

UNIVERSITY OF GHANA

DEPARTMENT OF GEOGRAPHY AND RESOURCE DEVELOPMENT

SMALL-SCALE MINING OPERATIONS AND THEIR EFFECTS IN THE EAST

AKIM MUNICIPAL ASSEMBLY

BY



**THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN
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DECLARATION

I declare that this thesis is my own original work undertaken under the supervision of Dr. Joseph Teye and Dr. Charlotte-Wrigley Asante of the Department of Geography and Resource Development of University of Ghana, Legon. Whenever sources have been quoted and used, full acknowledgements have been made and that no part or the entirety of this work has been presented to another University for the award of a degree.

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DEDICATION

This work is dedicated to my wife Mrs. Priscilla Awuku Gbafa, my son Raymond S. Mihaye and the entire family for their moral, spiritual and financial supports. Special dedication also goes to Mr. Samuel Agbey for his numerous contributions and words of encouragement.



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ABSTRACT

Small-scale mining has gained much recognition throughout the world. In Ghana it employs thousands of people and affects the livelihoods of many households located within the catchment areas of the mines. The study examined small-scale mining operations and their effects on the livelihoods of people the East Akim Municipal Assembly. In addition, the coping strategies adapted by affected individuals were also indentified. Four communities within the municipality were selected for the study. A total of 260 respondents were contacted for relevant information and the main research instruments used were questionnaires and interviews. The findings of the study show that the main method of mining in the studied communities is surface mining. With this method, about 54% of respondents serve as porters who engage in fetching of sand that has been dug to be washed for gold. Besides, over 95% of the miners in the municipality operate illegally, without any valid mining license. The study further revealed that small-scale mining activities have caused both positive and negative effects on livelihoods of people in the East Akim Municipality. The positive effects include generation of employment and income, increase in compensation, contributions to community development and improvement in trading activities. Some of the negative effects include degradation of forest cover and farmlands, creating of dangerous pits and trenches and pollution of water bodies. In terms of socio-economic effects, the study revealed high cost of living, high rate of school dropout, absenteeism and drug abuse. In order to cope with the adverse effects of the small-scale mining, respondents adapted several strategies such as farming on alternative lands, fetching water from boreholes and buying of sachet water for domestic use. The study recommends that small-scale mining activities must be monitored and degraded lands should be reclaimed. In addition, compensations packages must be given to affected farmers including the provision of alternative water sources.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
CSOs	Civil Society Organizations
DFID	Department for International Development
EAMA	East Akim Municipal Assembly
ERP	Economic Recovery Plan
FAO	Food and Agriculture Organization
GMC	Diamond Marketing Corporation
HDI	Human Development Index
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
IDS	Institute for Development Studies
ILO	International Labor Organization
IMF	International Monetary Fund
ITDG	Intermediate Technology Development Group
MCE	Municipal Chief Executive
MCH	Maternity and Child Health
MLNR	Minister of Lands and Natural Resources
NOGs	Non-Governmental Organizations
PHC	Population and Housing Census
PMMC	Precious Mineral Marketing Company
PMRL	Precious Metal Refinery Limited
PNDC	Provisional National Defense Council
PTA	Parents and Teachers Association
SAP	Structural Adjustment Programme

SL	Sustainable Livelihoods
SLA	Sustainable Livelihood Approach
SPSS	Statistical Package for Social Sciences
STDs	Sexually Transmitted Diseases
STIs	Sexually Transmitted Infections
UK	United Kingdom
UN	United Nations

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Small-Scale Mining (SSM) is a global economic activity that is widespread especially in developing and underdeveloped countries where poverty is pervasive and endemic (Hentschel et al., 2002). Currently, it is seen as a major source of subsistence for millions of people in many parts of the world, particularly the poor in some rural communities (Eshun, 2005). Despite its numerous contributions to livelihoods of millions people, it is also considered as a major cause of environmental degradation and resource depletion in areas where the minerals resources are located (Agyemang, 2010). Small-scale mining operations, particularly illegal mining activities in many parts of the world are considered equally important as large-scale mining activities, because of the number of people employed in the sector as well as its crucial role in poverty alleviation and rural development (Opoku-Antwi et al., 2012).

A survey carried out by the International Labor Organization (ILO) and the World Bank suggests that, approximately 13 to 20 million people worldwide are engaged directly in small-scale mining activities. It has been established that in developing countries, small-scale mining affects the livelihoods of about 80-100 million people (World Bank, 2005; Ofei-Aboagye et al., 2004). It was reported that, while women constitutes the greater percentage of those engaged in the mining activities (Hentschel et al., 2002), children are also involved in many parts of the world. This is situation pervasive in developing nations where the majority of the inhabitants depend on mineral resources for their livelihoods (Clausen et al., 2011).

Currently, the international development community has turned its attention to the small-scale mining sector particularly, its crucial role in poverty alleviation and rural development. As a result, many national governments, bilateral and multilateral donor organizations are providing assistance programmes to the sector in order to improve the livelihoods of the poor who are involved directly or indirectly in the mining operations (Shen and Gunson, 2006). However, the small-scale mining sector is better known for its high environmental costs and poor health and safety records in areas where the mines are located. Consequently, many countries continue to view it as dirty, unprofitable and economically unsustainable industry.

In Africa and other developing countries, the small-scale mining sector is gradually experiencing significant growth, particularly, in remote rural areas where such activities take place. It is largely practiced in rural areas by miners who lack the requisite education, training, management skills and essential equipments necessary for mining. This has occurred mainly in response to widespread unemployment within African, especially countries located within the catchment areas of the mines (Hentschel et al., 2002). The influx of foreign investments coupled with current increase in the world market price of gold which is the main commodity produced under small-scale mining has also facilitated an unprecedented increase in mineral production throughout sub-Saharan Africa and other developing countries (Gavin and Mohammed, 2009).

There is a consensus worldwide that, small-scale mining is largely poverty driven (Hoadley and Limpitlaw, 2004) as the redundancies caused by the structural adjustment programme and modified patterns of livelihood over the past years, especially in Africa has driven millions of people to take up employment in the sector (World Bank, 2005). In Africa, there are approximately three million people employed directly in the small-scale mining sector (Ofei-Aboagye et al., 2004). In many instances, the mining operations are

done haphazardly with severe consequences to the environment, the surrounding communities and to the miners themselves who are involved in the operations (D'Souza, 2002). Although, small-scale mining in Africa is still far from achieving its full potential, there are indications of positive efforts by governments of several countries to promote the efficiency of the sector.

Ghana is one of the countries with a record of mining particularly, on small scale basis dating back to the colonial era. The Ghanaian small-scale mining industry has a very long historical antecedent where alluvial gold and diamond extraction were the main mining related activities which gave Ghana the name "Gold Coast" (Hilson, 2001). During these periods, small-scale mining operations done were considered illegal because miners operates without mining license and as such, much of the revenue obtained from the mining processes were being lost through smuggling of the final products to other countries for substantial profits for individuals.

Under the Structural Adjustment Programme (SAP) by the World Bank and the International Monetary Fund (IMF) in the 1980s (Akabzaa and Darimani, 2001), there has been radical reforms and liberalization in the mining sector of which the small-scale mining sector is of no exception. This together with other factors has encouraged an increase in mining sector investment in Ghana (Eshun, 2005; Awumbila and Tsikata, 2004). This led to the influx of new foreign mining companies and multinational agencies into the country which resulted to an intensification and expansion of both small and large scale mining operations into the mining areas in the country (Ofei-Aboagye et al., 2004).

The government of Ghana, realizing the potential growth of the small-scale mining sector passed the PNDC law 218; the Small-Scale Gold Mining Law, in 1989 to legalize small-scale mining in the country (Akabzaa and Darimani, 2001). Under this law, the Mineral

Commission was made responsible for the registration and supervision of small-scale miners in the country (Hilson, 2001). However, the frustrations miners encounters during the processes of registration and renewal of license by legal means gave rise to two groups of operators: those who were legalized (registered) and those who were illegal (unregistered) and were referred to as *galamsey* in the Ghanaian local parlance (Amankwa and Anim-Sackey, 2003). Since the regularization of small-scale mining in 1989, it is believed that approximately 1.5 million troy ounces of gold and 8.0 million carats of diamonds have been produced by the sector. The small-scale mining sector contributes about 23% of Ghana's gold production and some calculations from other studies also indicate that about 95% of all small-scale mining in Ghana comes from illegal activities (Ghana Minerals Commission, 2004 cited in; Amankwa and Anim-Sackey, 2003).

Small-scale mining operations in Ghana are extremely widespread, due to the favourable geological settings of the country. However, bulk of the activities of small-scale mining tends to be concentrated within the greenstone belts of Ghana such as the Birimian and Tarkwaian formations and alluvial areas of major river such as Offin, Pra, Ankobra, Tano and Birim and their tributaries (Xtra-Gold Resources Corp., 2010). In Ghana, the main minerals mined on small-scale basis can be put into two major categories, namely, precious and industrial minerals. Precious minerals mined in Ghana, on small-scale basis are gold and diamonds, while industrial minerals include, gravels, kaolin, granite, clays, salt among others (Hilson, 2001).

Small-scale mining generates substantial foreign exchange for Ghana's development in many rural communities. In 2008, the total gold production by small-scale mining was 15.8% of the total gold production and that of diamond was 100% of the total diamond production. Thus, small-scale mining operations generate employment for thousands of

people particularly rural folks thereby reducing the rate at which people migrate to urban centers. The Minerals Commission and Ghana Chamber of Mines confirmed that, 60% of the country's mining labor force is employed by the small-scale mining sector. The current estimation of employment in the small-scale mining sector is around 200,000 people for the illegal sector and 30,000 for the legalized sector, thereby reducing the increasing rate of unemployment and absolute poverty in many communities and the country as a whole (Ghana Chamber of Mines, 2008).

The East Akim Municipal Assembly is one of the municipalities in Ghana where small-scale mining operations substantially dominates. In most cases, the concessions of the mines cover lands on which the rural households use for farming activities for a living (Obara and Heledd, 2006). Consequently, the livelihoods of the rural communities are affected in one way or the other by the mining activities. Although, government's efforts in Ghana to legalize the sector have improved the efficiency of operations, environmental and socio-economic problems as well as land-use conflicts continue to exist and are becoming increasingly unmanageable in the East Akim Municipal area which the researcher intended to investigate.

1.2 PROBLEM STATEMENT

One of the most environmental and health disruptive activities undertaken in Ghana is the discovery, extraction and processing of mineral resources, as an economic activity. Small-scale mining poses unmanageable challenges to many communities located within the catchment areas of the mines. This process affects the sources of livelihoods for many individuals in many parts of the country (Gavin, 2002). The rapid exploitation of mineral resources in Ghana is causing alarming scenarios for both the present and the future generations of the country. Efforts made by the government of Ghana to address these and

other related challenges have led to the enactment of the Small-Scale Gold Mining Law, PNDC law 218; in 1989. Contrary to one of its objectives of monitoring and supervising the activities of small-scale miners by ensuring acceptable mining practices with minimum damage to the environment (Amankwa and Anim-Sackye, 2003), the environmental challenges of small-scale mining still continues unabated.

In Ghana, it has been noted that the distribution of revenues from mines favours the national government at the expense of the communities where the minerals are located (Andre and Gavin, 2013). This occurs because the Minerals and Mining Act, 2006 (Act 703) of Ghana stipulates that ‘every mineral in its natural state under or upon land in Ghana, rivers, streams, water courses throughout the country, the exclusive economic zone and an area covered by the territorial sea or continental shelf is the property of the Republic and is vested in the President in trust for the people of Ghana’. In view of this, chunk of the revenue goes to the national government than to the local people. Beside, based on Act 703, the national government in consultation with other stakeholders and institutions are responsible to grant mining leases/licenses in the country (Hinde, 2010). However, in many instances, local chiefs, land owners and other opinion leaders arrogate power to themselves by granting mining lease and concessions to people to mine thereby, benefiting from the mining operations at the expense of the local people who are directly affected by the negative activities of the mines.

The East Akim Municipal Assembly is one of the Municipalities in Ghana noted for its rapid exploitation of precious minerals resources. Illegal mining activities and its related challenges are on the increase in recent times in the municipality (Obara and Heledd, 2006). It is believed that most of the miners in the area lack the requisite skills and technology to engage in legal mining practices, hence, uses crude methods in their

operation which causes adverse effects on the environment and the health of residents living within the catchment areas of the mines. The activities of the miners causes several environmental effects such as destruction of forest cover and farmlands, pollution of water bodies and creating of dangerous pits which are dangerous to human life.

It is also known that most the people in the municipality depends on the land on which these mining activities are undertaken, for both agricultural and non-agricultural products, to support their livelihoods. Despite all these challenges, alternative livelihoods strategies are not available to support the marginalized and the vulnerable people in the municipality. It is predicted that, these activities are likely to have a major effect on the livelihoods of those living within the catchment areas of the mines and the nation as a whole. However, the extent of these effects is yet to be examined through much empirical research which the study aims to achieve.

Previous studies on small-scale mining have placed emphasis on environmental consequences (Gavin, 2002; Donkor et al., 2006; Aryee et al., 2003), gender roles and child labour issues (Hinton et al., 2003; Hentschel et al., 2002), technical and legal frameworks (Amankwa and Anim-Sackey, 2003; The Minerals and Mining Act, 2006), and the impacts on livelihoods and the environment (Chupezi et al., 2009; Ofei-Aboagye et al., 2004). However, not much study has been done on the mode of operations and their effects on livelihoods of people in the East Akim Municipal Assembly. The study therefore focused on the mode of operations of small-scale mining and its effects, both positives and negatives, on socio-economic lives of people in the East Akim Municipality. This will provide a balanced picture of the overall effects of small-scale mining in terms of positives and negatives in the East Akim Municipal Assembly, since most of the studies in Ghana have placed much emphasis on the negative effects. The findings of the study

would serve as a data source where information could easily be accessed and used to address the major challenges that confront the small-scale mining sector in Ghana.

1.3 RESEARCH OBJECTIVES

The main objective of the study is to examine the effects of small-scale mining operations on the socio-economic lives of people in the East Akim Municipal Assembly.

Specifically, the study shall seek to:

- ❖ Examine the mode of operations of small-scale mining in the East Akim Municipal Assembly.
- ❖ Analyze the contributions of small-scale mining to the livelihoods of people in the East Akim Municipal Assembly.
- ❖ Examine the adverse effects of small-scale mining on people's livelihoods in the East Akim Municipal Assembly.
- ❖ Identify the coping strategies adopted by people who have been adversely affected by the operations of mines in the East Akim Municipal Assembly.

1.4 HYPOTHESES

The hypotheses to be tested in the study are based on the following:

Hypothesis 1:

- ❖ Ho: There is no significant relationship between respondent's perception of environmental effects of small-scale mining and the number of years of stay in their communities.
- ❖ H_A: There is a significant relationship between respondent's perception of environmental effects of small-scale mining and the number of years of stay in their communities.

Hypothesis 2:

- ❖ Ho: There is no significant relationship between respondent's appreciation of health problems associated with small-scale mining and their educational status.
- ❖ H_A: There is a significant relationship between respondent's appreciation of health problems associated with small-scale mining and their educational status.

1.5 PROPOSITIONS

- ❖ Small-scale mining contributes positively to people's livelihoods in the East Akim Municipal Assembly.
- ❖ Small-scale mining causes negative effects on the environment in the East Akim Municipal Assembly.

1.6 JUSTIFICATION OF THE STUDY

Small-scale mining has the potential to boost a country's economy, both internal and external, through the benefits that are made available to countries that are involved in the extraction of mineral resources. Internally, there is the creation of employment and revenue generation which has the potential to alleviate poverty. Besides, there is substantial amount of foreign exchange to countries producing mineral resources externally. However, it can cause negative social and environmental problems which may have implications on the livelihoods of local communities.

Most of the studies on small-scale mining have focused on the general impact of mining especially on environment (Gavin, 2002). Specific studies on mode of operations and issues relating to livelihoods have not been adequate. Besides, literatures available on the effects of small-scale mining are based on data at the national and regional levels and very little research has been done at the local level to determine the extent of the effects. The

study, seeks to investigate the effects of small-scale mining operations on the livelihoods of people in the East Akim Municipal Assembly and the coping strategies adapted by the affected individuals to the negative effects.

Despite the major contributions of small-scale mining to the economy of many countries, its beneficial roles are often overlooked. As a result, the negative impacts dominate many studies and scholarly publications of the sector at the neglect of the positive effects. This study intends to build a balanced picture of the overall effects of small-scale mining, both positives and negatives, in the East Akim Municipal Assembly. The findings of this thesis will contribute to knowledge on small-scale mining as a whole. This is confirmed by Kitchen and Tate (2005) that in addition to contributing to policy issues, a piece of research contributes to knowledge. Thus, the knowledge acquired from the research could be used to explain the meaning, nature, and challenges of small-scale mining often experienced but unexplained in the studied communities.

It is believed that the report of this study will also become a very useful document that will be used to address major challenges relating to small-scale mining and livelihoods issues in the East Akim Municipality. It will serve as a source of data for policy makers and researchers who are interested in mining related issues to help improve the efficiency of mining operations in the country as a whole. It will also serve as a significant guideline for future research into small-scale mining and rural livelihoods. This will help reduce the increasing rate of environmental, health and socio-economic effects of illegal mining in the country.

1.7 DEFINITION OF KEY CONCEPTS

1.7.1 Small-Scale Mining

Throughout the world, small-scale mining has been defined differently by various scholars probably due to the diversity within the sector (Mwaipopo et al., 2004; Mutemeri and Petersen, 2002). The United Nations (UN) and the Intermediate Technology Development Group (ITDG) defined small-scale mining as “any single unit mining operation having an annual production of unprocessed material of 50,000 tones, or less as measured at the entrance of the mine” (Aryee, et al., 2003). In this study, small-scale mining is defined as the process of extraction of minerals deposits most commonly, gold and diamond by miners working in small or medium sized operations, using rudimentary techniques with minimal capital investment and little consideration of environmental issues.

1.7.2 Livelihood

The Institute for Development Studies (IDS) and the British Department for International Development (DFID) on many occasions have applied the sustainable livelihood approach in poverty reduction especially in developing countries. Ian Scoones, a leading member of IDS gave a modified definition of livelihood which states that “a livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets, while not undermining the natural resource base” (Krantz, 2001). Based on the objectives of the study, the modified definition of Ian Scoones, a leading member of the Institute for Development Studies (IDS) is adopted.

1.7.3 Household

A household is defined by Ghana Statistical Service (2010) as “a person or a group of persons, who lived together in the same house and shared the same house-keeping arrangements”. A household therefore consists of a man, his wife, children and some other relatives who may be adopted or housemaids (Ghana Statistical Service, 2010). The head of household could be a person who has economic and social responsibility for a particular household. In the context of personal observation and for the purpose of the study, the definition of the Ghana Statistical Service is adopted in this study.

1.8 ORGANIZATION OF THE STUDY

This study is organized into six major chapters with sub-titles. The first chapter deals with the introduction of the study and covers the research background, problem statement, objectives, and hypotheses, definition of key concepts and significance of the study and the organization of the study. The second chapter provides information on literature review and conceptual framework that was applied in the study. The literature review focused on historical overviews, legal regimes, and mode of operations, environmental, socio-economic and health impacts of small-scale mining. In this chapter is also the conceptual and theoretical frameworks employed in the study. Thus, the Sustainable Livelihood (SL) Framework of DFID (1999) and the Entitlement Theory of Robert Nozick (1974) were thoroughly reviewed. It also contained the schematic diagramme and an explanation of the framework that was used in the study.

The third chapter of the study dwells on the background information of the study areas such as location, drainage and topography, climate and vegetation, demography, economic activities, education and health related issues. In addition to this is the research methodology which focused on methods and techniques for data collection, sources of

data, sampling techniques and instruments that were used for data collection. This chapter concluded with the procedures of data analysis and finally, the limitations to the study.

Chapter four of the study covers presentations and analysis of data based on the objectives of the study. These include the mode of operations of small-scale miners and the contributions of mining on livelihoods. The five chapter of the study focused on discussion of major findings in terms of negative effects of small-scale mining and coping strategies. Finally, the sixth chapter highlights the summary of the major findings and presents conclusion and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, there is a general overview of the available literature on previous studies, regarding knowledge or awareness of small-scale mining operations. In this study, empirical studies on small-scale mining globally, as well as studies in the developing regions of the world including Ghana were reviewed. This has helped the researcher to fully analyze and discuss the results of the study and juxtaposed them with the previous findings of other researchers.

2.2 HISTORICAL OVERVIEW OF SMALL-SCALE MINING IN GHANA

One of the countries in the world with a record of small-scale mining that dates back to the colonial era is Ghana. Major precious commodities that were exploited during the colonial era were alluvial gold and diamonds. In the 15th and 16th centuries, Ghana was named “Gold Cost” due to the abundance of gold that was available in the ancient Ghana Empire (Hilson, 2001). The exploitation of gold by small-scale means formed the basis of the then Ashanti Empire and enhanced the opening of trans-Saharan trade route prior to European contact. During this period, gold was extracted using simple implements such as chisels and hammers, where rocks were crushed and grounded into powdered form before the mineral is obtained (Ofei-Aboagye et al., 2004). In Ghana and other developing countries, small scale mining is important economically, culturally, socially and spiritually because it plays a major role in poverty reduction and rural development (D’Souza, 2002; Hilson, 2001). Until 1985, small-scale mining activities were unregulated in Ghana as the sector was regarded as informal economic sector and was abandoned by many previous

governments. Due to this, the activities of small-scale mining as well as its marketing processes in the country were all considered illegal, despite their major contributions to people's lives. As a result, the mining operations turned to enrich neighbouring countries through a well-oriented black market, system where the mineral resources were being smuggled to by unregulated miners in the country (Aryee et al., 2003).

In the mid-1980s, the government of Ghana launched the national Economic Recovery Plan (ERP) in consultation with the World Bank and the International Monetary Fund (IMF). The main purpose of the Economic Recovery Plan was to help the country draft a national economic plans and policies, which are necessary for development. Under the Structural Adjustment Programme (SAP), the mining sector, particularly the small-scale mining sector was targeted to prevent and reverse the fall in the countries mining industry and also to ensure its potential growth in the country (Awumbila and Tsikata, 2004).

Recognizing the potential growth of the small-scale mining sector and the amount of revenue that were lost through smuggling of mineral products to other countries, the Government of Ghana decided to legalized the sector. The mining sector has also received assistance from the World Bank to enhance legislation and provision of technical support services in areas of health, safety and environmental considerations (Akabzaa and Darimani, 2001). As a result, the Minerals Act of 1962 was passed shortly after the country's independence in 1957. This Act vested all minerals in the power of the President for the people of the republic of Ghana. The Minerals (Control of Smuggling) Act of 1965 made the purchasing, sale and possession of gold illegal without a mining license, and also made small-scale mining illegal (Aryee et al., 2003). In view of this, mining was regulated by the Minerals and Mining Law (PNDC Law 153), as amended by the Minerals and

Mining Act, 1994, Act 475, in which provisions were made for small-scale mining activities in the country (Ofei-Aboagye et al., 2004; Wikipedia, 2013).

Today, the Small- Scale Mining Law; PNDC Law 218 was enacted in 1989 to fully regularize the small-scale mining sector in the country (Hilson, 2001). Under this law, the Small-Scale Mining Project was responsible to register and supervise all small-scale miners in the country. In addition, the Diamond Marketing Corporation (GMC) was also renamed the Precious Mineral Marketing Company (PMMC), mainly to market gold and diamond produced by the small-scale mining sector in the country (Akabzaa and Darimani, 2001). The Mercury Law, PNDC Law 217 also legalized the purchasing of mercury for gold production purposes from authorized dealers and the Precious Minerals Marketing Corporation (PMMC) Law, PNDCL 219, was responsible to buy and sell gold and diamonds in the country (Amankwa and Anim-Sackey, 2003).

The legislation for Ghana's minerals and mining sector was updated in 2006 by enacting the Mineral and Mining Act 2006 (Act 703). Major participants for drafting and passing this Act were relevant stakeholders, including mining sector regulators, Civil Society Organizations (CSOs), Non-Governmental Organizations (NOGs), traditional authorities, local government authorities, labour unions, mining investors, government revenue agencies and academia. This Act stipulates that 'Every mineral in its natural state under or upon land in Ghana, rivers, streams, water-courses throughout the country, the exclusive economic zone and an area covered by the territorial sea or continental shelf is the property of the Republic and is vested in the President in trust for the people of Ghana'. In view of this, the Minister of Lands and Natural Resources (MLNR) is exclusively mandated to grant mineral rights on the advice of a technical committee constituted by the Minerals Commission of Ghana (Hinde, 2010).

Under (Act 703) application of the mineral legislation is reserved to investors, Ghanaians and foreigners, except for small-scale mining and restricted mining rights, which are reserved for Ghanaians. By the end of the year 2001, 420 small-scale mining concessions had been licensed in the country of which, 9 were diamond mining licenses and 411 were gold mining licenses (Ghana Minerals Commission, 2002; cited in; Amankwa and Anim-Sackey, 2003; Hinde, 2010).

