UNIVERSITY OF CAPE COAST

EFFECTS OF SMALL-SCALE GOLD MINING ON LIVELIHOODS OF SELECTED MINING COMMUNITIES IN OBUASI MUNICIPAL ASSEMBLY, GHANA

BY

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DECLARATION

STUDENT'S DECLARATION

I do hereby declare that this thesis is the result of my own original research and that no part of it has been presented for any degree in this University or elsewhere.

Candidate's Signature: ……

Date: ……....

Name ……

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Supervisor's signature…….

Date……

Name ……

ABSTRACT

Small-scale gold mining and its effect has been an interesting area of study for many researchers. Most of these studies posit that poverty is the main predisposing factor that pushes people into illegal small-scale mining (Opoku-Ware, 2010). In a similar study conducted by Awumbila and Tsikata (2004), they found that unemployment is the reason why several people in their region take up mining. Also, Danyo and Osei-Bonsu (2016) noted that unlawful small-scale mining negatively affects farmers wellbeing and food production in Ghana.

The main objective of this study was to analyze the effects of small-scale gold mining on the livelihoods of residents of mining communities within the Obuasi Municipal Assembly. Specifically, the study sought to identify the factors that influence residents of mining community's engagement in small-scale mining (SSM) and assess the effects of small-scale mining (SSM) activities on the livelihoods of residents in the Obuasi Municipal Assembly. Additionally, it sought to examine the coping strategies of residents whose livelihood had been affected by SSM activities within the Obuasi Municipal Assembly. The study used concurrent triangulation mixed method design and a sample of 406 respondents.

In general, the study found that small-scale gold mining is plagued with conspicuous negative social and environmental consequences that affect the livelihood and wellbeing of members of affected communities in the study area. has a lot of negative consequences. In the same vein, the social and environmental consequences are conspicuous.

Additionally, the study discovered that illegal mining is one of the primary sources of income for the majority of Obuasi residents, despite the fact that some individuals continue to work in agriculture or engage in both unlawful mining and farming activities.

KEY WORDS

Livelihood

Small-scale

Mining

Gold

GDP - Gross Domestic Product

ASGM - Artisanal and Small-Scale Gold Mining

EPA - Environmental Protection Agency

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DEDICATION

To my family and all my loved ones for supporting me throughout my thesis journey.

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CHAPTER ONE

INTRODUCTION

1.0 Background to the Study

Through the evolution of human civilisation, populations have been surrounded with fauna and flora that serves as raw materials or end products in itself for the populace. To that end, countries that are endowed with mineral resources such as gold, bauxite, aluminium and diamond extract and utilize them for the betterment and progression of their economies (Arthur et al, 2016). Therefore, mining has become an essential component and contributor to the development of many countries across the globe. Specifically, gold mining has been the most pervasive mining activity that contributes significantly to the socio-economic development of countries (Owusu, Bansah & Mensah, 2019).

The literature is replete with information and evidence that show that mining activities have significant influence on socio-economic development both at the micro and macro levels. First, mining activities have be posited to contribute substantially to socio-economic development by providing raw materials that are needed for secondary manufacturing services (Arthur et al., 2016). For instance, gold extracted through mining activities are refined and used for the manufacture of watches, bracelets, aesthetic needs among others. Likewise, the World Gold Council (2015) reports that in 2014, gold mining companies contributed over US$171.6 billion to the global economy through their production activities and expenditure on goods and services. Secondly, the mining industry is quintessential to the alleviation of poverty and improvement of livelihoods across different geographical boundaries.

In the mining arena, small-scale mining is considered the oldest and is mostly practiced by rural dwellers who are usually living in poor socio-economic conditions (Owusu, Bansah & Mensah, 2019). Small-scale mining [SSM] could be viewed as an informal, unlicensed, unregulated, undercapitalised and underequipped for which the dealers lack technical and management skills and expertise (Awatey, 2014; Baffour-Kyei, Mensah & Owusu, 2018). Alternatively, Laari (2018) referred to SSM as any form of mining that is characterised by no or little mechanisation. Although SSM is usually informal and under resourced capital-wise it is well patronised by, many people worldwide (Hentschel, Hruschka, & Priester, 2003). For instance, it is estimated that more than 13 million people across 30 countries are engaged directly in SSM with about 80 million people benefitting circuitously through the SSM value/supply chain (Laari, 2018). It is therefore worth noting that SSM plays a critical role in the socio-economic development of nations and states.

In Africa, SSM is widespread and creates a foundation for economic growth as well as sustainable livelihoods and development (Angyobore, 2016; Chiomba, 2016; Hilson & Maconachie, 2020; McQuilken & Hilson, 2018). From the perspective of Buxton, Hebditch, Blackmore, Bellanca, Wilson, Docherty, and Robbins (2013), SSM remains highly unregulated amongst most countries within the sub-Saharan African [SSA] region. Notwithstanding, it employs a significant proportion of the African working population. Beyond the benefit of job creation, SSM is associated with foreign exchange revenue generation.

Within the context of Ghana, SSM operations can be traced back to the pre-colonial period (Hilson, 2001). Per the laws of Ghana (PNDC Law 218 of 1998), SSM denotes "*mining by any method not involving substantial expenditure by an individual or group not exceeding nine (9) in number or by co-operative society made up of ten (10) or more persons*" (Ezeji Onyebuchi, 2014). It is also worth noting that SSM is a major economic activity for many people in Ghana. According to Mensah and Okyere (2014), this mining activity has attracted about a million Ghanaians. Moreover, available literature shows that there are almost 4.5 million people in Ghana who depend directly on SSM miners for survival and daily living (McQuilken & Hilson, 2016; Mensah & Okyere, 2014).

According to Hausermann and Ferring (2018), Ghana is amongst the first African countries to recognise the need to regularise and formalise SSM. Nevertheless, SSM in Ghana like many other SSA countries have been associated with a myriad of challenges and adverse effects on the environment. Extant studies have reported that SSM in Ghana is associated with water pollution, degradation of land as well as mercury pollution (Amankwah, 2013; Clifford, 2017; Hilson, 2017; Hilson & Maconachie, 2020; Orleans-Boham et al., 2020; Zolnikov, 2020). Such negative associations have made SSM unpopular, particularly within the legislative and regulatory environment wherein SSM is operated.

1.1 Statement of the Problem

Generally, people are engaged in economic activities in order to improve their livelihoods. In the context of this study, livelihood denotes the various household activities and capabilities as well as assets (natural capital, physical capital, financial capital, social capital, human capital) that aim at generating resources for daily living (Krantz, 2001). Also, Mazibuko (2012) defines livelihood as the various means by which individuals and their households make a living. As such, it may encompass *"all activities involved in finding food, searching for water, shelter, clothing and all necessities required for human survival at individual and household levels"* (Mphande, 2016, p.17). One of such activities that impacts on the livelihood is SSM. Interestingly, in general terms, there is little consensus in the literature about the effects of SSM on the livelihoods of mining communities. On one hand, there is a replete of evidence that suggest that the effects of SSM on livelihoods is negative, particularly when it is viewed from the environmental perspective (Clifford, 2017; Hilson & Maconachie, 2020; Madzimure, 2015; Orleans-Boham et al., 2020; Zolnikov, 2020).

By contrast, other perspectives are that SSM has positive effects on the livelihoods of miners and their community. There is evidence to suggest that SSM may be a viable alternative in the fight to eradicate or reduce poverty (Baffour-Kyei, Mensah & Owusu, 2018). This may probably happen because SSM creates more jobs and generates income that does not only contribute to micro economic development but also translates into a macro-level impact through enhancement in the livelihoods of the communities where SSM is operated (Amankwa & Anim-Sackey, 2004; Yakovleva, 2007). Other

empirical evidence indicates that SSM does not only affect the livelihoods of miners but also extends to those who depend on SSM operators for their livelihood (Agyemang, 2012). Hence, there is lack of consensus about the overall effects of SSM on the livelihoods of mining communities. This lack of consensus is not exclusive to Ghana (Kwateng, 2012).

Notwithstanding the potential of SSM to affect all aspects of livelihoods of mining communities and their population, most studies in Ghana have focused primarily on specific livelihood domains. For instance, Ontoyin and Agyemang (2014) examined the environmental impact of SSM and its implication on rural livelihoods in some selected communities in Northern Ghana. Similarly, Baffour-Kyei, Mensah and Owusu (2018) also focused exclusively on the effects of SSM on livelihood assets.

Additionally, studies conducted on SSM and its effects on livelihoods in Ghana have predominantly been conducted in the Northern and Westerns regions of Ghana (Ontoyin et al, 2014; Osumanu, 2020). For example, Osumanu (2020) situated his study in the Nabdam District. In contrast, Laari (2018) and Onyebuchi (2014) conducted their study in Amenfi-West district. Similarly, Gyan (2019) examined the impact of SSM on livelihoods in Prestea. Thus, the present study found that after extensive literature search, fewer study has been conducted to investigate the effects of SSM on livelihood within the Obuasi Municipal Assembly, although the Obuasi mines, one of the oldest mining industries in Ghana is located in this Municipal Assembly. municipal (Mensah et al, 2014). For instance, a study by Angyobore, 2016; Mensah et al, (2014) that focused on Obuasi only explored the perceptions about the likely socio-economic impact of closure of mines and conflicts over gold mining.

Hence, the study lacked critical empirical evidence of the effects of SSM on the livelihoods of residents of the Obuasi that the present study covers.

Small-scale mining activities in the Obuasi Municipal Assembly have exposed the communities to many negative consequences. These include depletion of water resources, digging and earthmoving activities and pollution of river bodies. Additionally, these mining activities have caused deforestation, increased erosion, and soil degradation in the three communities selected for this study where miners have abandoned open pits without reinforcing them with wood and soil elements after their operations.

Below are some images showing the effect of SSM activities on the land degradation and water pollution.

Picture 1 showing the effect of SSM activities on the land.

Picture 2 showing the effect of SSM on water quality and availability

Therefore, for Ghana to achieve the Sustainable Development Goals, especially, SDG 1 (end poverty), SDG 6 (clean water and sanitation), SDG 9 (infrastructure, innovation and industrialisation), and SDG 10 (reduced inequalities), it is important to understand the effects of SSM on the livelihoods of mining communities in Ghana. Yet there is paucity of knowledge and literature about the effects of SSM on the livelihoods of mining communities in Ghana, specifically, the Obuasi Municipality. Therefore, the current study seeks to fill this gap in literature by assessing the effects of SSM on the livelihoods of residents of mining communities within the Obuasi Municipality.

1.2 Research Questions

The study provided answers to the following research questions:

1. What factors influence engagement in SSM in the Obuasi Municipal Assembly?
2. How do SSM activities affect the livelihoods of residents in the Obuasi Municipal Assembly?
3. What coping strategies do residents adopt to cope with SSM operations in the Obuasi Municipal Assembly?

1.3 Objectives of the Study

The main objective of this study was to assess the effects of small-scale mining on the livelihoods of residents of mining communities within the Obuasi Municipal Assembly. Specifically, the study:

a. Analyzed the effects of SSM on the livelihood of households and individuals in three selected communities (Koffikrom, Odumasi and Pomposo) in Obuasi Municipal Assembly.
b. Assessed the effects of SSM activities on Koffikrom, Odumasi and Pomposo Communities.
c. Identified major the coping strategies adopted by residents whose livelihood have been affected by SSM activities within the Obuasi Municipal Assembly.
d. Provided recommendation and strategies that could be employed by the government and Obuasi Municipal Assembly and other stakeholders to help curb the negative effects of small-scale mining on

the livelihoods of residents of mining communities within the Obuasi Municipal Assembly.

1.4 Significance of the Study

The current study is significant for many reasons. First, as established from the review of available literature, there is little scholarly consensus about the effects of SSM on the livelihoods of mining communities in Ghana, and by extension, sub-Saharan Africa. Therefore, this study is useful in articulating and contributing to the ongoing discourse on the effect of SSM on the livelihood of affected mining communities. Given the fact that SSM is the most pervasive mining activity in Ghana due to the use of simple mechanisms and more labour-intensive procedures (Aubynn, 2015), the current study could also be useful in identifying why people in the Obuasi Municipal Assembly engage in SSM and how it can be improved to enhance their livelihoods.

Also, the study is pertinent because it provides the basis for the government, policy makers and interventionists to understand the nuances and dynamics relating to the effects of SSM on the livelihoods of mining communities in Ghana, particularly within the Obuasi Municipal Assembly. Furthermore, the findings from this study can serve as a useful source of information or reference to inform policies and interventions that aim to capitalise on the potential of SSM to improve livelihoods, and towards the realisation of the SDGs (SDG 1, 6, 9 and 10).

1.5 Delimitation of the study

The study was delimited to three communities within the Obuasi municipal Assembly. This was to help the research to complete the study in time as the research was to be completed in a stipulated period.

1.6 Limitation of the study

Difficulty in finding key informants was a limiting factor in carrying out this study. Thus, getting the head of the EPA to interview was difficult because of his by schedule.

Also, language barrier was a limiting factor in carrying of this study as participants spoke other languages besides Twi. Therefore, the researcher had to seek the services of interpreters to be able to continue the survey.

In addition, time was a major limiting factor in in carrying out this study. Thus, the period available for the work was relatively short, coupled with the demands of other academic work limited the study to a relatively small area than could have been covered.

1.6 Organisation of the Study

The study is organised into five chapters. Chapter One entails an introduction to the study. It comprises the background to the study, problem statement, objectives, research questions, as well as the significance of the study. Chapter Two forms the review of available literature that are related and relevant to the study. The literature review is based on empirical studies conducted by other researchers that are relevant and related to the objectives of this study, in addition to theoretical and conceptual issues and frameworks.

Chapter Three focuses on the research methodology. It encapsulates the research and study designs, study area, data sources, methods of data collection, instruments for data collection, sampling procedures, data processing and analysis, ethical considerations, as well as COVID-19 strategies in the data collection process. Chapter Four on the other hand, presents the results of the analysis and its concomitant discussions. The results of the quantitative data analysis are presented in tables and charts with their respective inferential statistics where applicable while the results of the qualitative data analysis are presented in themes and sub-themes. Chapter Five presents the key findings of the study, conclusions and recommendations necessary for policy implementation.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter covers the review of related and relevant literature on the effects of small-scale mining on the livelihoods of selected communities in Obuasi Municipal Assembly, Ghana. The chapter is thematically categorized into three sections: the theoretical, conceptual and empirical review sections. Under the theoretical review section, different theories that have been used in explaining the effects of SSM on the livelihoods of residents of mining communities were reviewed. Additionally, the chapter discusses the theoretical framework of the study. In respect of the conceptual review, the various concepts in this study were reviewed to provide relevant information on the study concepts and scope. Some of the relevant concepts reviewed under this section include the nature of small-scale mining, livelihood strategies adopted by miners, and sustainable livelihood practices. Also, the empirical review section discussed the evidence from the literature across the globe, within the context of Africa and Ghana on the effects of SSM on livelihoods.

2.2 Theoretical Review

2.2.1 Small-scale gold mining

Globally, exploitation of natural resources provides a primary source of income for people in underdeveloped countries. Usually, people turn to the soil when all else fails, either for subsistence agriculture or to find whatever wealth the earth has to give. According to a recent UN Environment Program report (2006), artisanal and small-scale mining is on the rise in many low- and middle-income nations, owing to the rising price of gold and widespread

poverty. Small-scale mining is popular among rural people all over the world since it requires little technology, capital, and specialized skills. Gold from these unofficial mines could account for 20–30% of global gold output. According to Spiegel and Viega (2006), around 15 million individuals work in artisanal and small-scale gold mining (ASGM) in 30 countries, and maybe 100 million people globally rely on income received indirectly from ASGM activities. The mining sector is one of Ghana's primary economic backbones, contributing significantly to the country's GDP. Gold mining, for example, accounted for 34.4 percent of the country's export earnings in 2013. The amount of gold extracted using ASGM in Ghana increased from 6% in 2000 to 23% in 2010. (Rajaee, Obiri, Green, Long, Cobbina, Nartey, Buck, Antwi & Basu, 2015). Since 2005, Ghana's total mineral production has increased dramatically, with gold surpassing cocoa as the country's primary source of foreign exchange. Mineral revenue was $798 million in 2004, and increased to $995.2 million in 2005, accounting for 13% of all revenue collected by Ghana's Internal Revenue Service. Gold production climbed by 63%, with export income rising from $731.2 million to $903.9 million and diamond production rising from $26 million to $34.7 million (Ghana Chamber of Mines, 2012). Small-scale gold mining is important for people's livelihoods and hence provides a means of subsistence (Hentschel, Hruschka, & Priester, 2002).

Small-scale gold mining makes a variety of contributions at both the local and national levels, which helps sustain resource imports. It provides major livelihoods for African rural communities and helps to alleviate poverty (Iddrisu & Tsikata, 1998). Small-scale gold mining, according to Hilson

(2002), has a significant impact on employment in developing countries, particularly in rural areas where job possibilities are few. In a study of small-scale gold mining in Bolivia, Hentschel et al. (2002) discovered that people engage in mining operations to improve their lifestyles. In contrast, Mitullah, Ogola, and Omulo (2003) argued that small-scale gold mining diverts people's attention away from agriculture due to low-income earnings associated with farming, and that lack of formal jobs and opportunities compel people to engage in such activities despite the high risks involved. In his research in Ghana, Hilson (2001) found that majority of small-scale miners are active in gold extraction since it provides a quick source of revenue. Mining has also been shown to provide surprising effects in many researches.

According to Tsikata (2007), the importance of the mining sector to a country's economy is not usually proportional to other economic activities. Mining investors purchase inputs and export mineral products. This has a detrimental impact on the communities where mining operations take place because they only obtain a little amount of added economic value.

Furthermore, when only a few local workers are involved in the process, the expected multiplier effect of increased employment opportunities is less effective than when strong policy direction tools are in place to properly integrate mining with other economic activities to serve the general interest of the local people. According to Hilson (2004), the predicted socioeconomic benefits of some rural areas where mining operations take place can be problematic, especially when mining and its related activities continue to expand, resulting in environmental damage. These circumstances may put indigenous people under stress and make it difficult for them to survive.

Reduced food supplies may result in hunger, as well as rises in the prices of a variety of consumables, resulting in higher overall living expenditures. Because of weak local politics surrounding the entire extraction process, many of the developmental gains connected with mineral exploitation are hardly realized in host communities. Displacement of indigenous people, cultural adulteration, disputes, human rights abuses, water pollution, biodiversity loss, and, most crucially, loss of livelihood due to environmental degradation are all severe side effects of mining in rural areas (Akabzaa, Seyire, & Afriyie 2007). On both sides of the debate, pundits and stakeholders make arguments on whether small-scale gold mining has beneficial or bad consequences. For instance, the knowledge on the negative impact of small-scale gold mining on regions and locations where cocoa production is the predominant source of income is, limited in Ghana.

2.2.2 Cocoa production as a livelihood source

Cocoa (Theobroma cacao) is a perennial crop that benefits smallholder farmers in more than fifty nations throughout Africa, Latin America, the Caribbean, and Asia. The plant grows best in humid, tropical climates about ten degrees north and south of the equator (COCOBOD, 2001). It necessitates a warm, humid climate with temperatures ranging from 25 to 35 degrees Celsius. Cacao also requires a lot of rain and nutrient-rich soil to thrive properly. It produces green pods that turn yellow, red, or reddish brown as they develop, depending on the cultivar (Boateng et al., 2014). Only healthy pods are picked and opened to remove cocoa seeds during harvesting. After that, the seeds are sun-dried and fermented. Following fermentation, the seeds are processed into finished goods for human use.

