-related accidents to understand their incidence and impact. Five questions were asked on the topic—whether miners had witnessed a mining accident; how frequently accidents occurred; what types of accidents were common; and whether the respondent himself or a family member had ever suffered a mining accident.

Responses revealed that 31 percent of respondents had witnessed such accidents (1.6 percent chose not to respond on this topic). About 19.4 percent of respondents had either themselves been in an accident (or a family member had); of these accidents, 28.0 percent involved broken bones, concussions, or major wounds and 1.3 percent were so severe as to render the individual unable to return to mining. The most common type of mining accident was the collapse of waste rock onto someone (reported by 38 percent of respondents) followed by tunnel or shaft collapse (reported by 14 percent of respondents).

When discussing health and safety in the mines, Kadoma miners reported that many accidents occur. Miners had been asphyxiated, ropes and safety equipment broke, tunnels collapsed, and miners, including children, fell when descending shafts. Fights were reported, and drunken people would fall into the pits. When LSMs closed, people would start going underground to mine out the pillars and causing catastrophic mine collapses. KIIs with nurses in a health center near a mining site revealed that most mining-related accidents in the area were physical injuries to limbs and digits.

There is a need for awareness raising and training around occupational health and safety.

Water, Hygiene, and Sanitation

The baseline survey also considered water, hygiene, and sanitation (WASH). Respondents were asked about household water sources, whether drinking water is protected, availability of latrines, and personal hygiene practices.

Responses indicated that 39 percent of households obtained water from a machine-drilled well with a pump, 27 percent from hand-dug wells, and 18 percent from piped water. It appeared that more non-miners (61 percent) in Kadoma had access to machine-drilled wells with pumps than their mining counterparts (53 percent) in Shurugwi. Water sources for mining and non-mining households are summarized below by district (Figure 50).

Contaminated drinking water is one of the most common means of transmission of fecal-oral diseases. Yet 35 percent of miners and 52 percent of non-miners get their water from unprotected sources.

Data reveal that 70.4 percent of respondents did not treat or protect their drinking water, while 23.1 percent used chemicals, such as chlorine, to treat it; 0.3 percent of miners used traditional herbs to treat it; and 6.1 percent boiled it. Asked why they did not treat their water, 17 percent of respondents said they had no reason, while 64 percent felt that the water was clean and did not need treating. The high cost of water treatment chemicals was the reason that 14 percent of miners did not treat their water.

To understand respondents' personal hygiene practices, the survey collected data on frequency of face washing and bathing. It was interesting to note that 14 percent of miners in Kadoma took a bath only at least once a week. Considering the physical nature of ASM as well as the Kadoma climate, this potentially explains incidence of skin diseases among miners. Overall, however, 91 percent of miners bathed at least once a day, and 44 percent of respondents washed their faces once or twice a day (although 33 percent did not do so daily).

Figure 51: Land degradation caused by artisanal and small-scale mining in Kadoma.

Household latrines were reported by 67 percent of respondents, and 99 percent of that group said their latrines were within 1 kilometer (0.621 mile). Of those who have latrines at home, 52 percent have hand-washing facilities near the latrine. Hand-washing practices were reported variously, both with and without soap.

Environmental Impact

ASM has contributed significantly to land degradation, deforestation, and air and water pollution. After high-value ores are exhausted or once extraction becomes impossible, miners often shift from one place to another without rehabilitating the mined-out areas.[54] This practice damages not only the environment around the mine site but also the downstream rivers, weirs, dams, and land.

Environmental degradation generally occurs in the following ways:

- **Land degradation:** Small-scale and artisanal miners occupy and utilize approximately 0.005 percent of Zimbabwe's total land in use and move about 10 million tonnes (about 11 million tons) of rock per year. At least 80 percent of operations are open cast or shallow pits[55] and are left behind in uncovered and unprotected trenches. The chrome miners on the Great Dyke, a layered mafic intrusion of igneous, metal-bearing, 2.5 billion-year-old rock that extends north-south through Zimbabwe, have a major impact in this regard.[56]
- **Soil erosion:** ASM can cause both the drying of topsoil around the open pit and severe soil erosion, with subsequent, potentially catastrophic flood events. Most material moved by artisanal miners ends up in the streams and dams as silt. Some dams and weirs have been known to silt over completely within five years. The 2000-2001 floods in Mozambique, South Africa, and Zimbabwe are believed to have been exacerbated by siltation and deforestation within certain riparian states. The absence of common water standards in the Southern African Development Community (SADC) means that there will always be disagreement as

to what water quality ought to be or how and where it should be tested. Soil erosion aids the movement of tailings into valleys and waterways. Additionally, the decrease in soil pH due to acidic runoff and the high heavy metal concentration makes the soil unsuitable for growth of plants and organisms.

- **Vegetation destruction:** Gold panners are usually nomadic, and when they discover a lucrative panning area, they construct makeshift homes out of poles and mud, using local trees. In addition, almost all their fuel comes from wood.
- **Mercury contamination:** Some small-scale miners use mercury to recover gold. Mercury is released into the environment by direct disposal and vapor. A bioaccumulating toxin, it contaminates surrounding and downstream river systems, potentially poisoning plant and animal life dependent on these river systems for survival as well as humans who eat fish from the contaminated rivers.

Mercury

Small mining and milling operations in Zimbabwe that use both mercury and cyanide have existed since the 1870s,[57] even before the colonial era.

Mercury is a highly potent neurotoxin that adversely affects central nervous system function and development in both humans and wildlife. Mercury exposure is particularly dangerous for pregnant and breastfeeding women, as well as for children, since mercury is most harmful in the early stages of development. ASM is the world's second greatest source of atmospheric mercury pollution, after coal combustion.[58]

Like air pollution, water and soil pollution from mercury has increased exponentially, with more than 200 million artisanal and small-scale miners dependent on mercury to recover free gold. Use of mercury was largely unknown, especially in gold panning, 30 to 35 years ago, because of the coarseness of alluvial gold. However, as the rich high-grade areas have been continuously reworked and as finer or lower gravel grades are treated, the gold recovered is much finer and harder to concentrate. Gold panners and small-scale miners use mercury fairly extensively during the gold-recovery process. After crushing gold ore and concentrating it, miners mix the powder with mercury and water in a pan. The mercury attracts the gold particles, creating a gold-mercury amalgam. During this process, miners are in direct contact with mercury, particularly if they have open cuts or sores. Miners then burn the amalgam to evaporate the mercury and recover the gold; during this process, they may inhale vapor. In Zimbabwe, it was observed, stated, and recorded that mercury is mostly used at milling centers, in homesteads (the home bases where men and women do hand milling and use mercury during the process) and also on mine sites (for testing samples and recovering gold from high-grade ore).

Global Mercury Project

In 2002, the GMP was started as a project of UNIDO, working with the MMMD and Mining Development and the Institute of Mining Research. In 2002, FPR was selling mercury to small-scale miners.

In the Pact scoping study, data revealed that although 46 percent of miners know about the effects of mercury use, 54 percent do not. This reflects a decrease in awareness of the effects of mercury since 2006, when the GMP study showed 61 percent of miners aware of the effects of mercury and 39 percent unaware. Although the Pact scoping study did not measure ambient mercury levels in air or water sources, the 2006 GMP study found mercury at a mill in the Kadoma-Chakari area (Table 18).

The sample data was collected from different points where effluent discharged from the stump mill, which used mercury in gold amalgamation. With a standard threshold level of 0.01, the figures in the table show that mercury is above the stipulated limits, suggesting that water sources within the community are polluted with heavy metals and that any use of open water is likely to raise mercury concentrations in the blood stream or its bioaccumulation (in animals).

SAMPLE SITE	Hg CONCENTRATION (MILLIGRAMS PER LITER)	RECOMMENDED THRESHOLD LEVELS. STANDARDS OF ZINWA AND WORLD HEALTH ORGANIZATION (WHO)/ STANDARDS ASOCIATION OF ZIMBABWE SAZ (xxxx) (MILLIGRAMS PER LITER)
Seepage from water pond (a)	2.13	0.02
Trailing impoundments(b)	1.14	0.02
Stream down the mill (c)	0.13	0.02

Table 18: Mercury concentrations near Kadoma–Chakari area mine in 2006. Source: Global Mercury Project.

The project sought to establish a train-the-trainer program in gold mining communities in the Kadoma-Chakari area to reduce and/or manage mercury use in ASM. The project facilitated educational services on issues ranging from pollution-reduction technologies to business and organizational training. The GMP, in essence, adopted a research-based strategy to achieve a skills-based, health-enhancing behavior change curriculum around a "Protect Myself, Protect My Children" message.

Project findings suggested that Zimbabwe has some of the world's highest levels of mercury pollution and human exposure to toxic risks. In a sample of miners examined for mercury poisoning in a study in Insiza Mining District,[59] 60 percent of the population had general body weakness, 55 percent had nausea, 50 percent had lost teeth, 45 percent had a history of respiratory distress, 40 percent had high salivation and tremors, 40 percent had high mercury levels in hair, and 30 percent had high mercury levels in their blood. These symptoms are all associated with occupational mercury poisoning. The findings were not surprising, given how carelessly mercury is handled by sector miners.

The GMP partnered with the MMMD, providing special funding to the Institute for Mining Research to scientifically prove that low-cost vinyl loop carpets are more efficient than copper plates in Kadoma and to determine the optimum amount of cyanide necessary to recover all the gold while minimizing the dissolution of mercury in amalgamation tailings. A statutory instrument banning whole-ore amalgamation was to be promulgated following the introduction of the carpets to miners and millers by MMMD metallurgists in 2008, but it never materialized.

The GMP faced challenges in achieving its objectives in Zimbabwe, and there are lessons to be learned and put in place before moving ahead with any intervention to follow up on the Pact scoping study:

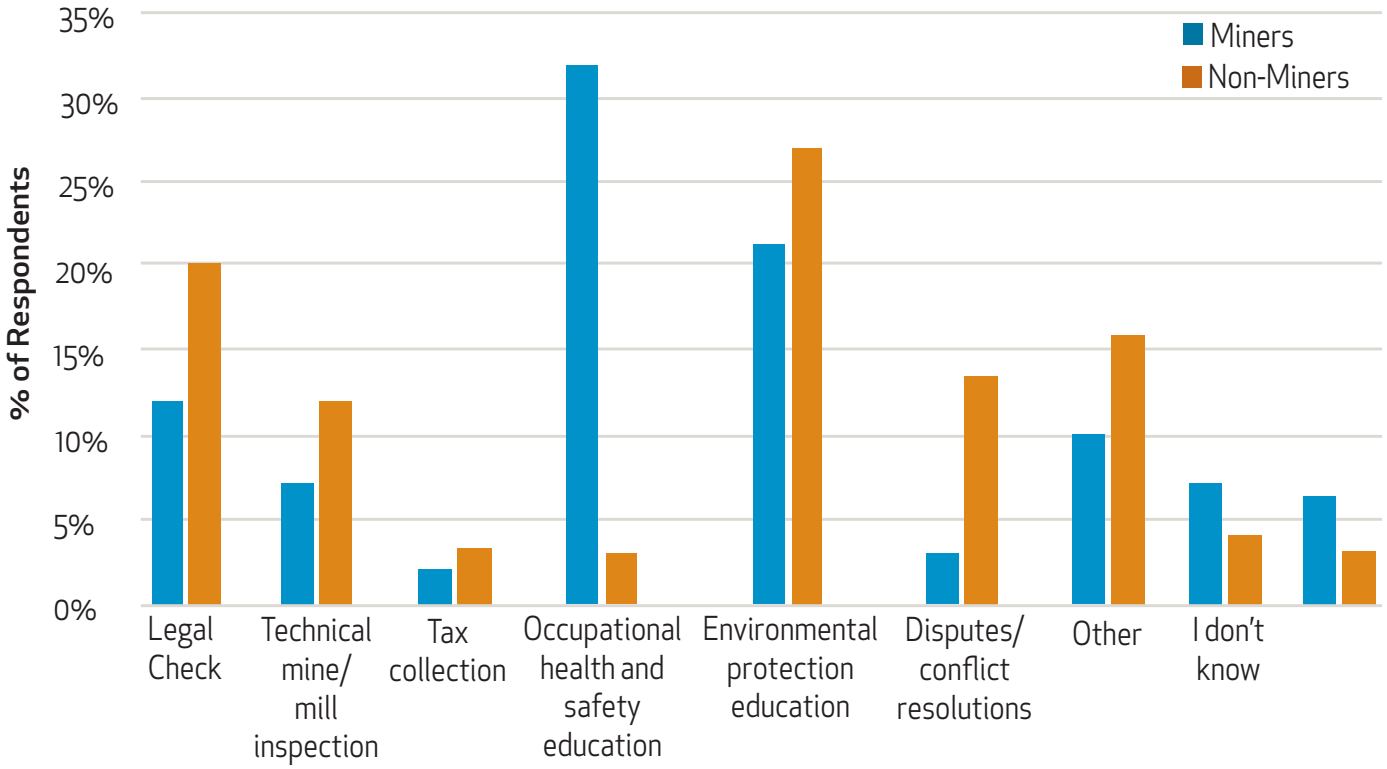
Context: The uniqueness of each ASM site is crucial to recognize, and each area's climatic, geological, political, and cultural differences have to be considered in

Table 19: Levels of cyanide at a mill site.