The legislation of the small scale mining sector has brought about two types of small-scale miners namely legal and illegal small-scale miners. The legal small-scale miners comprised those who have acquired mining licenses from the Minerals Commission of Ghana to operate on their concessions while illegal small-scale miners includes those mining without the requisite mining license and they usually operate on concessions of other companies. This group is popularly known in Ghanaian local parlance as *galamsey* operators (Amankwa and Anim-Sackey, 2003). The Government of Ghana also granted buying licenses to some private owned companies to purchase gold from small-scale miners in the country. Other companies have also been registered as mining support service companies in the small-scale mining sector. These companies provide technical assistance in prospecting, contract mining and helps in minerals processing in the country. They also give financial and managerial support to companies and groups engaged in the mining operations. Besides, some of the large-scale mining companies have allowed small-scale miners to work as tributes on their concessions and also supports the miners through training and also provision of equipments (Amankwa and Anim-Sackey, 2003).

The small-scale mining industry in Ghana has now expanded, with many companies producing precious minerals such as gold, diamonds, bauxite and industrial minerals, such as sand, stones and granites. Currently, Ghana has over 300 registered small scale mining

groups and 90 mine support service companies and numerous unregistered miners operating in the country. As a result, Ghana is ranked the second largest gold producer in Africa, after South Africa and the 10th in the world (Hayford et al., 2008 cited in; Awuah-Nyamekye and Sarfo-Mensah, 2012).

2.3 INSTITUTIONAL FRAMEWORK OF SMALL-SCALE MINING IN GHANA

Small-scale mining could provide employment to many rural communities and generate significant revenue for the government, if properly managed. In view of this, governments have established a number of institutions to regularize the small-scale mining operations in the country. Among the institutions are: the Ministry of Mines and Energy, the Minerals Commission, the Geological Survey Department, the Chamber of Mines, the Environmental Protection Agency, Lands Commission, Land Valuation Board and the Forestry Commission. These organizations are required to provide supports services to ensure optimal exploitation of the country's natural resources (Hentschel et al., 2002).

The Ministry of Mines and Energy is in charge of all aspects of the minerals sector in the Ghanaian economy. It is responsible to grants mineral exploration and mining licenses and leases to people to mine. The Minerals Commission has the responsibility to recommend mineral policy and also advises the government on mineral matters. It also serves as a liaison between the government and the mining industry (Opoku-Antwi et al., 2012). The Ghana Geological Survey Department is responsible for conducting geological studies and prepares geological maps for the government. The Mines Department is responsible for safety in the mines. The Ghana Chamber of Mines is a private association that takes care of operating mines in the country. It communicates information on mining matters with government and other public and private bodies. It also engages in discussion of proposals for legislative bodies and also negotiates miners' compensation and benefits.

The Lands Commission keeps legal records of exploration licenses and mining leases and takes part in the examination of new license applications. It also initiates policies relating to stool and state lands in the country. The Valuation Board provides rates for valuation of property affected by mining operations. The Environmental Protection Agency strikes a balance between the demands of the rapid economic growth and the need to protect the country's natural resources and the health and of people. The Forestry Commission is responsible for the management of the country's forest (Akabzaa and Darimani, 2001; Hentschel et al., 2002).

2.4 OPERATIONS OF SMALL-SCALE MINING

2.4.1 Introduction

The geological setting of Ghana is favorable and allows small-scale mining of gold and diamonds to take place throughout the country, specifically within the Tarkwaian and Birimian rock systems of Ghana (Amankwa and Anim-Sackey, 2003). Small-scale miners are prohibited from working on mineral concessions of large-scale mines in order to avoid conflict between the two groups. The Mineral and Mining Act 2006 (Act 703), permits small-scale miners to mine in areas that does not exceed 25 acres of land for a period of three to four years (Hinde, 2010).

2.4.2 Methods of Small-Scale Mining

Globally, small-scale miners employ various methods in their operations to extract the mineral resources. These methods vary, according to the type of mineral deposit being exploited, its location and the degree of mechanization adopted by the miners (Gavin, 2002). There are significant differences between the highly rudimentary or manual

methods such as pick and shovel mining, hand panning and sluicing and the sophisticated methods involving the use of heavy equipments, controlled blasting, and the use of processing plants. The sophisticated method is a form of industrialized small-scale mining due to its high capital cost and is mostly carried out by foreign companies or joint ventures. The majority of small-scale miners rely solely on the manual method of mining, using simple equipment like shovels, pick-axes, pans and chisels. In some cases, water pumps, explosives and washing plants are used during the mining process. Small-scale mining takes place either through extraction of primary ores like hard rocks or secondary ores such as alluvial materials which sometimes occurs along water courses.

Throughout the world, mining of primary deposits is an arduous activity because it requires much effort from the miners to break the rocks containing the mineral ore before the mineral is extracted. It also involves the use of hammers, chisels, crowbars and wheelbarrows, or it may rely on the use of drills, explosives and excavators. It is believed that, several small scale miners throughout the world use drilling and blasting method to break the rock before processing the ore. Under this method, breaking of the rock containing the mineral ore is done manually, involving digging of shafts and tunnels to depths up to 30 metres using basic tools, such as pick-axes, shovels, hammers and chisels (Hinton and Beinhoff, 2004). Mining of secondary deposits often also takes place directly within watercourses, where gravel or jet pumps are used for mineral-rich sands and gravels from the bottom of rivers and lakes. The dredges used may range from simple rafts floated with steel drums to sophisticated barges using mechanized cutter head systems to break through the hard pan sediment crust to reach underlying gravels where the minerals ore is derived from the sediment (Hinton, 2005).

In small-scale mining, open pit mining is the most common form of mining of both primary and secondary ore deposits. The pits range in size from tens of metres in diameter in depth to just a few metres deep. However, this method of extraction can be dangerous and destructive as the risk of land failure is high. Besides, surface mining can be undertaken using the most basic techniques such as shovels and machinery like bulldozers and excavators to dig the ground for the exploitation of the mineral ore (Hinton, 2005).

According to Appiah (1998), “the operations of small-scale mining in Ghana are in twofold: those who use the ‘krowa’ (wooden bowl carved out of tree stem) like the Brazilian ‘batea’ and those who use crude sluice boxes and hoppers”. He believed that the ‘krowa’ is used to wash the material like the way any gold pan is used for gold washing. In using the sluice box, a group comprising 4 to 6 people initially digs the land and takes out the soil and dumps it on one side, to make it muddy. The miners, then use crudely made sluices to retrieve the mineral ore from the clayey soil. He believed that the ineffectiveness of this method makes the production of the miners fall below the accepted margin.

In Ghana, the extraction of gold begins when the mineral bearing rock is first crushed into pebbles by hand or machine. The pebbles pass through primary, secondary and tertiary grindings processes in preparation for washing after which it is washed to separate the valuable gold particles. Mercury is then used to pan the sediment and the amalgam is roasted over charcoal fire in open air (Aryee et al., 2003; Hilson, 2003). Diamond processing involves fewer production phases than that of gold. Diamond winners dig out the diamonds containing gravel and take it through washing and screening processes to remove the clay and coarse gravel from the mineral ore. Diamonds in Ghana are of smaller sizes, usually below 8 mm and since those below 1 mm are of no commercial value, the miners screen the gravel to obtain particles between 8 mm and 1 mm and sort them by

hand to retrieve the required size. There are varying degrees in the process of mining alluvial deposits. Mining tools that are used range from simple equipments such as pick-axes, shovels to heavy equipments, such as bulldozers and front end loaders (Hilson, 2003). All these methods of mineral exploitation could be manual or sophisticated depending on where the mineral is located and the people involved in the operation.

2.4.3 Types of Minerals extracted under Small-Scale Mining

In the small-scale mining sector, miners are engaged in the extraction and processing of several commodities. In Ecuador, gold constitutes two thirds of total gold production by small-scale mining, while 80% of total diamond production comes from the small-scale mining sector. In India for instance, it was discovered that over 40 different minerals are exploited on small-scale basis, while in China, over 20 different types of mineral are exploited, out of which coal constitutes 46% and construction materials 44% (Hilson, 2003). In Ghana, gold constitutes the major mineral being extracted under small-scale mining, which is followed by diamond. Other minerals mined in the small-scale mining sector includes bauxite, different gemstones, iron ore, marble, limestone, kaolin, sand, gravels, granite, clays, salt, aggregate stones and other construction materials. However, the exploitation of some of these commodities, such as salt and limestone, has received only marginal consideration in the sector (Hentschel et al., 2002).

2.5 SOCIO-ECONOMIC CONTRIBUTIONS OF SMALL-SCALE MINING

2.5.1 Introduction

The Ghanaian society is guided and protected by certain principles and values that are unique to every community within the society. The influx of small-scale mining operations in many communities in Ghana has contributed significantly to the economic and social

structure of the people living within the catchment areas of the mines. In many instances, the positive contributions of small-scale mining to communities and the nation at large are overshadowed by the negative effects. In Ghana, small-scale mining has improved the livelihoods of many people within the mining communities in diverse ways which needs to be acknowledged. These positive contributions include generation of employment, income, and foreign exchange thereby contributing to poverty alleviation in many mining communities in Ghana.

2.5.2 Generation of Foreign Exchange

In Ghana, small-scale mining is important economically, culturally, socially and spiritually, due to its role in community development (Hilson, 2001; cited in; Offei-Aboagye et al., 2004; D'Souza, 2002). Small-scale mining has the potential to contribute to national mineral exports and foreign exchange for the country if the sector is properly legalized. It is established that the small-scale mining sector in Ghana contributed over 30% of the 3.6 million ounces of gold that was produced in 2011 (Agbenyega, 2013). Besides, it also provided about 85% of gemstones and 20-25% of all gold produced in the country. From the late 1980s, initiatives were undertaken by the government of Ghana to streamline legislative and policy to regularize operations of the sector to increase productivity. Between 1989 and 1994, the small-scale mining sector earned the country a substantial amount of \$63 million (Akabzaa and Darimani, 2001).

2.5.3 Generation of Employment

Small-scale mining of precious minerals has made significant socio-economic impact on many individuals and communities as it provides both part time and fulltime jobs. In some cases, it is the only source of income available to the people. Small-scale mining provides

jobs and income for over 20-30 million of the world's poorest people and supports the livelihoods of five times that number. In 2003, the registered small-scale gold and diamond mines in Ghana generated employment for over 100,000 miners in the country. The small-scale mining sector, if properly managed, could provide employment for many people in rural communities where the mines are located (Ghana Minerals Commission, 2002; cited in; Amankwa and Anim-Sackey, 2003).

In the rural communities where mining takes place, the activity has reduced rural-urban drift and has promoted local economic development and poverty reduction. In addition, the mining operations are useful in basic skill development and contribute to the transformation of unskilled labour into semi-skilled and skilled workers. Because of low barriers to entry in terms of capital needs and formal educational requirements, small-scale mining operations offer excellent opportunities for the development of indigenous entrepreneurs. In many rural areas where white colour jobs are non-existing and the available jobs are of low paying, the only means of survival for the majority is to take up employment in the small-scale mining sector. Besides, the sector also serves as a source of raw materials for local industries including the construction and jewellery industries (Yakovleva, 2007). Apart from creation direct employment, the small-scale mining industry generates substantial numbers of indirect jobs in other sectors of the economy in the form of production, transportation and other services. Other people related indirectly in the small-scale mining sector are goldsmiths, traders and food vendors.

2.5.4 Contributions to Livelihoods

Centre for Development Studies (2004) argues that the unsuccessful attempts by governments and organizations over the years to define small-scale mining in the 1970s, has led to a shift in research and policy towards the technical aspects of the industry in the

1980s. In the early 1990s, much attention was paid towards integration of technical, environmental, socio-economic and legal issues of the small-scale mining sector. Towards the mid to late 1990s, there was an improvement in establishing the relation between large scale and small-scale mining companies including gender and child labour issues. Much attention was shifted to community related issues and livelihoods aspects of the sector in the year 2000 and thereafter.

According to Hoadley and Limpitlaw (2004), “the activities of the small-scale mining sector are largely poverty driven, and that, there is a correlation between the Human Development Index (HDI) position of countries and the proportion of the total workforce involved in small-scale mining”. Given the growing incidence of poverty in developing countries, it is more likely that there will be a significant growth in the small-scale mining sector and the number of operators involved in the activity. Although, mineral exploitation contributes positively to the livelihoods of many, it generally leaves negative impacts on the environment, which becomes detrimental to people’s livelihoods. The impacts of small-scale mining on the environment and people’s livelihoods are of particular concern in areas that have high conservation values and with high poverty level where majority of the people live on subsistence basis (Chupezi et al., 2009).

A review of Alternative Livelihood Projects in some mining communities in Ghana showed that the influx of people into mining areas was to look for employment and also to depend on the workers employed by the mines. In Ghana, people in mining areas after mine closures, live in poverty because their socio-economic lives were solely dependent on the mines. Besides, the various economic activities that emerge from mining operations are not diversified enough to sustain the lives of people in mining communities (Amoako

and Abew, 2009). These findings are clear indications of strong relationship between mining and rural livelihood activities.

Hoadley and Limpitlaw (2004) conducted a study in Africa to establish the relationship between small scale mining and sustainable livelihoods. Their study investigates the extent to which small scale mining can contribute to sustainable development and poverty alleviation. Their findings show that small-scale mining has the potential for poverty alleviation. However, in an unregulated state, this potential is seldom realized and governments across the world are putting up mechanisms to improve the regulatory environment under which it is practiced. Besides, guidance from governments could promote the formation of partnerships between large-scale and small-scale mining companies to ensure sustainable community supports.

Chupezi et al., (2009) conducted a study in the Sangha Tri-National Landscape (a protected area located within the triangular southwestern tip of the Central African Republic), which main purpose was to understand how artisanal and small-scale mining affects the livelihoods and the environment of the inhabitants. The study concluded that, the small-scale mining sector in this area is characterized by poor governance and informality. However, mining provides a considerable income for over 3,000 miners and their dependents and pays for their important basic needs. Miners in the area cited a number of opportunities for resolving their problems, including assistance to obtain tools and legal papers (Chupezi et al., 2009).

Awumbila and Tsikata (2004) studied how the migration of small-scale gold miners has led to a restructuring of livelihoods around gold mining in the Talensi-Nabdam area in Ghana. They noted that, resources and livelihoods in the north eastern part of Ghana were structured around farming, sheanut picking and fuel wood gathering. The influx of small-

scale gold miners in the area led to a re-structuring of livelihoods around gold mining in the local economy. They argued that, while migration into the district for gold mining opened up opportunities for participation in the local economy and has the potential to reduce the north-south migration trends, access to and benefits from gold mining is clearly gendered (Awumbila and Tsikata, 2004).

The work of Bannock Consulting Limited (2005) examined the impact of price fluctuations on livelihood strategies in small-scale mining communities as compared with other non-financial shocks. The paper argued that price fluctuations in small-scale mining communities affects the amount that households are able to spend on essentials such as food, clothes, schooling and medical care and the demand for locally produced goods and services. The findings of the study shows that, while price fluctuations clearly do have an impact on livelihood strategies in small-scale mining communities, their vulnerability to other non-financial shocks such as land eviction, conflicts, accidents, environmental damage and social tension are also equally more significant.

The relationship between small-scale mining and livelihood has been shown more clearly by Amoako and Abew (2009) when they reviewed the types of alternative livelihood programmes being undertaken by some mining companies and their effectiveness in the Wassa West and Upper Denkyira Districts in Ghana. They investigated the livelihood of people in the mining communities before, during and after mining operations, and proposed a framework for sustainable alternative livelihood for mining communities. It was discovered from this study that the alternative livelihood programmes implemented by the mining companies range from small businesses to agro-based activities. Besides, the major livelihood activities for men and women before the commencement of mining activities were small-scale mining, trading and farming. However, during the period of the

mine, majority of the men either got employed by the mining companies or were still engaged in small-scale mining while the women continued to be engaged in trading and farming. Unfortunately, after the mine, most of the people in the community become idle (Amoako and Abew, 2009). This conclusion is supported by the findings of Awumbila and Tsikata (2004) that livelihoods in the northeastern part of Ghana were structured around farming and fuel wood gathering before the influx of mining activities in the area.

2.5.5 Contribution to Poverty Alleviation

Mwaipopo et al., (2004) conducted a study in Tanzania to examine the contribution of artisanal and small-scale mining to poverty reduction based on an analysis of gold and diamond mining in Mwanza Region. Besides, a parallel research was conducted in Ghana to review existing livelihoods literature with an assessment of key policy challenges facing the sector. It was found out from these studies that artisanal and small-scale mining has considerable potential to reduce poverty. This is so because in comparison, communities involved in mining activities were fare better in terms of poverty levels than those who were not involved. According to their findings, artisanal and small-scale mining has the potential to increase people's livelihood security and contributes to vulnerability reduction apart from being a source of wealth creation, asset accumulation and investment. In addition, it is believed to provide a lead to many discoveries of large-scale deposits and offers a greater opportunity for direct and indirect job creation than do large-scale operations. At the micro level, it generates revenues which increase local purchasing power as well as the demand for local products such as food, working tools, housing, and furniture. In turn, this creates more employment in other economic sectors such as agriculture, carpentry, fabrication among others.

2.6 ENVIRONMENTAL IMPACTS OF SMALL-SCALE MINING

2.6.1 Introduction

Despite the contribution of small-scale mining to livelihoods and other benefits that it creates, the sector is still faced with numerous environmental problems. Some of these problems include destruction of forest cover, destruction of farms, disturbance of the natural habitats of game species, water pollution, air pollution, noise pollution, and land degradation (Offei-Aboagye et al., 2004). In Ghana, the environmental impacts of small-scale mining activities are put into one of three major categories including damage that are caused to the lithosphere, the hydrosphere and the atmosphere (Aryee et al., 2003; cited in; Offei-Aboagye et al., 2004).

2.6.2 Land Degradation

Damage to the lithosphere in mining communities in Ghana includes destruction of tracts of agricultural land which induces soil erosion. The Centre for Development Studies (2004) contends that the small-scale mining sector is strongly associated with widespread land degradation, loss of biodiversity, natural resources and deforestation. Besides, dug out pits during small-scale mining are not reclaimed, and previously vegetated areas are degraded, an act which consequently induces erosion and subsequent siltation of water bodies (Donkor et al., 2006). In typical mining communities in Ghana, lands which are virtually devoid of vegetative cover after mining operations are quite common to be found in many small-scale mining zones throughout the country (Hilson, 2001).

Akabzaa and Darimani (2001) argued that extensive areas of land and vegetation in Tarkwa mining area have been cleared to make way for surface mining activities. It has been observed that open pit mining concessions have taken over 70% of the total land area of Tarkwa. It is estimated that at the close of mining, a mining company would have

utilized 40-60% of its total concession space for activities such as heap leach facilities, tailings dump and open pits, mine camps, roads, and resettlement for displaced communities (Akabzaa and Darimani, 2001). This explains why land as a natural asset is considered essential in the mining activity. These activities have the potential of causing negative effects on the livelihoods of people living within the catchment area of the mines. It is without doubt that small scale gold mining activity has caused significant damage to the landscape on which these activities takes place.

2.6.3 Water Pollution

In addition to the damage to the lithosphere are the impacts of small-scale mining upon the hydrosphere. Small-scale mining causes serious river and stream pollution and change water courses as a result of excessive siltation. Most small-scale mining operations increase sedimentation in rivers, especially through the use of hydraulic pumps and suction dredges, which sometimes leave scars on the landscape. Others add poisonous chemicals into the river, making them unsafe for human use (Akabzaa, 2000; cited in; Offei-Aboagye et al., 2004).

One of the main environmental and health hazards caused by small-scale mining in Ghana is the widespread release of mercury. The mercury that is used to extract gold is usually released directly into the environment by activities of the miners. The released mercury enters the drainage system and the food chain through the soil and ends up in humans where it causes problems to many individuals. The use of mercury in small-scale mining techniques has health and environmental consequences. Prolonged exposure to mercury can cause permanent brain damage and may induce vomiting, diarrhea and sensory impairment on people. Mercury is discharged into the environment either by dumping wastes directly into rivers or by releasing mercury vapors into the atmosphere when the

compound is burned. Mercury is often used to separate the metal from the ore and is generally handled by people with little or no awareness of its risks or training to minimize risks. Elemental mercury is now known to spread very effectively from diverse sources to both terrestrial and aquatic systems (Donkor et al., 2006).

Most of the activities of small-scale miners are meant to reduce the water table or divert watercourses away from the mining sites. This disturbs and disrupts the natural watercourse which eventually leads to surface water pollution. A study conducted by Akabzaa and Darimani (2001) in Tarkwa mining areas in Ghana identified four main problems of water pollution. These are chemical pollution of ground water and streams, siltation through increased sediment load, increased faecal matter into water bodies and dewatering effects (Akabzaa and Darimani, 2001).

2.6.4 Air and Noise Pollution

Atmospheric effect is yet another environmental problem of small-scale mining. Mining activities discharge particulate matter into the air which becomes dangerous to human health. Thus, sulphide dioxide (SO₂), nitrogen dioxide (NO₂) and carbon monoxide are of major concerns in mining areas. Some of these pollutants that affect the air quality have been identified as airborne particulate matter, emissions of black smoke, dust, noise and vibration. It has been observed by Akabzaa and Darimani (2001) that dust particles of less than 10 microns poses health threats to the people of the Tarkwa mining area. All fine dust at a high level of exposure has the potential to cause respiratory diseases and also increases the condition of people with asthma and arthritis. Dust from gold mining operations has a high silica content, which has been responsible for silico-tuberculosis in the mining area (Akabzaa and Darimani, 2001). The release of dust through digging and clearing of land cover are some of the causes of atmospheric impacts of small-scale

mining. In view of this, Hilson (2002) called for the adoption of retorts when miners were observed burning amalgam freely, thereby, causing harm to the immediate environment. High-pitched and other noise in mining communities is known as a cause of damage to the auditory systems, cracks in buildings, stress and discomfort to people and animals alike (Akabzaa and Darimani, 2001). The noise also adversely affect animal population by terrify them and hinder their mating processes thereby causing them to have abortions.

2.7 HEALTH IMPACTS OF SMALL-SCALE MINING

According to the World Health Organization (2004) “health is a state of complete physical, mental and social well being of an individual, and not merely the absence of disease and infirmity”. Stephens and Ahern (2001) examined the impact of mining on the health of both mine workers and the people within the surrounding communities of the mines. They concluded that, mining remains one of the most hazardous occupations in the world, not only in terms of short term injuries and fatalities, but also due to long term impacts such as cancers and respiratory conditions. Health and safety risks differ according to where the mines are, what products are mined, who is involved and what processes are used in the exploitation. In different countries, women and children may be involved in mining and depending on what product is being mined, mining conditions and the degree of risks changes at the mines (Stephens and Ahern, 2001). Respiratory truck infections are the most studied and problematic of health impacts for mine workers. However, injuries has also continue to be an important safety issue confronting mining communities. It is believed that the long-term effects of these mining related problems are diseases such as cancers and mental health impacts for workers.

In small-scale gold mining, especially underground mining, miners dig only to a limited depth and tunnels supported by wooden logs. Hand dug tunnels and shafts created are

shallower and smaller than those of commercial mining companies, with no logistical supports. This makes them prone to various dangers, such as pit collapse and landslides. Therefore, the risks of fatal accidents are high, particularly in underground mines (Hilson, 2001). In addition, the mining operations change the nature of the environment through creation of open pits that accumulates stagnant waters that supports malaria vector growth (Akabzaa and Darimani, 2001).

Other mining and environmental related diseases include skin disease, diarrhoea and Sexually Transmitted Diseases (STDs). According to AngloGold Ashanti Report (2004) HIV/AIDS and malaria are the public health threats facing the company during their mine in Africa. HIV/AIDS is a significant challenge in South Africa, but less in the other African countries, where mineral extraction occurs. The East and West African populations have far lower prevalence levels of HIV/AIDS and malaria than that of Southern African mining operations. The labour intensive nature of mining in South Africa is a major reason why this pandemic is critical to South African mining operations. AngloGold Ashanti estimates that in 2004, HIV/AIDS prevalence rate was 30.24% amongst its South African workforce in small-scale mining. In 2003, this was estimated to be 29.95% and 4,248 cases of Sexually Transmitted Infections (STIs) were treated by the AngloGold Health Service. Besides, malaria remains the most significant public health threat for AngloGold Ashanti's mining operations in Ghana, Mali, Guinea and Tanzania. As a result, \$1.6 million malaria campaign has been proposed by the company at Obuasi in Ghana to reduce the high rate of infections of malaria (Anglogold Ashanti Report, 2004).

Corno and de Walque (2012), examined whether the very high HIV prevalence recorded in Swaziland and Lesotho, 26% and 23.2% respectively, could be partially explained by the massive numbers of migrant miners who were employed in South Africa mines during

the past century. Their results show that there is the likelihood of HIV infection to increase for individuals employed in the mines in the age range between 30-44 years old. The study also showed that women who have husbands or cohabiting partners in the mining sector are also more likely to be tested HIV positive (Corno and de Walque, 2012).

2.8 THEORETICAL FRAMEWORK

2.8.1 Introduction

This chapter focused on the theoretical concepts and approaches that have been used in the study based on the review of the available literature. These theories serve as bases upon which the study was conducted. The selection of these theories depended on their appropriateness, ease of application, and their explanatory power of the phenomenon under study. The study reviewed the sustainable livelihood framework and the entitlement theory to examine the effects of small-scale mining operations on the livelihoods of people in the East Akim Municipal Assembly. Besides, these theories were also reviewed to explain and analyze how various factors and processes constrain or enhance people's ability to make a living in an economically, ecologically, and socially sustainable manner.