Most people today consume cocoa in the form of chocolate and the butter extracted from the beans, which is used for a range of products including creams for nourishing the skin and hair, as well as cooking (World Population Review, 2020). The World Cocoa Foundation estimates that there are currently 5–6 million cocoa producers globally, as well as 40–50 million people who rely on cocoa for their livelihood. Cocoa production has expanded dramatically in recent decades, reaching 3.6 million tons in 2009/2010, with a market value of US $5.1 billion (Ghana Cocoa Board 2010; World Cocoa Foundation 2010). Because of its economic importance, it is critical not to overlook variables that encourage large-scale cocoa production. Africa has recently emerged as the world's biggest cocoa producer. According to the International Cocoa Organization (ICCO), Africa's cocoa production has increased at a 2.7 percent yearly pace since 2000. The ICCO anticipated in 2010 that annual global production will reach 4.5 million tons by 2013, with the majority of this expansion occurring in West Africa, particularly Côte d'Ivoire and Ghana (Afoakwa, 2014). Of course, Ghana overtook Cote d'Ivoire as the world's second-largest cocoa producer in the 2010/2011 crop year, accounting for 22% of global production. Cocoa is the country's second-largest foreign exchange earner, and many rural households rely on it for their survival (Afoakwa & Pattarson 2010). Ghana's cocoa grows ecologically in the Ashanti, Brong-Ahafo, Central, Eastern, Western, and Volta Regions, where the climate is optimal. The first cocoa farms in Ghana were mostly found in the country's southern areas. The Ashanti and Brong-Ahafo regions accounted for 35.5 percent and 18.5 percent of total output, respectively, in the 1980s. Currently, the western area produces 56.5 percent of Ghana's total

annual cocoa production (COCOBOD, 2001). The government's measures to eliminate poverty in Ghana include improving farmers' livelihoods in general. As a result, the government invests in and motivates cocoa growers by providing technical help, financial incentives, loans, and inputs such as fertilizer and insecticides. In 2001, the government launched the country wide Cocoa Disease and Pest Control Project (CODAPEC) to combat illnesses and pests, which are the two main reasons of cocoa production loss (Ntiamoah & Afrane, 2007). As the government makes every effort to meet cocoa demand in both the domestic and international markets, the impact of small-scale gold mining, which is thought to have a negative impact on cocoa production and sustainable livelihood in general, is an intriguing topic to investigate.

2.2.3 Small-scale gold mining's impact on local communities

While there are significant economic benefits to small-scale gold mining, the environmental and societal consequences are a big concern. These effects are mostly related to the processes and techniques used by gold miners to extract gold. Mercury is commonly used by artisanal and small-scale gold miners to amalgamate and concentrate gold since it is less expensive and easier than other mineral extraction procedures, such as using arsenic to dissolve the mineral ore. Because mercury emissions from these operations are likely to bio-accumulate and interact with many biological and non-biological processes, the amalgamation approach poses major environmental hazards (Watts et. al., 2003). When soil is degraded as a result of mining activities, it takes longer for that soil to recover its fertility for agricultural production. The small-scale gold mining industry is beset by a slew of environmental and social issues. Tsikata (2007) classifies the following as examples:

2.2.3.1 Degradation of the environment

Deforestation, topographic alterations, slope instability, increased erosion, drainage pattern changes, and soil degradation are all examples of negative impacts of SSM. Mining operations are an important element of local livelihoods in Ghana, particularly in locations where cash and food crops are grown. Miners clear forest and excavate land parcels for their operations prior to gold amalgamation. Because of the poor legal structures that oversee these operations, miners often abandon open pits without reinforcing them with wood and soil elements after their operations. As a result, large tracts of land have been stripped of their forest cover, causing ecological disturbances that have resulted in the loss of farms, animal habitats, and freshwater ecosystems (Smith, Ali, Bonfiger & Collins, 2016).

2.2.3.2 Water pollution

Depletion of water resources, changes in hydrology as a result of digging and earthmoving activities, groundwater percolation and pollution, siltation, increased sediment loads in rivers, toxicity and contamination with heavy metals such as mercury, arsenic and copper are some of the effects of mining and mining-related activities on water quality and availability. For instance, the Woara River, a source of drinking water for the people of Mpohor in Ghana's Western Region, was discovered to contain residues of mercury and other chemicals used in gold mines a few years ago. This has health ramifications, which may have an impact on indigenous people's productivity and seasonal harvest output.

2.2.3.3 Dispossession, displacement and resettlement

Displacement, dispossession and relocation caused by mining operations can occur either directly or indirectly in a given geographic area. People are displaced from their homes due to encroachment or pollution caused by mining activities. Furthermore, people who lose their source of income are forced to relocate. The effects of these, such as displacement and dispossession, manifest themselves in a variety of ways: "1. landlessness; 2. joblessness; 3. homelessness; 4. marginalization; 5. higher sickness and mortality; 6. food security difficulties; 7. loss of access to common property, 8. social disarticulation, and; 9. community disintegration, and culture insecurity" (Terminski, (2012, p. 9). Women's rights are also violated as a result of mining-induced displacement. Usually, the consequences of displacement leave women in a worse situation. Women lose land that is needed for food production, which is a vital source of income for them to support their families. Land loss also has an impact on women's regular functioning, such as undermining their economic standing, as well as starvation, health issues, and a lack of fundamental supplies (Terminski, 2012). In his book "Resource Wars Against Native Peoples," Gedicks (2005) argues that harming one's source of food is a violation of human rights. He went on to say that indigenous peoples face violence all around the world because their territory contains precious natural resources needed for industrial manufacturing. Mining companies, both multinational and non-state, intrude on rural communities' resource borders, causing systematic displacement, dispossession, and, in some cases, destruction of local communities. Unfortunately, because local people are often characterized as fighting a

losing war against the devastating invasion of industrial society, most of these issues faced by local communities are not captured in the dominant media. Another aspect of the problem is the portrayal of state and corporate efforts to allow the extraction of communities' resources in the name of addressing such communities' economic challenges. The Ghanaian government, with the help of the IMF and the World Bank, introduced the Minerals and Mining Law (PNDCL 153) in 1989 as part of the Mining Sector Reform Program, with the goal of creating a more appealing investment climate for international mineral extraction and exploration businesses (Maconachie et al, 2011). Efforts and attempts have been made to build a clear legal structure for small-scale gold mining, similar to what is done in large-scale mining. There is a legally recognized sort of gold mining known as small-scale mining, which follows a regulated process. Any Ghanaian citizen over the age of 18 can apply for a small-scale mining permit for a piece of land (Ghana Government 1989a). Despite the fact that the system for obtaining a permit exists, about 85 percent of Ghana's small-scale miners do not register for these licences (Hilson and Potter, 2003). Registered "legal" mines in Ghana are classified as "small-scale mines," while unregistered mines are known as "galamsey" mines. In reality, the many names and legal distinctions suggest two distinct types of mining activities, but there is no such separation. There is no differentiation between "small-scale" and "galamsey" mines in reality. As a result, many Ghanaians, especially academics, refer to all types of small-scale mining businesses as "galamsey." The procedure of formally registering a mine is considered time-consuming and inefficient, which discourages miners from doing so. According to the International Labour Organization (ILO), bureaucratic

licensing procedures are a barrier to formalizing small-scale gold mining. The research shows that in most developing countries, the licensing process is beset by an unusual number of laws, most of which are meant to restrain and is overseen by only a few inspectors. For instance, most miners have complained that the procedure involves a lot of paperwork and attracts a lot of fees. According to a study by (Ghana Government 1989a; Hilson et al, 2003), a slew of documents that applicants must fill out are particularly burdensome because they are frequently illiterate. As a result, formalizing small-scale gold mining in Ghana has gained less value to the point where the reality of formalizing small-scale mining regulations is no longer considered in the sector's activities. Both registered and unregistered actors nowadays do not function on an equal footing; rather, they mix and are extremely reliant on one another. There is a widespread belief that there is no obvious separation between formal and informal actors.

The monitoring of the state's informal mining problems is ignored by regulatory bodies. (World Bank, 2008; Hilson et al, 2003). As a result, the small-scale gold system's operations have increased under poor government control.

2.2.4 Small-scale surface mining land use

Surface mining is a broad category of mining that involves the removal of soil and rock from the surface of a mineral deposit. This approach, which includes open-pit mining, strip mining, and mountaintop removal mining, necessitates the use of a vast amount of land. As a result, there is a constant conflict of interest between land required for surface mining and other land uses such as farming and housing (Yirenkyi 2008). Small-scale surface mining is on the

rise in Ghana. It is practiced in all locations in Ghana endowed with mineral resources, ranging from Nangodi, Yale, and Gbani in the Upper East region of the country's northern portion (Tom Dery et al. 2012; Yembilla 1997) to the majority of communities in Ghana's southern section (Yelpaala 2004). Thousands of people (including locals and foreigners) are employed in small-scale mining, but the industry is mostly unregulated, unmonitored, and unmanaged (Hilson 2001). The sector has a bigger economic impact on the people who work in it, but it has a less impact on the communities where it is practiced. The industry employs a significant portion of the Ghanaian workforce. Although there are no exact employment data for small-scale mining in Ghana, it is estimated that 200,000 individuals are directly involved in the extraction of gold and diamonds (Hilson 2001), but this number has risen to around 600,000 in recent years (Nartey et al. 2011). Small-scale surface mining allows communities and individuals who would not have benefited directly from the mineral richness located in their communities to benefit from these resources.

2.2.5 Institutional roles in policy and practice for sustainable livelihoods

According to Davies (1997), "Institutions are the social cement that connects stakeholders to access to money of various sorts to means of exercising power and hence define the gateways through which they pass on the route to positive or negative livelihood adaptation,". Understanding institutional processes allows for the identification of hurdles to sustainable lives as well as opportunities (or 'gateways'). Because formal and informal institutions, such as tenure regimes, labour sharing systems, market networks, and credit arrangements, mediate access to livelihood resources and, as a result, affect

the composition of portfolios of livelihood strategies, a thorough understanding of institutions and organizations is essential for developing interventions that improve long-term livelihood outcomes. The social dynamics that underpin livelihood sustainability are illuminated by an institutional approach. At every point, contestations, compromises, and trade-offs are obvious in the pursuit of sustainable livelihoods. It is crucial to understand social interactions, their institutional forms (both formal and informal), and the power dynamics that underpin them. If appropriate institutional entry points are to be established, interventions in support of sustainable livelihoods must be responsive to such complexity (Scoones, 1998).

2.2.6 The social features of small-scale surface mining in Ghana

In recent years, the societal impact of surface mining in Ghana has gotten more attention. Even though mining is seen as a critical economic booster for most developing countries, such as Ghana, because of its ability to support industrialization and job development, it can also be a source of social turmoil, civil unrest, and other high societal costs. The interaction of the social cost of mining with other cultural concerns necessitates more coordinated attempts to solve them. Some of the social difficulties linked with small-scale mining in Ghana include community displacement, migrant miners' influence, substance misuse, and a high cost of living.

2.2.6.1 Displacements of communities

Many communities in Ghana have been completely uprooted as a result of mineral reserves discovered nearby. According to Antwi-Boasiako (2003), mining activity and investment in Tarkwa and its environs in the Western Region resulted in the total displacement of fourteen (14) communities with approximately 30,000 residents between 1990 and 1998. Some members of the afflicted communities were forced to migrate in pursuit of farmland, while others were relocated by the mining firms to new communities. Communities are relocated, resulting in the loss of social bonds, psychological issues, and disruption of communal life (Yirenkyi 2008). The massive influx of individuals from the impacted communities into Tarkwa township had a number of negative implications for the community. There was a surge in the number of unemployed young who turned to illicit mining as a result of the increased demand for housing. Teenage pregnancy, high levels of absenteeism, drug trafficking, prostitution, a high school dropout rate, and youth disrespect are all examples of social problems that might arise from such a scenario (Owusu 2012; Antwi-Boasiako 2003).

2.2.6.2 Effects of migration on mining communities

According to a report by the International Institute for Environment and Development (IIED, 2002), one of the most significant impacts of mining activities on mining communities is the migration of people into mining communities, particularly in developing countries where mining is the dominant and viable economic activity in the area. As a result of mining activities in Ghana, places like Konongo, Obuasi, Tarkwas, Kwaebibrem, and Nkawkaw have seen a large influx of youth from other areas. Meanwhile, the

migration phenomena linked with small-scale surface mining is considered as a godsend in Bolgatanga and its environs in Ghana's north-eastern region, from whence the youth generally travel to the southern portion of the country for greener pastures (Agyemang 2010). The migration of small-scale surface gold miners into Bolgatanga, as well as men and women providing support services, has resulted in the acquisition of mining tracts and a new value for land, resulting in community and family changes.

Also, many people of mining communities have first-hand knowledge that addictive substance misuse is on the rise in their communities. Drug and alcohol abuse is becoming more prevalent among small-scale surface miners in particular. Usually, drugs are abused with the hope of motivating them to work harder. Small-scale mining, which requires a lot of physical exertion, is tiring, energy-intensive, and dangerous, which explains why there is so much substance misuse like alcohol, marijuana, and cocaine (Amponsah-Tawiah 2011). This has also resulted in a slew of health issues among these workers, including mental diseases and skin issues.

2.2.6.3 High cost of living

When compared to other communities in Ghana, the cost of living in mining communities is relatively high (Antwi 2010). In certain places, wages or salaries of mine workers are used as a deciding factor for products and services, ignoring the condition of non-mine workers (i.e., government workers, farmers etc). According to (Akabzaa et al. 2001), the incomes of Ghanaian workers in mine-related jobs are paid in US dollar. As a result, they earn more than those working in the government sector. Furthermore, expatriate employees are given internationally comparable salaries, whereas a

small-scale miner's profit is ten times that of a government employee. Because of these income differences within a community, pricing policies for goods and services tend to benefit those with higher incomes.

2.2.7 Environmental aspects of Ghana's small-scale mining

Small-scale mining has substantial health and safety ramifications for miners, as well as a significant environmental impact on the communities surrounding it (Armah et al. 2013). As gold mining has become the primary industry in these places, virgin forest and fertile farm lands in the country's central belt (which includes sections of the Brong Ahafo region, Ashante region, Western region, and some parts of the Eastern region) are disappearing. In Ghana, majority of the issues faced by small-scale surface mining are related to environmental deterioration and its effects on various ecological systems. Small-scale surface mining poses a number of serious difficulties, including land degradation, mercury pollution and water pollution, (Hilson 2001).

2.2.7.1 Land degradation

To Tetteh (2010), small-scale surface mining is one of the most significant drivers of territory degradation and devastation, destroying almost 13% of Ghana's total wooded land. According to a study by Schueler et al. (2011), surface mining in Ghana's western area resulted in around 58 percent deforestation and a significant 45 percent loss of agriculture. Excavations are prevalent (Aryee 2003; Yelpaala 2004), and river banks have been mined to a depth of 35 meters, with a width of 60 meters in certain places (Aryee 2003; Yelpaala 2004; Hilson 2002). Land degradation poses a serious challenge to biodiversity conservation, including increasing soil temperature, loss and

depletion of soil nutrients, erosion, and topographic changes (Tetteh 2010) destroying ecosystems with their unique habitats, fauna, and plants that makes the land less productive (Asiedu 2013). The majority of mining concessions are located near or within forests, agricultural regions, and human settlements, causing land competition and denying farmers access to farmed land (Tetteh 2010). The difficulties created by small-scale mining are better understood when miners leave behind unstable trash heaps, abandoned excavations, wide areas of barren land, and un-reclaimed excavated pits, sometimes filled with water, which become death traps and mosquito breeding grounds (Aryee, 2003; Yelpaala, 2004). Farmers are forced to abandon their farms and farm lands as a result of these issues, which have rendered affected lands unsanitary, hazardous, and unprofitable.

2.2.7.2 Mercury pollution

Mercury contamination is a major environmental issue in Ghana, as it is one of the most dangerous components of global concern (Donkor et al. 2006). Mercury pollution can occur naturally, such as through volcano eruptions and weathering, or anthropogenically, through the burning of fossil fuels or mining (Oduro et al. 2012).

In many places of the world, including Ghana, the use of liquid mercury in small-scale mining continues to represent a major threat to water quality (Anane-Acheampong-Osisiadan et al. 2013). When mercury is employed in the extraction process, it creates an amalgam and transforms into a stable methyl-mercury molecule, which is harmful to humans and the environment when consumed, inhaled, or absorbed by fauna and flora (Hilson 2001). Small-scale miners in Ghana use mercury to treat their ore. In most

cases, waste items are thrown into bodies of water, causing bioaccumulation in aquatic species and possibly entering the human food chain (Donkor et al. 2006). Mercury poisoning can result in renal problems, respiratory, central neurological, and cardiovascular system abnormalities, memory loss, psychosis, reproductive issues, and, in some cases, death in children.

2.2.7.3 Pollution of water bodies

Contamination of surface and ground water sources has been particularly prevalent in gold mining villages in Ghana (Adetunde et al. 2014). Chemical processing contamination occurs when chemicals used in ore processing, such as sulphuric acid (H2SO4) or cyanide (CN-), leak, spill, or leach into neighboring water bodies. These substances have the potential to harm humans, aquatic life, and wildlife in general. The bulk of Ghana's small-scale surface miners wash waste products from the ore into rivers and other bodies of water, which serve as supplies of safe, portable drinking water for the mining communities (Obiri et al. 2010). Others discharge mining tailings straight into rivers, introducing vast quantities of suspended particles and pollutants into aquatic ecosystems (Serfor-Armah et al. 2006). Mine tailings are frequently poisonous, posing major health risks to humans, animals, and plants (Hayford et al. 2009). According to a recent study conducted by Ghana's Council for Scientific and Industrial Research (CSIR), several mining villages in the Western Region are at danger of health problems as a result of significantly polluted water bodies caused by small-scale mining activity in the region (Yeboah 2013).

2.2.8 Small-scale surface mining's contribution to the Ghanaian economy

It is crucial to highlight that small-scale surface mining has a substantial impact on the overall contribution of the mining sector to the national economy. Between 2000 and 2008, it generated around 12% of overall gold production and 90% of total diamond production. More than half a million people are believed to be directly employed in the small-scale surface mining industry, and almost the same number of people profit directly or indirectly from the operations of small-scale surface mining. This means that Ghana's small-scale surface mining business has a considerable positive impact on the country's mining sector and the economy.

2.2.9 The economic characteristics of small-scale surface mining in Ghana

Ghana's mining industry is credited with having a significant impact on the country's economy. Ghana, behind South Africa, is Africa's second-largest gold producer, with gold exports accounting for more than 40% of overall export revenues (Tschakert & Singha 2007). Many Ghanaians and international citizens have found work in the area, both formally and informally. Royalties, corporation taxes from mine firms, and income taxes from mine operations have all been key revenue sources for Ghana's Internal Revenue Service (IRS).

2.2.9.1 Employment

Formal employment increased from a little over 15,000 in 1987 to around 22,500 in 1995 (Ghana Minerals Commission 2000), despite the fact that informal employment in small-scale surface mining was roughly twice that of the formal industry at the same time (Akabzaa et al. 2001). As of the

end of 2004, there were 10,624 formal direct employees employed by producing members of the Ghana Chamber of Mines, with 1.4 percent of total employees being expatriates and the remainder being Ghanaians. Employees in exploration, mining support service firms, as well as suppliers to large-scale mining enterprises, contractors, and companies not registered with the Chamber of Mines are not included in these data (Salifu et al. 2013).

2.2.9.2 Tax revenues and foreign exchange

Ghana's mineral production increased significantly in 2005, with gold replacing cocoa as the country's top foreign exchange earner. Mineral resource revenues increased by 197 million dollars between 2004 and 2005, accounting for nearly 13% of the Internal Revenue Service's overall collection. Gold production increased by 63 percent, with export earnings increasing by nearly $173 million (Salifu et al. 2013). Payments of royalties, income taxes, and corporation taxes on wages, salaries, and dividends were also a key contribution of the industry to the Ghanaian economy (Ghana Chamber of Mines' annual report 2012). For the past decade, the industry has been the major contributor of royalties, accounting for 98 percent of all royalties paid to the Ghanaian government.

