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Artisanal and Small-Scale Mining Livelihoods in Nigeria: Drivers, Impacts and Best Practices

by

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DEDICATION

This thesis is dedicated to my great parents, Titus Oramah (late) and Angela Oramah, for the upbringing and spiritual support, and my dear loving wife Ntomo Oramah, for her emotional support, encouragement, and sacrifices. Late Titus Oramah, your dreams and sacrifices have not been futile.

ABSTRACT

Artisanal and small-scale mining (ASM) operations are part of the economic stream in most Sub-Saharan African countries. The potential economic, social, and environmental impacts of ASM are extensively recognizable and documented. In view of this, most governments and donor agencies are designing and implementing policies and intervention programs to maximize the economic benefits of ASM while mitigating the negative socio-environmental impacts.

By primarily using qualitative research methodologies, this study investigates the potential of ASM livelihood to support rural-scale community developmental objectives, such as poverty and hunger reduction, job creation, and provision of basic community infrastructures and services, in four rural communities in north-central Nigeria.

The findings reveal the main drivers for community involvement in ASM livelihood to include high poverty and unemployment levels, farming seasonality, lack of alternative livelihoods, the incentive to raise capital for alternative livelihoods, and neglect of rural development by the government. The findings suggest that the practice has evolved into a viable venture that can potentially sustain rural developmental objectives, such as employment, poverty and hunger reduction, and provision of basic community infrastructure. This is in addition to potentially being able to increase government revenue through mineral and royalty tax, foreign exchange, foreign direct investments, and exploitation of marginal, unattractive deposits. Findings reveal that low levels of education and training, lack of funds, lack of access to mining equipment, lack of access to mineral markets, the general business attitude, and poor governance are the major constraints. For the sector to be able to realize its potential, the study recommends a re-conceptualization of the perceptions about ASM livelihood; the creation of an enabling environment for ASM to thrive, including efficient service delivery on the part of the government, political stability, and continuity in the sector ’s administration; and organization and formalization of the sector using a community-inclusive approach, which appears to offer optimal economic, environmental, and social benefits to stakeholders.

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CHAPTER 1

INTRODUCTION

One of the biggest challenges facing development practitioners and policymakers around the world is how to help large numbers of people in the developing world to have a meaningful livelihood that sustains them and ensures they can live with dignity and hope for the future (Ellis, 2000). It is the quest for development that forced most countries in Sub-Saharan Africa (SSA) to participate in the Johannesburg World Summit on Sustainable Development in 2002. The Johannesburg Plan of Implementation was aimed at setting developmental goals by the year 2015 for most third-world countries, amongst which the SSA countries constitute the majority. Economic growth and poverty eradication, social equity, and environmental sustainability (the major indicators for sustainable development) were some of the goals that were top of the agenda during this summit (Igbuzor, 2006). The target year of 2015 is only two years away, and Nigeria still faces poverty challenges, poor social equity, poor infrastructural and human development, and poor environmental sustainability (Francis & Akinwumi, 1996; Elumilade et al., 2006). In contrast, some other SSA countries, such as Ghana, Malawi, and Ethiopia, are expected to reach most of the goals by 2015 or soon after (World Bank, 2011).

The reinvestment of Nigeria's huge oil wealth toward true sustainable development would have been the easiest and most effective developmental strategy in achieving some of the goals of these initiatives and developmental frameworks. However, given that this has not been the case (due to "Dutch Disease"[1] and "Resource Curse"[2] syndromes), coupled with the poor performance of the farm sector, developing and supporting non-farm sectors, such as artisanal

[1] "Dutch Disease" is caused by the distorting effect of a single dominant industry (e.g., oil and gas), which results in wage and domestic price inflation, higher exchange rates, and a reduction in the competitiveness of other sectors of a nation's economy (Sachs and Warner, 1995; Bulte et al., 2005; Pedro, 2006).

[2] The concept of "Resource Curse" describes the observation that the economies of some resource-rich developing nations have declined rather than improved because of the nature of the resource industry and the inability of government to effectively manage windfall revenues from the resource industry. This mismanagement of resources can be due to corruption or weak or unstable government (e.g., Sachs & Warner, 1995; Wantchekon, 1999; Jensen & Wantchekon, 2004; Rosser, 2006; Crownson, 2009).

and small-scale mining (ASM),[3] may be the best strategy for achieving some of the goals of this initiative (even if this is only a short-term approach).

Despite the fact that ASM is associated with social, safety, and environmental problems (Davidson, 1993; UN, 1996; Hilson, 2006; Hilson & Yakovelva, 2007; Banchirigah, 2008), it still has the capacity to expand livelihood opportunities through the provision of employment and the reduction of poverty and hunger (Hilson, 2001, 2012; Aryee et al., 2003; Hilson & Pardie, 2006; Hayes, 2008). It also has the capacity to contribute to rural infrastructural development, foreign exchange earnings, foreign direct investment, and exploitation of marginal, unattractive deposits (Hinton, 2005a). It is estimated that "approximately 20 million people worldwide from over 50 countries engage in artisanal and small-scale mining [ASM], with another 80 million to 100 million people depending on this sector for their livelihood" (World Bank, 2005, p. 3). In Nigeria in particular, the sector has experienced extraordinary growth in the past decade, and this is expected to continue as long as poverty persists and the sector remains viable. Although there are no official statistical figures on the actual number of people engaged in ASM in Nigeria, the sector is estimated to be directly employing over 500,000 people and indirectly providing a source of livelihood for over 1.5 million people (Eyre & Agba, 2007; Hayes, 2008).

Though some efforts have been made toward harnessing the sector's potential through the enactment of the Minerals and Mining Act of 2007 and the establishment of the ASM Department in the Ministry of Mines and Steel Development (MMSD), the progress in this sector has remained constrained. In most cases, the operators and communities have remained trapped in a poverty loop, with limited alternative income-earning opportunity (Nöetstaller, 1996; Heemskerk, 2005; Sinding, 2005; Hilson, 2006; Hilson & Pardie, 2006). The failure to harness the potential of this sector is further exacerbated by the fact that the administrators have struggled to comprehend the dynamics of this burgeoning sector, including the sector's drivers, challenges, and its potential to contribute toward rural developmental objectives (such as poverty and hunger reduction, employment, and provision of basic rural amenities). Moreover, the fact

[3] According to the Nigerian Minerals and Mining Act (2007), artisanal and small-scale mining (ASM) is a mining operation limited to the utilization of non-mechanized or low-level mechanized methods of reconnaissance, exploration, and processing of mineral resources within a small-scale mining lease area (Nigeria Minerals and Mining Act, 2007).

that most ASM operators often operate outside legal frameworks is also a major obstacle to harnessing the sector's potential. It is estimated globally that about 90% of ASM operators are operating illegally (Hinton, 2005a; ILO, 1999; Clausen et al., 2011). Thus, a key step in harnessing the potential of this sector is to understand its dynamics, such as the drivers, potential impacts, challenges, and the reasons why operators choose to operate illegally even where there are formal regulations. In a report prepared for the Communities and Small-Scale Mining (CASM) Initiative Hinton (2005a, p. 6) explains that, "Understanding the complex nature of ASM is critical to effectively implementing any measures to mitigate the negative and optimize the positive effects of these activities in the context of sustainable development."

It is against this backdrop that this study hopes to contribute to the ASM livelihood debate by providing extended analysis of the sector's dynamics, including the players, the drivers fueling the growth of the sector, the impacts, the challenges, and the sector's potential to be a genuine livelihood strategy that is capable of creating employment, reducing poverty and hunger, and providing rural basic amenities.

For this study, personal income level, employment opportunities, commerce, and level of infrastructure were surveyed as economic indicators. The level of education, availability of basic and leisure facilities, level of security and crime, and availability and quality of healthcare were observed as social indicators. In addition, land and water pollution were surveyed as environmental indicators. The community[4] will be the basic unit of analysis in this study.

1.1 Study Objectives

The main goal of this study, principally through the use of qualitative research methodology, is to investigate the potential of ASM livelihoods to support rural-scale community developmental objectives, such as employment, poverty and hunger reduction, and provision of basic community infrastructure and services. To achieve this goal, the study draws on results from case studies of four different ASM communities in north-central Nigeria. Four research questions are fundamental to this research:

[4] The community in this case refers to the village benefiting and most impacted by the mining activity.

1) What are the drivers for ASM growth in Nigeria?
2) What are the economic, environmental, and social impacts of ASM in Nigeria?
3) What are the challenges for ASM practice in Nigeria?
4) What is the most beneficial approach for ASM formalization and organization in Nigeria?

The results of this study will contribute toward:

i) advancing the general debate on rural livelihood diversification;
ii) addressing issues of accessibility, organization, and general practice of ASM in Nigeria, SSA, and other developing regions; and
iii) the development of policies and programs, which can assist governmental and non-governmental responses or interventions.

1.2 Thesis Structure

The thesis is organized into six chapters. This introduction constitutes Chapter One. Chapter Two presents the study background and context, along with a review of the relevant academic literature. It also presents a summary of solid mineral mining in Nigeria, the logic for study site selection, and descriptions of the study region. The study methodology is concisely explained in Chapter Three. It explains the approach and techniques used in the research. Chapter Four presents the findings, which form the basis of the discussion in Chapter Five. Chapter Five discusses the findings, which include the ASM setups and operations, the drivers for ASM diversification, and the economic, environmental, and social impacts. It also presents the challenges facing the ASM sector, as well as the sector's organization and formalization. Chapter Six presents the study conclusion and recommendations.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter begins with a presentation of the study background and context. It is followed by a review of the relevant literature and the theoretical framework that inspired this thesis. An overview of mining in Nigeria is presented, as well as the rationale for study site selection. The chapter concludes with a description of the study region.

2.2 Study Background and Context

Rural communities in SSA are largely characterized by high poverty rates and unemployment, price inflation, low infrastructural development, high infant and maternal mortality rates, low levels of education, and insecurity for lives and properties (Onugu, 2005). These problems are manifestations of the region's failed economic policies and developmental choices of the past three decades (Barrett et al., 2001; Hinton, 2005a; Ellis, 2006; Havenevik et al., 2007). In a bid to tackle these socio-economic problems, the governments in this region have adopted and implemented several initiatives and developmental frameworks over the last two decades.

One example is the New Partnership for Africa's Development (NEPAD), an initiative of the African Union to eradicate poverty, accelerate growth and sustainable development, and enhance the participation of Africa in the global economy (NEPAD, 2002). The initiative was adopted during 37th assembly session of Africa's Heads of State and Governments in Lusaka, Zambia, in July 2001. This initiative in particular laid the foundation for a series of state-owned initiatives for economic recovery, growth, and development in the SSA region. In Nigeria, for example, NEPAD laid the foundation for the National Economic Empowerment and Development Strategy (NEEDS), which was conceptualized in 2003 and initiated in 2004 (IMF, 2007). The major goal of NEEDS is to tackle rural poverty and unemployment through wealth creation and value orientation (Obadan, 2001; Bindir, 2002; Elumilade et al., 2006; IMF, 2007).

Whereas initiatives like NEPAD strongly advocate for agriculture-driven development,

some regional initiatives have aimed at maximizing the mineral resource potential of SSA in tackling the prevalent socio-economic problems. Prominent amongst these initiatives is the "Strategy for African Mining" (Strongman, 1992), an initiative developed by the World Bank in August 1992 to accelerate the growth of the mining sector in order to contribute toward the economic development of Africa. This initiative contributed substantially to the creation of the ASM sector across SSA and was the first to advocate for the regularization of the ASM sector (Strongman, 1992).

Following this, similar initiatives have been developed and implemented within the last decade. Another example is the "Yaoundé Vision on Artisanal Small-Scale Mining" (Hilson, 2006). The Yaoundé vision was initiated in Yaoundé, Cameroon, in November 2002, during a joint session of the United Nations Economic Commission for Africa (UNECA) and the United Nations Department of Economic and Social Affairs (UNDESA). In line with the Millennium Development Goals (MDGs),[5] the vision is to reduce poverty and improve livelihoods in African ASM communities by the year 2015. The main strategies proposed to achieve this vision include formalizing and integrating ASM into Poverty Reduction Strategies and rural community-development programs (Hilson, 2006).

A more recent mineral resource-driven initiative is the "African Mining Vision 2050" (AMV 2050), which was approved by the African Union Heads of State and Governments in February 2009, in Addis Ababa, Ethiopia. The key goal of this initiative is to eradicate poverty (one of the MDGs) and promote accelerated socio-economic development in Africa through the mining of mineral resources. One of the visions also entails harnessing the potential of ASM to improve livelihoods through the stimulation of national and local entrepreneurship and the advancement of rural socio-economic development (Tamufor, 2009).

The problem is that over the years, the government of Nigeria and donor agencies, such as the World Bank and the International Monetary Fund (IMF), have prioritized rural farming as a long-term key rural livelihood strategy for rural poverty reduction and employment in SSA (see

[5] The Millennium Development Goals are eight developmental goals that were agreed upon by 193 United Nations countries and international agencies during the Johannesburg World Summit on Sustainable Development in 2002. These goals were meant to be achieved by the year 2015, and they include eradicating extreme poverty and hunger, achieving universal primary education, promoting gender equality and empowerment of women, reducing child mortality rates, improving maternal health, combating HIV/AIDS and malaria, ensuring environmental sustainability, and developing a global partnership for development (Igbuzor, 2006).

Nigeria's Poverty Reduction Strategy Paper;[6] IMF, 2007; NEPAD, 2002). This rural farming livelihood has remained unviable for most rural dwellers as a result of low farm investment and productivity, land constraints, credit market failures, seasonality/droughts, economic hardship brought about by Structural Adjustment Programs (SAPs)[7] and trade liberalization, and individual entrepreneurial motives or necessities (Chilowa, 1998; Reardon, 1997; Bryceson, 1999, 2002; Barrett, 2001; Hinton, 2005a; Ellis, 2006; Havenevik et al., 2007). This situation has only served to encourage rural dwellers to diversify into other forms of livelihood (Haggblade et al., 1989; Bryceson, 1999; Hilson, 2010).

Today, the non-farm sector is thought to be contributing about 45% of SSA's average household income (Bryceson, 1996, 1999, 2002; Reardon, 1997; Reardon et al., 2001; Barrett et al., 2001; Ellis, 2006; Banchirigah & Hilson, 2010). For example, in their analysis of labor force participation in agriculture in SSA, Banchirigah and Hilson (2010) reported a decline in agriculture participation in Nigeria from 72% in 1965 to 3% between 1996 and 2005. This decline in agriculture participation in Nigeria can be linked to the upsurge of non-farm activities like ASM, which is seen by many as a higher-paying livelihood in comparison to farming (Hilson, 2010). The unviable nature of a farm livelihood may also have contributed to the decline in agriculture participation in Nigeria.

Thus, the focus of this study is to provide an extended analysis of the situation unfolding in Nigeria by identifying the drivers, opportunities, impacts, challenges, and best practices. The hope is that the lessons and findings from this study will be used to advance the understanding of ASM as a genuine livelihood strategy.

2.3 Relevant Academic Literature

2.3.1 Farm Livelihood and Non-Farm Diversification in SSA

An earlier-held view on rural farm livelihoods in SSA in the 1970s and early 1980s was that farmers were less likely to be involved in non-farm activities unless they migrated to urban

[6] Poverty Reduction Strategy Paper (PRSP) is a formal document prepared by countries needing debt relief from the IMF and World Bank. It usually contains a comprehensive strategy for poverty reduction.

[7] Structural Adjustment Programs (SAP), also known as Structural Adjustment Policies, are conditional economic policies that were introduced by the World Bank and IMF for developing countries. These policies were to be followed in order to qualify for loans and debt payments. Some of the guiding principles and requirements include privatization and trade liberalization, devaluation of currencies against the dollar, removal of state subsidies through spending/budget cuts, price controls, tax reductions for high earners, and export-led growth.

areas (Hill, 1982; Reardon, 1997). This view was sustained for several years until the late 1980s and 1990s, when several empirical studies provided evidence of non-farm income in rural African households (Collier & Lal, 1986; Low, 1986; Haggblade et al., 1989; Bryceson, 1996, 1999, 2002; Reardon, 1997; Reardon et al., 2001, 1998; Barrett et al., 2001; Ellis, 2000, 2006). For example, Haggblade et al (1989) in their study of "farm–nonfarm linkages in rural Sub-Saharan Africa" estimated that rural dwellers in SSA acquired about 25–30% of their income from non-farm sources. Similarly, Reardon (1997) provided an extended analysis of non-farm income during his review of case studies from 25 countries (including Nigeria) and found that an average of 45% of household incomes was derived from non-farm sources. Some of the reasons cited by Reardon for rural household income diversification include the quest to maintain food security in the face of low farm productivity and income shocks (such as drought) and the search for cash income to finance farm investments (in the face of credit market failures).

The last two decades in the SSA region has witnessed a tremendous increase in poverty and unemployment and an upsurge in the number of rural inhabitants diversifying their sources of income from farm livelihood to non-farm livelihoods (Reardon, 1997; Reardon et al., 2001; Bryceson, 2002). This has subsequently shifted the livelihood debate to focus on non-farm activities and the motives prompting non-farm diversification.

2.3.2 Drivers of ASM Livelihood in SSA

The last two decades in particular have witnessed the proliferation of ASM activities in SSA; the growth has been attributed to factors such as "low barriers to entry," low technical skill requirement, minimal startup capital, and an increase in global mineral prices (Heemskerk, 2003; Barry, 1996; USAID, 2005; World Bank, 2005; Snyder, 2006; Hayes, 2008; Banchirigah & Hilson, 2010; Hilson, 2012). In SSA, ASM is thought to be directly employing about nine million people (both on a seasonal and full-time basis) and indirectly providing livelihoods to about 50 million people (see Table 2.1; Hayes, 2008).

Table 2.1. Estimated ASM employment and dependence in SSA

Country	ASM est. at > 100,000 worker numbers		Country	ASM dependence as > 5% population
DRC	2,000,000		CAR	54.00
Tanzania	1,500,000		Eritrea	43.62
Zimbabwe	500,000		Sierra Leone	28.60
Ethiopia	500,000		Zimbabwe	26.43

Nigeria	500,000		Tanzania	22.38
Niger	450,000		Niger	20.34
CAR	400,000		Mali	19.47
Eritrea	400,000		DRC	18.04
Mali	400,000		Liberia	17.99
Sierra Leone	300,000		Djibouti	11.85
Ghana	250,000		Gabon	10.10
Burkina Faso	200,000		Eq. Guinea	9.73
Mozambique	200,000		Burkina Faso	7.86
Sudan	200,000		W. Sahara	7.62
Angola	150,000		Angola	7.18
Uganda	150,000		Ghana	6.41
Liberia	100,000		Guinea	6.12
Guinea	100,000		Chad	5.93
Chad	100,000		Namibia	5.75
Madagascar	100,000		Lesotho	5.64
Cote d'Ivoire	100,000		Mozambique	5.64
Kenya	100,000		Swaziland	5.32

Source: Hayes (2008, p. 11)

There are numerous debates over the reasons for rural inhabitants' diversification of their sources of income into ASM. Several narratives have been put forward, but five narratives are most commonly discussed: farming seasonality, poverty, entrepreneurial drive (or "get rich quick"), mineral rush (or "gold rush"), and deep ancestral ties.

2.3.2.1 Farming Seasonality

The notion that rural inhabitants are lured into ASM as a result of farming seasonality has been championed by authors such as Mondlane and Shoko (2003), Maponga and Ngorima (2003), MMSD (2008), Adesina and Ouattara (2008), Wouterse and Taylor (2008), and Hilson and Garforth (2012). These proponents argue that ASM is strictly a seasonal activity carried out by rural farmers as a supplementary income activity that provides extra income during non-farming periods. These authors do not believe in a permanent shift from farm livelihood or the substitution of farm livelihood, but rather the growth of other complementary income sources as a result of economic hardships. In essence, this school of thought sees ASM as a secondary economic activity (or subsistence activity) that helps rural inhabitants to maximize earnings, while farming remains the primary economic activity.

2.3.2.2 Poverty

The second narrative on the drivers of ASM is that rural inhabitants are attracted to ASM as a result of poverty (Davidson, 1993; Labonne, 1994; Barry, 1996; Labonne & Gilman, 1999;

Aryee et al., 2003, Hinton, 2005a; Hilson & Pardie, 2006; Hayes, 2008; MMSD, 2008; Hilson, 2010). This view was clearly captured by Hilson (2010) in his recent study in Akwatia, Ghana:

> These people pursue work in surrounding artisanal gold mining communities mainly because of poverty, and their decision has more to do with a desire to immerse in activities with which they are familiar, that offer stable employment and consistent salaries, and provide immediate debt relief. (Hilson, 2010, p. 296)

Those who argue in favor of poverty as the major push for ASM diversification claim that "people engage in ASM because there are few viable income-earning alternatives" (Hilson, 2012, p. 436). They suggest that ASM has overtaken farming as the primary source of livelihood and that farming is mainly for subsistence purposes.

2.3.2.3 Entrepreneurial Drive

A contrasting narrative is that rural inhabitants are driven into ASM as a result of entrepreneurial drive or the drive to "get rich quick" (Alpan, 1986; Nöetstaller, 1987, 1996; ILO, 1999; Walsh, 2003; USAID, 2005; World Bank, 2005; Barry, 1996; Maconachie & Binns, 2007; Havnevik et al., 2007; Cartier, 2009). Proponents of this view maintain that most individuals in this classification generally wish to diversify their income because of the perception that they can earn money faster and in greater quantity from ASM than from farming (Hilson, 2010). One major factor cited in the literature as serving as a catalyst in spurring the engagement of rural inhabitants in this classification is the increase in global mineral prices (ILO, 1999; USAID, 2005; World Bank, 2005; Havnevik et al., 2007; Banchirigah, 2008; Hilson, 2010). Proponents of this view contend that most individuals in this classification are opportunists lured by the prospect of earning quick money with greater financial returns.

2.3.2.4 Mineral Rush

A similar narrative to the former idea is the "rush type" or "gold rush," which often happens following new mineral discoveries (Dreschler, 2001; UNECA, 2003; MMSD, 2008; Maconachie & Binns, 2007; Cartier, 2009). Proponents of this idea contend that most people in this category are also opportunists, lured by the prospect of earning quick money. Examples that support this narrative are the gold rush around the south of Lake Victoria (Dreschler, 2001), the gold rush in California (Clay & Jones, 2008), the artisanal ruby-sapphire trade in Madagascar (Walsh, 2003; Cartier, 2009), and the diamond rush in Sierra Leone (Maconachie & Binns,

2007). This is also the main view shared by most policymakers and donor agencies in SSA (Hilson & Garforth, 2012). The proponents of this idea credit the emergence of new settlements (organized with formal legal systems and modern infrastructures) to the rush activity (Hentschel et al., 2002; Hilson, 2002, 2010; Meijerink & Roza, 2007; Hayes, 2008; Banchirigah, 2008; Wouterse & Taylor, 2008). Hilson (2010, p. 299) commented on the link between mineral rushes and settlements in his study in Akwatia, Ghana, that "Many of Ghana's artisanal gold mining towns, including Tarkwa, Bibiani and Bolgatanga, were also established under similar 'boom' conditions and today have an array of education facilities, hotels, banks and paved roads."

2.3.2.5 Deep Ancestral Ties

There are also narratives of rural inhabitants being drawn into ASM as a result of what Banchirigah (2008, p. 28) calls "deep ancestral ties to mining lands" (Hilson, 2002; Banchirigah, 2008; MMSD, 2008; Hilson, 2010). The literature asserts that the miners in this classification are often equipped with mining skills that are "passed from generation to generation, [and they are sometimes] used by the government officials, mineral exploration companies and international mining houses as pathfinders" (Hilson, 2010, p. 299) in locating viable mineral deposits. Proponents of this view also see ASM as the main economic livelihood in these communities, with farming as mainly a subsistence activity.

In summary, evidence from the ASM livelihood literature has revealed that the drivers for ASM engagement in SSA are not homogenous. Poverty, farming seasonality, entrepreneurial drive, the "rush" for new mineral discovery, and family tradition are the major drivers discussed in the literature. Interestingly, little attention has been given to date to the situation in Nigeria, despite the fact that Nigeria is strategically situated to influence the economic development of Africa (due to its land size, mineral endowments, and large population). Thus, this study hopes to bridge this gap in knowledge by reporting findings from a recent study undertaken in four rural communities in north-central Nigeria. In addition, the study hopes to advance the ASM livelihood debate by shifting the discussion beyond the sector drivers to suggestions on how the sector should develop, a topic rarely addressed in the mainstream ASM literature.

2.3.3 General Impacts and Challenges to ASM

2.3.3.1 Economic Impacts

Some authors contend that ASM perpetuates poverty (Hayes, 2008) or that rural inhabitants are often trapped in a vicious poverty loop when they choose to diversify their livelihood to ASM (Nöetstaller, 1996; Heemskerk, 2005; Sinding, 2005; Hilson, 2006; Hilson & Pardie, 2006; Banchirigah, 2008). However, reports have shown that ASM can still alleviate poverty (for rural dwellers), create jobs, contribute to state revenues (through taxes, royalties, and foreign exchange), and create other business and economic activities (Hayes, 2008; Slack, 2009). Hayes (2008), for example, asserted that the revenue from ASM is broad and multifaceted, involving many people "from the production, transport, processing and re-selling of the minerals" (Hayes, 2008, p. 13). In an ASM community, a spectrum of employment opportunities is created, and this is accompanied by the likelihood of a large number of people "making a small income at various levels, and a handful of the top actors making a significant return" (Hayes, 2008, p. 13).

Apart from providing incomes and livelihoods for artisans, ASM can also contribute to infrastructure (for example, roads, pipe-borne water, schools, and clinics), employment, and national wealth (through royalties and taxes). A report by Tschakert (2009) stated that "the total ASM sector in Ghana has contributed roughly US$460 million to the national economy since 1989" (Tschakert, 2009, p. 25) when it was legalized (Carson et al., 2005). This is a significant feat considering that a huge section of the ASM sector in Ghana is still operating illegally. The economic impacts of ASM cannot be overlooked given that it accounts for "approximately one-sixth of global mineral output" (Hilson, 2001, p. 7). What has further reinforced the viability of the ASM sector is the weak response of ASM operators and miners to numerous efforts by the regional governments and donor agencies to advance alternative livelihood activities in rural communities around the region (Banchirigah, 2008; Banchirigah & Hilson, 2009). This weak response clearly indicates that ASM is providing better financial incentives when compared to other livelihood activities, such as farming (Hilson, 2010).

The major issues attributed to limiting the economic impact of ASM around the SSA region are the "inefficient exploitation and beneficiation methods" (Hayes, 2008, p. 13) that lead to loss of revenue and shortened mine lifespan, restricted access to fair and competitive markets (due to ASM's illegal status), illegal smuggling, and the actions of middlemen (Hilson, 2001; Hayes, 2008). The illegality of ASM encourages illegal smuggling, which leads to the loss of

royalty fees, title fees, and taxes that are supposed to accrue to the communities and government (Hayes, 2008).

2.3.3.2 Environmental Impacts

Mining can have impacts on the environment through chemical pollution, contamination of watercourses and sources, diversion of watercourses, siltation of watercourses, land degradation, and deforestation (Hinton, 2005a; Hilson & Pardie, 2006; Hayes, 2008). The dangers that mining poses are even greater at the ASM level because of the difficulties involved in organizing and monitoring such activity (Shoko, 2002; Hayes, 2008; Sikaundi, 2008; Twerefou, 2009). Several studies have examined the environmental and health challenges of ASM (e.g., Davidson, 1993; Golow & Adzei, 2002; Babut et al., 2003; Golow & Mingle, 2003; Kitula 2006; Hayes, 2008), but much of the literature is focused on the effects of mercury use in gold mining (Hilson, 2001, 2006; Hinton, 2005a; Hilson & Pardie, 2006; Spiegel et al., 2006; Hilson & Vieira, 2007).

The consensus is that the current poor environmental and health conditions in the ASM sector in SSA are mainly caused by low levels of environmental awareness or the lack of information on the risks associated with the use of chemicals such as mercury and cyanide, reluctance to learn safer practices, lack of alternatives or cost-effective methods to local methods of amalgamation, lack of strong legislation and control of chemical supply, and the lack of governmental technological support and training (Hinton, 2003; Yakubu, 2003; Hilson & Pardie, 2006; Hilson & Vieira, 2007).

2.3.3.3 Social Impacts

As chiefly a poverty-driven activity, ASM can cause social problems in rural communities if not properly managed. It can cause physical conflict, drug use, alcoholism, robbery/crime, rape, and divorce (Twerefou, 2009). It can also be associated with greed, prostitution, and HIV/AIDS (Hinton, 2003, 2005a; Lahiri Dutt, 2004; Hayes, 2008). Amutabi and Mukhebi (2001) reported that over 70% of women interviewed during a study around Mukibira mines in Kenya claimed to have had an incidence of sexually transmitted disease. Authors such as USAID (2000), Hinton (2005a), and Hayes (2008) have also reported similar high rates of sexually transmitted diseases in their reports on the social impacts of ASM in mining communities.

Some factors cited in the literature that control these social impacts include the drivers for diversification into ASM (e.g., poverty and unemployment), the process of accessing the mine, the mineral being mined, the process of mineral extraction, the procedure for disposing of the minerals and sharing the proceeds, the number of migrant workers with different cultural values, and the presence or absence of authorities (Hinton, 2005a). Several studies have been able to document evidence where some of these factors were responsible for perpetuating social problems. Kuramoto (2001), for example, reported cases of rape, high crime rates, and violence caused by the absence of law-enforcement authorities in the Madre de Dios gold mining region of Peru (Hinton, 2005a). Authors such as Barry (1997) and Hilson and Yakovleva (2007) have reported cases of conflict caused by issues related to mine accessibility.

ASM is also associated with child labor and gender discrimination (or low female participation). According to Hinton (2005a), the number of women involved in ASM varies from region to region and from site to site. Regionally, the number of women in the ASM sector in Asia and Latin America is thought to be approximately about 10% and 20%, respectively. In Africa, it is believed that women make up about 40-50% of the ASM labor force (Hinton, 2005a; Hayes, 2008). The number also varies depending on the site or mineral being exploited (ILO, 1999; Onuh, 2002; Hilson, 2001; Hinton, 2005a). It is common to see a higher number of women involved in mining industrial minerals such as aggregates and evaporites. For example, Hilson (2001) claimed that about 75% of the people involved in ASM salt mining in Ghana were women. This is similar to the case of Nigeria, where women dominate ASM salt mining (Hinton, 2003). By contrast, women are often low in number when it comes to the extraction of high-value minerals such as gold and precious stones (Hinton, 2005a) because of high mechanization or the physical energy required.

In spite of this high participation rate in aggregate and evaporite mining, women are still much discriminated against when it comes to "access to resources [or mines]; ownership and tenure; types of work undertaken; and pay received" (Hayes, 2008, p. 8). They are also discriminated against when it comes to decision-making, education, training, and access to loans (Hinton, 2003; Hinton, 2005a). For example, some studies have reported cases where women have been paid less for doing the same amount of work as men (see USAID, 2000; Hayes, 2008). Generally, some of the reasons given for the marginalization of women in most ASM camps

include the assumption that women are naturally less skilled compared to men; the cultural appropriateness of men operating machinery or engaging in strenuous activities; cultural superstitions; and health-and-safety concerns (Hilson, 2001; Hayes, 2008). As a result, women are often confined to less strenuous duties, such as panning, crushing, washing, sorting, transportation, trading, and cooking (Hilson, 2001; Hinton, 2005a; Hayes, 2008).

