EFFECTS OF SMALL-SCALE MINING ON FOOD PRODUCTION IN THE AMANSIE WEST DISTRICT OF THE ASHANTI REGION

By

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DECLARATION

I hereby declare that this thesis is my own work towards the MSc. and that, to the best of my knowledge it contains no material previously published by another person or material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

Food security is said to exist when; all people, at all times, having physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. One critical element which guarantees food availability and accessibility and ultimately reduces poverty in any country is food production. Food production has been identified to exhibit a continuous improvement in the developed world while developing countries have been

experiencing a reduction.

This situation to a large extent has been blamed on a number of factors with the most recent ones being deforestation, land degradation, pollution of water bodies and other causes of environmental degradation and deterioration; mostly caused by small-scale mining activities. Such activities normally take place in rural communities where foods are produced. It is based on this premise that the research probes the trends of small-scale gold mining in the Amansie West District and the resulting effect on crop production and supply which is the mainstay of the people.

The research made use of both primary and secondary data which were in qualitative and quantitative forms. A total of 398 respondents made up of 245 food crop famers and 153 small-scale miners were randomly sampled in additions to data from three key institutions which were purposively sampled and interviewed. Semi-structured questionnaires containing open and closed ended questions. Interviews guides were used to get the institutional data. The data was analyzed using Statistical Package for Social Sciences (SPSS) version 16.0 and Excel of Microsoft Office Application, 2010. The data was presented in tables and diagrams for easy analysis.

The study revealed that there are no effective legal and regulatory measures put in place to control the activities of the small-scale mining in the district. It also revealed a reduction in the production of food crops within the five years period (2008-2012) as a result of the small-scale mining activities. These activities were identified to have negatively affected resources needed for food crop production such as land, water,

natural Forest and active labour. It is therefore recommended that empowering the local authorities, provision of alternative job opportunities for the youth and ensuring institutional coordination among others will help control small-scale mining activities and its effects on food crop production.

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LIST OF ACRONYMS

AWDADU	Amansie West District Agricultural Development Unit
CFSVA	The Comprehensive Food Security and Vulnerability Analysis
DFID	Department for International for International Development
EPA	Environmental Protection Agency
ERP	Economic Recovery Plan
FORIG	Forestry Research Institute of Ghana
GSRBPL	Golden Star Resources Bogoso Prestea Limited
IIED	International Institute for Environment and Development
ITDG	Intermediate Technology Development Group
MOFA	Ministry of Food and Agriculture
PMMC	Precious Minerals Marketing Corporation
PNDCL	Provisional National Defense Council Law
SEA	Strategic Environmental Assessment
SPSS	Statistical Package for Social Scientists
UN	United Nations
WHO	World Health Organization

CHAPTER ONE

GENERALN INTRODUCTION

1.1 Background to the Study

A study conducted by the World Food Programme in Ghana, discovered that 5 percent of the population of 1.2 million people have limited access to sufficient and nutritious food for an active and healthy life (Biederlack & Rivers CFSVA Report, 2009, p 13).

At the World Food Summit in 1996 , it was agreed that food security exists only when: “all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (Mwaniki, 2009). It is estimated that 33 to 35 percent of the population living in Sub-Saharan Africa are food insecure (Mwaniki, 2009).

For the purpose of this study food security would be looked at in two key dimensions; food availability and food access. Food availability concerns the food that is physically present through all forms of domestic production and commercial imports. Food

accessibility also concerns a household's ability to regularly acquire adequate amounts of food, through a combination of its own home production and stocks, purchases, barter, gifts, borrowing or food aid (Reisenberger, 2010).

One critical element which guarantees food availability and food accessibility and ultimately reduces poverty in any country is food production. Food production ensures food availability and accessibility in the sense that it is only through food production that food is available for people to have access and consume. Empirical evidence indicates that every one percent increase in per capita food production lead to a 1.61 percent increase in the incomes of the poorest 20 percent of the population. Furthermore, one percent increase in agricultural yields reduces the number of people living on less than US$1 a day by 0.83 percent (DFID, 2005). These underscore the immense role of food production in any economy.

However, while food production continues to improve in the developed world, it dwindles yearly in most developing countries (Ocansey, 2013). This volatile situation to a large extent has been blamed on a number of factors which include; unfavorable rainfall pattern, poor farming systems among others. In recent times, it has been revealed through research that land degradation, pollution of water bodies and other causes of environmental degradation and deterioration are the major causes of low food production especially in developing countries. The activities of small-scale gold

mining is believed to be a major cause of the above mentioned land and environmental degradation (Aragon and Rud, 2012; Ocansey, 2013).