2.2.10 Regulatory issues in small-scale surface mining

In Ghana, the Mineral and Mining Act of 2006, also known as Act 703, recognises small-scale mine and defines it as "mining by any means not involving large expenditure by an individual or group of persons" (Aryee 2003). People who engage in small-scale mining must get a license from the Minerals Commission or a mining corporation with a concession right in the mining area (Yelpaala 2004). A small-scale operator or miner will be awarded

a license to mine a specific plot of land not exceeding 25 acres for a term of three to five years (Hilson 2001), and the license will be provided to Ghanaians aged 18 and up (Aryee 2003). The law, on the other hand, requires a licensed operator to produce an environmental impact assessment for his activities, which must demonstrate how the mining activities have been planned in an environmentally sensitive manner and that appropriate environmental safeguards have been incorporated into the design. This should be followed by a high-quality reclamation plan that details how topsoil will be protected, slopes will be stabilized and repaired, progressive reclamation will be carried out, and re-vegetation will be affected (Yelpaala 2004). To cover the expense of any environmental damage, the concessioner will be required to deposit a pre-mining financial assurance or security in the form of cash, letters of credit, surety bonds, or a trust fund (Tetteh 2010). In the event of default, this sum is used to reclaim the mined site. On the hand, if the community or regulatory authority is satisfied that reclamation has been completed successfully, a closure certificate is provided, allowing a refund of the amount awarded for reclamation.

2.2.11 The key regulatory institutions in the mining industry

A number of regulatory entities are responsible for enforcing regulations and monitoring compliance in the small-scale mining sector. Six important regulatory authorities in Ghana that ensure compliance in the mining sector are given below.

(i) The Minerals Commission

The Mineral Commission is in charge of regulating and managing all of Ghana's mineral resources. It also coordinates and implements policy in the

mining industry. The Mineral Commission is a government-advisory body that advises the government on mineral problems. Apart from the Commission's supervisory responsibilities, the Inspectorate Division is responsible for enforcing all mining regulations.

(ii) Inspectorate Division

This organization was created with the goal of implementing all mining regulations in order to safeguard the health and safety of all mining activities. Before a mineral right holder may begin mining, the Inspectorate Division must first approve the proposed project before issuing an operational license. The Chief Inspector of Mines leads the Inspectorate Division, which is responsible for inspecting all mining operations and ensuring that all rules and regulations governing the industry are followed.

(iii) Forestry Commission

The Forestry Commission's responsibilities include regulating the use of forest and wildlife resources, conserving and managing such resources, and coordinating all policies connected to these resources. In the mining Act 703, section 18 mandates that a mineral right holder get a license from the Forestry Commission before engaging in any activity. The operations of holders of mineral rights who have been granted a permit in any forest reserve are monitored by a committee comprised of the Forestry Commission, Minerals Commission, Environmental Protection Agency, District Assembly, and Ministry of Lands and Natural Resources. The committee expects mineral right holders to submit feasibility reports. Mineral right holders that act outside of the framework risk losing their rights and may be sanctioned.

(iv) Water Resources Commission

Act 522 of 1996, also known as the Water Resources Commission Act, established the Water Resource Commission. The commission's principal responsibilities include the control and management of the use of water resources. Also, it guarantees that any policy relating to these resources is coordinated. The commission is required by section 17 of Act 703 to grant water rights to any mineral right holder. A holder of a mineral right may obtain, divert, impound, convey, and use water from a river, stream, underground reservoir, or watercourse within the land subject to the mineral right, subject to obtaining the necessary approvals or licenses under Act 522, for the purposes of or ancillary to the mineral operations (Act 703 section 17). Because of flaws under this clause of Act 703, mining firms have been able to damage water bodies. The right to a water body does not extend beyond the boundaries of the mining right-owned land. As a result, any operation that will have an impact on the quality of the water downstream should be carefully scrutinized. The law is silent on how these water resources should be used to ensure that water quality is preserved. This has resulted in an increase in water pollution in practically all of Ghana's mining villages.

(v) Environmental Protection Agency (EPA)

The Environmental Protection Agency (EPA) is in charge of implementing environmental regulations. A mineral right holder must get an environmental permit from the EPA under Section 18 of Act 703 and the Environmental Assessment Regulations (L.I. 1652) of 1999 of the EPA before engaging in any mining activity. The EPA frequently examines mineral right holders' operations to ensure that they are complying with the terms and

circumstances under which they were awarded. The EPA has the authority to cancel, suspend, or revoke a permit or certificate, as well as impose penalties on violators. Despite the fact that the EPA has been given all of these powers, the agency's lack of resources has rendered it less effective.

(vi) Lands Commission

The Land Commission is the regulatory authority in charge of ensuring that the nation's lands and resources are managed responsibly. The Land Valuation Board, which is part of the Land Commission, is in charge of valuing lands and other land-related properties when mining firms compensate individuals. Despite any right or title, a person may have to land in, on, or under which minerals are located, a person shall not conduct activities on or over land in Ghana for the search, reconnaissance, prospecting, exploration, or mining for a mineral unless the person has been granted a mineral right in accordance with Act 703:9 Act (1). Meanwhile, some traditional mining community leaders have granted land parcels to individuals and groups, including foreign nationals, in their own capacity, and exploration has taken place without the Minerals Commission's knowledge. This is another legislative flaw on the part of the Land Commission, which is responsible for overseeing all mining activities in Ghanaian territories.

2.2.12 Ways to address problems created by small-scale surface mining

The following are some of the factors that will aid in the resolution of problems caused by small-scale surface mining:

(i) Resourcing the regulatory bodies

Due to a lack of resources and the widely dispersed and inaccessible nature of small-scale mining, monitoring environmental infractions and

executing the policies that prevent such crimes has proven challenging (Anane-Acheampong-Osisiadan et al. 2013). As a result, complete compliance in the mining industry necessitates competent and well-resourced regulatory agencies. All regulatory bodies, like all other governmental institutions in Ghana, rely on insufficient government subventions. This makes monitoring extremely difficult because the majority of illegal mining activities take place in distant areas of society, necessitating a large amount of resources to adequately monitor. Other security organizations, including as the Ghana police and the army, have had to assist in the monitoring effort in recent years, as some of the illegal miners are armed with sophisticated weapons.

(ii) Streamline the license application procedure

The licensing process is time-consuming, bureaucratic, and overly complicated. As a result, only the wealthy and influential can secure mining titles, while poor people in the hinterlands, who need them the most due to poverty, are unable to obtain operating licenses. Meanwhile, millions of poor Ghanaians are employed by small-scale surface mining (including the informal industry), which may be their only source of income. In addition, the expense of obtaining a license is too expensive for newcomers to the market. This has all contributed to people opting out of the procedure of acquiring a mining permit and instead opting to operate illegally.

(iii) Harsher penalties to offenders

According to the Mining Act, a license for a small-scale mining business cannot be granted to someone who is not a Ghanaian citizen, has reached the age of eighteen, and is registered with the Mineral Commission's office. Meanwhile, some traditional leaders have sold their land rights to foreigners involved in unlawful small-scale surface mining. Since 2005, around 50 000 gold prospectors have left China alone for Ghana, according to Hilson et al. (2014). The majority of these Chinese immigrants work in illegal small-scale mining, which is solely open to Ghanaians. Other traditional leaders will be deterred from engaging in such illegal activities by a prison sentence or perhaps a heavier punishment. Other foreign nationals will be deterred from engaging in illegal small-scale surface mining by large fines and repatriation to their home country. Non-compliant mining businesses, or companies that diverged from the initial environmental impact assessment on which the license was awarded, must also lose their mining rights after being penalized to fix the problem they created. Even though there have been reports of environmental damage as a result of mining corporations' non-compliance, it is uncommon for companies' mining licenses to be revoked in Ghana.

(iv) Make the informal sector more official (galamsey)

Although legislative tools have been put in place to regulate the actions of small-scale miners, much more has to be done to get all participants on board. Despite the fact that the informal sector of small-scale mining (locally known as galamsey) is not acknowledged in any part of decision-making, they make up a significant portion of the mining sector's players.

Their actions have a broader impact than the rest of the industry. They have been accused for the majority of the harmful effects of mining in Ghana as a result of their unregulated actions. In order to control this scenario, it would be good for the country to regulate the activities of these miners so that they can be monitored. As a result, the government must develop policy frameworks to regulate the operations of small-scale surface miners so that they can be monitored.

(v) Environmentally friendly equipment should be made available

River bodies are the next most damaged ecosystem after degraded farmland. Surface mining has significantly polluted the majority of rivers that provide drinking water to populations. The cost of purifying such water by Ghana Water Company Limited has risen considerably, sparking a public discussion about our country's future ability to obtain affordable drinkable water. Rather than using water from river bodies, the government, through district assemblies, should build mechanized bole-holes and vast basins into which water from these bole-holes would flow for use by gold miners. The miners would then be charged on a pay-per-use basis. This type of innovation will provide revenue for district assemblies while also helping to protect the water bodies that provide drinking water to majority of the people. In brief, the small-scale mining industry in Ghana can only contribute meaningfully to the country's socio-economic development in terms of employment and social infrastructure if the sector's social and environmental challenges are properly handled. By addressing these issues, mining communities in Ghana would be able to benefit from the mineral deposits that have been discovered in their area.

(vi) Motivation for engaging in small-scale mining

The vast majority of people involved in small-scale mining or mineral extraction are impoverished (Ghana Action Aid, 2006; World Bank, 2013). These are persons who are poor and have no other paid employment or source of income. Scholars have also looked into why people engage in small-scale unlawful mining (Antwi et al 2014; Mactaggart et al 2016; Opoku-Ware, 2010; WHO, 2013) and have found that poverty drives people to engage in unlawful small-scale mining. Also, they put illegal miners in the category of those who previously had no source of income or who lived on less than a dollar a day and thus decided to seek an alternate source of income, resulting in their decision to engage in illegal mining. Poverty, according to Opoku-Ware (2010), predisposes people to engage in small-scale mining for a living, whether legitimately or illegally. The high unemployment rate in Ghana, which is linked to the issue of poverty, is a key cause and reason for people to engage in illicit small-scale mining. Around 39% of persons are unemployed, with the formal or government sector accounting for the majority (Akabzaa, 2009). In a study conducted by Hilson and Clifford (2010) in Akwatia in Ghana's eastern region on the subject of 'once a miner, always a miner,' the researchers concluded that the fact that there are several risks associated with illegal small-scale mining and yet people continue to do it indicates that they do it out of necessity. They go on to say that even though people are aware of the dangers of small-scale mining, they have no choice because they do not have any other options or paid work (Hilson & Clifford, 2010). Unemployment was cited by the majority of their respondents as the primary motivator for engaging in unlawful small-scale mining.

Furthermore, in accordance with Hilson's work in 2001, Awumbila and Tsikata (2004) conducted a similar study in the Talensi-Nabdam District in Ghana's northern area, and found that unemployment is the reason why several people in the region take up mining. Lack of employment has also been cited by Ghana Action Aid (2006) and the World Bank (2013) as a major factor driving people to engage in illegal mining. Loss of cropland is another reason for illegal mining. In their study of unlawful small-scale mining as a hazard to food security in Ghana, Danyo et al (2016) noted that the practice has harmed many farmers and the country's food production efforts. People who formerly relied on their crops for sustenance no longer have that option. This is because mining organizations and firms have taken over their farms (which they either sold themselves or had taken away from them by authorities such as chiefs and the Lands Commission). As a result, farmlands have become mining sites. This is one of the reasons why some farmers have turned to illicit mining in Ghana as a source of income, posing a threat to Ghana's food security (Amponsah-Tawiah et al, 2011; Danyo et al 2016; Hayes K, 2008). Poor company performance is another reason why people participate in illicit small-scale mining. People operate minor trading businesses with success in mining settlements and their environs (Hilson et al 2010). Success is defined as a situation in which people are able to earn more money. However, this is not always the case for certain people. Hilson (2001) discovered that persons with low or poor business performance rely on illegal mining operations to help raise revenue to assist them grow their company. He did add, however, that the bulk of these people are migrants living in mining communities, with a smaller minority being locals. The reasons for migrating are due to a lack of

job opportunities in their own countries. Another reason for illicit mining operations is the refusal to provide a mining concession. According to Awumbila and Tsikata (2004), certain small-scale miners in Ghana are hampered by the procedures for obtaining mining permits. Thus, they employ tactics to cut corners in order to engage in mining while abiding by the country's mining rules and regulations. It has been stated that the methods and processes involved in the granting of mining concessions are 'problematic' (Awumbila & Tsikata, 2004). People abandon the process and engage in illegal mining because of the large sums of money and time required, as well as the procedures to follow in order to be given mining concessions. The Mineral Commission lays forth the procedures and rules that must be followed in order to get a concession in Ghana.

2.2.13 Rules to follow in getting a mining concession

(a) You will need to obtain a mining concession in the area where you intend to mine.

(b) Also, there should be a document proving your concession, which you must obtain to demonstrate the location's borders. The document must indicate the location where you intend to mine, as well as the district and region in which the concession is located.

(c) Surveyors should determine the exact boundary of your concession as it exists on the ground. This is to ensure that you stay inside your operational parameters.

(d) Before you may carry out your operation, you must first register the land or your concession and have a licensed surveyor endorse it.

During this process, the official owner of the land is whoever registers the land first and possesses the legal documentation for that concession. This is because other people may be interested in the same location or concession. Traditional authority in the concession region needs to be informed about the land concession to raise awareness of the activity in the area.

2.2.14 Stages you have to go through before the acquisition of a mining permit

There are five key stages that a company or individual must go through before a permit is issued. They are:

(i) Prospect Stage

Individuals or groups of people that wish to mine go on the hunt for land to find out where the resource is. In this stage, there is a land lease that applies to all subsequent stages. Before you may mine, you must obtain a permit from the Minerals Commission and the Environmental Protection Agencies (EPA).

(ii) Exploration

Usually, a piece of land is drilled during this stage to determine where the resource can be found on the piece of land.

(iii) Exploitation

If the mineral's quantity is sufficient, you may proceed to harness the resource.

(iv) Development

This is when you set up the plants, machineries, and any other tools and equipment needed for mineral extraction. It includes all basic requirements, such as finances and lodging.

(v) Reclamation

This is the final step. After a resource has been used, it is the obligation of any individual or company to return the land to its original state. It includes filling trenches, planting trees, and any other method of restoring the land to its original or fairly comparable state so that it can be used for other purposes.

2.2.15 Small-scale mining and its impact on livelihood

Small-scale mining activities have a beneficial and negative impact on people's life. According to Ezeji Onyebuchi's (2014) research in Ghana's Wassa Amenfi East Local, the impact of illicit small-scale mining is of great concern to government officials, district authorities, and the general public. This is due to the fact that SSM has devastated countless farmlands that provide people with a source of income. Chemicals miners discharge into fields or chemicals that run through their farms when it rains owing to mine operations have also harmed the vegetation and rendered the grounds unfertile for agricultural purposes.

Madzimure, (2015) in Zimbabwe made a similar discovery, finding that illicit gold miners' actions have resulted in severe environmental concerns such as the destruction of farmlands and the creation of trenches that serve as death traps for people. The merits and downsides of illicit mining were examined by Ezeji Onyebuchi (2014). While most people focus on the negative effects of illegal mining, the researcher believes it is equally important to highlight the

beneficial effects. He mentioned that one of the positive effects or advantages of illicit mining is that it provides jobs for a significant number of people in Ghana. According to Hilson (2001), an estimated 200,000 individuals are working in illicit small-scale mining, accounting for around 60% of the mining sector's labour force. Furthermore, the activity deters people from engaging in social vices such as armed robbery, prostitution, and so on to some level (Ezeji Onyebuchi, 2014; Mactaggart et al, 2018). The reason for this is that people can now work in the sector and earn money to help them meet their fundamental necessities. Most importantly, the activity has provided a source of income not just for the miners, but also for those who rely on them for a living (Agyemang, 2012; Akabzaa et al, 2001; Awumbila et al, 2004; Hilson, 2001). More than 80,000 individuals rely on 'galamsey' operators to make a living (Ezeji Onyebuchi, 2014). As a result, "Galamsey" has provided relief to a number of people who were before unemployed or reliant on others. Several experts, however, have indicated that the disadvantages of small-scale mining much exceed the benefits (Agyemang, 2012; Akabzaa et al, 2001; Awumbila et al, 2004; Hilson, 2001). Small-scale mining has had an impact on the environment and many people's livelihood alternatives in mining communities (Ontoyin et al, 2014). Despite the fact that the present Ghanaian government is working hard to regulate mining, media reports show increased unregulated mining activities and their resulting devastation of water bodies and farmlands in the country (Ghana Web, 2018). Chemicals used in mining activities end up in bodies of water that are utilized to provide drinking water to humans (Mactaggart et al., 2018). In a study by Kwarteng (2012) in Akwatia, respondents were questioned specifically whether they had

encountered any type of environmental damage from 'galamsey' activities or mining in general. The majority of responents said that miners had harmed the environment in some way. Simply a few persons responded that they were unaware of the environmental repercussions or impact of mining activities, and others only knew of the impact of mining activities as land and air pollution. The researcher discovered that "galamsey" activities have had a significant impact on the region's natural resources, particularly lands and rivers, which provide people with a means of subsistence. Akabzaa et al (2001) noted that mining activities had destroyed almost 70% of the land area in Tarkwa in Ghana's western region, destroying farmlands that serve as a basic source of income for residents in such communities. Similar observation has been made in Mali and Zimbabwe, where small-scale mining has resulted in the destruction of countless farmlands that provided people with a source of income (Belem, 2009; Madzimure, 2015). Small-scale mining activities have also resulted in deforestation in mining areas. Surface mining is a serious danger to land and forest resources (Abdus-Saleque, 2008; Kwateng, 2012). The extent to which the removal of forest cover facilitates the drying up of rivers and streams at these mining sites/communities, thereby affecting people's overall livelihood and wellbeing. This is as important as the removal of forest cover that has often been overlooked by government authorities and community leaders. Kwateng (2012) questioned respondents if they consider deforestation to be a problem as a result of the region's mining activity. This was viewed as difficult question by the majority of respondents (60 percent). Based on his observations and the responses of the research participants, he came to the conclusion that mining activities in Akwatia are really a threat to

the environment and forest reserves. Mining activity on a lower scale, according to Abdus-Saleque (2008), should be carefully planned and its impact thoroughly anticipated. That is to say, it is an action that results in the destruction of vegetation and the resulting bareness of the vegetation. It has long-term consequences, and the magnitude of those consequences can be anticipated by the mining process (Gualnam, 2008). These different stages, for example, start with deposit prospecting and exploration, then move on to mine development and preparation, mine exploration, and mineral treatment, with each mine stage having its own environmental impact. According to Abdus-Saleque (2008), even establishing access routes to mine sites has an environmental impact because some forest reserves are cleared, resulting in deforestation. When it rains, this causes more land erosion (Opoku-Ware, 2010). The huge loss of arable lands, particularly in agro/ecological areas and zones where illicit small-scale gold mining persists. According to Danyo et al (2016), illicit small-scale gold mining activities harm agricultural production in Ghana and hence affects food security. According to their findings, the country's key 'galamsey' mining regions and zones (Western, Brong Ahafo, Ashanti, Central, and Eastern regions) had higher consumer prices in 2016 with decreased food production, compared to the previous years. In the same year, the devastation of farmlands had an impact on the contribution of agricultural products to GDP. They concluded that by degrading vast lands, shifting labor from food crops farming to mining activities, polluting the air and contaminating water bodies, and, most importantly, displacing farmers as a result of 'galamsey' activities, low food production is a threat to food security not only in the region of operation but nationwide. When mining operators