2.3.3.4 Finance Challenges

Authors such as Hinton (2005a), Eyre and Agba (2007), and Hayes (2008) have stressed that the lack of financial and market resources can reduce the productivity of the ASM sector. For example, Hayes (2008, p. 32) explains that "access to finance is essential to enable formalization, improved production, and strengthening of artisanal mining, and its potential transformation into small-scale mining." In essence, access to finance is very important if ASM is to help in meeting developmental goals such as poverty reduction and job creation. ASM operations in SSA are severely constrained because of the lack of support from governments and other financial institutions like banks (Eyre & Agba, 2007). Even when it is possible to secure loans, the interest rates are usually too high for ASM operators (Dikko, 2001). The consensus in the literature is that the artisanal miners are held back by certain factors that make them "unattractive to lenders" if they desire to obtain personal loans. Hayes (2008) lists some of these factors:

> First, they tend to be already in debt. Second, they are frequently migratory and ensuring potential repayment of credit is difficult. Third, they usually lack collateral. Fourth, they rarely have the capacity or expertise to be able to present a viable business plan for why they need the credit or how it will be effectively used. Fifth, ASM is rarely well reported statistically and therefore does not allow for risk analysis by creditors. And finally, there is a dearth of lending institutions that provide this type of credit or support for ASM. (Hayes 2008, p. 32)

Faced with these harsh conditions, artisanal miners are usually forced to turn to the mineral buyers or "sponsors" for sponsorship, and this rather exposes them to the possibility of exploitation (Hayes, 2008). Some suggestions cited in the literature to address this issue of finance include training artisanal miners in financial management and financial market requirements, cash flow, business plans, and project forecasting, as well as building the knowledge capacity of banks (Eyre & Agba, 2007; Hayes, 2008).

2.3.3.5 Mineral Trading Challenges

The consensus in the literature is that ASM operators or artisanal miners are preyed upon by intermediaries or middlemen because of the former's lack of knowledge of the minerals market and its functioning, as well as the absence of a controlled minerals market (Hilson & Pardie, 2006; Eyre & Agba, 2007). For example, Eyre and Agba (2007, pp. 94–95) report that "most ASM operators, association members, and other stakeholders have poor knowledge about the minerals market size, function, practice quality control measures and pricing." As a result, they easily fall victims to "sponsors" or "middlemen" when it comes to negotiating value for services rendered or minerals sold (Eyre & Agba, 2007). Likewise, Hilson and Pardie (2006) report that the artisans made less money whenever the so-called "sponsors" or mineral buyers sponsored them. Hilson and Pardie (2006) explain:

> In Noyem, for example, several ore owners reported not having money to pay workers after "digging a hole," and therefore "plead with buyers to get money". In cases where mercury is supplied upfront by sponsoring buyers, miners reported selling their gold for as low as 80,000 cedis. (Hilson and Pardie, 2006, p. 110)

2.3.3.6 Access to Mining Equipment

Authors such as Hilson (2001, 2002) and Hayes (2008) posit that access to affordable mining technology is vital for the success of both large- and small-scale mining schemes. The consensus is that the productivity of the ASM sector is severely hampered by the lack of essential equipment. One solution cited in the literature to address this issue is "hire purchase," which Hayes (2008) reported to have been somewhat successful in countries like Burkina Faso, Ghana, Tanzania, and Mozambique. Another option is equipment hire (Eyre & Agba, 2007; MMSD, 2008). According to Section 91 of Nigeria's Minerals and Mining Act of 2007, the government is supposed to provide extension services in areas such as the application of modern mining technology and provision of equipment hire on arrangement with manufacturers to active and registered ASM cooperates.

2.3.4 Rural-scale Sustainable Livelihood and Alternative Livelihood

The concept of sustainable livelihoods developed by Robert Chambers and Gordon Conway (1991) states that

> A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with

> and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term. (Chambers & Conway, 1991, p. 5).

The problem with ASM livelihood, as Hayes (2008) explains it, however, is that

> ASM is an inherently unsustainable activity as it involves the extraction of non-renewable resources. Therefore, even if ASM plays an important role in contributing to livelihoods in Africa today, this potential will eventual reduce over time as resources become increasingly scarce and increased mechanization is required to access deeper and lower grade minerals. (Hayes, 2008, p. 8)

Therefore, for communities to be able to achieve a sustainable livelihood (Scoones, 1998), they must learn to manage and reinvest proceeds from ASM into community-development projects and other alternative livelihoods, such as cash crop farming, livestock and poultry farming, and fish farming (Carson et al., 2005; Hinton, 2005a; Banchirigah & Hilson, 2008; Hilson & Banchirigah, 2009; Tschakert, 2009). By reinvesting ASM proceeds into community-development projects and alternative livelihoods, these communities will be better prepared for self-sustenance and the survival of future generations when the minerals are depleted. Studies have shown, however, that most artisanal miners prefer to continue in their ASM livelihood instead of diversifying into other alternative livelihoods because of the higher incentives of ASM and the lack of other skills to survive outside ASM (Carson et al., 2005; Banchirigah & Hilson, 2008; Hilson & Banchirigah, 2009). Other reasons given by Hayes (2008) that might also explain why artisans will not likely diversify their ASM livelihood to other alternative livelihoods is debt—which often accrues when artisans are trapped in a poverty loop (Tschakert, 2009)—and addiction to ASM. Thus, it is important for the communities to keep exploring alternative livelihoods that are linked to farm or other non-farm livelihoods (Hinton, 2005a).

2.4 Theoretical Framework

This study seeks to investigate the potential of ASM livelihood to support rural-scale community-development objectives such as employment, poverty and hunger reduction, and provision of basic community infrastructures. Issues related to ASM in Nigeria are complex and socio-cultural, however, and involve interactions between diverse behavioral patterns, including

those of individuals, groups, communities, ASM operators, and government. Hilson and Pardie (2006) explain that

> The dynamics of an artisanal mining community are exceptionally complex, which is why most support-related initiatives implemented for the benefit of the sector and its participants rarely materialize into anything meaningful: most have been designed based on simple observation, rather than conclusions reached from careful analysis of population. (Hilson & Pardie, 2006, p. 110)

It is against this backdrop that this study employs social ideologies of "Institutionalism," "Marxist political economy," and "Post-colonialism" to fully comprehend the dynamics and complexities of ASM in Nigeria

2.4.1 Institutionalism

There are many approaches to institutional theory, but this study will focus on the interpretations of North (1995) and Ostrom (1990) to understand how human behavior is shaped to act collectively for the good of the community. North defined institutions as "humanly devised constraints that structure human interaction. They are composed of formal rules (statute law, common law, and regulations), informal constraints like (norms, conventions, and self-imposed codes of conduct), and the enforcement characteristics of both" (North, 1995, p. 29). According to Ostrom, "institutions are the prescriptions that humans use to organize all forms of repetitive and structured interactions" (Ostrom 2005 p. 3).

Institutions can thus be seen as social practices that influence human behaviors and interactions (both individually and collectively), and this applies in particular to ASM. At the ASM level, diverse and interconnected institutions or organizational settings play major roles in shaping the exploitation of mineral resources, and this makes it very important to understand the influence of the institution (including rules and norms). The ability of an institution to influence human behaviors will depend on how strong or weak the institution is (Ron, 2005). Ron (2005) has noted that natural resource exploitation could lead to conflicts when the institution is weak. Institutions that are well structured can restrain bad behavior, however, and can compel community members to act to achieve communal goals (Bates et al., 2003). The Ancient Igbo society of Nigeria represents an example of such a well-structured institution. In this ancient society, good cultural norms were revered and bad behaviors such as greed were forbidden

(Omorogbe, 2002). Institutions can thus play a major role in influencing humans to act collectively in achieving a common purpose, rather than acting selfishly or causing conflict (Ostrom 1990; Ostrom et al., 1999; Ostrom, 2000). In this thesis, institutions are the formal rules and informal norms (i.e., the institutional arrangements) and the stakeholders involved in ASM.

2.4.2 Marxist Political Economy

According to Macionis and Gerber (1999), the Marxist concept of political economy can help to explain power distributions and struggles amongst ASM stakeholders in Nigeria. Marxist political economy posits that the power imbalance in a society is as a result of uneven wealth distribution. The concept also suggests that those with the larger share of the wealth commonly control the economic institutions and consequently determine how the political system operates (Macionis & Gerber, 1999). In their study of "mineral exploration and the challenge of community relations," Thomson and Joyce (2000) claimed that community–operator relationships are commonly dependent on the balance of power, which is usually tilted toward the operators.

In Nigeria there is a strong class division between the small "political elite" and the "poor majority" (Kieh, 2007). These elite groups are the advocates of liberalization and globalization (Darimani, 2008). They have argued that liberalization of both large- and small-scale mining sectors will serve as a catalyst for the economic growth and development of the minerals sector in Nigeria and other SSA countries, through employment, technology transfer, increased government revenue, and foreign exchange earnings. SAPs and loans (enforced by the World Bank and IMF) and monetary aid from developed countries are some of the measures proposed to reduce inequality. Investigations have shown, however, that this framework has not been beneficial for the poor majority in their quest to survive economically. This is because the political elite often dominates even in such local activities as ASM and controls the access and rights to mineral resources (Aubynn, 1997; Aryee, 2001; Ribot & Peluso, 2003).

2.4.3 Post-colonialism

According to Ashcroft et al. (2000), post-colonial theory helps to explain the complexities of governance in post-colonial times in terms of the legacy of colonial-era government structures. Ancient Nigerian societies were mainly traditionalist, following

traditional, indigenous ways of conservation and administration. They had separate systems of administration that were decentralized, with definite legal and administrative structures (Gordon, 2004). This system allowed the majority of people to be involved in one way or another in decision-making, and this created a balance of power (Gordon, 2004). Omorogbe (2002) reports that democratic societies existed in the southeastern regions (such as amongst the Ibos), whereas monarchs ruled in the northern and western regions. The advent of colonization brought industrialization and development, but the downside was the disruption of the local institutions and a focus on centralized types of administration (Omorogbe, 2002). This type of administration has not been effective in the post-colonial era because a small, powerful elite has dominated and controlled access and rights to resource exploitation even at the ASM level. The weakness of the judiciary and the other arms of government (such as the legislature), which are responsible for checking the excessive powers of these elites, is the reason why some elite groups can abuse their administrative powers for personal gain rather than in the interests of the people. These dictatorial and autocratic styles of government have become the dominant ideologies behind economic systems and resource-management strategies in Nigeria and most developing countries in SSA. Aidan (1999) has observed that centralized political systems in developing economies often prevent rural communities from deriving optimal benefit from royalties paid to governments by mining companies. Aidan (1999) concluded that this political system has affected the general perception of people in developing economies, and as such, people see the government as being predatory.

2.5 Solid Mineral Mining in Nigeria

Historical records show that mining has occurred in Nigeria for over 2,400 years (Jemkur et al., 2006; MMSD, 2008). Ancient Nigerian communities, such as the Nok, Kano, Benin, Ife, and Oyo, are reported to have exploited minerals such as iron, clay, and gold for metal sculpting around 400 BC (Jemkur et al., 2006; MMSD, 2008). The advent of British colonialism in the early 19th century created an upsurge of small- and large-scale mining operations, which became the turning point in Nigeria's industrialization. During this era, minerals like tin, columbite, and coal were exported in exchange for foreign revenue (Michelou, 2006; MMSD, 2008). Nigeria was the largest columbite exporter (accounting for about 95% of the world's total supply) and the sixth-largest tin producer in the world (Michelou, 2006; MMSD, 2008). A combination of oil and gas discovery (in 1956), decline in global metal prices, depletion of alluvial reserves, the

Nigerian civil war (1966–1970), the Indigenization Act,[8] and ineffective state operations deeply affected the mining sector, however, and left it poorly developed (Michelou, 2006; MMSD, 2008). Today, large-scale mining is mainly limited to iron ore and coal mining, but the mines are not operated at full capacity and generate little revenue. For example, reports have shown that steel exports only earned $2 million for the government in 2006 (Mobbs, 2008).

The poor performance of the large-scale mining sector has left most of the industry in the hands of ASM operators, who conduct over 95% of the mining in Nigeria (Lawal, 2002). This number is expected to rise because of the prevailing harsh socio-economic conditions in Nigeria and the comparative viability of the ASM sector (Michelou, 2006; MMSD, 2008).

In 2005, the World Bank attempted to assist the sector by providing $120 million in credit under the Sustainable Management of Mineral Resources Project (SMMRP), with $10 million specifically earmarked for the development of ASM. So far, the bulk of the money has been used for the refurbishment of the MMSD, development of the Nigeria Geological Survey Agency (to generate geophysical and geochemical information), and the Mining Cadastral Office (for issuance of titles), and the money set aside for ASM operators has yet to be fully put to use (Michelou, 2006). However, studies have shown that, when organized, ASM can provide direct opportunities for economic improvement through the generation of foreign exchange, creation of employment, and provision of basic amenities and wealth for the people involved in local communities (Labonne, 2002; Michelou, 2006; Pegg, 2006; MMSD, 2008; Hayes, 2008). This is in contrast to the oil and gas sector, where the wealth and employment opportunities created are not easily accessible to the poor majority in the communities (Omorogbe, 2002; Hilson & Haselip, 2004; Kumah, 2006; Ghazvinian, 2007). Presently, the government is missing out on substantial revenues from royalties and taxes because of the lack of organization and formalization in the ASM sector. If the sector was properly organized and formalized, the government would stand to have better and more effective control of the revenues from royalties and taxes, which could be used for community-related developments.

2.5.1 Overview of Legislative Frameworks and Institutions

The British colonists brought in the first Mining Act in Nigeria in 1946 because of the

[8] The Indigenization Act was a law enacted to empower Nigerians to take over the responsibilities of running the economy from foreigners.

increase in mining activities and a growing awareness of the public regarding mineral resource control (Lawal, 2002). After the Nigerian civil war in 1970, the Minerals and Mining Act of 1971 was introduced to repeal the Act of 1946. The Act of 1971 was promulgated to help the country recover from the war, but its focus was on government control and nationalization. This was because the 1946 Act was generally seen as promoting the British colonial government agenda rather than the development of Nigeria (Lawal, 2002). This consequently led to the closure of the remaining foreign-operated mines.

In its bid to revitalize the sector and re-attract foreign investors, the government created the MMSD in 1995. The Ministry was created in order to evaluate and create an inventory of all the mineral deposits in Nigeria. The Minerals and Mining Act of 1971 was replaced by the Mining Act of 1999, which was aimed at encouraging more private-sector involvement but was not widely acknowledged and followed because of the enormous discretional powers it bestowed on the Minister for MMSD, especially in relation to the issuance of mining leases. In order to address some of these shortcomings and to develop a private-sector-led mining industry in which the government's role would be restricted to that of a regulator or administrator, a new Minerals and Mining Act was introduced in 2007. Key aspects of the 2007 Act include:

i) tax-friendly regimes to investors, including royalty payments of less than 5%, corporate tax rate of 35% of net profit, 3-year tax holiday for new mining companies, and exemptions from all other Nigerian taxes (such as custom import and export taxes);
ii) the establishment of the Mining Cadastral Office (solely to administer mining leases);
iii) the recognition of ASM and the creation of an ASM Department in the MMSD;
iv) the provision of sound environmental management and community-development agreements;
v) application of the "*use it or lose it*" principle in mineral title administration;
vi) easy accessibility to mineral titles for all mining groups (including foreign, local, big, medium, and ASM) on a "*first come, first served*" basis; and
vii) guaranteed security of tenure and transferability of mineral rights (MMSD, 2008; Uka, 2011).

In summary, the change from state ownership to private-sector-led industry has provided the basis for speedy growth of the sector. "The new regulatory framework is conducive to attracting interest in the development of the [mining] sector but requires a speedy implementation" (Eyre & Agba, 2007, p. 99) to be able attract both foreign and local investments. The large-scale sector has remained dormant, however, because of the dominant and distorting effect of the oil and gas industry, the nature of the resource industry, and the inability of the government to manage windfall revenues from the resource industry (due to corruption and weak or unstable government). Walker and Jourdan (2003) have suggested that mining could serve as a catalyst for industrial development were the government able to play its role adequately. In the same vein, Richards (2005), Boschini et al. (2007), and Belem (2009) posit that strong governance through public institutions and the capability to enforce a legislative framework are critical to the success of a country's economic development based on mineral resource exploitation. It is in this context of sound governance and the ability to enforce legislative frameworks that the development of resource-rich developing countries can be viewed (Campbell, 2006, 2009).

2.5.2 ASM Profile in Nigeria

ASM is believed to constitute over 95% of mining taking place in Nigeria (Lawal, 2002; MMSD, 2008). Gold, columbite, tin, tantalum, gemstones (such as emerald, aquamarine, and tourmaline), barite, gypsum, limestone, kaolin, rock aggregate, and salt are the most important minerals mined at the ASM level in Nigeria (Rock Crystal Limited, 2005; Michelou, 2006). These minerals are either extracted from hard rocks (as primary ores) or from alluvial and colluvial deposits (i.e., from secondary ores) (Hinton, 2005a). Generally, the artisans commonly mine using basic hand tools, such as chisels, crowbars, axes, hammers, buckets, shovels, wheelbarrows, sluice boxes, and pans. Some more advanced equipment sometimes used includes hand drills, water pumping engines or generators, jaw crushers, pale loaders, and milling plants. The number of ASM sites/operations in Nigeria cannot easily be estimated because of the large number of illegal operators.

Depending on accessibility, the artisans are committed to either a specific site or mineral. The practice is not standardized because of differences in technical knowledge and skills, cultural and geographic affiliations, types of minerals mined, social and environmental factors, level of formalization, and access to markets (MMSD, 2008). A simple classification by MMSD

(2008) broadly grouped ASM practices in Nigeria into five categories, namely,

i) seasonal ASM: mainly carried out by seasonal farmers;
ii) rush ASM: freshly discovered sites (usually populated by migrant workers without ties to any site);
iii) legacy ASM: old mining sites left behind from the 1960s/1970s industrial mining revolution (either operated manually or mechanized);
iv) established ASM: sites that have been in existence for more than a decade and still operate at a manual level but with developed organizational structure and mineral market; and
v) semi-mechanized ASM: sites with some level of mechanization and funding.

Michelou (2006) and MMSD (2008) have classified the participants that get involved in ASM in Nigeria into the following groups:

i) formal lease holders who mine for profit;
ii) men who mine because of a lack of other economic skills/occupation or farming seasonality;
iii) women who mine because they are widowed or supporting a non-working/working husband;
iv) youths who mine because of unemployment or because they are looking for funding for education or another trade; and
v) children who mine because of parental unemployment or forced labor.

The practice is not organized and is largely characterized by low productivity, lack of capital, poor technology, hazardous working conditions, land degradation, and pollution (Okunlola & Ocan, 2002; Adetunji, 2003; Chukwuma, 1993; Salami et al., 2003; Duruibe et al., 2007; Childs, 2008). Salami et al (2003) and Duruibe et al (2007) have noted that the most serious concern of unregulated ASM is the danger to the environment (such as pollution of watercourses). They noted that the effect may be minimal on an individual basis but greater on a collective basis (Salami et al., 2003; Duruibe et al., 2007).

The ASM sector in Nigeria is recognized and encouraged by government. According to

the Mining Act of 2007, ASM operators can hold a "small-scale mining lease" and operate under such a lease if they are:

i) Nigerian citizens with no criminal record, or

ii) Nigerian Mining cooperatives or quarry associations.

Through the Mining Cadastral Office (MCO), the MMSD awards licenses to ASM operators (i.e., individuals, incorporated companies, and mining cooperatives) to mine in a designated area. According to the Nigerian Minerals and Mining Act (2007, p. 34), "the area covered by [a] small-scale mining [ASM] lease shall not be less than 5 acres and shall not exceed 3 square kilometers." Mining leases in Nigeria are usually valid for 25 years and renewable for a maximum of 20 years. The holder of an ASM license pays an annual surface rent that is subject to the approval of the Minister in charge of the MMSD. The 2007 Act also notes that artisans without valid mining titles would be referred to as illegal miners (Uka, 2011), but artisans lacking the capacity to obtain a lease are to be formalized into mining cooperatives or quarry associations by the MMSD (Uka, 2011). Uka (2011) reported that over 1,000 cooperatives have so far indicated an interest to register with the MMSD. Encouraging as this development may sound, the broader issue is that these operators do not possess the financial muscle or influence to navigate successfully through the bureaucracies involved in acquiring ASM licenses in Nigeria. This reason may explain why the majority of the operators have continued to operate outside the legal framework (Clausen et al., 2011) or within the "extralegal economy"[9] as described by De Soto (2000) and as a result are continually being criminalized and institutionally excluded.

2.5.2.1 ASM Organization and Formalization

According to Spiegel (2009, p. 52), "to speak of formalization means also to speak of individual and group rights: the right to mine, the right to land title, and the right to minerals." The issue of ASM legalization, formalization, and organization gathered momentum in 1992 after the "Strategy for African Mining" initiative recognized the potential of ASM to alleviate poverty in SSA (Strongman, 1992). Following this, more initiatives, such as the International Roundtable on Artisanal Mining (in 1995), the "Yaoundé Vision on Artisanal Small-Scale

[9] De Soto used the term "extralegal economy" to refer to informal or illegal economic sectors. He referred to the opposite as the "legal economy."

Mining" (in 2002), and the "African Mining Vision 2050" (in 2009) have all acknowledged the potential of ASM to improve livelihoods through the stimulation of national and local entrepreneurship and the advancement of rural socio-economic development (Tamufor, 2009). All these initiatives have "concluded that none of the challenges facing the ASM sector could be overcome until a prime need was met: legal titles" (Hinton, 2005a, p. 95).

Thus, much of the ASM discussion has recently centered on the sector's organization and formalization (Hinton, 2005b; Spiegel, 2009; Tschakert, 2009). The general consensus is that the lack of recognition of the property rights of the artisanal miners (which is often expressed through criminalization and institutional exclusion) is the major obstacle to the sector's organization, formalization, and socio-economic progress (see Young, 1990; Veiga and Beinhoff, 1997; De Soto, 2000; Honneth, 2001; Schlosberg, 2004; Tschakert and Singha, 2007; Siegel, 2009). Authors such as Veiga and Beinhoff (1997), ILO (1999), Heemskerk (2005), and Hinton (2005a, b) contend that if organized and formalized, ASM can be beneficial to both the operators and the administrators. For example, the government stands to benefit from tax income and having contact with the operators (which will facilitate tracking and monitoring of the sector) (Heemskerk, 2005; Siegel, 2009). The operators can benefit if the sector is organized and formalized through growth in gross profits and income security, empowerment of workers to participate in decision-making, advancement in personal status or class, ability to access capital or loan from banks for "operational improvements," pressure to conform to environmental standards, and the leverage to attract government services and support (Young, 1990; Hinton, 2005a; Fajnzylber et al., 2009, 2011; McKenzie & Sakho, 2010; Rand & Torm, 2012). Siegel (2009) and Tschakert (2009) also captured some of these benefits in their respective studies on ASM recognition and formalization:

> In theory, formalization provides miners two forms of stability. First, it allows them to predict their taxation rather than having to pay the hidden cost of bribes; and second, it reduces stress over the cost of rebuilding after military actions taken against them. Siegel (2009, p. 52)

> It can be argued that devaluation, misrecognition, and criminalization hamper the participation of … [ASM operators] not only in environmental and political decision-making but also in negotiating potential alternative livelihoods. Tschakert (2009, p. 25)

Thus, for the operators and administrators in Nigeria to benefit, the sector must be

organized and formalized. Part of what this study hopes to achieve is to contribute toward the sector's organization and formalization by presenting data on the people involved, the drivers, the opportunities, the impacts, the challenges, and the best practices.

2.5.2.2 ASM Setup and Practices

As reported by Hilson (2009, p. 4), the ASM "sector [in SSA] is characterized by complex labor hierarchies, unique forms of production and informal systems of assistance, all of which have evolved, for the most part, in an environment devoid of regulation and formal support." This was corroborated by Hayes (2008, p. 13), who explains that "artisanal mining teams, associations and communities are highly complex groupings of people, often with well-structured hierarchy…[with] specific roles in team structures, differential pay rates, taxes, authorizations, security, loyalties, royalties, dependences and debts."

The literature reveals that, in a typical setting, a licensed operator would either employ, or be in an agreement with, 10–15 workers (depending on the size of the mine) who dig and process the minerals/ore (Hilson, 2001; Brownell, 2009; MMSD, 2008; Nyame & Blocher, 2010). Hilson (2001) gives a summary of a setup in his evaluation of the ASM operations in Ghana:

> Plot owners [i.e., the operators] employ gangs of individuals and the profits earned from the concentrate obtained [are] shared between owners and the workers (typically, the plot owner keeps one-third of the profits and the balance is distributed to workers). (Hilson, 2001, p. 10)

In summary, mining (even at the ASM level) is a capital- and technology-intensive venture that requires combined efforts to lower risk and increase the chances of optimum output. Thus, it is always going to be easier to break through the economic constraints of mining as a group/community than as an individual. Hinton (2005a) and Eyre and Agba (2007) have also captured this view:

> The formation of organizations (associations, cooperatives, entrepreneurial ventures) by miners and communities can be an effective means to identify needs and capacity, lighten the load and access the necessary support. (Hinton, 2005a, p. 164)

> It is common for labour to be pooled to achieve increased productivity. This may be simply achieved within family groups but more often a partnership, association, co-

operative or joint venture will be formed to share resources and tasks as mine becomes larger. (Eyre and Agba, 2007, p. 87)

2.5.2.3 Facets of Authority Within the ASM Circle

There are so many dimensions of power that are at play around the ASM circle (Hinton, 2005a; Brownell, 2009). Therefore, "understanding the power[s] held by all stakeholders, and power differentials between them, is … necessary to conflict resolution" (Hinton, 2005a, p. 124).

First, the influence held by the government is "dictated by its position" (Hinton, 2005a, p. 124). For example, the Nigerian Land Use Act, 1978, vests sole control of all lands in Nigeria on the local states and federal governments (Agbosu, 1998; Laws of the Federation of Nigeria, 1990). Similarly, the Nigerian Minerals and Mining Act of 2007 vests control of all minerals properties in Nigeria in the State (Nigerian Minerals and Mining Act, 2007; Adefulu & Esionye, 2010). Such a monopoly of power places the other parties (i.e., the communities and operators) at a disadvantage because of the weakness of the other arms of government, such as the judiciary and the legislature, that are meant to be responsible for protecting the governed from any misuse of power by government. This power monopoly usually affects the relationship between the government and the communities. For example, the Niger Delta region of Nigeria is embroiled in dispute with the government over the exclusion of communities in decisions concerning the concession of communal lands for oil exploitation (Osaghae, 1995; Ibeanu, 1997; Bassey, 2002; Donwa, 2011; Paki, 2011). In addition, the power monopoly of the government can also affect community–operator relationships because it usually reveals the communities to be weak during negotiations with operators. Fashina (2010), for example, reported that ASM operators in Komu (a mining community in southwestern Nigeria) always claimed to be accountable only to the federal government whenever the community approached them with issues related to their operations.

Second, the ASM operators are also influential. For example, in line with the current Mining Act of Nigeria (2007), an ASM operator holds the license to mine. As such, the operator is allowed to exercise rights under such leases in accordance with the Act and is mandated, amongst several obligations, to pay rents, negotiate with the communities, provide funding for mineral extraction activities within the lease, and extract minerals and sell to brokers or major dealers.

Third, the communities are also influential. For example, Section 71 of the Nigerian Mining Act, 2007, asserts that the holder of a mining lease (i.e., a company) must first notify, negotiate, compensate, and sign a Community Development Agreement (CDA) with a host community prior to the commencement of any operations (Nigerian Minerals and Mining Act, 2007). According to the Act (in Section 116), the CDA should be able to ensure the transfer of social and economic benefits to the community. It cites such benefits as including educational scholarships, apprenticeships, technical training, employment opportunities, and financial support for indigenes of the communities. It also cites contributory support for infrastructure development and maintenance, such as education, health or other community services, roads, water, and power (Nigerian Minerals and Mining Act, 2007). Besides giving consent to lessees, the Act also empowers the communities to negotiate for compensation. In this case, however, the Minister of MMSD still retains the power to decide if the compensation is fair or not. The communities can thus use these powers to develop a sense of belonging, but they can also use this power to make unreasonable demands. Within the community, there are also several power structures (Brownell, 2009). For example, Brownell (2009) revealed in a study in Liberia that there are several layers of authority, which include "gang leaders" (or group leaders) and "laborers."

2.6 Rationale for Study Site Selection

Studying the Nigerian situation is of great importance to understanding the problems of ASM in SSA. This is because Nigeria presents a good opportunity for ASM but also faces many challenges. Some of the challenges are a lack of capacity in policy implementation, political instability, inadequate infrastructure, and corruption (Kieh, 2007). The opportunities, some of which can be created through ASM, include employment and provision of basic amenities, such as better healthcare, education, and social facilities (Richards, 2005; Slack, 2009). Lessons from Nigeria will provide helpful insights on how to address the problems of ASM in SSA and other developing regions of the world.

This study selected four communities (coded as Community A, Community B, Community C, and Community D)[10] located within three states in central Nigeria because this is

[10] Pseudonyms were used for the study communities to ensure anonymity and confidentiality of information.

where the bulk of solid mineral deposits and mining occurs (Figure 2.1): Niger state (which hosts deposits of metals, industrial minerals, and aggregates); Plateau state (which hosts tin and coltan); and Nasarawa state (which hosts metals, gemstones, and industrial minerals). The decision to undertake research in the four selected communities was also based on the fact that they have licensed operators and distinct ASM practices (see Appendix 5).

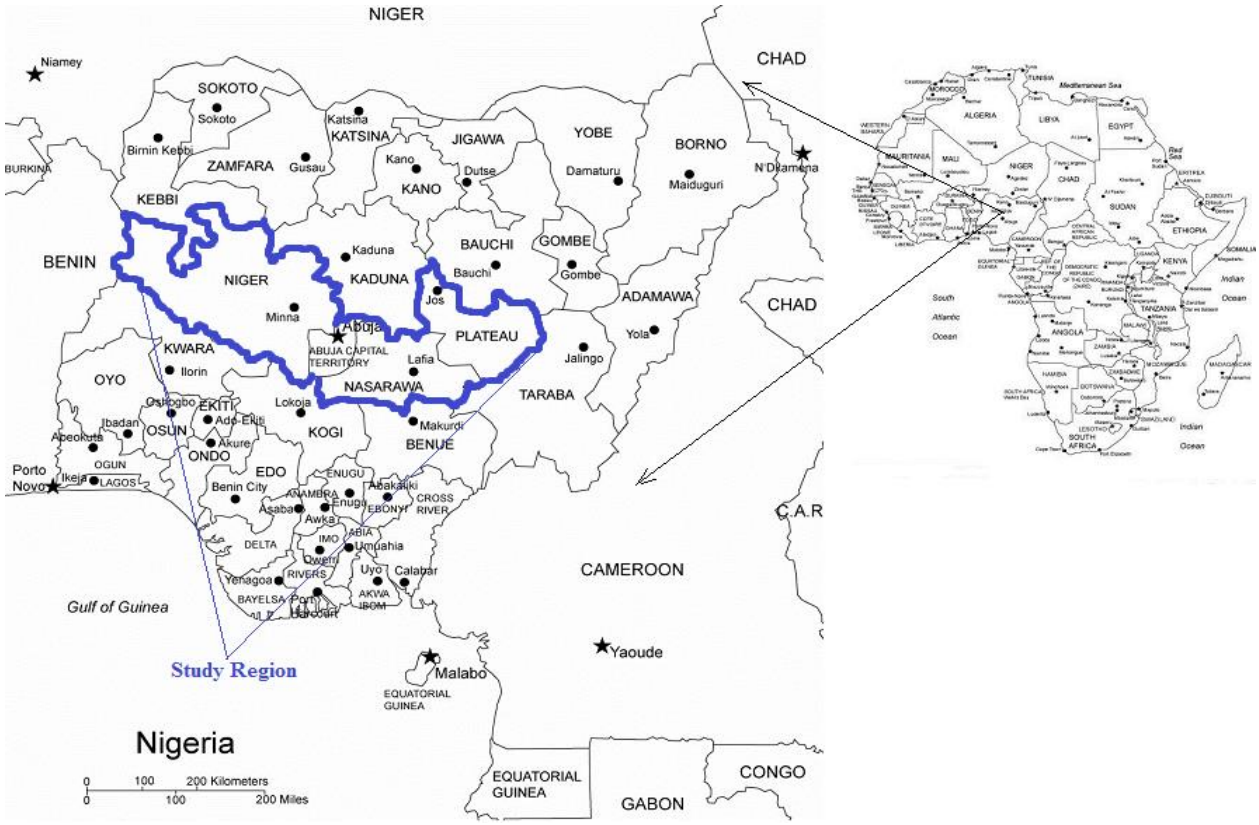

Figure 2.1. Map of Nigeria showing study region: Map modified from World of Maps™ (© Bruce Jones Design 2010, with permission)

2.7 Description of Study Site

In order to contextualize this study, this section will briefly present a profile of the country of Nigeria and the study communities.