Small-scale mining in Ghana has been defined to include both the exploitation of mineral deposits by using fairly rudimentary tools and at low levels of production with minimal capital investment (Aryee, et al., 2002). For decades, this level of minerals extraction and subsequent processing has provided thousands of indigenous peoples with employment. These grassroots industries have also made important contributions to foreign-exchange earnings, and are now recognized by the government as the cornerstones of a multimillion-dollar industrial sector (Hilson, 2001). It is estimated that mineral production from small-scale mining accounts for approximately one-sixth of global mineral output. In Ghana, since the sectors' activities were legalized by the enactment of small-scale mining law, PNDCL 218, in

May 1989, significant revenues have been generated in the sector (Hilson, 2001). According the Minerals Commissions' report on the performance of the mining industry in Ghana, small-scale mining contributed newly 35 percent of the total gold output in 2013. As indicated in the report, this was 10 percent higher than the output of the Gold Fields Group, the largest mining company in the country.

However, artisanal and small-scale mining which employs ten times more people than large-scale mining mainly take place at the very remote areas within the country and are noted for severe pollution and land degradation. According to the Forestry Research Institute of Ghana (FORIG), small-scale mining has resulted in the degradation of about 15000 hectares of arable land across the country (FORIG report 2009). Coincidentally these areas are predominately farming communities and thus serve as food production nationwide. The Amansie West District which is predominately agrarian is one of such areas where artisanal and small-scale gold mining activities have become very rampant. Their activities have resulted in the pollution of rivers and degradation of vast farming lands including cultivated lands. As Aragon and Rud (2012) indicated, an increase in pollution of air, water and land due to mining activities would seriously affect farmers' ability to produce. The resultant potential loss of agricultural productivity and rural income due to gold mining activities in these areas is considered as part of social costs of the extractive industries. It is thus disappointing that both environmental regulators and opponents of the industry have focused mostly on other aspects such as risk of environmental degradation, health hazards and social change (Aragon & Rud 2012). According to the Amansie West District Strategic Environmental Assessment report (S.E.A Report, 2011) environmental degradation due to the proliferation of small-scale gold mining activities is a major problem militating against agriculture in the district. Therefore based on this premise, this research probes the trends of small-scale gold mining in the district and the resulting effect on crop production and supply which is the mainstay of the people.

1.2 Problem Statement

In the report of the Amansie West District Strategic Environmental Assessment (S.E.A Report, 2011) environmental degradation due to the proliferation of smallscale gold mining activities was indicated to be a major problem militating against food production and agricultural development in the district.

The District Agricultural Development Unit (AWDADU) also reported that block farming programme which were being implemented by the Millennium Villages Project in some communities could not be continued due to small-scale illegal gold mining activities (AWDADU, 2010). Furthermore, major crops including Maize, Rice, Cassava, Cocoyam, Yam and Plantain production levels reported by AWDADU between 2008 and 2012 indicated some level of reduction. Depending on the type of crop, significant reduction as recorded ranges from 10 percent to 80 percent.

Even though the small-scale mining in Ghana was regularized by the enactment of small-scale mining law PNDCL 218 in 1989, there are still several people who operate illegally. The lack of capacity coupled with illegalities of the sector's operations allows miners to destroy vegetative cover of arable land, pollute rivers and causes varied problems to other users of land including farmers. Consequently agricultural production, especially food crop production would be affected by the negative effects of the proliferation of small-scale gold mining activities across the district. These adverse effects on food production will ultimately result in food insecurity in the district over a period of time. Therefore it is crucial to investigate to ascertain how and why the proliferation of small-scale gold mining activities in the district can affect food production and supply.

1.3 Research Questions

The following research questions are derived from the above problem statement.

- What are the legal frameworks responsible for the regulation of small-scale mining in the Amansie West District?
- What has been the production trend of the major food crops in the district over the past five years?
- To what extent have small-scale gold mining activities affected major crop production and supply in the Amansie West District?
- What lessons and recommendations can be advanced in order to properly control the activities of small-scale miners especially in the food growing areas?

1.4 Objectives of the Research

The objective of this research is to assess the effect of small-scale gold mining activities on food production in the Amansie West district in response to the destruction of farms and farmlands through unsupervised and illegal methods of mineral exploration of miners. However, specific objectives of the research are:

- Examine the legal framework responsible for regulation of small-sale gold mining in the Amansie West District;
- Examine the production trend of the major food crops (plantain, yam, cassava, cocoyam, maize and vegetables) in the district for the past five years;
- Determine the extent to which small-scale gold mining activities have affected major crop production and supply in Amansie West District; and
- Make recommendations that may assist in the proper control of the activities of small-scale gold mining and thus reduced the risk of food insecurity in the district.

1.5 Scope of the Research

Geographically, the scope of the study is limited to the Amansie West District of the Ashanti region of Ghana. More emphasis was placed on major food crop production namely; maize, rice, cassava, yam, cocoyam and plantain. The findings and recommendations however may be applied to similar farming communities where small-scale mining explorations are taking place. The focus of the subject area of the research is small-scale mining in connection with its effects on crop production in the district.

1.6 Significance of the Research

Most small-scale gold mining predominantly apply shallow mining techniques which are popularly called “dig and wash” to mine shallow alluvial gold deposit usually found in valleys and low lying areas. This method used to extract gold is reported to have led to the pollution and degradation and destruction of farmlands and crops in the mining area (Ocansey, 2011). The situation is believed to have direct effect on crop production.