become victims of accidents at mine sites, dangers arise, compounding the detrimental impact on their livelihood. In Dunkwa On-Offin, a town in Ghana's central region, more than 100 'galamsey' operators died in 2010 when 'galamsey' pits caved in on them, killing them all (Teschner, 2012). A year later, in the Ashanti area, a similar tragedy occurred, this time killing roughly 12 people in the town of Attaso (Tschakert, 2009). Illegal small-scale mining is a common occurrence in Ghana, resulting in the death of miners. Tschakert (2009) went on to say that this is not only sad news to hear, but that the bulk of the miners are breadwinners in their families, putting a strain on their family's finances. Organizations such as the World Bank, the International Labour Organization (ILO), and the International Institute for Environment and Development have studied the social implications of 'galamsey' activities, with a focus on education and public health. According to Danyo et al (2016), the activities have resulted in a significant number of young people in Ghana absenting themselves from school in order to engage in illegal mining in order to become wealthy overnight. As a result, there have been a number of school dropouts in Ghana's mining zones and regions. According to Danyo and Osei-Bonsu (2016), the temptation of gold money has led to many children pledging their future for fortune. Despite the fact that Danyo and Osei-Bonsu (2016) did not present data or evidence to show whether the children become wealthy or not, they did highlight that parents who reject their children's decision to drop out of school for illegal mining do not have their views respected. This is due to the fact that such children can support themselves with their newfound employment (Danyo et al, 2016). As a result, some affected children have been taken from their parents' care, which is a major

blow to mining communities. Furthermore, social vices, criminal activities, and violent acts, such as drug misuse, prostitution, armed robbery, and teenage pregnancy, are more prevalent in mining towns than in other places (Danyo & Osei-Bonsu, 2016; Mactaggart et al., 2018). In mining areas, stagnant rivers are being left exposed. This is huge enough, according to Kwateng (2012) and Mensah et al (2014), to have formed a 'man-made' lake in the region. Streams and water bodies have been polluted, making it impossible for people to obtain safe and portable drinking water as well as perform basic domestic tasks. People have switched to sachet water (300ml distilled water packaged in a sachet) as a source of drinking water (Kwateng, 2012). It has also been discovered that, despite the fact that Ghana government adopted a national environmental policy in 1991 to ensure that our environment and surroundings are safe and protected during and after the exploitation of various minerals resources, such implementation has done nothing to benefit the various mining communities because it is not effectively monitored and controlled (Yelpaala, 2004). One of the health consequences of small-scale mining is that small-scale miners are frequently exposed to hazardous working circumstances, which can have a negative influence on their health. They participate in environmentally damaging practices like as leaving pits exposed, which serve as death traps for people (Awumbila et al 2004) and breeding grounds for mosquitoes that spread malaria (Agyemang, 2012; de Santi et al., 2016; Kwateng, 2012). Kwateng (2012) polled community residents to see if mining has a negative influence on their health. The majority of the respondents said they had contracted malaria as a result of open pits left behind by mining activities, which serve as a breeding ground for mosquitoes. According to

Yelpaala (2004), malaria was the main killer illness in Ghana that year, with 35 percent of cases happening in the eastern region, which includes Akwatia. People complained of having cholera in the same study (Kwateng, 2012). Agyemang, (2012) and Ezeji Onyebuchi, (2014) have also noted that polluted water bodies caused by mining activities and chemicals such as cyanide and mercury utilized in their operations cause people to become sick with cholera, even if they are aware of the risk. Diarrhoea and skin infections were among the health problems associated with mining in Tarkwa, Ghana's Western Region (Awudi, 2002). Furthermore, according to Opoku-Ware (2010), increased pollution of water bodies by galamsey operations in Ghana has created a significant problem to mining communities, resulting in an increase in water-borne diseases such as bilharzias. According to Opoku-Ware's research (2010) in Ghana, many individuals had broken their legs as a result of illegal small-scale mining operators' open pits, affecting their general health and wellness. Similarly, some people die as a result of falling into the uncovered pits (Aryee et al., 2003; Awudi, 2002). The nature of the machines and equipment used in the mining process also contributes to health risks. Occupational health risks are thus possible or widespread among persons who engage in mining activities, particularly those who do so illegally or informally with little or no technical knowledge (WHO, 2010, 2013). Mining operators are frequently exposed to physical hazards such as accidents, explosions, falls from great heights, falls into pits, and boulders falling on them, while others suffer from hearing loss and other problems resulting from the drilling and blasting of rock materials (Hinton, 2006).

As a result, some researchers claim that hearing loss is frequent in the mining profession and poses a serious health risk to miners (Hinton, 2006; WHO, 2010, 2013). Furthermore, some of the machines employed in small-scale mining, particularly mobile equipment such as diggers, drilling machines, and trucks, cause miner's bodies to shake. Researchers have discovered that this can harm the miners' spinal cords and render them paralyzed (Hinton, 2006; WHO, 2010, 2013). Drilling equipment can harm the arms, hands, and other essential body parts. Some miners work bare-chested and bare-footed, while others stand in muds that have been treated with chemicals. All of these practices have negative impact on miners' health (Hinton, 2006; WHO, 2009, 2013). Inhaling chemicals used in mining can harm the eyes, lungs, induce respiratory difficulties, kidney problems, and even mortality, according to studies (Haile et al, 2017). (Landrigan et al, 2013). Also, Awudi's research (2002) on the impact of the Ash-Gold Mining Company's mining activities in Obuasi found that some the company's activities resulted in some community members contracting upper respiratory tract infections (URTI). Mining businesses' operations and accompanying pollutants, according to medical specialists in the region, are to blame for the spread of such diseases.

Although research has looked into the broad livelihood, development, and environmental impacts of mining operations (Horsley et al., 2015), the extent to which small-scale mining operations have direct or indirect effects on the health and livelihood of miners and community members in specific mining areas is not well documented. Given that small-scale mining in Ghana is the most basic form of mineral extraction, characterized by extremely labor-intensive procedures, hazardous working environments, and repeated negative

human and environmental impacts (Aubynn, 2015), it will be particularly interesting to investigate why and how people engage in such an activity, as well as how small-scale mining practices affect miners and the community. To the best of my knowledge, the health-livelihood links relating to small-scale mining operations in specific areas have primarily been anecdotal, relying on media headlines, opinion surveys, and casual observations by government officials and pressure groups/NGOs. The migratory and 'clandestine' nature of small-scale mining operations, which are typically reliant on varied cross-community networks (Nyame & Grant, 2014), makes it difficult to trace these operators and assess the extent to which mining operations have impacted their livelihoods and health.

2.16 Concepts

2.16.1 Livelihoods

The concept of livelihoods is reported to have first appeared in the 1990s following the publication of Chambers and Conway's report (1990) entitled: *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century* (Hilson, & Banchirigah, 2009). The authors contend that 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 long and short term" (Chambers & Conway, 1990 as cited in Abbiw, 2020, p. 45). Thus, the concept of livelihood has been

used to describe the various activities that people undertake for their daily living (Adato & Meinzen-Dick, 2002; Mazibuko, 2012).

Put differently, Krantz (2001) refers to livelihoods as the various household activities, assets and capabilities that are used to generate resources for making a living. Specifically, household activities include the search for water, food, shelter and other necessities essential for survival (Mphande, 2016). Similarly, assets that constitute livelihoods include human capital, natural capital, physical capital, social capital, and financial capital (Baffour-Kyei, Mensah & Owusu, 2018). In the end, specific concepts work together to define the general concept of livelihood.

2.16.2 Sustainable Livelihoods

According to Chambers and Conway, (1992 as cited in Laari, 2018, p. 8), livelihoods are said to be sustainable when affected individuals are able to "cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base". Thus, livelihoods that do not compromise on the ability of the future generation to meet its own needs can be defined as sustainable livelihoods. With the introduction of the Sustainable Development Goals (SDGs), sustainable livelihoods have become a major sustainable development issue across the globe, particularly in the rural and resource-poor regions and communities of the world. Therefore, the activities of SSM are expected to help provide sustainable livelihoods and sustainable development for affected communities in the long run.

2.17 Conceptualising Small-Scale Mining

Small-scale mining (SSM) is an everyday concept used in the mineral extraction industry. Although it is widely known as SSM, in some jurisdiction including Ghana, the concept of SSM has also been referred to as artisanal and small-scale mining (ASSM) (Ezeji Onyebuchi, 2014). Nevertheless, different societies and cultures conceptualize SSM in their own peculiar way based on the nature of their environment and the circumstances surrounding mining activities in their communities. Therefore, the conceptualisation of SSM has rather become equivocal in the prevailing discourse of sustainable mining activities. In order to arrive at a consensus about what constitutes SSM, different countries and scholars have used different parameters to conceptualise SSM. These parameters that have been used in conceptualising SSM include the kind of tools used for mining (Ezeji Onyebuchi, 2014). as well as the quantum of production that comes out of mining activities (Aryee, 2003). For instance, according to the United Nations as cited in Aryee (2003), a mining activity can be categorised as SSM if in a single mining operation unit, yields an unprocessed material measuring 50,000 tonnes or less per annum. However, Ezeji Onyebuchi (2014), and Laari (2018) posit that SSM represents a type of mining activity where unsophisticated tools (example: shovel, diggers, etc.) are used for mining mineral resources.

The aforementioned conceptualisations have been found to be limited in their scope. Therefore, other researchers have come out with much detailed, and more encompassing conceptualisation of SSM, otherwise known as ASSM. The growing understanding of SSM in contemporary times is that, it is an informal, unlicensed, unregulated, undercapitalised and underequipped

mining activity for which its dealers lack technical and management skills and expertise (Awatey, 2014; Baffour-Kyei, Mensah & Owusu, 2018). This is further iterated by Buxton (2013) who states that:

> ...many small-scale producers in the resources sector operate informally and often this is the norm. Such informality dominates because of formidable barriers to formalisation, where processes are overly complicated and bureaucratic, centrally determined and managed, reliant on the state for regulation and lacking social relevance (Buxton, 2013, p. 6).

In Ghana, the law regulating mining (PNDC Law 218 of 1998), states that SSM includes "mining by any method not involving substantial expenditure by an individual or group not exceeding nine (9) in number or by co-operative society made up of ten (10) or more persons" (Ezeji Onyebuchi, 2014, p. 3). Based on this law, SSM could be categorised from the perspective of staff strength and amount of capital needed to run the mining operation. Notwithstanding, according to Hentschel, Hruschka and Priester (2002), SSM may be categorised from the perspective of the duration of the mining cycle, the staff strength, size of the concession, the sales volume, production volume, continuity, labour productivity, and organisational reliability.

2.18 Small-Scale Gold Mining in Ghana

In practice, SSM is not new to Ghanaians. It was an ingrained economic activity prior to the introduction of modern large-scale mining (Kuma & Yendaw, 2010). The literature on mining suggests that Ghana is abounds in many mineral resources of which gold is number one, thereby making gold mining an important spatio-economic activity in Ghana (Kuma &

Yendaw, 2010). According to Laari (2018), SSM existed before the advent of the colonial master to the Gold Coast. However, formal documentation of SSM activities began when the Portuguese arrived in the Gold Coast (Kuma & Yendaw, 2010). For instance, Frenchman Pierre Bonnat is reported to have been the first person to report on mechanised gold mining activities in Tarkwa and Obuasi environs in 1874 and 1890 respectively (Junner & Wild, 1935 as cited in Kuma & Yendaw, 2010). SSM before the colonial era was mainly basic in nature. It involved the picking of gold nuggets, collection of gold dust and the use of simple equipment that allowed for the easy removal of gold resources at locations that gold could be found in Ghana, particularly along the forested and southern coastal parts of Ghana. This traditional or indigenous form of mining became extinct during the colonial era where mining became more mechanised and foreign oriented.

In Ghana, SSM is operated in two ways: the legal way (regulated) and the illegal way (unregulated), popularly known as galamsey (Bansah, 2017; Doudu, 2013). Although there is a significant difference between mainstream SSM and galamsey, most people in Ghana conflict the two due to the extensive deleterious consequences of the latter on the environment as well as the livelihoods of individuals (Adda, 2014). Unlike galamsey operators, regulated small-scale miners have registered their plot and are therefore able to demand some legal rights that come from the registration process (Teschner, 2012).

Although SSM activities have been in operation in Ghana for a long period of time, available records indicate that it remained an informal activity for more than three decades after Ghana had gained independence (Ministry of

Lands and Natural Resources, 2017). However, in 1989, the government saw the need for formalising this business venture. Hence, the SSM Law (PNDCL 218) was passed in order to help control the activities of SSM operators (Laari, 2018). Kuma et al (2010) alluded that the government having realised the contribution of SSM, decided to capture regulate the activities and benefits of SSM operations under the Minerals and Mining Law Act 703. Before, the Minerals and Mining Law Act 703 were passed, SSM activities was regulated by two main laws: Minerals and Mining Law (PNDCL 153) and Small-Scale Gold Mining Law (PNDCL 218) (Osei-Kojo & Andrews, 2016).

With respect to the dominant mineral extracted, studies have shown that gold mining dominates the SSM industry, with about two-thirds of SSM operators engaging in gold mining and the reminder engaging in diamond extraction (Hilson, 2001). Corroboratively, Kuma and Yendaw (2010) report that about 15 percent of gold production in Ghana comes directly from small-scale gold mining activities. Notwithstanding, the SSM industry in Ghana is beset with some spatial, social and economic challenges. For instance, about 85 percent of SSM miners are unregistered (Teschner, 2012). This situation is further deepened with the huge influx of foreigners, particularly the Chinese who are constantly reported to be leaving devasting ecological footprint in mining communities (Osei-Kojo & Andrews, 2016).

2.19 Reasons for engaging in small-scale gold mining

There are several reasons for which individuals and households engage in SSM. One of such motivations is income generation that leads to poverty reduction. The review of available empirical studies suggests that most of the people who engaged in SSM were either living below the poverty line or had

no prior sources of livelihood (Antwi, Boakye-Danquah, Asabere, Takeuchi, & Wiegleb, 2014; Gyan, 2019; Mactaggart, McDermott, Tynan, & Gericke, 2016; Opoku-Ware, 2010). Therefore, residents in mining communities perceive SSM as a conduit to escape poverty and/or mitigate its effects (Hilson, 2016; Kelly, 2014). This observation is consistent with the findings of a study by Gyan (2019) that shows that poverty is the primary motivation for people's engagement in SSM in Ghana.

Beyond the perspective of poverty reduction, individuals engage in SSM as a result of the high unemployment rate in Ghana (Gyan, 2019). As a result, most unemployed persons, particularly in the rural areas where SSM activities dominate get attracted to engage in SSM as a means to escape unemployment and poverty in the long run. According to Danyo and Osei-Bonsu (2016), in communities where agricultural production and employment has become somewhat problematic, farmers are forced to divert into SSM. Similar findings were reported by Amponsah-Tawiah and Dartey-Baah (2011). For example, Hilson and Clifford (2010) reported that unemployment was among the major reasons why miners engaged in SSM in Akwatia, in the Eastern region. Also, Gyan (2019) in a qualitative study to examine the rationale behind people's engagement in SSM revealed that unemployment was among the major reasons.

Loss of farmlands has also been cited to be one of the reasons why people engage in SSM. Losses of farmlands due to the overuse of land, and the easy acquisition of farmlands for large-scale mining activities have compelled many people to move into SSM (Gyan, 2019). Gilbert and Osei-Bonsu (2016) contend that in most mining communities in Ghana, farming used to be the

major economic activity. However, mining activities have negatively impacted farmlands, hence, through loss of fertile farmlands, which is a major source of livelihood for rural dwellers. Therefore, for the purposes of economic survival, most affected rural dwellers, particularly the youth, get engage in SSM to provide them with a new source of livelihood (Gilbert & Osei-Bonsu, 2016). Similarly, Gyan (2019) observed that in some parts of Ghana, relatively large parcels of farmlands have been converted into mining sites. In identifying the culprits, Gilbert and Osei-Bonsu (2016) found that traditional and government authorities have leased-out farmlands to mining companies. Consequently, young and energetic rural people that used to have access to farmlands no longer have that access to available farmlands in affected communities (Amponsah-Tawiah & Dartey-Baah, 2011). According to Amponsah-Tawiah and Dartey-Baah (2011) most farmers in mining communities are settler farmers, and for that reason, they lack total right over the lands they cultivate. Therefore, as and when the owner of the farms deems fit, they lease-out the farmland to mining companies without due consideration of the needs of the farmers that operate on these lands. In such circumstances, the farmer is faced with no option than to find an alternative source of livelihood or divert from farming to get engaged in SSM.

2.20 Effects of small-scale gold mining

Small-scale gold mining is fraught with several effects. Broadly, the literature categorises these effects based on the level or area that is affected. Therefore, the effects of SSM can be seen from the perspective of health, social impact, environment, and livelihoods. As a result, the ensuing section

discusses the effects of SSM based on the three thematic perspectives indicated above.

2.20.1 Effects on health

In the domain of health, SSM is seen as a hazardous occupation (Smith et al 2016). Vingard et al (2013) posit that in countries where there is real-time, accurate data on health statistics, SSM ranks among the top three causes of morbidity and mortality. This observation suggests that SSM has serious effects on the health of miners and residents of mining communities. For example, Smith et al. (2016) report in their study that miners involved in SSM are at higher risk of being exposed to mercury, which is deleterious to their health. Mercury exposure has several adverse effects on humans. These effects include "irritability, nervousness or excitability, insomnia, dysarthria (motor speech disorder), incoordination, and hallucinations" (Basu et al., 2015, p. 5152). In general, this finding is consistent with the findings of a study by Haile, Hussein, and Haile (2017) that also reported that miners who are exposed to chemicals like mercury and cyanide can have damaging effects to their eyes, kidneys, and lungs. Similarly, some studies have also emphasized that the heavy metals used in the extraction and processing of gold during SSM operation contains high levels of toxicity and is therefore hazardous to human health (Basu et al., 2015; Ezeji Onyebuchi, 2014; Gilbert & Osei-Bonsu, 2016).

Additionally, individuals engaged in SSM activities are often exposed to the likelihood of accidents and injuries (Smith et al., 2016). Relatedly, the results of other similar studies have shown that most SSM workers have limited access to personal protective equipment (PPE) like steel-toed boots,

and gloves (Paruchuri et al 2010). Evidence from the Democratic Republic of Congo reveals that about 72% of SSM miners have experienced at least one accident in the year preceding the survey (Elenge et al, 2013). Specifically, in Ghana, small-scale gold miners have been found to experience accidents and fatalities aggravating from collapsed mining tunnels, drowning, violence (clash and shooting) and falls into mining pits (Brewster, 2013). Also, uncovered mining pits have resulted in many accidents and injuries to residents of mining communities (Opoku-Ware, 2010). These adverse health effects are expected to further increase the near future if efforts are not made to control the situation (Basu et al., 2015).

Besides the effects of SSM on the health of miners, SSM has serious effects on the health of residents of mining communities. For instance, the heavy metals used in the extraction and processing of gold usually contaminate water bodies in mining communities, thereby increasing the levels of arsenic concentration in affected water bodies (Basu et al., 2015; Gilbert & Osei-Bonsu, 2016). According to Basu et al., 2015, p.5153), observed increases in arsenic concentration levels of some affected water bodies could be linked to the risk of "cardiovascular diseases, blood pressure, anaemia in pregnancy, obstructive lung diseases, mortality from respiratory diseases, and diabetes in adults; and neurodevelopment problems, skin lesions, cancer, and respiratory diseases in children". As a result of the contamination of water bodies due to the activities of SSM, there is high rate of water-borne disease in mining communities. Some diseases such as Buruli Ulcer have become endemic to small-scale gold mining communities (Basu et al., 2015). For example, Duker, Stein, and Hale (2006) in their study found that distance

to SSM polluted water bodies was significantly associated with prevalence of Buruli ulcer in the Amansie West District.