2.7.1 Country Profile

2.7.1.1 Geography, Climate, and Vegetation

Located on the west coast of Africa, Nigeria covers a total area of 923,768 km^2 (land: 910,768 km^2 and water: 13,000 km^2) (Rock Crystal Ltd., 2005). It is bordered by Chad and Cameroon to the east, Niger to the north, Benin to the east, and the Atlantic coast (Gulf of Guinea) to the south.

Nigeria has two major seasons: rainy and dry. The rainy season usually starts around April/May and ends around September/October, and the dry season starts in October and ends in March. The dry season is accompanied by a dry and dusty northeasterly wind called the harmattan, which blows from the Sahara into the Gulf of Guinea and is marked by cold temperatures, usually from November to February or March (Rock Crystal Ltd., 2005). The climate falls within the tropical hot zone, and as such, the average temperature is relatively high. Across the country, the average temperature range is 23–31 °C with relatively high humidity in the south, and 18–35 °C in the north. Annual rainfall ranges from 650 mm in the north to 3800 mm in the south (Rock Crystal Ltd., 2005).

Nigeria is generally covered by three major vegetation types, namely, rainforest (found mainly in the southern states), savannah (mainly spreading across the central and northern states), and montane (found mainly around Jos Plateau, Adamawa Plateau, and the Bauchi Highland).

2.7.1.2 Geology

Geologically, Nigeria is composed of three major rock constituents, namely, the Basement Complex, the Younger Granites, and the Sedimentary Basins (Obaje, 2009, p. 2). The Basement Complex is made up of the Migmatite-Gneiss Complex, the Schist Belts, and the Older Granites and is of Precambrian age (Obaje, 2009). The Younger Granites, which are compositionally and structurally different from the Older Granites, are of Jurassic age and consist of migmatite ring complexes or dykes found mainly around Jos Plateau and neighboring states in north-central Nigeria (Obaje, 2009). Both the Basement Complex and the Younger Granites underlie the current study region, and they host most of Nigeria's solid mineral deposits, which include minerals such as columbite, coltan, cassiterite, gold, iron ore, gemstones, barite, and clays. The Sedimentary Basins are of Cretaceous to Tertiary age and consist of seven

distinct basins, namely, the Niger Delta Basin, the Anambra Basin, the Benue Basin (divided into the Lower, Middle, and Upper Benue Trough), the Bida Basin, the Sokoto Basin, the Chad Basin, and the Dahomey Basin (Obaje, 2009). The Sedimentary Basins host most of the oil and gas and coal deposits in Nigeria. Nigeria has a favorable geological setting that encourages the growth of ASM.

2.7.1.3 Population

Nigeria is the most populous country in Africa and is often referred to as the "Giant of Africa" because of its large population and landmass, abundant mineral deposits, and diverse ethnic groups and customs (Rock Crystal Ltd., 2005). It is strategically situated to influence the economic growth of Africa. Nigeria's population is estimated to be over 167 million, and it is ranked the seventh most populated country in the world, with an annual population growth rate of 3.2 percent (National Population Commission, 2004, 2009; Oyedele, 2011; Zubema, 2012).

Although English is the official language, used in all institutions and establishments, Nigeria is home to more than 250 ethnic groups and over 500 ethnic languages (MMSD, 2008). The three most influential and largest ethnic groups/languages are the Igbo in the southeast (~18%), Yoruba in the southwest (~21%), and Hausa-Fulani in the north (~29%) (National Bureau of Statistics, 2012). Nigeria is also a multi-religious country, including Muslim (~50%), Christian (~40%), and traditional beliefs (~10%) (Rock Crystal Ltd., 2005; MMSD, 2008; National Bureau of Statistics, 2009, 2010, 2012).

2.7.1.4 Economy

Nigeria's unit of currency is called Naira (₦[11]). The country is endowed with abundant agricultural and mineral resources, such as cocoa, cotton, palm oil, groundnut, rubber, oil, and gas. Oil and gas constitute the bulk of the economy, contributing more than 90% of government revenues and 99% of export earnings (Gillies, 2009). With a proven reserve of 36 billion barrels, it is reported to be the largest oil producer in SSA and is the 13th largest oil producer in the world (at 2.2 million bpd) and the fifth largest exporting OPEC (Organization of Petroleum Exporting Countries) member to the United States (Ross, 2003; Oyefusi, 2007; Gillies, 2009). By the end of 2011, Nigeria recorded a 7.68 percent growth in its Gross Domestic Product

[11] ₦1 is approximately equal to US$0.0063.

(GDP) (National Bureau of Statistics, 2012). Even with this growth and its GDP per capita at US$1,500 (National Bureau of Statistics, 2012), Nigeria still has 62.8% of its population living below US$1 a day, and this ranks the country at 159th out of 177 countries in the Human Development Index (National Bureau of Statistics, 2009, 2010, 2012). Recently, Nigeria was ranked the 14th most Failed State out of 174 countries in a "Failed State Index" ranking by Fund For Peace (FFP), a non-governmental organization. This ranking was based on certain economic, social, and political indicators, such as poverty level, insecurity, and level of infrastructure (Fund For Peace, 2012; Usigbe, 2012).

A recent statistical publication by the Nigerian National Bureau of Statistics shows that poverty is increasing in Nigeria: "relative poverty"[12] rose from 54.4% in 2004 to 71.5% in 2011 (National Bureau of Statistics, 2012). In terms of "absolute poverty,"[13] the report shows an increase from 54.7% in 2004 to 61.9% in 2011 (or 99,284,512 out of 163,070,300 Nigerians). Based on the "dollar-per-day measure,"[14] the report shows that 51.6% of Nigerians were living below US$1 per day in 2004, a proportion that increased to 62.8% in 2011 (National Bureau of Statistics, 2012) (see Tables 2.2 and 2.3 for a summary).

Table 2.2. Nigerian poverty reports

	2004	**2010**	**2011**
Estimated Population (million)	126.3	163	168
Relative Poverty (% of population)	54.4	69.0	71.5
Absolute Poverty (% of population)	54.7	60.9	61.9
Dollar Per Day (% of population)	51.6	61.2	62.8

Source: National Bureau of Statistics (2012)

[12] According to the National Bureau of Statistics (2012), "relative poverty" is defined by making reference to the living standards of the majority in a given society.

[13] According to the National Bureau of Statistics (2012), "absolute poverty" is defined in terms of the requirements necessary to afford minimal standards of food, clothing, healthcare, and shelter.

[14] According to the National Bureau of Statistics (2012), the dollar-per-day measure refers to the proportion of those living on or beneath the US$1 per day poverty line.

Table 2.3. Proportion of Nigeria's population in poverty from 1980 to 2010

Year	Poverty Incidence (%)	Estimated Population (Millions)	Population in Poverty (Millions)
1980	27.2	65	17.1
1985	46.3	75	34.7
1992	42.7	91.5	39.2
1996	65.6	102.3	67.1
2004	54.4	126.3	68.7
2010	69.0	163	112.47

Source: National Bureau of Statistics (2012)

By contrast, in Ghana, a similar resource-developing country, poverty has decreased (see Figure 2.2).

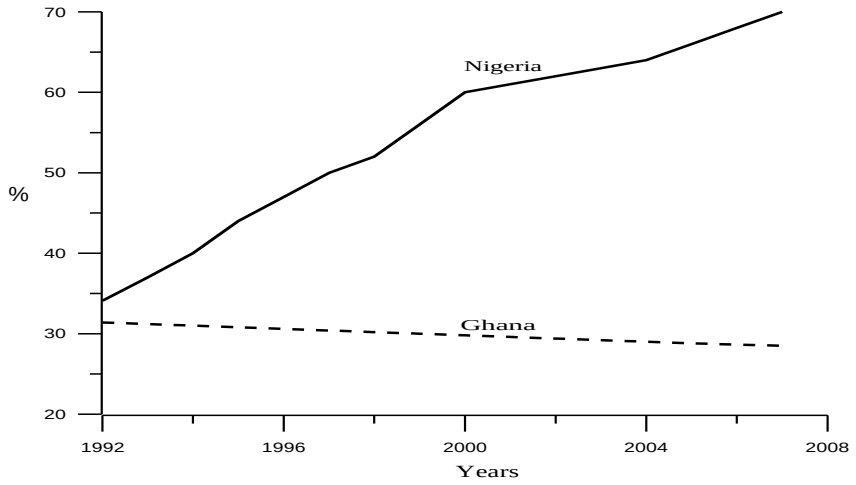

Figure 2.2. Population below the poverty line in Nigeria and Ghana
(Source: computed from Index Mundi, 2012d, e)

2.7.1.5 Literacy Rate

Education can serve as a measure of growth or development for a country (Igbuzor, 2006; UNESCO, 2011). Igbuzor (2006) observed that education could empower people to improve their political and social participation, health, and productivity while reducing negative effects such as HIV/AIDS, crime, drugs and alcohol abuse, early pregnancy, maternal and infant mortality, and child labor. When related to ASM, low literacy can also have adverse effects.

Regionally, Nigeria has the lowest literacy rate when compared to other resource-rich developing countries in SSA, like Botswana and South Africa. A nine-year comparison of the

literacy rates between these countries shows that Nigeria had the lowest literacy rates, followed by Botswana and South Africa, respectively (see Figure 2.3 below).

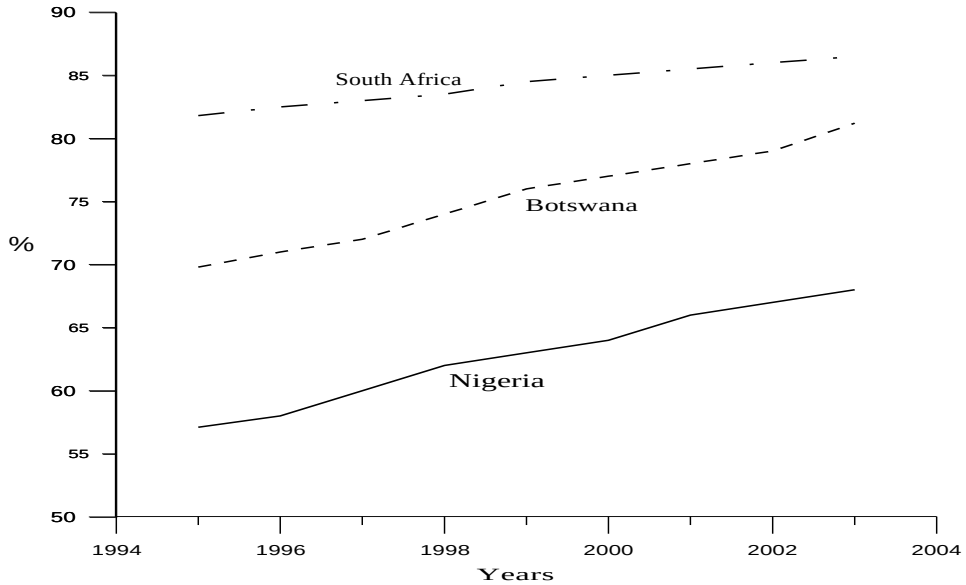

Figure 2.3. Literacy comparison between Nigeria, Botswana, and South Africa (1995-2003)
(Source: computed from Index Mundi, 2012a, b, c)

Over the years, the allocations to education by the federal government of Nigeria have declined and are below the minimum demanded by UNESCO (Igbuzor, 2006; Ozohu-Suleiman, 2011; Alaba, 2012). UNESCO demands a minimum of 26% allocation of national budgets to education (Alaba, 2012). Reports by Igbuzor (2006) and Ozohu-Suleiman (2011) on the educational sector in Nigeria show that the federal government's expenditure on education between 1997 and 2001 was below 10% of overall expenditure (see Table 2.4). Most recently, in the last budget of 2012, the federal government of Nigeria allocated ₦400.15 billion (~US$2.5 billion) to the education sector, out of a total budget of ₦4.749 trillion (~US$30 billion). This represents 8.3% of the total budget, well below the 26% recommended by UNESCO. For there to be a growth in the level of education in rural communities in Nigeria, the government needs to increase its allocation/expenditure on education.

Table 2.4. Federal budgetary allocation for education in Nigeria

Year	%
1995	**7.2**
1996	**12.32**
1997	**17.59**

1998	**10.27**
1999	**11.12**
2000	**8.36**
2001	**7.00**

Source: Ozohu-Suleiman (2011)

2.7.1.6 Governance

Administratively, Nigeria became a federal republic in 1963 after gaining independence from Britain in 1960. Since the return of democracy in 1999, Nigeria has been practicing the presidential system. The government is made up of three arms and three levels. The three arms are the executive, the legislative, and the judiciary. The three levels are the federal, state, and local governments. In total, Nigeria has 36 states (grouped into six geo-political regions: north-east, north-west, north-central, south-east, south-west, and south-south), 774 local government areas, and six area councils of the Federal Capital Territory (Abuja).

Before 1999, Nigeria was governed by the military for almost two decades, and this hampered the growth of many industries, including mining (see Appendix 1). This style of government did not offer any stability because ministers were constantly changed without notice or due process (see Appendix 1) (Eyre & Agba, 2007). These frequent ministerial changes often led to policy enactments and policy reversals. Though the past decade has witnessed civilian rule, the mentality of the ruling elite still appears tyrannical, like the authoritarian military regimes that preceded democracy (a legacy of imperialism and colonialism), and this has severely hampered the growth of the ASM sector.

2.7.2 Study Region

This study was conducted across three neighboring states in the north-central geo-political region of Nigeria where the bulk of artisanal mining occurs (Figure 2.1). This region constitutes about 27% of the total land area and 13% of the total population of the country (National Bureau of Statistics, 2009, 2010, 2012). The study states constitute about 55% of the total land mass and 42% of the population of the region (National Bureau of Statistics, 2009, 2010, 2012). The region is marked by two distinct climatic seasons (rainy and dry seasons) and falls within the savannah vegetation zone, with average annual rainfall of 1000 mm and temperatures of 25–30 °C (Rock Crystal Ltd., 2005). Agriculture and mining are the two major economic activities in this region. Yam, rice, tomatoes, and potatoes are some of the main

agricultural products (Rock Crystal Limited, 2005), while the major minerals mined by artisans include gold, columbite, tin, tantalum, gemstones (emerald and tourmaline), barite, gypsum, limestone, kaolin, rock aggregate, and salt (Rock Crystal Limited, 2005; Michelou, 2006). Available data show that the region had a 278%[15] increase in mineral revenue from 2006 to 2007 (see Table 2.5) (MMSD, 2007).

Table 2.5. Regional mineral revenue from 2006 to 2007

Regions	**2006 Total (₦)**	**2007 Total (₦)**	**Absolute Change**	**% Change**
North-east	48,075,435.00	38,589,760.00	6,486,675	-14.4
North-west	31,908,342.62	56,665,087.58	24,765,766.96	78
North-central	26,733,523.60	101,176,215.97	74,442,692.37	278
South-east	37,782,444.20	33,156,951.80	4,625,492.40	-12.2
South-west	155,522,261.00	189,365,321.09	33,843,060.09	22
South-south	54,320,604.89	69,174,742.27	14,845,137.38	27.3
FCT	50,626,267.07	54,873,931.46	4,247,664.39	8.4
Total	401,978,878.38	543,002,010.17	141,023,131.79	35

Source: MMSD, 2007

The number of ASM sites/operations in this region cannot easily be estimated because of the large number of illegal artisanal miners. The illegal sites are usually affected by factors such as seasonality, migration of artisans for alternative livelihoods, global mineral price changes, and exhaustion of deposits (Rock Crystal Limited, 2005).

[15] The average inflation rate in Nigeria for the past 13 years is 11.96% (Index Mundi, 2013).

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter describes the methods used in collecting and analyzing the data for this study. It begins with a brief overview of the philosophical foundations guiding those methods. A detailed description of the fieldwork, data collection procedures and logical basis for the selection of study participants follows after that. Finally, the procedures used to analyze the data are discussed, and the approach to rigor is explained. The chapter concludes with a discussion of the author's role as a researcher, and the limitations of the study.

3.2 Research Design and Philosophical Views

The design, conduct, and methodologies adopted for this research are grounded within the social constructivist philosophical assumptions based on its ontological, epistemological, axiological, methodological, and rhetorical rationales (see Table 3.1) (Bernard, 2000; Creswell, 2003, 2007). Social constructivists believe that objective truth and knowledge are constructed from human perceptions rather than outside human thoughts (Baxter and Eyles, 1997; Guba and Lincoln, 1994). In agreement, the researcher adopted the social constructivist paradigm because he shares the belief that the truth and knowledge about ASM are socially constructed. In addition, constructivism is the most suitable approach for answering the research questions because it allowed the researcher to subjectively understand the drives for ASM diversification, the impacts, and the best practices. Other qualities of the social constructivist approach are summarized in Table 3.1. This approach is different when compared to other conventional paradigms like positivism or post-positivism (Baxter and Eyles, 1997; Guba and Lincoln, 1994).

Table 3.1 Qualities of Constructivist approach

Worldview Aspect	Social Constructivism
Ontology (What is the nature of reality?)	Multiple realities (the researcher provided quotes to illustrate different perspectives from study participants)

Epistemology (What is the relationship between the researcher and that being researched?)	Closeness (the researcher visited participants at their sites to collect data)
Axiology (What is the role of values?)	Biased (the researcher actively talked about his biases and interpretations)
Methodology (What is the process of research?)	Inductive (the researcher started with participants' views to build "up" to patterns, theories, and generalizations).
Rhetoric (What is the language of research?)	Informal style (e.g., the researcher's writing is in a literary, informal style)

Adapted from Creswell (2003)

3.3 Fieldwork

Qualitative data gathering was selected for this study because it is rooted within the social constructivist paradigm and allows for greater levels of insight into individual respondent perceptions over that of a quantitative approach. According to Creswell (2003), a qualitative approach is one in which the investigator frequently makes knowledgeable claims based primarily on constructivist perspectives or advocacy/participatory perspectives, or both.

Personal interviews were chosen as one of the primary data collection methods for this study for the following reasons:

1. interviews are flexible and sensitive to the social context in which data are collected or produced. This involves an in-depth understanding of human behavior and the reasons that govern human behavior (Jorgensen, 1989; Dunn, 2005; Kearns, 2005; McGuirk, 2005);
2. they enhance data so that cases can be more clearly understood (Dunn, 2005).
3. They are based on analysis methods that involve complex, detailed and contextual comprehension (Jorgensen, 1989; Mason, 1996); and
4. there is no 'right answer' to the research questions, and the data collected will be primarily based on people's interpretations and researcher observation (Minichiello et al., 1990; Vanclay, 2002).

Participatory observation was chosen as a secondary data collection method for this study because it can enable the researcher to:

1. acquire an in-depth understanding of human settings and human-lived experiences within the study sites (Winchester, 2000; Miles & Huberman, 1994; Patton, 1990);
2. incorporate data from previous field seasons (Baxter, 2000);
3. gather additional descriptive (ethnographic) information (Dunn, 2005; Creswell, 2003);
4. understand community settings through direct personal experience; and
5. Triangulate findings by comparing interviews from various sources with researcher observations.

The research involved four key phases of inquiry. The first phase began in 2008 with a review of documents and socioeconomic data from the Federal Ministries of Mines Development, and Environment in Nigeria, as well as scholarly literature relating to ASM and livelihood diversification. This review allowed for reconstruction of the policy context and history of ASM and the environmental and social systems in Nigeria (Omorogbe, 2002). Likewise, through a comparative review of related literature, gaps in prior research were revealed, which formed the basis of this study.

The second phase (which marked the commencement of fieldwork) was conducted in the summer of 2009, involving field interviews with stakeholders and individuals. Prior to the commencement of this phase, an interview guide (Appendix 2) was developed and received Research Ethics Board approval (Appendix 3). Telephone calls were made and letters were written to selected participants to gain their consent (see Appendix 4). This early contact facilitated meeting with participants and entering selected study sites. During these field visits, meetings were held with bureaucrats overseeing the MMSD in order to obtain information about the historical context of solid mineral mining and ongoing programs directed towards ASM, and to introduce the study and its potential benefits. Secondly, visits were made to eleven communities (Appendix 5) within three states in central Nigeria (Figure 2.1): Niger state (which hosts metal deposits, industrial minerals, and aggregates); Plateau state (which hosts tin and coltan); and Nasarawa state (which hosts metals, gemstones, and industrial minerals). These field visits (which lasted three months) were part of a largely reconnaissance field study to become familiar with participants (and vice versa) prior to in-depth interviews and participant

observations in 2010 and 2011. Approximately one month was spent doing interviews with community participants in each of these states. In general, a total of 46 interviews were completed across these 11 communities during this phase, but since the research focused on four selected communities (due to the presence of licensed operators and distinct mining practices), this study only considered those particular interviews for analysis. As a result, only 24 interviews were considered out of a total of 46 in this phase (see Appendix 5).

The researcher also spent time in the capital Abuja, researching archival material and interviewing 18 public servants (15 bureaucrats and three elected policy makers), three pro-mining Non-Governmental Organization (NGO) representatives, and three business representatives (two private business owners and one mineral dealer; Appendix 5). These interviews were conducted in order to obtain a general view of the larger population (participants) on the current state, constraints, and prospects of the mining sector in Nigeria.

The third phase was conducted during the summer of 2010, lasting for two and a half months. Key activities included further interviews and participant observation. Time was spent conducting interviews and assessing (observing) key economic, social, and environmental indicators (set out by this study for measuring the level of community development and the impact of mining). This phase focused on four communities (communities A, B, C and D) that were selected from among the previous eleven visited in 2009 in north central Nigeria. The decision to undertake further research within the four selected communities was based on the fact that they had licensed ASM operators and distinct ASM practices (see Appendix 6). The other communities were eliminated due to time constraints and the fact that they shared similar ASM practices. Twelve additional follow-up interviews (six in community A, two in community B, three in community C, and one in community D) were conducted using the same interview guide (Appendix 2) from phase 2. These additional interviews were added in order to augment interviews already conducted in these selected communities in phase 2. In all, 36 interviews were conducted in the four selected communities during phase 2 and 3 field seasons. Participant observation was only performed in communities A, B, and C in this phase due to time and budget limitations. Participant observation for community D was executed in the final field session.

The fourth phase was conducted in the summer of 2011 and lasted three weeks. Two weeks were spent engaging in participant observation in community D. After the participant observation, a week was spent member-checking (an act of presenting and verifying results with participants; Baxter & Eyles, 1997). A total of ten meetings were held to discuss initial research findings, obtain final views and comments from participants, and also to see whether the conditions observed during previous fieldwork had changed. A schematic representation of the field activities and the key stakeholders is summarized in Figures 3.1 and 3.2. Table 3.2 summarizes field activities alongside the targeted objectives.

Figure 3.1: Schematic representation of fieldwork design

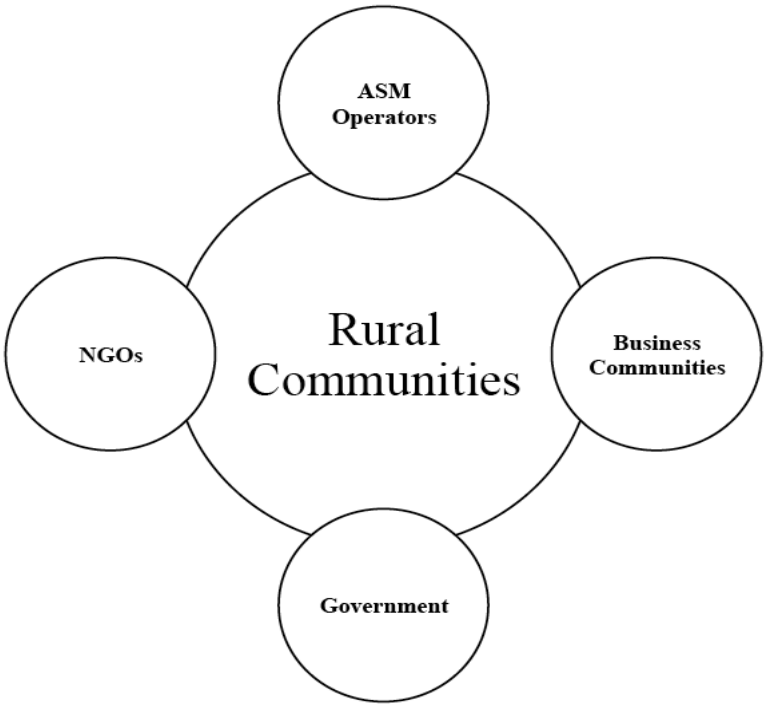

Figure 3. 2. ASM stakeholder map

Table 3. 2. Field activities and Summary of objectives

Field Activities	Targeted Objectives
Semi-structured interview	- To gather data on direct and indirect experiences of ASM: including ASM drivers, income levels, constraints, and opportunities. - To gather data on social and environmental impacts of ASM. - To gather data related to ASM governance and programmes. - To gather opinions on the way forward for the ASM sector.
Participant observation	- To assess the level of employment/unemployment, commerce, and other livelihood activities. - To assess the level of infrastructures: including the presence or lack of leisure facilities, healthcare facilities, educational facilities, pipe-borne water, adequate roads, and modern housing. - To assess the level of environmental degradation and operational risk. - To assess the level of security, and crime.

3.4 Processes used for Collecting Data

3.4.1 In-depth Interviews

In-depth interviews were chosen in order to access people's thoughts and ideas in their own words (Reinharz, 1992). These were held with participants that the researcher met during the field visits in the summers of 2009 and 2010. Before the commencement of the interviews, an interview guide (Appendix 2) was developed based on a list of issues that developed during the first phase of data collection. These issues covered all aspects related to mining such as social, environmental, and economic impacts. The interview guide was designed to suit all participants, and it evolved during the data collection process. Sometimes it was modified to incorporate issues discovered in previous data collection processes. But generally, the interview guide was semi-structured as recommended by Miles and Huberman (1994) and Maxwell (2005). These authors recommend that researchers with limited experience and time in the field should generally adopt a more pre-structured approach than those with longer research experience and timeframes. Subsequently, the interviews were semi-structured in style in order to encourage in-depth discussions of issues deemed important to the interviewees. It was also structured to keep the interviewees focused on mining related issues. Although the interviews were semi-structured, the style of questioning was suited to the particular participant in order to put them at ease during the interviews (Ross, 1990). Interviews generally followed a conversational style in order for participants to retain control over the interview process and to build rapport. During the

interviews, participants were asked for their perspectives on issues concerning the economic, social, and environmental aspects of mining.

Interviews with artisanal miners and ASM operators were held at mining sites, whereas interviews with policymakers, government officials, and NGOs were held in their respective workplaces. Interviews with community chiefs and other community members not directly involved in mining were held in their homes. Among all the interviews, the ones held in participants' homes ensured privacy and provided a more comfortable environment in comparison with the rest of the interviews. Participants generally dictated the pace and rules of the interaction. Interviewing artisanal miners at mining sites was an important aspect in understanding their experiences and establishing a cordial relationship.

At the beginning of the interviews, the researcher explained the nature and objectives of the study. When participants were capable of reading and writing, they received a letter of introduction (see Appendix 4) explaining the purpose of the study and how their participation would be kept confidential. The letter was read and translated by a translator whenever participants could not read and write in English. The researcher received verbal/signed informed consent from all participants. The method of recording the interview (both written notes and tape) was discussed and agreed to by each participant before it began. At the end of the interviews, most of the participants were asked for feedback on how they felt about taking part in the research, and most expressed satisfaction and also showed an interest in learning the final results of the study, and the recommendations that could help the advancement of the ASM sector.

English was the language used for 58 of the interviews, with the remaining 24 interviews done in Hausa, using translators. The interviews lasted from 9 to 60 minutes (see Appendix 5). The recorded interviews and field notes were later translated (where necessary) and transcribed for analysis.

3.4.2 Participant Observation

According to Jorgensen (1989), participant observation is suited for studying processes, relationships among people and events, the organization of people and events, continuities over time, and patterns as well as the immediate socio-cultural context in which human existence unfolds. For this study, participant observation was used for data collection in the second, third,

and fourth phases. It was sparingly used in order to learn about the communities and to build relationships with some of the participants during researcher's initial visit in the second phase. However, it was used extensively in the third and fourth phases to complement data obtained during in-depth interviews. It involved everyday interaction, informal questioning, meetings, and informal discussions with participants at mining sites in communities A, B, C, and D. The informal questioning and discussions provided the platform for discussing issues that arose from the in-depth interviews and researcher's earlier observations. In some cases the informal questioning and discussions created avenues for the in-depth interviews.

The researcher's personal findings (experiences, observations, and assessments) were recorded in a field notebook at the end of each visit. These notes were then transcribed into organized themes and codes according to researcher observations. A preliminary analysis was then undertaken that entailed objective reasoning, and empirical comparisons of observed commonalities and differences identified in indicators across the communities. This helped the researcher make comparisons within emerging patterns from the data.

In each of the four communities, the researcher first visited the community's chief leader to confirm consent, to reaffirm the reasons for doing participant observations, and explain his role. The researcher employed local assistants who guided him through the communities. These assistants came from the communities and were familiar with activities in the area; they also provided answers to some of the researcher's informal questions regarding the indicators. These observations were made during visits to different mining sites and non-mining sites. During visits to non-mining sites such as community squares, the researcher asked informal questions and observed the availability and present conditions of infrastructure and facilities such as roads, electricity, potable water, clinics/hospitals, and schools. After visits to non-mining sites, the researcher daily visited the mining sites in order to interact with the participants (artisanal miners) during and after mining activities. The purpose of these repeated visits was to reduce the effect that the researcher's presence might have on the participants' behavior (Jorgensen, 1989; McNabb, 2010).

During the daily visits to the mining sites, the researcher observed and asked informal questions pertaining to the level of mining done, how it was done, average daily income of the miners, the level of mineral trading, those involved in this trading, what other forms of economic

activities occurred, the risks involved in mining, the level of environmental damage from the mining, and logistical problems encountered during mining. These daily visits enabled the researcher to gain firsthand information regarding all the activities that actually go on at these sites.