SAMPLE SITE	SAMPLE RESULTS MILLIGRAMS PER LITER	THRESHOLD LEVELS (SAZ, ZINWA, WHO, STANDARDS (MILLIGRAMS PER LITER)
After tailings impoundments	2.17	0.01
Turura Stream	0.23	0.01
Seepage from borrow pit	0.105	0.01

(Source: Global Mercury Project.)

Figure 52: Purposes of government agencies' visits to mines and milling sites.



designing interventions.

Local solutions: In interventions that will be proposed for a future project following the scoping study, it is essential to include local content and/or solutions, engaging all government institutions at various levels of authority, from Senate and Parliament down to RDCs.

Long duration: It is critical to engage artisanal and small-scale miners in a long-term commitment (i.e., a mutual relationship) and to involve them in the formulation of any interventions.

Broad application: Implementing projects at regional level (e.g., through SADC) allows forward and backward linkages to be established as well as strong synergies with multilateral benefits.

Cyanide

Cyanide, highly toxic, is found both naturally and as an introduced contaminant. Cyanides occur naturally in a number of foods and plants, produced by certain bacteria, fungi, and algae, and are present in a number of compounds, including hydrogen cyanide, sodium cyanide, and potassium cyanide. In Zimbabwe, sodium cyanide is commonly used by artisanal and small-scale miners in processing the locked-up gold found in sand tailings after stamp milling. Sodium or calcium cyanide is used only at stamp mills. Severe exposure to lower concentrations of hydrogen cyanide (6 to 49 milligrams per cubic meter) causes weakness, headache, nausea, increased respiration rate, eye and skin irritation, and other effects on humans.

Environmentally, if cyanide is continually released into the atmosphere, it can adversely damage the ozone layer. The result is global warming. Although cyanide is acutely toxic to human beings, it is not, like mercury, a cumulative poison, and it rapidly decomposes in sunlight due to the instability of the sodium and/or calcium cyanide compound.

Very few millers use cyanide to recover gold, as the process is more involved and it requires a high degree of technical input to maintain the chemical balances that will yield high gold recoveries. For that reason, cyanide is normally used at milling centers, most of which wash the chemical directly into rivers, to the detriment of both humans and animals downstream.

The Pact scoping study observed that miners and mill workers are aware of the dangers associated with cyanide use. Leach operators and other workers at mills make it a point to wash their hands after handling cyanide. While walking around some milling sites, signs could be seen warning people of the presence of cyanide. The Global Mercury Project discovered cyanide at a mill site as well (Table 19).

The presence of cyanide concentrations of 2.17 milligrams per liter after tailings impoundment suggests neutralization was inadequate and implies high cyanide pollution—hence, a high chance of polluted water in the immediate environment.

Monitoring and Regulatory Framework

For formalization of artisanal and small-scale gold mining and trading to be effective, there is a need for a strong regulatory and monitoring framework, particularly from the government, with support from other stakeholders in artisanal and small-scale mining and trading. The Pact scoping study sought to gain the perspective of respondents and their understanding of the current legal and policy environment, including the presence of government agencies monitoring the ASM sector at mining and milling sites, the visits' frequency and purpose, as well as respondents' opinion of the quality of services provided by those government agencies.

Legal Instruments for Monitoring artisanal and small-scale mining

Environmental impact assessments are required of ASM. However, according to the Zimbabwe Artisanal and Small-Scale for Sustainable Mining Council (ZASMC), these are not appropriate to ASM work, and revision of the requirements and miner education are needed. ZASMC has proposed that artisanal miners should propose specific environmental protection measures rather than a whole package of EIA criteria.

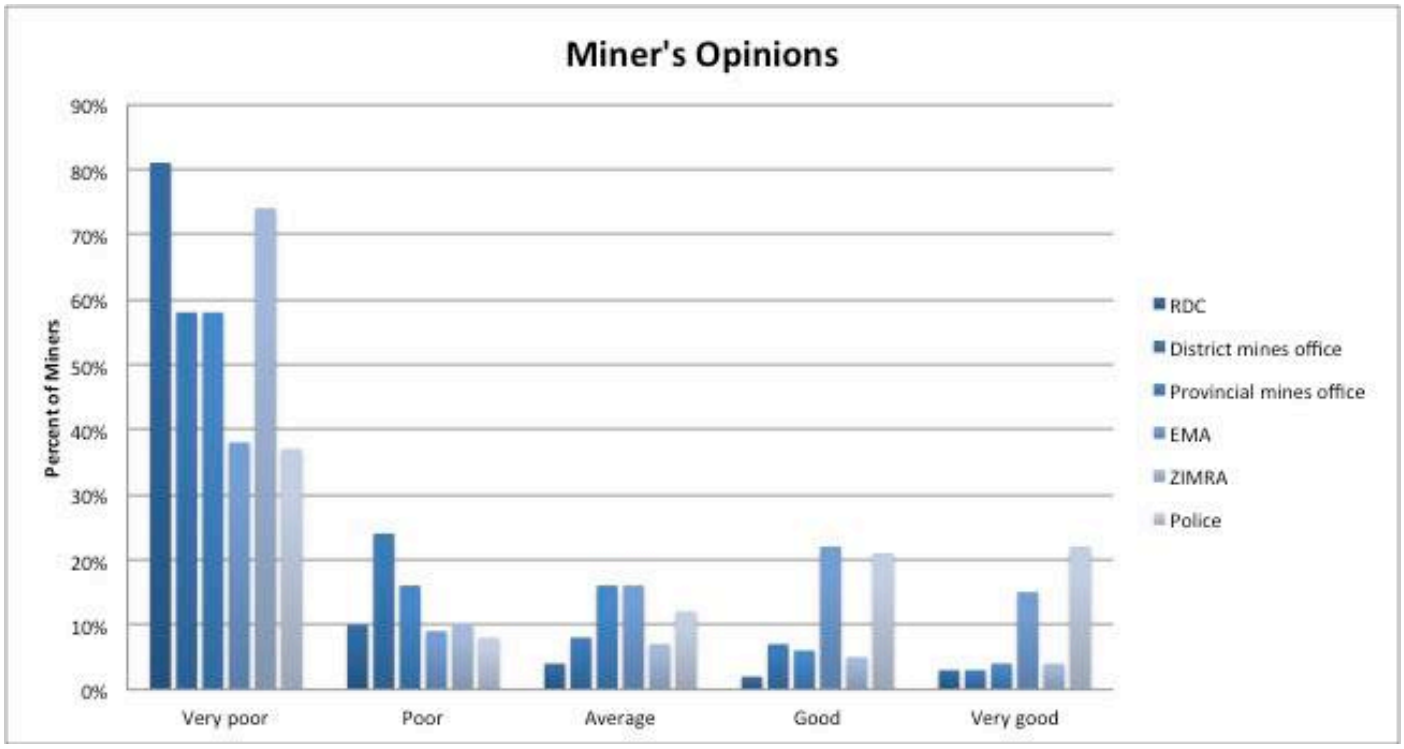
Another challenging requirement for ASM is that every mine have a manager with a diploma or certificate of competency; the reality of ASM income makes it difficult for mines to hire a legally qualified manager.

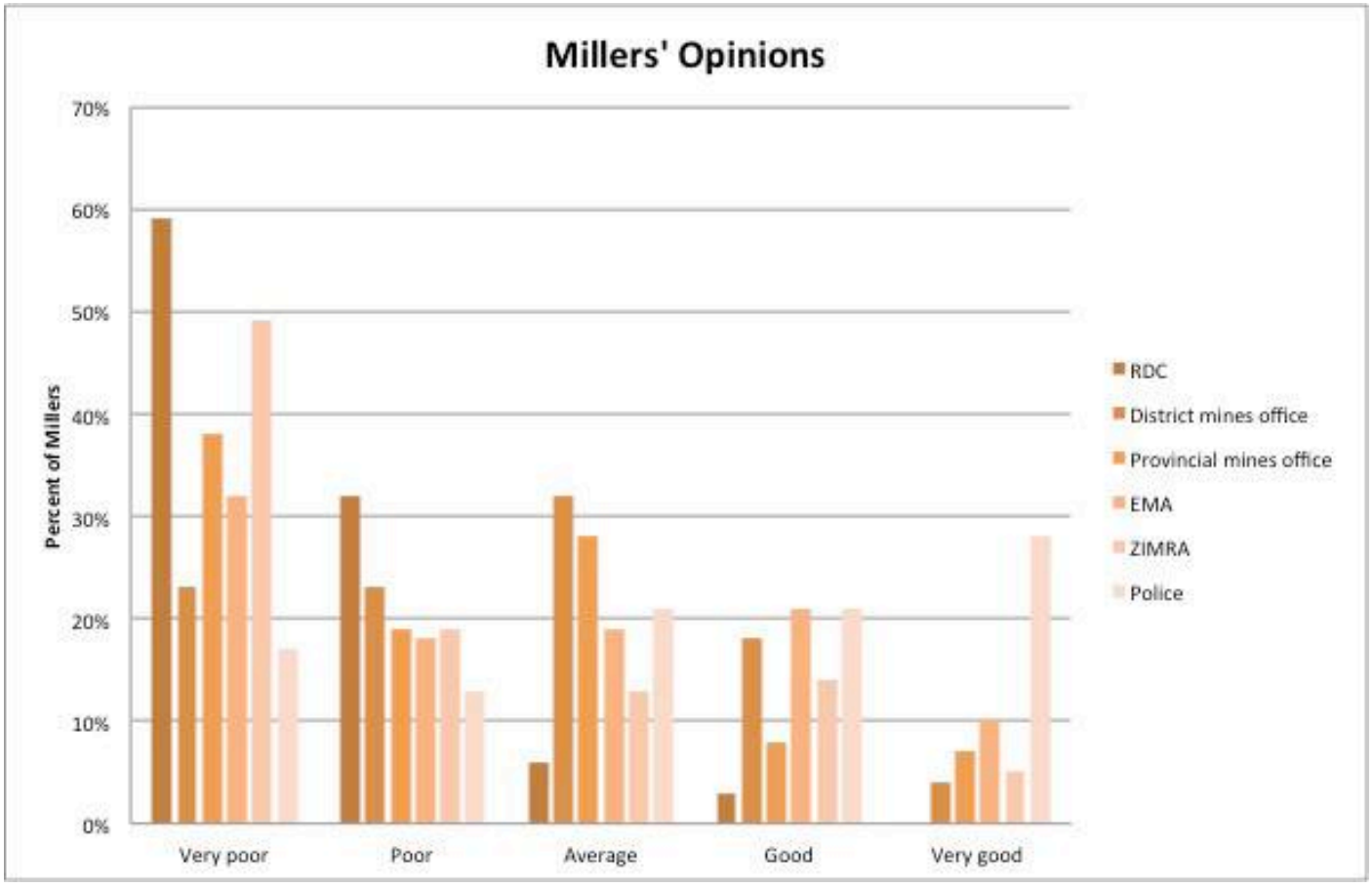
Government Monitoring and Supervision of artisanal and small-scale mining

The government role in providing supportive supervision and monitoring of ASM activities cannot be overemphasized. Supporting and ensuring compliance to the legal and policy framework as well as mediating relationships among stakeholder groups are key government roles in ensuring formalized ASM.

In the Pact scoping study, 65 percent of miners and 94 percent of millers reported the presence of government agencies at mining sites. Almost half of miners felt that government agencies visited at least quarterly, while a fifth reported visits at least once every six months, plus 12 percent who said government agents never visited. More than 80 percent of millers reported a visit at least once a month, and 5 percent reported a visit of only once per quarter. Fourteen percent of millers reported government agencies' presence full time, noting an example of Police CID Minerals.

Figure 53: Comparison of miner and miller opinions on the quality of services from government ASM monitoring agencies.





A third of respondents reported the visits were to provide occupational health and safety education, and a fifth reported they were to provide environmental protection education. Legal checks were reported by 13 percent of respondents, 8 percent reported technical inspections of the mine, and a further 8 percent reported visits to resolve disputes or conflict. Only 1 percent reported tax collection. Mine and mill site visits' purposes are shown below (Figure 52).

Miner and miller opinions about the quality of services provided by government ASM monitoring agencies are compared below (Figure 53).