However, this dimension has been neglected despite the existing evidence linking land pollution and degradation to reduction in crop yields and the fact that most extractive operations are located in rural areas where agriculture is the main economic activity (Aragon and Rud, 2012).

This situation has created grave competition between gold miners and farmers for land. Therefore it is believed that farming activities such as crop production in these areas where gold mining is very rampant could be negatively affected. It is therefore based on this assertion that this research has been carried out to ascertain the extent to which small-scale gold mining activities affect major crop production and supply in the Amansie West district. Useful recommendations would be forwarded to

responsible institutions to inform policy decision-making to ensure proper monitoring and supervision of the activities of small-scale miners, especially in food crop production communities. The study would examine the policy environment,

institutional and administrative set ups and the trend of small-scale gold mining in one breath and major crop production and supply in another breath taking into account a time series data in the district.

The research would be beneficial to the Amansie West as a district since it will help to clearly identify the effects of small-scale gold mining activities on crop production. The recommendations could be used by the District assembly, Environmental Protection Agency, Mineral commission and all other mining related institutions to amend the existing regulations, if necessary, as well as strengthen the monitoring and supervising activities of small-scale gold mining. The usefulness of the findings of the study will not be limited to Amansie West district but can be applied by other districts of the country which are rich in mineral deposit. Further, the findings of the study would contribute to the existing body of knowledge thereby extending the frontiers of knowledge. Also this research would stimulate further research in this area and help bridge the gap between theory and practice which would ultimately provide practical interventions in addressing the challenges confronting food production.

1.7 Structure of the study

This study was structured into five main chapters with chapter one outlining the introduction of the research study thereby providing foundation framework upon which the entire study rests. This chapter presents issues on background of the study, problem statement, research questions, objectives of the research, scope of the study, justification, as well as organization of the of the entire research work. The second chapter will appraise relevant literature by examining the concepts of small scale mining and food production. Further, case studies of the effects of small scale mining on food crop production in selected countries will be considered in this chapter.

Chapter three encapsulates the approach and methodology for the study and also presents the chronological order of undertaking the research study. The chapter describes the research design chosen for the study and the rationale for choosing the particular research design, the research process undertaken to achieve the study using the chosen research design and the various data requirements and sources for the study. It also presents issues on the sampling and data collection techniques used in the study as well as the data presentation and reporting style. The Chapter then provides a contextual profile of the Amansie West District.

Chapter four presents analysis of the study. In this chapter analysis of both primary and secondary data collected from the field with the data collection instruments was carried out. It seeks to provide analysis on the legal and regulatory frameworks regulating small scale mining activities in the study area and how these frameworks contribute to protecting agricultural activities in the sampled communities.

The final chapter of the research study elucidates the findings of the study in relation to the objectives of the research study. Based on the findings, apposite recommendations will be made to address the negative effects of small scale mining on food production in the District.

1.8 Limitations

The research study was confronted with the following limitations.

1. Data gap

The study is based on a time series data of the past five years trend of major crop production and activities of small-scale gold mining in the district. It is envisaged that relevant and detailed data such as the total land size involved in small-scale mining will not be readily available. This is because some of the miners operate illegally and therefore hide their activities. Thus expectantly, there will be gaps in the available data with regards to degraded land mining concessions and total number of small-scale miners present in the district.

2. Cooperation on the part of stakeholders

As stated earlier on, some of the small-scale gold miners operate illegally and there was the anticipation that cooperation in providing the necessary information will be to somewhat difficult. The fear of been arrested on the part of the illegal miners or "galamseyers" by law enforcement agencies could not be ruled out. Therefore it was necessary for me to explain them at every point that I was undertaken an academic exercise and thus cannot arrest anybody.

The objective of the research as indicated earlier is to assess the effects of small-scale gold mining activities on food production. This will form the basis for the next chapter.

In the next chapter, relevant literature will be appraised in line with the research objective by examining the concept of small-scale mining and food crop production.

CHAPTER TWO

SMALL-SCALE MINING AND FOOD PRODUCTION

2.1 Introduction

This chapter specifically deals with the review of literature required to make effective analysis of how small-scale mining affect food production. It focuses on the concept of small-scale mining, trends of small-scale mining in Ghana, legal and regulatory framework for small-scale mining in Ghana and the mining methods in Ghana including how the minerals are processed.

It further talks about small-scale mining and agricultural production particularly its effects on the environmental resources needed for farming such as land and water bodies. The chapter finally presents literature on the small-scale mining and food production as well as the framework for small-scale mining and food production.

2.2 Small-scale Mining

Small-scale mining has been defined differently around the world. The United Nations (UN) and Intermediate Technology Development Group (ITDG) generally defines "small-scale mining" in terms of a given production ceiling, or the level of sophistication with which minerals are exploited. In terms of productions ceiling, Small-scale mining is 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., 2002). On the other hand with regards to level of sophistication, small-scale miners are "poor people; individuals or small groups who depend upon mining for a living; who use rudimentary tools and techniques (e.g. picks, chisels, sluices and pans) to exploit their mineral deposits" (Aryee, et al., 2002).