3.5 Study Participants

Key participants for this study were purposively selected (Patton, 1990; Miles & Huberman, 1994; Bradshaw & Stratford, 2000) to provide a cross-section of all the stakeholders involved in the ASM sector (Figure 3.2; see Appendix 5 for a listing of interviewees by occupation). Participants and their reason for selection included:

1. community heads, local miners and their families based on direct personal experiences with mining, local, social, environmental, cultural, and government issues;
2. business representatives, community dwellers, and others not directly involved in mining to ascertain indirect experiences of the effects of mining on the local communities;
3. ASM operators in order to ascertain their experiences with business constraints and opportunities, and opinions on government regulation;
4. policymakers and politicians, and civil servants in the mining, environment, women, and justice departments to get larger-scale economic, environmental, and social perspectives on government issues and regulations; and
5. local and international NGOs in order to hear alternative perspectives on poverty, the environment, human rights, social and cultural issues, and sustainability.

Stratified purposeful sampling (Patton, 1990; Miles & Huberman, 1994; Bradshaw & Stratford, 2000) was employed in the selection of participants to maximize the similarities and variations of perspectives across the participating groups (Baxter & Eyles, 1997). This form of sampling focused on the selection of participants with differing expertise within the research who constitute different sub-groups within the selected participant groups (Patton, 1990; Miles & Huberman, 1994; Baxter & Eyles, 1997; Bradshaw & Stratford, 2000).

Thus, the study sample size of 36 participants (Table 3.3) from communities A, B, C, and D, was aimed at documenting the opinions and perspectives of key informants who were purposively selected because of the experience they could bring to the topic of interest (Miles &

Huberman, 1994; Kvale, 1996; Baxter & Eyles, 1997; Strauss and Corbin, 1998; Bradshaw and Stratford, 2000; Gubrium & Holstein, 2000; Winchester, 2000). Authors such as Strauss and Corbin (1998), Silverman (1993, 2000), and Baxter and Eyles (1997), stress that the number of participants required for any credible research project is a function of the purpose and nature of the study as well as the number of experiences a study requires. All the participants involved were adults above the age of 18.

Table 3. 3. General summary of interviews conducted in communities A, B, C, and D

Community A	9
Community B	9
Community C	9
Community D	9

3.6 Data Analysis

According to Kvale (1996), Lindsay (1997), Miles and Huberman (1994), and Neuman (2000, 2003) qualitative data analysis involves gathering large and complex interview data into a presentable format for the reader. Marshall and Rossman (1989, p. 112) described data analysis "as the process of bringing order, structure, and meaning to the mass of collected data." They also described data analysis "as a messy, ambiguous, time-consuming, creative, and fascinating process."

This study adopted the grounded theory analytical method from Strauss and Corbin (Strauss & Corbin, 1994). The end product of this method of analysis is the generation of a theory grounded in empirical data (Strauss and Corbin, 1994, 1998). Data analysis took place throughout all phases of the research process and involved continuous interaction with the data collected to construct theoretical standpoints. Open coding, axial coding, and selective coding are three major sequential analytical stages outlined by Strauss and Corbin (1998) for researchers adopting a grounded theory approach. According to Strauss and Corbin (1998), a researcher needs to be open-minded about what is to be extracted from the data until the coding process gets to a point of saturation. This entails examining text for salient categories and applying labels or codes. Strauss and Corbin (1998) called the action of exploring relationships of codes with each other and making connections between them axial coding, whereas selective coding entails being selective and choosing certain codes to help develop one's ideas or theory.

3.7 Data Analysis Description

The interview recordings were played back in order to identify patterns and themes as they emerged, to ascertain whether data saturation points had been reached, and to determine if additional or follow up interviews were necessary (Strauss and Corbin, 1998). All interviews and field notes were then transcribed and edited for repetitive and extraneous material. According to Miles and Huberman (1994), Neuman (2000), and Peace (2000) the essence of editing is to ensure that transcribed data remain relevant to the research focus. All transcribed data from the field visits were later imported into Nvivo software (Richards, 1999). Nvivo is a qualitative data management and analysis program that is capable of running queries, and coding then arranging codes into themes, and displaying results in visual formats. It is designed to aid users in handling both structured and unstructured qualitative data (Miles & Huberman, 1994; Bazeley & Richards, 2000; Peace, 2000).

Three stages of data analysis were employed for this study. In the initial stage, data was openly coded by examining the text for salient categories and labeling them accordingly (Table 3.3). During the axial coding stage, connections among categories were made by exploring the conditions that give rise to ASM, the context or circumstances that form the setting of ASM activity, the actions or strategies that people use to carry out ASM, and the consequences of those strategies. This thematic grouping was done in order to understand the relationships between the categories and how they relate to the study phenomenon (Miles & Huberman, 1994; Strauss & Corbin, 1998; Baxter, 2000; Neuman, 2000). In the selective coding stage, core categories were systematically identified and then related to other categories, forming the basis for the theoretical ideas presented (Straus and Corbin, 1998). Selective codes (Table 3.4), sometimes referred to as the "core-codes" (Straus and Corbin, 1998), were used to identify certain key areas that are central to the whole framework.

Table 3.4: Derivation of major codes and themes

Open codes	Axial codes	Major themes	Selected codes
3.4.2 Employment 3.4.3 Act of survival	- Seasonal employment opportunities, poverty and hunger reduction	Economic issues	• Job creation • Wealth creation • Poverty reduction
• Mineral • Act of mining	- Availability of minerals and high global mineral prices - Economic activity		
• Act of farming	- Rainy seasons, drought periods, and seasonal		

	employment		
• Trading	- Mineral traders, sponsors, and community market		
• Equipment	- Limited mining equipment		
• Amenities	- Lack of infrastructure and basic amenities		• Infrastructure and basic amenities
• Accessibility and ownership • Sharing act	- Mining laws, norms, and institutional practice		• Benefit sharing
• Risk and profitability	- Group sharing act		
• Behavior	- Cultural attitude and practice		• Business attitude
• Education	- Low level of education and technical know-how	Social issues	
• God	- Religious beliefs		
• Risk	- Group sharing act		
• Stakeholders	- Government, artisanal miners, communities, companies, and NGOs		• Stakeholder participation
• Pollution	- Land degradation and land filling	Environmental issues	• Environmental practice

Since the main focus of this study concerned four selected communities (due to their different ASM ownership and management practices), Neuman's (2000) analytical methodology on agreement was adopted to identify similarities across the communities (Table 3.5; see also Garvin et al., 2009).

Table 3.5: Community hypothetical agreement

Experiences	Community A	Community B	Community C	Community D
Ancestral home (U)	U	U	U	U
Pre-mining economic activity (V)	V	V	V	V
Present economic activity (W)	W	W	W	W
Presence of licensed ASM operators (X)	X	X	X	X
Type of mine ownership/practice (Y)	A	B	C	D

Adapted from Neuman (2000)

Based on Neuman (2000), all four communities shared four major hypothetical experiences as denoted by letters U, V, W, and X in Table 3.5 (see also Appendix 5), but differed in one major experience (Y). Neuman's (2000) "method of agreement" technique was adopted because an objective of this study was to understand the type of rights and access schemes that are most effective for stimulating growth of the ASM sector. Thus, by drawing on similarities and comparisons among communities, the data were organized around certain contexts to

strengthen the theoretical ideas. For instance, artisanal miners often compared their mining and ownership practices with others found within or outside the country; sometimes comparing the amount of money they could earn if they had certain prevalent conditions.

By using selected codes/themes (Table 3.3) and summaries of text from interviews, memos, and field notes (see Chapter 4) this study was able to reconstruct the communities' experiences and the relationship of these experiences in conjunction with stakeholders (Baxter, 2000). The researcher sought to ensure that preconceived notions did not cloud the experiential derived concepts (Neuman, 2000).

3.8 Verification of Results and Ensuring Rigor

According to Baxter and Eyles (1997), the results of good qualitative research should meet the following criteria: they must be credible, reliable, transferable, and confirmable (Baxter & Eyles, 1997). By being credible, ordinary people should easily be able to understand the results, and participants' experiences should be reconstructed in a way that readers can relate to the description (Baxter & Eyles, 1997). Some techniques listed by Baxter and Eyles (1997) in order to achieve credible research results include appropriate sampling procedures (such as purposive sampling), peer de-briefing, and prolonged engagement of a researcher with participants and the study setting. For this study, stratified purposeful sampling (Patton, 1990; Miles & Huberman, 1994; Bradshaw & Stratford, 2000) was employed in the selection of participants in order to maximize the similarities and variations of perspectives across the participating groups (Baxter and Eyles, 1997). The researcher made sure that all participants were de-briefed during member-checking. The participants that could not be reached during member-checking were de-briefed through telephone communication. Together with the actual data collection period of six months, the researcher engaged with the communities for about nine months. To some extent, this enabled the researcher to meet the criterion of prolonged engagement within the study setting.

In terms of qualitative research reliability, Baxter and Eyles (1997) reason that some interrelated techniques can increase reliability, including mechanically recorded data and low inference descriptors. Mechanically recorded data (such as field notes, audio and video recordings of interviews) and low inference descriptors (such as verbatim or direct quotation transcriptions) are techniques for verifying synchronization between data sets and interpretation.

Interviews were audio-recorded and transcribed verbatim for analysis.

Baxter and Eyles (1997) defined transferability as the capacity to apply research findings to settings other than the study context. According to Baxter and Eyles (1997), the researcher needs to engage in multi-site studies as well as present clear and comprehensive descriptions of the study context in order to be able to achieve transferability. For this study, four mining communities were selected for in-depth study in 2010 and 2011 after the initial reconnaissance study in 2009. The researcher also presented a broad description of the study area (see Chapter 2) to provide background knowledge about the study region, and how it compares with other global settings.

Baxter and Eyles (1997) posit that qualitative research is confirmable if the researcher situates him/herself within the research design. The researcher was able to position himself both as an insider and outsider in order to be able to have a meaningful understanding with participants (see Appendix 8; Edwards, 1993; Copper, 1994; 1995; Mullings, 1999). As a member of the larger Nigerian community who was born around these communities, the researcher viewed himself as an "insider" (Mullings, 1999; Edwards, 1993), and this "insider" position offered a variety of advantages during the course of this study. First, it facilitated easy access to participants and also created a meaningful working understanding. This made it possible for the researcher to be seen more as a friend rather than a professional researcher (Witcher, 2010).The researcher's deep understanding of the customs and traditions of the communities also contributed to easy access. Secondly, the researcher's fluency in the local Hausa language spoken in these four communities aided in the conduct, translation, and transcription of the interviews (Witcher, 2010).

Not being ethnically related to any of these communities and residing outside the country placed the researcher as an "outsider" (Mullings, 1999; Edwards, 1993), offering some advantage in reducing the bias associated with this type of study (Mullings, 1999; Edwards, 1993). For example, the researcher was seen more as someone who could present the true situation of life in these communities without fear of coercion from authorities because he resides outside the country.

Some other strategies adopted to add rigor included: the use of standardized interview

guides and a willingness to show details of interview practices (if needed); returning to the University to present and review preliminary results to and with colleagues outside the study area; data analysis and interpretation throughout the data collection process; re-visitation of study sites in 2011 to present and verify results with study participants, and collection of data from people with different points of view and understanding. This study also adopted data and method triangulation. For example, the researcher visited different communities, and used different data sources and methods (interviews, observations, and documents) to build strong justification for identified themes (Baxter & Eyles, 1997; Tashakkori, 1998). In general, triangulation added depth and increased the reliability of the research data (Thurmond, 2001). It also provided clearer understanding of the problems faced within communities in relation to the subject matter (Porter, 1989; Thurmond, 2001).

3.9 Dissemination and Application of Results

Research results were disseminated to participants, relevant government agencies, NGOs, researchers, academic audiences, and other interested persons. All study participants received provisional results throughout the course of the study. In May 2011, the researcher returned to the study sites to provide the participants with detailed results. They also received verbal information during visits. The researcher held meetings and provided written reports to government agencies, companies, lawmakers, and other participants. Participants who could not be reached during the final visit were informed through telephone communication. Verbal feedback during discussions of the preliminary results with participants helped to confirm or clarify questions relating to the translated and transcribed interviews. This helped to improve the credibility of the data. Copies of the final results will be provided to participating communities, government agencies, NGOs, and companies. Information will be disseminated to the academic community through peer-reviewed papers in international journals and conferences.

3.10 Study Limitations

This research study is an exploratory and descriptive study initiated mainly to understand the practice of ASM in four rural Nigerian communities. Participants' views were documented to help identify and understand the challenges that inhibit communities with mineral resources from effectively using the practice of ASM to support rural-scale community developmental objectives such as employment, poverty and hunger reduction, and provision of basic community

infrastructure and services. Subsequently, this study did not make any physical measurements of the selected indicators used in this study (see Appendix 7). This means that the actual economic, social, and environmental effects shown by the selected indicators cannot be precisely determined from the study results. The researcher mainly used participants' perceptions because they are in the best position as subjects of change to understand any positive or negative consequences of mining (Macfarlane & Akabzaa, 1999; Vanclay, 2002). Therefore, participants' views were a useful roadmap in reconstructing reality in mining communities.

Secondly, due the large amount of data generated, triangulation may have disharmonized the data, creating false interpretations, and conflicts in the theoretical framework (Banik, 1993; Thurmond, 2001). Nevertheless, the researcher made sure that thematic data analysis (using the Nvivo software) was done alongside data collection. This helped in reducing the large amount of data generated.

Time and budget constraints also limited the scope of this research study. It would have been useful to extend the time spent doing participant observation and member-checking with participants to ensure accuracy of interpretations. Likewise, the interview transcripts were not audited by the researcher's supervisory committee or any other person with knowledge of the Hausa language due to time and budget constraints. Nevertheless, the researcher made sure to the best of his ability, that the interviews were translated and transcribed verbatim.

Language difficulties may also have adversely affected the quality of responses to the interview questions. This necessitated the use of an interpreter where the local language was not Hausa, and this may have affected the quality of information. For the 60 interviews included in the analysis, 36 interviews were done in English, and 24 were done in Hausa. The interviews in Hausa were translated by professionals fluent in both Hausa and English, and were crosschecked by the interpreter and the primary researcher.

Furthermore, the researcher used purposive sampling to select the study participants. This may have introduced some bias because purposive sampling sometimes entails selecting participants with knowledge in the topic under research. Nonetheless, the researcher stratified his selection process to represent all stakeholders, all of whom willingly participated.

The limited extent or non-existence of previous studies done in these communities also affected the width of data gathered. Vital community demographic information was lacking from these communities, which made it difficult to crosscheck or validate some of the data obtained from these communities.

Finally, the researcher's interests, values, beliefs, past academic and working experiences, as well as motivation in selecting the research topic may have also combined to influence the data collection and results interpretation. However, to enable readers to assess the aptness and worthiness of the research analyses (Guba & Lincoln, 1994), the researcher's underlying values are self-recognized and described in Appendix 8.

3.11 Conclusion

This research is firmly rooted in the constructivist philosophical paradigm; therefore, the researcher mainly employed a qualitative technique in data collection and interpretation. This exploratory and descriptive approach is important in advancing the understanding of the drives, opportunities, and challenges of ASM. Participants were selected representing a cross-section of the communities, government, companies, NGOs, and general public. Four communities were selected for participant observation and in-depth interviews. The researcher selected communities with ongoing mining activities to aid in answering the research questions. The data were analyzed and interpreted in line with the grounded theory approach of Strauss and Corbin (1998).

CHAPTER 4

RESEARCH FINDINGS

Picture 1. An ASM group in one of the study communities

4.1 Introduction

Results of the field study are presented in this chapter, beginning with a description of the communities researched and participants involved, and followed by ASM setup and practices. Next, the drivers behind community involvement in ASM are presented, followed by the economic, environmental, and social impacts of ASM. Finally, the chapter concludes by presenting the challenges and the incentives for ASM organization and formalization. These findings provide a contextual background for discussions in subsequent chapters. Direct quotations from transcripts are used throughout the presentation to clarify links between data (themes), interpretation, and conclusions (Beck, 1993; Greenhalgh & Taylor, 1997; Spencer et al, 2003; Long & Godfrey, 2004; Corden & Sainsbury, 2006).

4.2 Study Community Demographics

Contrary to the notion that ASM communities are often built and populated by migrant miners, the four selected communities (A, B, C, and D) in this study are all indigenous settlements and share similar economic, physical, and social characteristics (see Appendix 6). Though most of the inhabitants in these communities live locally, there are a few inhabitants who commute from other localities within the north-central region. Hausa is the common language spoken in all four communities. Islam is the dominant religion in communities A, C, and D, whereas Christianity is dominant in community B. Among the four communities, only community B has an ongoing history of mining activities. Farming was the dominant pre-mining economic activity in these communities and is still a livelihood occupation today, though usually only during the rainy seasons (for subsistence purposes). Artisanal small-scale mining is currently a major livelihood activity in these communities, and community members usually get involved in ASM activities in small groups. Despite the abundance of mineral resources and ASM activities, these communities still lack such amenities as pipe-borne water, health care facilities, modern housing facilities (e.g., flush toilets), a reliable source of electricity, and social/leisure facilities (see Appendix 7 for results of participant observation). All these communities are accessed by paved and dirt roads constructed by the government.

These communities also share similar cultural and socio-political structures. Each community is headed by a community ruler (Sarki) who is usually a titleholder recognized by Nigeria's customary law, and is selected on a hereditary basis by the royal clan or appointed by

government (Francis and Akinwumu, 1996; interview data, May 2009). Clan chiefs (Mai Angwa) and elders make up the traditional ruling council and often assist the Sarkis in the making and execution of decisions/laws. In general, the Sarkis have the final say in every matter in the community (including consenting to mining operations; Francis and Akinwumu, 1996; interview data, May 2009). Like the ancient Igbo society, the communities in this study also have established norms and rules that guide personal and interpersonal behaviors. These norms/rules often outline various punishments or sanctions on individuals that defy them, which helps prevent certain issues like greed, stealing, and interpersonal conflicts. In essence, for someone to decide to be a member of these communities, that person must be willing to accept the norms/rules and sanctions even if they do not agree with them. Informal norms (as seen in some of the study communities) are usually complex (when compared to formal rules) due to the way they develop and function (Cleaver, 1999). As a result, an in-depth anthropological study is needed in order to fully comprehend how the institutional arrangements (or norms) in the study communities have been developed and established. This was not attempted. Instead, this study observed how the embedded norms and institutional arrangements functioned to influence participants' behaviors and beliefs, and how the norms were enforced. In general, norms played important roles within some of the communities studied. The motivations behind conformation to these norms are often based on an individual's fear of sanctions and segregation, or belief in an impending curse from a supernatural being.

4.3 Demographics of Study Participants

In each of the four communities (Appendix 4), the researcher interviewed one ASM operator and eight other individuals including community heads, artisanal miners, and residents. These groups were interviewed in order to obtain direct and indirect personal experiences of ASM. Socio-demographic characteristics of study participants (excluding the ASM operators) in communities A, B, C, and D are presented in Table 4.1.

Table 4. 1. Socio-demographic characteristics of participants in communities A, B, C, and D

Communities	Participants		Gender		Age range (years)			Education					Marital Status		Indigene	
	Miners	Non-Miners	M	F	18-29	30-49	50-69	IE	PS	JS	SS	None	Married	Single	Y	N
Community A	5	3	6	2	1	5	2	2	3	-	-	3	8	-	7	1
Community B	6	2	8	-	5	2	1	-	3	2	3	-	7	1	7	1
Community C	7	1	6	2	3	4	1	3	2	-	-	3	5	3	5	3
Community D	7	1	7	1	3	4	1	1	4	-	1	2	6	2	6	2
Total 32	**25**	7	**27**	**5**	**12**	**15**	**5**	**6**	**12**	**2**	**4**	**8**	**26**	**6**	**25**	7
M = Male, F = Female, IE = Islamic Religious Education, PS = Primary school, JS = Junior secondary, SS = Senior secondary, Y = Yes, N = No																

*ASM operators are not included in this table.

Outside the communities, the researcher interviewed 18 public servants (15 bureaucrats and three elected policy makers), three pro-mining Non-Governmental Organization (NGO) representatives, and three business representatives (two private business owners and one mineral dealer). The public servants were interviewed in order to have larger-scale economic, environmental, and social perspectives on government policies. The NGO representatives were interviewed in order to have alternative perspectives on poverty, the environment, human rights, social and cultural issues, and sustainability. Finally, the business representatives were interviewed for perspectives on business constraints, opportunities, and government regulations.

Within the 4 communities, 25 of the respondents were artisanal miners, whereas seven were non-miners. Twenty-three of the artisanal miners were males and two were females. The non-mining community respondents were four males (three community heads and one male dweller) and three females. The artisanal miners and the non-mining community respondents selected for this study were those found near the mining sites.

The educational level of the respondents in the four communities was generally low, with the majority (12) having only attained a primary (or elementary) education level. Community B had the highest education level, whereas communities A and C had the lowest level. Senior secondary education (or high school) was the highest level of education attained by any of the respondents (Figure 4.1). This suggests a low level of literacy and numeracy in these four mining communities, which is consistent with other published data on the educational level of

community inhabitants around the study region (Rock Crystal Ltd., 2005). In addition, physical observations (see Appendix 7) indicated that all the communities lacked functional schools and public libraries, and even where a functioning school was located nearby it lacked teachers, books, and materials for teaching and learning. This observation is in contrast to what is seen in urban areas. Figure 4.2 shows a cumulative description of the literacy level in all communities visited in the second phase of this study.

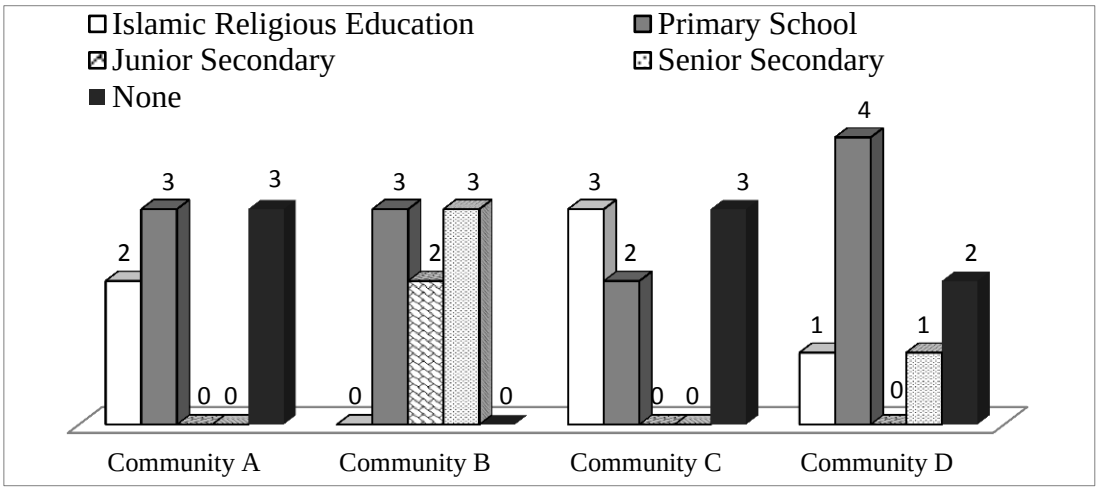

Figure 4.1: Educational levels of respondents from communities A, B, C, & D

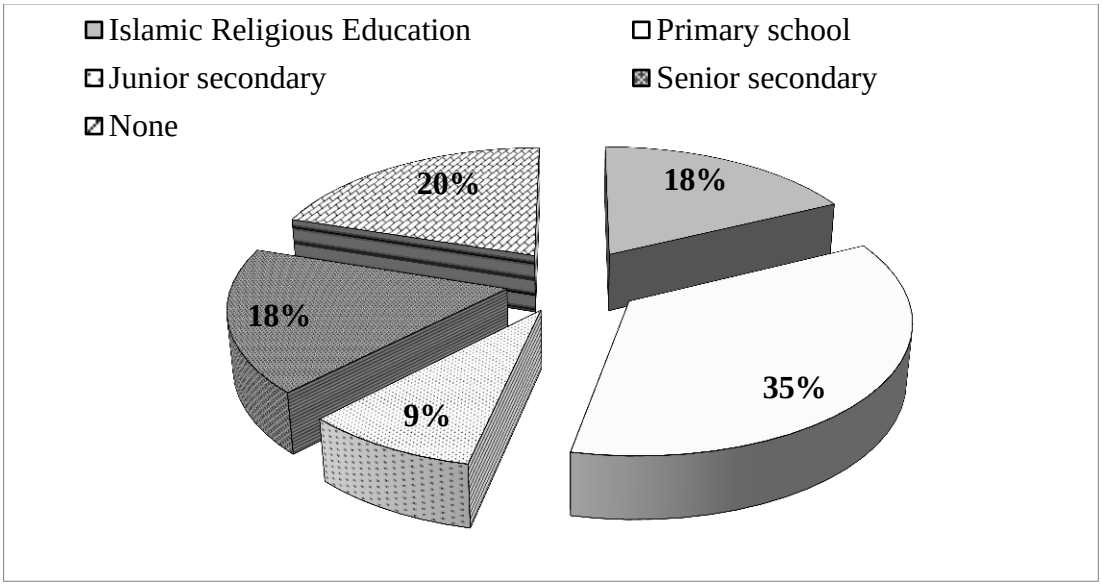

Figure 4.2: Educational levels of respondents across 11 communities

In terms of indigenous makeup, 25 of the 32 community respondents (Table 4.1) were ancestrally related to the communities, whereas 7 were non-indigenous or residents who have lived in the communities for less than 5 years. This proportionality was broadly similar in all four communities (Figure 4.3). Three of the ASM operators (in communities A, B, and D) were indigenous to the communities, whereas the operator in community C was an immigrant to the community. They were all males, with only one having a university degree.

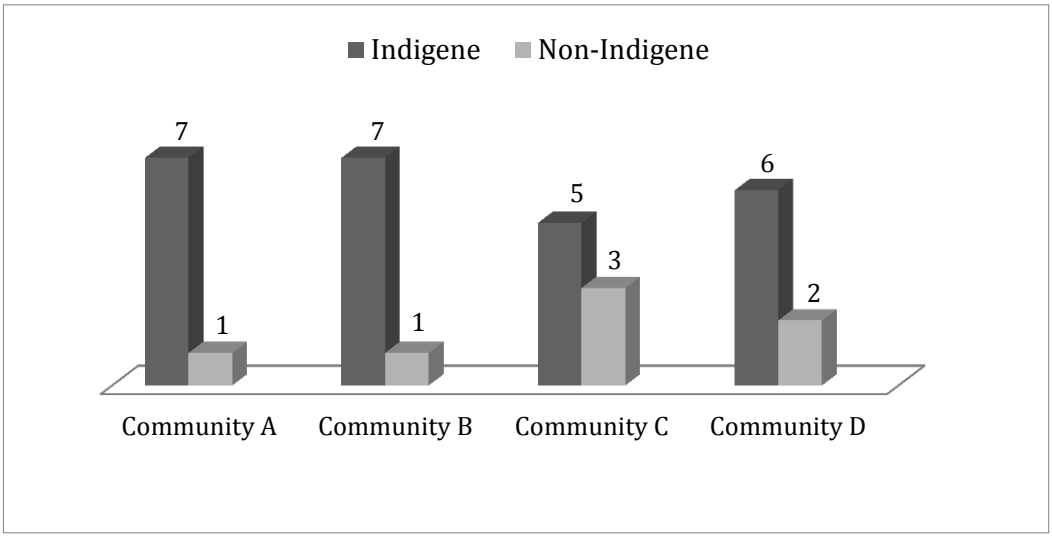

Figure 4.3: Indigeneity of respondents from communities A, B, C, and D

The 15 bureaucrats interviewed were all males with university degrees. They were drawn from the ministries of Mines and Steel Development, Environment, and Women Affairs in Abuja. Their positions varied from Deputy Directors to Permanent Secretaries. Among the policy makers interviewed, two were males and one was female. The female respondent and one of the male respondents were members of the Nigerian House of Assembly. The female respondent was a member of the House Committee on Steel Development, and the male respondent was the Chairman. The third policy maker was the Committee Chairman on Solid Minerals Development in the Nigerian Senate. The policy makers were all university graduates of Nigerian descent. The NGO respondents were also university graduates of Nigerian descent. They were representatives of the United Nations, United Nations Children's Fund, and United Nations Development Fund for Women. Two of the NGO respondents were Program Analysts, and the third was a Departmental Head. All three business respondents were males of Nigerian descent. Two of the

business respondents were private business owners with university degrees, and the third was a mineral dealer with a primary education certificate.

4.4 ASM Setup and Practices within the Study Communities

This study is focused on four selected communities based on the presence of licensed operators and distinct mining practices. These practices represent the major organized ASM practices within the region. The ASM approach within communities A and D is generally similar. In these communities, operators (lease owners), artisanal miners, and community heads share proceeds according to a set formula that is agreed upon by the operators, artisanal miners, and community heads before mining begins. The share collected by the community head is reserved for community development projects. The power of negotiation in this case lies evenly within all parties involved. Mineral products are shared among the parties in community A, whereas the parties in community D share money generated from mineral sales. The operators in communities A and D touched on this during the field study:

> The relationship we have with the community is a cordial one. Right from the onset we have related well. We felt that for a better coexistence with the community, we will have the community as a partner and this has worked very well so far. We agreed to share the minerals at a certain proportion with the community miners in order to give them a sense of ownership. So based on the quantity or size of the gemstones mined, the minerals are shared between the miners and the company on a size/quantity ratio of 3:1. This means we usually take a larger portion to be able to meet the cost of our operations and also meet some community needs. (ASM operator in community A)

> We have an amicable understanding with the artisanal miners from this community. We actually see them as partners in progress because we can't really tell if a digging exercise will be fruitful or not. As such, we have an agreement with them concerning the risk involved in not finding any mineral after digging. So the company and the labourers basically share the risk equally or to some certain level. What we do as a company is to provide the artisanal miners with basic mining equipment such as chisel, hammer, diggers, shovels etc. We also make provision for feeding the miners during that period based on the agreement that they will not be paid anything in form of wages for that period until the minerals are discovered. At this time, we apply a sharing formula where the company will take one third, the land owners will take one third and the artisanal miners will take one third out of the money made, and whenever the company is buoyant enough it can now help with the provision of bore hole or sometimes help in building one or two class rooms for the communities. (ASM operator in community D)

In community B, the operator employs residents and pays them wages on a daily/monthly basis. When not mining with the operator, some of employees organize themselves to mine open

pits abandoned by a colonial mining company. The power of negotiation lies with the operator in this case. As the operator explains:

> You know because I'm from this community, I have the privilege of interacting well with the community. This gives me an insight to the needs of this community. For example, I'm hiring all my staff from this community because I know the youths need jobs. Presently, the people we have on a monthly salary are about 10, even though most of the current work is more or less a daily paid job. There are times that we hire 50 to 100 people from this community alone. (ASM operator in community B)

In community C, the operator mines with the residents, but the operator owns all the proceeds. The community members are compensated monetarily based on their efforts. The power of negotiation lies with the operator. This setup appears to have created a less friendly environment between the community and the operator. The respondents reflected upon the nature of the existing relationship during an interview:

> We sometimes fight with the operator when he denies us access into the mine or when he does not pay us well for the minerals we sell to him. (Artisanal miner from community C)

> It hasn't been easy operating in this community. Sometimes the community members go into our property to mine without authorization. They often times lay claims to the minerals as part of their natural ancestral inheritance even though the lease belongs to me. We lose quite a lot because of this. (ASM operator in community C)

In summary, the setups in communities A, B, and D appear to have created a harmonious relationship between the communities and the operators. The community heads in communities A and B appeared cognizant of this:

> We generally have good relationship with the operator for at least providing employment for our youths. (Community head in community A)

> We have a good relationship with the operator in the community not just because he is an indigene, but also because he is employing our children. (Community head in community B)

In addition, the setups in communities A and D also appear to have created a sense of trust and accountability among all parties involved due to strict adherence to the informal institutional arrangements agreed upon prior to the commencement of mining. One of the operators commented on this:

> Because everybody is involved, cheating or stealing does not arise. In fact, the culture here won't even permit stealing. Everybody knows when we hit a mineral zone, the amount of mineral we recover, and how much the minerals are sold. So issues of community members going back to mine at night does not occur here like you'll find elsewhere where there is no partnership. So, I go back home each day with rest of mind. (ASM operator in community D)

4.5 The Drivers behind Community Involvement in ASM

During the interviews, artisanal mining respondents from the four communities were asked to give reasons why they took part in ASM. Though their responses varied, most of the respondents in the four communities claimed they participated in mining activities as a result of a struggle for survival (or poverty), unemployment, farming seasonality, and lack of alternative livelihoods. Three artisanal miners captured these claims during the interviews:

> I am involved in this columbite mining because I don't have anything else to do to take care of my needs when am not farming. (Artisanal miner from community B)

> I mine solely to earn money and survive. (Artisanal miner from community C)

> I am this mining activity because am unemployed. There are no jobs even for graduates in this country. So am even lucky to have something doing to make ends meet. (Artisanal miner from community D)

All five of the artisanal miners interviewed in community A and five of the six miners interviewed in community B claimed to be supporting a family. In both communities C and D, 11 out of the 14 artisanal miners interviewed claimed to be supporting a family.