The survey results demonstrate that most respondents were not happy with the quality of services generally provided by government agencies. However, slightly more than 20 percent of miners and close to 30 percent of millers felt the police were providing very good quality services, while about 15 percent of miners and 10 percent of millers felt that EMA was providing very good services. Fewer than 10 percent of miners and 30 percent of millers reported district mines offices providing average-quality services. Millers' satisfaction with services provided by the provincial mines office was average—about 30 percent—compared to about 15 percent of miners reporting the same. A large majority of respondents were not happy with quality of services provided by RDC.

Assessment of local-level mining regulatory structure, capacity, and resources

The MMMD highlighted its ongoing restructuring exercise, which has decentralized and restructured the five mining districts to administrative provincial boundaries. Each provincial office is headed by a provincial mining director.

In KIIs, the MMMD raised concerns about staff skills and experience and about staff turnover, which the MMMD is trying to address amid limited resources. "At the moment we are highly compromised on staff. We have been given a go-ahead to recruit now, and we have taken technical skilled staff such as engineers, but because of low salaries, we couldn't manage to get staff with experience. Therefore, most new recruits are recent graduates." The World Bank has been working with MMMD at a high level to reform the ministry.

Miners pointed to the lack of resources that limits government's involvement on the ground in ASM. Understanding artisanal miners' needs was also seen as a capacity gap within government, and a key informant reported, "As much as they may want to support, they may end up doing a shoddy job, because they are not clear on the needs of the people engaged in SSM." A tribute holder noted: "Those who work in Fidelity and all those who occupy high positions in the MMMD are non-miners and will never be miners in their lives, yet they are controlling the mining sector." In addition, miners felt that their voices were not heard within government, and this soured their relationship with it. One miner said, "Government sees our ideas as valueless, because we do not talk the same language. This will always affect the mining sector."

Segregation of duties and clearly defined mandates of different government bodies were noted to be a capacity gap. As noted by a key informant from an NGO, "The bureaucracy makes it difficult for the government to provide proper regulation and monitoring, because so many people with overlapping mandates seem to be involved." Millers observed that according to the laws of Zimbabwe, the MMMD is the only government agency that can close down mines and milling sites, but that this is also sometimes done by the EMA and CID Minerals; millers are confused about mandates, roles, and responsibilities.

Unclear Ministerial Mandates

Mandates from the government are unclear to the respondents. In the words of one miller during a FGD, "The government is fighting itself. We try to increase production and try to help the government, but we spend most of our time just talking to agents. The MHCW now wants US$500 from us every month, and we wonder where they think we get all this money. They came from nowhere, and we were shocked when they left the invoice. There is no relevant statutory instrument. They just said, 'You use mercury and it is affecting the environment.' I replied that was the duty of EMA to deal with environmental damage."

Notes

1 **Mads** Haahr, "Random Sequence Generator," Random.org, 1998–2015, www.random.org/sequences.

2 **Mobenzi** [home page], 2005–2015, www.mobenzi.com.

3 **Larry** B. Christensen, R. Burke Johnson, and Lisa A. Turner, Research Methods, Design, and Analysis, 12th ed. (Boston: Pearson Education, 2014), http://www.pearsonhighered.com/assets/hip/us/hip_us_pearsonhighered/preface/0205944566.pdf.

4 **John** W. Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 3rd ed. (Los Angeles: Sage Publications, Inc., 2009).

5 **Office** of the Secretary, the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research (Washington, DC: US Department of Health & Human Services, April 18, 1979), http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html.

6 **Zimbabwe** National Statistics Agency, 2011 Labour Force Survey (Harare: ZimStat, 2011), http://www.zimstat.co.zw/dmdocuments/Laborforce.pdf.

7 **These** responses were to the question, "What type of gold mining activities occur in this area?" There were more than seven response options, and respondents were permitted more than one response. Thus, the figures do not add up to 100 percent.

8 **The** scoping study classified skill levels as unskilled, semiskilled, and skilled. This classification is based on how long it takes to learn to perform required tasks and the qualities and characteristics of the specific job. Unskilled work requires little or no judgment to perform simple tasks and can usually be learned in less than a month. Unskilled work often requires strength, but not always. Semiskilled work requires some skills but doesn't include complex job functions. Semiskilled work usually requires the ability to remain alert and pay attention to detail and/or protect against risks. It usually takes between three and six months to learn a semiskilled job. Skilled work requires specific qualifications, the use of judgment, and knowing how to perform mechanical or manual tasks to create a product or material (or provide a service). Skilled work may also include reading specifications, measuring, estimating, and making calculations. Skilled work can include jobs that require a person to work closely with others or with figures, facts, or ideas that require complex, abstract, or critical thinking. It takes at least six months and often many years to train for and learn a skilled job.

9 **2004** estimate.

10 **A** recycling plant for gold and other metals.

11 **On** the day of the interview, US$10,000 would buy 351 grams of gold.

12 **Jennifer** J. Hinton and Marcello M. Veiga and Christian Beinhoff, "Women and Artisanal Mining: Gender Roles and the Road Ahead," in The Socio-Economic Impacts of Artisanal and Small-Scale Mining in Developing Countries, ed. by Gavin Hilson (Lisse, The Netherlands: Swets & Zeitlinger, B.V., Publishers, 2003), http://siteresources.worldbank.org/INTOGMC/Resources/336099-1163605893612/hintonrolereview.pdf.

13 **Karen** Hayes, Artisanal and Small-Scale Mining and Livelihoods in Africa (Amsterdam: Common Fund for Commodities, 2008).

14 **Thomas** Akabzaa and Abdulai Darimani, Impact of Mining Sector Investment in Ghana: A Study of the Tarkwa Mining Region, Draft Report (Washington, DC: IFC Asset Management Company, January 20, 2001), https://www.ifcamc.org/userfiles/files/1466_file_Impact_20of_20Mining_20Sector_20Investment_20in_20Ghana.pdf.

15 **Blasius** Susapu and Geoff Crispin, Report on Small-Scale Mining in Papua New Guinea, Mining Minerals and Sustainable Development Working Paper No. 81 (London: International Institute for Environment and Development, IIED, 2002), http://pubs.iied.org/G00733.html?k=susapu.

16 **USAID,** "Mining for Gold in Siguiri: A Close Look at a High-Risk Population. Report on Guinea," USAID Health, December 26, 2000, http://web.archive.org/web/20070216164514/http://www.usaid.gov/gn/health/news/001226_mines/index.htm.

17 **Bernd** Drechsler, Small-Scale Mining and Sustainable Development.

18 **Kuntala** Lahiri-Dutt, presentation at 8th Annual CASM Meeting in Brasilia, Brazil, 2008.

19 **Karen** Hayes, Artisanal and Small-Scale Mining and Livelihoods.

20 **Kuntala** Lahiri-Dutt, "Women and ASM—Issues and Priorities," presentation at 4th Communities and Small-Scale Mining (CASM) Annual General Meeting, Colombo, Sri Lanka. October 12–16, 2004.

21 **USAID,** "Mining for Gold in Suiguiri."

22 **Ministry** of Women Affairs, Gender and Community Development Statement, 2015.

23 **Hannah** Hahn, Karen Hayes, and Azra Kacapor, Breaking the Chain: Ending the Supply of Child-Mined Minerals (Washington, DC: Pact; 2013), http://www.pactworld.org/sites/default/files/PACT%20Child%20Labor%20Report%20English%202013.pdf.

24 **Child** labor is defined by the International Labour Organization as work that is harmful to children's physical and mental development and interferes with their schooling.

25 **Hannah** Hahn, Karen Hayes, and Azra Kacapor, Breaking the Chain.

26 **Human** Rights Watch, Toxic Tail: Child Labor and Mercury Exposure in Tanzania's Small-Scale Gold Mines (Washington, DC: Human Rights Watch, 2013), http://www.hrw.org/reports/2013/08/28/toxic-toil-0.

27 **Karen** Hayes, Artisanal and Small-Scale Mining and Livelihoods.

28 **Verisk** Analytics, "New Products and Analysis: Climate Change Will Push More Children Into Work," Verisk Maplecroft [Web site], n.d., http://maplecroft.com/about/news/child-labour-index.html.

29 **Karen** Hayes, Artisanal and Small-Scale Mining and Livelihoods.

30 **International** Programme on the Elimination of Child Labour, Child Labour in Gold Mining: The Problem (Geneva: International Labour Organization, 2006), http://webcache.googleusercontent.com/search?q=cache:RGRDZilt7oUJ:www.ilo.org/ipecinfo/product/download.do%3Ftype%3Ddocument%26id%3D4146+&cd=1&hl=en&ct=clnk&gl=us.

31 **Karen** Hayes, Artisanal and Small-Scale Mining and Livelihoods.

32 **Human** Rights Watch, Toxic Tail.

33 **Ibid.**

34 **Geraldo** Valoi, Artisanal Mining Baseline Survey–Murrupula (Maputo: Open File of the National Directorate of Mines, 2000).

35 **Zimbabwe** National Statistics Agency, 2011 Labour Force Survey, 2011, http://www.zimstat.co.zw/dmdocuments/Laborforce.pdf. The study noted that the rate was "higher in rural that in urban areas." It was discovered that 34 percent of these activities are in agriculture, forestry and fishing.

36 **FinMarkTrust,** FinScope Consumer Survey Zimbabwe 2011, http://www.zimstat.co.zw/dmdocuments/Finance/FinScope.pdf.

37 **Once** again, an independent t-test with no equal variance assumed was performed to determine statistically if sex of respondent or type of respondent had an effect on monthly savings. The results showed a statistically significant difference in all cases—that is, miners (M = 1.26, SD = 0.56) and s (M = 1.13, SD = 0.43) conditions t (3.08) = 613.919, p = 0.02, as well as men (M = 1.23, SD = 0.56) and women (M = 1.12, SD = 0.37), conditions; t (2.95) = 493.920, p = 0.03.

38 **An** independent t-test with no equal variance assumed, showed a statistically significant difference in monthly expenditure in medical care for miners (M = 1.02, SD = 0.15) and non-miners (M = 1.00, SD = 0.06) conditions; t (2.18) = 483.724, p = 0.03. A statistically significant difference was also shown for monthly expenditures for medical care for men (M = 1.02, SD = 0.14) and women (M = 1.00, SD = 0.00) conditions t (3.03) = 435, p = 0.003. This means the sex of respondent and type of respondent did have effect on monthly medical expenses.

39 **International** Food Policy Research Institute, "Our Work: Global Hunger Index" (2014), http://www.ifpri.org/book-8018/ourwork/researcharea/global-hunger-index.

40 **An** independent t-test with no equal variance assumed was conducted to compare food security in mining and nonmining households. The results showed a statistically significant difference for mining households (M = 2.69, SD = 0.69) and nonmining households (M = 2.81, SD = 0.54) conditions; t (-2.41) = 625.83, p = 0.016. No significant difference was observed when the same was compared by sex of respondent.

41 **Thomas** Hentschel, Felix Hruschka, and Michael Priester, Artisanal and Small-Scale Mining.

42 **Ibid.**

43 **M.** Bhagyalakshmi , "Women Mineworkers in Bellary District: A Case Study of the Vulnerable Groups of Mineworkers in Southwest India," in Artisanal and Small-Scale Mining in Asia-Pacific Case Study Series, no. 14. (2007), http://asmasiapacific.org/wp-content/uploads/2014/07/ASMAP-CS14_Bellary.pdf.

44 **Jinky** Leilanie Lu, "Occupational Health and Safety in Small-Scale Mining: Focus on Women Miners," Journal of International Women's Studies, 13, no. 3 (2012), 103–113, http://vc.bridgew.edu/jiws/vol13/iss3/7.

45 **Thomas** Hentschel, Felix Hruschka, and Michael Priester, Artisanal and Small-Scale Mining.

46 **Jinky** Leilanie Lu, "Occupational Health and Safety."

47 **Mines** & Geosciences Bureau, Mining Industry Statistics (Manila: Republic of the Philippines, Department of Environment & Natural Resources, 2015), http://www.mgb.gov.ph/Files/Statistics/MineralIndustryStatistics.pdf.

48 **T.C.** Greece, "Social, Economic and Environmental Impacts of Gold Mining in Halkidiki" (n.p., 2012), https://soshalkidiki.files.wordpress.com/2012/11/impacts-of-gold-mining.pdf.

49 **S.** L. Chakravorty, Artisanal and Small-Scale Mining in India: Mining, Minerals and Sustainable Development (London: International Institute for Environment and Development, 2001), http://www.hsph.harvard.edu/mining/files/Chakravorty_on_India.pdf.

50 **Jinky** Leilanie Lu, "Occupational Health and Safety.."

51 **Stephanie** Porter, Mallory Phipps, Jake Muller, Caitlin Nortosn, and Nick Peterson, "The Impacts of Gold Mining in Africa" (last modified April 2010), http://web1.cnre.vt.edu/lsg/GEOG3104S10Web/Group6/Nick/Zimbabwe.html.