According to the World Bank Group, "Small-scale mining is largely a poverty-driven activity, typically practiced in the poorest and most remote rural areas of a country by a largely itinerant, poorly educated populace with few employment alternatives". In Ghana, small-scale (gold) mining is defined as "…mining (gold) by any method not involving substantial expenditure by an individual or group of persons not exceeding nine in number or by a co-operative society made up of ten or more persons (Aryee, et al., 2002). The definition therefore includes what has been termed "artisanal"— those operations using only rudimentary/artisanal implements—as well as more sophisticated mining activities operating at a relatively low level of production and which generally require limited capital investment.

Hilson (2001) also indicated that unlike other countries that define small-scale mining in terms of output and manpower, government of Ghana definition for small-scale mining focuses on concession size. He stated that, in principle, a small-scale mining in Ghana was that which is based on a land plot measuring less than 25 acres.

Hilson (2001) however was quick to add that his enquiries from the national Geological Survey, Mines Department, Environmental Protection Agency (EPA) and Minerals Commission confirmed that there were supplementary indicators that were occasionally used to classify small-scale mining. These were manpower, equipment type and operating time.

2.3 Trend of Small-scale Gold Mining in Ghana

Small-scale mining in Ghana has been defined to include both the exploitation of mineral deposits by using fairly rudimentary tools and at low levels of production with minimal capital investment (Aryee, et al., 2002). The Ghanaian small-scale mining industry is well over 2,000 years old. Vestiges of alluvial gold extraction and winning have been found that date as far back as sixth century, and there is a wealth of evidence indicating that precious metal mining activities were attracting Arab traders to certain areas of the economy as early as the 7^{th} and 8^{th} century AD (Hilson 2001).

As Aryee, et al., 2002 also put it, Gold produced by artisanal mining were traded with the Moors and the Phoenicians on the trans-Saharan trade routes before the advent of the Portuguese and other European incursions, which began in 1471. During this period local chiefs on whose land gold was mined controlled and regulated operations of miners by virtue of the fact that they were entitled to one-third of the gold won. This form of organization according to (Aryee, et al., 2002) existed for over two centuries. They further indicated that intensive small-scale mining of precious minerals was concentrated along the northeast–southwest gold belt of the country and both legal and illegal miners operated along this belt. Hilson (2001) pointed out that small-scale mining in Ghana, as in most developing countries, was for decades considered as an informal industrial sector, employing thousands of people but using largely rudimentary, unmonitored and uncontrolled practices. This situation changed with the implementation of the national Economic Recovery Plan (ERP), which, following years of careful planning, was finally launched in the mid-1980s (Hilson 2001). Aryee, et al., (2002) also noted that the increasing awareness of the fact that the continued marginalization of the small-scale gold mining sector was detrimental to the economy led to a study into the phenomenon, which resulted in its regularization through the enactment of the small-scale Gold Mining Law, PNDCL 218 , in May 1989.

Aryee, et al., (2002) again explained that licenses were issued to some small-scale miners by the government of Ghana on concessions registered in their names. These licenses were granted to Ghanaians 18 years of age and older and were subject to the following conditions:

a. maximum allocation of 1.2 hectares of land in the case of a grant to any one person or group of persons not exceeding four in number;

b. a maximum allocation of 2.0 hectares of land in the case of a grant to any group of persons not exceeding nine in number; and

c. a maximum allocation of 10 hectares in the case of a grant to a co-operative society of 10 or more persons and registered companies.

The process of small-scale mining license acquisition however involves, among other things, the submission of 10 copies of completed small scale mining application forms and site plans of the area being applied for to the Minerals Commission through the district centre, a field inspection report from the district mining centre, and recommendation from the District Chief Executive of the political district in which mining is intended to be undertaken, an environmental permit from the Environmental Protection Agency (EPA) and the payment of the requisite fees. The application is evaluated and recommendations made to the Minister responsible for Mines for the granting of a license. If the Minister approves, then he signs an agreement between the applicant and the Government of Ghana. The applicant then takes the signed agreement (license) to the Chief Inspector of Mines to obtain an operating license before commencing work on the land. Small-scale mining licenses are subject to renewal after three or five years depending on the size of the concession.

Hilson (2001) also recorded that operators of small-scale gold mines are awarded licenses by the government to mine in a designated area not exceeding 25 acres for three to five years. Typically, a licensed operator employs between 5 and 20 groups of tributers consisting of five to 10 workers each that excavate ore and process gold. The arrangement is that the tributers keep two thirds of the profits, and the remaining third is given to the concessionaire.