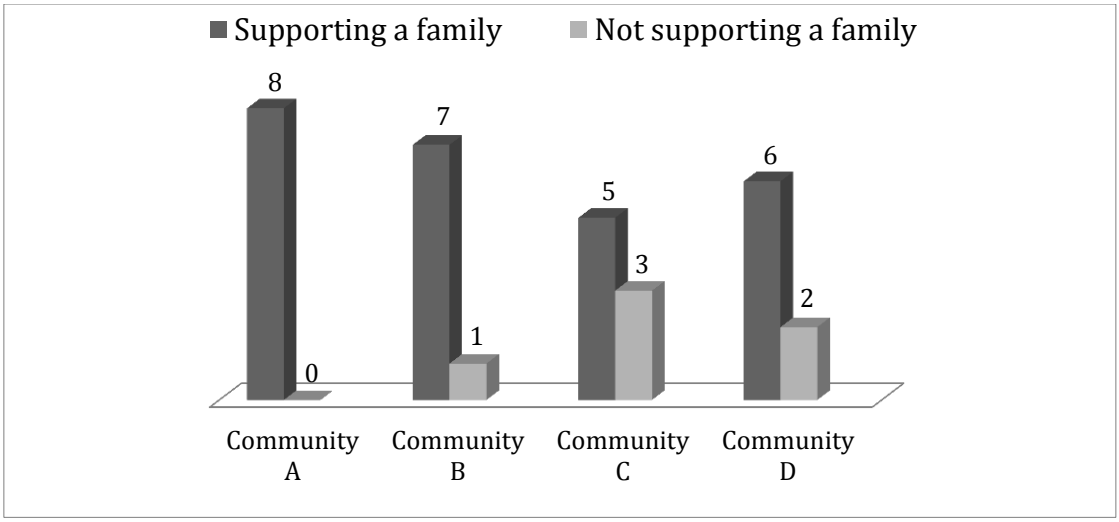

Figure 4. 4. Respondents supporting families in the study communities

Seven artisanal miners also claimed that the drive to raise capital to build shelters, finance other alternative livelihoods, and provide basic amenities (such as a power generating setup) was part of the reason for their involvement in ASM. One artisanal miner described this claim:

> I'm involved in this mining activity because I need to provide basic things for my family. I have built a small house through this mining and I still plan to buy a generator because there's never any electricity in this village. (Artisanal miner from community C)

Most of the younger respondents (mostly under 29 years of age), who were not pushed into mining by the burdens of family, claimed to be mining because of a lack of funds to pay tuition, or because of the lure of a better economic and social life. Two artisanal miners summarized these claims:

> I'm out of school because I can't afford to pay tuition. I dropped out after my Junior Secondary. But I plan to go back and complete my Senior Secondary education if I can save enough from this mining. (Artisanal miner from community D)

> I want to also enjoy what those people who reside in the city are enjoying. That's why am here every day trying to make money to have better life. (Artisanal miner from community B)

Only two respondents said they participated in mining as a daily employment/business activity:

> I am involved in this mining because it has become a form of business or trade for me. For example I got married using my savings from the mining. (Artisanal miner from community A)

> I have spent over 18 years doing this mining, and it has helped me to take care of my family. I have four children and I take care of them from this mining. So this mining is more like a business to me. (Artisanal miner from community D)

Apart from mining, artisanal miners in the four communities were also involved with other economic activities such as farming, carpentry, and trading. Ten out of the 25 artisanal miners interviewed in these communities worked full time at mining, whereas the remaining 15 were also involved with other economic activities. Farming was the most common economic activity after mining (Figure 4.5).

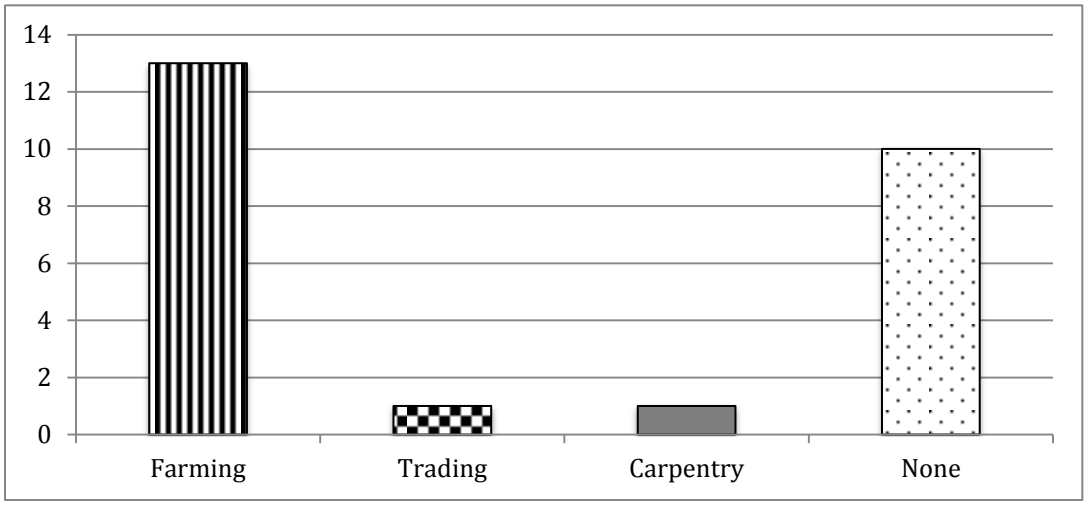

Figure 4.5: Other economic activities by artisanal miners

4.6 The Economic Impacts of ASM within the Study Communities

In response to questions on earnings and other economic dividends from mining, artisanal mining respondents in these four communities claimed to make more money from ASM than farming or other economic activities. During the interviews, respondents were asked to state how much they made on a daily or monthly basis. Some respondents who could not give direct estimates or figures either stated they made enough or were not making enough to survive:

> Truthfully, no job pays more than this mining. So, am here every day. This is my only job. (Artisanal miner from community A)
>
> Honestly, we make up to ₦100,000 in a month or even more. If we mine and wash the ore without any problems, we can even make more than that. (Artisanal miner from community B)
>
> At times in a week or two I can make a lot. I have made ₦430,000 in a week, but gambling and drinking ate up the whole money". To be honest I drink a lot too…. (Artisanal miner from community C)

Overall, most of the community respondents claimed to be making enough to get by especially during periods of higher mineral prices. Only two of the respondents reported not to be making enough (Figure 4.6). The high numbers quoted by the artisanal mining respondents in communities B and C might be an exaggeration or a case of a 'lucky' day. This is because reports from interviews and the researcher's field notes and memos showed they typically made between ₦10,000 and ₦60,000 ($63–$378) per month (Figure 4.6).

Respondents who were also involved in farming, trading, and carpentry could not give exact figures about how much money they made from these activities. For example, farmers could not give any meaningful information because most of the produce from farming was for family consumption and bartering. This information indicates that mining provides cash income to the miners, whereas other activities are largely subsistence.

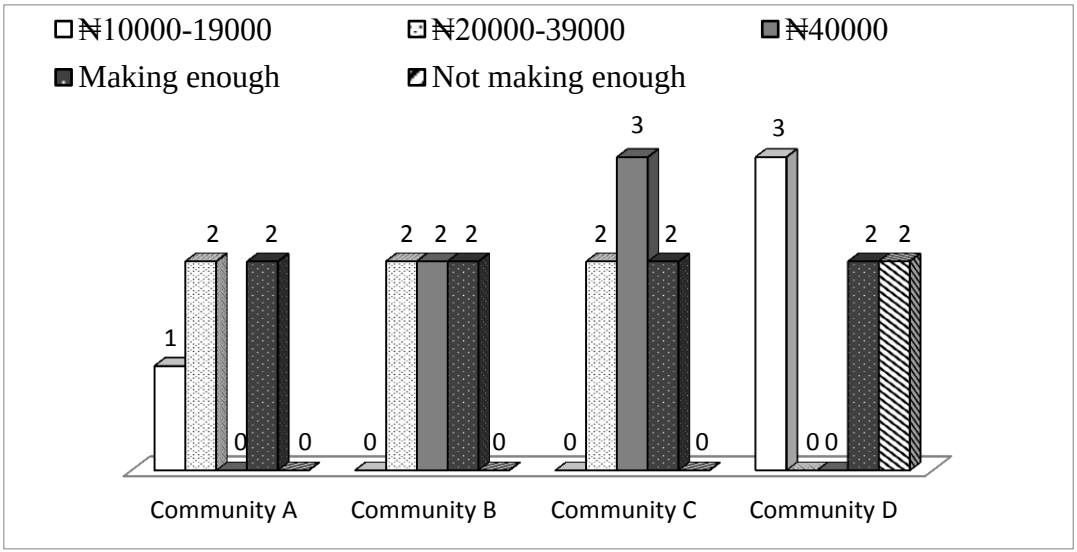

Figure 4.6: Monthly income range of artisanal miners in communities A, B, C, and D

Furthermore, most respondents also asserted that mining has created employment for the community members. Two community dwellers commented on this:

> The mining in this community has provided jobs for some of the youths even though more are still unemployed. This community can benefit more if those responsible for mining in this country can come in and see how to harness the mining potential this community has. This can create more jobs for those youths without jobs. (Community dweller in community B)

> At the moment, I will say there are benefits. At least the youths are employed. (Community dweller in community D)

This study also observed that, in addition to offering direct employment to the members of these communities, mining also created opportunities for other small businesses (like mobile food vendors, transporters, mineral dealers/buyers, hawkers, and small grocery shops). At least two community respondents interviewed during the course of the field study claimed to be

indirectly benefitting from mining:

> I got motivated to supply cooked meals to the miners because they usually find it difficult leaving their mining sites for their lunch breaks. Sometimes some of them spend nights digging. So I thought it would be nice to set up a mobile restaurant. Sometimes I sell on credit to them, but I make a lot of sales whenever they find the minerals. (Community dweller from community A)

> I used to be a housewife, but this mining has made it possible for me to run my own snack business. I make money from here to support my husband in taking care of my needs and that of my family. (Community dweller from community A)

In a bid to understand the economic profitability of ASM from the viewpoint of the operators, all four operators in the four communities were asked to comment on the financial viability of their operations. They were asked to state if their operations were either viable or not. Interestingly all four operators affirmed that their operations were viable (notwithstanding the reported constraints):

> Although we just started mining tourmaline in this site within the last two years, I will say the mining have been profitable. (ASM operator in community A)

> Yes, it has been a viable venture. But the problem we have is that of finance to boost production. For instance we applied for loan, but we were given only a portion and this is hampering our operations. (ASM operator in community B)

> I can only say so far so good. We have been operating for over ten years now and I can say it has been a viable venture. (ASM operator in community C)

> Yes, our mining operations have been viable. We are principally engaged in the mining of precious stones for now, although we sometimes come across tin, tantalite and so on. (ASM operator in community D)

These responses from the operators can be corroborated with the responses given by a majority of the artisanal miners from the four communities who claimed to be generating a good measure of capital from ASM (irrespective of the harsh operating environment and the type of mineral mined).

Other stakeholders interviewed were also positive in indicating the economic impact of ASM on the communities. Respondents claimed that the creation of jobs, poverty reduction, revenues (through tax and royalties), and foreign exchange earnings are major positive impacts that ASM can generate on the economy:

It can create employment and also reduce poverty if it is well funded. We cannot totally eradicate poverty, but at least it can help to reduce it to some extent. (Bureaucrat)

If well managed, it can encourage the participation of local and foreign investors that will pay royalties and tax to the government. It can also generate foreign currency when the minerals are exported. (Bureaucrat)

Firstly, ASM can create employment for so many in this country if the local miners can be organized into cooperatives and adequately supported and monitored. Secondly, in the process of developing the local mines, local areas will be developed. Thus, ASM can lead to the construction of access roads, schools, hospitals etc. (NGO respondent)

4.7 The Environmental Impacts of ASM within the Study Communities

On the effects ASM activities has on the environment, most artisanal miners and community residents argued that the mining activities have minimal or no effect on the environment:

The mining done now is really not doing much harm to the environment when compared to the damage done when the bigger company was here. If you go round the community, you will see the large pits they left open. This is dangerous to livestock and people in this community. (Community head in community B)

We always try to cover the pits we've dug, but sometimes we don't and it is very dangerous because people or animals can get trapped in it. We also lose areas we usually farm. (Artisanal miner in community B)

I don't see any major environmental impact from this mining activity, because I barely use diggers and shovels to work. But the operator with the lease dug the bigger holes you see presently. They used excavators and bulldozers. (Artisanal miner in community C)

All four operators claimed to be environmentally compliant. However, only operators from community A and B made mention of environmental impact assessment reports, though they did not provide any documentary evidence:

Normally, before you start mining, you are supposed to hand in your environmental impact assessment report to the ministry of mines. So, before we started, we did some EIA work. (ASM operator in community B)

You know the government cannot issue out any mining license to any company unless they agree to work and cover the holes been dug. So we try to do that. (ASM operator in community C)

In general, the perceived environmental effects in the opinions of the four operators and the artisans were the same. Their perception was that their actions merely caused temporary land

damage, which could be remedied by backfilling of excavated holes. This indicates that a majority of the operators/miners had little knowledge about the environmental and health dangers that their activities posed.

Reports from researcher's observations (see Appendix 7) also indicate that land disturbance, contamination and diversion of water courses/sources, and loss of arable farming lands were the major environmental problems associated with ASM in the study communities. Two bureaucrats interviewed in the course of the study appeared cognizant of this:

> The major environmental impact I see that comes with mineral exploitation [such as ASM] is that of land degradation, air pollution, and erosion. (Bureaucrat)

> We have currently embarked on a program to reclaim all abandoned mine pits because they cause serious land degradation. Some of them are what we call "mystery pits" because we don't know who dug them. Some of them were dug illegally but that's not the issue now, the issue is that they cause environmental degradation and we are going to try to reclaim them. (Bureaucrat)

Based on interviews and the researcher's personal notes, community respondents from community C appeared less aware of the environmental impact of mining when compared to respondents from the other three communities.

The major occupational health risks observed by the researcher in the course of the participant observation include exposure to dust (which can cause silicosis[16], asthma, and lung cancer), noise (which can damage hearing), exposure to poisonous gases and chemicals (such as mercury, lead, and arsenic) that can cause headaches, fatigue, convulsion, and death, and diseases (such as malaria, diarrhea). Two operators appeared cognizant of this:

> Our major risk comes from noise, gravels, and dust ejected during blasting, but we usually try to enlighten people to stay away or go under a tree or shelter. (ASM operator in community A)

> In terms of risk, we face minimal risk because we don't mine very deep. But the risk can come when the artisans mine alone. They usually use enter the mine and use chemicals without caution. (ASM operator in community C)

[16] Silicosis is a disease caused by the inhalation of crystalline silica dust (World Health Organization, 2007)

4.8 The Social Impacts of ASM within the Study Communities

Despite the fact that these communities lacked basic amenities such as pipe-borne water, health care facilities, modern housing facilities (e.g., flush toilets), a reliable source of electricity, and social/leisure facilities (see Appendix 7), most of the respondents seemed optimistic that the communities' social lives would improve:

> I will say the social life of our community improved when the big companies came. But since the big companies left, there's really not much improvement. We presently have a company run by an indigene of this community, but they are not operating at full capacity. At least they are helping out in the little way they can. I believe the social life will improve as soon as they start operating at full capacity, and it will even get better if more operators come. (Community head in community B)

> [ASM] can still lead to infrastructural development as seen in the past when tin mining was very popular in the country before the oil boom. Today, we have found even more minerals such as gold, copper, lead, zinc, and other precious metals. So I see no reason these minerals cannot be explored to the benefit of the people and the government as tin did before. (Bureaucrat)

The ASM operators claimed that the communities were always demanding or expecting them to create jobs, sink water boreholes, and build clinics and schools. Most of the operators argued that they could realistically provide only jobs due to the fact that their operations were not large enough to provide the financial muscle needed to fulfill all the expectations of the host communities. Only the operators from communities A and B claimed to have plans for providing basic amenities for their communities:

> Although we have been here for a short period of time, we have already asked the community for a list of what they want, and we are looking into what they have listed to see what we can do. At least we have created jobs which are the most important at this time. (ASM operator in community A)

> The only realistic demand we've met is that of creating jobs. Although we are a small company, we are trying our best to help in any way we can. For example, we are presently thinking of sinking a borehole in the community, and we are also thinking of partnering with the community to bring a school here because we presently don't have any school in this community. Even if we sink the borehole, we will still need help from the government for the school because teachers will need to be employed and paid regularly and we cannot shoulder this alone with the community. (ASM operator in community B)

Furthermore, drug use (such as Indian hemp, heroin, marijuana, and paracetamol), alcoholism, ethnic discrimination, low women participation, health problems (due to malnutrition, lack of sanitation, and exposure to mercury vapours), and conflicts (seen between operator and artisans in community C) were the major social problems observed. For example, two artisanal mining respondents made claims of discrimination:

> It is painful when you leave your family and children to work in the mine and you are not allowed access into the mines. (Non-indigenous artisanal miner in community D)

> Although the major problems we face here is the lack of finance and mining equipment. But I will also like the government to talk to the community members to allow us have access to the mine sites without harassments. (Non-indigenous artisanal miner in Community C)

On the issue of women participation, some of the respondents advocated for the inclusion of women in developing mining regulations and policies. Some advocated for equal participation in decision-making, and the eradication of social norms that prevent women from fully participating in mining activities. Three respondents touched on these issues during the interview:

> We need to make sure that our mining regulations and developmental policies are gender sensitive. (NGO respondent)

> We need to throw away certain practices in this country that doesn't advance the interests of women. Everybody is affected by poverty and unemployment so women should be able to survive economically with the men regardless of the job. (Bureaucrat)

> Women are often relegated to the background when it comes to mining. So I decided to form an NGO that I called 'Women in Mining' to help women often relegated to the background as found in other sectors. (Policy maker)

Finally, the researcher also observed that artisans had strong connections with their cultural and religious beliefs. Some of the respondents touched on this:

> It depends on God's favours. Sometimes I'll get nothing in a month, sometimes in a week or a day I will get enough. (Artisanal miner from community B)

> To God be to the glory, at least I just get enough to carry me through even though I suffer before getting the money. There are times we stay longer without getting anything and

there are times we get something. But once God allows us to find the mineral, everybody becomes happy. (Artisanal miner from community C)

Such is life. Sometimes we get the minerals and make money, sometimes we don't and we take that as the will of God. (Artisanal miner from community D)

4.9 Challenges to ASM Operations within the Study Communities

Artisanal mining respondents claimed that major difficulties they faced were lack of mining tools and financial loans. They claimed they would be making more money if they had these things in place. In general, most respondents expected the government to help them in overcoming these constraints:

We face so many challenges, but the major ones we really need help with is the issue of mining tools and finance, because these things actually keep the operations going. (Artisanal miner in community A)

In fact, the biggest problem we face is the lack of equipment. We need equipment to help in clearing the overburden soil because they could be dangerous sometimes. For instance, we have dug about 30-40 feet and it is difficult for us getting to the bottom of the pit. So for us to keep up, we really need the government to help us by providing or loaning caterpillars or bulldozers. (Artisanal miner in community D)

Some artisanal mining respondents stressed the overbearing influences of mineral dealers or sponsors:

These people really exploit us to the point that we end up with nothing at the end of the day. For example, five to six hours of work should usually give us nothing less than ₦10,000 naira, but we end up with ₦2000-3000 only because of these dealers. So we expect help from the authorities as regards these dealers. (Artisanal miner in community B)

Similarly, the general perception from the operators was that their operations were severely hampered mainly by lack of adequate mining equipment. They also indicated the non-availability of training, mineral data banks, and financial loans as other constraints they faced:

We have so many problems. Firstly, we have the problem of logistics. The blasting material we use cost a lot. Sometimes the blasting materials go out of stock and it takes weeks to replenish due to scarcity. In this tourmaline mining you cannot mine without blasting. We also face the problems of finance or loans and knowledge about the deposits." (ASM operator in community A)

I think the major challenge we face is that of machineries and trained human labour.

> Sometimes you need to train these people to meet up with the challenge of what you want them to do because mining is now going scientific. For example, our processing plant needs trained labourers because it is a bit technical but we can't afford to train them because we don't have the capacity to do that. As a result, we usually have our products rejected by the companies due to so many mistakes from the labourers. We seriously need trained manpower. Those are some of the challenges." (ASM operator in community B)

> We are constrained by lack mining equipment and finance because we are a small company. Sometimes we hire some of this equipment and this adds to the cost of operations. We need excavators and bulldozers to help us in removing the overburden soil without much risk. For example for the past six months, we have not produced anything due to the lack of equipment. (ASM operator in community C)

In the same vein, some of the other stakeholders interviewed also commented on the issues of finance and mining equipment:

> One of the major challenges is that of funding: The banks here are not familiar with the mining sector, so they are unwilling to give loans to the mining operators at a reasonable interest rate. And you know that mining has a very long gestation period, so if these miners take loans at the prevailing interest rate, they are not likely to break even. (Bureaucrat)

> It is due to the lack of financial commitment on the part of the federal government. Mineral resources development is capital intensive, and its major bane centers on the lack of adequate capital and technical know-how. (Bureaucrat)

However, an interview conducted with one bureaucrat from MMSD revealed that money has been set aside to assist registered ASM operators:

> You should know that there is also government intervention in ASM. For example, the World Bank through the sustainable management of mineral resources project: SMMRP has provided a grant to artisanal and small-scale miners, and host communities. The disbursement unit for that fund is $50,000 (fifty thousand U.S. Dollars). Communities and ASM operators will benefit from that [if registered as cooperatives]. The value is $10,000,000 (ten million U.S. Dollars). (Bureaucrat)

Some respondents pointed towards general business and cultural attitudes as the main challenges to the sector's development:

> I think the problem has to do with our culture. The Nigeria business culture is mainly that of buying and selling. We don't have the culture of investing in long-term projects. Not many Nigerians will venture into mineral business because of the long gestation period. (Bureaucrat)

> People always want to do things on their own and this is not the best. For any business, it is better you team up in order to get things done easily. This is because you share the risk, the prospects, and it becomes lighter. Just like our people used to say: if you eat alone you will die alone, but if you share, the goodies will go round and the multiplier effect will still be there. (Bureaucrat)

> We tend to be mono-cultural in everything that we do. We don't want to diversify in our nature. Everybody copies what the other person is doing. Nobody wants to be innovative to go in a certain direction. (Business respondent)

The issue of government regulation also came up during the interviews as one of the main challenges inhibiting the sector's development. Most comments were directed towards a change in government actions. The respondents argued that the ASM sector could compete more effectively with other sectors if the government played its role properly. Some respondents were of the opinion that political instability, corruption, unfriendly bureaucracy, and the lack of ability to implement policies were the main challenges:

> The major challenges I see are political instability, corruption, and the inability to implement policies. (Bureaucrat)

> To me, the long bureaucracy in our public system is the major challenge to governance in this country. That is why life is tough for the poor Nigerians who cannot afford to bribe get services. (Bureaucrat)

> I think it is because of our political history. We have had the military in power for a long time, and the military governance style makes them distant from the people and as such there are no inputs. Even with democracy, we still have that mentality because it has been there for a long time. We also have the problem of corruption. (NGO respondent)

To some respondents, the main challenges are the lack of adequate mining regulations and enforcement, and the lack of continuity in the administration of MMSD. Four respondents commented of these points:

> The truth of the matter is that most times our mining laws are not strictly adhered to. We have laws but they are never adhered to. The extractive industries must be strictly regulated with adequate standards if it is meant to be sustainable. Interestingly, the ministry of environment is currently working on putting some environmental laws in place to help in regulating this sector. For example, having adequate environmental impact assessment prior to the commencement of any mining activity is one of such laws. (Bureaucrat)

For the sector to move forward there needs to be adequate enforcement of existing regulations. Where there are no regulations we should try to make them, and where there are, we need to make sure they are enforced. This is because the major problem we have about environmental management is enforcement. Currently, the mining sector has very robust laws with lots of parameters as obtained elsewhere but what is lacking is the enforcement. If you enforce the laws properly, you'll be solving part of the problems. In a nutshell, enforcement is a major issue, and it will be good to start looking at the gaps or factors affecting enforcement or those things that are militating against enforcement. This should be the first step. (Bureaucrat)

Having a stable and continuous government is the first step in moving this sector forward. What is common here is continuous change in personnel and policies. This needs to stop for any meaningful development. There is the need to have systems that function beyond individuals. We need a system that will function whether the minister is there or gone tomorrow. We need to move beyond politics and focus on service delivery. If the government can do that, I believe we have a better future. (NGO respondent)

I think the government needs to be consistent with its policies. The continuous change in ministers overseeing this sector is not helping it all. It is very common to see numerous uncompleted projects and policies because we do not prioritize our projects or agenda. Every minister always has his or her own agenda and this is drawing the sector backwards. (Policy maker)

4.10 ASM Organization and Formalization

Most of the respondents (including the artisanal miners and operators) argued that it would be beneficial to all the stakeholders if the artisans were organized into cooperatives. Five respondents summarized this claim:

I'm tired of running from the authorities. So will I be glad if the authorities can organize us into groups and give us identity cards. At least my identification card will show that I am a miner and not a thief. (Artisanal miner in Community C)

The advantages of involving them legally are that you can be able to increase their production, control and improve the quality of their mining methods, and protect the environment. If you legalize them, you can comfortably visit them to see what they are doing, and you can talk to them, and they also can talk to you. By so doing you can show them the best way to go about mining. Then they are not afraid of anybody and nobody is afraid of them. (Bureaucrat)

Legalizing artisanal miners will give room for operational security, conducive mining environment, and harmonious relationship. (Bureaucrat)

The major advice I will suggest for a breakthrough in the ASM sector is for the authority to organize the artisanal miners. If they are organized, their actions can easily be assessed

and monitored. This will also help the artisanal miners to have one voice, and having one voice will carry more weight and it means they can be properly looked after. (ASM operator in community B)

It should be organized and formalized, but not for single individual artisans. They should rather form cooperatives and have one voice. This is because, if they have a union, you can easily track their operations, and it can also make it much easier assisting them with loans or equipment. (NGO respondent)

CHAPTER 5

DISCUSSION

Picture 2. Artisanal miner operating a sluice box in one of the study communities

5.1 Introduction

The findings of the study are discussed in this chapter. A description of ASM setups and practices is followed by a discussion of the major factors that drive community members to engage in ASM. The chapter concludes with an examination of the economic, environmental, and social impacts of ASM activities and the major challenges affecting ASM practices in Nigeria.

5.2 ASM Setups and Practices

It was concluded that the ASM setups in communities A and D (which are community-inclusive and involve sharing of proceeds) provided more benefits to the artisanal miners and the communities than the ASM setups in communities B and C. One reason for this could be the strict adherence of the parties in communities A and D to the informal institutional agreements (or norms) cooperatively agreed upon prior to the commencement of mining. These norms appeared to have controlled the behavior of the parties and further reduced the likelihood of mistrust and conflict over access and the sharing of proceeds. For example, apart from the preexisting norms in these communities, which worked to prevent problems of greed and conflict, the parties were observed to have cooperatively developed some additional institutional arrangements and norms to encourage behavior that would achieve common goals (Crawford & Ostrom, 1995). The developed norms addressed issues such as: who has the right to mine, what time or days is mining permitted, and how much and what type of work is required for each party. The purpose of these cooperative institutional arrangements and norms was to put communal goals ahead of individual goals, as the latter often led to greed and conflicts (Crawford & Ostrom, 1995).

Secondly, the operators in communities A and D acknowledged that the sector is poverty-driven, and acted to reduce poverty by recognizing the rights of the artisans to mine. By so doing, the operators gained the trust and respect of the communities (Govier, 1997), which further helped to defuse tensions and avert conflicts. In addition, both parties reaped the benefits from the mining activities. Similar community-inclusive or proceed-sharing setups (seen in communities A and B) have been reported by Hilson (2001, 2010), MMSD (2008), and Nyame and Blocher (2010). Hilson (2001) and MMSD (2008), for example, reported similar setups

where operators and artisans shared proceeds, based on a set ratio, in Ghana and north central Nigeria.

In contrast to communities A and D, a nonharmonious relationship existed between the operator and the artisans in community C due to the operator's hard stance on limiting the artisans' involvement in or access to the mines. This stance engendered disapproval and mistrust in the artisans and a lack of cooperation between the parties (Barber, 1983). In this situation, the artisanal miners were not always motivated to conform to formal rules or informal norms. However, the author of this study suggests that the tension between parties in this community was a result of the operator's inability to understand the social dynamics of ASM. Barry (1997) and Hilson and Yakovleva (2007) came to similar conclusions. For example, in a study of the mining conflict in the Prestea community in Ghana, Hilson and Yakovleva (2007) concluded that a poor understanding of the social dynamics of ASM by policymakers and mine operators was mainly responsible for the refusal of the operator to grant mine access to residents of the community. In dealing with the conflict, they suggested that the mine operators adopt a participatory (or community-inclusive) approach. Thus, the operator in community C had to discuss operations with the community and incorporate the community into the ASM plan to create a peaceful mining atmosphere and to safeguard his investments. This practice was observed to work in communities A and D. In addition, by incorporating the community into the mine operations, the operator stood to reduce risk and increase mining output.

Thus, this study observed some potential benefits of organizing and formalizing the ASM sector on a community-inclusive basis as seen in communities A and D:

i) job creation for community members;
ii) wealth creation and collective sharing of profits, with financial benefits staying within the community (through multiplier effects)
iii) operational risk sharing;
iv) mine security and protection of property;
v) accountability to communities, operators and title holders, and government: this includes having the knowledge of where the mineral is mined, what is mined, how it is mined, how it is sold, and how many people are involved;
vi) harmonious coexistence between the communities and operators or title holders;

vii) culture preservation and protection of important cultural areas;

viii) collective environmental responsibility, protection and monitoring;

ix) increase in government's internal revenue through taxation of mineral sales and profit;

x) easy contact with and tracking of operators and community; and

xi) easy monitoring and control of ASM activities.