52 **UNICEF** estimates that Zimbabwe has an HIV prevalence of 13.7 percent.

53 **Miniature** James tables are small shaking tables used in concentrating gold ore.

54 **Oliver** Joseph Maponga and Anderson Mutemererwa, Management of Natural Resources, 1995.

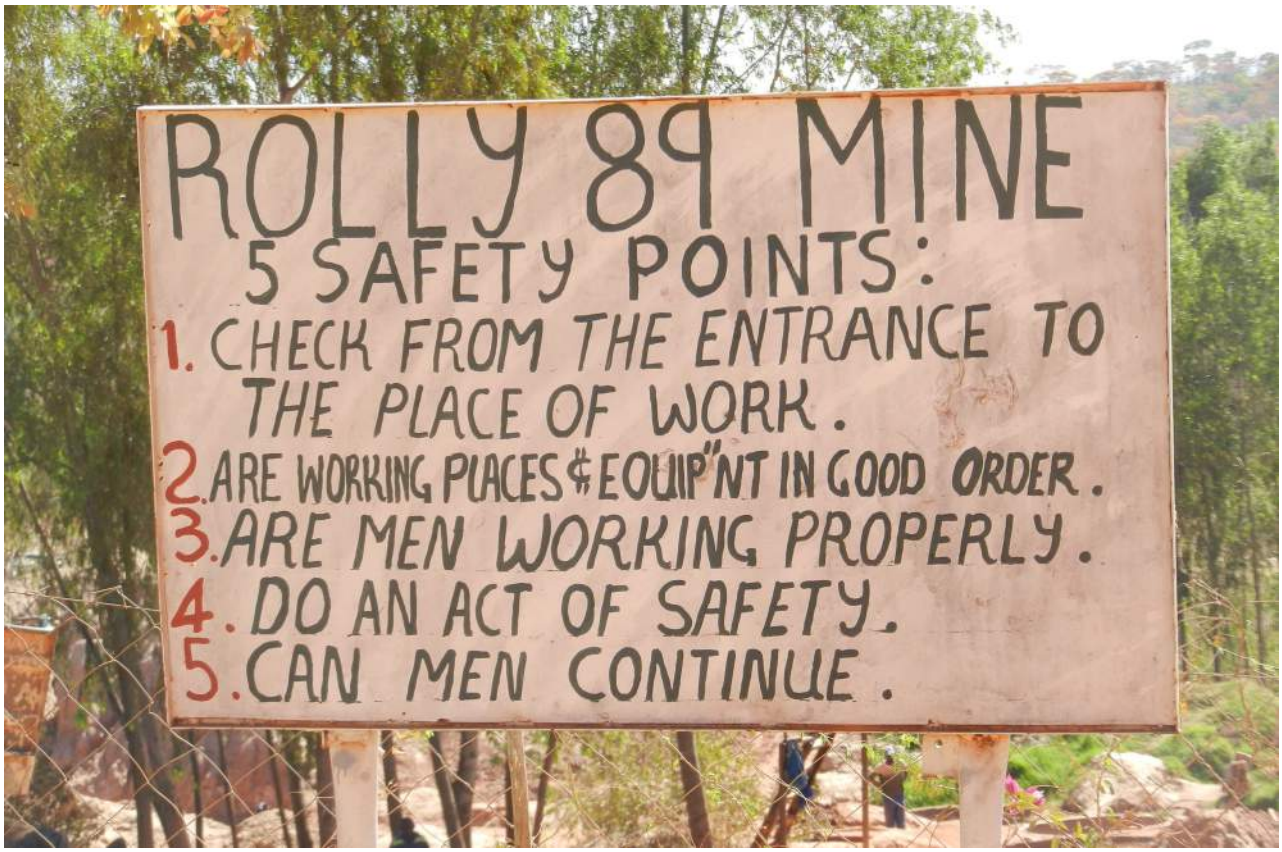
55 **Less** than 30 meters (98.4 feet).

56 **Oliver** Joseph Maponga and Anderson Mutemererwa, Management of Natural Resources, 1995.

57 **Ian** Phimister, "A History of Mining in Southern Rhodesia to 1953," 1975.

58 **Charles** W. Schmidt, "Quicksilver and Gold: Mercury Pollution from Artisanal and Small-Scale Gold Mining," Environmental Health Perspectives 120, no. 11 (2012): a424–a429, doi: 10.1289/ehp.120-a424, PMCID: PMC3556620.

59 **Intermediate** Technology Development Group (ITDG), Insiza Mining District Study, 1998.



chapter 5

Discussion

Opportunities for Interventions to Formalize Production of and Trade in ASM-Produced Gold

To identify opportunities for interventions to formalize artisanal and small-scale gold mining and trading, Pact's scoping study gathered recommendations from miners, millers, and other key stakeholders during FGDs and KIIs.

Opportunities within the Government

It was noted earlier that the Government of Zimbabwe is undertaking reforms to improve ASM. The MMMD has acknowledged that these reforms should start with the MMA. A ministry official commented during discussions, "The act is still being revised. It was enacted in 1960s, and it cuts across whether you produce 1 ton per year or 10 grams per year. The small-scale miners are saying it was not tailor-made for the small-scale sector. That, I think, is something that has been noted." The MMMD also reported that the government has formed a Mining Commission Company, an exploration company that is still in its infancy.

The MMMD also hinted at the potential benefits of supporting the improvement and formalization of ASM to Zimbabwe's global position as gold producer, noting: "We are aware that we are no longer on the London Bullion Market Association because of what they call 'production capacity.' We are also aware that although small-scale miners might be producing in small quantities, they are big in number and—once we make use of those numbers—we anticipate we can once again achieve the standards of the LBMA."

Opportunities within the Mining Sector

There is already recognition among miners that nomadic gold panning makes certain places unsafe to work; and that to solve this, people must be registered and formalized, and the appropriate government services must exercise their mandated authority.

A sponsor in Kadoma noted the industry development patterns from informal to formal mining. He identified a key role played by the informal mining sector as a training ground for beginners. "Personally," he said, "I got experience from the informal side, and now I am on the formal side." In addition, formalization was seen as the only way to grow mining business beyond ASM. That said, in FGDs, some miners noted that they did not necessarily want to grow. "If you are a small-scale miner, it is better to remain nonformalized," one said.

Incentivizing Formalization

One way of incentivizing formalization was said to have the potential to create a win-win situation, one where people could be given access to equipment and could then pay later. Another path to formalization would be via rewards for innovations and good practices—for example, like the miner in Filabusi, who took a gear box from a Peugeot 405 and connected it to a head gear to form a lever for pulling ore and rubble from shafts. ZASMC has begun supporting miners with awards to recognize artisanal miners who have been able to comply with government policies.

The MMMD reported having received suggestions from artisanal and small-scale miners who would like to come to agreement with the ministry to be allowed to register their mines and pay relevant fees later. This same model of operation has been used successfully by many millers, who provide transport and milling services for miners and receive payment when the gold produced is sold.

Banks were seen as influential in determining artisanal miners' access to capital and were urged to think creatively of a means to guarantee loans that miners could afford—for example, by accepting mining equipment as collateral for loans. It was noted that banks could also use FPR to verify artisanal miners' books (based on the sales that artisanal miners submit to FPR). These sales records would give the banks an indication of a miner's productivity as assurance of return on investment.

Tribute holding was also noted as a means to incentivize formalization. Many claim owners had not been able to exploit or mine the land allocated to them for a number of years, while on the other hand, many miners were conducting illegal mining because they could not afford to own claims legally. Bringing these two stakeholder groups into some form of agreement that would provide them with mutual and equitable benefits would enable miners to conduct their activities and sell their gold to FPR. Such an arrangement would mean fewer invasions of mining areas by ASM and fewer conflicts between claim owners and illegal miners.

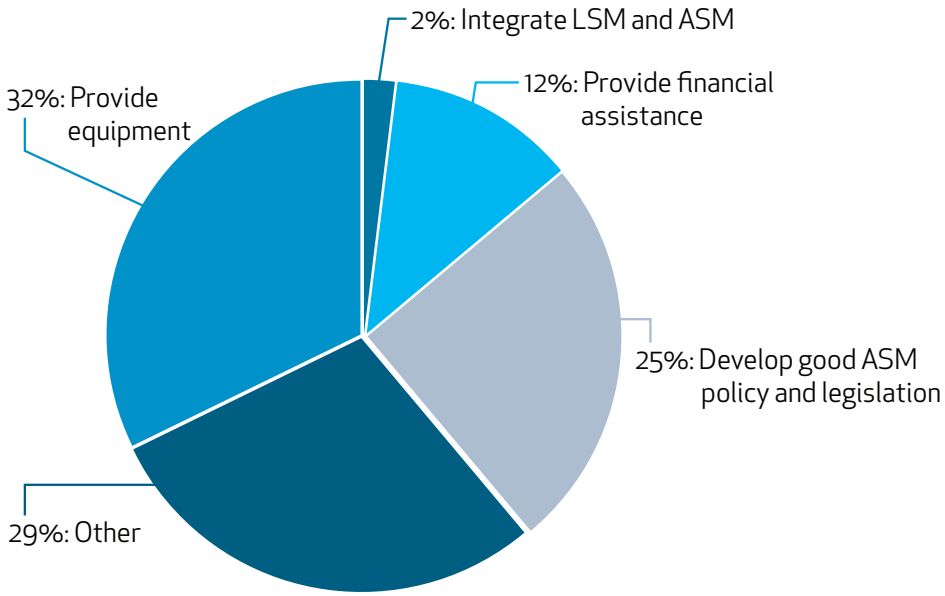
Needs for Successful Formalization

To assess the priorities to support formalization, the Pact scoping study questionnaires included indicators of key recommendations from miners and millers. This indicator aimed to understand what is most important to those who will be the primary beneficiaries of reform. The data revealed that 32 percent of respondents wanted the government to prioritize provision of equipment and mechanization of ASM. Almost 50 percent of millers wanted to see a good ASM policy and legislation (Figure 54).

There was general recognition of the need for a comprehensive policy framework that speaks to artisanal mining, acknowledging it as a formal sector and providing for the protection, regulation, and promotion of ASM miners, processors, and traders.

The government was urged to produce summary versions of the relevant laws and policies in a format that could be

Figure 54: Most important recommendations for policy reforms.



understood by the miners (i.e., with simplified and popularized versions). These summaries should cover the Environmental Management Act, the RDC Act, the ZINWA Act, the MMA, and the Finance Act. It was noted that the police sometimes used these acts when arresting people and miners, not understanding the acts' provisions, were unaware of their rights and thus at a disadvantage.

A nationwide exploration is needed to determine the locations of mineral deposits. Such a survey will simplify the issuing of claims and will increase banks' confidence in investing in loans to registered artisanal and small-scale miners.

Reducing fees will allow more miners to formalize their operations. The government should also consider mechanisms whereby the public or private sector could provide loans at reasonable interest and with government guarantees, along with other financial services, to facilitate miners' access to capital—essential to formalization. The government should also review the tax system with a view to not only regulating but also incentivizing ASM formalization.

In addition, the government should assess artisanal miners' capacities and provide assistance to fill gaps and address their needs, including the need for technical support, rather than focusing solely on law enforcement. Education and empowerment are important. The government should facilitate training to capacitate miners to formalize and acquire the skills they need to mine effectively and efficiently as well as the knowledge about mining equipment use and even where to access loans and mining capital. Information centers disseminating key information about the importance and benefits of formalization would be helpful.

Finally, the idea was advanced that LSM should be licensed to buy gold from ASM and that promoting tribute mining could reduce conflicts between LSM and ASM.

Challenges, Opportunities, and Potential Road Blocks Facing Any ASM-Formalization Pilot Program

The Pact scoping study sought to understand the challenges, opportunities, and prerequisites for a potential successful pilot program for formalization of artisanal and small-scale mining and trading. To address this objective, FGDs and KIIs were planned with the aim of gaining an in-depth understanding of issues that influence and affect the gold mining and trading sector and how

these might be addressed within the context of a pilot intervention.

Challenges to a Future Pilot Program and Key Roadblocks

Lack of surveys to ascertain mineral deposits: This was seen as a major challenge by the MMMD, who reported, "We can hardly say with confidence what minerals are available where. The miner might just come and say, 'I dreamed of a ton of gold there,' and you just say 'Go ahead and peg the area.'" This uncertainty has made the mining business a risky investment for all: both the sponsor and miller are carrying a risk, and if nothing comes out of the ground, the cost of operations is not recouped.