2.3.1 Mining methods

Aryee, et al., (2002) recorded that small-scale miners of precious minerals employ varied mining methods according to the type of deposit being exploited and its location. A great majority of small-scale miners rely solely on traditional and manual methods of mining, which are largely artisanal, featuring simple equipment like shovels, pick-axes, pans, chisels and hammers due to their poor financial base. Hilson (2001) recorded earlier that the most common equipment used by small-scale miners are basic hand tools such as picks, axes, sluice boxes and shovels, although occasionally Honda water pumps, explosives and washing plants are seen within regions. He further stated that during visits to certain small-scale gold-mining regions, he discovered however that, even the sites that feature the most advanced of machinery were, for the most part, rudimentary in design. Aryee, et al., (2002) base on their earlier assertion categorized the methods used in the small-scale mining of precious minerals in Ghana into the following three groups:

- Shallow alluvial mining;
- Deep alluvial mining; and
- Hard rock (lode) mining.

According to the explanation given by Aryee, et al., (2002) shallow alluvial mining techniques, which are popularly called "dig and wash", are used to mine shallow alluvial deposits usually found in valleys or low lying areas. Such deposits have depths not exceeding three meters. Vegetation is initially cleared and the soil excavated until the gold-rich layer is reached. The mineralized material is removed and transported to nearby streams for sluicing to recover the gold. Aryee, et al.,

(2002) indicted that in view of the relative ease of reaching these deposits and treating such ores, a significant proportion of the industry's operations are of this type and for similar reasons, and illegal workings are predominantly of this type.

This method of gold mining was also referred to as "Shallow-pit mining" by Ofosu-Mensa & Ababio (2011). They described it in their study as the most common form of indigenous gold mining and the principal source of the gold dust and nuggets produced by the auriferous Akan miners during the pre-colonial era. In the study entitled "Historical overview of traditional and modern gold mining in Ghana", it was

documented that the surface was opened either in small holes, dug by individuals or in larger excavations such as trenches or broad pits (sometimes up to eight feet in diameter) with entire families working together on the project. These pits were usually not more than three to ten feet deep. Miners found little difficulty in getting to the sedimentary deposits of fine gold and nuggets (where they existed) which underlay the upper strata of the topsoil, laterite, clay and gravel. This corroborates what (Dumett, 1987 cited from Ofosu-Mensa & Ababio, 2011) documented that expert European miners reported that the alluvial gold of the Gold Coast lay much closer to the surface, typically, than was the case in the other goldfields of the world they had worked in.

Plate 2.1: Shallow Alluvial Mining Technique

Source: Study area, 2013

Deep alluvial mining techniques are used to mine deep alluvial deposits found along the banks of major rivers such as the Ankobra, Tano, and Offin and certain older river courses. These methods involve excavating a pit and digging until the gold bearing gravel horizon, which is typically located at depths of 7 to 12 metres, is reached. Terraces or benches are constructed along the sides of pits to prevent collapse. The gold bearing gravel is then removed and sluiced to recover the gold, Aryee, et al., (2002).

Ofosu-Mensa & Ababio (2011) recorded that deep level reef gold mining, as they called it, was more serious indigenous form of mining during the pre-colonial era involved digging a shaft. They indicated that in spite of the fact that most pits were dug in softer sub-surface sedimentary deposits, the nineteenth century European observers argued that African gold mining could only be described as "primitive" and "inefficient" and also Africans were marginalised as incapable of sinking deep shafts, using timbering, making adits and tunnels, or of extracting deep-level reef gold. Ofosu-Mensa & Ababio (2011) also recorded that the depth and size of an indigenous shaft varied considerably according to the geologic terrain, the kinds of earth encountered, the preferences of the miners, and fluctuating levels of ground water (Dumett, 1979). One common type of pit recorded was the bottle-shaped opening – long and narrow at the top and neck but widening at the centre and bottom –where miners chipped away at the cave-like sides and ceiling. They indicated that most excavations ran from ten to twenty feet in depth. However, (Romer, 2005 cited from Ofosu-Mensa & Ababio , 2011) wrote, there were numerous cases in the records of shafts which were sunk to depths of eighty to hundred feet, and sometimes even more.

Hard rock mining techniques are adapted to mine gold bearing reefs, which can be located close to the surface or deep-seated. Holes are sunk to intercept the reefs and when accomplished, the reefs are worked along the strike. Where such reefs are weathered, small-scale miners use chisels and hammers to break ore. In cases where ore is hard, explosives are commonly used, despite being prohibited throughout Ghana, Aryee, et al., (2002).

2.3.2 Processing Methods

Small-scale miners apply different methods to process mined material to extract gold. The method normally depends on the type of mined material obtained from the particular method of mining method used. As recorded by Aryee, et al., (2002) smallscale gold miners invariably prefer free milling ores (not sulphidic ores), and therefore gravity concentration, using sluicing. In the case when the mined material is of alluvial ores, the traditional ore processing method, which usually yields a recovery rate of approximately 60%, involving sluicing in a sluice box to obtain gold concentrate is used. Mercury is then added to the concentrate and mixed to form a gold amalgam, which is then heated to separate the gold, Aryee, et al., (2002). In a situation when the

mined material is hard rock ores, traditional or manual processing methods featuring artisanal implements are typically used. It is largely due to the lack of the requisite crushing and milling equipment to facilitate the process. This manual method of gold extraction from hard rock ore involves "pounding" (crushing and grinding) using locally designed metal mortars and pestles. The resultant powder is mixed with water and sluiced to obtain a gold concentrate, which is later amalgamated with mercury.