2.20.2 Social effects

Small-scale gold mining activities has substantial effects on the social environment. In communities where SSM operates, miners make conscious effort to bring about community development (Baffour et al 2018). According to Yeboah (2008), small-scale gold mining brings about improvement in social infrastructure such as electricity, schools, water supply, hospitals and roads. Other studies have postulated that SSM activities have aided in reducing social vices in mining communities as many young people who were hitherto engaged in robbery or prostitution now have a source of livelihood (Ezeji, 2014; Mactaggart et al, 2018). Nevertheless, some studies suggest that SSM activities exacerbates social vices (i.e., prostitution and child labour) in mining communities (Adu-Gyamfi, Brenya, & Abakah, 2016; Addai & Baiden, 2014). Baah-Ennumh and Forson (2017) also posit that SSM leads to loss of culture and territory.

2.20.3 Effects on the environment

The effects of SSM operation on the environment has been well documented (Laari, 2018; Persaud, Telmer, Costa, & Moore, 2017). These effects include a variety of measured and observed negative outcome on the environment in SSM communities. The review of the negative impact of SSM revealed that deforestation, loss of farmlands, water pollution and contamination, noise pollution, and erosion form the most common environmental consequences of SSM in developing countries including Ghana (Armah et al, 2013; Baffour-Kyei et al, 2018; Dupuy, 2014; Gyan, 2019).

Similarly, Eftimie et al. (2012) report that the effects of SSM on the environment can be manifested in different ways, which include unrehabilitated excavations, acid mine, river siltation, and dust emission. Similarly, SSM impact on the environment could create awareness for adopting sustainable environmental practices (Baah-Ennumh et al 2017). A plausible explanation to this could be that, as the environmental issues surrounding SSM increase, it draws the attention of key actors and stakeholders in the mining industry. Also, the government and its agencies in charge of mining operation are compelled by the prevailing conditions to engage in advocacy for better and sustainable SSM practices (Baah-Ennumh et al 2017).

2.20.4 Effects on livelihoods of miners and mining communities

Small-scale gold mining has a pluralistic effect on the livelihoods of miners and mining communities. On one hand, it has significant positive effects on livelihoods. On the other hand, it is recognised to have some negative effects on the livelihoods of miners and mining communities. On the positive side, SSM is a major source of livelihood in mining communities (Laari, 2018). Hillson (2011) argues that whether legal or illegal, SSM activities serve as an alternative source of livelihood for smallholder farmers to finance their farming activities. The author emphasised that small-scale gold miners are often in remote areas where farming is the main occupation. Therefore, SSM provides them with additional revenue to purchase agro-chemicals for their farms (Hillson, 2011).

Similarly, Ezeji Onyebuchi (2014) reports that SSM employs substantial proportion of Ghanaians, and help them generate revenue for

themselves and their households, as well as improving the economic status of mining communities. Furthermore, Ezeji Onyebuchi (2014) indicated over 80,000 people rely directly on small-scale gold miners for their livelihood. Thus, SSM does not only improve the livelihoods of miners but also caters for the wellbeing of their dependents and the wider mining community (Agyemang, 2012; Gyan, 2019). In a study by Arthur et al (2015), the authors found that SSM activities contributed to improving the livelihoods of miners and residents in Prestea through reduced vulnerabilities and empowerment. Also, the authors reported that through SSM activities, miners are able to acquire assets (e.g., technological gadget and trucks for their farm), which contributes substantially to improving their livelihoods.

Notwithstanding this positive effect of SSM on the livelihoods of miners and mining communities, the existing literature identifies several negative effects of SSM on miners and mining communities' livelihoods. One of the major negative effects of SSM on the livelihoods of miners and residents of mining communities is high cost of living (Laari, 2018; Yakovleva, 2007). Traditionally, small-scale gold mining activities attract migrants to affected communities. Hence, there is usually disequilibrium in the demand and supply for basic necessities such as clothing, food, and housing (Burrow & Bird, 2017). This excess demand over supply creates artificial shortage that leads to increases in prices (Laari, 2018). The findings of a study by Burrow and Bird's (2017) that corroborates the observations of Gilbert and Osei-Bonsu (2016) reported that communities engaged in intensive SSM activities had high Consumer Price Indices compared to the national average.

In practice, such situations exacerbate poverty and relative deprivation, and thus, negatively affect the livelihoods of miners and mining communities.

Another effect of SSM activities is that, it tends to destroy the original sources of livelihood for mining communities that leads to unsustainable livelihoods in affected communities (Laari, 2018). For instance, a study by Egyir, Baffoe-Bonnie, Otchere, Asante, and Oku-Afari (2015) revealed that 20 percent deterioration in the health of miners is bound to occur when they engaged in SSM. Relatedly, Gilbert and Osei-Bonsu (2016) found that farmlands which are the major source of livelihood of rural communities were destroyed by SSM activities. This corroborates evidence from Ghana (Ezeji Onyebuchi, 2014) and Zimbabwe (Madzimure, 2015).

On the other hand, Adjei (2007) in a study conducted in the Wassa mining areas found that farmers are often compensated for the claim of their lands, hence, providing them with the financial capital to acquire alternative lands to farm on. The author also added that although farmers are compensated for their lands, such situations create agricultural land shortage. Thus, facilitating unfavourable agricultural land tenure.

2.21 Livelihood Coping Strategies of Miners in Ghana

Usually, coping strategies are employed by miners and mining communities to be able to escape livelihood uncertainties (Brottem & Ba, 2019). In the words of Kyei-Baffour, Mensah, and Owusu (2018), livelihood coping strategies "may take the forms of changing consumption patterns like livelihood diversification, petty trading, migration, reducing number and quality of foods or meals, postponing entertainments, etc." (p. 5). Relatedly, Mabe, Owusu-Sekyere and Adeosun (2021) observed that in Ghana, many of

the miners resorted to farming as the main coping strategy with other coping strategies being their engagement in petty trading and the supply of labour services. However, Abbiw (2020) reported that many miners in Ghana find it difficult to identify livelihood coping strategies. For instance, in a qualitative study of 26 participants, conducted by Gyan (2019) to examine the reasons why people engage in SSM and how SSM impacts on the livelihoods of miners at Prestea, it was found that a combination of social and economic factors explained why people engaged in SSM at Prestea. Economic wise, the author found that the reasons for engaging in SSM activities were poverty and unemployment whereas the social factors that influenced SSM activities were loss of farmlands, lack of skills to engage in alternative livelihoods, as well as the notion of wanting to get rich overnight. The study articulates that SSM activities improved the livelihoods of miners through an improvement in their standard of living. The findings are in agreement with earlier finding by Ezeji (2014). Notwithstanding, SSM activities are fraught with negative effects on the environment and health of miners.

Kyei-Baffour et al (2018) in their study aimed to assess the impact of small-scale mining activities on the livelihood assets of households in the Bekwai Municipal, Ghana. The authors used a sample size of 400 households and applied the Propensity Score Matching (PSM) method to estimate the effects of SSM on the livelihoods of households. The study found that SSM activities impacted positively on household finances. However, the effect of SSM activities on the social, human and natural capital were all negative. This implies that SSM has a positive effect in terms of economic or financial component of livelihoods. However, its effect on the environment and social

capital remains negative. With regards to coping strategies, the authors found that almost half (42%) of the respondents reported that they did nothing as a coping strategy. Meanwhile, for those who reported to be using a coping strategy, they coped through community self-help, compensation, and forced compliance.

Similarly, Laari (2018) conducted a study that sought to examine how SSM influences rural livelihoods in the Amenfi West District, Western Region of Ghana. The study used a mixed method approach with a sample of 70. Also, the author used both purposive and snowballing sampling techniques in selecting the sample. The finding of the study revealed that SSM activities resulted in the depletion of land quality, water contamination and bites from harmful insects bred from the abandoned mining sites. Additionally, the study found that SSM activities improved the livelihoods of rural mining communities in the Amenfi West District through the provision of improved road network and employment. This observation coincides with the findings of a study by Kyei-Baffour et al. (2018) that intimated that SSM activities have both negative and positive effects on the livelihoods of miners and mining communities.

In a related study, Baah-Ennumh et al (2017) assessed the impact of artisanal small-scale mining (ASM) on sustainable livelihoods in the Tarkwa-Nsuaem Municipal Assembly of Ghana using a qualitative approach to research, and case study as the mode of inquiry. The results from the study showed that ASM activities had only negative effects on sustainable livelihoods. The author reports that the effects of ASM included loss of farmlands, inability to reclaim lands after mining, and significant exposure to

cyanide and mercury. This finding is supported by Haile, Hussein et al (2017) who also reported that miners in rural areas were overly exposed to chemicals like mercury and cyanide.

Likewise, Arthur, Agyemang-Duah, Gyasi, Yeboah and Otieku (2016) explored the relationship between SSM and livelihood in Prestea mining region, Ghana. The study adopted a cross-sectional mixed method survey, with a sample size of 151. The study found that the major reasons that accounted for people's engagement in SSM in Prestea included limited employment opportunities, poverty and "quick" income earnings. This corroborates the findings of Gyan (2019) concerning the reasons why people engage in SSM. Furthermore, the study revealed that SSM activities improved livelihoods via income generation, community and household empowerment, reduced vulnerabilities, and asset acquisitions. Nevertheless, there were some negative effects, which include damage to farmlands, forest, and water, as well as incidence of SSM-related accidents and injuries.

2.22 Conceptual Framework

The Sustainable Livelihood Framework (SLF) serves as the foundation for this research (SLF). The notion of livelihood can be traced back to Chambers and Conway's paper, Sustainable Rural Livelihoods: Practical Concepts for the Twenty-First Century, published in 1990. (Hilson, & Banchirigah, 2009). "All actions involved in getting food, seeking for water, shelter, clothes, and all needs required for human life at the individual and household levels are referred to as livelihood," according to the World Bank (Mphande, 2016, p.17).

SLF was first established in the 1990s to provide analytical contexts for the creation of long-term, pro-poor policies that are required for socioeconomic growth (Mensah, 2011). According to this theory, families have a variety of resource endowments that reflect the environment in which they operate (Mensah, 2011). Individuals discover prospective livelihood choices that will increase their wellbeing and socio-economic status based on their level of resource endowment. Also, the SLF demonstrates the connections between a person's livelihood and institutional structures and processes such as cultural and societal sensitivities, laws and social expectations, and legislative regimes (Mensah, 2011). The framework goes on to say that as people work to make a living, they should not jeopardize the environment's long-term viability, their own health and well-being, or their own safety (Mazibuko, 2012). All activities (such as the search for money and employment) that people of mining communities recognize as livelihood strategies are expected to support the long-term viability and protection of persons' health and well-being in the context of SSM (Mazibuko, 2012). The pervasiveness of environmental and health risks linked with SSM activities, on the other hand, constitutes a threat to long-term livelihood (Laari, 2018). The SLF is seen in Figure 1.

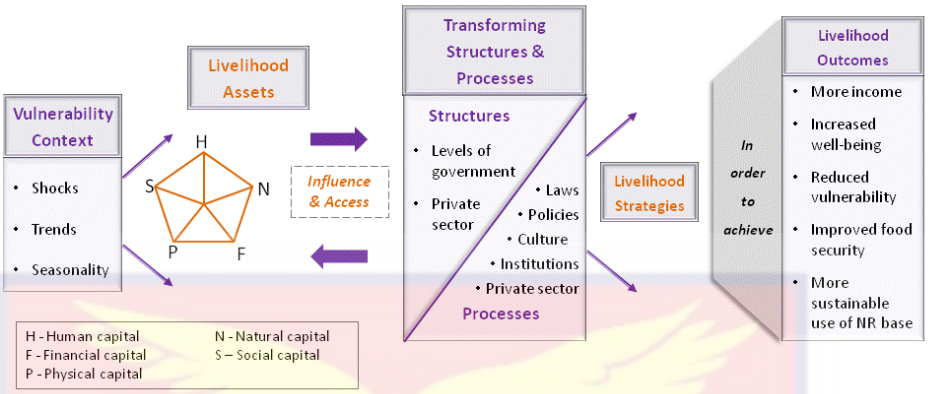

Figure 1. The Sustainable Livelihood Framework. source: Adopted from DFID (1999)

2.23 The Sustainable Livelihoods Framework

The sustainable livelihoods framework is an attempt to conceive livelihoods holistically, incorporating the numerous intricacies of livelihoods as well as the restrictions and possibilities they face. Numerous variables influence these limits and opportunities, ranging from global or national patterns and structures over which individuals have little control and may not even be aware, to more local norms and institutions, and lastly, the assets to which households or individuals have direct access. In the study, the household was used as a unit of analysis, but it is crucial to note that, not everyone in a household has equal decision-making authority or benefits equally from household assets or income.

In the framework (figure 1) the external environment in which people reside is referred to as the vulnerability context. Trends (such as national or worldwide economic trends, changes in available technology, and political systems), shocks (such as illness or death, violence, and weather), and

seasonality are all examples of vulnerability context (of prices, production cycles and so on). Because the three elements have a direct impact on impoverished people's ability to make a living now and in the future, the vulnerability context is critical. Wider economic conditions can generate more or fewer chances; a family member's illness can deprive them of a significant source of income and force them to sell valuable assets they have accumulated. Seasonal changes in prices, production, and employment possibilities are one of the most persistent sources of hardship for the world's poor.

From public and private entities to national policies and local culture, the shifting structures and processes box refers to the institutions and policies that affect the lives of impoverished people. All of these factors have the potential to alter both the vulnerability setting and the assets available to impoverished people.

The concept of assets is important to the approach to sustainable livelihoods. Rather than viewing poverty solely as a lack of money, the sustainable livelihoods approach takes into account the assets that impoverished people require in order to maintain a sufficient level of income. Poor people can engage in a variety of livelihood strategies - activities and choices - that ultimately define their livelihood outcomes, based on those assets and formed by the vulnerability context and shifting structures and processes. As previously stated, poor people are often forced to employ a variety of techniques in order to simply exist; individuals may engage in various activities, and members of a household may live and work in separate

locations. If all goes well, individuals may be able to obtain more income, improved well-being, reduced vulnerability, and increased food security.

Five sorts of assets, or capital, have been identified in the literature that everyone, not just poor people, require in order to make a livelihood include:

(i) Human capital: This consists of skills, knowledge, work capacity, and good health. Good health is not only a means to an end; it is, in fact, a goal in and of itself.

(ii) Social capital: This refers to the social resources that people use to create a living, such as relationships with more powerful people (vertical connections) or people who are similar to them (horizontal connections), as well as participation in groups or organizations. In general, trust, reciprocity, and exchange connections that the poor may rely on in times of need and that reduce the costs of productive collaboration. Social capital, like human capital, has intrinsic value; good social ties aren't just a means to a goal; they're an end in itself.

(iii) Natural capital: This refers to the natural resource supplies from which people can derive their livelihoods, such as land, forests, water, and air.

(iv) Physical capital: the basic infrastructure, as well as the tools and equipment that people utilize to make a living. Transportation and communication systems, for example, as well as shelter, water and sanitation systems, and energy.

(v) Financial capital: any type of savings, access to financial services, and regular money inflows.

The more assets a household has, the less exposed it is to the negative impacts of the trends, shocks and seasonality indicated in figure 1, and the more secure

their livelihood. Increases in one type of capital frequently lead to increases in other types of capital. For example, as people get educated the more (increase in quality human capital), they may be able to obtain better jobs that pay more money (increase in financial capital), which could help them upgrade their homes and household facilities (increase in physical capital). However, there are instances when one sort of capital declines while another rises. This could be the case, for example, if a person or family sells their land in order to relocate to a city.

2.24 Criticisms of the framework for a sustainable livelihood

In recent decades, development practitioners have challenged the five capitals' prominence for focusing too much on the micro-level and overlooking 'upper' levels of governance, policy environment, national and global economic growth. This has resulted in a limited grasp of how markets work, and how procedures that are far removed from the lives of impoverished people have a huge impact on their ability to earn a stable living. Of course, these issues are addressed in the broader framework of sustainable livelihoods, specifically the transforming structures and processes and the 'vulnerability context,' but in practice, many people have focused on the five capitals rather than the connections between them and the larger environment in which people live. It's critical to remember that the larger environment has an impact on not only the assets to which people have access to, but also what they can do with those assets.

The paradigm for sustainable livelihoods has also been chastised for failing to include power relations, such as those relating to gender. While such dynamics are included in the framework, they have been overlooked in practice. In

particular, social capital has been viewed as only 'a positive thing,' despite the fact that social networks may be both inclusive and exclusive, with the weakest and most vulnerable generally excluded. Also, the framework features hierarchical and coercive interactions, which limit options for people at lower levels and even when relationships are more horizontal than vertical.

Although all of the aforementioned objections and limitations of the sustainable livelihoods' strategy are unquestionably correct, the technique aims to summarize the enormously complex and diverse causes of poverty, as well as the options for alleviating it, in a single collection of diagrams and associated concepts. Inevitably, when utilized in practice, it becomes cumbersome, and certain components will be highlighted more than others based on the users' preferences. Nonetheless, it is very useful for the present study, both for thinking about the micro-level details of poor people's livelihoods and for thinking about the larger context in which those livelihoods operate.

CHAPTER THREE

RESEARCH METHODS

3.0 Introduction

This chapter provides details of the research methods used in this study. It covers the research design, study area, data sources, methods of data collection, instruments for data collection, sampling procedures, data processing and analysis, ethical considerations, as well as COVID-19 strategies employed in the data collection process.

3.1 Research Design

Generally, research approaches are seen in two folds: quantitative and qualitative. Usually, the former deals with having statistical power in order to be able to generalise the results whereas the latter is concerned with gaining in-depth understanding and interpretations of a given phenomenon (Creswell et al, 2017). However, each of these approaches come with their shortcomings. Due to lack of the application of rigorous and appropriate statistical sampling techniques, resultant findings and conclusions are less representative of the nature of the population. In general, quantitative research lacks the in-depth appreciation and comprehension of a phenomena. Therefore, in order to make up for the shortcomings of the individual approaches, the study employed a combined approach that utilises the benefits of both the quantitative and qualitative approaches.

The study acknowledges that there are a number of mixed method designs: sequential-explanatory, sequential-exploratory, concurrent triangulation, concurrent nested, and concurrent transformative mixed methods (Creswell, Plano, Clark, Gutmann & Hanson, 2003). However, in this

study, the concurrent triangulation mixed method design was used. The choice of the concurrent mixed method design is premised on the philosophical underpinnings of the study. The study is underpinned by both the interpretivist (this guides the qualitative component) and positivist philosophy (which guides the quantitative component). Additionally, the study employed cross-sectional research design as both qualitative and quantitative data were collected during a single phase of the study. The purpose of the qualitative inquiry was to provide a complementary and deeper understanding about the effects of small-scale mining on the livelihoods of miners and residents of the selected study mining communities, whereas the quantitative inquiry was basically to collect data that could be tested for statistical associations between selected explanatory variables and the outcome variable.

3.2 Study Area

This study was situated in three selected mining communities within the Obuasi Municipal Assembly. The Obuasi Municipal Assembly is located in the Ashanti region of Ghana. It lies between latitudes 5º35'N and 5º65'N, and longitudes 6º35'W and 6º90'W, sharing boundaries with Adansi North District to the North, Adansi South to the East and South and Amansie Central District to the West (Angyobore, 2017). According to Mensah and Okyere (2014), this municipal assembly covers a land area of 162square kilometres and is about 64 kilometres from the regional capital, that is, Kumasi. In addition, statistics from the 2010 Population and Housing Census also indicates that the Obuasi Municipal Assembly has a total population of 168,641, with a sex ratio of 92.5 and a total dependency ratio of 63.8 (Ghana Statistical Service, 2013).