> *Lack of security: Artisanal miners sell gold to informal traders partly because of the risk of holding onto gold for protracted periods of time. "Gold is dangerous—you can be killed for 10 grams and its equivalent, maybe $350," said one miller. A tribute holder in Kadoma emphasized the security issues, "Gold is a pull factor. A lot of people come in search of gold. There is a lot of gold here, and it's leading to overpopulation. When the number of people in a certain area increases, crimes start to occur, as well as prostitution and environmental degradation."*

- **Lack of working tools:** Miners explained that this was always a challenge. Reported one tribute holder, "Mining is about breaking rocks, and we use explosives, water pumps, and compressors. So there are a lot of expenses that miners are incurring. It is expensive to produce a gram of gold and, at the same time, the price of the gold is going down. The government needs to chip in and help us with compressors and other mining equipment."
- **Informal payments demanded from miners and millers by government officials:** These make business difficult. Millers complained about being asked for US$20 by police at every roadblock when transporting ore, and the same time having to deal with EMA and RDC charges. Ultimately all costs are borne by the artisanal miners, as one miller reported: "At the end of the day, the charges imposed on us end up on the small-scale miner working underground, because—whatever they are taking off us we just pass on and take it off our payments to the miners."
- **Inadequate government support for artisanal and small-scale miners:** Frequent arrests and harassments have been a problem. A ZASMC member related, "The government does not fully support artisanal and small-scale miners. If you look on television, there is a program called 'Talking Farming.' But we have never heard of any program that talks about mining, and the government needs to look at that."
- **Access to basic services:** Finding these around the mining sites is a challenge. Women miners in Shurugwi reported the mining area had no clinic. Many millers complained that interruptions in the supply of electricity from ZESA, up to 50 percent of the time, limited operations to 50 percent capacity or less. They said they spent huge sums generating power or had to install private lines, at great cost, with ZESA demanding they pay for poles and cabling, which makes for escalating installation costs.
- **High and inequitable license fees for mining and milling:** Both miners and millers complained about high government fees charged to obtain a claim, a milling license, a hazardous chemicals or explosives handling permit, an EIA, or the like. Millers reported paying US$8,000 for a milling license and US$5,000 for a claim and explosives license. One miller, comparing his business and that of another miller, noted during a FGD, "He has 18 stamp mills now, and he pays US$8,000 per year and on my own property, I have three stamp mills—but I pay the same US$8,000 per year. For him, it's not as expensive as for me."
- **The challenge of environmental destruction:** This has been an issue wherever mercury and other chemicals were used, and these practices may result in serious health issues in the future. "Mercury is the biggest problem waiting to happen," said one respondent. "Most people don't have knowledge, and there are potential risks of mercury poisoning and water pollution. Probably in 30 years' time,

children will be deformed because of chemicals."

- **Bureaucracy in Fidelity Printers and Refinery is a challenge:** "At my office," said one frustrated miller in a FGD, "it takes us all 2 minutes to conduct the specific gravity test, fill out the log book, let the police fill out their log, and let Fidelity fill out its log book. After which we drive to Fidelity and spend 40 minutes to an hour and half waiting for them to do the same thing. How long does it take them conduct the specific gravity test ESG on a piece of gold? Because it goes through 20 hands before it comes back, that's the thing. It's ridiculous."
- **Corruption:** This challenge was reported to be a source of conflicts among miners. A mining sponsor reported, for example, "If you sell too much tonnage to Fidelity, you find that your mine will get occupied by many government officials. Police, CID, ZIMRA, and the army—they all also want a share." Millers added that the role of the state was generating income and that government officials were using their positions to generate revenue.

Opportunities for a Future Pilot Program

Obtaining money to pay fees and cover costs of inputs has long been a challenge to miners. The lack of funding has been a key deterrent to ASM formalization. Any pilot program that devises a way to provide this essential missing ingredient will have taken a significant step toward success.

Any future pilot program could get a jump start on success by tackling the handful of challenges that face miners in their work:

Commented an official from FPR, "Loans are there, but to access them you have to satisfy certain conditions. And you have to have a clear track record. It makes it difficult. I think those who have a track record and are not afraid of interest rates would get such loans from banks."

Nonetheless, miners do face limited access to formal financial services. Sponsors were advanced as one possible solution. They were reported to be a key source of capital for artisanal and small-scale miners, providing the necessary mining inputs (e.g., explosives and machinery as well as food for the miners for the period of mining) and taking their share of profits only after the gold had been recovered and operational costs deducted. It was recommended that pilot interventions explore access to financial services as a key factor in formalization as well as looking at how the current informal sponsorship system could be motivated to enter the formal economy.

Another option would be the MMMD mining development fund. Said a representative, "We have what we call a mining industry loan fund, a vehicle created to assist small-scale miners, where it provides funds, equipment, technical assistance, advice, and things like that." The ministry noted some shortcomings of the fund, including limited resources compared to the needs and dependency of services on funds availability. In 2012, for example, the fund gave out 60 compressors to artisanal miners nationwide. However, there was a very high nonrepayment rate (99 percent of loan recipients had not yet repaid their loans), and because the goal had been to create a revolving fund to help other miners across the country, the lack of repayment became a serious impediment to the program's survival. ZASMC associated the failure to recover the loans to lack of involvement of miners' associations. A future pilot intervention might further use evidence-based methods to incentivize loan repayment and appropriate financial mechanisms among miners.

Low gold recovery in processing plants due to poor technology was reported as another major challenge facing miners and millers. Said one miller in Kwekwe, "With the type of milling we are using, which is not so efficient, I estimate they probably recover maybe up to 40 percent of the gold, which would leave 60 percent. Sometimes in custom milling, the sands that are left are reprocessed using vat leaching. Maybe only about 50 percent of what remains is recovered and sent to Fidelity. It's an inefficient way of recovering gold." A future pilot intervention that provided technical assistance on the use of appropriate technologies

would give miners a chance to experience firsthand the advantages of improved technology and thus pave the way for a change into more efficient gold-recovery technologies. However, such an intervention must be coupled to incentives for channeling gold into the formal market—otherwise the assistance merely increases product flow into the illegal market.

Gold pricing for licensed buyers (i.e., millers) was noted as a challenge; millers felt there was no incentive for them to buy on behalf of FPR. "You know, Fidelity wants me to buy gold at my elution plant, but they won't give you any benefit. You work hard to go borrow money in town and pay 4 or 5 percent interest a month. Then you have the cost of providing security. No one is footing those bills for you. Fidelity thinks you should be buying gold for half the percent," a miller explained during a FGD. Incentivizing registered gold buyers might diversify gold trading to include availability of weekend gold markets, whose absence, miners have pointed out, is among the shortcomings of the existing gold trading system.

chapter 6

Recommendations for Pilot Intervention

Based on the findings of the scoping study, in order to formalize ASM gold mining and trading the following interventions have been recommended for future programming (funding permitting):

The interventions fall under three themes which respond to the needs identified in the scoping study. Within each theme, specific project components have been identified and elaborated. The components are inter-related and mutually reinforcing, sharing cross cutting approaches and issues which are pertinent to all. The themes and components are stated below:

- Theme 1: Business and Economic Development
- Component 1: ASM-LSM Collaboration
- Component 2: ASM Services
- Theme 2: Environment, Health and Gender
- Component 3: Mercury Abatement
- Component 4: Women in Mining
- Theme 3: Policy
- Component 5: Policy and Learning

Theme 1: Business and Economic Development

Component 1: ASM–LSM Collaboration

This component addresses the issue of integration between ASM and LSM to form one mining industry, which COMZ has championed. LSM will allocate to ASM ore bodies of a scale that is uneconomical for industrial extraction but suitable for smaller-scale exploitation. The project intends to provide an environment conducive to accessing claims that are in the long-term plans of LSM on tribute agreements. Relationships will be established on a business/contractual basis with a plan for mutual profitability and with minimum standards set in terms of operational, safety, and environmental parameters.

This component will contribute to the formalization and professionalization of ASM and to improved operational efficiency and skills transfer. ASM will benefit from the extension of services by LSM, which may include:

- Technical information in the form of exploration or geological information and mining methods.
    - Technical support from LSM staff, including geologists, surveyors, OSH experts, maintenance engineers, and others.
    - Access to processing facilities, such as milling services.
    - Equipment use, leasing, or transfer.
    - Environmental management and health and safety skills.

The ASMs will also benefit from other support: training on legal issues and business skills, and support for access to finance. Targets will be set for inclusion of women in these activities and issues such as security for women, appropriate site facilities, and promotion of business opportunities will be included. The component will depend heavily on facilitation of dialogue and mutual agreement, rebuilding of trust in the sector, and contributing to policy dialogue by providing concrete examples of hurdles faced and success that can be achieved in an appropriate enabling environment.

Component 2: ASM Services

This component is aimed at transforming the fractured relationship that currently exists between millers and ASM into one that is mutually beneficial and based on provision of services. This component will pilot ways in which services can be delivered to artisanal and small-scale miners as part of their formalization and integration into the mining sector. The project will seek to transform selected mills into service centers where more efficient, environmentally sensitive milling takes place and where miners' gold recovery is improved. This project component builds on the successes achieved by other projects in ASM service centers but will avoid their pitfalls.

The project has a philosophy of inclusion, and rather than cutting out informal actors, seeks to integrate them into the formal sector by providing positive incentives for participation in legal structures and channels. This is essential to avoid a "spoiling" of the project by disenfranchised actors finding vested interests threatened. The services to be provided at each center will be determined on the basis of existing facilities, demand, and a site-specific business plan that demonstrates the center's profitability. The centers will be developed as extensions of existing, viable businesses. They will not require building new infrastructure and access. Continued maintenance and future growth will be part of the normal business operations. Using existing mills will enable ongoing relationships to be improved and formalized and delivers a message that the project seeks to support and strengthen the sector in partnership, rather than parachuting in solutions and partners from

outside.

The range of services to be provided at each site will vary but may include:

- **Transport:** Provision of transport to haul ore from the mines to the mill could be a direct service of the mill owner or contracted to a local transporter to build local business.
- **Equipment:** Equipment provided for hire by miners could include compressors and drilling and blasting equipment. Again, this could be a direct service of the mill owner, or the center could become a distribution point for another existing business, which would benefit from being closer to its clients.
- **Maintenance:** Provision of equipment maintenance expertise and facilities (e.g., workshops) could be a component.
- **Supplies:** Provision of a central stores facility could give miners easy access to consumables such as explosives, picks, shovels, and safety clothing.
- **Extension services and training:** Provision of technical services in areas such as geology, survey, mining, and environmental management could involve government and other partners (e.g., the School of Mines); the activity would benefit the miller by drawing more clients to the mill.
- **Training on mercury reduction:** This, plus access to appropriate techniques and technology for mercury reduction would be helpful.
- **Miner training in financial and business management:** This should be coupled with orientation on access to finance and markets.
- **Improved milling services:** The goal would be to increase gold recovery for the customer.
- **Gold assay and incentivized gold sales:** The hope would be to channel gold into the legal trade channel.

A range of policy and practical challenges will be faced in this component, and the experiences of finding solutions to genuine difficulties will feed directly into the project's component on policy and learning.

As with the ASM-LSM component, targets will be set for inclusion of women. The MoWAGCD and the MMMD are working to resuscitate women's ASM service centers, and MoWAGCD has, to date, held four mining capacity building workshops to facilitate the transformation of women miners' businesses from informal to formal. The interventions will seek to build on these activities.

Theme 2: Environment, Health, and Gender

Component 3: Mercury Abatement

According to the Artisanal Gold Council (AGC), ASM contributes 400 tonnes of gold from 70-plus countries, accounting for approximately 15 percent of annual gold production globally (as of September 2012), valued at USD$20 billion. In order to recover this gold, ASM primarily uses mercury, which—although efficient in amalgamating gold—is hazardous to the miners and negatively affects local biodiversity and/or the environment. In the scoping study, Pact found that the use of mercury in ASM in Zimbabwe is widespread, profligate, and inefficient, with major release into the environment.

The upcoming ratification of the Minamata Convention on Mercury, which proposes significant reduction in the use of mercury by 2020, poses both threats and opportunities. Artisanal and small-scale miners have expressed concern that the proposed reduction in mercury availability will undermine the viability of the sector. Certainly, decisions such as to ban mercury must be made after careful consideration, lest the impact on ASM be severe and drive miners into illegal activities, at the mercy of the informal market, with reduced returns, and potential exposure to mercury used clandestinely, with dramatically increased risks to health. Zimbabwe's participation in the Minamata process requires a comprehensive, inclusive national action plan if it is to be successful.

Component 4: Women in Mining

The ASM sector creates important opportunities for impoverished women to find nonagricultural alternative employment. Women frequently turn to ASM for supplementary income, often seasonally, and their presence around the mines may thus be less visible, such that they may be excluded from official estimates; as a result, the number of women in the mines may be even higher than recorded. Literature indicates that women may constitute up to half the ASM workforce in Africa, although the proportion of women in ASM varies from country to country. The proportion of ASM miners in Zimbabwe who are women is unknown.