2.8.2 Sustainable Livelihood Framework

One of the dominant approaches to the implementation of development interventions by major international agencies since the 1990s is the Sustainable Livelihood Approach (SLA). It formed a central concept of the UK's Department for International Development's (DFID) strategy during the early years of the new labour government in the UK (Morse et al., 2009). The idea of Sustainable Livelihoods (SL) was first introduced by the Brundtland Commission on Environment and Development. However, in 1992, United Nations Conference on Environment and Development expanded the concept, as a

goal for poverty eradication (Krantz, 2001). It is believed that the sustainable livelihoods framework could serve as an integrating factor that can allow policies to address development, sustainable resource management, and poverty eradication simultaneously. The Sustainable Livelihood Framework seeks to investigate how a person or communities in a particular environmental situation uses a number of resources with a given institutional rules and social norms and come out with a livelihood strategies towards achieving a sustainable livelihood. In this respect, the livelihood outcomes are not always sustainable or positive. In real world situations, livelihood outcomes are almost invariably negative with rising poverty which the sustainable livelihood framework blames on vulnerability contextual factors, structures and processes (Ludi and Slater, 2008).

At the centre of the of the Sustainable Livelihood framework are the various assets on which households or individuals employ for their livelihoods. These assets include human capital, physical capital, financial capital, natural capital and social capital (Morse et al., 2009). These are influenced by the vulnerability context, which refers to the external factors that change people's ability to earn a living. The main vulnerability contexts identified in the livelihood framework are seasonality of livelihood activities, trends and shocks that are outside the control of the households. Having access to and use of these assets is influenced by policies, organizations and relationships between individuals, organizations and authority. These institutional processes and organizational structures link the various elements together. The multiple choices that people make in order to use the available assets are known as livelihood strategies. Three broad groups of livelihood strategies identified by the framework are: livelihood intensification, diversification and migration. The strategies which individuals and households adopt produce outcomes, which could either be positive or negative (Morse et al., 2009). The DFID approach is unique in the sense that it includes environmental sustainability as a consideration of

relevance to poverty and also includes power relation as one aspect of transforming processes to be examined.

The SL approach, if applied consistently, might be beyond the practical realities of many local development administrations. It is therefore important to modify the framework to suit local realities. The SL framework has therefore been modified due to the fact that there are evidences of different elements in the livelihoods of the households of the studied communities. It has been identified that not all the elements found in the livelihood framework of DFID are applicable to the livelihoods of people in the communities studied. It is important to ensure that development initiatives fit with people's livelihood strategies to make them better at responding to the constraints and opportunities affecting their livelihoods. Besides, in the DFID livelihood framework, not enough emphasis is given to the informal structures and processes that affect access to resources within communities. This is very crucial because the way resources and other livelihood opportunities are distributed locally are often influenced by informal structures of social dominance and power within the communities and individuals.

2.8.3 The Entitlement Theory

The entitlement theory of Robert Nozick (1974) forms the basis for this study and was used to analyze the effects of small-scale mining on people's livelihoods. The theory explores what justice tells us about holdings or what can be said about and done with the property people own when viewed from a principle of justice (Nozick, 1974; cited in; Cust and Cooper, 2004). This theory is meant to assess the holdings of any given person at any given time, and determine which of those holdings, if any, are possessed justly by that person. The entitlement theory comprises of three main principles:

1. A principle of justice in acquisition: This principle has to do with the initial acquisition of holdings. It is an account of how people first come to own common property, what types of things can be held, and so forth. Thus, if something is acquired justly, then it is just to own it.
2. A principle of justice in transfer: This principle explains how one person can acquire holdings from another, including voluntary exchanges and gifts. If someone who justly owns something freely transfers that property to another, then it is just for that other person to own it, provided that it does not leave others worse off.
3. A principle of rectification of injustice: This involves how to deal with holdings that are unjustly acquired or transferred, whether and how much victims can be compensated, how to deal with long past injustices done by a government, and so on. If someone unjustly owns something, then the situation ought to be rectified, for example by restoring the property to its rightful owner (Cust and Cooper, 2004).

In view of the entitlement theory a distribution is just if everyone is entitled to the holdings they possess under the distribution. However, this does not apply to everyone in a society as some people steal from others, defraud them, or enslave them, seizing their product and preventing them from living as they choose, or forcibly exclude others from competing in exchanges. In this situation, the third principle of rectification is needed to correct such unfortunate occurrences (Stout and Glymour, 2005; Bruno, 2010).

Historical and End-State Principles: a distinction is made between principles of justice which are historical and those that are non-historical. Historical Principles of Justice are those principles for which, if we were to examine a distribution of wealth, we cannot determine whether it is just or unjust unless we know some of the historical details about how this distribution came about. Non-Historical Principles of Justice are those principles

for which, in order to determine whether or not a distribution is just or unjust, we only need to look at the distribution itself, but not any of the historical details regarding how this distribution came about.

Patterned and Non-Patterned Principles: Another distinction marked by Nozick's theory was between patterned and non-patterned principles of justice. Patterned Principles of Justice dictates that we distribute goods according to some specific property, formula, or pattern. For example, goods could be distributed according to moral merit, need and usefulness to society. Non-Patterned Principles of Justice dictates that we distribute goods in a way that does not follow some pattern. Thus, Nozick's entitlement theory is historical and unpatterned (Bruno, 2010). The use of these theories will help the researcher to place the study within the perspective of other studies in the same discipline. Besides, it sets limits or boundaries for the proposed study by providing direction and put the findings of the study into meaningful and generalized pattern.

2.8.4 Conceptual Framework

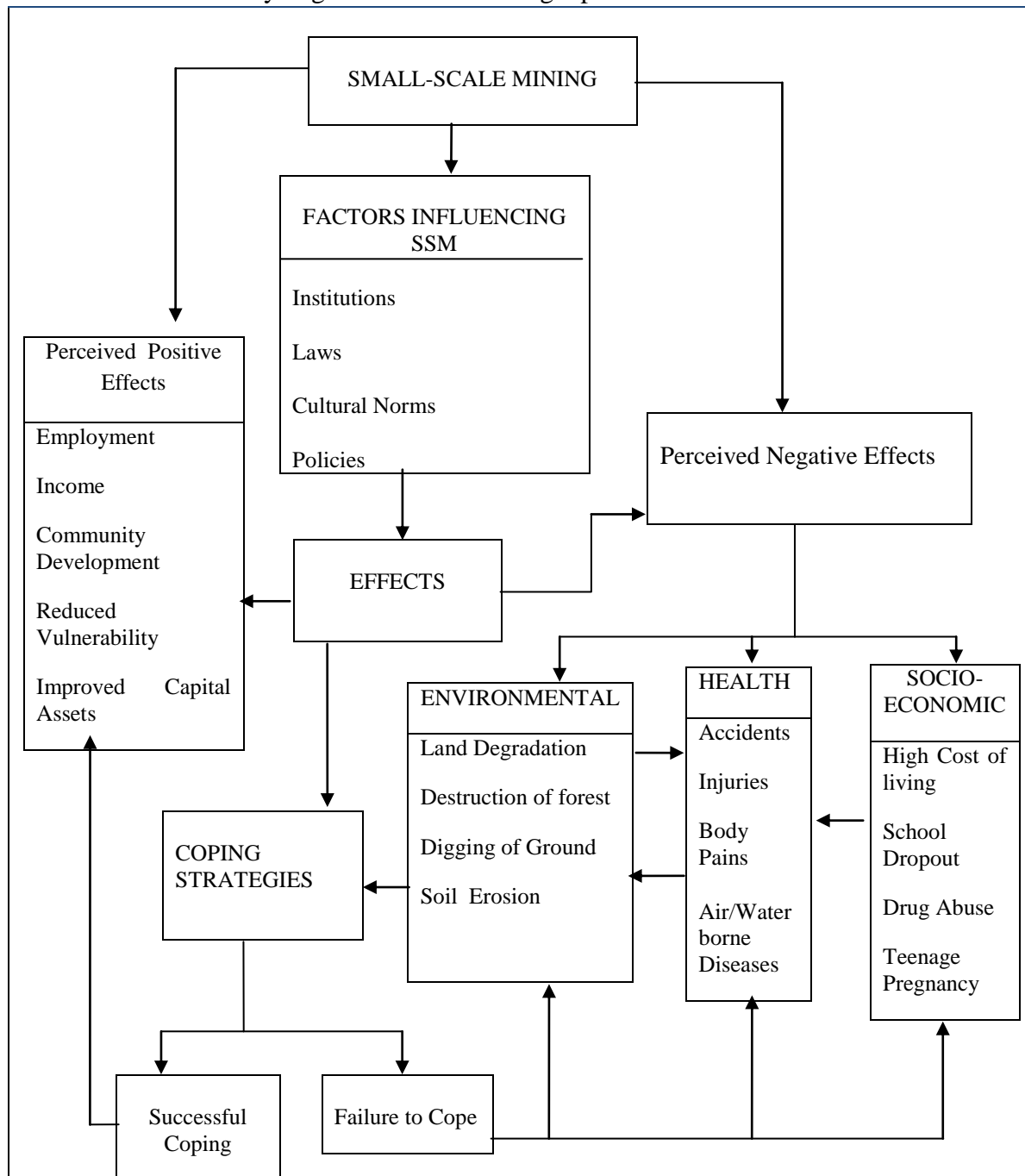
Figure 1 represents the conceptual framework that has been applied in the study. The framework shows how small-scale mining operations affect the livelihoods of people in the East Akim Municipal Assembly. The mineral resource is identified as a natural asset that households exploit for a living. Drawing from the framework in Figure 1, small-scale mining is a major economic activity that requires acquisition of large acres of land for its operations. Apart from the land which is a natural asset required for the exploitation of the mineral, other equally important factors come into play. These factors include governmental policies, laws, institutions and cultural norms of the society which influences individuals and households ability to have access to and use the mineral

resources for livelihood. Besides, these factors are frequently filled with power thereby directly or indirectly, mediate access to the available livelihood resources.

The influence of these factors also determines who gains access to the available assets from which the mineral are extracted. As a result, people make multiple choices in order to use the available assets to survive which subsequently produce outcomes, which could either be positive or negative. These choices by the individuals or households are referred to as coping strategies. The positive effects are the achievements or outputs of these livelihood strategies through the use of the available resources. These positive outcomes includes more income, generation of employment, reduced vulnerability, community development, increase well-being, improved food security and a more sustainable use of natural resources. The negative effects as identified in the framework could be environmental, health and socio-economic. In terms of environmental effects, small-scale mining results to destruction of forest cover leading to erosion. As a result, there is loss of land for farming and other agricultural purposes. Other environmental effects are pollution of water bodies that serve as a source of drinking water for the communities and destruction of aquatic lives. Dug out pits in mining communities also have several environmental implications for people within the catchment areas if the mines including the natural ecosystem.

There are several health implications that are associated with small-scale mining activities. Mining activities such as digging of the land leads to air and dust pollution that affects people within the surrounding areas. This eventually results to incidence of upper respiratory tract infections such as cancer, cough or cold and asthma. Other equally important incidences of health are malaria, diarrhea, prevalence of HIV/AIDs, accidents and injuries which affects people's health in the mining communities. Small-scale mining

Fig 1: A Framework for Analyzing Small-Scale Mining Operations



Source: Author's own Construct, 2013 based on the Livelihood Framework of DFID (1999)

also have negative socio-economic effects on the livelihoods of individuals and households in the studied communities. These include high cost of living, teenage pregnancy, child labour, school dropout and drug abuse. The negative effects of small-

scale mining on the livelihoods of people require that people adapt a mechanism to cope with such effects. In view of this, those households or individuals who were able to cope successfully saw an improvement in their livelihoods while those who failed to cope successfully were faced with adverse effects of the mining activities. This is to say that successful coping with the available strategies leads to positive effects while, failure to cope causes the negative effects on peoples livelihoods.

Taking the framework in Figure 1 into consideration, the study examined the extent to which small-scale mining has affected the livelihoods of people in the East Akim Municipal Assembly. In addition, the livelihood strategies or coping measures of the affected households were also examined in relation to the framework. It was identified that small-scale mining operations have affected the livelihoods of people in the studied communities either positively or negatively.

CHAPTER THREE

BACKGROUND OF THE STUDY AREA AND RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter of the study dwells on the background information of the study area. Major characteristics such as location, drainage, climate and vegetation, topography and demography were discussed. In addition, socio-economic issues such as education as well as health related issues in the East Akim Municipality were thoroughly examined. The chapter also discusses the research design and relevant methodology used, by focusing on sources of data, methods and techniques for data collection, sampling techniques and instruments used for data collection. The chapter concludes with major limitations that the researcher encountered during the study.

3.2 BACKGROUND OF THE STUDY AREA

The East Akim District now known as East Akim Municipal Assembly (EAMA) is one of the oldest districts in Ghana. The district's existence dates back to the colonial era, when it was carved as one of the administrative centers in the country with much historical antecedents. In the year 1988, East Akim was established as a District Assembly and elevated to a Municipal status in the year 2008. The district used to be the second largest of the 15 districts in the Eastern Region of Ghana until 2004, when the Atiwa district was carved out of it as a separate district (EAMA, 2006). The Assembly has 8 Zonal Councils, 40 Unit Committees and 2 constituencies namely Abuakwa North and South. The assembly is also made up of 58 Assembly Members of which 40 are elected and 18 are appointed, with a Municipal Chief Executive (MCE) and 2 Members of Parliament who serves as ex-officio members (EAMA, 2012).

3.2.1 Location and Topography

The East Akim Municipal Assembly is located in the central part of the Eastern Region of Ghana. The Municipal Assembly has a total land area of approximately 732km² (Ghana Statistical Service, 2010). It is bounded by six districts namely Kwahu South District to the North, Atiwa District to the North-West, Kwaebibirem District to the South-West, Fanteakwa District to the East, New Juaben Municipal and Suhum-Kraboa-Coaltar Districts to the South. The capital of the East Akim Municipal Assembly is Kibi, which is 55km away from Koforidua, 105km from Accra and 179km from Kumasi and lies on the eastern slopes of the Atewa Range. Other important towns in the municipality that are equally of economic value are Old Tafo, Kukurantum, Apedwa, Osiem, Asiakwa, Asafo Nkuronso, Apapam, Maase, and Bunso (EAMA, 2006).

The topography of the East Akim Municipal Assembly is characterized by steep sloping ridges and undulating hills which rise about 240 to 300 metres above sea level. The Atiwa range is the highest point in the area, which rises over 350 meters above sea level, about 50 km long and 10-15 km wide (Xtra-Gold Resources Corp., 2010; EAMA, 2006). There are several different types of rock formations, giving different relief features, ranging from flat bottom valleys to steep-sided highlands, which are usually covered with iron pans, bauxite and kaolin. The underlying rocks are of the Birimian formation, covering over three-fourths of the closed forest zone. Tarkwaian rocks, a major source of gold, have also been found near Kibi and other smaller towns in the Municipal Assembly. These rock groups contain several mineral deposits including gold, diamond, bauxite and kaolin.

3.2.2 Geology and Drainage

The major soil type in the municipality is the Atiwa series which are mainly red, well drained and silty loam. The Peki series are brown to reddish yellow, moderately well drained, very shallow and rocky. The valley bottoms are occupied by the Oda series which are poorly drained alluvial silty clays. The soils are suitable for the cultivation of both food crops such as cassava, plantain, yam, cocoyam, maize and cash crops like cocoa, coffee, oil palm, citrus, cola, which are grown in the municipality. The land in this area is susceptible to severe soil erosion if left bare for long without vegetation (EAMA, 2006).

The Municipal Assembly is drained by rivers such as the Birim, Pra, Densu, Adenchensu and Merepong, most of which have their catchment areas within the Atiwa forest ranges. Several streams that are seasonal in nature are also found in most parts of the municipality. Most of the rivers have the dendritic pattern and flows in the north-south directions. The Birim River has its headwaters in the Atewa Range and is one of the major sources of water for the local villagers within the municipality (Xtra-Gold Resources Corp., 2010).

3.2.3 Climate and Vegetation

The Municipal Assembly lies in the west semi-equatorial climatic zone which is characterized by double maxima rainfall regimes. The first rainy season starts from May to June and the second from September to October. Annual rainfall is abundant with 1,500mm to 2,000mm for most of the areas and 2,000mm or more in the summit areas in the municipality. The mean annual rainfall is between 125cm and 175cm. The dry seasons are really distinct with the main season commencing in November and ending in late February. Temperature is found to be fairly uniform throughout the year ranging between 26°C in August and 30°C in March. Relative humidity is generally high throughout the year, ranging between 70% - 80% in the dry season and 75% - 80% in the wet season.

Temperatures in the day are high, ranging between 30-35⁰ Celsius and are usually 23-28⁰ Celsius during the evening (Xtra-Gold Resources Corp., 2010).

The major vegetation type in the region is the moist semi-deciduous forest. The Vegetation consists of low, thick bush, open canopy and deciduous trees. There are few forest reserves covering about 108.8 square kilometres including part of the Atiwa Forest Reserve. The forest reserves constitute about 15% of the entire surface area of the Municipality. Some commercial species of trees contained in the forest are includes Odum, Wawa, Ofram, Mahogany, among others (EAMA, 2006).

3.2.4 Population

According to the 2010 population and housing census of Ghana, the East Akim Municipal Assembly had a total population of 167,896 constituting 6.4% of the total population of the region. The population density of the Municipal Assembly is 229.4 in a hector square kilometer. The area has an urban population of 100,068 and a rural population of 67,828. There are 42,093 households within the municipality with 164,568 members in these household in the Municipal Assembly. The 2010 Population and Housing Census of the municipality show that there are 81,768 males and 86,129 females (Ghana Statistical Service, 2010). Thus, females are more than males in the entire geographic region.

3.2.5 Economic Activities

3.2.5.1 Infrastructure

In the East Akim Municipality, numerous tracks and paths are available for easy access to most areas. The municipality has a fair distribution of accessible roads majority of which link the Accra-Kumasi trunk road. People who live along the Accra-Kumasi main road

have less travel time to other places outside the communities. Telecommunication services in the municipality have developed over the years, especially with the introduction of the mobile phone net-works. Private telecommunication services have covered over 90 percent of the municipality. Power is available in larger towns in the municipality. The electrical grid follows the main secondary roads and most of the major villages in the Kibi Municipality have electrical power. When the national power grid is not available, most people use generators for as a source of power. Telephone communications are fairly stable and mobile phones are also used in most places. There are two commercial banks, the Ghana Commercial Bank and Agricultural Development Bank as well as Atiwa Rural Bank and Mumuadu Rural Bank and several Co-operative Credit Unions. These financial institutions provide financial services to people in the Municipality (EAMA, 2006).

3.2.5.2 Farming and Manufacturing

The Municipal Assembly is well endowed with land that is good for crop farming. Cocoa is the main cash crop being cultivated. Most of the inhabitants of the area are subsistence farmers who grow plantain, cassava and cocoyam. In addition, vegetables such as tomatoes, peppers and garden eggs are also cultivated in many part of the municipality. Major manufacturing and processing activities in the municipality are mostly small scale and comprises of oil palm extraction, soap making, ‘gari’ processing, furniture making, blacksmithing, woodworks, and ‘akpeteshie’ distillery (EAMA, 2006).

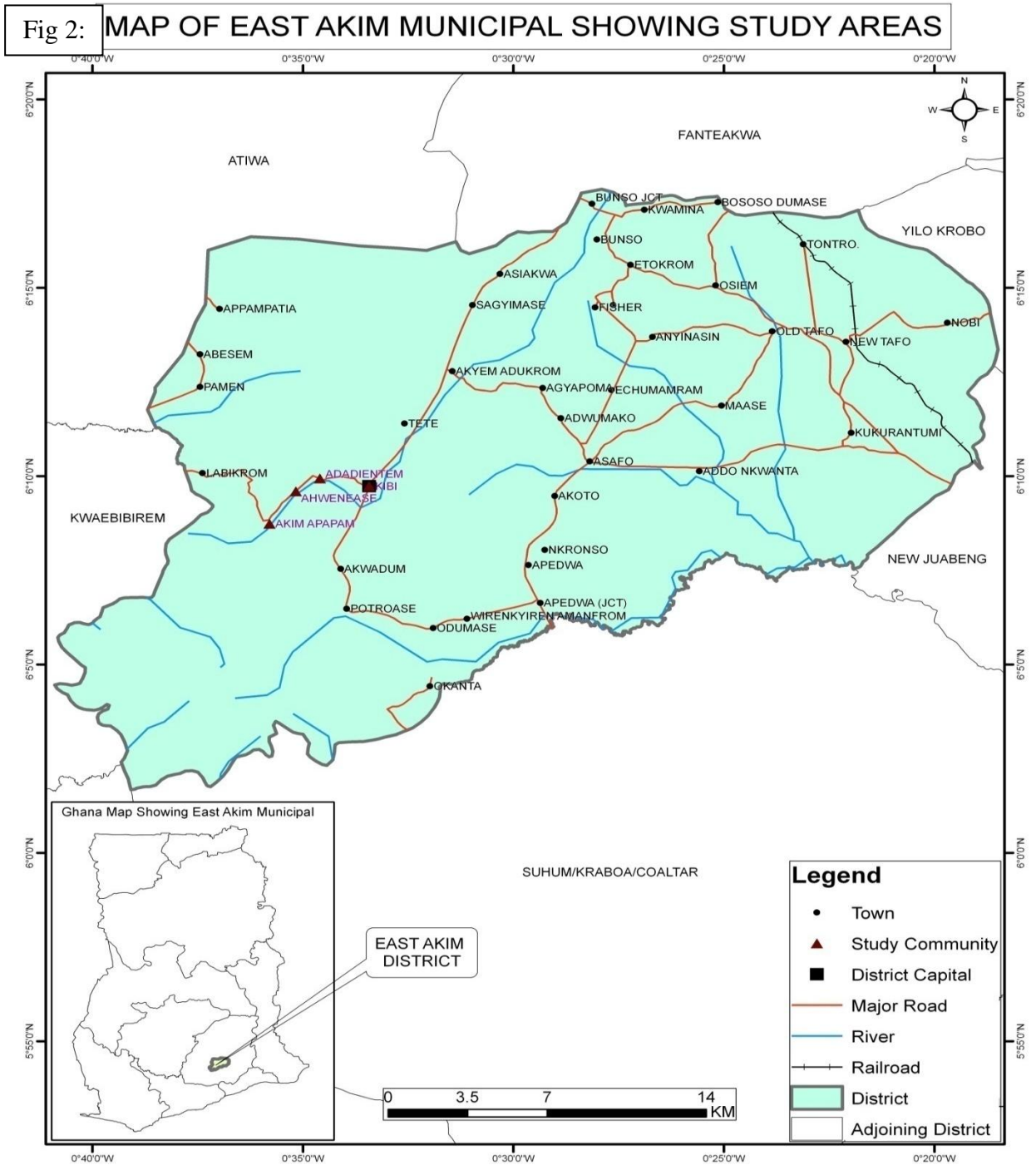
3.2.5.3 Mining and Quarrying

There are several mineral deposits in the municipality such as gold, diamond, bauxite and kaolin. The basins of Rivers Pra and Birim have gold and diamond, which are easily exploited by miners. The prospecting of gold as well as small-scale gold mining covers a

total land area of about 343 and 159 acres respectively (Ron et al., 2010). Mining companies including Paramount Mining Corporation and Xtra Gold Mining Company have been exploring their potentials in the municipality. For example, in 2004 RUSAL, a major Russian Aluminum Company applied to the Minerals Commission and the Ghana Integrated Aluminum Industry Committee for permission to explore the bauxite deposits near Kibi and its suburbs (EAMA, 2012). In addition, other companies are prospecting for gold at Adadientam, Adjapoma, Asiakwa and Ahwenease. It is an undeniable fact that the activities of illegal miners are posing serious threats to the environment in the municipality. Besides, at the lowlands areas along the Kumasi-Accra road, quarrying activities are also being undertaken extensively (Ron et al., 2010; EAMA, 2012).

3.2.5.4 Lumbering and Tourism

The Municipality Assembly can boast of a great number of timber resources. Many timber species such as mahogany and 'Kyenkyen' are found in the forest reserves. The forest resources in the region are under siege from deforestation, mining and overexploitation of the timber and other forest products. The forest is also a source of commercial fuel wood harvesting and charcoal burning for people in the municipality (EAMA, 2012). The Municipal Assembly is one of the most endowed in a wide range of untapped Eco-tourism resources in Ghana. The area stands to gain from tourism, if the potential of the industry is well tapped. The Municipal Assembly has sites of historic and aesthetic importance. The *Okyenhene's* Old Palace is being kept and preserved presently as a museum. Another known site is the monumental rocks at Kukurantumi (EAMA, 2012).



3.2.6 Social Facilities

3.2.6.1 Education

The Municipal Assembly has a number of educational facilities which are fairly resourced both in terms of infrastructure and staff. Approximately, there are 125 nursery and

kindergarten, 135 primary schools, 97 junior secondary schools, 11 senior secondary schools, 3 technical and vocational schools and 1 teacher training college. Kibi also has a school for the deaf, which has a population of about 213 students by 2008. Sixteen schools in the municipality are currently benefitting from the School Feeding Programme. All public schools are enjoying the Capitation Grant in the municipality. Besides, free school uniforms have also been distributed to some schools in the municipality, as implemented by the Government of Ghana (EAMA, 2012).