Economic-wise, about 63.7 percent of the population aged 15 years and older are economically active (Ghana Statistical Service, 2013), with agriculture and mining constituting the primary occupation within the Obuasi Municipal Assembly. For instance, the mining industry provides a total of 35% of employment opportunities within the Obuasi Municipal Assembly (Angyobore, 2017). Evidently, the Obuasi Municipal Assembly represents one of the oldest mining areas in Ghana with concessions that date as far back as to over a century ago (Mensah & Okyere, 2014). Currently, the AngloGold Ashanti Limited dominates mining activities in the Obuasi Municipal Assembly. Although the study is situated in the Obuasi Municipal Assembly, it is specifically based on three communities: Kofikrom, Pomposo and Odumase. Figure 3.1 shows a map of Obuasi mining community highlighting the three selected communities wherein this study was conducted.

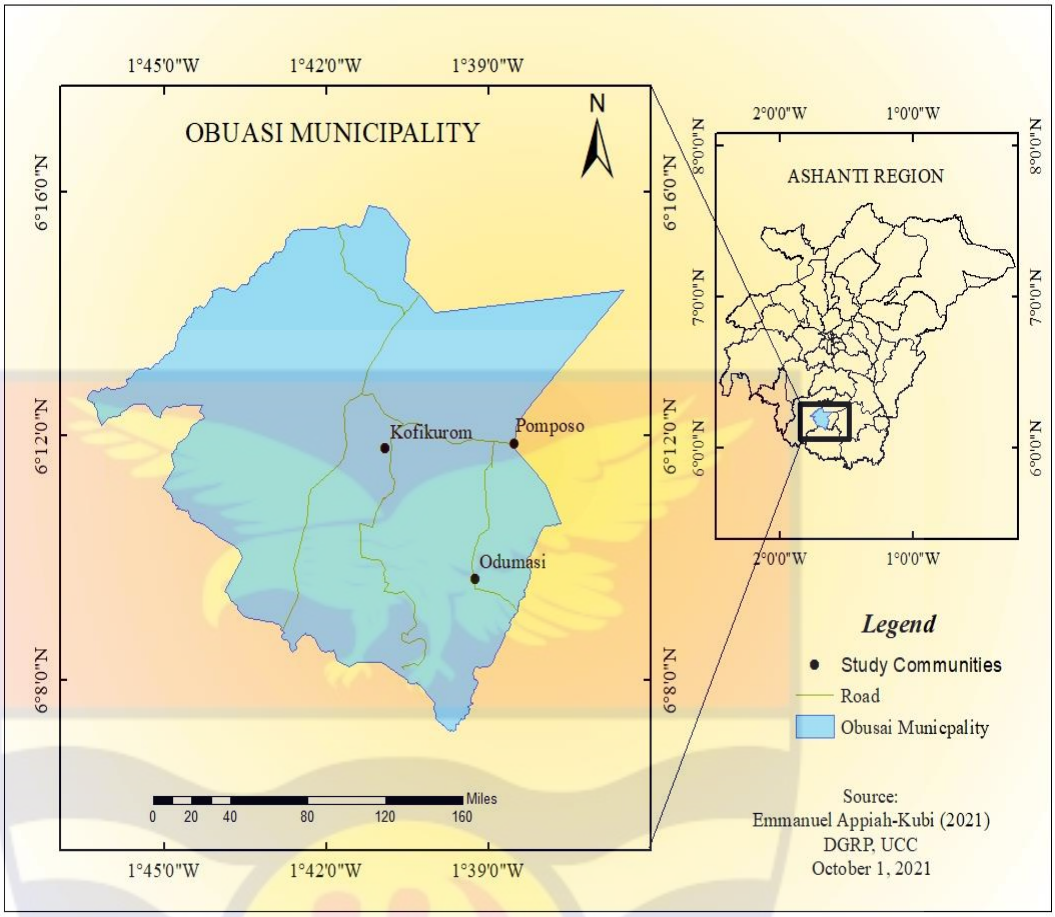

Figure 2: Map of Obuasi Municipality Showing study mining communities

Source: *Appiah-Kubi (2021)*

3.3 Population

The target sample in this study included household members in three communities within the Obuasi Municipal Assembly: Koffikrom, Pomposo and Odumase. Also, key informants including miners, officials from the Environmental Protection Agency as well as community leaders including assembly members were consulted.

3.4 Sampling Procedures

Based on the GSS (2010) population census, the total population of Odumasi is 2,510, Pomposo being 4,842 and Koffikrom was 3,236. The total combined

population of these three communities is 10,588. Based on aggregation, Odumasi represent 24%, Pomposo being 46% and Koffikrom represent 31% of the total population.

Therefore, using the Morgan and Krejci (1970) sample size formula;

$$n = \frac{X^2 \times NP(1-P)}{e^2\,(N-1) + X^2P(1-P)}$$

In calculating the sample size for 10588 population size (N), at 95% confidence level with 1 degree of freedom, the chi-square value is X^2 = 3.841, level of margin of error (e) is 0.05 and Population proportion (P) =0.5. therefore;

$$n = \frac{3.841 \times 10588(0.5)(1-0.5)}{0.05^2\,(10588-1) + (3.841 * 0.5)(1-0.5)}$$

n= 406.6876068

therefore, n (sample size) = 406 respondents.

Moreover, in apportioning the number of samples to the total population of the three communities based on their percentage aggregation of the total population;

(i) Odumasi = 125 sample

(ii) Pomposo = 170 sample

(iii)Koffikrom = 111 sample

Hence, the total sample of the three communities, which is stated above represent the number of samples that were be taken from each community for the study. Moreover, simple random sampling method will then be applied in selecting the participants from these communities for the study.

Practically, the study adopted both probability and non-probability sampling procedures due to the use of the mixed method research design. Specifically, simple random sampling was used for selecting the sample for

the quantitative survey. This was done by first listing the households in the selected communities in order to develop a sample frame. Afterwards, random numbers were generated using Microsoft Excel. Subsequently, participants from the households were recruited into the study based on the random numbers that were generated.

With respect to the qualitative interviews, there was no predetermined sample size. Purpose sampling procedure was used for sampling participants for the study. This type of sampling procedure involves recognising and selecting participants that are expressly conversant about or experienced with a given phenomenon of interest (Creswell et al, 2011). Therefore, the choice for purposive sampling in this study was to ensure that only persons who are likely to provide data that are detailed, relevant, and reflective of the situation at hand could participate in the study (Oliver, 2011).

Creswell et al (2011) identified several purposive sampling strategies, which include criterion-I, criterion-e, typical case homogeneity as well as extreme or deviant purposive sampling strategies. However, this study employed the criterion-I strategy. Unlike the Criterion-e strategy that identifies and selects all cases that exceed or fall outside a specified criterion, the Criterion-I strategy holds that only participants who meet a predetermined set of criteria can be sampled for a study (Creswell et al 2011). Thus, participants in this study were expected to meet a set of criteria: (a) participants must be residents of any of the three communities where the study was conducted; (b) they must voluntarily participate in the study; (c) they must be above the age of 18 years as that is the legal age to engage in economic activities like small-scale mining; and, (d) they must have lived in the community for a minimum

of two years. The last criterion is based on the assumption that the length of stay in the community will influence the participants experience and knowledge about the effects of SSM on their livelihoods. Only participants who met the four stated criteria were included in the study.

3.5 Data Collection Instruments

The study depended mainly on primary data. Persaud (2012) defines primary data source as the original source where data is collected first hand by the researcher for a particular research objective. Consequently, the study data were sourced from both the surveys and interviews conducted. Besides the primary data source, the study also relied on secondary information sources that were obtained through the review of published articles and unpublished theses.

The instruments for data collection in this study were questionnaires and interview guides. The questionnaires were used to solicit participants responses for the quantitative survey. It constituted four main sections. Section A collected data on the socio-demographic characteristics (age, marital status, educational status, length of stay in the community, religion, ethnicity) of the study respondents. Section B asked questions about the factors that influence residents of mining communities to engage in SSM. Section C solicited responses about the effects SSM activities have on the livelihoods of residents while Section D asked questions pertaining to the coping strategies used as well as recommendations for ensuring that SSM has positive effects on the livelihoods of residents.

3.6 Data Collection Procedures

Data were collected using interviews and surveys. The surveys were used to collecting quantitative data whereas in-depth interviews were used to collect the qualitative data. Audio recorders and notebooks were used as tools for aiding the qualitative data collection excercise. Prior to the survey and interviews, the researcher read out the study protocols to the respondents. This was done with the aim of briefing the study respondents about the aims and objectives of the study as well as seeking the consent of the study respondents. The study interviews were conducted at the household level. Also, both the survey and interviews were conducted in a language (mainly English and Twi) that the study respondents felt most comfortable.

3.7 Data Processing and Analysis

Effective data processing and analysis is as essential component of the research process. With regards to the analysis of the quantitative data, the completed study questionnaires were coded and entered into the Predictive Analytical Software Version 32. Both descriptive and inferential analyses were done and subsequently presented in distribution tables and charts showing the frequencies and percentages of the events or factors that were studied. In relation to the analysis of the qualitative data, the study adopted Lacey and Luff (2007) stages of thematic analysis. First, the analysis of the study interview data began with familiarisation with the data through continuous listening of the data. Second, a verbatim transcription of the audio data was performed. Afterwards, the common themes and sub-themes that emerged out of the pre-data analyses aspect of the study were coded and

categorised for final interpretation. The main themes were subsequently reported and supported by direct quotes from some of the respondents.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Socio-Demographic Characteristics

The total number of respondents who participated in the study were 406. Majority (53.7%) of the respondents interviewed were males and the remaining (46.3%) were females. Also, majority (34%) of the participants fall within the age group of 29 -39, followed by 18-28 (23%), 29-39 (34%), 40-50 (25%), 51-61 (25%) and lastly 62-72+ comprising (6%). In all, 48 % of the participants had Secondary/Vocational education whilst about 23% had no formal education with 19% having Primary/JHS education and 10% had tertiary education. With respect to marital status, majority of the participants were married couples (55.4%) followed by those who never married (23.2%), cohabiting (7.9%), separated (5.7%), widowed (4.2%), and Divorced (3.7 %). This is illustrated in the table 4.1 below.

Table 1: Socio demographic Characteristics of Respondents

Characteristics	Frequency	Percentage
Gender		
Male	217	53.7
Female	189	46.3
Total	***406***	***100***
Age Group		
18 – 28	93	23
29-39	140	34
40-50	100	25

51-61	49	12
62-72+	24	6
Total	***406***	***100***

Characteristics	Frequency	Percentage
Education Level		
None	93	23
Primary/JHS	78	19
Secondary/vocational	195	48
Tertiary	40	10
Total	***406***	***100***

Table 4.1: Socio demographic Characteristics of respondents (cont'd)

Marital Status		
Cohabitation	32	7.9
Married	225	55.4
Separated	23	5.7
Single	94	23.2
Widowed	17	4.2
Divorced	15	3.7
Total	***406***	***100***

Source: Fieldwork (2021)

4.2. Effects of SSM on livelihood & household

In assessing whether SSM had an effect on the livelihood and household of the inhabitants in the selected study communities, about 88.7% of the respondents indicated Yes whilst about 11.3% of the respondents indicated No as shown in Figure 4.1 below.

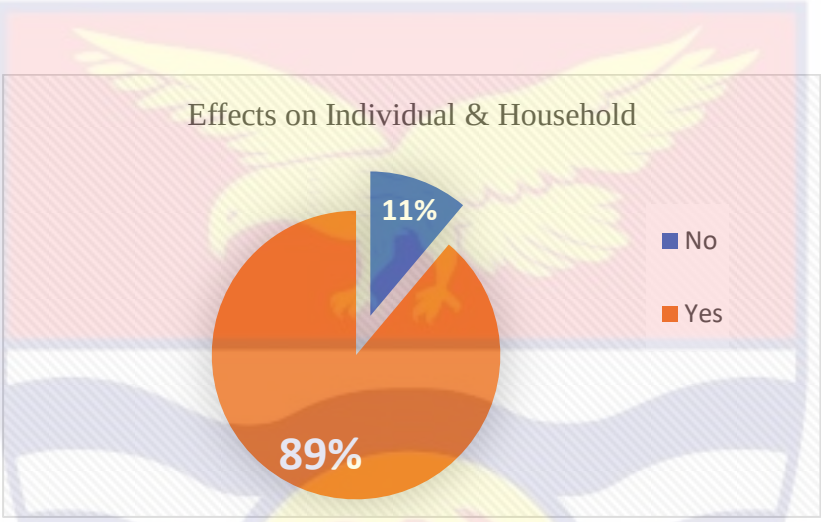

Figure 3: Effects of SSM on individuals and Household

Source: Fieldwork (2021)

4.3. Household Employment as a Result of SSM

In any mining community, SSM provides benefits to the residents of the community. Table 4.2 shows that about 43% of the respondents indicated that SSM has provided some form of employment in their household. Whilst about 56 % indicated that there has not been any form of employment in their household associated with SSM.

Table 2: Employment in Household due to SSM

Employment in household due to SSM		
	Frequency	Percent
No	228	56.44
Yes	176	43.56
Total	404	100.00

Source: Fieldwork (2021)

Probing further, the respondents who indicated that there has been some form of employment in their household associated with SSM further indicated that the number of people employed in their household as a result of SSM ranges from ten (10) to one (1).

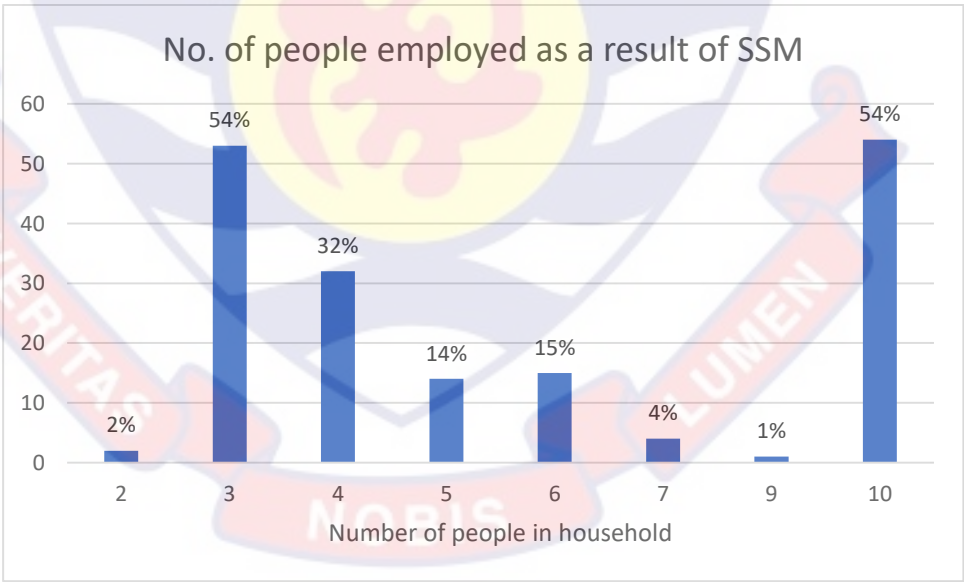

Figure: 4: No. of people employed as a result SSM

Source: Fieldwork (2021)

When asked whether this results/finding (Table 4.2) coincides with the expectations of the people of the selected SSM mining communities, the Assembly man of Gauso/Koffikrom stated that;

> "*There is no job in the area aside mining, so many people in the community have engaged in the SSM activity". Due to unemployment, most people have no other option than to engage themselves in it. Also, many people who are not employed directly in the SSM activity, sell things in the sites. So, in a way it has created employment both directly and indirectly."*

4.4. Skills & Knowledge Acquisition through SSM

Skill set and knowledge acquisition play an important role in the development of any community. As shown in Figure 4.3, 24% of the respondents indicated that they have acquired some form of Skills or Knowledge as a result of SSM.

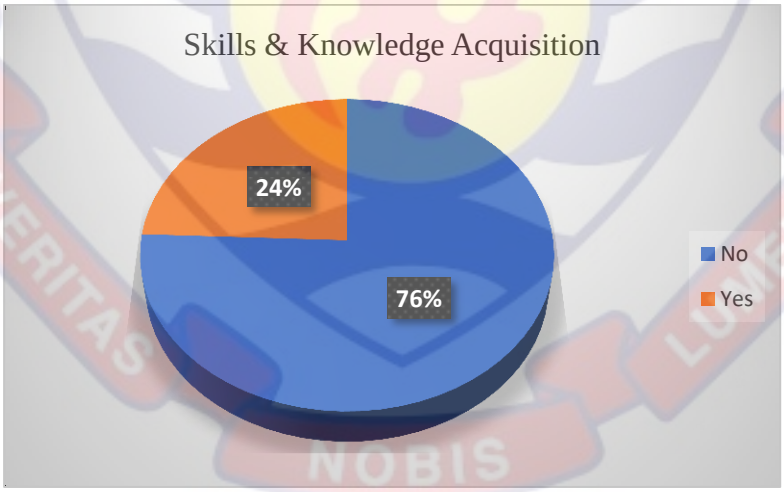

Figure 5: Skills and Knowledge Acquisition

Source: Fieldwork (2021)

Based on further analysis of the question on the skills and knowledge acquisition through SSM, figure 4.4 revealed that majority (69%) of the

respondents achieved skills and knowledge in Trading, with only one percent acquiring skills and knowledge in Tailoring (1%).

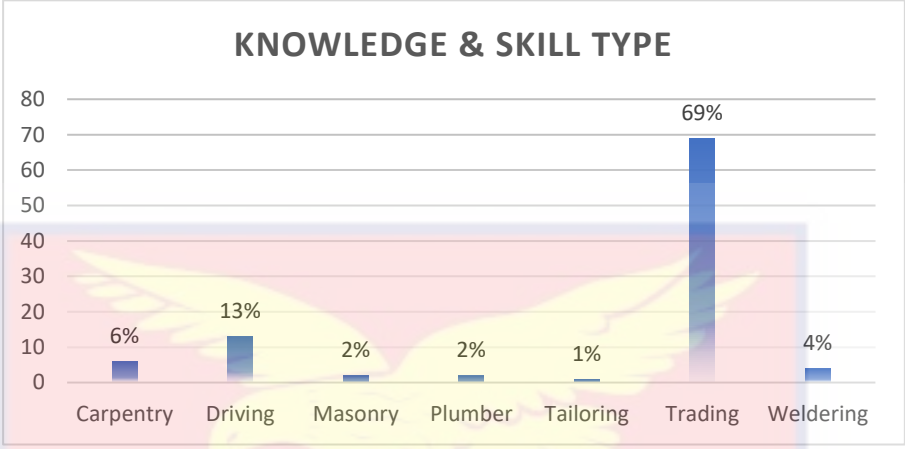

Figure 6: Knowledge and Skill type

Source: Fieldwork (2021)

4.4. Adverse effect of SSM on livelihood & locality

From Table 4.3 about 47% of the respondents indicated that SSM had an adverse effect on their livelihood. However, majority (52.1) of the respondents indicated that activities of SSM had no negative effects on their livelihood.

Table 3: Adverse effects on livelihood

	SSM effects on your livelihood?	
	Frequency	Percent
No	211	52.1
Yes	191	47.1
Total	402	100

Source: Fieldwork (2021)

In asking how SSM activities affected the livelihoods of the 191 respondents in (Table 4.3) 45% of them indicated that it has negatively affected the

educational system of the youth in their community (Figure 4.5). Additionally, figure 4.5 shows 15% of the respondents indicated that it has destroyed agricultural lands while 12% indicated that SSM has caused water pollution, environmental pollution and land destruction. Only 4% and 1% of them that indicated that it has caused them financial loss respectively.