Women carry out a full range of activities within ASM, at mining sites, in mineral trade, and in the provision of support services. At the mining sites, women dig, crush and pound rocks, wash and sort material, carry out processing such as amalgamation of gold, and transport materials. Women also provide services to mining areas, including catering, sales of goods, and sex work.

Although some women occupy powerful positions in ASM as millers, mine owners, or gold traders, most women occupy a distinctly marginal role in the management of SSM operations. They are rarely identified as miners in their own right and only sporadically attain the same decision-making positions as their male counterparts. The scoping survey revealed that there is a clear difference in the opinions of men and women on the issue of women in mining. Sixty-three percent of women in Kadoma and 47 percent of women in Shurugwi reported that women's role in mining is essential, compared to 25 and 23 percent of men in those areas, respectively.

Women in ASM suffer different forms of discrimination. In Zimbabwe, women are more likely to operate on unregistered land or informal operations (35 percent) than men. Economically, women are often required to surrender higher -value products than men. Moreover, women often do not receive financial rewards equal to men and tend to have greater difficulties accessing capital to purchase equipment. Women also suffer from culture-based discrimination, face security risks, and must cope with lack of segregated sanitation facilities.

Although this project will integrate gender issues into all project components, the needs relating to the integration of women into the mining sector are such that gender warrants a specific component to ensure that sufficient resources and attention are dedicated to bringing about discernible change.

Theme 3: Policy

Component 5: Policy and Learning

ASM is a highly mobile, adaptable, opportunistic, and dynamic sector, within which actors and context are constantly evolving. This is particularly the case because the sector remains informal and obscured from official view. The creation of a regulatory framework within which legal ASM can flourish and deliver benefits to the economy is a key requirement for formalization to be successful. Such a regulatory framework can come about only through comprehensive engagement of stakeholders intimately involved in the sector, who can articulate the constraints that limit participation, who can identify risks and opportunities, who have a genuine commitment to the success of the framework, and who have a forum in which their voice and input is heard and incorporated.

All the project components will deliver results that can influence policy, yet some will rely on adjustments to policy for success. The components will generate learning points and results that are essential to inform decision makers and to provide the evidence base for effective advocacy.

The context in which this project will be carried out will change over the life of the project. Indeed, the project is itself an agent of that change, and for that reason, the capacity for reflection and learning is critical for the project to be iterative.

References

Publications

African Union and Economic Commission for Africa. Economic Report on Africa 2009: Developing African Agriculture through Regional Value Chains. Addis Ababa, Ethiopia: United Nations Economic Commission for Africa, 2009. http://www.uneca.org/sites/default/files/publications/era2009_eng_full.pdf.

Aubynn, Anthony. "Sustainable Solution or a Marriage of Inconvenience? The Coexistence of Large-Scale Mining and Artisanal and Small-Scale Mining on the Abosso Goldfields Concession in Western Ghana." Resources Policy 34, no. 1–2 (2009): 64–70. http://www.sciencedirect.com/science/article/B6VBM-4V87DRP-1/2/22bb732028fd4ae4d65d1259c0fa1e9f.

Akabzaa, Thomas, and Abdulai Darimani. Impact of Mining Sector Investment in Ghana: A Study of the Tarkwa Mining Region (draft report). Washington, DC: IFC Asset Management Company, January 20, 2001. http://www.ifcamc.org/userfiles/files/1466_file_Impact_20of_20Mining_20Sector_20Investment_20in_20Ghana.pdf.

Bhagyalakshmi, M. "Women Mineworkers in Bellary District: A Case Study of the Vulnerable Groups of Mineworkers in Southwest India." In Artisanal and Small-Scale Mining in Asia-Pacific Case Study Series, no. 14. 2007. http://asmasiapacific.org/wp-content/uploads/2014/07/ASMAP-CS14_Bellary.pdf.

Brundtland, Gro Harlem. Our Common Future: Report of the World Commission on Environment and Development. Oslo: United Nations; 1987. http://www.un-documents.net/our-common-future.pdf.

Cartier [home page], http://www.cartier.com/maison/commitments/cartier-and-corporate-social-responsibility/resources-excellence/gold-12160

Christensen, Larry B., and R. Burke Johnson and Lisa A. Turner. Research Methods, Design, and Analysis. 12th ed. Boston: Pearson Education, 2014.

Communities and Small-Scale Mining (CASM), CommDev, International Council on Mining and Metals (ICMM). Working Together: How Large-Scale Mining Can Engage with Artisanal and Small-Scale Miner. CASM, CommDev, and ICMM: 2010. http://www.icmm.com/document/789.

Centre for Natural Resource Governance. An Analysis of Zimbabwe's Draft Minerals Policy. Harare; 2013.

Chakravorty, S. L. Artisanal and Small-Scale Mining in India: Mining, Minerals and Sustainable Development. London: International Institute for Environment and Development (IIED), 2001. http://www.hsph.harvard.edu/mining/files/Chakravorty_on_India.pdf.

Collins, Nina, and Lynda Lawson. Investigating Approaches to Working with Artisanal and Small-Scale Miners: A Compendium of Strategies and Reports from the Field. IM4DC Action Research Report. Brisbane: and International Mining for Development Centre and Centre for Social Responsibility in Mining, University of Queensland, 2014. http://im4dc.org/wp-content/uploads/2013/09/Collins-ASM-FR-Completed-Report.pdf.

Creswell, John W. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 3rd Edition. Los Angeles: Sage Publications, Inc., 2009.

Department of Environment and Natural Resources, Mines and Geosciences Bureau (DENR-MGB. Mining Industry Statistics. 2011. http://www.mgb.gov.ph/art.aspx?artid=775

Drechsler, Bernd. Small-Scale Mining and Sustainable Development within the SADC Region. London: MMSD; 2001.

Eurocantera [Web site], http://www.goldlake.co.uk/The_projects/Eurocantera.aspx

Erzurumlu, Sinan, and Marty Anderson and Assheton S. Stewart-Carter. Goldlake/Eurocantera Case Study, 2012. Wellesley, MA: Babson College: 2012. http://www.goldlake.it/public/Goldlake_EurocanteraUKCover.pdf.

García, Oseas, and Marcello M. Veiga, Paul Cordy, Osvaldo E. Suescún, Jorge Martin Molina, and Monika Roeser. "Artisanal Gold Mining in Antioquia, Colombia: A Successful Case of Mercury Reduction." Journal of Cleaner Production 90 (March 2015): 244–252. doi: 10.1016/j.jclepro.2014.11.032.

Garrett, Nicholas. A Corporate Strategy Approach Towards Sustainable ASM/LSM Co-existence. PowerPoint presentation at the Mining Investment Indaba, February 4, 2014. http://www.globaldialogue.info/IGF%20Regional%20Meeting%20-%20RCS%20A%20corporate%20strategy%20approach%20towards%20sustainable%20ASM%20LSM%20co-existence%20-%20Nicholas%20Garrett.pdf

Garrett, Nicholas. Artisanal Mining and Conflict Financing in Eastern Democratic Republic of Congo (DRC); Coping, Conflict, and Shadow Economy Actors and the Impact of the 'Conflict Minerals' Campaign. Berlin: Freie Universität Berlin, 2013. http://www.diss.fu-berlin.de/diss/servlets/MCRFileNodeServlet/FUDISS_derivate_000000014950/NicholasxGarrett_PhD_Master_Final_NoCV_18_03_2014.pdf?hosts=

Gilbert, Simon, Massaran Traoré, and Gavin Hilson. Facilitating Innovation in Artisanal Diamond Mining and Trading in Côte d'Ivoire: A Scoping Study. Washington, DC: USAID, 2015.

Goldlake Group. "The Projects: Eurocantera." Gubbio, Italy, n.d. http://www.goldlake.co.uk/The_projects/Eurocantera.aspx.

"Gold Panning along Public Streams Now Legal," The Insider, December 31, 1991, http://insiderzim.com/gold-panning-along-public-streams-now-legal/.

Gran Colombia Gold. "Artisanal Partnership Model." n.d. http://www.grancolombiagold.com/sustainability/Artisanal-Miner-Partnership-Model/default.aspx.

Gran Colombia Gold. "Golden Opportunity." 2014. http://grancolombiagold.com/files/Marmato%20info.jpg.

Gran Colombia Gold. "Production at a Glance." 2014. http://www.grancolombiagold.com/files/images/Visual-Capital.jpg.

Gran Colombia Gold. "Working Together" report. 2014. http://grancolombiagold.com/files/Working%20Together%20final.pdf.

Greece, T. C. Social, Economic and Environmental Impacts of Gold Mining in Halkidiki. n.p., 2012. https://soshalkidiki.files.wordpress.com/2012/11/impacts-of-gold-mining.pdf.

Grosse, Robert E. Drugs and Money: Laundering Latin America's Cocaine Dollars. Westport, CT: Praeger Publishers, 2001.

Haahr, Mads. "Random Sequence Generator." Random.org. 1998–2015. www.random.org/sequences.

Hahn, Hannah, Karen Hayes, and Azra Kacapor. Breaking the Chain: Ending the Supply of Child-Mined Minerals. Washington DC: Pact; 2013. http://www.pactworld.org/sites/default/files/PACT%20Child%20Labor%20Report%20English%202013.pdf.

Hayes, Karen. Artisanal and Small-Scale Mining and Livelihoods in Africa. Amsterdam: Common Fund for Commodities; 2008.

Hentschel, Thomas, Felix Hruschka, and Michael Priester. Artisanal and Small-Scale Mining: Challenges and Opportunities. London: International Institute for Environment and Development, 2003. http://afrim.org.ph/IDLS/files/original/94db37ffd394f7786a06f03b5ccf9c69.pdf

Hilson, Gavin. A Contextual Review of the Ghananian Small-Scale Mining Industry. London: Imperial College Centre for Environmental Technology, 2001. http://pubs.iied.org/pdfs/G00722.pdf.

Hilson, Gavin. "What Is Wrong with the Global Support Facility for Small-Scale Mining?" Progress in Development Studies 7 (2007): 235–249. doi: 10.1177/146499340700700304.

Hilson, Gavin, ed. The Socio-Economic Impacts of Artisanal and Small-Scale Mining in Developing Countries. Lisse, The Netherlands: Swets & Zeitlinger BV, 2003.

Hilson, Gavin. "'Constructing' Ethical Mineral Supply Chains in Sub-Saharan Africa: The Case of Malawian Fair Trade Rubies." Development and Change 45, no. 1 (2014), 53–78, doi: 10.1111/dech.12069.

Hinton, Jennifer J. Communities and Small-Scale Mining: An Integrated Review for Development Planning. Washington DC: World Bank, 2006. http://www.eisourcebook.org/cms/June%202013/CASM,%20an%20Integrated%20Review%20for%20Development%20Planning.pdf.

Hinton, Jennifer J., Marcello M. Veiga, and Christian Beinhoff. "Women and Artisanal Mining: Gender Roles and the Road Ahead." In The Socio-Economic Impacts of Artisanal and Small-Scale Mining in Developing Countries, ed. by Gavin Hilson. Lisse, The Netherlands: Swets & Zeitlinger, BV, 2003. http://siteresources.worldbank.org/INTOGMC/Resources/336099-1163605893612/hintonrolereview.pdf.

Hinton, Jennifer J., Marcello M. Veiga, and Christian Beinhoff. "Women, Mercury, and Artisanal Gold Mining: Risk Communication and Mitigation." Journal de Physique IV 107 (2003): 617–620. http://communitymining.org/attachments/242_Women,%20Mercury%20and%20Gold%20Mining%202003%20Hinton.pdf.

Hinton, Jennifer J., Marcello M. Veiga, and A. Tadeu C. Veiga. "Clean Artisanal Gold Mining: A Utopian Approach?" Journal of Cleaner Production 11, no. 2 (2003): 99–115. http://www.sciencedirect.com/science/article/pii/S0959652602000318.

Hoadley, M., and D. Limpitlaw. "The Artisanal and Small-Scale Mining Sector and Sustainable Livelihoods." Mintek Small-Scale Mining Conference, Nasrec, Johannesburg, September 9, 2004, Book of Proceedings: 1–9. http://womin.org.za/images/impact-of-extractive-industries/women-and-artisanal-mining/M%20Hoadley%20and%20D%20Limpitlaw%20-%20ASM%20and%20Sustainable%20Livelihoods.pdf.

Hollaway, John. "Lessons from Zimbabwe for Best Practice for Small- and Medium-Scale Mines." Minerals and Energy Raw Materials Report 15, no. 1 (2000):16–22. Doi: 10.1080/14041040009362547.