3.2.6.2 Water and Sanitation

There has been a considerable improvement in the supply of water over the past four years, even though there are few challenges. Pipe-borne water and boreholes have been supplied to some communities and about 65 percent of the people have access to safe water, compared to the national average of 38.4 percent. However, some communities have limited centralized pipe-borne water supplies. Most of the towns depend on wells and boreholes, as well as the Birim River and other nearby streams for water. However, the sanitation situation is not impressive. The population of people in the municipality with access to and using hygienic sanitation facilities stands at 35 percent (EAMA, 2012).

3.2.7 Health Facilities

The Municipality has two Hospitals, at Kibi and New Tafo and a number of Health Centres and Maternity and Child Health Care Centres (MCH), offering health services to

the people. The assembly has succeeded in improving upon Disease Control and Surveillance, Immunization, Safe Motherhood, School Health and Nutrition and HIV/AIDS. However, malaria is the most common type of disease and continues to be a major health challenge that the municipality faces. Malaria tops the 10 reported cases of diseases for the period of 2006 to 2009 in the municipality. In 2006, there were 18,413 reported cases of malaria, which rose 21,089 in 2009, among residents in the Municipal Assembly (EAMA, 2012).

3.3 RESEARCH METHODOLOGY

3.3.1 Introduction

This section of the thesis is concerned with a description of methodological approaches that have been applied in the study. A research method consists of a systematic, methodological and accurate execution of a research design (Babbie and Mouton, 2002; cited; in Luci, 2012). There are many different methodologies used in various types of researches as the term is used to consider the design of the research, the methods of data collection, type of data collected as well as methods of data analysis procedures. In this segment, attempt was made to justify the adoption and use of the methodological approaches used in the study.

3.3.2 Research Design

Research design is the basic plan for a research that shows and explains how the research question will be connected to the available data and what tools and procedures will be used in answering them (Punch, 2005). It is believed that a good and careful design ensures that the research is valid and could yield consistent results every time (Berg, 20010). There are various methods of conducting a research. However, all these methods

can be put into three major research strategies namely: quantitative research strategies, qualitative research strategies and mixed method designs (Burke et al., 2007). In ideal situation, a comprehensive research should try to integrate both qualitative and quantitative methodologies but this is not always possible, usually due to time and financial constraints on part of the researcher or group of researchers. However, for the purpose of the topic, the questions to be answered and the nature of data to be collected, mixed method approach is the appropriate method for the study.

Mixed method can be described as a type of research design in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches for the purposes of breadth and depth of understanding and collaboration (Johnson et al., 2007). It is the third major research paradigm, which gives an impressive alternative approach to quantitative and qualitative researches. Even though, the researcher is aware of the fact that it is more expensive in terms of resources such as time and money (Creswell and Plano, 2011), it is still the best method and its application in this study is justified by several reasons. When qualitative and quantitative research strategies are combined in a single research, the advantages of each methodology complements the other making a stronger research design which results to more valid and reliable findings (Bowen, 2002; cited in; Perone and Tucker, 2003). Besides, the use of mixed method design also helped the researcher to use words, pictures, and narrative to add meaning to numbers which no single research method could provide. Other important justification for the use of the mixed method in this research as supported by Spratt et al., (2004) is that it was able to answer a broader and more complete range of questions since the researcher is not confined to a single research approach. Besides, more complete knowledge that is necessary to inform theory and practice can be produced when qualitative and quantitative techniques are used together in a single research (Perone and Tucker, 2003). In this study,

the main quantitative technique applied is questionnaire survey while the main qualitative techniques that were applied are in-depth interviews and observations.

3.3.3 Selection of the Study Area

The East Akim Municipal Assembly is one of the regions in the Eastern Region with Kibi as its administrative capital. Four communities in the municipality namely Kibi, Ahwenease, Apapam and Adadientem were selected for the study. These communities were selected because it is impossible to conduct field work in all the communities where small-scale mining operations are undertaken in the municipality. Some of the criteria used to select these communities were that they are located within the catchments areas of the mines. Besides, their proximity to one another as well as to the mines was also considered. Proximity between the selected communities was an important criterion because it helped the researcher to save time and cost while on the field due to inadequate resources for the study. Additional factor considered in selecting the communities was their homogeneity in terms of livelihood activities they undertake for survival.

3.3.4 Sources of Data

Data gathering is crucial in research as the data is meant to contribute to a better understanding of a theoretical framework that is applied in a study (Bernard, 2002). It is imperative that selecting the manner of obtaining data and from whom the data is acquired is done appropriately and with sound judgment. This is necessary in data collection procedures because no amount of analysis can make up for improperly collected data. In data collection processes, it is important to consider what methods are available to gather the original data from respondents. In view of this, data for the study was obtained from two main sources namely primary and secondary data sources. The primary sources of

data collection were based on empirical information through an intensive field work in the East Akim Municipality by the use of questionnaire survey, interviews and personal observations. The selected mining areas in the studied communities were visited and questionnaires distributed to household heads to elicit information on the small-scale mining activities. Interviews were also conducted for assemblymen, opinion leaders and miners to obtain firsthand information about the mining activities in the region.

Secondary data was gathered from books in libraries, reports, published and unpublished journals, articles, internet and other documented materials. Existing literature on the mining sector was also consulted. In addition, a cartographic map was sought from the planning office of the East Akim Municipal Assembly to show clearly the study areas. Lastly, information on population size, projections and other types of data in relation to household characteristics and settlements were all obtained from the East Akim Municipal Assembly for the study.

3.3.5 Questionnaire Survey

Among the quantitative research instruments, questionnaire is the most appropriate for the purpose of effective measuring and analyzing numerical data. A questionnaire could be described as a research instrument consisting of a series of questions asked to individuals to obtain statistically useful information about a given topic (Mellenbergh, 2008). Questionnaires are useful instruments to gather original information about people, their opinions, degree of awareness of events and more importantly their behavior and social interactions (McGurik and O'Neill, 2005). The justifications for the use of questionnaires in this study includes the fact that it is cheap and easy to use and does not require as much efforts from the questioner as verbal or telephone surveys. Besides, the questionnaires have standardized answers that made it simple for the researcher to compile. By the use of

questionnaires, large amount of data was collected from a large number of people for the study in a relative short period of time and in cost effective way.

Communities such as Kibi, Apapam, Adadientem and Ahwenease in the East Akim Municipal Assembly were selected for the study. From these communities, 260 respondents, including miners and non-miners, were selected and questionnaires distributed to them. The questionnaires were administered one per respondent and by hand. Questions covered issues such as small-scale mining operations, the effects of small-scale mining (both negatives and positives) and the coping strategies of those negatively affected by the operations of the mines. Questionnaires contained both closed and open ended questions. The open ended questions were intended to explore new areas that the researcher had limited knowledge while the close ended questions were to enhance easy processing of respondents answers. In addition, there were few five point likert-scale questions intended to assess the degree of respondents' agreement or disagreement of major issues relating to the mining activities in mining communities.

3.3.5.1 Systematic Sampling Technique

Taking the different classes of respondents into consideration as well as the different kinds of questions needed to be answered, systematic sampling technique was the most appropriate technique that was applied in this study. Johnnie (2012) describe it as a probability sampling procedure in which a random selection is made of the first element for the sample, and then subsequent elements are selected using a systematic interval until the desired sample size is reached. The study was conducted in the East Akim Municipal Assembly in communities such as Kibi, Apapam, Adadientem and Ahwenease. The population for the study includes small-scale miners, and non-miners who are mainly males and females of different ages, educational backgrounds and marital status. The

sample size for the study consisted of 260 respondents of which 200 were selected using systematic sampling technique. These include 200 non-miners who are mainly household heads. In selecting the respondents, the researcher used a modified systematic random sampling technique where he first identified the needed sample sizes for each of the communities. The researcher therefore divided the total population of each community with the sample sizes to obtain the sampling fraction or sampling interval. The sampling fraction was then used as the constant difference between subjects upon which respondents were selected.

Taking the 2010 population projections of the East Akim Municipality based on the 2000 Population and Housing Census (PHC), the researcher calculated the sampling interval for the study. In this regard, the population of the various communities were used and 60 respondents each were selected from Kibi and Apapam and 40 respondents each selected from Adadientem and Ahwenease respectively. This was done by dividing the total population of each community by the proposed sample size to obtain the sample interval upon which the respondents were selected. As a result, a total of 200 respondents were selected from the four communities. The systematic sampling technique is justified because it is easier, simpler, and more economical to apply. It also gives an assurance that the population is evenly sampled (Castillo, 2009).

3.3.6 In-depth Interview

In qualitative interview, the interviewer establishes a general direction for the conversation and pursues specific topics that the respondent raises in the process of the study (Luci, 2012). Interviews provide in-depth information about the experiences and viewpoints of participants' on a particular topic a researcher intends to study (Turner, 2010). Interviewing differs from other methods of data collection because it is often more

exploratory in nature and allows for more flexibility for the interviewee beyond certain thresholds. An In-depth interview was conducted to generate data during the field work to provide the researcher with well-rounded information for data analysis. Even though the researcher is aware that qualitative interviewing is not a perfect method for all types of researches, it was used due to its efficiency. In addition to the above justifications, an interview enables researchers to structure the questions to the respondent in order to get rich and full information for their projects. Using qualitative interviewing, the researcher gained more detailed information from the interviewee about specific events.

3.3.6.1 Purposive Sampling Technique

Purposive sampling is yet another sampling technique that was applied in the study. According to Tongco (2007), “purposive sampling technique, also called judgment sampling, is the deliberate choice of an informant due to the qualities the informant possesses”. Bernard (2002) describes it as a technique that the researcher decides what needs to be known and sets out to find people who are willing to provide the information by virtue of their knowledge or experience about the subject matter under consideration.

Purposive sampling technique was employed to select 50 miners for the study. These include 13 respondents each from Kibi and Apapam and 12 respondents each from Adadientem and Ahwenease respectively. In addition, 10 respondents were also selected purposively in the studied communities for in-depth interviews. These were assemblymen, community leaders and other community members. The respondents were selected based on their in-depth knowledge about the subject matter under consideration. The community leaders were selected based on their role in maintaining the welfare of the people in their communities. The interview type was mainly semi-structured to enable respondents have the freedom to operate within wide latitude without any restrictions. Questions about all

aspects of small-scale mining including issues such as mode of operations, land acquisitions, negative and positive effects and coping strategies were asked. The purposive sampling technique was used to focus on particular characteristics of the population that are of interest and enabled the researcher to answer the research questions. This technique was useful because it enabled the researcher to know which respondents were necessary to give which specific information needed for the study. Table, 1 below shows a summary of design and the methodology used in the study. This is to make a clear distinction between which research instruments were used for the different category of respondents and the distribution of respondents in the various communities.

Table 1: Distribution of Respondents and Research Instruments used in the Study

Target Population, Communities and Sample Size	Research Instruments	Sampling Techniques
Miners = 50 Kibi, =13 Apapam =13 Adadientem =12 Ahwenease =12	Questionnaires	Purposive Sampling
Non-Miners = 200 Kibi, =60 Apapam =60 Adadientem =40 Ahwenease =40	Questionnaires	Systematic Sampling
Other Respondents=10 Opinion Leaders =3 Famer =1 Miners =3 Others =3	In-Depth Interview	Purposive Sampling
Sample Size = 260		

Source: Field Work, 2013

3.3.7 Observations

The researcher applied personal observation to clarify and ascertain validity of issues that had been raised by respondents. The actual data that was collected during the observation were mostly notes that the researcher took while on the field which were interpreted later. The use of this method was appropriate because, the perceptions of people, their understanding and giving meaning to the things being questioned varies based on their differences in educational levels, age and other interests (Tewksbury, 2009). Besides, a lot of issues relating to the mining activities were confirmed through personal visit to the mines that, indeed, majority of the people were engaged in small-scale mining activity in the area. Other important issues observed during the field visit includes uncovered mined pits and trenches, degraded forest cover, dust pollution as a result of digging of the ground. Observation enabled the researcher to experience the practical methods of the mining processes as carried out by miners and how the mineral ores were finally obtained and marketed. The researcher also inspected some water bodies that have been polluted by the mines. This was a useful technique through which the qualitative data was generated because it provided the researcher with first hand information on issues related to the small-scale mining. Through personal observation, it was discovered that the operations of the mines have created some benefits in terms of livelihood opportunities to some households but have crippled the economic activities of others in the municipality.

3.3.8 Ethical Issues

During the period of the study, ethical principles were complied with as they serve to safeguard the dignity, right, safety and wellbeing of all the participants in the research (Babbie and Mouton, 2002; cited in; Luci, 2012). Thus, ethical measures such as justice, fairness, objectivity and respecting the privacy of all participants were all adhered to. In

this respect, an introductory letters were obtained from the Department of Geography and Resource Development explaining the academic intention of the study, which in one way or the other, won the confidence of the respondents to participate effectively in the study.

During the course of the study, there were no impositions of issues on participants with regard to participation. Respondents were informed about their rights to terminate their participations at any given time, without any penalty. Besides, in order not to expose the identity or any other information about participants, data collected were stored and handled in a professional manner. Besides, respondents were asked not to write their names on the questionnaires delivered to them. The researcher did not engage in any form of deception regarding the aims, contents or nature of the study. Lastly, the benefits that both the participants and the community could derive from the study were explained thoroughly to the participants.

3.3.9 Techniques of Data Analysis

Data analysis is necessary because it helps in cleaning and transforming the information for final decision making. The purpose of data analysis is to reduce and transform the data collected to intelligible and interpretable form so that the relations of the research problems can be tested and conclusions drawn from it. Based on this, the information gathered from the field was organized and analyzed both qualitatively and quantitatively.

Qualitative data in the form of field notes through observation and interviews were coded and analyzed using Statistical Package for Social Sciences (SPSS Version, 17.0) software. The final output was presented in the form of texts and direct quotes from key informants, community leaders and local community members. The application of this method of analysis by the researcher is based on the fact that, the original views of respondents will be demonstrated without any biased interferences with the view of the researcher. Besides,

this technique gives a detailed description of phenomena under study and also allows for fine distinctions to be drawn.

For easy analysis of the quantitative data, the pre-coded data from the questionnaires was entered using Microsoft Excel database and the Statistical Package for Social Sciences (SPSS Version, 17.0) software. In quantitative research, features are classified, counted and a complex statistical models is applied to explain what is observed. In view of this, data for the analysis were presented, explained and discussed using descriptive statistics such as frequencies, tables, graphs and percentages. In addition, a chi-square test was employed to test the proposed hypotheses. The application of quantitative analysis enabled the researcher to generalize the findings and also made comparisons between two variables. Finally, quantitative analytical approaches also allowed the researcher to report the summary of results of the study in numerical terms.

3.3.10 Limitations to the Study

A research of this nature could not be successful without any limitations. These limitations include inadequate resources in terms of time and money. Travelling to the study area and from one community to another requires additional money. Besides, more time was spent with the community members in order to obtain adequate information on the operations of the mines as practiced in the municipality.

Secondly, lack of co-operation from the respondents also posed a major problem. Most of the respondents were reluctant to give information, because of the sensitive nature of small-scale mining activity in the country as a whole. They claimed that they were being harassed very frequently by security personnel and other mining companies. In view of this, the researcher was nearly beaten or lynched at one of the mines during field

observation, because he was perceived to be a journalist or a criminal investigator. Miners fear to see strangers at the mines let alone should strangers intend to take photograph of their activities. The behaviour of the miners was frightening and life threatening both at sites and homes, because of the sensitive nature of the mining activities in the municipality and the country as a whole.

The issue of politics also posed a major challenge to the researcher. Some of the respondents were unwilling to co-operate because they thought the study was for political purposes. The respondents claimed that political leaders have been using the mining activity for their political gains, just to canvas votes in their communities after which their communities are never visited. They only co-operated after they were shown an introductory letters from the Department of Geography and Resource Development explaining the academic intention of the study. To get the assemblymen and other respondents for an in- depth interview was also a major challenge.

CHAPTER FOUR

MODE OF OPERATIONS OF SMALL-SCALE MINERS AND CONTRIBUTIONS OF MINING TO LIVELIHOODS

4.1 INTRODUCTION

This chapter focused on presentation and analysis of data obtained from respondents in the East Akim Municipal Assembly during the study. In all, 260 respondents, from four communities, were involved in the study. The findings of the study were presented taken into consideration the proposed objectives and hypotheses outlined in the study. Analysis of the results included major areas such as the background information of respondents, mode of operations and contributions of small-scale mining to people's livelihoods. It further explained how the livelihoods of people have changed positively as a result of the mining activities in the municipality.

4.2 BACKGROUND AND DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

The following provides a summary of the demographic profile of respondents interviewed for the study: age distribution, gender, marital status, educational background and ethnicity. Other socio-demographic variables discussed for both miners and non-miners in the study include the number of people in a household, main economic activity, secondary economic activity and income of respondents. The main economic activity for the miners in the studied communities is mining while that of the non-miners is food crop farming. The major livelihood activities for women in the area are farming, provision of services to miners and trading. The livelihood of men is centered on farming and mining activities. Other income generating activities for people in the studied communities includes hunting, lumbering, carpentry, masonry, driving, trading, barbering, tailoring and teaching. These

activities form the basis for the livelihoods of the respondents before the influx of the small-scale mining operations. We can therefore conclude that majority of the community members are engaged in primary economic activities.

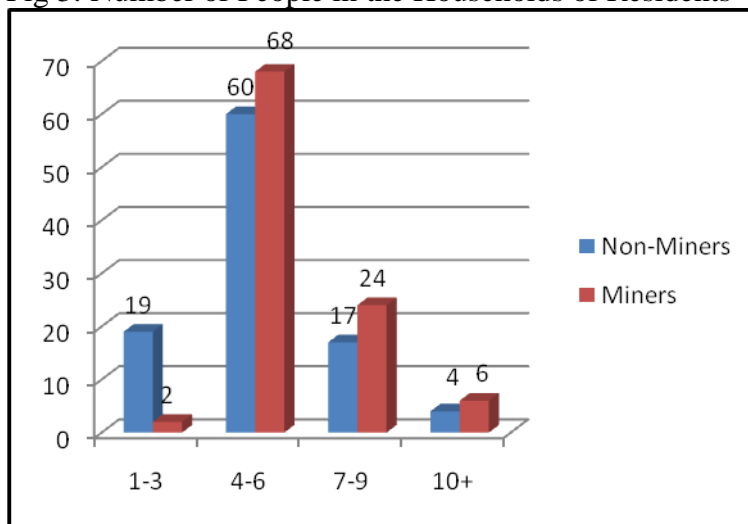
One of the main tenets of the livelihood framework under vulnerability context is seasonality. Farming and mining which constitutes the main economic activities for the people in the studied communities are seasonal in nature. The seasonality of these activities makes the people vulnerable as specified by the livelihood framework. In the studied communities, farming activities are done seasonally and farm produce are obtained only after specific seasons of the year without which local farmers have little or no food and income to survive. The act whereby miners take over farmlands as confirmed by the respondents affects the livelihoods of the majority in the studied communities. Besides, most household heads depends on single income generating activities which is also seasonal in nature, which makes them vulnerable and more susceptible to the negative effects of small-scale mining in their respective communities.

4.2.1 Number of People in the Households of Respondents

Figure 3 below indicates the number of people found in the households of respondents. This was put into categories ranging from 1-3, 4-6, 7-9 and 10 and above. Responses of miners shows that the least number of people in a households is between 1-3, which represents 2% and the highest number of people in a household ranges between 4-6, which represents 68%. On average, 5 people are found in the household of miners in the studied communities. This number of people found in households of miners is likely to put undue pressure on them to seek employment for survival. Since the main income generating activity for the people in the studied communities is seasonal in nature, most of the inhabitants engage themselves in small-scale mining. This explains why most of the

people in the East Akim Municipality prefer to take up employment opportunities in the primary sector of the economy particularly, mining and agriculture sectors.

Fig 3: Number of People in the Households of Residents



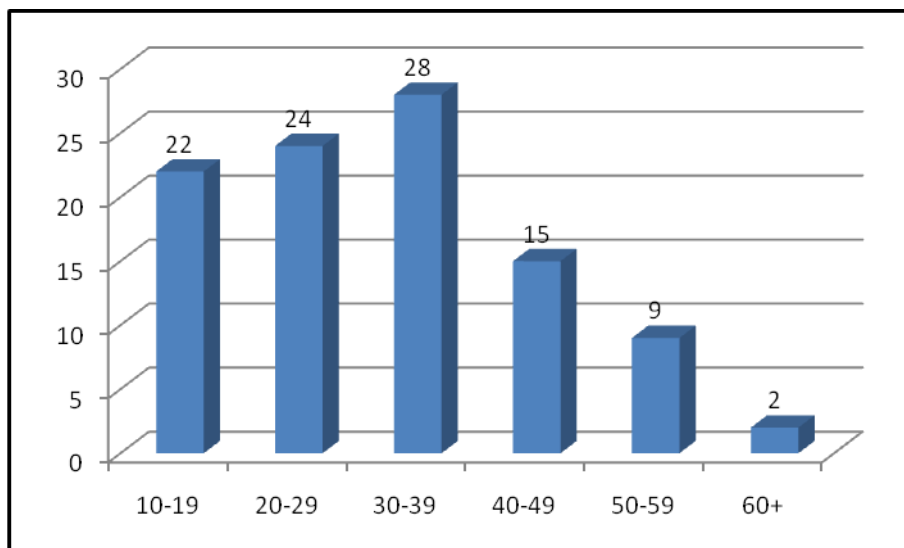
Source: Field Survey, 2013

For non-miners, the least number of people in a household is 10 people or more, which represents 4%, and the highest number of people in a household ranges between 4-6, representing 60%. On average, 6 people are found in the household of non-miners. It is assumed that the higher the number of people in a particular household, the more vulnerable the household will be to the negative effects of small-scale mining activities. Thus, unmonitored mining activities will have adverse effects on vulnerable households that many people depend on the head of household for survival. This is so because many people in the mining communities depend on land that is degraded by small-scale miners. In this regard, there is undue pressure on household heads for the survival of household members in the studied communities.

4.2.2 Age Distribution of Respondents

The age of respondents', particularly that of miners, is very essential to determine which category of people in terms of age are involved or affected by small-scale mining operations in the East Akim Municipality. Figure 4 shows the age distribution of miners in each of the four communities studied. The ages of respondents' are put into six groups ranging, from 10-19, 20-29, 30-39, 40-49, 50-59 and 60 years and above respectively. From Figure 4, the least age of miners is 11 years and the highest age is those who are 60 years and above. The age groupings shows that 22% of the respondents are between the age group of 11 and 19, 24% are between 20 and 29 years, 28% are between the ages of 30 and 39, while 15%, 9%, and 2% are all respondents between the age groups of 40 and 49, 50 and 59 and 60 years and above respectively. Thus, respondents who are more than 60 years constitute the least from the table.

Fig 4: Age Distribution of Miners



Source: Field Survey, 2013

It is clear from the responses that the highest age group for the miners are those between the ages of 30 and 39, which constitute 28%. We can therefore conclude that majority of the miners are young people below 40 years of age. This occurs as a result of the hazardous nature of the mining activities, which is physically demanding and the youth are physically stronger.

In terms of age, non-miners were put into six categories ranging from 20-25, 26-30, 31-35, 36-40 and 41 years and above. From Table 2, the lowest age group of the respondents is those between 20 and 25 years of age, which constitutes 3% and the highest age group is those who are 40 years of age and above, which constitutes 59%. This implies that majority of the respondents in the studied communities are above 40 years of age. It is believed that these are people with experience of life and could have a better understanding of the effects of small-scale mining activities in their communities. This confirms the assumption that, the more years a resident stays in a particular environment, the better his/her appreciation of the environmental effects of that area will be.

Table 2: Distribution of Non-Miners by Age

Category	Frequency	Percentage (%)
21 - 25	7	3
26 - 30	22	11
31 - 35	23	12
36 - 40	30	15
41+	118	59
Total	200	100

Source: Field Survey, 2013

4.2.3 Distribution of Respondents by Gender

Gender is defined by Food and Agriculture Organization (FAO) as “the relations between men and women, both perceptual and material”. Gender is not determined biologically as a result of sexual characteristics of either women or men, but it is a social construct (Babbie and Mouton, 2002; cited in; Luci, 2012). From Table 3, male constitutes 80% of the total respondents for miners, while female respondents represent 20%. Drawing from the results, it is clear that male constitutes the majority of the respondents interviewed. We can therefore conclude that majority of the miners are men. Thus, there is an imbalance between men and women respondents, as men are by far more than women even though females are also in the mining operation.

The result in Table 3 reflects the fact that small-scale mining is a physically demanding activity and is mainly male dominated in the municipality. For example, digging and haulage of mined ore to the surface are physically demanding in nature and require working for several hours in watery pits. This situation contributes to widespread use of hard drugs and alcohol at the mines, especially by male workers in order to work beyond limits. However, in some instances, women were employed mainly to transport mined ore in head pans to washing stations for washing.

Table 3 also shows how non-miners are distributed by gender. As shown by the responses, 53% of respondents are men, while 47% are women. It is clear from the table that men constitute the majority of the people interviewed in the studied communities. This distribution is contrary to the 2010 Population and Housing Census conducted by the Ghana Statistical Service, where male constitutes 49% of the total population and female constitutes 51% (Ghana Statistical Service, 2010). However, this imbalance in age

distribution did not affect the outcome of the study in any way, as the sample size was representative of the target population.