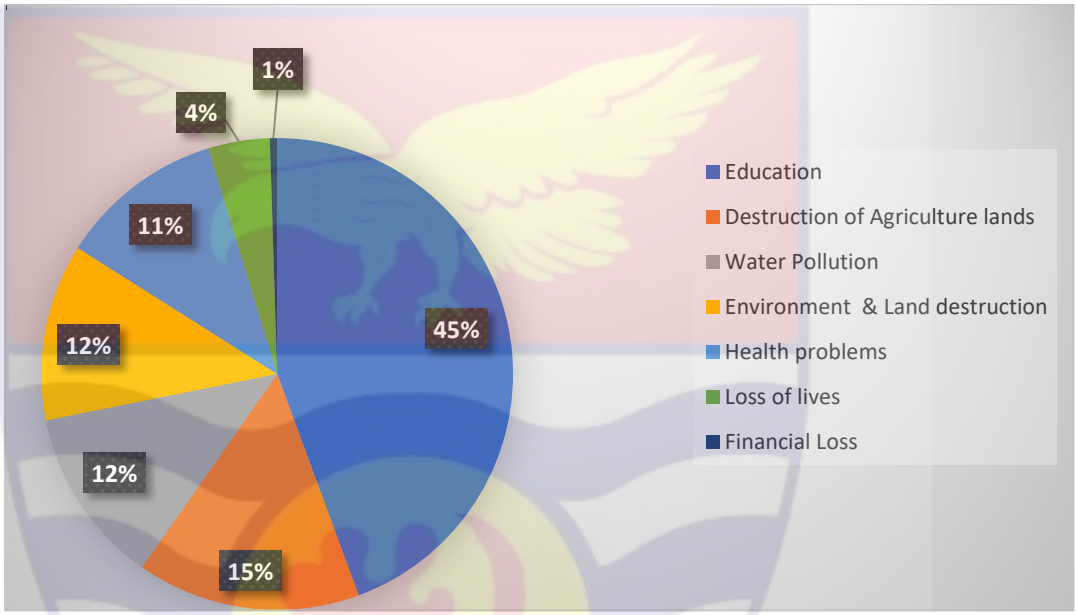

Figure 7: Effects of SSM on livelihood

Source: Fieldwork (2021)

From the focus group discussion, it emerged that;

"SSM operations are very dangerous but because of unemployment, most people involve themselves in it. People lose their lives because of this operation. It has rendered many widows. I will not recommend it for anyone. Sometimes human blood is even involved before they get certain amount of mineral. So, it all boils down to poverty and unemployment. We lose farmlands usually as a result of the small-scale mining activity, sometimes the chiefs are behind it, they pull down acres of cocoa trees and crops."

In a discussion with the Assistant Director of EPA about the effects of livelihood on the inhabitants of the mining communities, it emerged that:

> *"People are denied farmlands or agricultural lands by the chiefs and elders of the community. Sometimes, the miners encroached on the farmlands of others that are close to the mining site. They destroy these lands without caring about the consequences it may have on those whose land they are destroying."*

On account of the effects on SSM on livelihood of the people, the Assembly man of the community intimated that:

"*The chemicals they use in the operations damage crops and kill animals. The pits they leave uncovered after digging also pose a danger to people living around. Living conditions in Obuasi is not very high as compared to the SSM sites. People tend to increase the prices of their items, twice what is sold at the main Obuasi market. Education at mining sectors is not encouraging at all, due to the returns they get from the SSM. SSM also pose as a threat to most men and women here especially the elderly ones. It changes the physical appearances of the younger ones too due to the nature of the job. It sometimes has effects on their health."*

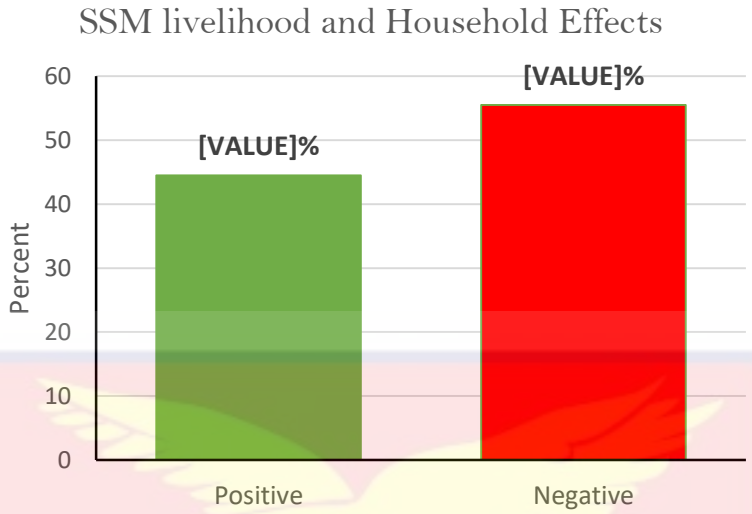

Figure 8: Effects of SSM on the livelihood and household of miners

On the effects of SSM on the livelihood of the people of the mining communities in Obuasi Figure 5.1 reveals that the negative effects far outweigh the positive effect. It was, therefore, not surprising that the data revealed that some of socio-economic problems including health related problems, education, pollution and safety persist in selected mining communities in Obuasi.

4.5. Loss of Assets

Figure 4.6 shows that 30% of the respondents confirmed that they have lost livelihood assets such as land and farms as a result of SSM. On the other hand, majority of the participants (70%) indicated that they have not lost any form of livelihood assets due to SSM.

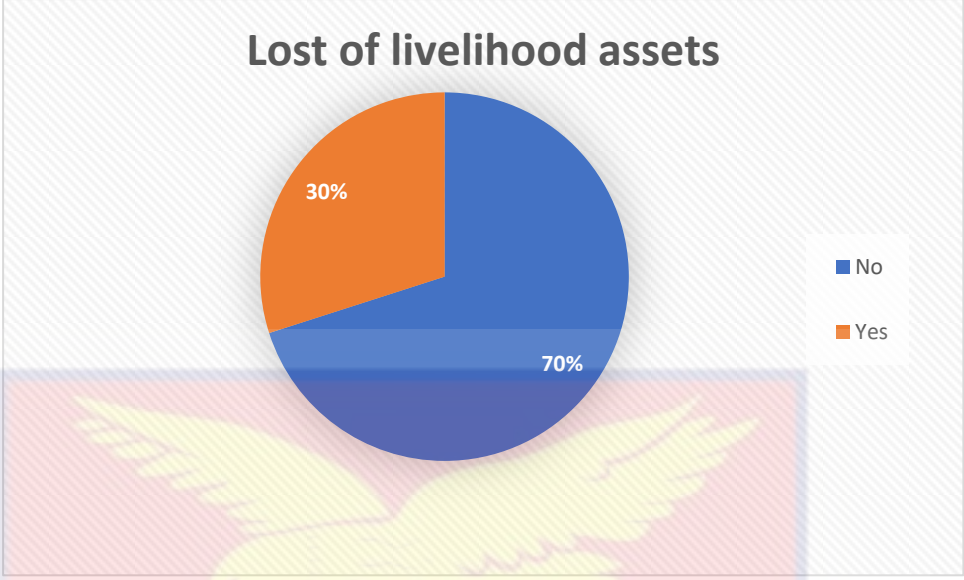

Figure 9: Lost of livelihood assets. Source: Fieldwork (2021)

4.6. Impact on Locality

Figure 4.7 shows that SSM has a diverse impact on the locality that it takes place in. According to the respondents, SSM has major effects on waterbodies of affected localities through pollution that render affected water bodies unsafe to drink. For instance, 80% of the respondents indicated that there has been vegetation loss in the communities. Also,76% of the respondents indicated that communities had to be displaced as a result of SSM because SSM sometimes takes place in existing established communities. However, 69% of the respondents indicated that lives are lost as a result of SSM since the miners sometimes use old and traditional methods of mining, which can cause the collapse of the pit. Additionally, 56% of the respondents indicated that it endangers the health of the people and the ecosystem since both are sometimes exposed to harmful chemicals. Furthermore, 26% of the participants indicated that it causes loss of Biodiversity.

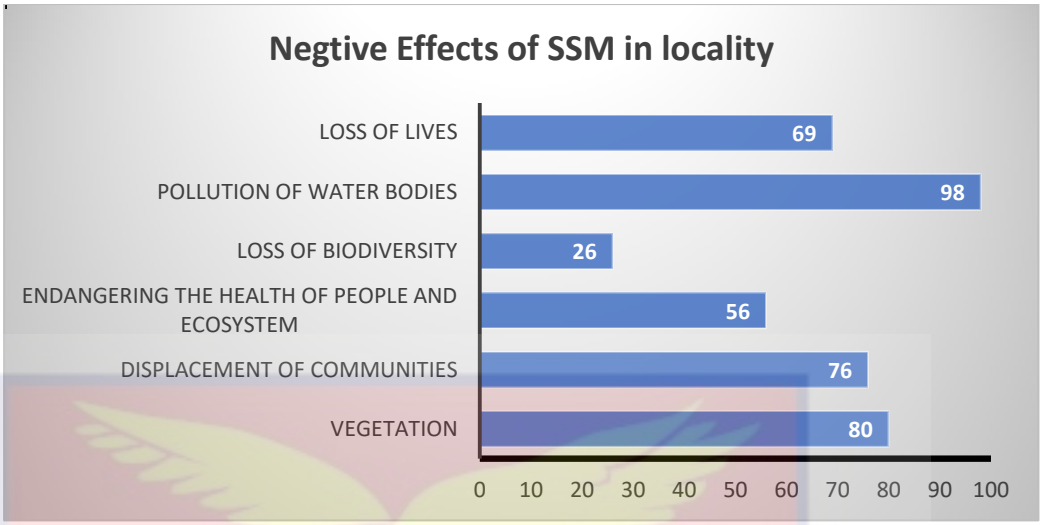

Figure 10: Negative effects of SSM in locality

Source: Fieldwork (2021)

In addition to the views expressed by the respondents in the study area on the negative effects of SSM on the three selected study communities, the Assembly man of Gauso stated that;

> "*People tend to increase the prices of their items, twice what is sold at the main Obuasi market, which increases the cost of living in the locality. Education at mining sectors is not encouraging at all, due to the returns they get from the SSM. The youth usually drop out of school and focus on SSM so as to get money to feed themselves and their families which in the long run increases the level of illiteracy in the community".*

Also, from the focus group discussion, the following negative effects of SSM on the selected study communities were documented;

> *"SSM activities have made living conditions in the mining communities in Obuasi difficult. Miners often leave the pits open and release the dirty water in the Akaporiso river, which kills the fishes in the river.*

This makes fishing not lucrative. Sometimes lives are lost. I saw someone moving around with a sack containing a kid meant for rituals which actually helps them to get a lot of money than the usual. But who are you to say anything? You just have to pass by and so this business is not something that should be entertained if you are fully employed. People fall in the pit and they get hurt to the extent that we sometimes do not even find some parts of their bodies due to how their bodies tear apart and so they pack them in sacks and take them out."

4.7 Correlation Analysis

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.210[a]	.044	.034	14.811	.044	4.490	3	293	.004

To establish the relationship between SSM and its effect on livelihood of affected communities, Pearson product moment correlation coefficient and hierarchical regression analysis were conducted. The correlation coefficient proved that SSM have a positive relationship in affecting the livelihood of the residents of the affected three communities in Obuasi Municipal Assembly (R=.210, P<.004) as showed in Table 4.4.

4.8 Coping Strategies and Mechanism: Support Received from Agencies when in Livelihood Crises

4.8.1 Relatives

Figure 4.8 a, depicts respondents who stated they do or do not receive support when they are in deep economic crises. Specifically, 97% of the respondent noted that they do not receive any support from any relatives when they are into crises. However, 3% of the respondents indicated that they do get support from other relatives whenever they are in crises.

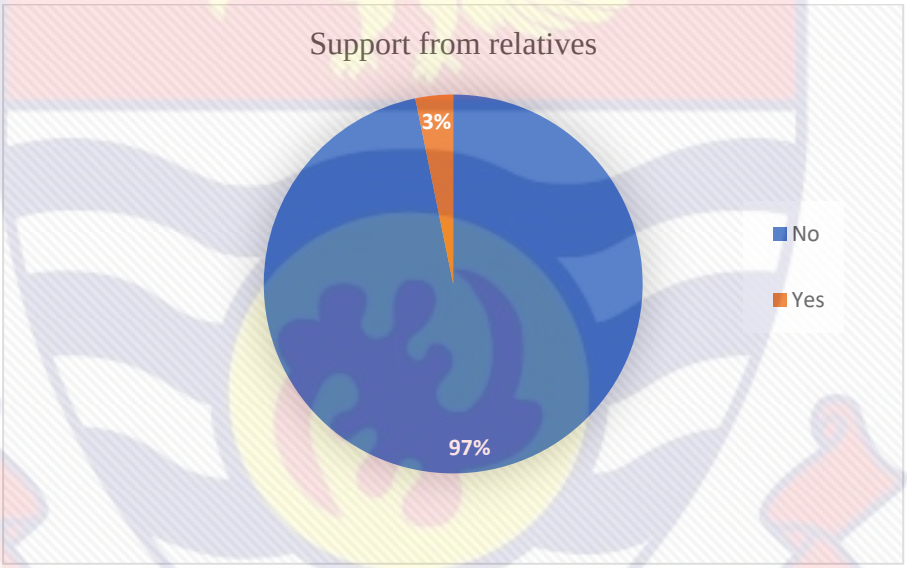

Figure 11: Support from relatives

Source: Fieldwork (2021)

4.8.2 NGO's

Figure 4.8 b, majority of the respondents (98%) intimated that they do not receive any form of support from any NGO's whiles a few of them (2%) indicated that they get support from the NGOs and other source.

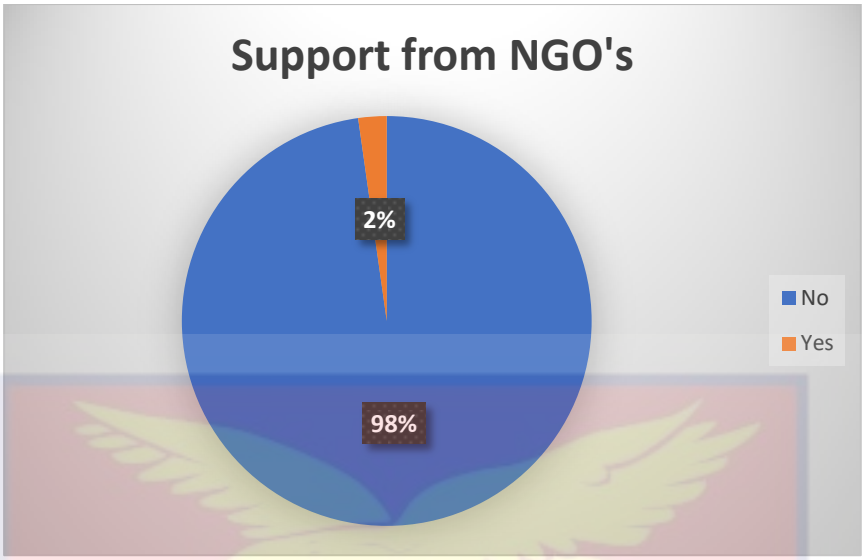

Figure 12: Support from NGOs

Source: Fieldwork (2021)

These results coincide with an observation made by the Assemblyman of Koffikrom, Pomposo and Odumasi that,

> "*The NGO's sometimes come to the community to talk to the people about the mining activity and how it will affect their lives. But they do not provide any financial support to those who have lost their lands as a result of SSM''.*

Relatedly, when asked about the involvement of NGOs in compensating victims of SSM, the Obuasi Municipal Assembly EPA Assistant Director stated that;

> *"The NGO's do not actually support the affected people in the community from the SSM activity. The NGO's only focus on sensitization and capacity building. They only focus on educating the people on the effects and benefits of SSM. "*He

further indicated that, "*the NGOs are not required by law to compensate the people affected by SSM.*"

4.8.3 Civil Society Groups

Figure 4.9 shows that 92% of the respondents did not receive any form of support from civil society groups in time of crisis. However, 8% of them indicated that they did receive some form of support from community-based civil society groups.

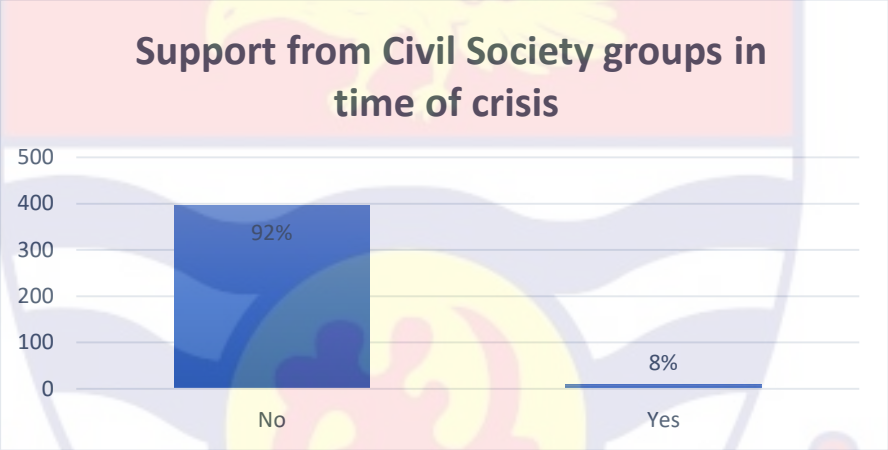

Figure 13: Support from civil society groups in time of crisis

Source Fieldwork (2021)

4.8.4 Private and Community Based Organisations

Figure 4.10 shows that majority of the respondents (98%) in the study communities indicated that they did not receive any form of support from any private or community organisation. Only 2% of them indicated otherwise.

Figure 14: Support from private/community organisations

Source: Fieldwork (2021)

4.8.5 Government Agencies

With respect to the government agencies, about 6% of the study respondents indicated that they had support from the government agencies in dealing with the negative impacts of SSM. However, majority of the respondents indicated that government agencies in the communities did not provide them with any support or aid. This is shown in Figure 4.11.

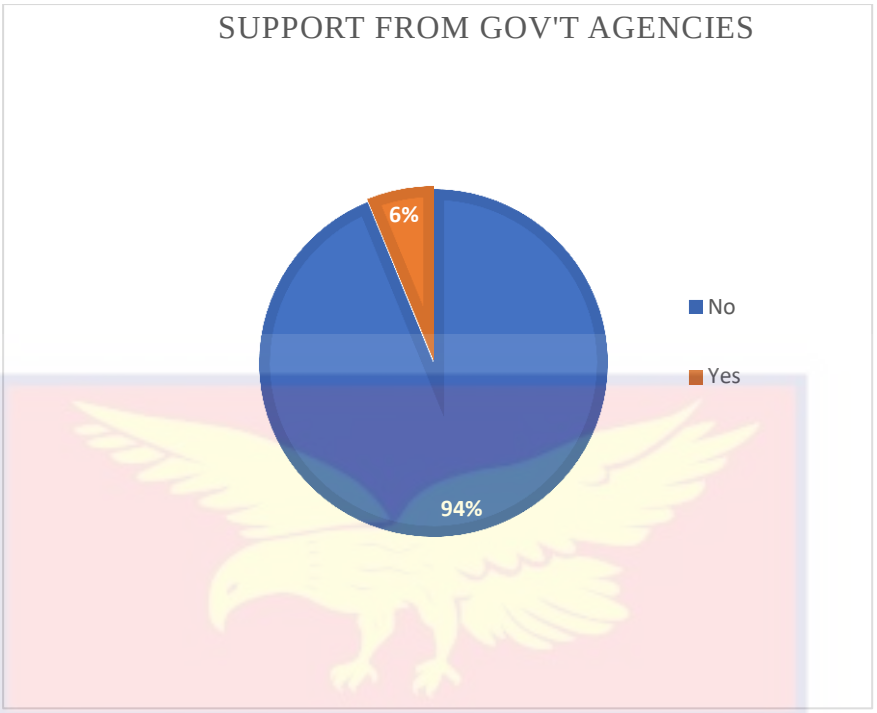

Figure 15: Support from government agencies

Source Fieldwork (2021)

In relation to this observation, focus group participants of the communities asserted that:

> "*The government does not help us, the municipal does not help us, we need lots of help but nobody helps us. Due to corruption and political interference, our municipal assembly and the enforcement agencies cannot even work independently and so arresting deviants have become a major challenge.*"

Additionally, the assemblymen of Koffikrom, Odumasi and Pomposo of the study communities noted that government do not compensate any of the SSM victims. He explained that:

> *"The Municipal cannot help the people unless the affected persons report their problems to them. However, they do not provide any*

compensation. They only come in with NADMO when the problem is regarding fire and water, to support the victims."