Hilson (2001) also recorded that the ore or mined material, which is in pebbles form, undergo primary, secondary and tertiary grinding before it is carried to the riverside in cloth bags for washing. The finely crushed sediment is then laid along washing blankets or is hand washed along riverbanks (see photos below) to separate valuable gold.

Plate 2.2: Blanket washing of sediment along river bank at Manso Nkwanta, Ghana

Source, Study area 2013

2.4 Small-scale Gold Mining and Environmental Degradation

Small-scale mining predominantly apply surface mining techniques to extract gold from the land. Ntiamoah (2000) indicated that surface mining processes involves removal of the vegetation of a place and the use of heavy equipment to mine the mineral. This process, he noted, leaves behind pits and dumps that are created and result in the degradation of the land. As noted earlier on in chapter one, this type of mining has can

be associated with the degradation of about 15000 hectors of arable land across the country (FORIG report 2009). Aryee, et al., (2002) revealed that mining, irrespective of the scale of operation, has some degree of impact on the environment. However, the extent of damage depends largely on the mining and processing methods being used. They further explained that although both legalized and illegal small-scale mining activities have some negative impacts on the environment but in most cases, lack of monitoring and supervision of operations which is characterized by the illegal small-scale mining is responsible for the most significant share of environmental damages in the sector. Aryee, et al., (2002) again indicated that In Ghana, environmental problems associated with the small-scale mining of precious minerals can be broadly grouped into three categories as follows; the lithosphere , the hydrosphere and all atmospheric impacts.

The first category, the lithosphere, concerns land degradation which they described as primary impact and is a common phenomenon at virtually all uncontrolled, unmonitored small-scale mining sites. Miners leave behind horrible landscapes consisting of unstable piles of waste, abandoned excavations and vast stretches of barren land. Excavated pits are typically left unfilled and abandoned to become receptacles for water.

Large tracts of agricultural lands are also destroyed as a result of excessive vegetation removal and disturbance of soil structure. Growth supporting topsoil is usually removed during mining, and the land is rendered virtually incapable of supporting plant growth, in addition to being left exposed to erosion, Aryee, et al., (2002). In a study conducted by D. Tom-Dery, et al., (2012) on the topic "Effect of Illegal SmallScale Mining Operations on Vegetation Cover of Arid Northern Ghana" it was concluded that mining significantly affected vegetation cover. The study tested the hypothesis that density and diversity of key native tree and shrub species differ in the mined and not mined areas of Nangodi in the Talensi-Nabdam District of the Upper East Region in Ghana. A total of 20 plots (10×10 m) were studied in the mined and not mined areas. A total of 8 tree species and 9 shrub species were recorded. The extent to which illegal small scale mining has affected the vegetation of the study area was assessed. The Simpsons reciprocal diversity index of tree species at mined area was 8.33 as compared to 10.8 for the not mined area. For shrub species, the Simpsons reciprocal diversity index was

8.33 for the mined areas while that of the not mined was 10.2. Simpson's reciprocal diversity is a measure of diversity. It is often used to quantify the biodiversity of a habitat. It takes into account the number of species present, as well as the abundance of each species. Common trees and shrubs species were identified in both areas as designated by the calculated Jaccard's similarity index of 0.6 for trees and 0.7 for shrubs. However low mean density of 2.4 individual trees per 100 m2 and 5.6 individuals per 100 m2 was recorded in the mined and not mined areas respectively. Shrubs species also recorded very low density figures of 1.4 and

2.6 per 100m2 in the mined and not mined areas, respectively.
Thus the null hypothesis that there was no significant difference of illegal small-scale mining on tree and shrub species density was rejected at the 0.05 significant level, indicating that mining significantly affected vegetation cover. Edward E. Duncan and Jerry S. Kuma (2009) in their study "Open pit mining and land use changes: an example from Bogosu-Pretea area", recorded that surface mining activities has reduced agriculture land in the area. They used an estimation of areas and analysis of land use flow methods over twenty year period (1986 – 2006) to evaluate areas within the Golden Star Resources Bogoso Prestea Limited (GSRBPL) concession that have experiences land use change due to mining. The study revealed that mining in the area increased by 12.1 % in land coverage from 4.69 ha in 1986 to 530.84 ha in 2006. Agricultural land use reduced from 97.8% in 1986 to 82.7% in 2006. However, the study also revealed that land use due to mining stabilized between 1996 and 2006 due to good reclamation practices and reduced mine development.

The second category includes all impacts on the hydrosphere. The drainage system in many small-scale mining areas is adversely affected by such operations. Rivers and streams are polluted by solid suspensions and mercury, which are commonly discharged into resident water bodies during the sluicing process and amalgamation respectively. This in turn leads to siltation and coloration of such waters. Improperly disposed tailings also find their way into streams and rivers during heavy rains, creating sedimentation problems and rendering streams unusable for both domestic and industrial purposes. Removal of vegetation also causes soil erosion, which in turn increases the turbidity of runoff surface waters. Drainage of lubricants and other oils into streams also causes problems such as de-oxygenation of water, which threatens aquatic life, Aryee, et al., (2002).