Table 3: Gender of Respondents

Category	Non-Miners		Miners	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Male	107	53	40	80
Female	93	47	10	20
Total	200	100	50	100

Source: Field Survey, 2013

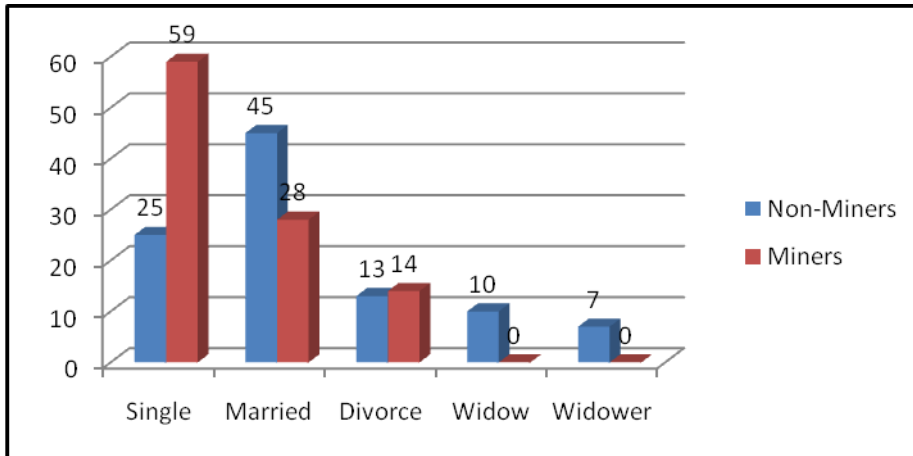
4.2.4 Distribution of Respondents by Marital Status

Figure 5 shows the responses of non-miners in terms of marital status. From the responses, 25% of respondents are single, while 45% are married. In addition, 14% are divorced, 10% widows and 7% are widowers. This responses show that, most of the non-miners are married and are likely to be affected by the small-scale mining operations in the studied communities. This is because their only source of livelihoods, the land, is being destroyed by the activities of the small-scale miners therefore making them vulnerable to poverty.

In terms of the miners, the survey revealed in Figure 5 that 59% of the miners are single, while 28% are married. Only 14% of the respondents are divorced and 8% did not declare their marital status. None of the respondents was a widow or widower. Majority of the men who are not married complained of financial problems as a major obstacle that prevents them from getting married through the appropriate means. This explains why

most of the youth, who are single struggles for employment in the small-scale mining sector to earn some income.

Fig 5: Marital Status of Respondents



Source: Field Survey, 2013

4.2.5 Distribution of Respondents by Educational Attainments

The mineral industry requires a steady supply of skilled professionals to enter the work force for efficient operations (McDivitt, 2002). Table 4 shows the educational attainments of respondents. From Table 4 below, 4 people, representing 8% of the respondents, mainly miners, had no formal education while 43 people representing 86% had Junior High School or Middle Education. In all, 3 people, representing 6% ended their educational career at the Senior High School or Vocational School levels. The general level of education of the respondents was very low, as majority of the respondents ended their education at the Junior High School or Middle Education levels. It could be implied that the only survival strategy of this class of people is to engage primary economic activities especially mining or farming as a main source of livelihood. This is because the educational attainments of these categories of people may not qualify them to engage in any meaningful educational related occupation such as banking, teaching and nursing.

Table 4: Educational Background of Respondents

Levels of Education	Non-Miners		Miners	
	Frequency	Percentage (%)	Frequency	Percentage (%)
No Education	67	34	4	8
JHS/ Middle School.	70	35	43	86
SHS/ Voc/Tec.	34	17	3	6
Tertiary	29	15	0	0
Total	200	100	50	100

Source: Field Survey, 2013

In the studied communities, non-miners, who are mainly household heads, were interviewed about their educational attainments. The result shows that 34% of non-miners had no formal education while 35% had Junior High School or Middle School Education. From the responses, 17% of the respondents completed Junior High School or Technical School Education and 15% completed Tertiary Education. It is believed that respondents who have higher educational attainments are likely to have a better understanding of the negative health and environmental challenges that confronts the small-scale mining sector in the studied communities.

4.2.6 Distribution of Respondents by Ethnic Groups

The ethnicity of respondents is essential to enable the researcher know the proportion of respondents who are migrants and those who are natives. The study shows that 128 people, representing 64% are Akan speaking people, while Ewe, Krobo and other tribes represent 19%, 11% and 7%, respectively. This implies that majority of the respondents in

the studied communities are natives, with few migrants from other communities. It is believed that the natives will have a better understanding of issues relating to small-scale mining operations in the municipality. This is because they have lived in those communities for longer period of time and can give vivid account on the changing patterns of the landscape than the migrants.

Table 5: Ethnicity of Respondents

Ethnic Groups	Frequency	Percentage (%)
Akan	128	64
Ewe	37	19
Krobo	22	11
Others	13	7
Total	200	100

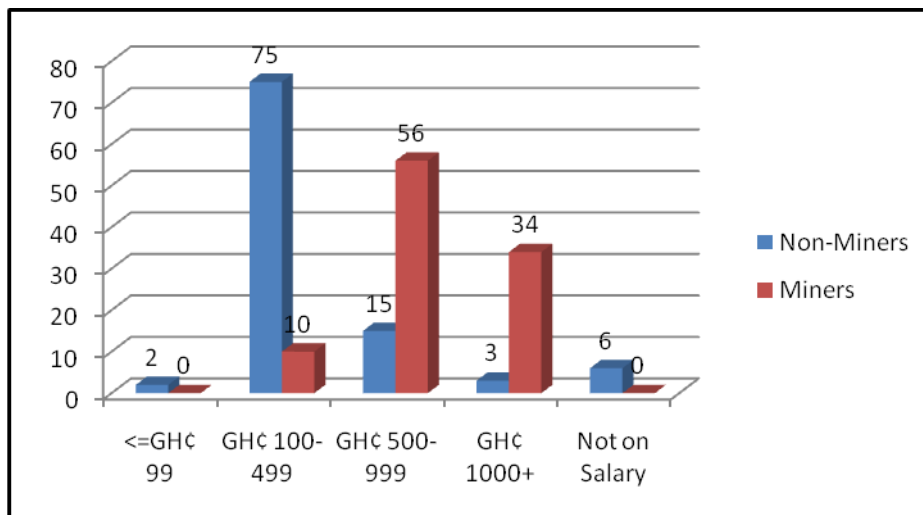
Source: Field Survey, 2013

4.2.7 Distribution of Respondents by Income

Respondents were asked about their income status in terms of what they obtain from their economic activities they undertake. Figure 6 shows how the monthly income of respondents is distributed for both miners and non-miners. From Figure 6, 2% non-miners earn monthly income below GH¢100. However, no respondents among the miners earns monthly income below GH¢100. Respondents who earn monthly incomes between GH¢100 to 499, GH¢500 to 999 and GH¢1000 and above for the non-miners represent 75%, 15%, and 3%, respectively. The response shows that 6% of the respondents mainly, non-miners were not on salary.

In terms of the income of miners, none of the respondents earn monthly income below GH¢100. However, 10% earn monthly income between GH¢100 to 499, 58% earn between GH¢ 500 to 999 of monthly income and 34% earn GH¢ 1000 and above income monthly, depending on nature of work and quantity of gold obtained at the mines. The result shows that almost all the miners are on salary. Thus, majority of the miners earn higher income than the non-miners, as shown by the results, where 54% of the miners earn income between GH¢ 500 to 999 as against 15% by non-miners. This explains why majority of the youth in the municipality are engaged in small-scale mining activity.

Fig 6: Income Distribution of Respondents.



Source: Field Survey, 2013

One major trend identified in the studied communities, which affects the livelihoods of people, is declining incomes, as reported by most of the respondents. Low income, as well as dependence on single economic activity has made many people vulnerable to poverty. Besides, loss of farmlands, together with soil erosion due to removal of land cover for mining activities has also resulted to a decline in farm yields, which eventually lead to declining incomes and poverty. As a result, people's livelihoods are affected negatively, due to the adverse effects of the small-scale mining activities in the municipality.

4.3 MODE OF OPERATIONS OF SMALL-SCALE MINERS

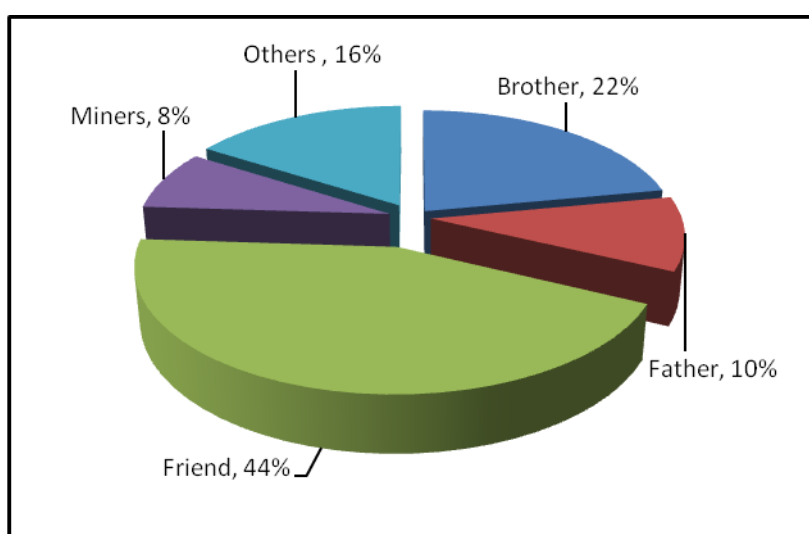
Small-scale mining operations in Ghana and other developing countries offers opportunities for the support of rural livelihoods. It also serve as a source of industrial raw materials for many industries both indigenous and foreign in many countries. It is important that small-scale miners are assisted in their efforts to operate in a technically, economically and environmentally sustainable manner. In view of this, the Government of Ghana has implemented some measures in terms of regulation to promote the small-scale mining sector in order to achieve efficiency and positive results in their operations (Hinde, 2010). Some of the major issues discussed under the mode of operations include how miners entered into small-scale mining, processes of land acquisition, methods of mining, main duties of employees at mines, sources of capital, acquisition of mining license and issues relating to law enforcement in small-scale mining.

4.3.1 Mode of Entering into Small-Scale Mining

Miners were asked about how they entered into the small-scale mining operations. Figure 7 shows the responses of miners in relation to how they had the idea to go into small-scale mining. From the responses, 8% of the miners said they were influenced by those who have been mining in their communities while 10% said they were introduced to mining by their fathers. In all, 22% of the respondents said they were introduced to mining by their brothers while 44% said their friends introduced them to mining. However, 16% of the respondents entered into the mining operations on their own wishes. This implies that most of the respondents were being introduced to mining by their friends. Thus, the influence of friend is a major determinant for people's willingness to enter into small-scale mining in the studied communities. This influence may be due to either the direct involvement of their friends in the mining activities or the benefits of mining to their

friends or the communities at large. As a result, the livelihood of the youth in the studied communities is mainly depended on the small-scale mining. Owusu and Dwomoh (2012) confirmed this finding, when they examined the impact of illegal mining on the Ghanaian youth at Kwaebibirem District. Their findings show that poverty, get rich quick, attitude of the youth, especially as portrayed by friends who are in the operations, were the main motivational factors for entering into illegal mining activities in the Kwaebibirem District.

Fig 7: How Miners Entered into Small-Scale Mining



Source: Field Survey, 2013

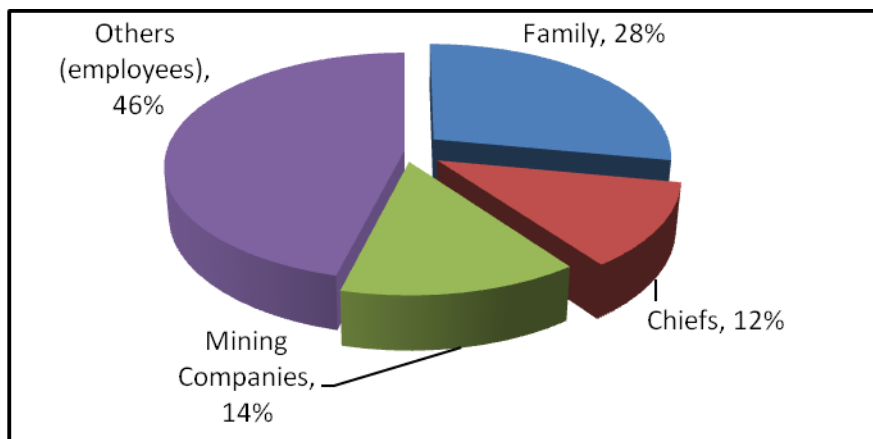
4.3.2 Land Acquisition for Small-Scale Mining

Land is a source of wealth in many nations and also a key resource for the rural and urban people as it provides an important basis for their economic and social development. Land tenure is the set of rules that determines how land is used, possessed or sold to people within societies. These rules about land may be established by the state or by custom, and the rights to acquire land may extend to individuals or families of interest within a society (Garvelink, 2012).

A total of 50 miners were asked about how they acquired land for the small-scale mining operations. From Figure 8, 12% of the miners said they acquired land from chiefs, while 14% said they use land that is supposed to belong to the Extra-Gold Mining Company and other mining companies prospecting in the area. In addition, 28% said they use family land for their operations, while 46% are mere employees, who did not acquire the land but work in the mines as laborers for their daily incomes.

This finding is confirmed by Nyame and Blocher (2010), when they examined the issue of land tenure and how it influences artisanal and small-scale mining activities in Ghana. Their findings show that, regardless of the fact that mineral resources are by law the property of the state, stool lands in mineral-endowed areas continue to be utilized and in most cases, frequently traded, according to existing customary laws and this has promoted small-scale mining in Ghana (Nyame and Blocher, 2010).

Fig 8: How Miners Acquired Land for Small-Scale Mining



Source: Field Survey, 2013

The entitlement theory also clearly explained the nature of resource ownership. The theory is meant to explore what justice tells us about property holdings of people or what can be said about and done with the property people own, when viewed from a principle of

justice (Nozick, 1974; cited in; Cust and Cooper, 2004). In terms of land ownership for mineral exploitation, the government has the ultimate right to lands with minerals underneath even though individuals, communities or households may be in a position to use and generate benefits from the land and its resources. The power to lease out lands for mining activities is the prerogative of institutions of government. Justice of acquisition is one of the principles of the entitlement theory, which explains that if you acquired something justly, then it is just to own it provided it does not make other people worse off. In all the studied communities, there is a violation of the principle of justice in land acquisition. The Minerals and Mining Act, 2006 (Act 703) entrusts all mineral in the hands of the government for the people of Ghana. Thus, the national government, in consultation with stakeholders and other institutions are responsible to grant mining leases/licences in the country (Obara and Heledd, 2006). However, landowners, opinion leaders and some chiefs arrogate power to themselves by granting mining lease to people to mine. Since the miners acquire the land without any proper consultation with the authorities responsible, such acquisitions are unjust. We can therefore say that it is not just to own such lands, according to the principle of just acquisition, because it has the tendency to make other people worse off.

Besides, the principle of justice of transfer also talks about how someone who justly owns something freely transfers that property to another, then it is just for that other person to own it, provided that it does not leave others worse off. Since lands containing minerals belong to the state, those who own such lands cannot transfer them to others, because it is unjust acquisition. However, this is not the case in the communities studied, as lands containing mineral resources are being transferred to miners by the local land owners, without any consultations with the government and other institutions responsible to grant mining leases/licences in the country. This act makes others worse off, since there is no

proper monitoring of the mining activities in these areas. As a result, resources are exploitation inefficiently, thereby causing serious harm to the environment and the livelihoods of many people in the municipality.

4.3.3 Methods of Small-scale Mining

There are several methods that are employed in small-scale mining activities. In small-scale mining operations, there are significant differences between the highly rudimentary, manual methods such as the use of pick and shovel, hand panning and sluicing and the sophisticated methods involving the use of heavy equipments, controlled blasting, processing plants among others in mining operation (Gavin, 2002). Depending on the type of mineral to be exploited, all these methods have the own strengths and weaknesses as far as small-scale mining is concerned.

In view of this, miners were asked about what methods they employ in extraction of the mineral ore. The responses show that 100% of the miners are engaged in surface mining methods, while none of the respondents is engaged in underground mining. Under the surface mining method, a group people between 2 and 20 or more are engaged in the operation. Initially they dig the ground with excavators and scoop out the soil. The soil is handled several times before the ore is retrieved. After the soil has been dug and dumped to one side of the pit, water is added to it in order to make the clayey soil muddy. The small-scale miners stand in the pit and stamp on the soils in order to make it into slurry. They then put the slurry into the hopper on the sluice box and pump water on it for it to run over the board. The hopper helps to trap any oversize material which is later discarded. The sluice box contains a blanket which traps all the heavy minerals from the slurry that runs over it. Miners therefore use mercury to amalgamate the concentrate obtained. The amalgam is burnt on a coal pot with charcoal. The unrefined ball of gold that remains is

sold to buyers. This process became clear during field observation when some mines were visited and miners interviewed on the mode of operations.

This observation is in sharp contrast with the findings of Hinton and Beinhoff (2004) that several small-scale miners throughout the world use drilling and blasting to break rock before processing. Under this method, breaking of rock is done manually, involving digging of shafts and tunnels to depths up to 30 meters using basic tools, such as picks, shovels and hammers. The influx of foreigners particularly, Chinese has also altered the type of equipments used in mining even though their influence is minimal in the studied communities. This is due to strict monitoring and constant crusade by the 'Okyehene' to combat 'galamsey' operations. With the foreign influence, excavators were being used for clearing and digging of the land before manual processes begins. This has the tendency to degrade the land thereby inducing soil erosion.

4.3.4 Main Duties of Employees at Mines

Miners perform several duties at mines, depending on the type of mineral to be mined and the available method employed during the operations. A total of 50 miners were asked to indicate what duties or roles they perform during mining operations. Out of the 50 respondents, 4% said they engage in digging of the ground/soil that contains the mineral ore with excavators, while 54% serves as porters who engage in fetching of the sand that has been dug for washing. The data shows that 33% of the miners were engaged in washing of the sand to retrieve the gold. Besides, 7% of the respondents were involved in pumping of water, while 2% were mainly supervisors who monitor the activities of the miners. During the field observation, the researcher had the opportunity to experience how miners perform their duties at the mines. The operations of miners are portrayed by the photographs in Plates 1 and 2 below.

Plate 1: Miners Carrying Muddy Sand to be washed for Gold



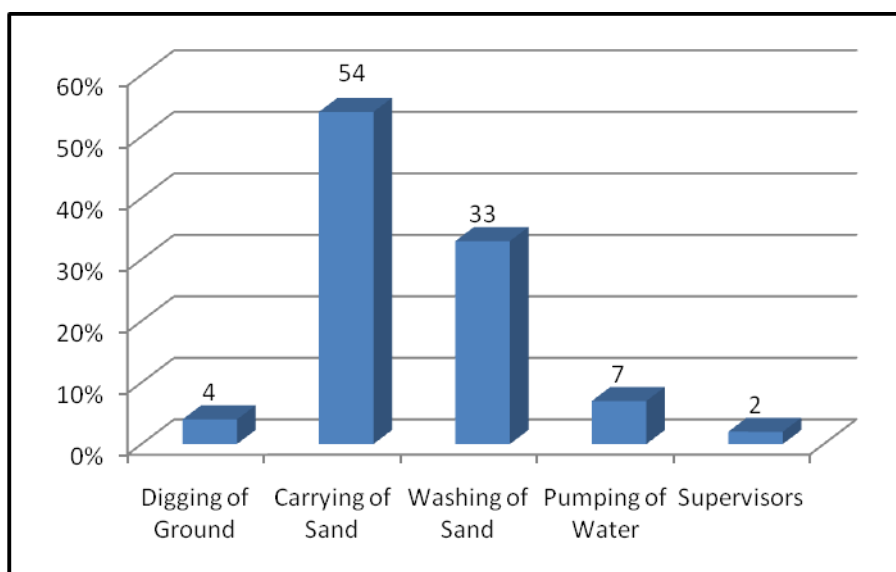
Source: Photographed by Author during Field Survey, 2013

Plate 2: Miners Washing Sand with a Sluice Box for Gold



Source: Photographed by Author during Field Survey, 2013

Fig 9: Main Duties of Miners at Mines



Source: Field Survey, 2013

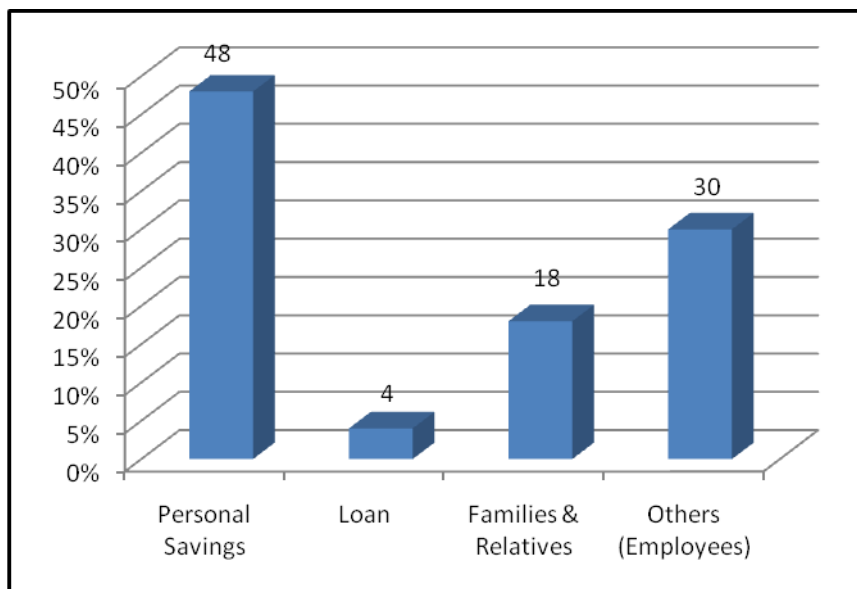
In the literature reviewed, these findings are contrary to the findings of Awumbila and Tsikata (2004) in their study on migration dynamics and small-scale gold mining in north-eastern Ghana. They found out that men came into the area and got involved in all stages of mining as sponsors, buyers, pit owners, different categories of mine workers, and processors of ground ore. In addition, women were mainly involved in sieving of gold chippings and powder and also provided support service to miners. In effect, the activities of miners in the north-eastern Ghana are quite different from that of the East Akim Municipality, as portrayed by Awumbila and Tsikata, even though there are few similarities in their operations.

4.3.5 Sources of Capital for Small-Scale Mining

Financial capital denotes the financial resources that people use to achieve their livelihood objectives. In the mining industry, sources of capital for mining relates to financial resources and how to find the right capital structures in an environment of healthy operational structure. It is an obvious fact that raising capital for mining activities has been

problematic to many mining companies as well as individuals in the industry due to the sophisticated equipments that are employed in the operations. The source of capital is essential for the success of any economic venture and the mining industry is no exception.

Fig 10: Sources of Capital for Small-Scale Mining



Source: Field Survey, 2013

In view of this, miners were asked about how they acquire capital for the small-scale mining operations. Figure 10 presents the responses of respondents in terms of their sources of capital. From the responses, 48% of respondents disclosed that they finance their mining operations through their own personal savings, while 4% of them said they take loans from banks to finance their mining activities. In addition, 18% of the respondents said they finance their mining operations through money from families and relatives, while 30% of the respondents were employees who never finance the mining operations, but were employed to work on contract bases. Because majority of the respondents finance their mining operations through their own personal savings, they were not able to expand their operations as expected. The inability of these miners to acquire

loans or get financial assistance for their mining activities explains why majority of them work on small-scale basis and also uses simple equipments in their operations.

These findings are validated by the findings of Villas-Bôas and Barreto (2002) that due to the high financial risk associated with mineral exploration and extraction, junior mining companies typically are unable to raise funds from banks for their operations. As a result, they therefore rely heavily on equity investment, through either public financing or joint ventures with larger mining companies. In effect, lack of capital is the main factor why most small-scale miners operate illegally and on small-scale basis, thereby destroying the natural environment. Besides, Koven (2005) also concludes that raising capital for mining activities of late is quite difficult due to global economic meltdown. As a result mining companies have turned creative financing such as royalty, selling a greater part of a project for cash or engaging in private equity.

4.3.6 Acquisition of Valid Mining License

There is considerable potential for growth in the small-scale minerals exploitation in Ghana. In view of this, governments over the years have implemented a range of measures to encourage small-scale miners to operate in an economically and environmentally sustainable manner. The main legislation that regulates the small-scale mining sector in Ghana is Small-Scale Gold Mining Law (PNDCL 218) that was enacted in 1989 (Hinde, 2010). Other legislations include the enactment of the Mineral and Mining Act, 2006 (Act 703). Under this Act, the Minister of Lands and Natural Resources (MLNR) is exclusively mandated to grant mineral rights and license on the advice of a technical committee, constituted at the Minerals Commission. Thus, small-scale mining is mainly reserved for Ghanaians, who have acquired the right license to mine through proper supervision and monitoring (Obara and Heledd, 2006).