Human Rights Watch. Toxic Tail: Child Labor and Mercury Exposure in Tanzania's Small-Scale Gold Mines. Washington, DC: Human Rights Watch, 2013. http://www.hrw.org/reports/2013/08/28/toxic-toil-0.

International Programme on the Elimination of Child Labour. Child Labour in Gold Mining: The Problem. Geneva: International Labour Organization, 2006. http://webcache.googleusercontent.com/search?q=cache:RGRDZilt7oUJ:www.ilo.org/ipecinfo/product/download.do%3Ftype%3Ddocument%26id%3D4146+&cd=1&hl=en&ct=clnk&gl=us.

Intermediate Technology Development Group (ITDG). Insiza Mining District Study. 1998.

International Food Policy Research Institute. "Our Work: Global Hunger Index." 2014, http://www.ifpri.org/book-8018/ourwork/researcharea/global-hunger-index.

Jamasmie, Cecilia. "Colombian Gold CEO Involved in $970m Laundering Case Arrested," January 22, 2015. Mining.com. http://www.mining.com/colombian-gold-ceo-involved-in-970m-laundering-case-arrested-91852/.

Kambani, Stephens M. "Key Issues in Illegal Mining and Marketing in the Small-Scale Mining

Industry." In The Socio-Economic Impacts of Artisanal and Small-Scale Mining in Developing Countries, ed. Gavin Hilson. The Netherlands: Swets & Zeitlinger BV, 2006.

Kambani, Stephens M. "The Impact of Policy Changes on Small-Scale Mining in Zambia." In The Socio-Economic Impacts of Artisanal and Small-Scale Mining in Developing Countries, ed. Gavin Hilson. The Netherlands: Swets & Zeitlinger BV, 2006.

Labonne, Beatrice. "Small- and Medium-Scale Mining." Natural Resources Forum 18 (1994): 13–16. doi: 10.1111/j.1477-8947.1994.tb00868.x.

Lahiri-Dutt, Kuntala. "Women and ASM—Issues and Priorities." Presentation at 4th Communities and Small-Scale Mining (CASM) Annual General Meeting, Colombo, Sri Lanka. October 12–16, 2004.

Lahiri-Dutt, Kuntala. Presentation at 8th Annual CASM Meeting. Brasilia, Brazil.

Lu, Jinky Leilanie. "Occupational Health and Safety in Small-Scale Mining: Focus on Women Miners." Journal of International Women's Studies, 13, no. 3 (2012), 103–113. http://vc.bridgew.edu/jiws/vol13/iss3/7.

Maglambayan, Victor B., Satishi Murao, Tierry Jerome C. Corpus, Koichiro Sera, Shoji Futatsugawa, and Masamichi Tsuji. Mercury Contamination Associated with Small-Scale Gold Mining in the Upper Ambalanga River, Benguet, Philippines from River Sediment Sampling. Quezon City: National Institute of Geological Sciences, University of the Philippines, 2005. http://www.psdn.org.ph/aple/paper_maglambayan.pdf.

Maponga, Oliver Joseph. Small-Scale Mining Operations in Zimbabwe. Ottawa: International Development Research Centre (IRDC), 1993. http://idl-bnc.idrc.ca/dspace/bitstream/10625/12027/1/IDL-12027.pdf.

Maponga, Oliver Joseph. Small-Scale Mining and the Environment in Zimbabwe. Harare: Institute of Mining Research (IMR), University of Zimbabwe, October 1995.

Maponga, Oliver Joseph, and Anderson Mutemererwa. Management of Natural Resources and Environment in Zimbabwe: The Case of Gold. Geneva: United Nations Conference on Trade and Development (UNCTAD), 1995. http://unctad.org/en/Docs/pocomd45.en.pdf.

Maponga, Oliver Joseph, and Clay F. Ngorima. "Overcoming Environmental Problems in the Gold Panning Sector through Legislation and Education: The Zimbabwean Experience." Journal of Cleaner Production 11 (2003): 147–157. http://www.unites.uqam.ca/gmf/globalmercury-forum/files/articles/africa/Zimbabwe%20ASM%20JCP%202003%20Maponga.pdf.

Masiya, Trust Tendai, Lyman Mlambo, and Motive Mungoni. "Small-Scale Mining in Zimbabwe: Historical Perspective." Global Conference on Business and Finance Proceedings 7, no. 2 (2012): 286–295. http://www.theibfr.com/ARCHIVE/ISSN-1941-9589-V7-N2-2012.pdf.

Mesefin, Mahlet. "Ethiopia: Artisanal Gold fails to outshine expectations this time", All Africa, January 15, 2012. http://allafrica.com/stories/201201191096.html.

Metcalf, Stephen, and Samuel J. Spiegel. Global Mercury Project Activities in Zimbabwe 2002–2007. Project EG/GLO/01/G34: Removal of Barriers to Introduction of Cleaner Artisanal Gold Mining and Extraction Technologies. Final Report. UNIDO; 2007. http://iwlearn.net/iw-projects/1223/reports/zimbabwe/activities-in-zimbabwe-2002-2007-final-report

Mines & Geosciences Bureau. Mining Industry Statistics. Manila: Republic of the Philippines, Department of Environment & Natural Resources, 2015. http://www.mgb.gov.ph/Files/Statistics/MineralIndustryStatistics.pdf.

Ministry of Women Affairs, Gender and Community Development Statement, 2015.

Mobenzi [home page], 2005–2015. www.mobenzi.com.

Mondlane, Salvador, Jr., n.d. "ASM and LSM Relationship." Nairobi: United Nations Environm ental Programme, n.d. http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/ASGM/Presentations_Forum/Day%202/ASM_LSM_relationship.pdf

Moyo, Sternford. The Future of Mining Law in Zimbabwe: High Level Overview of Zimbabwe's Mining Legislation. Harare: Scalen and Holderness Solicitors, 2013. http://zimmining-indaba.com/wp-content/uploads/2013/10/SCANLEN-HOLDERNESS.docx.

Mugova, Alex. "The Shamva Mining Centre Project." Presentation at the Workshop on Artisanal and Small-Scale Mining, London, November 19–20, 2001.

Mutsinya, Peter. Mining Law and Mining Related Legislation: Insights. Harare: self-published, 2013.

Office of the Secretary, the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research. Washington, DC: US Department of Health & Human Services, April 18, 1979. http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html.

Oseas García, Marcello M. Veiga, Paul Cordy, Osvaldo E. Suescún, Jorge Martin Molina, and Monika Roeser, "Artisanal Gold Mining in Antioquia, Colombia: A Successful Case of Mercury Reduction," Journal of Cleaner Production 90 (March 2015): 244–252, doi: 10.1016/j.jclepro.2014.11.032.

Parliament of Zimbabwe. Senate Hansard 17, no. 6 (September 12, 2007): 15–21.

Phimister, Ian. "A History of Mining in Southern Rhodesia to 1953." D.Phil. diss., University of Zimbabwe, 1975.

Porter, Stephanie, and Mallory Phipps, Jake Muller, Caitlin, Nortosn, and Nick Peterson. "The Impacts of Gold Mining in Africa." Last modified April 2010. http://web1.cnre.vt.edu/lsg/GEOG3104S10Web/Group6/Nick/Zimbabwe.html.

PR News Wire. "Coeur Clarifies Bolivia Investment." May 2, 2006. http://www.prnews-wire.com/news-releases/coeur-clarifies-bolivia-investment-55933052.html.

Responsible Jewellery Council (RJC). Building Responsible Jewellery Supply Chains: Impacts Report. n.p.,

June 2014. http://www.responsiblejewellery.com/files/RJC-Impacts-Report.pdf.Schmidt, Charles W. "Quicksilver and Gold: Mercury Pollution from Artisanal and Small-Scale Gold Mining." Environmental Health Perspectives 120, no. 11 (2012): a424–a429. doi: 10.1289/ehp.120-a424, PMCID: PMC3556620.

Sokwanele. "Pillage and Patronage: Human Rights Abuses in Zimbabwe's Informal Gold-Mining Sector." This Is Zimbabwe (blog). http://www.sokwanele.com/thisiszimbabwe/archives/486.

Spiegel, Samuel J. Formalisation Policies, Informal Resource Sectors and the De-/Re-Centralisation of Power: Geographies of Inequality in Africa and Asia. Bogor Barat, Indonesia: Center for International Forestry Research, 2012. http://www.cifor.org/fileadmin/subsites/proformal/PDF/RSpiegel1212.pdf.

Susapu, Blasius, and Geoff Crispin. Report on Small-Scale Mining in Papua New Guinea, Mining Minerals and Sustainable Development Working Paper No. 81. London: International Institute for Environment and Development (IIED), 2002. http://pubs.iied.org/G00733.html?k=susapu.

Svotwa, Richard, and E. M. Bugnosen. "Shamva Mining Centre Demonstration Project: An Example of International and Local NGO Collaboration Progress and Problems to Date." Presentation at the United Nations Interregional Seminar on Guidelines for the Development of Small and Medium-Scale Mining, Harare, Zimbabwe, February 11–19, 1993.

Svotwa, Richard, and C. Mtetwa. The Environmental Impact of Small-Scale Mining in Zimbabwe. Harare: Intermediate Technology Development Group, 1999.

Telmer, Kevin. "Fifty thousand gold shops in the world's artisanal gold supply chain," Artisanal Gold Council (blog), http://www.artisanalgold.org/publications/articles/fifty-thousand-gold-shops-in-the-world-s-artisanal-gold-supply-chain

U.S. Agency for International Development (USAID). "Mining for Gold in Siguiri: A Close Look at a High-Risk Population. Report on Guinea." USAID Health, December 26, 2000. http://web.archive.org/web/20070216164514/http://www.usaid.gov/gn/health/news/001226_mines/index.htm.

Valoi, Geraldo. Artisanal Mining Baseline Survey–Murrupula. Maputo: Open File of the National Directorate of Mines, 2000.

Velez, Isabelo. Benguet Corporation's Acupan Contract Mining Project: Mining in Partnership with the Community. Presented at Community and State Interests in Small-Scale Mining: Sharing Experiences from the Asia-Pacific Region (workshop), Manila, Philippines, June 7–12, 2005. http://asmasiapacific.org/wp-content/uploads/2014/07/Velez2005_BenguetCorporations.pdf.

Verisk Analytics, "New Products and Analysis: Climate Change Will Push More Children Into Work," V erisk Maplecroft [Web site], n.d., http://maplecroft.com/about/news/child-labour-index.html.

Villegas, Cristina, Philipp Griedl, and Angela Jorns. Gold Mining and Conservation: A Situational Analysis and Response Plan in Ecuador. ASM-PACE Program; 2013.

Villegas, Cristina. Responsible Sourcing Models Relevant to Artisanal & Small Scale Diamond Mining: A Brief Review. Washington, DC: Catalyst Resources Development Group and TetraTech ARD, for USAID, 2014.

Wolff, P. Riverbed and Alluvial Mining in Zimbabwe. Harare: University of Zimbabwe, 1993.

World Bank Group. "Climate Change Knowledge Portal for Development Practitioners and Policy Makers." 2015. http://sdwebx.worldbank.org/climateportal/index.cfm?page = country_historical_climate&ThisRegion.

"World Class Gold Deposits." Gold Investing News. 2015. http://goldinvestingnews.com/world-class-gold-deposits.

Yahoo Finance 2014. "Gran Colombia Gold Announces Management Restructuring, Further Cost Reductions To Deliver an All-In Sustaining Cost of $950 Per Ounce in 2014 and Receipt of a $4 Million Bridge Loan." February 3, 2014. http://finance.yahoo.com/news/gran-colombia-gold-announces-management-120000816.html.

Yelibenwork, Ayele. "Commercial Bank of Ethiopia to Buy Gold from Artisan Miners." Addis Ababa, Ethiopia: 2Merkato.com (Web site), September 30, 2011. http://www.2merkato.com/news/energy-and-mining/376-commercial-bank-of-ethiopia-to-buy-gold-from-artisan-miners

Zwane, N., and David Love, Zvikomborero Hoko, and Dennis Shoko. "Managing the Impact of Gold Panning Activities within the Context of Integrated Water Resources Management Planning in the Lower Manyame Subcatchment, Zambezi Basin." Physics and Chemistry of the Earth 31 (2006): 848–856.

Zwane, N., and D. Love and Z. Hoko. Managing the Impact of Gold Panning Activities in the Context of Integrated Water Resources Management. Harare: United Nations Industrial Development Organization (UNIDO), n.d.

Zimbabwe National Statistics Agency. 2011 Labour Force Survey. Harare: ZimStat, 2011. http://www.zimstat.co.zw/dmdocuments/Laborforce.pdf.

Interviews

Barclay's Gold-Buying Unit former employee, interviewed by N. Mukwakwami, October 14, 2014.

Greaves, H., Managing Director, Farvic Consolidated Mines, interviewed by N. Mukwakwami, August 14, 2014.