The diagram in Figure 5.1 below summarizes some of the economic, social, and environmental benefits of adopting the community-inclusive ASM approach described above.

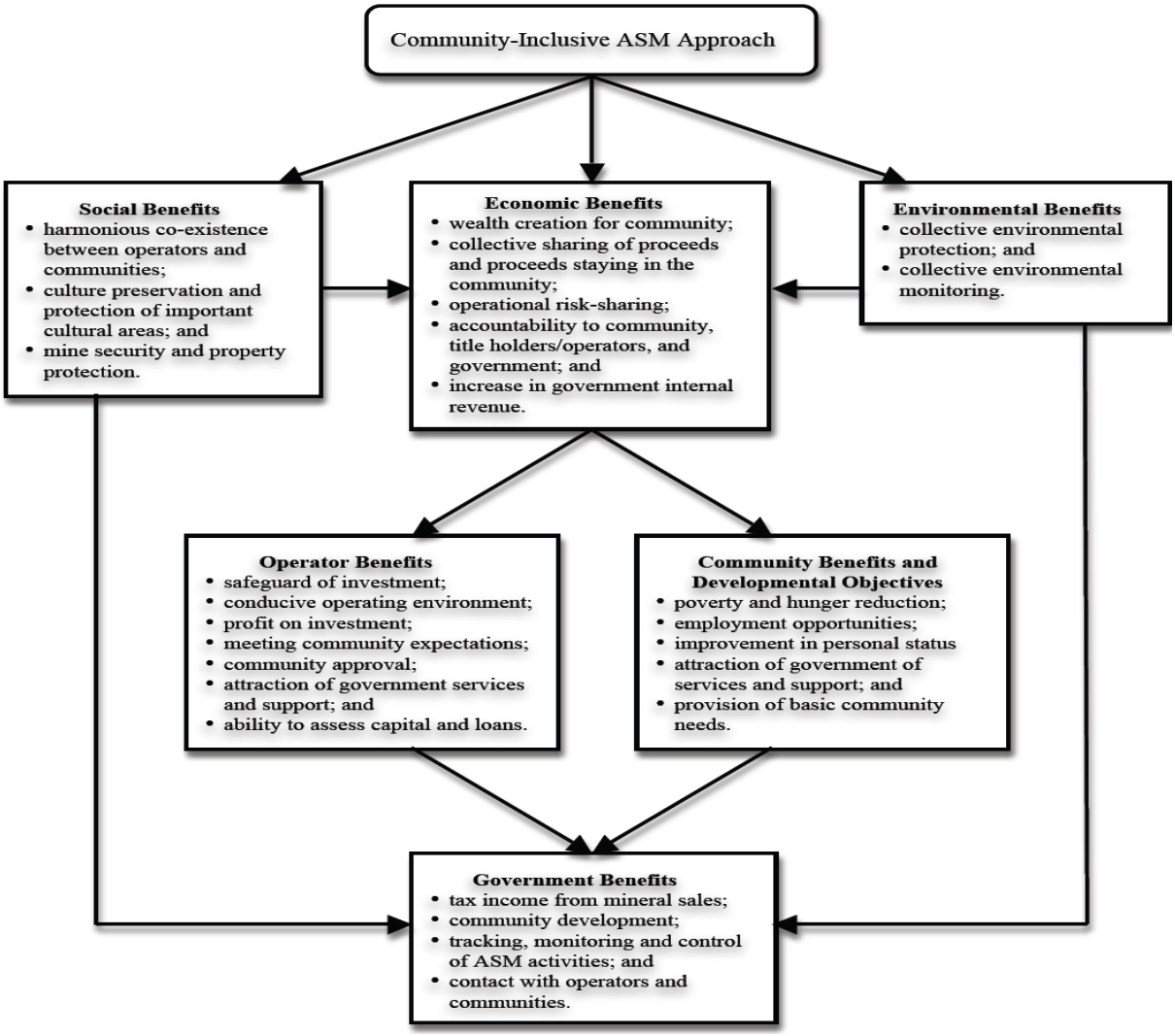

Figure 5.1. Economic, social, and environmental benefits of community-inclusive approach

Authors such as Chisholm (2000) and Agrawal et al. (2009) have also made similar observations. For example, Chisholm (2000) reported cases where communal resource management systems were effective in managing resources in the Tigray area of Ethiopia. In the same vein, Agrawal et al. (2009) also reported a case where community-based inclusive action was instrumental in managing coastal resources in Trinidad and Tobago.

Recommendation

Due to the benefits listed above, the community-inclusive approach seems to be the most beneficial arrangement for the communities and other stakeholders when compared to the other two setups. Thus, for sustainability, there is a need for the administrators to consider this approach in organizing and formalizing the ASM sector.

5.2.1 Facets of Authority within the ASM Circle

Three major power structures were observed in ASM in the study area based on roles of participants. These three power structures *are* the government, operators, and communities.

For this study, the assessment of communities' and operators' opposition to the influence of government was based on respondents' answers to the interview questions about community-operator-government relationships. During the interviews, the communities and operators did not state any opposition to the powers of the government. Rather, they bemoaned the lack of government support. This study identifies five reasons that may explain why the communities and operators in the present study did not oppose the authority of the government: firstly, the communities and operators seemed to be aware of the stipulations of the Land and Mining Acts, which vest the control of all lands and mineral properties in the government. Secondly, the communities appeared unwilling to express any opposition due to fear of arrest by the government authorities, or the fear of losing government support. Thirdly, the low level of education in these communities diminished their capacity to seek redress in court when they felt marginalized. Fourthly, government and elite dominance have commonly characterized resource policies in Nigeria, and as such they usually provide less room for communities or ASM groups to raise their concerns. Fifthly, the lack of activists or civil rights organizations in these communities may also have inhibited their response at times when they felt aggrieved by the actions of the government or operators (Kemedi, 2005). Nonetheless, as was discovered during the data gathering stage of this study, the government has laid a foundation for community

consultation prior to mining operations by incorporating community consultation into the current Mining Act. But the problem still remains that the government seems to be unable to fully implement its policies.

The finding of this study is in contrast to the findings of some other studies in other parts of the world (Madeley, 1999; Veiga et al., 2001; Nyame & Blocher, 2010). For example, Nyame and Blocher (2010) reported cases of stiff resistance from artisanal miners when government tried to control ASM activities by leasing indigenous lands.

The assessment of communities' opposition to the influence of operators was also based on respondents' responses to the interview questions about community-operator relationships. During the interviews, the respondents from communities A, B, and D did not report any opposition to the powers of the operators, whereas the respondents from community C occasionally defied the operator's authority due to the operator's hard stance on limiting the artisans' involvement in or access into the mines. Thus, the respondents in community C intentionally defied the operator's authority as a result of the discordant relationship between the operator and the artisanal miners. The findings of this study can be corroborated with the findings of Veiga et al. (2001) in Peru, and the findings of Hilson and Yakovleva (2007) in Ghana.

Within the community, this study identified three power structures in the ASM circle: the 'community head', 'group leader', and 'laborer'. The community heads are vested with the highest authority when compared with the other parties in the power structure. Commonly, the community heads are traditional titleholders who are recognized based on Nigeria's traditional institutions, or are hereditary. They generally act as custodians of the community and often direct or sponsor any community initiative. They also represent the community in meetings and other external events. As such, these community heads are powerful within the community. Within the mining circle, they are responsible for negotiating and giving consent to mining operations. They also provide security, resolve disputes, monitor and track the extraction of minerals, decide on the degree of mining, and decide on the number of people to be involved in mining. Cases of internal conflicts have been reported in communities where such powers have been abused to control royalties or other benefits from resources (Kemedi, 2005). However, during the course of this study, no one reported such problems.

The group leaders are next in line in the power structure relating to ASM. Although not as powerful as the community heads, the group leaders are influential within the artisanal mining circles in these communities. In addition to participating actively in decision-making within the artisanal mining circles, they also have the role of recruiting, organizing, and leading the artisanal miners (who are usually in groups of five to ten people). These group leaders are often skilled in digging deep mining pits, forecasting digging depths, and gauging ore quality. They sometimes also act as watchdogs for the community heads by reporting on the daily activities at the mining sites. Their verbal reports commonly contain details of the depth of mining pits, the amount of mineral recovered, and the number and identity of visitors visiting the mine sites. The danger of such influential power is that it can be monopolized for personal gain. For instance, the group leaders might base the recruitment of laborers on acquaintance rather than merit or any formally acceptable criteria. This was manifested during the course of the interviews, where two artisanal mining respondents made claims of having been discriminated against by the group leaders. Such cases of discrimination based on ethnicity or origin are not uncommon in ASM communities in SSA. However, gender discrimination appears to be more persistent (Lahiri Dutt, 2004; Hinton, 2003, 2005a; Hayes, 2008). Thus, the two cases reported in this study can be a coincidence and cannot be used to generalize.

The laborers (who possess the least authority) do not participate actively in the decision-making processes in the mining circle. Their role is to mine the ore and report to the group leaders or field managers. In general, this power structure within the artisanal mining circle, operating in accord with the developed informal institutions, was observed to be helpful in creating orderliness and the necessary environment for mining to benefit the communities.

A similar facet of authority within the community ASM circle was also reported elsewhere (Brownell, 2009). Brownell (2009), for example, revealed in a study in Liberia that there are several layers of authority, which include groups such as “gang leaders” (or group leaders) and “laborers”.

5.3 The Drivers behind Community Involvement in ASM

The findings in this study indicate that the drivers behind community involvement in ASM in the study communities are not homogenous. The main drivers observed are high poverty

and unemployment levels, farming seasonality, and lack of alternative livelihoods. Prior to diversifying their livelihoods to ASM, these communities were predominantly engaged in farming, but this agricultural livelihood was rendered unviable as a result of the implementation of unfavorable economic policies by the government.

The introduction of SAPs across the Sub-Saharan African region in the 1980s and 1990s resulted in several sectoral reforms. In Nigeria, the reforms resulted in the removal of subsidies of farm inputs (like seeds and fertilizer), liberalization of crop parastatals, and devaluation of the Nigerian currency (Naira) against the US dollar (Bryceson, 1999, 2002; Bryceson & Bank, 2001; Ellis, 2006). This rendered the farm sector unviable (even during the rainy seasons) and contributed to economic hardships and unemployment for rural farm households that depended on rural farming for survival (Bryceson, 1999, 2002; Bryceson & Bank, 2001; Ellis, 2006; Hilson, 2010; Hilson & Garforth, 2012).

In spite of this unfavorable situation brought about by policies such as SAP, the government of Nigeria and donor agencies have failed to admit that the diversification of rural inhabitants into ASM is, in part, a reaction to the unviable nature of rural farm agriculture or farm seasonality (Banchirigah & Hilson, 2010; Hilson & Garforth, 2012). Rather, they have continued to champion an "agriculture-led strategy" (Hilson & Garforth, 2012) for meeting rural developmental objectives (World Bank, 2005). This has culminated in the establishment of a series of agriculture-led poverty-eradication institutions and programs in the last two decades (Sofo et al., 2003). The National Agricultural Land Development Authority (NALDA) and the Directorate of Food Roads and Rural Infrastructure (DFRRI) are examples of such institutions, and some of the programs initiated include the National Economic Empowerment and Development Strategy (NEEDS, which outlined Nigeria's Poverty Reduction Strategy), the Family Economic Advancement Programme (FEAP), the Community Action Programme for Poverty Alleviation (CAPPA), and the National Poverty Eradication Programme (NAPEP). These institutions and programs, which have focused heavily on smallholder agriculture, have failed to reduce poverty or create employment for the millions of inhabitants in rural communities like the ones under investigation. This failure is, in part, attributed to the focus of these programs on the powerful elite rather than the poor in rural communities (Sofo et al.,

2003). Other reasons that have contributed to this failure are the lack of policy framework, government capacity, and "undue political interference" (Sofo et al., 2003, p. 32).

Authors such as Dreschler (2001), Maponga and Meck (2003), Tschakert (2009), MMSD (2010), Hilson (2010), and Hilson and Garforth (2012) reported similar results around the Sub-Saharan African region. For example, Hilson and Garforth (2012) in a study of two rural communities, in Komana west of Mali and the East Akin district of Ghana, reported that farm seasonality, agricultural poverty, and fewer viable income generating opportunities were the major drivers in the engagement of hundreds of thousands of rural inhabitants in ASM.

Other drivers, identified by this study, of ASM diversification in the study communities include the incentive to raise capital for other alternative livelihoods. The main attraction, as admitted by a majority of the interviewees (mostly those who claimed to be drawn to ASM due to entrepreneurial drive and the incentive to raise money for other alternative livelihoods and family needs), is the higher financial incentive that ASM offers when compared to other livelihood activities like farming, carpentry, trading, and bricklaying. For example, over 50 percent of artisanal miners interviewed in the course of this study claimed to have been driven into ASM during periods of higher local market demand for minerals, which is usually caused by rises in global mineral prices. Thus, the narrative that most rural inhabitants are opportunists who are abandoning farming for ASM because of the desire 'to get rich quick' is not a full representation of the drivers for ASM diversification in these communities. Instead, this study shows that the quest to provide family and personal needs (such as food, shelter, and tuition) in the face of low farm productivity, farm seasonality and shocks (such as drought) was a key driver for community involvement in ASM.

While the results from this study might not be representative of the entire ASM sector in Nigeria, they are consistent with the findings of other studies in this region (Reardon, 1997; Bryceson, 1996, 1999, 2002; Barrett et al., 2001; Maponga & Ngorima, 2003; Mondlane & Shoko, 2003; Hilson, 2010; Hilson & Garfort, 2012). For example, Maponga and Ngorima (2003) reported that rural inhabitants in Zimbabwe were using their earnings from ASM to support their agricultural livelihood. Similarly, Mondlane and Shoko (2003), in their study of the Niassa and Manica communities in Mozambique, reported that about 30% of rural inhabitants

were engaged in ASM to augment earnings from agriculture, which was practiced mainly during the rainy season.

Findings from the field interviews, personal observations, and anecdotal evidence also suggest that the neglect of rural development by the government has driven the communities into ASM. Most rural communities in Nigeria lack basic amenities such as electricity, hospitals, schools, roads, and improved water sources (Onugu, 2005). This can drive rural inhabitants to either migrate to urban areas or seek alternative ways to have such basic provisions. For example, some of the artisanal miners interviewed in the course of this study claimed to be involved in ASM in a bid to raise money for basic needs such as power generating sets (for electricity generation), clean water, and medical help. Hence, one can conclude that rural inhabitants in the study communities have been driven into ASM not just to earn money for survival but also to earn income and provide basic needs like electricity, clean water and other needs that were meant to be provided by the government.

In summary, high poverty and unemployment levels (caused by fewer viable alternative livelihoods and diminishing farm returns), farming seasonality, lack of alternative livelihoods, the incentive to raise capital for other alternative livelihoods, and neglect of rural development by the government were identified as the main drivers for community involvement in ASM in the study communities.

5.4 The Economic Impacts of ASM

The findings in this study suggest that ASM is currently a more viable livelihood than other alternatives in these communities. The results indicate that some of the artisanal miners earned above the monthly minimum wage in Nigeria, which was increased from ₦8000 to ₦18000 (US$50–$113) in 2011. This has further reinforced the viability of the ASM sector. However, it is important to note that the earnings reported by the artisanal miners from these communities likely varies depending on certain factors such as the type of mineral mined, current global mineral prices, access to mineral markets, influence of mineral dealers or sponsors, and the number of miners sharing the proceeds. Therefore, this might not be a true representation of their earnings. Nevertheless, the reported income from this study is also consistent with other related studies around the region of this study (Rock Crystal Ltd., 2005;

Michelou, 2006). Rock Crystal Limited (2005, p. 129), for example, in a study of the Janruwa and Yakan Dutse communities in north central Nigeria, reported that a miner makes on average about US$2.3 per day. Comparing the results with other studies around the Sub-Saharan African region, Hilson (2010, p. 304) reported similar claims of high income from ASM in Ghana.

Secondly, it was also observed that, in addition to offering direct employment to the members of these communities, mining also created opportunities for other small businesses (such as mobile food vendors, transporters, mineral dealers/buyers, hawkers, and small grocery shops). This type of secondary business activity was a common practice around mining sites in the study region. Authors such as Lole (2005), Rock Crystal Limited (2005), Hilson and Pardie (2006), Michelou (2006), Banchirigah (2008), MMSD (2008), and Slack (2009) also reported similar findings. Hilson and Pardie (2006, p. 110), for example, in their study in neighboring Ghana, reported cases of flourishing businesses, such as food and cloth vendors, and machine parts replacement services, in a study in Ghana. Similarly, Banchirigah (2008, p. 36) also reported a variety of flourishing secondary business activities, like transportation and machine hiring, in Noyem ASM community in eastern Ghana.

Recommendations

The evidence provided by this study shows that ASM has some economic potential. Thus, the administrators' focus should be on how to harness the benefits of the sector by finding ways to limit the controlling effects of factors that appear to keep the miners trapped in the so-called "vicious poverty circle". For the communities under investigation, the major issues found to limit the economic impact of ASM are: the lack of training regarding efficient exploitation and beneficiation methods; the lack of support, including funding for adequate mining equipment; restricted access to fair and competitive markets; the high number of miners sharing the proceeds from a single mine; and the overbearing influence of middlemen and "sponsors". If the ASM sector in Ghana can contribute about $460 million dollars to the economy within 24 years (Carson et al., 2005; Tschakert, 2009), why should the situation be different for Nigeria, which has a variety of large mineral deposits? The large-scale mining sector in Nigeria is currently underperforming, and this looks set to continue, judging by the current security and political situations in Nigeria. Hence, the ASM sector can in the meantime be contributing to the economic development of the country as seen in countries like Ghana.

5.4.1 Rural-scale Sustainable Livelihood and Alternative Livelihood

Findings from this study indicate that, apart from mining, the artisanal miners in the four communities were also involved with other economic activities such as farming, carpentry, and trading. Ten out of the 25 artisanal miners interviewed in these communities took mining as a full time job, whereas the remaining 15 were also involved with other economic activities, with farming being the most common (see Figure 4.5). Thus, because mining (both ASM and large-scale) is an "inherently unsustainable activity" due its depletable and scarce nature (Hayes, 2008), it is generally wise to reinvest plenty of the proceeds into community development projects and other alternative livelihoods such as farming, trading, and carpentry. These alternative livelihoods can sustain the communities when the minerals are depleted. Most of the respondents in the study communities claimed to be positively benefiting from the ASM activities, hence they are actually not trapped in the so-called "poverty loop" (Tschakert, 2009), which would have prevented them from seeking alternative livelihoods. However, studies have shown that most artisanal miners will rather prefer to continue in their ASM livelihood instead of diversifying into other alternative livelihoods due to the higher incentives from ASM, and the lack of other skills to survive outside ASM (Carson et al., 2005; Banchirigah & Hilson, 2008; Hilson & Banchirigah, 2009). Thus, it is important for the communities to keep exploring alternative livelihoods that are either linked to farm or non-farm livelihoods (Bryceson, 1996, 1999, 2002; Reardon, 1997; Reardon et al., 2001, 1998; Barrett et al., 2001; Ellis, 2000, 2006; Banchirigah & Hilson, 2008; Hilson & Banchirigah, 2009; Tschakert, 2009).

One ASM approach, that is designed to allow for mining proceeds to be reinvested back into the community, is the community-inclusive setup (as seen in communities A and D of this study). This ASM setup allows for the ASM operators, the artisans, the community, and government to fully benefit from the mining proceeds. In this case, the communities' share can be channeled towards community development and the establishment of alternative livelihoods for other community members or for artisanal miners with multiple livelihood skills.

Recommendations

This study recommends the reinvestment of some proceeds into community development projects such as boreholes (for clean water), and other alternative livelihoods such as farming,

trading, and carpentry. These alternative livelihoods will sustain the communities when the minerals are depleted. There is also a need for the authorities and operators to monitor how the proceeds set aside for community development projects are used. Furthermore, the economic impact of mining in these communities can be boosted if the government can focus on training the artisanal miners and operators in efficient exploitation and beneficiation methods. This will increase revenue and lengthen mine lifespan.

5.5 The Environmental Impacts of ASM

In this study, land disturbance, contamination and diversion of water courses/sources, mercury pollution, and loss of arable farming lands were observed to be the major environmental problems associated with ASM in the study communities (see Picture 3 below). Incidentally, it was discovered that a majority of the operators/miners had little knowledge about the environmental dangers that their activities posed. Hilson and Pardie (2006) also reported similar cases of environmental unawareness or poor environmental management practices during their study on the uses of mercury in Ghana's ASM sector. They revealed in their study that a majority of artisanal miners in Ghana were also not aware of the health dangers of mercury exposure and sometimes even chose to work without facemasks and gloves. Three major reasons may explain why respondents in the current study were less bothered about the environmental impacts of their activities.

Firstly, poverty and the struggle for survival have pushed these artisans to only focus on the immediate economic goal rather than the long-term consequences of their activities. All the licensed operators interviewed said that the high cost of environmental impact assessments (EIA) were a deterrent to effective environmental stewardship.

Secondly, the low literacy levels and lack of environmental awareness in these communities appear to be somewhat responsible for the careless attitude towards the environment. It has been documented that low literacy can lead to poor environmental management during mining. For example, Adamu (2011) reported that poor environmental management could lead to health risks, social instability, economic underdevelopment, and non-attainment of sustainability goals. A case of human tragedy from poor environmental management recently occurred in Zamfara state in northern Nigeria in 2010 (Adamu, 2011;

Emmanuel, 2011; Adesomoju 2012). Here, over 400 children died from lead poisoning during ore processing in the artisanal mines. This poisoning incident and the high casualty rate were attributed to the lack of environmental awareness, and it could possibly have been averted if the operators and artisans were aware of the environmental dangers associated with gold mining.

Thirdly, the lack of capacity to effectively monitor and control the activity of the artisanal miners by the government could also explain why the operators and artisans cared less for the environment. Environmental agencies in Nigeria are either underfunded or lack the technical know-how to adequately protect the environment, or both. For instance, the high number of deaths recorded during the lead poisoning incident in Zamfara in 2010 could have been averted if the environmental agencies in Nigeria were competent and responded in a timely manner. To date, there are numerous other cases of environmental pollution from mineral resource exploitation that have been reported in Nigeria (Nwankwo, 1988; Egborge, 1991; Al-Amin, 2010; Vidal, 2011; Okojie, 2012), but the environmental agencies have not done much to sanction the perpetrators or remediate and reclaim the polluted environments. The case of ASM, which is disorganized, poses an even greater challenge for administrators due to the fact that the sector is poverty driven and growing rapidly.

Over the years, much work has been done, through the enactment of environmental laws and regulations, to protect the Nigerian environment. Some of these laws and regulations include: the Federal Environmental Protection Agency Act of 1988, the Environmental Impact Assessment Act of 1992 (EIA Act), the Harmful Wastes Act of 1988, the Nigerian Radioactive Waste Management Regulations 2006, the National Environmental Standards Regulations Enforcement Agency (NESREA) Act of 2007, and the Nigerian Minerals and Mining Act of 2007 (Federal Republic of Nigeria, 2007; Oghogho & Adegoke, 2008; Ladan, 2009). However, the implementation of these regulations has been weak or non-existent. For example, the Nigerian Minerals and Mining Act of 2007 requires the government to provide extension services on EIA reports and waste and tailings disposal methods to ASM cooperatives (Uka, 2011), but the implementation of the extension service appears weak. Authors such as Mazmanian and Sabatier (1981) and Twerefou (2009) have identified some factors that may be responsible for the weak implementation of these regulations. These factors include:

i) weak judiciary to support the environmental Acts;

ii) lack of funds or small budgetary allocations;

iii) lack of skilled manpower to enforce the regulations;

iv) lack of environmental research and scientific data;

v) lack of political desire or awareness on the part of the government;

vi) laissez-faire attitude of the government and public/media;

vii) lack of public awareness of environmental rights;

viii) lack of strong environmental activism or environmental NGOs; and

ix) corruption.

Picture 3. Land degradation resulting from ASM activities in the study communities

5.5.1 Health and Safety Challenges of ASM

The major occupational health risks identified by this study include: exposure to dust (which can cause silicosis[17], asthma, and lung cancer), noise, poisonous gases and chemicals (such as mercury, lead, and arsenic, which can cause headaches, fatigue, convulsion, and death, as shown in: Hilson and Pardie, 2006; Eisler, 2003; and Chan et al., 2003), and diseases (such as malaria and diarrhea).

This study identified falling rock chippings and mine collapse as the major occupational safety risks for artisanal miners in the study area. Most of the ASM activities in these communities use the caving method, which is known to be susceptible to collapse (Hayes, 2008; Twerefou, 2009). There have been numerous reported deaths resulting from mine collapse around the study area (Adamu, 2011). Amongst the study communities, for example, Community B recently witnessed the death of two miners as a result of mine collapse. A similar incident was reported to have claimed four lives in another community nearby (Adamu, 2011).

Recommendations

There is the need for the administrators to focus on: creating environmental, health, and safety awareness through quality information or education on the risks associated with the use of chemicals such as mercury and cyanide; creating cost-effective alternatives to local methods of mining and mineral processing; providing technological support and training; and strengthening legislation and control of chemical supply (Hinton, 2003; Yakubu, 2003; Hilson & Pardie 2006; Hilson & Vieira, 2007). For example, the Nigerian Mineral and Mining Act of 2007 (section 91) requires the government to provide extension services on health and safety procedures in mines to the artisanal miners. But it appears that the ASM operators/miners are lacking the knowledge required to maintain good environmental and safety standards, and this could be because the training and/or extension services have not yet been provided or the implementation is weak. The operators and artisanal miners stand a better chance of minimizing environmental damage, health, and safety risks if they are properly educated and trained by the MMSD with regard to the hazards associated with mining. The environment, health, and safety dangers might be minimal at the moment, but they can certainly be exacerbated if nothing is done to monitor and control

[17] Silicosis is a disease caused by the inhalation of crystalline silica dust (World Health Organization, 2007)

the ASM activities. The major problems noticed with the extension services are that most of the ASM sites are located in remote communities (that are most times inaccessible), and even when these are accessible, the operators might also not be willing to learn (Heemskerk & Olivieira, 2004; Hilson & Pardie, 2006). Faced with these limitations, Crispin (2003), Heemskerk and Olivieira (2004), and Hilson and Pardie (2006) suggest a number of strategies for accessing or communicating with these artisans in remote communities, including using media options such as radio broadcasts and portable video. Hilson and Pardie (2006) explain that radio broadcast and video records have proved to be effective in communicating about the dangers of mercury to miners in communities like Tarkwa and Prestea in Ghana. A similar initiative was reported by Crispin (2003) in Papua New Guinea, where a series of videos dramatizing the use of mercury was equally effective in showing the dangers of mercury usage to artisans.

5.6 The Social Impacts of ASM

For this study, drug use, alcoholism, ethnic discrimination and low female participation, health problems (due to malnutrition, lack of sanitation, and exposure to mercury vapor), and conflicts (seen between operator and artisans in community C) were the major social problems observed. Furthermore, the impacts of religious and institutional beliefs were also observed.

5.6.1 Drugs and Alcoholism

The factors observed by this study that are encouraging the use of drugs and alcohol within the study communities include: the lack of basic social education (on the dangers associated with drugs, alcoholism, or exposure to mercury), the lack of modern medications (for treating even simple body aches), the lack of modern mining equipment (to reduce the strenuous physical activities and time spent mining), and the absence of authorities to maintain law and order. For example, due to the strenuous nature of the ASM activities, especially when they entail digging to reach deep mineral veins, artisanal miners were observed to use alcohol and drugs (such as Indian hemp, heroin, marijuana, and paracetamol) to cope with the daunting work. The artisans used some of these drugs as a form of stimulant (to raise their level of physical activity) or to treat body pains. Hilson and Pardie (2006) in their study in Ghana also acknowledged the growing dependence of miners on medicines to treat body pains or the after-effects of mercury exposure. But when alcohol and drugs like Indian hemp, heroin, and marijuana are abused, they can lead to mental and bodily disorder (Forson, 2002; Hinton, 2005a).

It can also lead to crime, unprotected sex (which can lead to unwanted pregnancy, HIV, and AIDS), and bankruptcy. Although the after-effects of alcohol and drugs were not observed in the study communities, this factor has been documented by other studies around the region of this study. For example, Amutabi and Mukhebi (2001) made this observation in Kenya. The lack of law and order in the study communities also contributed to the use of banned drugs (such as Indian hemp, heroin, and marijuana). Kuramoto (2001) also made similar observations in the Madre de Dios gold mining region of Peru.

Recommendations

In order to reduce the negative effects of drugs and alcohol usage in the communities, the artisans need to have access to social education with anti-drug and anti-alcohol messages, modern mining equipment, and modern medication. The government also needs to do more to control the misuse of drugs and alcohol by limiting availability as well as rehabilitating those already addicted.

5.6.2 Conflict

The non-harmonious relationship between the operator and the residents in community C (where the artisanal miners complained of limited access to the mines) is simply the result of the operator's inability to understand the social dynamics of ASM. Hilson and Yakovleva (2007) also reported similar issues in Prestea community in Ghana. No visible signs of community-operator or intra-community conflicts were observed in the other study areas. Three reasons might explain this: firstly, the community-inclusive approach adopted by the operators in these other communities may have contributed to the peaceful relationships. Secondly, the adherence of the non-indigenous miners to the host communities' rules and norms appears to have also played a part in the communal peace. Thirdly, the existence of an effective and efficient traditional system might have helped to maintain communal peace. A study conducted elsewhere in Nigeria by MMSD (2008) also claimed that the rarity of conflicts from ASM was a result of the effective traditional systems that were in place. An example of such a system was witnessed in community B, where the artisanal miners were compelled to temporarily suspend mining for farming until after the planting season. This was done so that more community members (especially the men and youths) could be involved in farming in order to boost the harvest. To ensure that the artisans complied with this regulation, a monitoring and enforcing team was put

in place by the community head. Members who failed to comply were sanctioned and excluded from participating in mining during the dry season. This served as an effective institutional tool for maintaining law and order within the community and also helping the community to achieve set targets. Similar arrangements have been reported (Ostrom, 1990, 2000; North, 1995, 2005; Scott, 1995; Agrawal et al., 2009). For example, Agrawal et al. (2009) reported cases where local institutions in Tanzania were effective in soil conservation. According to the authors, the local institutions were used to provide leadership, coordinate groups, mobilize resources, improve production, and redistribute output.

Recommendation

The operator in community C needs to take positive steps in consulting with the community and incorporating them into his operations. This will create a peaceful mining atmosphere while safeguarding investments, lowering risk, and increasing optimum output.

5.6.3 Low Participation of Women

In the current study, only two artisanal miners were women. None of the women complained of discrimination even though they were mainly designated secondary roles like mineral washing, panning, and cooking. The men on the other hand, do the digging as well as making the decisions. Hilson and Garforth (2012) also made similar observations in Mali and Ghana. Three major reasons were identified to be responsible for the low participation of women in the study area.