Table 6: Acquisition of Mining License

Responses	Frequency	Percentage (%)
Miners with License	1	2.2
Miners without License	49	98
Total	50	100

Source: Field Survey, 2013

Small-scale miners were asked whether or not they have acquired a valid mining license to operate. Table 6 shows the responses of the respondents. Out of the 50 respondents to this question, 2% said they have acquired a mining license and 98% said they have not acquired mining license. It is evidently clear from the responses that 98% of the miners operating in the four communities studied were operating illegally. These illegal activities of the small-scale miners have aggravated the negative effects of small-scale mining in the municipality, since such activities are not properly monitored. Illegal mining activities have the tendency to destroy the natural eco-system for human and animals' survival.

According to the explanations by the respondents, procedures required to secure a license to mine on a small-scale bases are cumbersome, due to inherent delays associated with the application by the licensing authorities. Miners claimed that rely on daily gold output from the mines for survival. Therefore, the longer there is a delay in the licensing procedure, the more difficult their livelihood becomes, and that increases their poverty rates. Based on this, their only means of survival is to operate without a license.

These assertions are in sharp contrast with the provisions of the Mineral and Mining Act, 2006 (Act 703) where the Minister of Lands and Natural Resources (MLNR) is

exclusively mandated to grant mineral rights on the advice of a technical committee constituted at the Minerals Commission (Wikipedia, 2013). When a pit owner in Adadientem was asked why he operates without a license, he said: *“My brother, I have a wife and five children who all depend on me for survival, but I have no work to do. The money I get from ‘galamsey’ is what the whole family depends on for a living, so where will I get money to acquire the license? I was told it is costly and you have to go through a lot of difficulties, even if you have the money. I cannot wait for my family to die because of license, when I can have my way out”*.

Legislations and institutions, as explained in the livelihood framework are responsible for performing statutory roles by granting mining lease and license and also monitor mining activities in mining communities (Akabzaa and Darimani, 2001). However, in the communities studied, the effective linkages among these institutions for such purposes are inefficient. The act of poor collaboration among these institutions has contributed to several mining related challenges such as environmental, socio-economic and health related problems. For instance, 98% of mining operations in the studied communities, according to the respondents, are done illegally, without any proper mining license or regard to environmental laws, as stated by the legislations. This clearly reflects inefficiency among these state institutions in the studied communities. It is perceived that, law enforcement agencies such as the police, the migration service, the Municipal Assembly and some traditional leaders are being compromised on issues relating to small-scale mining in the municipality. As a result, peoples farms are being destroyed, water bodies are polluted and many homes are encroached upon. This affects the livelihoods of many households in the region negatively, thereby making their lives worse off.

This assertion is supported by the finding of Hilson (2001) that small-scale mining employs about 60% of the country's mining labor, force with about 200,000 people for illegal segment and 30,000 for the legalized segment. It can therefore be concluded that, majority of small-scale miners in Ghana do not have a valid mining license that could permit them to mine and as such operates illegally, thereby, causing severe harm to the environment and people's health.

4.4 CONTRIBUTIONS OF SMALL-SCALE MINING TO LIVELIHOOD

4.4.1 Introduction

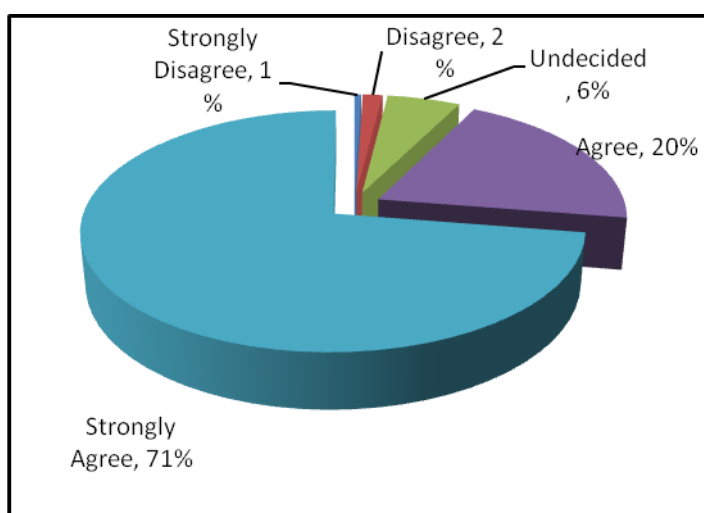
Small-scale mining has led to the development of many rural communities within locations where these activities are carried out. At the same time, these communities have been victims of several challenges such as air pollution, water pollution and environmental degradation that results from these mining operations (Offei-Aboagye et al., 2004). This section looks at the perceived positive effects of small-scale mining activities in terms of its contributions to development. To elicit the views of respondents on the benefits of small-scale mining, it is necessary to consider issues such as small-scale mining as an avenue for quick money, employment opportunities, and improvement in compensation packages, contributions of small-scale mining towards development and profitability of small-scale mining to livelihoods.

4.4.2 Small-Scale Mining as an Avenue for Quick Money Acquisition

Small-scale mining has become a major source of livelihood for many communities in Ghana. It contributes significantly to poverty alleviation and helps in community development. It is believed that most people engage in small-scale mining mainly for the fact that it is a major source of quick money. Based on this perception, respondents were

asked about their degree of agreement or disagreement on whether or not small-scale mining is an avenue for becoming rich quickly. In all, 200 respondents, particularly non-miners were interviewed. As pointed in Figure 11, majority of the respondents, representing 73%, strongly agree, while 20% of the respondents agree that small-scale mining is an avenue for quick money acquisition. However, 2% of the respondents disagree and 1% strongly disagrees. In all, 6% of the respondents were undecided on the role of small-scale mining as a means of getting rich quickly.

Fig 11: Small-Scale Mining as an Avenue for Quick Money



Source: Field Survey, 2013

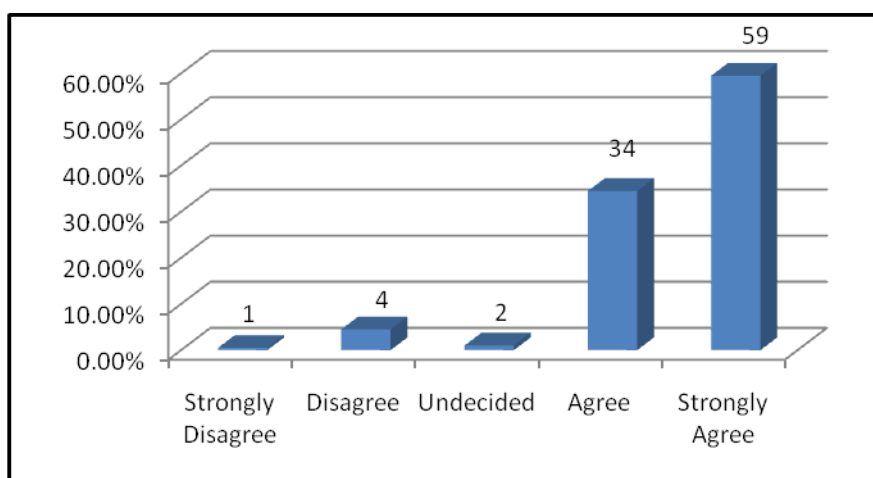
Drawing from the responses of the respondents, it becomes obvious that, majority of the respondents believe that small-scale mining is a means of getting money quickly as compared with other income generating activities, particularly farming. This explains why majority of the youth terminate their education at the Junior High School levels and are involved in small-scale mining activities. As a result, the livelihood of the youth in the studied communities is mainly depended on the small-scale mining activity for survival. A study conducted by Owusu and Dwomoh (2012) examined the impact of illegal mining on the Ghanaian youth at Kwaebibirem District of Ghana. Their findings confirm the findings

in the East Akim Municipality, as it indicate the fact that poverty, ignorance and get rich quick attitude of the youth were the main motivational factors for illegal mining activities in the Kwaebibirem District of Ghana.

4.4.3 Small-Scale Mining as an Avenue for Employment

The small-scale mining sector is perceived to be a significant contributor to formal and informal employment in many countries of the world, where mineral resources are located. The sector is said to have employed thousands of people particularly, in developing countries where poverty is pervasive and livelihoods are becoming unmanageable among the inhabitants within the catchment areas of the mines (Agbenyega, 2013).

Fig 12: Small-Scale Mining as an Avenue for Employment



Source: Field Survey, 2013

A total of 200 respondents mainly non-miners were asked about their degree of agreement or disagreement on whether or not small-scale mining is an avenue for employment generation. Out of this number, 1% of the respondents strongly disagree, 4% disagree and 2% were undecided to the question that small-scale mining is an avenue for employment generation. In addition, 34% of the respondents agree and 59% of them strongly agree that

small-scale mining is an avenue for employment generation. The implication here is that majority of the respondents believe that small-scale mining generates employment to a great number of the youth in the East Akim Municipality. In effect, most of the youth take up employment in the small-scale mining sector and does all kinds of work at the mines, ranging from digging of the ground to washing of the finished products. Some of the miners have been engaged in the mining activity through their own financing, while others were employed by pit owners therefore in the municipality.

The explanations given by the respondents indicate that small-scale mining operations offer excellent opportunities for employment. It also leads to the development of indigenous entrepreneurs, because of low barriers to entry in terms of capital needs and formal educational requirements. In many rural areas, where other jobs are non-existing, or are of low paying, the only means of survival of the majority is to take up employment in the small-scale mining sector. The sector also serves as a source of raw materials for local industries, including the jewellery and construction industries. These findings have been confirmed by the Ghana Minerals Commission (2002) that in 2003, the registered small-scale gold and diamond mines in Ghana generated employment for over 100,000 miners (Ghana Minerals Commission, 2002; cited in; Amankwa and Anim-Sackey, 2003). It is believed that the unregistered small-scale mines could provide employment to several times the number of the registered mines, particularly in the rural areas where lucrative jobs are inadequate and sometimes unavailable.

In addition, the finding is also validated by the study conducted by Hilson (2001), explaining that in Ghana small-scale mining operations generates employment for thousands of people particularly rural folks thereby, reducing the rate at which people migrate to urban centers. The Minerals Commission and Ghana Chamber of Mines

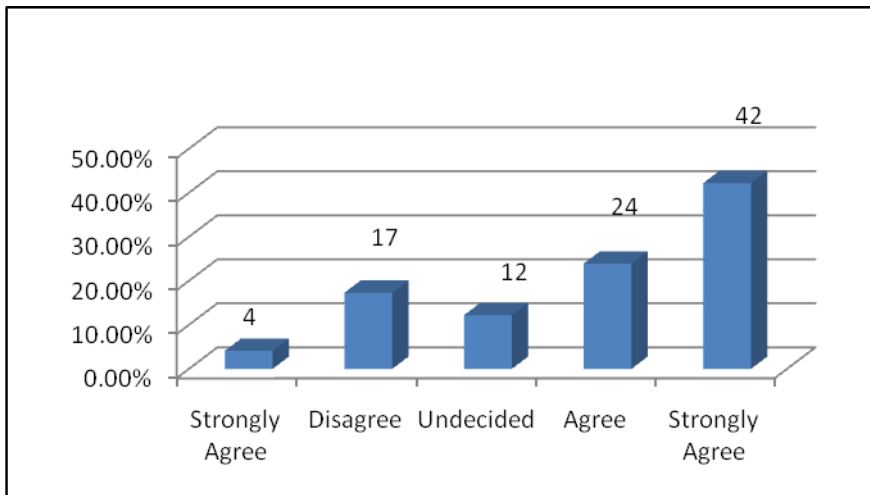
confirmed that, 60% of the country's mining labor force is employed by the small-scale mining sector. The current estimation of employment in the sector in Ghana is around 200,000 people for illegal segment and 30,000 for the legalized segment (Hilson, 2001; Ghana Chamber of Mines, 2008). Besides small scale mining also gives indirect jobs as people sell food stuffs, drinks and other consumable items which are highly patronized by the miners (Mwaipopo et al., 2004). The small-scale mining sector if properly managed Akabzaa and Darimani (2001) could provide employment for many rural communities and generate significant revenue to governments, for major development projects (Ghana Chamber of Mines, 2008).

4.4.4 Improvement in Compensation Packages for Affected Farmers

In Ghana, the basic law, which regulates all mining activities, is the Mining and Minerals Law, 1986 (PNDCL 153). However, this Law does not made provision for compensation for acquisition and deprivation of land for mining purposes. The passage of the Mineral and Mining Act, 2006 (Act 703) was to address some of the flaws in the previous legislation. However, it has provided no clear direction for the assessment for deprivation of land use (Hinde, 2010). Undoubtedly, there are tensions and conflicts between mining companies as well as small-scale miners and affected farmers on land acquisition and its related issues of compensation packages.

In order to assess the contributions of small-scale mining to the livelihoods of people in terms of compensation packages, 200 non-miners were asked about their degree of agreement or disagreement on whether or not small-scale mining has led to an improvement in compensation packages for loss of land in their communities.

Fig 13: Small-Scale Mining Improves Compensations



Source: Field Survey, 2013

From the responses given, 4% of the respondents strongly disagree, 7% disagree and 12% were undecided to the question. In addition, 24% of the respondents agree while 42% strongly agree. Approximately 42% of the respondents believed that small-scale mining operations have brought an improvement in compensation packages for affected people in the studied communities. When respondents were asked of the amount of money given to affected farmers in terms compensation, they explained that the amount of compensations ranges between GH¢1,500-10,000, depending on the size of land being affected. Drawing from the findings in Figure 13, we can conclude that there is some degree of compensation for affected farmers. However, respondents complained about the inadequacy of the compensation packages taking into consideration the benefits their farm produce might have brought if their farms were not destroyed and the produce sent to the market for sale.

4.4.5 Contributions of Small-Scale Mining towards Community Development

In many rural communities in Ghana, small-scale mining is a significant contributor to the economic and social well-being of many individuals and households. It serves as a main source of livelihood for millions of people particularly, rural communities where poverty

is pervasive. With regard to the issue of community development, respondents were asked whether or not small-scale mining has contributed towards the development of their communities. In Table 7, 125 respondents representing 63% said small-scale mining has contributed towards the development of their communities and 75 respondents representing 37% said small-scale mining has not contributed towards the development of their communities.

Table 7: Small-Scale Mining Contributes to Community Development

Responses	Frequency	Percentage (%)
Yes	125	63
No	75	37
Total	200	100

Source: Field Survey, 2013

From the responses, one can conclude that majority of the respondents believed that small-scale mining has contributed to development in their communities. In the mining communities, some feeder roads have been constructed to link mining sites. These roads are extensively used by farmers to their farms and also help them to transport goods from their farms to their communities. Besides, small-scale mining has also promoted trade in the studied communities. The influxes of migrants as well as local miners into the studied communities have also impacted positively on trading and other commercial activities. Traders particularly food vendors and drink sellers usually make high sales when miners are making progress. When a food vendor at Adadientem was interviewed on the contributions of small-scale mining to community development, she complained that: *“when miners are arrested I do not make any sale since this is a small community and it is*

only the miners that help us get some money. Without them, all the food we prepare gets waste and this affects our business badly. Without the presence of the miners we the sellers cannot make any progress in our community". Others believed that small-scale mining has provided them with income through employment generation and has made it possible for them to develop their community.

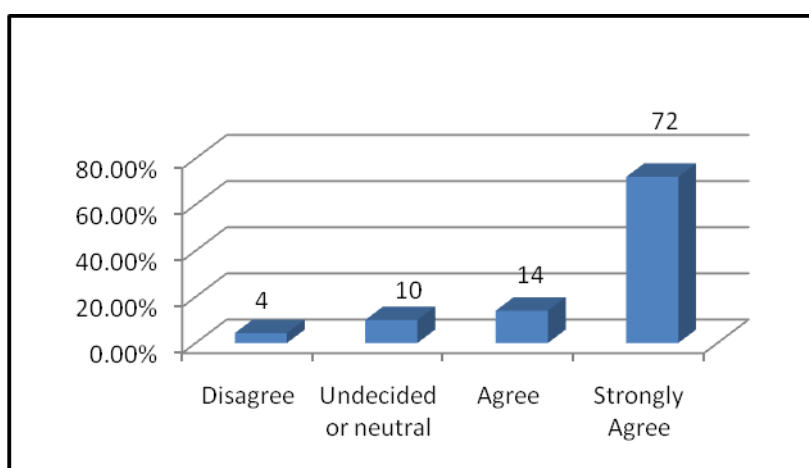
This responses from participants revealed similar results by the International Institute for Environment and Development (2013) that small-scale mining provide jobs and income for 20-30 million of the world's poorest people and supports the livelihoods of five times that number. Thus, artisanal and small-scale mining employs ten times more people than large-scale mining and serves as a means of rural development. Small-scale miners contributed 23% and 27.2% of total national gold production in 2010 and 2011 respectively. Currently, all the diamonds produced in Ghana are by artisanal or small-scale miners (Aguiar, 2012). These productions could be used for community development in areas where the mining activities are located. Besides, the 37% who said small-scale mining has not contributed towards the development of their communities claimed that miners have destroyed their land and water bodies but have failed to provide them with portable water. Besides, most of the miners dig close to people's homes and more importantly, the main road networks that link the various communities in the region.

4.4.6 Profitability of Small-Scale Mining

In terms of contribution of small-scale mining to the livelihoods of people in the communities studied, 50 miners were asked about their degree of agreement or disagreement on whether or not small-scale mining is more profitable than other jobs in their communities. Out of the 50 respondents, 4% disagree, 10% were undecided, 14% agree and 72% strongly agree that small-scale mining is more profitable the other jobs.

It is clear from the responses that majority of the respondents strongly agree that small-scale mining activity is more profitable than other jobs. The main economic activity in the in the studied communities is farming, which is a seasonal in nature. Due to the influx of small-scale mining activity in the area, most of the young people prefer to work at the mines than to learn a trade or go into farming and wait for years before getting some income. A 35 year miner at Kibi was interviewed on why he prefers mining to other jobs. This is what he has to say: “*Farming is difficult to do because it takes a long time for you to harvest your crops. How do I survive before that time? After all, what you get from the farming activity at the end is also not enough to feed your family, but with mining I can manage to survive*”. This explains why most of the miners prefer to work in the mining sector than any other job for survival. On the contrary, 4% of the respondents disagree with the assertion that mining is more profitable than other jobs. They believe that mining activities degrade the environment and that anything that destroys cannot be profitable. They believed that small-scale mining does more harm to their community than god.

Fig 14: Small-Scale Mining being Profitable than other Jobs



Source: Field Survey, 2013

Regarding the responses on the profitability of small-scale mining than other jobs, miners were asked whether or not small-scale mining has led to an improvement in the socio-economic lives of people in the studied communities. Out of the 50 respondents to this question, 90% believed that small-scale mining has led to an improvement in the socio-economic lives of people in the studied communities, while 10% do not agree to the assertion. This implies that majority of the respondents believed that small-scale mining has led to an improvement in the socio-economic lives of people in the municipality. The respondents who agreed explained that small-scale mining stood out as a major economic activity that brought an improvement in their income levels. In view of this, 16% of the respondent claimed that through small-scale mining they have been able to build or renovate their houses and stores while 9% were able to buy cars that they use for business. In addition, 50% of the respondents said they were able to provide for their families the basic needs of life, such as food and clothing through the mining activity. In terms of human capital development, 25% of miners were able to send their children to school through the mining activity. Thus, they were able to afford the education of their children to enable them acquire knowledge that is necessary for human capital development.

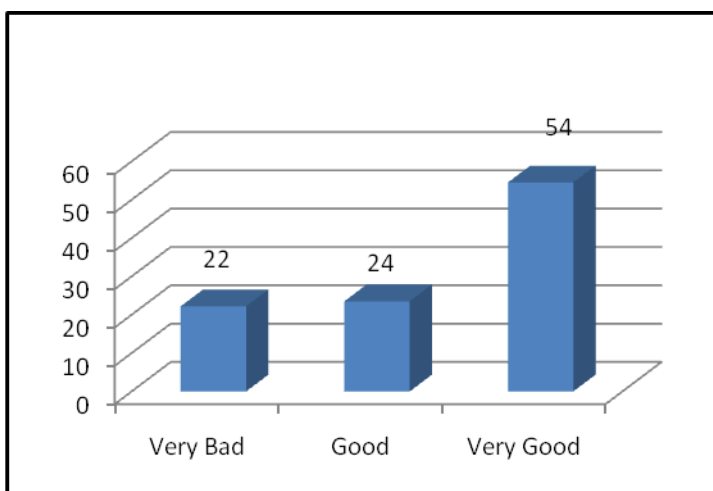
4.4.7 Importance of Small-Scale Mining as an Economic Activity

There are several perceptions about the role of small scale mining as an economic activity. While some people consider it as a main source of livelihood and poverty alleviations, others see it as dirty and unprofitable economic activity (Hilson, 2001). In view of this, respondents were asked whether or not small-scale mining is important as an economic activity. Figure 15 shows the responses of respondents taking into consideration the effects of small-scale mining. From the responses, 22% of respondents said small-scale mining is bad while 24% of the respondents said small-scale mining is good. Majority of the

respondents which constitutes 54% said small-scale mining is very good. They believe that small-scale mining has enhanced their physical capital base. These include building and renovation of houses, generation of employment to the majority and purchasing of vehicles and other physical asserts that gives them daily incomes.

To confirm these assertions, a review of the literature shows that small-scale mining is a major source of income for many people. It provides jobs and income for million of the world's poorest people and supports the livelihoods of several others (Agbenyega, 2013). In 2003, the registered small-scale gold and diamond mines in Ghana generated employment for over 100,000 miners. Apart from the direct employment, small-scale mining also generates substantial numbers of indirect jobs in other sectors of the economy due to the demand created for production, inputs, transport and other services. Other people related indirectly in the sector are gold buyers, goldsmiths, traders, food vendors among others. The small-scale mining sector, if properly managed, could provide employment to many rural communities (Ghana Minerals Commission, 2002; cited in; Amankwa and Anim-Sackey, 2003).

Fig 15: Importance of Small-Scale Mining as Economic Activity



Source: Field Survey, 2013

Hoadley and Limpitlaw (2004), confirmed that the activities of the small-scale mining sector are largely poverty driven, as there is a correlation between the Human Development Index (HDI) position of countries and the proportion of the total workforce involved in it. When an assemblyman of Ahwenease was interviewed on his views on small-scale mining, he said: *“small-scale mining is not bad per se, in that it helps our youth by giving them something to do, this in a way prevents them from moving to cities in search of jobs. In my own way, the work is good but we cannot rule out the negative effects that the miners cause to our environment especially the land and our rivers. These are the only challenges we have with the miners. If they are able to do it in a proper way by covering all the pits for us, then it is good. However, they must be monitored, controlled and regulated”*.

On the contrary, 22% of the respondents said small-scale mining is bad. They believe that, despite the positive effects of small-scale on the physical capital stocks of people, there are also numerous negative effects as well. Small-scale mining causes a major threat to the main physical capital stock, such as land for farming and other activities. In addition, respondents complained about the fact that small-scale mining leads to the destruction of the natural environment, flora and fauna, roads and homes of many people in the municipality.

CHAPTER FIVE

CHALLENGES AND COPING STRATEGIES OF SMALL-SCALE MINING

5.1 INTRODUCTION

This section of the study examined the negative effects of small-scale mining activities in the in the East Akin Municipal Assembly. These negative effects are discussed in the livelihood framework as vulnerability contexts which are external factor that can change people's ability to make a meaningful living. The livelihoods of people and their available assets are fundamentally affected by vulnerabilities such as trends, shocks and seasonality over which they have limited or no control over. Major issues discussed under this section includes environmental effects, health related effects and socio-economic effects of the mining activities to the lives of people.

5.2 ENVIRONMENTAL AND HEALTH EFFECTS OF SMALL-SCALE MINING

Environmental effects of small-scale mining include the destruction of natural capitals through the use of the natural resource stocks from which productions and services are derived. Among the natural capital stocks that are frequently exploited for livelihoods are land, forests, marine and water resources and air quality. In Ghana, the environmental impacts of small-scale mining activities are put into three categories including the damage to the lithosphere, hydrosphere and the atmosphere (Aryee et al., 2003; cited in; Offei-Aboagye et al., 2004). Small-scale mining activities can generate many kinds of environmental damages. It is believed that the inefficient use of natural resources on the environment has resulted to such serious environmental and health problems that affect the well being of many individuals and households.

In view of this, respondents were asked whether or not small-scale mining has caused any negative environmental effects on people's livelihoods in their communities. Drawing

from the responses, only 2% of the respondents said small-scale mining does not affect the environment while 8%, said they do not have any idea and 90% said small-scale mining affects the environment. This implies that over 90% of the respondents agreed that small-scale mining has negative effects on the environment. The reason given by the respondents in respect to the negative effects of small-scale mining on the environment was that the activities of the miners tend to destroy and degrade the forest ecosystems. The natural habitat that plants and animals survive in is being destroyed and livelihood activities, such as farming, gathering of firewood, hunting for bush meat and logging for timber are threatened by illegal mining activities. When the Assemblyman of Apapam was interviewed on the environmental effects of small-scale mining, this is what he had to say: *“Small-scale miners are destroying our land for us because the land takes several years to recover when destroyed. Anywhere they find their gold; they go in for it and destroy our natural forest and farms that we survive on. Our lives are threatened by these people (small-scale miners) because they don’t have respect for any individuals or any group of people. We can only negotiate with them to reclaim the land after use and pay compensation to affected farmers, because some of our youth depends on the mining for survival. This could be the way, I believe”*.