Local GIS expert, interviewed by D. Kisyombe, P. Mudzwiti, and N. Mukwakwami, November 17, 2014.

Masiiwa, O., Director of Inspectorate at the RBZ, interviewed by N. Mukwakwami and S. Mawowa, September 29, 2014.

Moyo, Fred, Deputy Minister of Mines, Zimbabwe, interviewed by P. Mudzwiti and N. Mukwakwami, November 21, 2014.

Singo, P., Project Manager, Sustainable Artisanal Mining, interviewed by N. Mukwakwami, November 3, 2014.

Tetrad former employee, interviewed by D. Kisyombe, S. Mawowa, and N. Mukwakwami, Interviewers, October 3, 2014.

ZIMASCO employee, interviewed by N. Mukwakwami, M. Kanoyangwa, and P. Mudzwiti, October 15, 2014.

Annexes

Annex 1
Ethical Clearance Certificate

Telephone: 791792/791193
Telefax: (263) - 4 - 790715
E-mail: mrcz@mrcz.org.zw
Website: http://www.mrcz.org.zw

Medical Research Council of Zimbabwe
Josiah Tongogara / Mazoe Street
P. O. Box CY 573
Causeway
Harare

APPROVAL

REF: MRCZ/A/1899 **17 October 2014**

Peter Mudzwiti
PACT
1 Downie Avenue
Belgravia
Harare
Zimbabwe

RE: - Formalizing artisanal gold mining and trading in Zimbabwe

Thank you for the application for review of Research Activity that you submitted to the Medical Research Council of Zimbabwe (MRCZ). Please be advised that the Medical Research Council of Zimbabwe has **reviewed** and **approved** your application to conduct the above titled study.

This approval is based on the review and approval of the following documents that were submitted to MRCZ for review:-

a) Study proposal
b) Informed Consent Forms (English, Ndebele and Shona)

- **APPROVAL NUMBER : MRCZ/A/1899**

This number should be used on all correspondence, consent forms and documents as appropriate.

- **TYPE OF MEETING : Expedited**
- **EFFECTIVE APPROVAL DATE : 17 October 2014**
- **EXPIRATION DATE : 16 October 2015**

After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ Offices should be submitted three months before the expiration date for continuing review.

- **SERIOUS ADVERSE EVENT REPORTING**: All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Offices or website.
- **MODIFICATIONS**: Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices or website.
- **QUESTIONS**: Please contact the MRCZ on Telephone No. (04) 791792, 791193 or by e-mail on mrcz@mrcz.org.zw

Other

- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.
- You're also encouraged to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study.

Yours Faithfully

.....

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABWE

MEDICAL RESEARCH COUNCIL OF ZIMBABWE
2014 -10- 17
APPROVED
P.O. BOX CY 573 CAUSEWAY, HARARE

PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH

Annex 2
Procedures, Cost, and Time Required To Become a Formal Miner

	PROCEDURE	DESCRIPTION	TIME(DAYS) LEGALLY MANDATED	TIME(DAYS) IN PRACTICE	COST (US$)
		REGISTRATION			
1	Acquisition of prospecting license	Any person over the age of 18 may take up a prospecting license. A prospecting license is not transferrable, and entitles prospecting on land open to prospecting and pegging, which includes communal land, state land, and privately owned land. It entitles the pegging of only one block of claims, whether for precious metals or base minerals. A prospecting license is valid for two years.	1	1	$350
2	Obtaining a map	A map of scale 1:25000 of the area is purchased at the mining commissioner's office.	1	1	$20
3	Hiring an approved prospector	An approved prospector (AP) is a person who for the time being is registered in the Register of Approved Prospectors.	1	1	$500 minimum
4	Notice of intention to prospect	Anyone wishing to prospect on town lands, private land, any area of land declared under the Forest Act [Chapter 19:05] to be demarcated forest or protected private forest, or communal land must give notice of his intention to do so by: *Town lands:* Writing a registered letter addressed to the local authority concerned. *Private land:* Registered letter addressed to the occupier at his ordinary postal address. *Unoccupied private land:* Registered letter addressed to the owner at his ordinary postal address. *A demarcated forest:* Written notice to the chief executive officer of the Forestry Commission established under the Forest Act [Chapter 19:05]. *A protected private forest:* Written notice to the owner of such land in person or by registered letter addressed to the owner at his ordinary postal address or, if such land is unoccupied, to the mining commissioner. *Communal land:* Written notice to the RDC. The prospecting notice is valid for a period of 120 days from the date on which it is delivered or posted, as the case may be, and, if such holder has not pegged and registered a block on the land concerned within that period, he should give fresh notice before continuing to exercise his rights under the prospecting license.	1	1 In practice, APs send the notice of intention and starts prospecting as soon as they send it.	
5	Posting prospecting notice	If there is need for detailed prospecting work, such as drilling or trenching, a prospecting notice should be posted. It is valid for 31 days and gives the right to carry out detailed prospecting work in a radius of 300 meters (about 984 feet) from the prospecting notice. The notice is valid for 31 days.	1		
6	Discovery peg	As soon as the gold reef is discovered, a discovery peg should be erected. This should be within a 300-meter (984-foot) radius of the prospecting notice and adjacent to the borehole where the reef was discovered.	1		
7	Pegging	When pegging a claim, it should be in the shape of a parallelogram 500 meters by 300 meters (i.e., 1 hectare, or about 2.47 acres). A prospecting license grants one the right to peg a block of claims (i.e., 10 claims on 10 hectares/24.7 acres).	1		
8	Posting of registration notice	Within 31 days of the posting of the prospecting notice, the license holder who has discovered gold may peg a block and then post a registration notice adjacent to the discovery peg. This should be within a radius of 300 meters (984 feet) of the prospecting notice.	1		
		Step 10 cannot begin before 7 days after completion of Step 1.			
10	Registration of claim	A certificate of registration must be obtained from the mining commissioner within 31 days of the day a registration notice is posted.	90 (3 months)		$200
11	Beaconing	Permanent beacons must be erected within two months of the date of registration.	1		$100
12	Environmental impact assessment	As required by law, mining operations cannot begin before an EIA is carried out by an EMA-approved consultant.	21		$2,000
13	Review of the EIA by EMA		60 (2 months)	60 (2 months If no EMA response is received within 90 days, mining can begin (Section 100 of the Environmental Management Act)	$150
TOTAL			158 days		$3,220

Annex 3
Operating Costs of a Formal Mine

DESCRIPTION	FREQUENCY	COST (US$)
Mine blaster	Monthly	500
Workers (10 workers @ $350 each)	Monthly	$3 500
NSSA (WCIF and NPS)	Monthly	
Box of explosives		
Ore removal permit	Every six months	20
Milling (charged per hour)	Every time the miner takes ore to the mill	5 (or gold equivalent)
Mercury	Every time the miner takes ore to the mill	$100 for a kilogram
Transport		Variable but around $100. Some millers offer free transportation for ore
Fuel (for generator and compressor)		
Consumables for mine machinery		
Food for workers		
TOTAL		

Annex 4
Procedures, Costs, and Time To Register a Mill

	PROCEDURE	DESCRIPTION	TIME (DAYS)	COST (US$)
			LEGALLY MANDATED	IN PRACTICE
1	Registration of a claim		158	$3,220
2	Environmental impact assessment	Required by law. Mining operations cannot begin before an EIA is carried out by an EMA-approved consultant.	21	$2,000
3	Review of the EIA by EMA		60	$150
4	Application for a custom milling license	Obtained from the Ministry of Mines and Minerals Development.	1	$8,000
5	Submission of a site works plan	Approved by MMMD and Minerals Development.	31	$5,000
	TOTAL		271	$26,370

Annex 5
Mill Start-Up Costs

Costs Not Including Electricity

ITEM	AMOUNT (US$)
Ball mill	$20,000
Stamp mill	$40,000
Driving system (reduction gear box, fan belts, and feeding spout)	$6,000
Concrete foundation (to mount the equipment)	$2,000
Cyanide per drum of 50 kilograms (110 pounds)	$250
Total	$68,250

Obtaining Electricity for a Milling Operation

PROCEDURE	DESCRIPTION	TIME (DAYS)	COST (US$)
		LEGALLY MANDATED	IN PRACTICE
Submitting relevant application form	In the application, the miller will have to state the type of power they require.	1	
Waiting period		7	
Receiving necessary inspection	This is carried out by the power supply company, ZETDC so that it can provide the customer with a quotation.	1	
Obtaining external installation works and possibly purchasing material for these works		7	
Concluding necessary supply contract and obtaining final supply		1	
TOTAL		17	

Capital Costs—What Millers Are Often Expected To Purchase To Obtain Electricity Supply

Transformer	$8,000
Wooden poles	$5,000
Insulators	
Conductors (e.g., wires)	
Miscellaneous (e.g., nuts and bolts)	
TOTAL	$13,000

Annex 6
Formal Mining Taxes

Summary of taxes charged on formal miners

Name of the tax	Description of tax	Collecting Agency	Frequency of tax payments	Value of the tax payment
Royalty	Payment made by the licensee to the State for its ownership of the mineral deposit for the right to extract the mineral	Paid to ZIMRA and collected by FPR	Every time gold is sold	1% of total gold sold (as of 1 October 2015)
Presumptive Tax	*Presumptive Tax* legislation was introduced by Zimbabwe's government to broaden the revenue base in view of the increase in informal business activities e.g. artisanal mining	Paid to ZIMRA and collected by FPR.	Every time gold is sold	2% of total gold sold THIS TAX WAS REMOVED EFFECTIVE 1 OCTOBER 2014
Corporate Income Tax	Charged to mine/mill owners. In Zimbabwe, the Corporate Income tax rate is a tax collected from companies. Its amount is based on the net income companies obtain while exercising their business activity, normally during one business year.	ZIMRA	Monthly	25.75% of profit
Pay As You Earn (PAYE)	A withholding tax on income payments to employees. The Pay As You Earn (PAYE) system is a method of paying Income Tax on remuneration. The employer deducts tax from your salaries or pension earnings before paying you the net salary or pension.	ZIMRA	Monthly	0% to 50% of income depending on the tax bracket
VAT	When a miller supplies gold laden carbon to an elution plant owner, the miller will levy Value Added Tax (VAT). The VAT incurred by the elution plant owner is known as Input Tax. When the elution plant owner sells the gold to FPR, VAT must be included in the price charged for the gold. This is known as Output Tax. The difference between the output tax collected and input tax incurred for making taxable supplies is the amount of VAT payable to the ZIMRA	ZIMRA	Monthly	15% of the value added during gold processing
Carbon Tax	A tax levied on the carbon content of fuels. It is a form of carbon pricing and it is charged to ASM operator that use generators	EMA	Monthly	$200.00

Payments made by formal mining operators

Annual licence	Licence fee for the maintenance of a mining / milling licence	MMMD	Annually	$8000.00 for millers $250 for miners
FPR charge	Charged by FPR to recover their overhead costs	FPR	Every time gold is sold	5.5% of gold sold
RDC levy	The levy is charged per each stamp mill. Legally the RDCs are supposed to charge per unit where the first unit is a 100 employees and the second is the next 50 employees, third is the other 50 employees and so forth.	RDCs	Annual	A percentage of gold sales which is variable from district to district
NSSA Workers Compensation Insurance Fund (WICF)	The objectives of the WICF are: Providing financial relief to employees and their families when an employee is injured or killed in a work related accident or suffers from a work related disease or dies thereof. (b) Creating an awareness of, and promoting health and safety at all places of work. (c) Encouraging adoption of health and safety legislation through factory and machinery inspection. (d) Providing rehabilitation services to disabled employees so as to reduce their disablement and enable them to return to their former employment or otherwise prepare them for a useful and meaningful place in society	NSSA	Monthly	2.46% of gross basic salary bill of a mine / mill
NSSA National Pension Scheme	The Scheme is for every working Zimbabwean above the age of 16 years and under the age of 65 years who is in permanent employment, seasonal, contract or temporary employment. This does not include domestic workers and the ***informal sector*** who are expected to join at a later stage. And because it is a national scheme it is a compulsory requirement by law for all Zimbabwean workers who meet these criteria to become members and contribute towards it	NSSA	Monthly	3.5% gross basic salary
RDC	For millers the levy is charged per each stamp mill. Legally the RDCs are supposed to charge per unit where the first unit is a 100 employees and the second is the next 50 employees, third is the other 50 employees and so forth.	RDC	Annually or quarterly depending on district	Variable from district to district
EIA Review	For the period review of the environmental impact assessment	EMA	Quarterly	$210.00
Discharge Licence Fee	Licence fee for the discharge of waste from mills or elution plants	EMA	Quarterly	$600.00
Association Dues / Membership fees		Miner's/Miller's association	Variable	Variable

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