The third and last category includes all atmospheric impacts. This particular category of effect of small-scale precious minerals mining according to Aryee et al., (2002) has generally been considered to be insignificant since operations are carried out in ambient air. Nevertheless, emissions of gaseous pollutants do occur. Small-scale mining operations that involve size reduction of ore generate some dust that could be hazardous to human health since the particles generated from such sources fall within the inhalable dust range and are capable of causing dust-related diseases. Furthermore, a common practice of small-scale gold miners in Ghana is the burning of gold amalgam in the open air. This practice produces mercury fumes, which are released into the atmosphere. In some instances, the burning of amalgam is conducted in poorly ventilated rooms, exposing miners to the dangers of mercury contamination, Aryee, et al., (2002).

2.5 Small-scale Gold Mining and Agricultural Production

Aragon and Rud (2012) documented that traditionally, gold mines have been located in the Ashanti gold belt, in the south-west of Ghana. The gold belt extends over three regions: Western, Ashanti and Central. Furthermore, new mines have been opened in the south of Brong-Ahafo, and there are several explorations and mine development in the Eastern and Northern regions. Characteristically, these areas are the hub of agricultural production. Available literature revealed that activities of gold miners in these areas pose a variety of negative effects on agricultural livelihoods. Aragon and Rud (2012) established that because mining operations in Ghana are located in areas where agricultural production is done, an increase in pollution of air and water would seriously affect farmers' ability to produce. Again they found evidence of a significant reduction in agricultural productivity based on estimates between 1998/99 and 2005. Through the estimation of production function using household level data, their study concluded that productivity decreased by almost 40% in areas closer to mines relative to areas farther away. The result according to them was driven by polluting mines and not by input availability.

Ceponis, 1987; Chiang et al., 1993; Guerena, 2006; Jarvis and McKeen, 1991 cited in Ocansey (2013) recorded that physiological or non-pathogenic disorders of crop plants are mainly caused by changing environmental conditions such as temperature, moisture, unbalanced soil nutrients, inadequate or excess of certain soil minerals, extremes of soil pH and poor drainage which are highest in the communities affected

by mining activities. Action Aid research work carried out in Obuasi also reported that food crops such as cocoyam, Plantain, Sweet potato, Sugar cane were poisoned by polluted spilled over water from the mines. The cultivation of fruit and vegetables – such as local crops, including 'Obuasi oranges' – on polluted land was reported to pose a risk to peoples' health and thus produce were prevented from been sold in local markets (Action Aid report, 2006).

According to the report, in response to the question asked about the effects of gold mining on local food supplies in Obuasi, 90% of those interviewed for Third World Network (TWN) Africa said that mining had led to the reduction of food production in their communities.

Ocansey (2013) also indicated that release of chemical substances by the mining processes into the soil discourages and destroys crops and in effect not much crops are cultivated in the mine area and thus food becomes scarce. Food production levels drop as more and more people opt for mining jobs either than farming leading to low food production level in the farming communities. Ocansey (2013) again revealed that the youth who should take up farming as occupation are engaged in the mining sector and this has contributed to the precarious food insecurity problem in the area. This buttresses the point made by Aragon and Rud (2012) that mines have the potential to generate significant negative spillovers to farmers such as pollution and competition for key inputs such as land and labor.

As indicated by Aragon and Rud (2012) mining has been associated with land grabbing and increases in the cost of living in mining communities. The situation could further lead to an increase in agricultural input prices and consequently production cost. In the natural and environmental science discipline researchers have widely documented the effect of pollutants (mostly airborne) on crop yields (Emberson et al., 2001; Maggs et al., 1995; Marshall et al., 1997, cited from Aragon and Rud, 2012). These studies, mostly in controlled environments, found drastic reductions in yields of main crops such as rice, wheat, and beans as result of exposure to air pollutants associated to the burning of fossil fuels, such as nitrogen oxides and ozone. Depending of the type of crop, the yield reductions were as high as 30 to 60%. This also buttresses the assertion by Environmental Canada that "Mining activity may also contaminate terrestrial plants. Metals may be transported into terrestrial ecosystems adjacent to mine sites as a result

of releases of airborne particulate matter and seepage of groundwater or surface water. In some cases, the uptake of contaminants from the soil in mining areas can lead to stressed vegetation. In such cases the vegetation could be stunted or dwarfed (Environment Canada, 2009, p. 39). In the report of Action Aid research (2006) it was reported that there were serious poisoning of local crops in areas of historic gold mining activity, with high levels of mercury, zinc and arsenic found in local 'Obuasi oranges'. For instance "Mercury values were up to five times more than EPA limits and 26 times more than World

Health Organization limits, Zinc concentrations were up to five and eight times more than EPA and WHO limits and Arsenic values were 24 and 1,226 times the EPA and WHO limits respectively.