This assertion was confirmed by the evidence of the East Akim Municipal Assembly (2012) that small-scale mining covers about 159 acres of land, with ultimate challenges of destruction of forest cover and farmlands in the mining areas. The encroachment of small-scale miners to major roads linking the various communities, as well as people’s homes were the major complains by most of the respondents. Small-scale miners mine very close to people’s homes and roads, thereby making lives unsafe. Besides, some respondents revealed that footpaths leading to their respective farms are being blocked by the miners during their operations, without any alternative.

These findings can equally be related to the findings of the Centre for Development Studies (2004), that small-scale mining sector is strongly associated with widespread land degradation, loss of biodiversity, natural resources and deforestation. The report further indicates that in most small-scale mining areas, dug out pits are not reclaimed, and previously vegetated areas are not re-graded, consequently inducing erosion and subsequent siltation (Donkor et al., 2006). Akabzaa and Darimani (2001) also came out with similar findings when they revealed that, extensive areas of land and vegetation in Tarkwa mining area have been cleared to make way for surface mining activities. It was observed that open pit mining concessions have taken over 70% of the total land area of the Tarkwa mining area.

Relating the responses to the livelihood framework indicates that small-scale mining operations have led to the degradation of the natural capital stocks that are available for people to earn a living. When respondents were asked about the effects of the environmental challenges on their lives, they revealed that there is inadequate supply of food which eventually leads to food scarcity. The persistent destruction of forest cover causes serious low crop yields and loss of biodiversity which affects the livelihoods of respondents. This is because the land which is supposed to be used for agricultural activities is being destroyed for mining purposes. Besides, majority of the youth who are supposed to be engaged in farming have resorted to work in the small-scale mining sector and have abandoned farming as a means of livelihood. In addition, water, dust and soil pollutions also cause widespread health related diseases as most of the chemicals used in mining enters the soil thereby causing food poisoning.

Table 8: Environmental challenges Associated with Small-Scale Mining

Number of years in a community	Environmental Effects of Small-Scale Mining		
	Mining affects the Environment	Mining does not affect the Environment	Don't know
	Percentage (%)	Percentage (%)	Percentage (%)
<= 1	7	40	25
2 - 4	63	40	62
5 - 7	30	20	13
8 - 10	0	0	0
11+	0	0	0

Source: Field Survey, 2013

Chi square value calculated: 11.885, df: 4, Probability value: 0.018

To validate the claims of respondents on the environmental challenges, a chi-square test was performed to verify whether there is a significant relationship between respondent's perception about environmental effects of small-scale mining and the number of years they stay in their communities. From the chi-square test, we can conclude that the p-value (0.018) is less than the conventionally accepted significance level (0.05). Since ($p < 0.05$) we reject the null hypothesis (H_0) and accept the alternate hypothesis (H_A) that there is a significant relationship between respondent's perception of environmental effects of small-scale mining and the number of years they stay in their communities. From Table 8, the chi-square statistics is significant at 0.05 level.

Plate 3: An Excavator Degrading Land during Surface Mining



Source: Photographed by Author during Field Survey, 2013

This means that those who have stayed relatively longer in the mining communities have better opportunities of appreciating the negative effects of small-scale mining on the environment, as compared with those who have stayed for relatively shorter periods. Thus, the chi square analysis confirmed that the number of years that respondents' stay in the communities affects their knowledge on small-scale mining activities on the environment. In this regard, the alternative hypothesis (H_A) that there is a significant relationship between respondent's perception of environmental effects of small-scale mining and the number of years of stay in their communities is validated. The main perceived environmental effects of small-scale mining emphasized in the study includes loss of farmlands to miners, presence of uncovered mined pits, effects on water bodies and health of people in the municipality.

Plate 4: Small-Scale Mining Operations and Environmental Effects



Source: Photographed by Author during Field Survey, 2013

Plate 5: Small-Scale Miners busily Encroaching People's Homes and Roads



Source: Photographed by Author during Field Survey, 2013

5.2.1 Loss of Farmlands to Miners

The main economic activities for respondents in the studied communities are food crop farming and mining. In view of this, land becomes a valuable natural asset upon which both miners and non-miners depend on for survival. Land issues sometimes results to conflict between miners and the non-miners in the mining communities. About 200 non-miners in the four communities studied were asked whether or not they have lost their

farmlands to miners. The responses in Table 9 shows that approximately 51% of the respondents said they have lost their farmlands to miners and 49% said they have never lost their farmlands to miners. This implies that over 50% of the respondents in the municipality have ever lost their farmlands to miners.

Table 9: Loss of Farmland to Miners

Responses	Frequency	Percentage (%)
Yes	101	51
No	99	49
Total	200	100

Source: Field Survey, 2013

The act of taking over farmland by individual miners and mining companies is the most common form of shock identified by respondents in studied communities as specified by the livelihood framework. This situation has lead to shortage of foodstuff in many parts of the municipality because lands which could have been used for farming purposes are being used for mining activities. Besides, farmers have to travel over long distances to newly acquired farmlands, a process which affects their production capacities. Other problems associated with loss of farmland are low crop yield, due to loss of soil nutrients and low income to farmers. The ultimate implications for these effects are hardships, hunger, high cost of living and poverty. This became clear from the responses of majority of the respondents in the municipality.

These responses are validated by other researches on small-scale mining related issues. Andre and Gavin (2013) argued that gold mining in Ghana on small-scale bases helps the

general economy at the national level but at the local level, individual communities are faced with numerous social and environmental problems including destruction of farmlands. A study conducted by Akabzaa and Darimani (2001), also confirms this assertion as the findings from this study, shows that poverty is pervasive and endemic in mining communities. He believed that mining companies have taken over vast lands for their operations in most of the mining communities, depriving such communities of their chief sources of livelihoods being the land and other natural resources.

These problems are emphasized by the principle of rectification of injustice espoused by the entitlement theory as reviewed in the literature. Based on this principle, if someone unjustly owns something, then the situation ought to be rectified by restoring the property to its rightful owner. It is clear that over 50% of respondents interviewed disclosed that they have lost their farmland to miners with little or no compensation. According to the principle of rectification of injustices, such lands or farms are supposed to be returned to their rightful owners but this is not the case. Due to this, most of the respondents become worse off as a result of the mining activities. The entitlement theory only applies if the original acquisition is just, and the transfer of it is also just. But, much of the mining concessions in the studied communities were transferred unjustly to the miners since only state institutions are responsible for giving mining license to miners in the country (Nozick, 1974; cited in; Cust and Cooper, 2004).

Based on the question of loss of farmland, respondents were asked about whether or not they were compensated. From Table 10, out of the 51% of the respondents who lost their farmlands to miners, 30% disclosed that they were compensated while 70% were not compensated. This means that about 70% of the respondents have lost of their financial

returns as a result of the operations of the mines in the municipality. Lack of compensation makes the farmers worse off and eventually results to high cost of living and poverty.

Table 10: Compensations for Loss of Farmlands

Responses	Frequency	Percentage (%)
Compensated for Loss Farmlands	30	30
Not Compensated for Loss of Farmlands	71	70
Total	101	100

Source: Field Survey, 2013

However, the 30% of the respondents, who were compensated, complained that the money they received from the miners does not match the income they anticipated to have obtained, if they had sold their produce at market. This explains why majority of the respondents were negatively affected by the operations of the mines in the municipality. When an affected farmer in Apapam was asked about the issue of compensation, he disclosed that *'the compensations we are given does not much our losses had our crops been harvested and sold in the market. We would have obtained more money as incomes than what we are given in the name of compensation. Now our drinking water is polluted and all the farms we have are also gone but we have no benefits from that. How do we survive if all our sources of livelihoods are taken away by miners with little or no compensation? I hope you will tell the government to help us to drive the miners away because they are threats to our lives'*.

5.2.2 Presence of Uncovered Mine Pits

One of the major environmental challenges in the East Akim Municipality is the presence of pits and trenches that have been dug by the miners and left uncovered. Out of the 200 respondents asked about whether or not there are uncovered mine pits in their communities, 99% said 'yes' and 1% responded 'no'. Convincingly, almost all respondents agreed that small-scale mining creates deep pits and trenches in their communities. According to the respondents, pits are dug haphazardly throughout the mining areas in the municipality and left uncovered even after the mining operations are over. In view of this, respondents were asked what consequences such pits bring to their livelihoods. They explained that the pits serve as death traps for both human beings and animals alike. Most importantly, many innocent people lost their lives as a result of falling into such pits. When the Assemblyman of Kibi was interviewed on this issue he said: *'few years ago, two people lost their lives in one of the pits left uncovered by the miners. People fall into them always when they go to farm. Just last year one of the students of ABUSCO was drowned in one of the disused pits near one of their dormitories. Even part of the school compound is being dug for gold. If these illegal miners are not driven away, the whole community will one day be filled with such dangerous pits and people's lives will be in danger'*.

Responses from participants also revealed that the disused pits servers an obstacle to farmers in several ways. These pits blocks most of the footpaths leading to people's farms and also makes farming unattractive since the terrain becomes uneven for efficient farming practices. Besides, the top soils are being scooped off through the mining activities thereby causing soil erosion. This in one way or the other eventually, results to low crop yield for farmers. Some of the respondents also claimed that the uncovered pits

serves as breeding grounds for disease causing organisms such mosquitoes, which cause malaria and other water related diseases. This assertion was confirmed by the East Akim District Health Management Team (2006) report which states that malaria tops the first ten top diseases in the East Akim Municipality, thereby constituting 56% of all diseases reported in the municipality.

Table 11: Presence of Disused Pits

Responses	Frequency	Percentage (%)
Yes	198	99
No	2	1
Total	200	100

Source: Field Survey, 2013

A review of the available literature confirms the rate at which the disused pits serves as a major threat to human lives in mining communities. The Ghana News Agency (2013) confirms that sixteen ‘galamsey’ operators including two women at Kyekyewere, near Dunkwa have been confirmed dead when a portion of land caved in on them. They were believed to have defied warnings to stay away from a mining landsite, which was currently being reclaimed. Jamasmie (2013) also confirmed that hundreds of miners have died in Ghana, as a direct consequence of poor safety conditions and uncontrolled digging of land at illegal mining operations. Between 2011 and 2012 alone, over 300 illegal mining-related deaths occurred among illegal mining operators in some mining communities in Ghana. This was partially as a result of undocumented immigrants into the country. Besides, the influx of local people participating in the small-scale mining sector for livelihood is also a major causative factor.

Plate 6: An Excavator Digging pits

Plate7: A Typical Example of Uncovered Mined Pit



Source: Photographed by Author, 2013

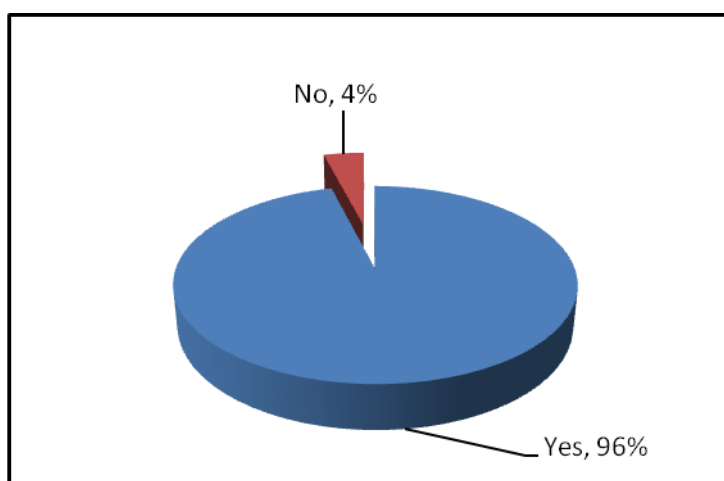
Source: Photographed by Author, 2013

5.2.3 Effects of Small-Scale Mining on Water Bodies

The Birim River is one of the major rivers in the East Akim Municipal Assembly that serves as a source of water for many people. Apart from it providing water and fish, it is also a national heritage site for the Akim communities. Respondents were asked whether or not small-scale mining has any effects on water bodies in their communities. Figure 16 below shows the responses of respondents. Out of 200 respondents, 4% said small-scale mining has no effects on water bodies while 96% said that small-scale mining has major effects on water bodies. The Responses from participants revealed that small-scale mining causes serious harm to water resources in the municipality. Poisonous chemicals, such as mercury and cyanide used by the miners pose serious threat to human beings, fishes and other aquatic animals.

Some of the negative effects mentioned by the respondents were pollution of water bodies, discoloration of streams and rivers and destruction of aquatic lives. According to the respondents, the Birim River and other smaller streams are heavily polluted, as a result of the small-scale mining operations in the municipality. As revealed by the respondents, the Birim River has muddy appearance because of mud and other more dangerous substances thrown into it by small scale miners, popularly known as ‘galamsey’. Small scale miners have invaded the river basin for gold and diamond mining activities at the expense of the health of the people who depend on the river as a source of safe drinking water and also for other purposes.

Fig 16: Effects of Small-Scale Mining on Water Bodies



Source: Field Survey, 2013

This result have been confirmed by a study conducted by Opare et al., (2012) on outbreak of cholera in the East Akim Municipality Assembly following unhygienic practices by small-scale gold miners. The findings revealed that, cholera outbreak affected all age groups in the municipality and more especially, young adult males. This was probably due to their involvement in the brisk small-scale mining activities in the area, which exposed them to the diseases. In some instances, the flow of the river is diverted to mining sites by

the ‘galamsey’ operators, where water is pumped to wash the gold ornaments. These activities affect the quality of the water for human use in the municipality and also results to several water related diseases.

Plate 8: Polluted Rivers by Small-Scale Miners



Source: Photographed by Author during Field Survey, 2013; Altravels.com

5.2.4 Effects of Small-Scale mining on Health

Health and safety risks differ according to where the mines are, what products are being mined, who is involved and what processes are used in the operations (Carolyn and Ahern, 2001). Small-scale mining is divided into deep and open cast mining. However, in all levels of mining operations the health risks occur unabatedly. Throughout the world, mining remains one of the most hazardous occupations. It causes not only short term injuries and fatalities, but also long term impacts such as cancers and respiratory

conditions, like silicosis, asbestosis and other severe diseases to miners and the surrounding communities (Stephens and Ahern, 2001).

Table 12 provides information on responses of non-miner on whether or not small-scale mining has any effects on the health of people in their municipality. Drawing from the responses, 57% of the respondents said mining affects the health of people while 3% said mining does not affect the health of people. However, 40% of the respondents said they do not have any idea about whether or not small-scale mining operations has any effect on the health of people.

To validate respondent's views on health implications relating to small-scale mining, a chi-square test was performed to verify whether or not there is any significant relationship between respondent's appreciation of health problems associated with small-scale mining and their educational status. From the chi-square test, we can conclude that the p-value (0.007) is less than the conventionally accepted significance level (0.05). Since ($p < 0.05$), we reject the null hypothesis (H_0) and accept the alternate hypothesis (H_A) that there is a significant relationship between respondent's appreciation of health problems associated with small-scale mining and their educational status. From the table, the chi-square statistics is significant at 0.05. The chi square analysis showed that, number of years of schooling affects people's views on health implication relating to mining activities in the municipality. This implies that those who had higher education had a better knowledge about health implications related to small-scale mining than the less educated respondents. Hence, respondents' appreciation of mining effects on health is positively correlated with their levels of education. The hypothesis that there is a significant relationship between respondent's appreciation of health problems associated with small-scale mining and their educational status is therefore validated.

Table 12: Health Implications Relating to Small-Scale Mining

Educational Background of Miners	Health Effect of Small-Scale Mining		
	Mining affects Health	Mining does not affect Health	Don't know
	Percentage (%)	Percentage (%)	Percentage (%)
No Education	18	0	16
JHS/Middle School	17	0	17
SHS/Voc./Tec School	9	1	4
Tertiary	13	2	3

Source: Field Survey, 2013

Chi square value calculated: 17.830, df: 6, Probability value: 0.007.

This claim has been confirmed by the District Health Management Team (DHMT), Kibi (2006) that the East Akim Municipal Assembly is faced with several environmental related diseases as well and accidents at mines as a result of small-scale mining operations. Data obtained from the DHMT shows that, among the first ten top diseases in the municipality, the first six diseases, except hypertension, are mining related disease. The data shows clearly that malaria tops the first ten top diseases in the municipality, constituting 56.7%, followed by upper respiratory tract infections 10.6%, diarrhea 5.8%, and domestic accidents 5.0% while skin diseases and ulcer constitute 3.5%, respectively. These are equally mining related diseases as revealed by the data. Thus, small-scale mining negatively affects the health of people in the studied communities.

According to the literature reviewed, the use of mercury in small-scale mining has also caused numerous health effects. Appel and Leoncio (2012) confirmed that, more than ten million artisanal and small-scale gold miners worldwide extract gold using mercury. Thus,

bout 1400 tones of mercury are used yearly by small-scale miners. The health risk of mercury in small-scale mining is well known today in many parts of the world, as gold extraction by amalgamation releases large amounts of mercury into the environment. The mercury is readily absorbed by biological tissue and becomes toxic to humans and wildlife alike. Eventually, this toxin enters the food chain and causes major health problems, such as brain and nervous system damage leading to retardation of mental and physical development. Regretfully, these effects are unknown to the miners, as the mercury released into the environment remains there and are capable of harming generations to come (Appel and Leoncio, 2012). In effect, the literature confirmed that small scale mining has lead to the pollution of water bodies in the studied communities, which eventually affects their health status.

5.2.5 Work Related Health Issues

Small scale mining causes a lot of health related problems to both miners a well as non-miners in many communities. Respiratory truck infections are the most studied and problematic of health impacts for mine workers. Injuries haves also continue to be an important safety issue in mining communities. The long-term effects of these mining related diseases are cancers and mental health impacts for workers. In addition, the mining operations change the nature of environment through creation of open pits that accumulates stagnant water that supports malaria vector growth. Other health related diseases of small-scale mining include skin disease, Sexually Transmitted Diseases (STDs) and diarrhea (Hilson, 2001; Akabzaa and Darimani, 2001).

Small-scale miners were asked whether or not they have ever been treated for work related diseases, with regards to the mining operations. Out of the 50 respondents interviewed, 58% said they have been treated for diseases relating to mining while 42% said they have

not been treated for diseases relating to mining. The main work related medical conditions identified by the majority of the respondents were body and waist pains, malaria infections, accidents at mine, cough and skin diseases. Miners complained about the hazardous nature of the mining activity, which causes body pains and sometimes accidents by the machines being used during their operations. Besides, dust pollution during the dry seasons also results to persistent cough.

The responses were related to the number of years miners have been mining. In view of this, miners were asked about how long they have been mining in their communities. The results in Table 13 shows that 31% of respondents have been mining for less than one year and were treated for work related medical conditions. On the contrary, 42% who have been mining for less than one year were not treated for any mining related disease. In addition, 15% of the respondents, who have been mining for over six years, claimed that they have been treated for work related diseases, while 17% who have been working for over six years have not been treated for any work related diseases. Since the number of respondents who have not been treated for any work related diseases is more than those who have been treated, we can conclude that the number of years miners have been mining does not have any relationship with disease relating to mining. This implies that work related diseases are not related to the number of years respondents have been mining. This is because any employee at the mines have equal chances of getting ill or injured at any given time despite his/her period of stay at the mines.

These findings are similar to that of Stephens and Ahern (2001), who examined the impact of mining on the health of both mine workers and the people within the surrounding communities of the mines. They concluded that mining remains one of the most hazardous occupations in the world, not only in terms of short term injuries and fatalities,

but also due to long term impacts such as cancers and respiratory conditions like silicosis, asbestosis and pneumoconiosis.

Table 13: Treatment for Work Related Medical Conditions

Number of years of Mining	Treated for Mining Related Diseases			
	Yes		No	
	Frequency	Percentage (%)	Frequency	Percentage (%)
<= 1	8	31	10	42
2-3	6	23	10	41
4-5	6	23	0	0
6-7	4	15	4	17
8+	2	6	0	0

Source:
Field

Survey, 2013

5.2.6 Law Enforcement

In Ghana, illegal small-scale mining activities far outweigh the legal mining practices, as some estimates calculate that 95% of all small-scale mining is illegal (Freiku et al., 2013). This has magnified environmental degradation and pollution of water bodies. The illegal mining activities pose security threats due to the highly sophisticated weapons that some of these miners possess. The Ghana Police Service, Ghana Migration Service and other state institutions are mandated by law to arrest unlawful mining operators in the country.

Based on this, miners were asked whether or not they have been arrested by the law enforcement agencies during their periods of operations. Table 14 shows the responses of

the respondents. From the Table, 34% of miners said they have been arrested and 66% said they have not been arrested. This means that majority of the respondents have never been arrested by the police. When they were asked why they have not been arrested they explained that they are aware of the constant police attack on them so they are always vigilant and run away anytime the police confronts them. With this revelation, it is clear that respondents always escape police arrest. They disclosed that in some instances, their tools, machines and other important equipments are seized but through negotiation with the agencies, they are able to retrieve such items later.

Table 14: Effects of Law Enforcement on Small-Scale Mining

Responses	Frequency	Percentage (%)
Law enforcement affects SSM negatively	17	34
Law enforcement does not affects SSM negatively	33	66
Total	50	100

Source: Field Survey, 2013

The 34% who said they have been arrested were asked what happens to them after the arrest. They disclosed that in most cases either land owners or mining companies who were not being paid their full amounts for leased lands call for their arrest. In such instances, the pit owners pay a fine for them to be released. Some of the miners also complained about maltreatment, loss of mining equipments through seizure and other forms of brutalities that are being meted out to them before they are released from police custody.

5.3 OTHER SOCIO-ECONOMIC EFFECTS OF SMALL-SCALE MINING

The analysis of social-economic effects of small-scale mining is necessary due to much interest in the mining sector in recent years. It is imperative to focus on the pressure generated by mining on service provision, infrastructure and housing availability as well as the socio-economic wellbeing of the affected communities. This section reflects on people's perceptions and interpretation of these effects as well as their implications for a sustainable future, which is essential for economic development. The concentration of small-scale mining activities in the East Akim Municipal Assembly is perceived to have been threatening the socio-economic lives of people in the communities, where the mines are located. Respondents were asked whether small-scale mining has any socio-economic effects on their lives or not. In all, 85% of the respondents said small-scale has some effects on their lives and 15% said small-scale mining does not have any effects on their lives. From the responses, it is clear that most of the respondents agreed that small-scale mining activities in the municipality have adverse socio-economic effects on their livelihoods. Some of the socio-economic effects that become major concerns for the respondents were high cost of living, high prices of accommodation and food items, absenteeism and its related school dropouts, high rate of teenage pregnancies/marriages and divorce, drug abuse and insecurity.

5.3.1 High Cost of Living

High cost of living is one of the major social issues that emerged as a result of concentration of mining activities in the East Akim Municipal Assembly. Food and accommodation prices rise beyond the reach of the ordinary person. This is because the small-scale mining sector has withdrawn much of the labour force from the agriculture sector and other income-generating activities in the municipality. In addition, the mining

activities in the municipality have deprived the local people of their traditional sources of livelihoods such as land for farming.

An interview with the community members revealed that a single room accommodation at Kibi is rented for GH¢ 400, which is similar to that of Accra. In most cases, people are evicted from their rented apartments if miners come from other areas in urgent need of accommodation for mining. A typical incident occurred at Apapam where alien miners were made to pay higher price for accommodations which were already occupied by local people. Similarly, a finger of plantain also cost GH¢1.20 at Kibi, making life more expensive. Thus, the prices of commodities in the studied communities are comparatively higher as expected of a farming community. This situations makes life difficult for the ordinary people who struggle to make earns meat.

5.3.2 Absenteeism and School Dropouts

The concentration of mining activities in the studied communities has brought about absenteeism and school dropouts among pupils of school going ages. Since the economic conditions in the mining communities are harsh and single parenting is also high, most of the children of school going age are pushed into menial jobs at the mines at the expense of their education. As a result, school dropouts and child labour are very common in the municipality due to poverty.

This is confirmed by data on educational attainment of respondents during the field work. From the data, 8% of the respondents had no formal education, while 86% had Junior High School or Middle School education. In all, 6% of the respondents ended their educational career at the Senior High School or Vocational or Technical School levels. The general level of education of the respondents is very low as majority of the

respondents ended their education at the Junior High School or Middle School levels. It could be implied here that the only survival strategy of this category of people is to engage in small-scale mining as a means of living.

When a 14 year junior high school pupil of Adadeantem was asked why he engages in small-scale mining, he said: *“My parents said they don’t have money to pay my school fees, I have nobody but when I go to mine, I get money to do many things I want. I can buy my shoe and also pay my school fees when I go to do ‘galamsey’ with my friends”*. This response is the fate of many of the affected children in the studied communities, as they all have similar concerns. Small-scale mining negatively affects the human capital stock in the studied communities as children of school going age are seriously engaged in the illegal mining activity, for the purpose of getting money at the expense of their education.

5.3.3 Drug Abuse and High Rate Insecurity

In the studied communities, one major issue that emerged and has gained much ground among the ‘galamsey’ operators is drug addiction and insecurity. Small-scale mining is regarded as a hazardous activity, therefore majority of the miners take addictive drugs such as cocaine and other drugs as stimulants to enable them work beyond their limits. In addition, there is a high rate of insecurity, as people’s homes are being encroached upon by small-scale miners. Digging of pits and trenches and leaving them uncovered makes people unsecured in the municipality. In most cases, major roads linking various communities, are encroached upon by miners and footpaths leading to peoples farms are blocked by the miners, thereby endangering the lives of residents. Besides, the security agencies also monitor and sometimes assaults people suspected to be ‘galamsey’ operators in the municipality making life more dangerous and frightening.