Firstly, most of the mining done in these communities involves digging deep pits through hard rocks for minerals such as gemstones and gold. As such, the number of women likely be attracted to these mines will be less due to the strenuous nature of extracting such minerals. Secondly, the study communities are dominated by Islamic religious and cultural practices which limit the social and economic participation of women in outdoor activities like mining. This practice prohibits close interaction between adult males and females in public places. This differs from non-Muslim regions or communities in Nigeria (e.g., Keana), where there are higher percentages of women involved in mining activities. Thirdly, the general cultural practices in most African societies limit the function of women to mainly domestic activities and subsistence farming as opposed to more vigorous activities like mining. Authors such Tráore (1994), Hilson (2001), Hinton (2003, 2005a), Hinton et al. (2003), and Hayes (2008) have also made similar

observations.

Recommendations

For more women to be fully involved in ASM in these communities, this study recommends the consideration of women in developing mining regulations and policies, equal participation in decision-making, and the eradication of social norms that prevent women from fully participating in mining activities.

5.6.4 Impacts of Religious and Institutional Beliefs

In this study, artisanal miners were observed to have strong connections to their cultural and religious beliefs, and this influenced the way they went about mining. For example, the artisans believed that their success (i.e., high mineral production) or failure during mining activities was dependent on God's will. Thus, this religious and cultural belief served as an effective tool of consolation for the artisanal miners during periods of failure or low production (even though the failures could be linked to the unavailability of quality data on the mineral deposits). Authors such as Kraan (2007), and Soeftestad and Alayón (2007) also made similar observations on the impacts of religious and institutional beliefs in the management of natural resources. For example Kraan (2007) reported that religion was effective in fisheries management of Anlo-Ewe beach seine fishermen in Ghana.

5.7 Challenges to ASM Operations

Even though the findings in this study suggest that ASM has the potential to contribute towards rural community developmental objectives (including poverty reduction, employment, and infrastructural development), several complex challenges exist that threaten the sector's sustainability. It is the ability of the administrators to understand and deal with these challenges that will determine the extent of the socio-economic progress that will be achieved in the ASM sector. This section will discuss some of the major challenges identified in the course of this study.

5.7.1 Low Level of Education

In this study, the educational level of the respondents in the four communities was generally low, with the majority having only attained primary (or elementary) education level. Senior secondary education (or high school) was the highest level of education attained by any of

the community respondents (see Figures 4.1 and 4.2 in chapter 4). This low level of education in these four ASM communities is consistent with other published data on the educational level of community inhabitants around the study communities (see Rock Crystal Ltd., 2005).

Thus, the low level of education in these communities was partly responsible for some of the environmental and social problems observed in these communities, which included: low environmental awareness about the dangers of mercury use, low safety awareness, and drug and alcohol abuse. Authors such as Hilson and Pardie (2006) and Hayes (2008) also made similar observations. For example, Hilson and Pardie (2006) revealed that the lack of education and training were partly responsible for the poor mercury and environmental management in ASM communities in Ghana.

This study identified three main reasons for the low literacy levels in the study communities. Firstly, these communities are located in the northern part of Nigeria, where Islamic religious and cultural practices are dominant. These practices can contribute to low levels of literacy because: 1) they discourage western education by laying more emphasis on Quranic education (which pays more attention to Quranic teachings than literacy), and this commonly affects the enrolment of children and adults into western schools; 2) they encourage early marriage for both female and male children, and this early marriage disrupts the academic progress of children; 3) they encourage polygamy (while discouraging birth control), which increases the size of the family and makes it difficult for families to provide the basic needs for social development of their children; and 4) they discourage the education of female children.

Secondly, high levels of poverty, unemployment, and low investment returns around the study area may have also contributed to the low literacy rates observed in these communities. These conditions can influence community members' decisions by shifting their focus to economic survival. Such conditions offer little incentive for community members to engage in purposeful literacy development or social development. In other words, survival demands in these communities have caused families to keep their children out of school, thus lowering the literacy rate.

Thirdly, the lack of government support and skewed distribution of educational facilities towards urban areas may also explain the noted low literacy levels in the study communities.

Most rural communities in Nigeria lack access to formal education (Igbuzor, 2006). For example, all the communities in the present study lacked functional schools and public libraries, and even where a functioning school was located nearby it lacked teachers, books, and materials for teaching and learning. Hence, the lack of accessibility to formal education is a fundamental cause of the low literacy in these communities. Other interlinked and isolated factors found by this study to contribute to the low literacy rate in these communities include: costs of learning, frequent industrial strikes by academic unions/teachers, low quality of teaching, and personal factors/preferences.

Recommendations

A higher literacy level can be achieved in these rural communities. But this would be dependent on an increased budgetary allocation to education, improved access to quality education, lower costs of learning, increased quality of teaching, and improved standards of living in rural communities. The ASM communities stand to benefit economically, environmentally, and socially if there is an improvement in the level of literacy and training.

5.7.2 Finance Issues

In this study, the operations of the artisanal miners were severely hampered by a lack of finance. As a result, most of the respondents advocated financial support through grants or loans from the government to boost operations. Eyre and Agba (2007) also made similar observations in Nigeria. This study identified two main reasons for the lack of finance in this sector.

Firstly, it is very difficult to secure loans in Nigeria. Even when it is possible to secure loans, the interest rates are usually too high for ASM operators. Thus, instead of seeking these high-interest loans, the operators have preferred to manage with inadequate funds. The second reason is the lack of government support. For example, while the bulk of the $120 million loan appeared to have been used for other developments in the mineral sector, the $10 million specifically earmarked for the development of the ASM sector had not been fully utilized. When asked why the $10 million had not been fully disbursed, the MMSD bureaucrat interviewed claimed that the ASM operators were required to meet certain requirements (like being in a cooperative) before they could benefit from the loan. However, it is presently over seven years since the loan was given, yet nothing positive can so far be said to have been achieved with the $10 million earmarked for the ASM sector. Even the organized operators, such as those in

communities A and D of this study, are yet to receive any financial assistance. This study identified two reasons why the government is delaying in fully disbursing the $10 million grant after conducting numerous appraisal studies on ASM operators and artisans in Nigeria.

Firstly, a lack of the technical capacity to implement policies might be responsible for the delay. The lack of capacity to effectively implement developmental policies has remained an Achilles' heel for the government of Nigeria for a very long time. Respondents also commented on this issue during the interviews. Thus, this weakness has meant that most policies have failed to meet their target outcomes, and this could be attributed to the lack of technical personnel and the feeble will of the government to implement policies (Obadan, 2001; Ogwumike, 2001). For example, within the last two decades several poverty alleviation programs were initiated and implemented by past governments, but none achieved the desired results (Obadan, 2001; Ogwumike, 2001). Ironically, this scenario could also be playing out with the World Bank loan. It is now over seven years since the loan was given to the government, but the targeted beneficiaries are yet to fully benefit from it.

Secondly, corruption in the government could be undermining any progress aimed at assisting artisanal miners with the World Bank loan. This was also pointed out during the interviews. Recent reports have indicated that the World Bank loan has been misappropriated by a group who were meant to disburse the $10 million grant to the artisanal miners (Itua, 2012). In contrast, reports have shown that countries like Ghana (through its Mineral Commission) have been able to provide loans at subsidized rates to ASM operators (Hilson, 2001).

Recommendations

Considering the harsh and uncertain operating conditions facing most ASM operators, it would seem pressingly urgent that the administrators try to find ways to assist. Thus, assuming the loan has not been misappropriated as pointed out by Itua (2012), and the administrators are serious about assisting licensed operators, then the best option would be to adopt a community-inclusive setup in disbursing the loan or any other financial assistance. This is because community-inclusive ASM (with its effective and efficient traditional systems), as seen in communities A and D, can offer better options for accountability through creating opportunities for every stakeholder (including the operators, artisans, and government) to know the quantity of

minerals mined, how the minerals are sold, and how much money is made. Also, this approach can aid in reducing poverty and promoting rural economic renewal (i.e., the goal of the World Bank) through collective sharing of profits (with financial benefits staying within the community for poverty reduction and community projects). Furthermore, training in financial management should be offered to the artisanal miners. There is also the need for financial institutions, such as banks, to offer financial support in form of soft loans (with low interest rates).

5.7.3 Access to Mining Equipment

It was observed that the lack of excavators and blasting materials (for semi-mechanized operators) and, in some cases, even basic mining equipment such as hand shovels, diggers, and pans, was hampering the output of ASM operators. And even where machines were used, spare parts were commonly not readily available or were unaffordable. Authors such as Hilson (2001) and Hayes (2008) also made similar observations. Hilson (2001), for example, reported that the productivity of the ASM sector in Ghana was severely hampered by the lack of essential mining equipment.

Recommendations

The administrators must find ways to assist in this matter also. One way could be through 'hire purchase', which Hayes (2008) reported to have been somewhat successful in neighboring Sub-Saharan African countries such as Burkina Faso, Ghana, Tanzania, and Mozambique. A second solution could be equipment hire. According to section 91 of Nigeria's Minerals and Mining Act of 2007, the government is supposed to provide extension services, in areas such as the application of modern mining technology and the provision of equipment hire, in cooperation with manufacturers, to active and registered ASM cooperatives. Providing such services can significantly improve efficiency for the operators and thereby increase returns and benefits for the community and government.

5.7.4 Mineral Trading Challenges

Artisanal miners interviewed made claims of being exploited by intermediaries called "sponsors". These sponsors either underpaid the artisans for minerals supplied or put pressure on the miners for quick returns. Hilson and Pardie (2006, p. 106) reported similar findings in Ghana were "monopolistic middlemen" manipulated artisanal gold miners and prevented them from

fully benefitting from their ASM livelihood. Their empirical findings showed that the artisans made less money whenever the so-called middlemen or "Sponsors" sponsored them.

This study identified three main reasons to explain why this was the case in the current study communities. Firstly, is the poor knowledge of, or training in, entrepreneurship and mineral economics (Eyre & Agba, 2007). According to section 91 of the Nigerian Mining Act of 2007, the government is meant to provide this training, but findings from this study suggest the extension services from the government are either weak or nonexistent. Second, is the lack of established markets for mineral trading. There are currently no established markets for the trade of minerals in Nigeria. Third, is the class difference or widening income gap between the artisanal miners and the Sponsors (who are usually rich, with enormous influence). A report by the National Bureau of Statistics (2012) shows a continuous rise in the Gini-coefficient[18] measure in Nigeria. This rise in the Gini-coefficient indicates increasing income inequality and uneven distribution of wealth (or power) between the poor and the rich in Nigeria. Thus, due to this widening income gap, the political elite often dominates even in such local activities like ASM and controls the access and rights to mines, and this often leaves the poor marginalized as seen in the study communities. Authors such as Aubynn (1997) and Aryee (2001) also made similar observations in Ghana, where powerful elites also dominated and controlled the ASM sector. These cases of dominance by these so-called sponsors or elites can be related to the Marxist political economy theory, which was discussed earlier in the literature review. Thus, the elite groups or sponsors, with the bigger share of wealth, commonly control the mineral markets, and consequently determine how the minerals are extracted and sold (Macionis & Gerber, 1999; Thomson & Joyce, 2000).

Recommendations

This study is of the view that the artisans can minimize the influence of these elite groups by forming community-linked cooperatives to develop their own businesses and marketing strategies that will entail cutting out the middlemen. It would also help if the artisanal miners were trained in entrepreneurship and mineral economics. Additionally, there is a need to have a

[18] Gini-Coefficient is the measure of inequality and income distribution in a country. It is usually a number between 0 and 1, where 0 corresponds with perfect equality (in which case everyone earns the same income); and 1 corresponds with perfect inequality (where only one person earns all the income and all others have zero income; National Bureau of Statistics, 2012).

coordinated minerals market that is competitive, organized, and regulated by the government (as found in Botswana and Ghana; Tschakert, 2009). But for the government to be effective in regulating the minerals market, it needs to restructure its institutional system to be efficient. This is because creating a viable and competitive minerals market will go a long way to encourage the involvement of more ASM operators in mining activities. For example, if properly managed and overseen by the government, mineral markets can also generate significant tax revenues, which can be used in part to facilitate the growth of the mining sector. This market could equally create job opportunities for other members of the public (such as trade brokers, mining consultants, economists, and security guards).

5.7.5 Cultural Challenges

In this study, respondents claimed that the general business and cultural attitudes of Nigerians were partly responsible for the sector's underdevelopment. Culturally, Nigerians are mono-cultural and prefer getting involved in individual short-term businesses of 'buying and selling' to long-term partnerships. This could explain why the large-scale mining sector is still dormant. Eyre and Agba (2007) made similar observations during a recent study in Nigeria. They affirmed that the economy in Nigeria is largely cashed based (or that of buying and selling), and this made it difficult for long-term businesses like large-scale mining that requires loan facilities to thrive. Thus, this could explain why the MMSD is still finding it difficult to organize ASM operators into groups or cooperatives over seven years after receiving the World Bank loan.

Recommendation

There is a need for a different business mentality that fosters collaboration. And this can be achieved through joint partnerships, cooperatives, and associations.

5.7.6 Issues of Governance

The main issues observed to be associated with ASM governance are, political instability, corruption, the lack of capacity to implement policies, the lack of adequate mining regulation and enforcement, and the lack of continuity in the administration of MMSD. These issues are the results of Nigeria's political history, a lack of political will, widening power gaps (which prevents stakeholder participation), and lack of transparency. These are the relics of colonial government structures (or pre-colonialism) that disrupted the local institutions in Nigeria.

Incidentally, these dictatorial and autocratic styles of government have become the dominant ideologies behind economic systems and resource management strategies in Nigeria. Eyre and Agba (2007) also observed some of these findings in Nigeria, and these findings suggest that the formal institutions in Nigeria are weak.

One of the tenets of good governance is the ability to manage windfall from resource exploitation to meet developmental objectives (Richards, 2005, 2006; Campbell, 2006), but in the absence of good governance, a resource-rich country may face the "Resource Curse" syndrome (Sachs and Warner, 1995; Weber-Fahr, 2002; Auty, 2004; Crowson, 2009) whereby their economies actually decline rather than grow as resource revenues flow. The current high poverty and unemployment rates in these communities suggest that Nigeria is already facing the Resource Curse syndrome.

Recommendations

The value of having good and stable governance cannot be overlooked (Campell, 2006, 2009). In fact, good and stable governance are the *sine qua non* for the development of the ASM sector in Nigeria. Hence, it is recommended that policies should be favorable to all stakeholders (especially the poor). It is also necessary that institutional capacities be developed for efficient service delivery. Additionally, there is a need for political stability, which will allow continuity in ASM administration. Finally, there is a need to have capable personnel in critical administrative positions. This will shorten the adaptation time for the administrators and equally encourage sound technical discussions and ideas.

5.8 ASM Organization and Formalization

The consensus view from the respondents is that it would be beneficial to all the stakeholders if the sector were organized and formalized. Based on respondents' views and the researcher's observations, the government stands to benefit through tax revenue, foreign exchange earnings, and contact with artisans (which can facilitate monitoring). For the operators and artisans the benefits include advancement in personal status, empowerment to partake in decision-making, leverage to attract government support, ability to access capital and loans, safeguard of investment and income, operational risk sharing, and a general pressure to conform to cultural, social, and environmental standards. Authors such as Fajnzylber et al. (2009, 2011),

McKenzie and Sakho (2010), and Rand and Torm (2012) have all reported that the formalization of small and medium scale enterprises can have positive effects. For example Fajnzylber et al. (2011) confirmed that the performance of micro-firms in Brazil improved after organization and formalization. Likewise, Rand and Torm (2012) demonstrated some benefits of formalization in Vietnam. Beside the issues of corruption and the lack of technical capacity to implement policies, this study also identified four main reasons to explain why the administrators are still struggling to organize and formalize this sector after conducting several appraisal studies (e.g. Rock Crystal Limited, 2005; Michelou, 2006; MMSD, 2008).

Firstly, the administrators in Nigeria may still be struggling to understand the drivers of the sector's growth. The ASM sector is mainly driven by high poverty and unemployment levels, and as such, conceptualizations such as the "get rich quick" narrative need to be critically examined and changed. It would be counterproductive to view everyone involved in the sector with the same lens of illegality and criminality. This misconception remains a major problem for the sector's organization, formalization, and socio-economic progress (Young, 1990; Veiga & Beinhoff, 1997; Fraser, 1998; De Soto, 2000; Honneth, 2001; Schlosberg, 2004; Tschakert & Singha, 2007; Siegel, 2009).

Secondly, the government might have the perception that a thriving ASM sector would be a deterrent to the large-scale mining sector. In this case, the administrators need to understand that both the large and ASM operators can work together as one policymaker interviewed during the field study explains:

> It is common to see large leases where the owners cannot work on the marginal fields, in such cases those fields can be ceded to the artisans who can work on the fields and sell the minerals to the major lease owner. By this way the artisans can make a living for themselves, and the lease owners can also make profits from their marginal fields. The only thing is that the government must take interest in organizing them because it is when you leave them on their own, that they constitute danger. (Policymaker)

Third, is the indecision regarding the most beneficial approach or basis for organizing the artisanal miners. Even though an official from the MMSD confirmed during the field study that preparations were being made to organize the artisanal miners into cooperatives (for the disbursement of the World Bank loan), it still appears the administrators are yet to fully decide the basis for the disbursement. It is presently over seven years since the loan was given and

nothing positive has occurred. Artisanal miners can be organized into cooperatives on several bases, such as the degree of mechanization or operational size (Hinton, 2005a), income generated, mineral extracted, social and political affiliations, and communities (as seen in this study). Thus, the administrators need to be decisive in adopting the most beneficial approach. This study has already outlined the benefits of organizing the artisanal miners on a community-linked basis (and the benefits are quite enormous).

The fourth issue observed to be obstructing ASM organization is "bureaucracy and complex procedures" (Hinton, 2005a; Eyre & Agba, 2007; Siegel, 2009). As claimed by a respondent, the bureaucracy in Nigeria is complex and unfriendly to less privileged individuals. As a result, the artisanal miners are handicapped when it comes to obtaining mining permits even when they are in a cooperative. This may explain why the elite are still dominating in the ASM sector. Authors such as Hinton (2005a) and Eyre and Agba have also made similar observations.

Recommendations

The findings in this study suggest that the organization and formalization of the ASM sector can be beneficial to stakeholders. The MMSD has already laid the foundation through the enactment of the Minerals and Mining Act of 2007. The next steps for the authorities are to:

1) re-conceptualize their perceptions about ASM;
2) recognize the property rights of the poor and not just the elite;
3) curtail corruption and unfriendly bureaucracies involved in acquiring mining permits;
4) organize the sector on the basis of cooperatives - preferably on a community-inclusive basis;
5) provide soft loans (with low interest rates) for equipment purchase and overheads;
6) provide genuine extension services; and
7) improve the capacity and efficiency to monitor, enforce, and implement policies.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

Picture 4. An artisan panning for gold in one of the study communities

6.1 Introduction

Through principally using qualitative research methodology, a major goal of this study was to investigate the potential of ASM livelihood to support rural-scale community developmental objectives such as employment, poverty and hunger reduction, and provision of better social services. To achieve this goal, four ASM communities in north central Nigeria were selected and investigated. In each of the four communities, one ASM operator and eight other individuals including community heads, artisanal miners, and residents were interviewed. Outside the communities, 18 public servants (i.e., 15 bureaucrats and three elected policy makers), three pro-mining non-governmental organization (NGO) representatives, and three business representatives (two private business owners and one mineral dealer) were also interviewed.

6.2 ASM Setup and Practices

This study identified four distinct ASM setups, which represent the major organized ASM practices within the region. The setups in communities A and D (which are community-inclusive and involve sharing of proceeds) seem to have a better arrangement for the artisanal miners and the communities to benefit when compared to the other two setups. This is because of the potential benefits, which include: job creation for community members; wealth creation and collective sharing of profits (with financial benefits staying within the community); operational risk sharing; mine security and protection of property; accountability to communities, operators/title holders, and government; harmonious co-existence between the communities and operators/title holders; culture preservation and protection of important cultural areas; collective environmental responsibility/protection and monitoring; increase in government's internal revenue through taxation of mineral sales and profit; easy contact with and tracking of operators and community; and easy monitoring and control of ASM activities. In contrast, the setup in community C (where the operator restricts the involvement of community members) seems not to be a good arrangement due to the potential of creating disharmony and conflicts between parties involved.

These findings are consistent with and support those of other studies that have examined the setup of the ASM livelihood. Some of these researchers include Barry (1997), Hilson (2001, 2010), Hilson and Yakovleva (2007), MMSD (2008), Brownell (2009), and Nyame and Blocher

(2010). They are also consistent with other studies such as Ostrom (1990, 2000), North (1995, 2005), Scott (1995), and Agrawal (2009) that have examined the benefits of community collective management systems. Thus, this study joins a number of sources showing that community-inclusive management systems can be beneficial for the management of natural resources even at the ASM level.

The most significant contribution this study makes towards general body of theory on ASM livelihood is detailing the practices that should be encouraged for maximum benefits of stakeholders.

6.3 Drivers for Community Involvement in ASM

As regards to the factors responsible for community involvement in ASM, this study identified high poverty and unemployment levels (caused by fewer viable alternative livelihoods and diminishing farm returns), farming seasonality, lack of alternative livelihoods, the incentive to raise capital for alternative livelihoods, and neglect of rural development by the government as the main drivers for community involvement in ASM in the study communities.

Most of the findings in this study are consistent with and support those of other studies that have examined rural livelihoods and the drivers of diversification. These studies include Collier and Lal (1986), Low (1986), Haggblade et al. (1989), Barry (1996), Bryceson (1996, 1999, 2002), Reardon (1997), Adesina and Ouattara (2000), Reardon et al. (2001), Barrett et al. (2001), Ellis (2000, 2006), Heemskerk (2003), Hinton (2003, 2005a,b), Mondlane and Shoko (2003), Maponga and Ngorima (2003), Hayes (2008), Banchirigah and Hilson (2010), and Hilson and Garforth (2012).

The findings of this study do not support the ideas of studies such as Alpan (1986), Nöetstaller (1987, 1996), ILO (1999), Walsh (2003), USAID (2005), World Bank (2005), Maconachie and Binns (2007), Havnevik et al. (2007), and Cartier (2009), which contend that artisanal miners are often opportunists drawn to ASM as a result of the desire to “get rich quick”. The artisanal miners in this study were drawn into ASM mainly as a result of poverty, unemployment, and farm seasonality. Thus, this thesis joins a number of sources indicating that the major drivers of rural farm diversification to ASM are poverty, employment, farm seasonality, and the incentive to raise capital for alternative livelihoods.

A significant contribution this research makes towards the general body of theory on the drivers of the ASM livelihood is its presentation and analysis of the drivers that are pushing rural inhabitants in a country that is richly endowed with oil and gas and solid mineral resources.

6.4 The Economic Impacts of ASM

This study showed that the artisanal miners made sufficient incomes from mining to survive and in some cases more than the minimum wage of civil servants in the Nigerian government. This was also the case for the operators, as this study revealed they made profits despite the harsh operating conditions. In addition, this study also revealed that the mining activities created jobs and contributed to the creation of other small businesses around the mining sites. Thus, this implies that with adequate organization and formalization, ASM can create more jobs and wealth for the communities, which can help to reduce hunger and poverty. It can also generate more profit for the operators (through mineral sales) and revenues for the government (through tax levied on mineral sales). Some of these profits and revenues can collectively be channeled to support rural community developmental objectives such as the provision of infrastructures and better social services.

Most of the findings in this study are consistent with and support those of other studies that have examined the economic potential of the ASM livelihood in developing countries. Some of these studies include Hilson (2001, 2012), Aryee et al. (2003), World Bank (2005), Hilson and Pardie (2006), Hayes (2008), Slack (2009), Tschakert (2009), and Hilson and Garforth (2012).

The findings of this study do not support the ideas of authors such as Nöetstaller (1996), Heemskerk (2005), Sinding (2005), Hilson (2006), Banchirigah (2008), Hayes (2008), who contend that artisanal miners are often trapped in a vicious poverty loop. A majority of the artisanal miners in this study economically benefitted from the ASM livelihood. Thus, this study joins a number of sources to show that the ASM livelihood can alleviate poverty, create employment and other businesses, and generate wealth for operators and governments.

A significant contribution this study makes towards the general body of theory on the economic impacts of ASM livelihood is detailing the potential of ASM to support alternative livelihoods and community developmental objectives.

6.5 The Environmental Impacts of ASM

In terms of environmental impacts, this study revealed that most of the community residents and companies had little knowledge about the environmental dangers their activities posed. Land disturbance, contamination and diversion of water courses/sources, mercury pollution, and loss of arable farming lands were observed to be the major environmental problems associated with ASM in the study communities. Data analysis revealed that the communities and operators' awareness or perceptions of good environmental stewardship were affected by factors such as low literacy levels and lack of environmental education, focus on economic survival, the high cost of Environmental Impact Assessments, and the lack of capacity on the part of the government to effectively monitor and control this activity.

6.5.1 Health and Safety Impacts of ASM

In relation to health and safety concerns, this study revealed that the exposure to dust, noise, poisonous gases, chemicals (such as mercury), diseases (such as malaria and diarrhea), drug use, and alcohol use were the major health risks associated with ASM in the study communities.

Likewise, falling rock chippings and mine collapse were found to be the major safety risks. Analysis revealed that the artisans were vulnerable to these health and safety concerns due to the lack of training and safety awareness, and lack of adequate mining equipment.

The findings in this study on the environmental, health, and safety impacts of ASM are consistent with and support those of other studies that have examined similar impacts. Some of these studies include Davidson (1993), Hilson (2001, 2006), Golow and Adzei (2002), Babut et al. (2003), Golow and Mingle (2003), Hinton (2005a), World Bank (2005), Kitula (2006), Hilson and Pardie (2006), Spiegel et al. (2006), Hilson and Vieira (2007), and Veiga and Beinhoff (1997). Thus, this study joins a number of sources to reveal the environmental, health, and safety impacts of ASM.

A significant contribution this study makes towards general body of theory on the environmental, health, and safety impacts of ASM is detailing the processes that can be implemented and maintained for sustainable resource exploitation at the ASM level.

6.6 The Social Impacts of ASM

For this study, drug use, alcoholism, ethnic discrimination and low participation of women, health problems (due to malnutrition, lack of sanitation, and exposure to mercury vapor), and conflicts (seen between operator and artisans in community C) were the major social problems observed. The conflict in community C was tied to the operator's inability to understand the social dynamics of ASM and the operator's failure to fully adopt a community-inclusive ASM approach as seen in other communities (such as communities A and D). A community-inclusive ASM approach, the existence of an effective and efficient traditional system, and the adherence of the non-indigenous miners to host communities' rules and regulations were pivotal in avoiding community-operator or intra-community conflicts in these communities. Furthermore, the artisanal miners were observed to have strong connections to their cultural and religious beliefs, and this influenced the way they went about mining. This religious and cultural belief served as an effective tool of consolation for the artisanal miners during periods of failures or low production.

These findings are consistent with and support those of other studies that have examined the social impacts of ASM. Some of these studies include Amutabi and Mukhebi (2001), Hilson (2001), Vanclay (2002), Hinton (2003, 2005a), Lahiri Dutt (2004), Hayes (2008), and Twerefou (2009). Thus, this study joins a number of sources to reveal the social impacts of ASM.

A significant contribution this study makes towards general body of theory on the social impacts of ASM is detailing the processes through which the social impacts of ASM can be mitigated.

6.7 Challenges to ASM Operation

Low level of education, lack of funds, lack of access to mining equipment, lack of access to mineral market, general business attitude (that discourages partnership), and poor governance were identified as the main challenges affecting ASM operation in the study area. Some of the issues revealed that affect governance include the lack of political stability, frequent change in the administration of the MMSD, politically motivated appointments of the administrators of the MMSD, the failure of the administrators to understand the sector's dynamics, the failure to decide on the basis for the sector's organization, bureaucracy and complex procedures,

corruption, and the perception that a thriving ASM sector would be a deterrent to the large-scale mining sector.

These findings are consistent with and support those of other studies that have examined the challenges to ASM operation. Some of these studies include Dikko (2001), Hilson (2001, 2002), Hinton (2005a), Eyre and Agba (2007), Hilson and Pardie (2006) and Hayes (2008). Thus, this study joins a number of sources to reveal the challenges to ASM operation in Sub-Saharan Africa.

A significant contribution this study makes towards the general body of theory on the challenges to ASM is detailing the processes that will propel ASM to become a genuine livelihood-sustaining activity that can support rural developmental objectives.

6.8 ASM Organization and Formalization

This study revealed that the organization and formalization of the ASM sector would be beneficial to stakeholders. The benefits that can be derived by the government include tax revenues, foreign exchange earnings, and contact with artisans (which can facilitate monitoring). For the operators and artisans the benefits include advancement in personal status, empowerment to partake in decision-making, leverage to attract government support, ability to access capital and loans, safeguard of investment and income, operational risk sharing, and a general pressure to conform to cultural, social, and environmental standards.

These findings are also consistent with and support those of other studies that have examined the question of the organization and formalization of ASM and other small-scale enterprises. Some of these studies include Young (1990), Veiga and Beinhoff (1997), ILO (1999), De Soto (2000), Honneth (2001), Schlosberg (2004), Heemskerk (2005), and Hinton (2005a, b), Barry (1996), Tschakert and Singha (2007), Fajnzylber et al. (2009, 2011), Siegel (2009), McKenzie and Sakho (2010), and Rand and Torm (2012). Thus, this study joins a number of sources to reveal the benefits of organizing and formalizing ASM and other small-scale enterprises.

A significant contribution this study makes towards general body of theory on the organization and formalization of ASM is detailing the setup and processes that must be implemented for optimal benefit of stakeholders.

6.9 Recommendations for Government Agencies

For the government, this study proposes first that it shifts its focus towards policy implementation and enforcement rather than policy enactment. The provisions of the Nigerian Mining Act of 2007 seem adequate to guide the mining sector, but this is not enough by itself to advance the sector. The government needs to redouble its efforts to formalize and organize the sector. And this will entail conducting research to more deeply understand the sector's drivers, the promotion of sustainable ASM approaches, the creation of a business friendly bureaucracy, the shunning of corruption, and a change in the general perception of ASM.

Secondly, for efficient service delivery on the part of the government, this study recommends political stability and continuity in the administration of the MMSD. This is because it is more likely for a ministry like the MMSD to meet both short and long-term policy goals if there is stability in administration. Frequent changes in administrators are disruptive and counterproductive to the sector. Furthermore, this study also recommends that appointments should be made based on technical knowledge rather than politics. This will shorten the adaptation time for the administrators and encourage sound technical discussions and ideas. This study also recommends further technical training for the staff of MMSD and other regulatory bodies affiliated to the MMSD, like NESREA (National Environmental Standards, Regulations Enforcement Agency). This training will equip them with modern technical knowledge and further strengthen the government's capacity to implement and enforce mining regulations.

Thirdly, the government needs to create an enabling environment for ASM to thrive. To achieve this goal, it is proposed that the government should focus on rural community developmental projects like schools and medical facilities, and provision of stable power supplies, pipe-borne potable water, and sealed roads. Such developmental projects will improve the currently poor socio-economic conditions of these communities. Likewise, the government needs to create awareness of issues such as good environmental stewardship, drug and alcohol abuse, and the rights of women.

Fourthly, for transparency, peace, and harmonious coexistence between the government, communities, and operators, this study recommends that the government be genuinely involved in the ASM actor. This will entail supporting the operators and communities through making

provisions for soft loans and subsidized mining equipment, through creating access to mineral markets, and through controlling the activities of middlemen. Furthermore, the government needs to be transparent with the disbursement of the World Bank loan. This will build trust and foster peace.