Further, the EPA Assistant Director of Obuasi Municipal Assembly made the following remarks when asked whether the government provide compensation to the people affected as a result of SSM;

"*Government do not provide any compensation or support to the victims. However, if a person reports that they face challenges with SSM, there is a negotiation concerning the damages between both parties. If an agreement is reached the case is forwarded to the Municipal Assembly and to the Ghana Valuation Board to handle the issue. But the government will not pay any individual compensation but provide you with an agency to make sure that a fair agreement is reached between both parties when issues arises from SSM."*

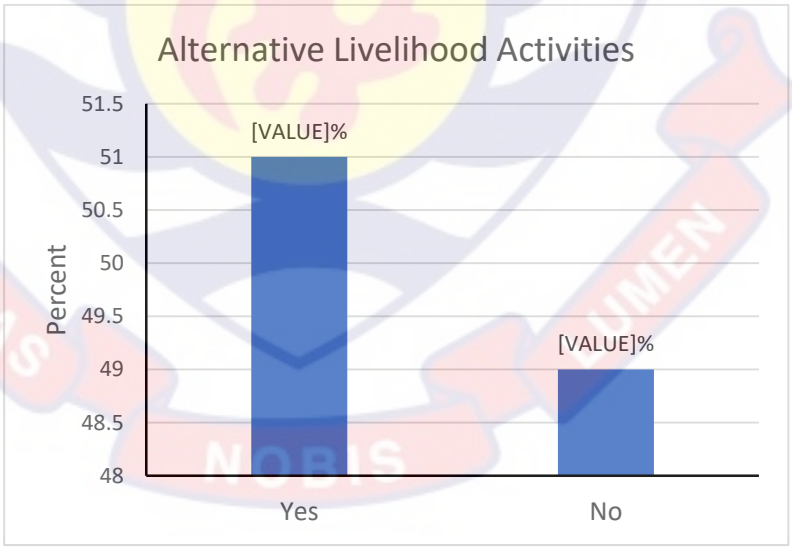

Figure 16: Resort to Alternative livelihood activities

Source: Fieldwork (2021)

Based on the analysis of the question on the impact of SSM on the livelihood of the people in the selected communities, Figure 4.12 shows that a total of 51% respondents indicated that they resort to alternative livelihood activities in order to survive, since SSM destroy their farmlands and other forms of livelihood. However, 49% of them indicated that they did not resort to any other livelihood activities. Hence, they intimated that they were facing economic hardships due to the negative effects of SSM activities at the time of the survey.

Figure 17: Resort to alternative livelihood activities

Source: Fieldwork (2021)

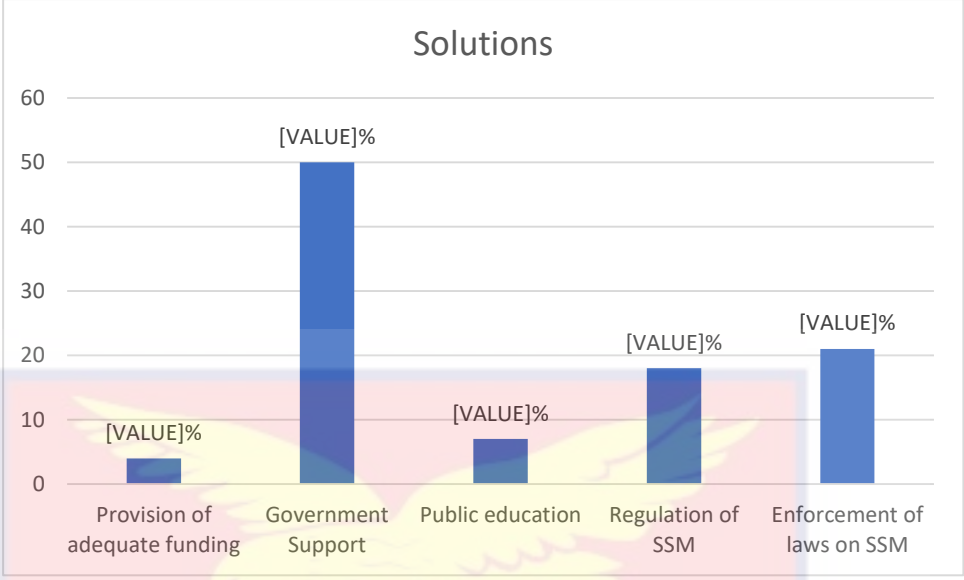

Figure 18: Solution to ensure SSM result in positive results

Source: Fieldwork (2021)

In order to help reduce the negative effects of SSM, participants were asked about solutions that will ensure SSM result in positive effect. In all, (50%) of them indicated that support from the government will help relieve them from the negative effects of SSM followed by the strict enforcement of laws on SSM. Other respondents were of the view that public education on the benefits and effects of SSM and lastly provision of adequate funding for better equipment and processes.

Relatedly, participants from the FGD stated that:

> *"The government should enforce laws on the SSM and also prevent people to stop using machinery such as excavators in the mining operation".*

On the same issue, the Assembly man of Gauso made the following remarks:

"I believe that if the public is sensitized about galamsey operations, they will operate legally for peace to prevail but because they don't operate legally, they are always on the run. If the government can find ways of allowing small

scale mining in a more suitable way, it will help the country to develop. Operations must only be allowed in a legal manner by taking permits, if that happens those who operate illegally will be made to face the law. Only three places have permits to operate in Obuasi here, Adaase, Ammemerewa and Dekyiwa. Those who have permits operate within the dimensions given to them so as to preserve water bodies."

In ensuring adherence to mining ethics, the Assistant Director of EPA in Obuasi Municipal Assembly stated that:

> *"We are developing a bond for the people to sign to ensure they mine responsibly. And also, there is a joint security action to check mining activities and their challenges. I believe what can help us is for Ghanaians to be honest and truthful about the operations of SSM so that we can reduce the risk associated with it."*

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter provides a summary of the study including summary of major findings, conclusions and recommendations made based on the findings of the study. Also, the chapter makes recommendations for policy implementation suggests new areas for further study.

The main objective of this study was to analyze the effects of small-scale mining on the livelihoods of residents of mining communities within the Obuasi Municipal Assembly. Specifically, the study sought to identify the factors that influence residents of mining community's engagement in SSM, assess the effects of SSM activities on the livelihoods of residents in the Obuasi Municipal Assembly, and examine the coping strategies of residents whose livelihood had been affected by SSM activities within the Obuasi Municipal Assembly. The study used concurrent triangulation mixed method design and a sample of 406 respondents.

5.2 Summary of Major findings

In general, the study found that small-scale gold mining has negative consequences on mining communities. Similarly, the social and environmental consequences of SSM were conspicuous. In particular, compared to the environmental repercussions, the social impacts of mining in the Koffikrom, Odumasi, and Pomposo mining communities were found to be extensive and severe. The tampering of the social organization of the inhabitants of Koffikrom, Odumasi, and Pomposo has had a latent social impact in addition to other observed social impacts outlined. This was mostly due to the

displacement and relocation of residents whose lands had been acquired by mining companies. The settlements at the new location are constructed in such a way that residents will have to stay in the region with completely new individuals with whom they have little in common. Major family relationships and networks have been severed, weakening their activist front in the fight for community development. People appear powerless because there is a pervasive lack of trust among them, owing to displacements and relocations that have undermined any sense of community that existed previously in affected mining communities. As a result of the weakening of ties and networks, a fundamental part of community life in co-dependence and interdependence has been pushed to the background. As a result, people in need are unable to seek assistance from friends and other relatives, as they could before the establishment of SSM activities. Another result of mining activity in Obuasi Municipal Assembly is increased frustration among the populace, particularly among the youth. Essentially, this arose from SSM operators' failure to give people employment and jobs, as well as general community development, because they are untrained and uneducated to work in mining firms in areas such as Koffikrom, Odumasi, and Pomposo. Because farmers whose farms were acquired by SSM operators hoped to gain work in return and continue to have a source of income, this has exacerbated the unemployment problem in affected communities. The minds of residents are clouded by a sense of deception as a result of their dissatisfaction.

Furthermore, the study found that dissatisfaction and a sense of deception are common among Obuasi communities. Some form of tension has been created due this and SSM operators have loathed as a result of this. As a

result, at the slightest provocation, some people of the afflicted communities attempt to attack employees and officials of the affected firms. Because the majority of the people are offended, there is currently simmering tension in affected communities.

Similarly,the empirical findings show that in Obuasi, a growing tendency has evolved and developed in response to the youth's lack of work and employment that has resulted in large-scale involvement of the youth in illicit mining in Koffikrom, Odumasi, and Pomposo. Although some people continue to farm, illegal mining now employs around 70% of the youth and people in the Koffikrom, Odumasi, and Pomposo communities. Migrants who have settled in Obuasi communities, particularly those from the Western, Eastern, and Central regions of Ghana, are mostly involved in the illegal mining business, with local and indigenous residents providing support services and petty businesses such as selling of sachet water, buff loaf and bread.

Additionally, the study discovered that illegal mining is one of the primary sources of income for the majority of Obuasi residents, despite the fact that some individuals continue to work in agriculture or engage in both unlawful mining and farming. Furthermore, while Obuasi municipal has made some significant progress in managing the effects of illicit mining activities on the lives of the people in the study areas, the majority of their impact management techniques can best be described as haphazard and very unsustainable. This is because the study found that the majority of the residents of the communities affected by these impact management strategies and measures are not benefiting as expected from the measures and strategies.

As a result, these methods and actions are failing to achieve their objectives, resulting in apathy among the affected communities, including people of Koffikrom, Odumasi, and Pomposo. This is due to the fact that the majority of these impact management methods do not address the specific demands of the community's residents and are mostly based on assumptions and earlier experiences of other mining firms.

Again, findings of the study reveal that, while Obuasi Municipal Assembly has made some efforts to ensure community involvement and participation in company activities, particularly in enhancing community and company interaction, the methods used for community engagement and participation are insufficient to achieve overall community participation and involvement in their activities to ensure sustainability of these activities and assuage concerns. For example, holding regular community meetings with inhabitants of Koffikrom, Odumasi, and Pomposo in huge auditoriums and meeting grounds is insufficient to achieve maximum involvement because the majority of those who attend these events do not have the opportunity to express their problems. In practice, several mining companies encourage communities to communicate their problems and grievances to community leaders, particularly chiefs and opinion leaders. The majority of community inhabitants, however, have lost faith in these leaders and opinion leaders are being accused of failing to represent their interests to the mining firms. Furthermore, because of traditional respect standards, some residents are afraid of being mistreated by their community leaders if they freely express their difficulties and frustrations to them. As a result, this method of

incorporating the needs of affected SSM communities in the success stories of mining companies is ineffective.

Furthermore, while the use of information centers is commendable, it has not yielded the desired results because most complaints lodged by residents are not communicated to the mining firm's management for action to be taken, most likely because they are regarded as minor, unimportant, or impediments to what the SSM mining operators intend to do. Although the health consequences of mining activities can be severe and widespread in most mining-affected communities, the current situation in Koffikrom, Odumasi, and Pomposo shows that Obuasi mining activities have had little impact on Obuasi residents' health, even though some people believe that some of the common illnesses found in affected SSM communities can be traced to the negative impact of illegal mining. This is especially true because SSM mining companies only recently began operations in Obuasi (specifically in July, 2006). As a result, even though health effects may be latent, they have not been visible. However, it is expected that severe diseases connected with the harmful effects of mining, particularly respiratory and skin ailments, would be reported on a wide scale in impacted areas within the next several years. Further, the long-term sustainability of impact management policies and procedures is jeopardized by an apparent lack of cooperation and engagement between SSM operators and community residents on the ground. As a result, most of the mining companies' strategies for managing negative impacts of SSM are seen by the community as activities or projects independent of them, which explains community apathy, which prevents the majority of people in the Koffikrom, Odumasi, and Pomposo communities from actively

participating in activities or development initiatives introduced by the SSM companies.

On livelihood, the study found that nearly 90% of the respondents' livelihood or that of their families have been affected by SSM operations. Also, the study found that SSM had created some form of employment in the households of 43% of the respondents. Also, 24% of the respondents reported that they have acquired some form of skills or knowledge as a result of SSM. Further, the study revealed that SSM activities has some adverse effects on the livelihood of miners and residents of the Obuasi Municipal Assembly. Among the reported adverse effects of SSM activities were: pollution of water bodies (98%), loss of vegetation (80%), displacement (76%), loss of lives due to accidents (67%), adverse health effects (56%) and loss of biodiversity (26%). Additionally, the study, found that respondents adopted various coping mechanisms, which included receiving support from relatives, NGOs, civil society groups, and government agencies. Finally, it was found that some of the respondents coped with the effects of SSM on their livelihoods by resorting to alternative livelihoods activities (selling of sachet water and petty trading) in order to survive, since SSM destroy their farmlands and other forms of livelihoods.

5.3 Conclusion

Based on the findings of the study, the study concludes that SSM activities have tremendous effect on the livelihoods of miners and their households in the Obuasi Municipal Assembly. This effect is pluralistic as it has both positive and negative effects on the livelihoods of miners and their households. However, the adverse effects outstrip the positive effects of SSM

activities. The study revealed that though people who engage in small-scale mining make money out of it to support themselves and their household thereby improving on their living standard, the practice leave a lot of negative outcomes in its wake. These negative out comes include loss of farm lands, land degradation, unemployment as a result of people losing their farm lands, water pollution, which present a lot of health risk. In all, this study has assisted in revealing some reasons why people engage in illegal small-scale mining such as employment and high cost of living. It is therefore recommended for the government to recreate more jobs in the Obuasi Municipalities for the youth which can help reduce illegal mining in the area. Additionally, the agencies responsible for taking care of the area and those responsible for giving permit for mining should be better resourced to carry out their duties effectively.

5.4 Recommendations

Based on the findings of the study, the following recommendations are made for effective policy implementation and practice and for further studies:

1. The Obuasi Municipal Assembly should strengthen their collaboration with other local government authorities to ensure strict enforcement of the small-scale mining laws. This would be significant in ensuring safe SSM activities and operations, which would be essential in mitigating the adverse effects of SSM operations on the livelihoods of miners and their households.
2. Also, the government through the authorities at the Obuasi Municipal Assembly could increase the support it provides to miners and households in mining communities within the Obuasi Municipal

Assembly. Such support could include the creation of an enabling environment that would help miners to have alternative sources of livelihoods.

3. Community leaders such as chiefs and family heads must ensure that mining companies or individuals they lease lands to for mining have obtained proper permits from appropriate institutions before they start to operate. This will ensure that the mining companies or individuals follow all the directives necessary to reclaim the land after mining.
4. The community members must form "watch groups" to scout areas susceptible to illegal mining and report to appropriate authorities for the right actions.
5. Land owners should be careful in giving lands out for mining since the negative effects of SSM affect just one person but the whole community.
6. The number of Environment Protection Agency (EPA) employees in the Obuasi Municipal Assembly must be increased to help make effective their routine checks that could help them stop illegal mining activities take place in the area.

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APPENDIX

EFFECTS OF SMALL-SCALE MINING ON LIVELIHOODS OF SELECTED MINING COMMUNITIES IN OBUASI MUNICIPAL ASSEMBLY, GHANA		
ID.	**Question**	**Response**
Section A: Background characteristics		
A1	Sex	[1] Male [2] Female
A2	Age (in completed years)	……
A3	Educational attainment	[1] No formal education [2] Primary [3] Secondary (JHS/SHS) [4] Tertiary
A4	Marital status	[1] Never married [2] Married [3] Cohabiting [4] Separated [5] Divorced [6] Widowed
A5	Occupation	……..
A6	Number of years in current occupation	……..
A7	Do you know about small-scale gold mining?	[ ] Yes [ ] No
Section B: Factors that motivate residents to engage in small-scale gold mining		
B1	Are you engaged in small-scale gold mining?	[ ] Yes [ ] No If No skip Q B2 & B3
B2	What occupation were you engaged in before going into small-scale gold mining activity?	……..
B3	Comparing the previous jobs available to small-scale mining now, how will you describe your livelihood?	[1] satisfied [2] Not satisfied [3] Very bad [4] Very satisfied
B4	How many members of your household are engaged in small-scale gold mining?	……..
B5	Is any member of your household engaged	[ ] Yes

	in small-scale gold mining?	[ ] No
Section C: Effects of small-scale gold mining on livelihoods		
C1	Would you say small-scale gold mining has affected your livelihood?	[ ] Yes [ ] No
C2	Would you say small-scale gold mining has affected the livelihood of your household?	[ ] Yes [ ] No
C3	Has any member of your household directly/indirectly gain employment from small-scale gold mining in this community?	[ ] Yes [ ] No
C4	Has the operation of Small-Scale gold mining in this community enhanced your use of certain skills, knowledge etc. to secure an additional or alternative livelihood?	[ ] Yes [ ] No
C5	Has small-scale gold mining had adverse effects on your livelihood?	[ ] Yes [ ] No
C6	Has small-scale gold mining had adverse effects on the livelihood of members of your households?	[ ] Yes [ ] No
C7	Did you lose any livelihood assets (e.g., land, physical structures etc.) as a result of the activities of small-scale gold mining?	[ ] Yes [ ] No
C8	Indicate among the following: the most important impact of small-scale gold mining in your locality	[ ] pollution of water bodies [ ] destroy of pristine environment [ ] endangering the health of people and ecosystem [ ] loss of biodiversity [ ] Displacement of communities
Section D: Coping strategies and recommendations		
D1	When in livelihood crises as a result of small-scale mining activities, do you receive support from relatives outside this community?	[ ] Yes [ ] No
D2	If yes to **D1**, what type of support do you receive from them?	[ ] Financial support [ ] Emotional support

		[ ] Social support [ ] Psychological support
D3	When in livelihood crises as a result of small-scale gold mining activities, do you receive support from NGOs?	[ ] Yes [ ] No
D4	When in livelihood crises as a result of small-scale mining activities, do you receive support from civil society groups?	[ ] Yes [ ] No
D5	When in livelihood crises as a result of small-scale gold mining activities, do you receive support from private and community-based organisations?	[ ] Yes [ ] No
D6	When in livelihood crises as a result of small-scale mining activities, do you receive support from governmental agencies?	[ ] Yes [ ] No
D7	When in livelihood crises as a result of small-scale mining activities, do you resort to alternative livelihood activities?	[ ] Yes [ ] No
D8	What do you think can be done to ensure that small-scale gold mining results in positive effects on the livelihoods of residents and miners of mining communities? ***TICK ALL THAT APPLY***	[ ] Governmental support [ ] Regulation of SSM [ ] Strict enforcement of laws on SSM [ ] Provision of adequate funding [ ] Public education [ ] Others…….

Thank you!