5.3.4 High Rate of Teenage Pregnancy and Divorce

There is high rate of teenage pregnancy leading to temporary marriages in the studied communities. This is as a result of the influx of miners into the mining communities and immoral acts, which results in teenage pregnancies and unplanned marriages. Young ladies in their teen ages mostly offer themselves to ‘galamsey’ operators for money, due to high rate of poverty in the mining communities. In so doing, they end up being impregnated by the miners, of whom the majorities are migrants. When the miners leave the communities, after the mining operations are over, the affected women are not able to locate their whereabouts and are left to their fate. An affected woman interview at Apapam claimed that: *“I did not know the man has a wife at home. He told me he has never married and will take me home during the Ester celebration. If I had known, I would have advised myself. But what can I do? I don’t have a job and all the burden is now on me. He will leave to regret, I promise”*. This assertion explains how women are treated badly by migrant “galamsey” operators in the studied communities. In addition some marriages in the communities also break down when the men leave the mining communities to work in other places, thereby leaving their wives behind and engaging in new relationships.

5.4 COPING STRATEGIES FOR SMALL-SCALE MINING OPERATIONS

5.4.1 Introduction

According to the Humanitarian Policy Group (2006), “vulnerability is the extent to which a person or group is likely to be affected by adverse circumstances”. The key variable in determining vulnerability is exposure to harm at a place where one lives and works. Susceptibility to harm also arises from social, economic, psychological and environmental variables that produce different impacts and disasters. Vulnerability can be chronic, in which small incremental shifts can change daily deprivation into a more profound crisis.

Just as people are vulnerable, so they also have capacities to anticipate, cope with and recover from disasters

In ordinary life situation, there are different strategies that individuals or households apply in order to minimize possible impacts of vulnerabilities and risks. These are coping strategies that usually begin with using available resources and assets that one possesses, such as savings withdrawal, selling of assets and taking loans in order to respond to crisis. Coping therefore becomes successful if the household is able to manage sufficient resources to control and reduce the crisis. On the other hand, coping fails if one sacrifices both short and long term assets and resources during his/her struggle for survival.

5.4.2 Coping with Environmental Effects of Small-Scale Mining

Despite the contributions of small-scale mining to livelihoods, the sector is still faced with numerous environmental problems. The environmental impacts of small-scale mining activities in Ghana are put into three major categories. These include damage to the lithosphere, damage to the hydrosphere and damage to the atmosphere (Offei-Aboagye et al., 2004). The major environmental effects of small-scale mining in the studied communities include destruction of vegetative cover, loss of farmland, presence of mine pits and water pollution.

5.4.2.1 Coping with Loss of Farmland

Loss of farmland is a major environmental problem that farmers face in the studied communities. Respondents were asked whether or they have ever lost their farlands to miners. From the responses of respondents, approximately 51% disclosed that they have ever lost their farlands to miners while 49% said they have not lost their farmland to miners. Out of this, 30% of the respondents disclosed that they were compensated while

70% disclosed that they were not compensated. Those who were not compensated were asked about their coping strategies for the loss of land. Some of the respondents claimed that they have been able to acquire alternative lands for farming. Others also resorted to alternative sources of livelihoods such as mining and lumbering which are all equally environmental destructive activities. Despite these coping mechanisms, affected farmers still face certain major challenges, such as long distance travel to their new farms, as well as unfavorable terms of land acquisition from land owners. These, together with other factors, such as destruction of land through constant removal of forest cover and the use of chemicals from the mines have led to low crop yields.

5.4.2.2 Coping with Water Pollution

Small-scale mining also has some impacts upon the hydrosphere. It causes serious river pollution and change in water courses as a result of excessive siltation. Most small-scale mining operations increase sedimentation in rivers thereby, discoloring them and making them unsafe for use. Others add poisonous chemicals into the rivers, which becomes dangerous for human's life. Respondents were asked whether small-scale mining has any effects on water bodies or not. Out of 200 respondents, 4% said small-scale mining has not affected their water bodies while 96% said small-scale mining has affected their water bodies. The greater number of respondents confirmed that small-scale miners constantly pollute the main water bodies that they use.

When they respondents were interviewed on how they cope with such a situation, they explained that they use water from bore holes instead of the one from the rivers. Some of the respondents said they buy sachet water for use which also adds to their cost of living. While some of the respondents boil the water from the rivers before use, others fetch the water and allow it to settle before use. Those respondents who do not actually know the

said effects of the poisonous chemicals and sediments dumped into the water resources explained that they use the water from the affected rivers without any safety precautions. This puts their lives to danger and makes them susceptible to water related diseases caused by the mining activities in the municipality.

5.4.2.3 Coping with Disused Pits

One of the most dominant environmental features available in the small-scale mining communities is the presence of uncovered mine pits. The pits become dangerous to both human and animals alike. The presence of these pits has caused several deaths and injuries to residents in the mining communities. Respondents were asked whether miners have created pits in their communities or not. From the responses, 99% of respondents agreed that there are several mine pits in their communities and 1% said there are no disused pits. With this particular challenge, respondents complained bitterly and did not actually have any positive measures to cope with it. Some of the respondents said they cover the minor pits with wooden structures which according to them are still dangerous when the woods are rotten. Others said they have to abandon the land for several years to regain its fertility. Almost all the respondents in the communities suggested that miners must be made to reclaim the land and cover all pits after their operations.

5.4.3 Coping with Socio-Economic Effects of Small-scale Mining

In Ghana, there are certain principles that protect the social values of every community. The influx of small-scale mining operations in the East Akim Municipality is creating serious adverse effects on the economic, cultural values and social structure of the people. The main socio-economic effects discussed in this section are high cost of living in terms of food and accommodation, inadequate housing, absenteeism and school dropouts.

5.4.3.1 Coping with High Cost of Living

The major economic challenge facing residents in the communities studied are high cost of food and accommodation. Prices of food and accommodation in the communities are comparatively higher making life difficult for the ordinary people. In order to cope with high prices of accommodation, some of the respondents said they were able to build houses while others said they manage to live in a single room with their families. Some disclosed that they put their resources together to rent apartment that they share in common. To cope with high prices of food, most of the respondents were engaged in food crop farming in order to supplement what they buy from the market. The little food that is obtained by the respondents is also preserved for future use. Others also explained that they buy their foodstuffs from neighboring communities where the prices are cheaper and affordable than that of their communities.

5.4.3.2 Coping with Absenteeism and School Dropouts

School dropout is a common feature identified through observation in the studied communities. Most of the children in the mining communities abandon their education and engage in small-scale mining activities. It was observed that the education of children is being jeopardized by the mining activities in the studied communities. When respondents were asked about how they cope with this increasing trend, they said they only do that through pieces of advice and counseling. During Parents and Teachers Association (PTA) meetings, the issue of 'galamsey' is discussed and children are advised on the effects of mining on the lives at the expense of their education. Parents are also encouraged to be responsible by providing their wards with the basic needs of life to enable them stay in school. Besides, the Okyehene and other important personalities, such as Municipal Chief

Executives and Members of Parliament in the municipality keep on advising parents and children alike on the importance of education to their lives in the near future.

5.4.4 Coping with Health Effects of Small-Scale Mining

The major health related challenges in the studied communities that affect both miners and non-miners are malaria, upper respiratory tract infections, accidents, skin diseases and body pains. Data from the East Akim Health Management Team shows that, malaria top the first ten top diseases in the municipality constituting 56.7%, followed by upper respiratory tract infections which represent 10.6%. In order to cope with these challenges, respondents used several strategies to survive. Some of the respondents explained that they use mosquito treated nets to protect themselves from mosquito bites. Others said they spray their rooms with insecticides to prevent mosquito attacks. Besides, those who are affected go to the Kibi Government Hospital for quick treatments.

With respect to accidents and injuries, miners explained that they are always cautious in the use of their equipments. When a miner at Ahenease was interviewed about his experience on health related issues at the mines this is what he said: *“the work we do is dangerous and tedious. The equipments we use can harm you if you are not careful. Anytime I go to work, I makes sure I protect myself with safety clothing and use the right equipment. However, accidents are bound to happen sometimes, no matter how careful you are”*. Some of the respondents also disclosed that they buy pain killers after work to reduce the body and waist pains. Based on the responses by respondents we can conclude that small-scale mining has had negative effects on health of people in the studied communities.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 SUMMARY

This section of the study involves the summary of major findings based on the analysis of available data and the stated objectives of the study. The study examined the effects of small-scale mining operations on livelihoods of people in the East Akim Municipal Assembly. It further explored the mode of operations as well as the coping strategies adapted by people who were negatively affected by the operations of the mines in the East Akim Municipality.

In terms of mode of operations, the study showed that the main method of mining in the studied communities is surface mining. In addition, majority of the miners do not have a valid mining license, but operate illegally. The findings further indicate that miners in the studied communities use simple tools and equipment, such as head pans, shovels, pick axes, sluice boxes and water pumping machines in their operations. However, some miners use modern equipment, such as excavators and bulldozers to clear the land and dig the ground for the mineral ore. It was discovered further that 14% of the miners operate on land, which is supposed to belong to the Extra-Gold Mining Company and other mining companies prospecting in the area. The study also showed that 47% of the miners self financed their mining operations. This explains why most of the miners operate on small-scale basis in the municipality.

The study further revealed that small-scale mining activities have resulted in both positive and negative effects on livelihood of people in the studied communities. The positive effects include generation of employment and income, improvement in compensation packages, contributions to community development and improvement in trading activities.

The responses of the respondents indicate that majority of the youth in the municipality depends on the mining activity for their livelihoods, hence rural-urban migration has reduced. The findings of the study show that 16% of the respondents were able to build or renovate their houses and stores while 9% were able to buy cars that they use for business. In addition, 50% of the respondents said they were able to provide for their families the basic needs of life, such as food and clothing through the mining activity. In terms of human capital development, 25% of miners were able to send their children to school, as a result of the mining activity.

The negative effects of small-scale mining include environmental, health and socio-economic effects. Some of the negative environmental effects revealed by the study include degradation of forest cover, water pollution, creating of dangerous pits and trenches, and destruction of farmlands, with little or no compensations. The ultimate effect of this is food scarcity due to limited land available for food crop production. Besides, the Birim River and other streams in the municipality are heavily polluted, making them unsafe for human use. Thus, the hypothesis that there is a significant relationship between respondent's perception of environmental effects of small-scale mining and the number of years of stay in their communities is validated.

The combined effects of these environmental problems have led to serious health related challenges, such as high prevalence rate of diseases like malaria, skin diseases, respiratory tract infections and accidents at mines in the studied communities. These diseases, according to medical experts, are among the major causes of deaths in the municipality. This is validated by the hypothesis that there is significant relationship between respondent's appreciation of health problems associated with small-scale mining and their educational status.

The study also revealed major socio-economic effects of small-scale mining on the livelihoods of people. These includes, high cost of living, high prices of accommodation and food items, absenteeism and its related school dropouts, high rate of teenage pregnancies/marriages and divorce, drug abuse and insecurity. The study showed that majority of the respondents whose farms were being destroyed by miners were not paid any form of compensation. For those who were compensated, the amount of compensation was low and did not much what was lost through the mining operations. Besides, the cost of living is high in the municipality in terms of food and accommodation. Children of school going age are also involved in mining activities at the expense of their education. In order to cope with the adverse effects of small-scale mining, respondents adapted several strategies. These include farming on alternative lands, buying of sachet water for domestic use, building of houses and living in single rooms with families. Others use mosquito nets and others insecticides to protect themselves from mosquito bites in order to combat malaria infections.

6.2 CONCLUSIONS

After a close investigation into the effects of small-scale mining operations in the East Akim Municipal Assembly, it is concluded that mining activities in the municipality are done informally, without any laid down regulations. Miners operate without any mining license and with no regard to the environment. However, the production of gold by the small-scale mining sector in the studied communities has contributed significantly to the socio-economic lives of individuals and communities and has also led to an increase in the overall production of minerals in the country. It is believed that miners benefits more from the mining products than non-miners because they are directly involved in the mining operations in the form employment. This is related to the report of the Ghana Minerals

Commission (2002) that in 2003, the registered small-scale gold and diamond mines in Ghana generated employment for over 100,000 miners. The small-scale mining sector, if properly regulated, could provide employment for many people in the country (Ghana Minerals Commission, 2002; cited in; Amankwa and Anim-Sackey, 2003).

The increase in gold production in the East Akim Municipality has also caused environment hazards to many individual and households in the studied communities. It can be concluded that non-miners are more affected by these environmental effects than miners because miners end up destroying the farmlands of non-miners. This is confirmed by the findings of Offei-Aboagye et al. (2004) that small-scale mining in Ghana has caused severe damage to the lithosphere, the hydrosphere and the atmosphere of the communities where the mines are located (Aryee et al., 2003; cited in; Offei-Aboagye et al., 2004). From the study it was found out that most of the community members adopted several measures to cope with the adverse effects of the mining activities. However, coping strategies of most of the respondents were not successful.

Based on the literature reviewed and the evidence from the study, it is concluded that small-scale mining gives both positives and negative effects to many individuals and households in the mining communities in the East Akim Municipal Assembly. However we can conveniently say that the environmental, health and socio economic effects of small-scale mining operations in the mining areas far outweighs the benefits derived from the mining activities. This implies that more effort must be put in place by major stakeholders to curb the situation before it deteriorates. It is important for small-scale miners to stop the current practices of degrading the environment thereby, denying governments the necessary revenue needed for developmental projects.

6.3 RECOMMENDATIONS

Based on the analyzed data and the findings of the study, it is imperative that recommendations are made for the major challenges to be addressed to protect the environment. In this regard, the following recommendations are made to help address the environmental, socio-economic and health challenges associated with small-scale mining operations in the studied communities:

6.3.1 Monitoring Small Scale Mining Activities

The Ministry of Mines and Energy, the Minerals Commission, the Mines Department, the Environmental Protection Agency, law enforcement agencies as well as community leaders must monitor small-scale mining activities to ensure that buffer lands and water bodies are not encroached upon by small-scale miners in the municipality. In view of this, miners should be offered prospective lands that are outside forest reserves by following the right procedures. They must be provided with clear guidelines on how to conduct their operations to ensure little or no harm to the environment and socio-economic wellbeing of individuals in their respective communities. These precautionary measures are necessary, because negative effects of mining continue to remain a major challenge to people in communities, where the mines are located.

6.3.2 Education on Environmental and Health Hazards

In Ghana, institutions such as the Ministry of Mines and Energy, the Minerals Commission, the Environmental Protection Agency, and the ministry of health must educate both miners and non-miners on the negative effects of mining. In the studied communities, there were health related diseases that were attributed to small-scale mining activities. There is therefore, the need to educate community members on environmental

and health effects, such as water pollutions and land degradation as caused by the operations of the mines. Effective education will help reduce the adverse effects of small-scale mining on health and the environment in mining communities.

6.3.3 Land Reclamation

The Government of Ghana, mining companies and mining groups must put up measures to restore back the degraded lands to their original state after mining activities are over. There is the need to reclaim lost lands through tree planting exercises and the filling of dug-out pits in the affected communities. This will not only reduce the negative environmental and health impacts, but will also ensure the availability of land particularly, to farmers for agricultural purposes. In addition, employment opportunities will receive a significant boost so as to trim down the high rate of unemployment in the municipality and the country as a whole.

6.3.4 Provision of Compensations Packages

The Government of Ghana, mining companies and individual miners must ensure that commensurable compensation packages are given to affected farmers who lost their farmlands through the activities of the mines. There should be no delay or denial of such payments to the affected heads of households to ensure that their livelihoods are not negatively affected. Thus, compensations paid must be commensurate with the actual total cost of farm loss as estimated by the owners in order not to make the farmers worse off.

6.3.5 Provision of Alternative Water Sources

The Birim River and other water resources in the municipality have been seriously polluted. For that matter, mining companies and mining groups as well as the Municipal

Assembly must provide alternative sources of well treated drinking water for the affected communities. Besides, miners must be prevented from mining close to water bodies to avoid further pollution of the rivers. This will entail strict implementation of the mining laws to ensure that proper mining procedures are adhered to.

6.3.6 Discouraging Child Labour

It is a duty of every parent to provide for their wards the basic needs of life to make them comfortable. Besides, children also have the right to education, which must not be overlooked. It was discovered from the study that majority of the children are allowed to engage in small-scale mining activities. Parents must encourage and assist their wards to attend school to prevent them from engaging in small-scale mining activities at the expense of their education. Besides, parents who allow their wards to engage in mining activities should be prosecuted for the offense of child labour. This will be discouraged to allow their wards to get into illegal mining activities.

6.3.7 Financial and Legal Support

The Government of Ghana and financial institutions must improve upon the capital base for miners in order to sustain their livelihoods. One way to give such financial assistance is to provide them with soft loans or micro credit facilities in order to expand their operational activities. Besides, small-scale miners should be assisted with legal and organizational supports to streamline their activities. However, the government must implement the polluter pay policy and also build the capacity of law enforcement agencies and state attorneys on environmental issues to help in prosecution of miners who contribute to environmental degradation.

Furthermore, security agencies should be well resourced and also motivated against bribery and corruption, in order to fight against illegal mining activities in the country. In addition, there is a limited capacity at the local community level to enforce laws related to small-scale mining in the studied communities. In view of this, the local community must ensure that laws relating to small-scale mining and other by-laws in the communities are strictly adhered to.

6.3.8 Promoting the Small-Scale Mining Sector by Decentralizing Mining License

To ensure the effectiveness of legal small-scale mining in Ghana, there is the need to fast track processes of acquisition of mineral rights, the right to renew, transfer and mortgaging mineral rights. Even though, limited capacities makes this provision difficult to come by, it is necessary to simplify the mineral trading licensing by decentralizing the licensing procedures and other related measures in the mining sector. Besides, prospecting licenses should be encouraged and promoted to increase the output of small-scale mining firms and individuals in the country.

6.3.9 Formation of Small-Scale Mining Associations

Small-scale miners should form associations that will interact regularly with all stakeholders in the mining sector. This should involve representatives from each traditional council in the municipality. These associations will help discuss major issues regarding the small-scale mining sector, such streamlining of mining operations, procedures on loans acquisition, training on mercury use and application of technology, in order to increase productivity.

6.3.10 Collaboration among Governmental Agencies

In order to deal with the environmental, socio-economic and health challenges associated with small-scale mining in Ghana, there is the need for an integrated approach involving all relevant stakeholders to address the multifaceted challenges confronting the mining sector. Such collaboration in the form of a taskforce is essential because it is impossible for any single state institution or organization to effectively monitor the activities of the small-scale mining sector.

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APPENDICES

APPENDIX A: QUESTIONNAIRE FOR HOUSEHOLD HEADS (NON-MINERS)

This is a questionnaire from an Mphil II student of the above-named Department of the University of Ghana, Legon to seek your candid views on small-scale mining operations and its effects on socio-economic lives of people in the East Akim Municipal Assembly. All responses will be treated with all confidentiality and will be used only for academic purposes. Your participation is appreciated.

Please, tick where appropriate

PART A

PERSONAL DATA

1. Name of community.....
2. Age of respondent.....
3. Gender (1)Male [] (2)Female []
4. Marital status: (1)Married [] (2)Single [] (3)Divorced [] (4)Widow []
(5)Widower []
5. Educational Background: (1)No Education [] (2) JHS/Middle School []
(3) SHS/Voc/Tec [] (4) Tertiary []
6. Number of years in this community.....
7. Ethnicity.....
8. Number of people in household.....
9. Main economic activity.....
10. Secondary economic activity.....
11. Monthly Income in Ghana Cedis.....

PART B**CONTRIBUTIONS OF SMALL-SCALE MINING TO LIVELIHOODS**

For each of the statements below, please indicate the extent of your agreement or disagreement by placing a tick in the appropriate box

The response scale is as follows:

1= Strongly Disagree

2= Disagree

3 =Undecided

4 =Agree

5= Strongly Agree

STATEMENTS CATEGORY:	SCALE
CONTRIBUTIONS OF SMALL-SCALE MINING TO LIVELIHOODS	

12. Small-scale miners, have a good chance of becoming rich quickly

1	2	3	4	5
---	---	---	---	---

13. Small-scale mining is an avenue for employment opportunities in the community.

1	2	3	4	5
---	---	---	---	---

14. Small- scale mining has led to an improvement in compensations packages for households in the community

1	2	3	4	5
---	---	---	---	---

15. (a) In your view, how do you consider small-scale mining as an economic activity?

(1)Very bad [] (2) Good [] (3) Very good []

b) Give reason(s)

16. (a) Overall, do you think mining in this community is contributing towards development? (1)Yes [] (2) No []

(b) Explain your answer.....

PART C**ADVERSE EFFECTS AND COPING STRATEGIES OF SMALL-SCALE MINING**

17. (a) Have you ever lost a farmland to miners? (1)Yes [] (2) No []

If no, go to question 18

b) Were you compensated? (1)Yes [] (2) No []

c) How much was the compensation?.....

d) Who compensated you?.....

e) How do the compensation change your living condition?.....

18. (a) Does small-scale mining have any negative socio-economic effects on people's livelihood in your community?

(1)Yes [] (2) No []

If "No", go to question 19

b) In what ways has it negatively affected your socio-economic life?.....

c) How do you cope with the adverse effects?.....

19. (a) Are there any environmental problems associated with mining operations in this community?

(1)Yes [] (2) No [] (3) Don't know []

b) If yes, what are some of the environmental problems?.....

c) How do the problems affects your livelihood?.....

d) Give the coping strategies adopted to mitigate the environmental problems?.....

20. (a) Do you have uncovered mine pits in this community? (1) Yes [] (2)No []

If no, go to question 21

b) What effects does it have on the lives of people in this community?.....

c) How can these pits be properly managed?

d) What are the coping strategies applied to mitigate the effects?.....

21. (a) Are there any health implications relating to mining?

(1)Yes [] (2) No [] (3) Don't know []

b) If yes, what types of health challenges do mining cause?.....

22. (a) Does small-scale mining have any effect on water bodies for domestic use?

(1)Yes [] (2) No []

b) If yes, what are the effects.....

c) What strategies do you adopt to cope with the effects.....

23. What recommendations will you give on the adverse effects of small- scale mining in your community?.....

APPENDIX B: QUESTIONNAIRE FOR MINERS**PART A****PERSONAL DATA**

1. Age of respondent:.....
2. Gender (1)Male [] (2)Female []
3. Marital status: (1)Married [] (2)Single [] (3)Divorced [] (4)Widow []
(5)Widower []
4. Educational Background: (1)No Education [] (2) JHS/Middle School []
(3) SHS/Voc/Tec [] (4) Tertiary []
5. Number of people in household:.....
6. Main economic activity:.....
7. Secondary economic activity:.....
8. Monthly Income in Ghana Cedis.....

PART B**SMALL-SCALE MINING OPERATIONS**

9. Who introduced you to mining?.....
10. How did you acquire land for your mining activities? (1) From family [] (2) From
Chiefs []
(3) From mining companies [] (4) Others (Specify).....
11. (a) Do you sometimes pay royalties and taxes? (1)Yes [] (2) []
b) If yes, how much?.....
12. (a) How long have you been mining?.....
b) For how long do you want to continue mining?.....
13. (a) Do you have a valid mining license? (1)Yes [] (2)No []

- b) If no why?.....
- c) If “Yes”, where did you get it from.....
- d) Did you pay for the license? (1)Yes [] (2)No []
14. What is the source of capital for your mining operations? (1)Individual contributions [] (2) Family contribution (3)Loan [] (4)Foreign investment [] (5)Others (Specify).....
15. (a) What is the main method used in Small-scale Mining?.....
- b) How do you sell your product (gold)?.....
16. (a) To what extent do you agree or disagree to the statement that mining is more profitable than other jobs. 1= Strongly Disagree [] 2= Disagree [] 3 =Undecided or Neutral [] 4 =Agree [] 5= Strongly Agree []
- b) Give reason(s).....
17. What are the main minerals produced?.....
18. (a) Have you ever been treated for work related medical conditions? (1)Yes [] (2)No []
- (b)If “Yes”, please provide details.....
19. What are your main duties in the mining operations?.....
20. (a) Have you ever been arrested by the police? (1)Yes [] (2) No []
- b) If yes, what happened after the arrest?.....
21. (a) Has small-scale mining improved your socio-economic live? (1) Yes [] (2) No []
- b) If yes, in what ways?.....

APPENDIX C: IN-DEPTH INTERVIEW GUIDE FOR COMMUNITY LEADERS

1. What is your general opinion on small- scale mining operations in your community....
2. How will you describe the relationship between miners and the local community?....
3. Do small-scale miners use mining income to invest in sustainable livelihoods for the local communities?
4. How do the community benefit from the operations of small-scale mining?.....
5. What regulations/programs are there to address or manage the negative effects of mining in the community?.....
6. What are the agreements (including land access) between miners and the local/ indigenous people?
 - (a)At the exploration stage.....
 - (b)At the mining stage.....
7. What role do the community leaders play on issues relating to small-scale mining in your community?.....
.....
.....