Fifthly, the government needs to re-conceptualize their perceptions about ASM because it is a poverty driven activity. Thus, the government needs to recognize the property rights of the poor and not just the elite.

Finally, to effectively organize and formalize the ASM sector in Nigeria, this study recommends organizing the artisanal miners into cooperatives that can be tied to a community. For example, the community-inclusive approach is a good example because:

i) it allows any member of a community to participate;
ii) less skill is required;
iii) it can raise internal revenue through 'multiplier effects' and tax;
iv) it can encourage foreign direct investment via government incentives (example: local environmental empowerment management programs);
v) it is easier to monitor and manage artisanal miners clustered as a community than a multitude of dispersed individuals; and
vi) the artisans stand to become legitimized and more aware and compliant with mining regulations, compared with illegal miners who have no reason to care for the environment or community

6.10 Recommendations for Operators

For the operators, this study recommends taking positive steps in consulting with and incorporating the communities into the operations. This will help foster peace as well as safeguard the operators' investments. The operator in Community C needs to improve his community relations by changing his attitude towards the community. He can do this by being more accommodating and by discussing his concerns with the community.

Secondly, in situations where the operators and the communities are in a sharing agreement (as in communities A and D), the companies need to monitor the communities' share (which is often given to the village heads) to make sure that it is actually used for the betterment of the community. This measure may help to reduce negative perceptions of the community regarding the operators.

6.11 Recommendations for Communities

For the communities, this study recommends discussing issues positively and being more accommodating to the operators and the government. This is because a harmonious coexistence between the communities, operators, and the government can encourage progressive community development.

Also, it is recommended that the communities reinvest some of their own share of the proceeds from mining into community development projects. The communities can also invest in education, which will equip them with the knowledge and skills to get other forms of employment.

6.12 Recommendation for the Business Community

For the business community in Nigeria, this study recommends a change in business attitude from the individualistic mindset of 'buying and selling' to that of partnership. This change would foster the growth of small- and medium-sized industries in Nigeria.

6.13 Limitations of the Study and Future Research Directions

There is still a need for further work in some of the areas addressed by this study. Firstly, data collected for this study was primarily based on participants' interpretations and the researcher's observations. This study did not carry out any empirical measurements of the selected indicators for rural-scale sustainable development (such as the actual level of environmental pollution, or the actual level of economic and social benefits). As such, the interpretations derived from this study are more subjective than objective. Thus, there is the need for further studies in this area to incorporate a combined subjective and objective approach (which should include both qualitative methodology of interviews and observations along with quantitative measurements of the indicators).

Secondly, due to limitations of time and budget, this study was not able to compare the ASM approaches in other geographic regions of Nigeria or Sub-Saharan Africa. A comparison with other regions would have presented more transferable results. Thus, future studies should be expanded to other regions for cross comparison of ASM approaches. Finally, time and budget constraints also did not permit an in-depth study of the economic, environmental, and social benefits of the community-inclusive ASM approach. Future studies should focus on understanding the long-term cumulative economic, social, and environmental benefits of this approach in order to make significant contributions to policy and sustainability agendas.

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APPENDICES

APPENDIX 1: GOVERNANCE STABILITY IN NIGERIA

Nigeria's political stability index

S/N	Regime	Tenure	Mode of Exit
1	Tafawa Balewa (Elected Civilian Prime Minister)	1960 - 1966	Coup d'états
2	Aguiyi Ironsi (Military Head of State)	1966 - 1966	Coup d'états
3	Yakubu Gowon (Military Head of State)	1966 - 1975	Coup d'états
4	Mutala Mohammed (Military Head of State)	1975 - 1976	Coup d'états
5	Olusegun Obasanjo (Military Head of State)	1976 - 1979	Civilian handover
6	Shehu Shagari (Elected Civilian President)	1979 - 1983	Coup d'états
7	Muhammadu Buhari (Military Head of State)	1983 - 1985	Coup d'états
8	Ibrahim Babangida (Military Head of State)	1985 - 1993	Abdication
9	Ernest Shonekan (Appointed Interim President)	1993 - 1993	Coup d'états
10	Sani Abacha (Military Head of State)	1993 - 1998	Died in office
11	Abdulsalami Abubakar (Military Head of State)	1998 – 1999	Civilian handover
12	Olusegun Obasanjo (Elected Civilian President)	1999 - 2007	Civilian handover
13	Umaru Yar' Adua (Elected Civilian President)	2007 - 2010	Died in office
14	Goodluck Jonathan (Acting Civilian President)	2010 -	-

Adapted from Eyre and Agba (2007, p. 18)

Professional training and service duration of the Ministers of MMSD (1999 to date)

Portfolio	Professional/Educational Training	Started	Ended	Duration (months)
Minister of Mines & Steel Development	Architect	April 2010 – current		24
Minister of Mines & Steel Development	Architect	Dec 2008 – Mar 2010		15
Minister of Mines & Steel Development*	Accountant	Oct 2008 – Dec 2008		2
Minister of Mines & Steel Development	Marketer	July 2007 – Oct 2008		15
Minister of Mines & Steel Development	Law professor	Jan 2007 – May 2007		5
Minister of Mines & Steel Development	Chartered accountant	June 2005 – Jan 2007		17
Minister of Mines & Steel Development	Political science professor	July 2003 –June 2005		23
Minister of Mines & Steel Development	Lawyer	Jan 2000 – Mar 2002		15
Minister of Mines & Steel Development	Politician	June 1999 – Jan 2000		7
Minister of Power & Steel	Lawyer	July 2003 – Jan 2007		26
Minister of Power & Steel	Lawyer	May 1999 – Jan 2000		7

*Supervisorial role

APPENDIX 2: GENERIC INTERVIEW GUIDES

Interview Guide for Bureaucrats and Policy Makers

1) Do you think the mining of solid minerals can in any way contribute to Nigeria's sustainable development?
2) Why has Nigeria not recorded any meaningful success in solid mineral exploration even with the abundant mineral deposits?
3) What do you think are the main constraints on this industry?
4) Are there any effects you think the solid mineral industry has had and will have on Nigeria and the mining communities?
5) Do you think the government, companies, communities, and NGOs are benefiting from the mining activities?
6) How do you think the local communities can benefit or participate in this industry?
7) In which ways do you think the country as a whole can benefit from this industry?
8) Are you in support of small–scale artisanal or local community mining?
9) Will you support the legalization or illegalization of artisanal mining?
10) Are there any advantages and disadvantages of involving the communities in this industry?
11) What positive and negative environmental impacts do you see arising from this industry?
12) Are there any positive or negative social impacts?
13) What is the government's relationship with the communities like?
14) How do you communicate and channel your queries to the communities?
15) How could your relationship with the communities be improved?
16) What is the government's relationship with the companies like?
17) How do you communicate and channel your queries to the companies?
18) How could your relationship with the companies be improved?
19) What is the government's relationship with the NGOs like?
20) How do you communicate and channel your queries to the NGOs?
21) How could your relationship with the NGOs be improved?
22) Is there anything you want to be done differently?
23) Any room for improvement or advice? The way forward?

Interview Guide for Mining Companies

1) Can you give an insight into the nature and background of your company?
2) What is your role within this company?
3) How would you define the current state of the solid mineral industry in Nigeria?
4) Has it been a viable venture for you?
5) How has the government support been in this industry?
6) What constraints do you currently face in this industry?
7) How do you interact with the communities? Any hostilities or peaceful coexistence?
8) Do you think the community is benefiting from the mining activities of your company?
9) How many people from this community have you employed?

10) How many people from this community have you trained in skills acquisition? What sought of skills acquisition?
11) Do you have any community social spending programs?
12) In which ways do you think the communities and the country as a whole can benefit from the solid mineral industry?
13) Are you in support of small–scale artisanal/community mining?
14) Do you see any advantages or disadvantages in involving the communities in this industry as artisanal miners?
15) Which will you support: the legalization or illegalization of artisanal mining?
16) How do you deal with environmental issues arising from your mining activities?
17) What is the company's relationship with the communities like?
18) How do you channel your queries and information to the communities?
19) How could your relationship with the communities be improved?
20) What is the company's relationship with the NGOs like?
21) How do you channel your queries and information to the NGOs?
22) How could your relationship with the NGOs be improved?
23) What is the company's relationship with the government like?
24) How do you channel your queries to the government? And how is their response?
25) How could your relationship with the government be improved?
26) Is there anything you want to be done differently?
27) Any room for improvement or advice? The way forward?

Interview Guides for NGOs

1) Can you give an insight into the nature and background of your organization?
2) What is your role within the organization?
3) How would you define the current state of the solid mineral industry in Nigeria?
4) Has it been a sustainable venture?
5) What is your view of this industry?
6) What is the level of your organization's participation in this industry?
7) Have your organization's participation or involvement in this industry been influenced in anyway? By whom? By what?
8) Do you participate in any negotiations or decision-making with the government, industry, or communities?
9) How do you see the government's role in this industry?
10) What constraints do you currently see facing this industry?
11) How is your organization responding to the social and environmental issues arising from this industry?
12) Is there any progress in dealing with these issues so far?
13) From your assessment, do you think the communities are benefiting from the mining activities in their localities?
14) In which ways do you think the communities and the country as a whole can benefit better from the solid mineral industry?
15) What is your organization's relationship with the mining companies like?

16) How do you channel your queries to the mining companies?
17) How could your relationship with the mining companies be improved?
18) What is your organization's relationship with the communities like?
19) How do you channel your queries or get information from the communities?
20) How do you support the communities?
21) How could your relationship with the communities be improved?
22) What is your organization's relationship with the government like?
23) How do you channel your queries to the government?
24) How could your relationship with the government be improved?
25) Is there anything you want to be done differently?
26) Any room for improvement or advice? The way forward?

Interview Guide for Communities

1) Are you employed? If Yes, by whom? Doing What?
2) Do you get part time employment from the mine?
3) Level of Education? Primary, secondary, or tertiary? Who sponsors?
4) Any skills? Hobbies?
5) What was your lifestyle like before the mining activities started?
6) How were employment or job opportunities before the mining activities started? What were you doing prior these mining activities?
7) What was the social life in the community like before the mining activities started?
8) What was the environment like before the mining activities started?
9) Were you in anyway involved in the decision-making process of these mining activities
10) Lifestyle as a mining community? Any positive or negative change with the new mining activities?
11) Any economic effects from the mining activities? Like Jobs?
12) Do you derive any benefit from the mining activities such as secondary business? Training? Social welfare?
13) Any change in the social life/networks. Any effects of the mine on normal life?
14) Any environmental effects?
15) How would you rate your health conditions?
16) Are you concerned about the environment?
17) What is the community relationship with the mining companies like?
18) Does the mine consult you on any developments?
19) Do they take into account your complains? Queries?
20) How do you channel your queries to the mine authorities?
21) How could your relationship with the mines be improved?
22) Do you own any assets? Money? Properties? Animals? Skills?
23) If you have a choice how would you prioritize your needs: Education, employment, and basic amenities?
24) What do you think will happen to your community if the mine is closed today?
25) What do you think will happen if your artisanal mining activities were legalized or made illegal

today?

26) What is the community relationship with the government like?
27) How do you channel your queries to the government?
28) How could your relationship with the government be improved?
29) What support from the government would help artisanal miners?
30) Would you support tighter regulations from the government if it were done to improve the development of mining?
31) What is the community relationship with the NGOs like?
32) How do you channel your queries to the NGOs?
33) How could your relationship with the NGOs be improved?
34) Is there anything you want to be done differently?
35) Any room for improvement or advice?

APPENDIX 3: ETHICS APPROVAL CERTIFICATION

UNIVERSITY OF ALBERTA

Arts, Science, Law Research Ethics Board

ASL REB Research Ethics Office
308 Campus Tower
8625-112 Street, Edmonton, AB T6G 2E1
Phone: 780-492-2614

Notification of Ethics Delegated Approval

Study ID:	Pro00009857
Study Title:	The Contribution of Mining to Sustainable Development: Nigeria as a Case Study
Study Investigator:	Theodore Oramah
Supervisor:	Jeremy Richards
Funding/Sponsor:	NSERC - Natural Sciences And Engineering Research Council NSERC
Approval Expiry Date:	October 1, 2010

Thank you for submitting the application above to the Arts, Science, Law REB. I have reviewed your application for human research ethics and find that your proposed research meets the University of Alberta standards for research involving human participants (GFC Policy Section 66). On behalf of the Arts, Science, Law REB, I am providing **delegated research ethics approval** for your proposed research.

Your application will be presented to the Board at its meeting on October 26, 2009. Any questions or comments raised about your project will be communicated to you as soon as possible after the meeting.

The research ethics approval is valid for one year and will expire on October 1, 2010.

A request for renewal must be submitted prior to the expiry of this approval if your study still requires ethics approval at that time. If you do not renew before the renewal expiry date, you will have to re-submit an ethics application.

If there are changes to the project that need to be reviewed, please file an amendment. If any adverse effects to human participants are encountered in your research, please contact the undersigned immediately.

Sincerely,

Dr. Christina Gagne, Delegated Reviewer - REB Member
Arts, Science, Law REB

Note: This correspondence includes an electronic signature (validation and approval via an online system).

APPENDIX 4: GENERIC INTRODUCTORY-CONSENT LETTER

UNIVERSITY OF ALBERTA
Earth and Atmospheric Sciences
Faculty of Science

I-26 Earth Sciences Building
Edmonton, Alberta, Canada T6G 2E3
www.ualberta.ca/eas
eas.enquiries@ualberta.ca
Tel: 780.492.3265
Fax: 780.492.2030

The Contribution of Mining to Sustainable Development: Nigeria As A Case Study

I am Theodore Oramah, a Nigerian PhD student with the Department of Earth and Atmospheric Sciences at the University of Alberta. As part of my PhD research on the contribution of mining to sustainable development, I am exploring the challenges and opportunities for sustainable development in economies based on non-renewable resource extraction, with a specific commodity focus on minerals, and geographic focus on sub-Saharan Africa, and in particular Nigeria. This project will examine opportunities for poorer people to engage in this industry, and the potential for mining to generate true sustainable development within the country, as well as the risks involved with expanding this sector.

This research is being conducted in collaboration with my supervisor Prof. Jeremy Richards, as part of a wider study on the application of sustainable development principles to the minerals industry, and you are cordially invited to participate in the research study. The research project has been reviewed and approved by the University of Alberta's Ethics Board and has the support of the Department of Earth and Atmospheric Sciences.

This project will involve a field-based qualitative survey of participants and stakeholders at all levels in the Nigerian small- and large-scale mining sectors. Your involvement in this research project will include participating in an interview and giving answers to a set of questions. The interview session will last approximately 30 minutes to one hour.

Your participation and opinions are important and will be valuable in helping me to develop a template for the sustainable development of the mineral industry in Nigeria and other resource-rich developing countries in Africa and the world.

Your participation in this experiment is completely voluntary. You have the right to withdraw from this experiment at any time. There are no potential physical or psychological risks associated with participation in this study. However, if you feel anxious and/or uncomfortable about your performance in this study, please bring your concerns to my attention immediately.

All data collected in this experiment will be kept strictly confidential through the assignment of a coded identification number and will remain so after the completion of this study. The information provided will be used for research purposes only and you will not be identified by name or position in any research reports produced from this study. As a participant, you will get feedbacks on the progress and outcomes of this research in a way that is appropriate and convenient to you. Further, the information provided is made available only to the researchers associated with this study, and the results of this study may be presented at scholarly conferences, published in professional journals, or presented in class lectures.

If you have any questions or comments on this study, or if you wish a clarification of rights as a research participant, you can contact me, or the Department.

Thank you in advance for your participation.

Yours faithfully,

Theodore Oramah
Email; Oramah@ualberta.ca
Website; http://www.ualberta.ca/~oramah

Signatures. Please sign below to indicate that you have read and understood the nature and purpose of the study. Your signature acknowledges the receipt of a copy of the consent form as well as indicates your willingness to participate in this study.

Participant's Signature _____ Date _____

Researcher's Signature _____ Date _____

APPENDIX 5: SUMMARY OF ALL INTERVIEWS CONCLUDED

Total interviews and participants

Participants	**Number of interviews**
Serving government officials	13
Retired government officials	2
NGOs	3
Policy makers	3
Artisanal miners	37
Mineral dealer	1
Community Heads	4
Community dwellers	4
Mining company representatives	13
Academicians	2
Total	**82**

* Average duration of interviews ~ 19 minutes
* Shortest interview done – 9 minutes
* Longest interview done – 62 minutes
* Number of women interviewed – 6
* Artisanal miners interviewed were all adults within 23 – 40 years.

List of participants interviewed in 2009

No	Participants interviewed	Duration of Interview (mins)	Preliminary consultation included in the analysis	Location
1	Retired bureaucrat	25	√	Transcorp Hilton, Abuja
2	Artisanal miner	20		Rayfield tin mining site
3	Community Head	23		Rayfield Community
4	Artisanal small-scale mining company Owner	27		Rayfield
5	Artisanal small-scale mining company Owner	19		Vom, Bukuru-Road Jos
6	Artisanal small-scale mining company Owner	15		Bukuru-Road
7	Artisanal miner	16		Kuru
8	Community Head	25	√	Community B
9	Community dweller	15	√	Community B
10	Artisanal miner	14	√	Community B
11	Artisanal miner	16	√	Community B
12	Artisanal miner	15	√	Community B
13	Artisanal miner	10	√	Community B
14	Artisanal small-scale mining company representative	25	√	Community B
15	Small-scale mining company Owner	21		Abuja
16	Retired bureaucrat	18	√	Abuja
17	Bureaucrat	19	√	Abuja

18	Bureaucrat	16	√	Abuja
19	Bureaucrat	23	√	Abuja
20	Bureaucrat	15	√	Abuja
21	NGO representative	32	√	Abuja
22	NGO representative	22	√	Abuja
23	NGO representative	24	√	Abuja
24	Bureaucrat	28	√	Abuja
25	Artisanal miner	11		Gwada
26	Artisanal miner	14		Gwada
27	Artisanal small-scale mining company supervisor	16		Gwada
28	Artisanal miner	13		Paimasa
29	Artisanal miner	11		Paimasa
30	Artisanal miner	14		Paimasa
31	Artisanal miner	12		Paimasa
32	Artisanal miner	17		Paimasa
33	Artisanal miner (female)	15		Wushishi, Minna
34	Business owner	33	√	Minna
35	Artisanal miner (female)	16	√	Community C
36	Artisanal miner (female)	10	√	Community C
37	Artisanal miner	12	√	Community C
38	Artisanal miner	11	√	Community C
39	Artisanal miner	13	√	Community C
40	Artisanal small-scale mining company supervisor	20	√	Community C
41	Artisanal small-scale mining company Manager	27		Galadima Kongo
42	Artisanal small-scale mining company PRO	32		Galadima Kongo
43	Business owner	40	√	Minna
44	Bureaucrat	21	√	Abuja
45	Bureaucrat	23	√	Abuja
46	Bureaucrat	25	√	Abuja
47	Artisanal small-scale mining company owner	31	√	Community D
48	Artisanal miner	12	√	Community D
49	Artisanal miner	10	√	Community D
50	Artisanal miner	14	√	Community D
51	Artisanal miner	11	√	Community D
52	Artisanal miner	9	√	Community D
53	Artisanal miner	15	√	Community D
54	Artisanal miner	13	√	Community D
55	Artisanal miner	12	√	Community A
56	Artisanal small-scale mining company rep.	18	√	Community A
57	Artisanal miner	13	√	Community A
58	Artisanal miner	10		Azara
59	Artisanal miner	12		Azara

60	Mineral dealer and Artisanal miners association chairman	17	√	Azara
61	State mining company chairman/ bureaucrat	62		Nasarawa
62	Policy maker (female)	30	√	Abuja
63	Federal mining company geologist	24		Lokoja
64	Policy maker	23	√	Abuja
65	Bureaucrat	26	√	Abuja
66	Bureaucrat	33	√	Abuja
67	Bureaucrat	22	√	Abuja
68	Policy maker	25	√	Abuja
69	Bureaucrat	27	√	Abuja
70	Bureaucrat	26	√	Abuja

Summary of interviews concluded in 2009

Participants	**Number of interviews**
Retired government officials	2
Serving government officials	13
NGOs	3
Policy makers	3
Artisanal miners	30
Mineral dealer	1
Community Heads	2
Community dwellers	1
Mining companies	13
Academicians	2
Total	**70**

List of participants interviewed in 2010

No	Participants interviewed	Duration of Interview (mins)	Location
71	Artisanal miner	17	Community C
72	Artisanal miner	15	Community C
73	Artisanal miner	22	Community A
74	Artisanal miner	14	Community A
75	Community dweller (female)	26	Community A
76	Artisanal miner	16	Community A
77	Community Head	31	Community A
78	Community dweller (female)	12	Community A
79	Artisanal miner	18	Community B
80	Artisanal miner	14	Community B
81	Community dweller (female)	11	Community D
82	Community Head	24	Community C

Summary of interviews concluded in 2010

Participants	**Number of interviews**
Artisanal miners	8
Community Heads	2
Community dwellers	2
Total	**12**

Summary of interviews concluded in Community A

No	Participants interviewed	Number of interviews
1	Artisanal miners	5
2	Mining companies	1
3	Community dwellers	2
4	Community Head	1
Total number of interviews		**9**

* Number of women interviewed: 1

Summary of interviews concluded in Community B

No	Participants interviewed	Number of interviews
1	Artisanal miners	6
2	Mining companies	1
3	Community dwellers	1
4	Community Head	1
Total number of interviews		**9**

* Number of women interviewed: 1

Summary of interviews concluded in Community C

No	Participants interviewed	Number of interviews
1	Artisanal miners	7
2	Mining companies	1
3	Community dwellers	0
4	Community Head	1
Total number of interviews		**9**

* Number of women interviewed: 2

Summary of interviews concluded in Community D

No	Participants interviewed	Number of interviews
1	Artisanal miners	7
2	Mining companies	1
3	Community dwellers	1
4	Community Head	0
Total number of interviews		**9**

APPENDIX 6: COMMUNITY DEMOGRAPHIC DATA

Communities	Community A	Community B	Community C	Community D
Ancestral home?	Yes	Yes	Yes	Yes
Approximate population at the time of study	2,500	5,500	3,000	2,500
% of males at the time of study	70	70	65	75
% of females at the time of study	30	30	35	25
Approximate population involved in mining activities	250	500	200	250
Pre-mining economic activity	Agriculture	Agriculture	Agriculture	Agriculture
Present economic activity	Artisanal mining, trading, and seasonal farming	Artisanal mining, trading, and seasonal farming	Artisanal mining, trading, and seasonal farming	Artisanal mining, trading, and seasonal farming
Type of mine ownership	Individual mine ownership (with collaborative mining and dividend sharing scheme)	Individual mine ownership (with community employment)	Individual mine ownership (with less collaborative mining and dividend sharing scheme)	Individual mine ownership (with collaborative mining and dividend sharing scheme)
Presence of licensed ASM operator?	Yes	Yes	Yes	Yes
Mineral/ore mined	Gemstones	Kaolin, Cassiterite	Gold	Gemstones
Mining history	~ 6 years	> 20 years	~ 5 years	~ 7 years

Source: Computed from interview data (May 2009)

APPENDIX 7: FIELD OBSERVABLE INDICATORS

Indicators	Measure of indicators
Level of employment	Availability of reasonable paying jobs
Personal income level	Personal daily wages/salaries: minimum wage
Commerce	High or low level of trading activities
Infrastructures	Good transport, stable electricity, portable water, waste management
Education	High-quality education and training for lifelong learning and a skilled workforce: Literacy and numeracy
Leisure facilities	Availability of leisure and recreation spots
Healthcare	Active, healthy community members with access to quality and affordable health care services: Avoidable mortality
Security and crime	Confident, friendly and safe communities: personal and safe community
Land Pollution	Land quality: Clean land, land disturbance/degradation
Water pollution	Surface and underground water quality: Clean water
Air Pollution	Air quality: Clean air

Observable commonalities and differences amongst communities based on field observations

Indicators	Measure of indicators	Communities			
		A	B	C	D
Level of employment	Jobs created from mining	Yes	Yes	Yes	Yes
	Availability of other paying jobs	Yes	Yes	Yes	Yes
Personal income level	Personal mining wages/salaries: above minimum wage?	Yes	Yes	Yes	Yes
	Profit sharing	Yes	No	No	Yes
Commerce	Mineral trading activities	Yes	No	Yes	Yes
	Other trading activities	Yes	Yes	Yes	Yes
Infrastructures	Availability of stable electricity and potable water	No	No	No	No
Education	Literacy and numeracy	Low	Low	Low	Low
Leisure facilities	Availability of leisure and recreation spots	No	No	No	No
Healthcare	Availability of good quality and affordable health care services	No	No	No	No
Security and crime	Confident, friendly, and safe communities	Yes	Yes	No	Yes
Safety	Availability of first aid: rescue plan/measures	No	No	No	No
Pollution	Surface land degradation, inadequate sanitation	Yes	Yes	Yes	Yes
	Environmental awareness	Yes	Yes	No	Yes

APPENDIX 8: MYSELF AS A RESEARCHER

Qualitative researchers are always advised to situate themselves into the research, because their positions, values, interests, experiences, and motivations can influence their study (Miles and Huberman, 1994). Miles and Huberman (1994), and Limb and Dwyer (2001) report that through personal, societal, and political affiliations, a researcher could commonly carry the imprint of a broader culture and society. Hence, this implies that the researcher cannot completely disconnect his orientation, values, and human complexities from the information participants provided him during the course of my study. As a result of these imprints, Guba and Lincoln (1994), Miles and Huberman (1994), and Schwandt (1994) recommend that researchers should search, recognize, and affirm such imprints to enable readers assess the appropriateness and usefulness of the analysis. In light of these, the researcher briefly presents below his personal, societal, and political interests and how the research developed.

The researcher was born and raised around the region of the four selected mining communities in north central Nigeria. His parents migrated to the north central region of Nigeria around 1950's when solid mineral mining was the major economic activity of the government. Then, tin and columbite was mined and exported as a foreign reserve earner for the government. The mining created numerous business opportunities for migrants like his parents. His parents were involved in running a trading business around one of the mining communities and the proceeds they made were enough to cater for the family. He would say his family was a middle class family at this time. By the time the researcher was born (the last of seven children) in the 1970's, tin and columbite mining had declined owing to the diversion of government's attention to oil discovery in the southern part of the country, the decline in global metal prices, and depleted alluvial reserves. This affected his parents' business, as the mineworkers (whom constituted the majority of those that usually patronized my parents) were laid off. From then onwards it was a struggle for his parents to cater for the family needs as they dropped below the middle class. This meant the researcher's siblings and him had to sacrifice a lot to get the family going. The researcher vividly remembers missing out numerous soccer practices with his friends because he had to go and help with the family trade. This presented him with the opportunity to learn and see life differently. For example, these experiences thought him to always be optimistic rather than pessimistic. Also while growing up, the researcher developed interest in asking more about "how" questions rather than "why" questions because of his drive of finding solutions to problems related to poverty. Thus, the researcher's upbringing, and personal beliefs may have influenced his study in the way he formulated his questions and interpreted his results.

His ethnic affiliation may have also influenced his study. Even though he was born and raised in

north central Nigeria, he is ethnically linked to an ethnic group found in southeastern Nigeria. His ethnic group, like most ethnic groups in Nigeria, prohibits certain types of actions towards women and elders. For example, His culture prohibits younger male adults like him from asking elders and women about their ages and status. This might also have influenced the way he interacted and interpreted his study questions with the elderly and female participants.

The researcher's personal life, work, and study experiences might have also influenced his study. For example, while growing up in north central Nigeria, he noticed that artisanal mining caused a lot of conflict and social problems due to non-regulation, and struggle for survival. He also noticed the conflicts were aggravated by: government neglect of the solid mineral sector due to the oil boom; communities' agitation for resource control; involvement of non-community members in mining without adequate approval; failure on the part of the government to honor community developmental promises. It was based on these observations that the researcher started asking "how" could the conflicts related to resource exploitation be stopped? To find answers, he firstly tried to understand the formation, accumulation, and exploitation of mineral resources by acquiring a Bachelor of Technology honors degree in Geology in 2004. And he focused his research in learning more about the formation, transport, and depositional history of minerals found around Kogi state, in Nigeria.

After his graduation from the Federal University of Technology, Minna, Nigeria, in 2004, he worked with the Department of Geo-miming at Nasarawa State University, Keffi, Nigeria, as a Teaching Assistant for a year to further hone his geological knowledge. Apart from getting involved in teaching geological courses, he was also involved in organizing geological field trips with the students to understand more about the mineral distribution of north central Nigeria. During these field trips the researcher was opportuned to visit a few artisanal mining sites, and the number of people involved in this mining activity, scale of mining, environmental degradation, and conflicts arising from these activities heightened his curiosity. His attention was immediately drawn towards finding a way to curb or remediate the degraded environment. At this point, the researcher realized the need to embark on a study of the environmental management aspect of mineral resource exploitation. He therefore acquired a Master of Science degree from China University of Geosciences, Wuhan, China, in 2007. His research was focused on monitoring environmental pollutants from mineral resource exploration. Getting the opportunity to further his studies outside the shores of Nigeria gave him the opportunity to experience a different culture and way of life. His first experience was to notice the improved standard of living, and hewas forced to start drawing comparisons. For example, the researcher noticed lower level of poverty and hunger in Chinese rural communities when compared to Nigerian communities, which even had larger mineral deposits. He also noticed the high level human and infrastructural development when compared to

Nigeria. With this exposure, his attention was now focused on Nigeria. The researcher's attention was focused on Nigeria because, Nigeria has the potential to develop sustainably through mineral exploitation, but yet it faces so many challenges. He then realized that there is the need to undertake an in-depth study to outline the path that could lead to harnessing the potential of mining and subsequently lead to human and infrastructural development, poverty and hunger reduction, and most importantly, reduction of the frequent conflicts emanating from mineral resource exploitation. The question that came to his mind was "how" can Nigeria and other Sub-Saharan African countries facing similar developmental challenges use "what they have" (mineral resources) to get/achieve "what they lacked" (livelihood means and development)? This personal belief was behind his motivation to seek an opportunity to formally undertake this study at a PhD research level under the supervision of an economic geologist with vast knowledge on solid mineral mining and sustainability in the mineral sector at the University of Alberta, Edmonton, Canada. The study is to find out how artisanal small-scale mining can provide a meaningful livelihood and support rural development objectives in Nigeria. Thus, his life experiences might have also influenced the choice of the topic and investigative approach adopted for the study.

In summary, the researcher's values (personal upbringing, beliefs, ethnicity, interests, experiences, and foresight) might have influenced the choice of the investigative approach he adopted for the inquiry. For example, his exposure and educational background might have influenced the power relationship between his participants and himself as a researcher during data collection, and this might have affected the information participants supplied to the study. However, his awareness of the uneven power relations between a highly educated researcher (like himself) and the less educated participants in his study, helped in achieving some sort of symmetry or balance during data gathering and interpretation. As a result, the researcher attempted to achieve symmetry by adopting a conversational approach in the manner he interacted with participants. This approach was also adopted to deal with the uneven power relationship with women and elderly participants. Also his work experience and knowledge in the topic might have also influenced his interpretation of the results. However, he worked hard to ensure a balanced analysis of the study. The researcher admits that his approaches may not have been enough to achieve full power symmetry with participants, and as such, he accepts any biased interpretation readers might spot, as he cannot completely hide or decouple his values from the data (Guba and Lincoln, 1994; Miles and Huberman, 1994; Schwandt, 1994).