2.6 Impact of Small-scale Gold Mining on Food Production

As cited in Ocansey (2013), Adu Yeboah *et al* (2008) observed that one of the major negative impacts of mining is the high cost of living within communities near the mining sites. Most basic needs such as food, accommodation, water and other necessities are expensive to purchase by ordinary people. He again stated that there are two main reasons for this situation. Firstly, the mining companies employ most of the strong and able-bodied young men into the mining industry, taking them away from the farms. Secondly, most of the farmlands in those communities are taken over by the mining companies. The result is that there is always a reduction in food production in those areas and the need for food to be brought from distant areas at exorbitant prices. Ocansey (2013) documented that the release of chemical substances by the mining processes into the soil discourages and destroys crops.

He also indicated that the environmental pollution occurred in the study area has affected on farming in general. The results as proven from the data analysis indicated that mining for natural resources in the area have contributed to loss of farming businesses which has led to food insecurity in the area. This is because mining activities have taken up some of the rich lands which are used for farming. Consequently there is not much crops grown in the area and thus food becomes scarce as a result of the mining activities. Food production levels drop as more and more people opt for mining jobs either than farming leading to low food production level in the farming communities. Ocansey (2013) in his analysis documented that majority of the respondents in his

study area owned just some small hectares of farmlands meaning they were mostly into subsistence farming and the introduction of mining operations rendered their farming activities ineffective. These poor farmers mostly derived their livelihood from their farming practices. As a result of the mining activities, they cannot produce as much food as they used to, which has led to food shortages and price hikes. He explained further that high labour and input cost also contributed to food shortages in the communities. Tsuma (2010) recorded that the acquisition of lands remains a major threat to food security and livelihoods safety in most mining areas. Tsuma (2010) argued that mining investments are by default situated in rural areas where inhabitants depend on healthy land systems for their livelihoods. These areas which are characterized by hilly-forested and fertile land suitable for food production are grabbed for surface gold mining. The effect of this situation is that communities abandon their farm-based activities to join in the mining which are more rewarding. This situation also brings dire consequences among which are low food productions, rising prices of food stuffs and the increase in illegal smallscale mining by the rural folks.

2.7 Trend of Small-scale Gold Mining Regulations in Ghana

Nyame and Blocher (2009) observed that many recent laws to regulate the mining sector in sub-Saharan Africa have their basis on a political atmosphere that was highly skewed towards increased state participation in the mineral resources sector. State participation in commercial enterprises—including mining—was the norm in postcolonial Africa, both in nations with civilian leadership (Lanning and Mueller, 1979 cited in Nyame & Blocher 2009) and those where laws were promulgated through decree by military regimes. As indicated by Aryee, et al., (2002). In Ghana prior to the 1989, when artisanal and small-scale gold mining received legal recognition, various legislations were introduced to prohibit and limit some of its activities. This situation stunted the growth of small-scale gold mining and the sector experienced near complete eradication.

Ofosu-Mensa & Ababio (2011) documented that small-scale artisanal mining which was a respected tradition in Ghana for centuries became a persecuted profession after the British colonized the region in the early 19th century and banned the practice. Expatriates mining companies gained enormous rights and powers as they purchased concessions of the gold- rich- lands and held tenancies at their will. Nobody could

embark on mining activities on these lands without the consent of the mining companies. Section 24 of the Concessions Ordinance of 1900 prohibited any person from searching for minerals without a prospecting license, while Section 34(1) restricted prospective African mining entrepreneurs to the use of indigenous technology (Gold Coast Ordinances for the year 1900; Adm 29/6/42 PRAAD, Koforidua). This attempted to exclude the local people or the indigenous miners from the mining industry which had been their main business up to the 1880s and turned it into the exclusive preserve of European capitalists, Ofosu-Mensa & Ababio (2011).

However as recorded by Aryee, et al., (2002), the increasing awareness of the fact that the continued marginalization of the small-scale gold mining sector was detrimental to the national economy led to a study into the phenomenon, which resulted in regularization through the enactment of the small-scale Gold Mining Law, PNDCL 218, in May 1989. Concomitantly, the Diamond Marketing Corporation (DMC), and state agency responsible for marketing diamond, had its mandate expanded and was re-named the Precious Minerals Marketing Corporation (PMMC) to provide a ready market for both gold and diamond produced by resident small-scale miners.

2.8 Small-scale Mining License Acquisition

The Ghana Minerals Commission is the institution responsible for all policy making and regulatory activities in the mining industry. It was established under the Minerals

Commission Law of 1986. The Mineral Commission is one of the main departments of the Ministry of Lands, Forestry and Mines and it seeks to help formulate government policy with respect to ‘exploration for and exploitation of mineral resources’ and handles ‘all public agreements relating to mining’.

In the work of Hilson (2001) he explained that when a prospective applicant notifies a local branch of the Minerals Commission of his or her intentions, a representative evaluates the chosen site to determine its suitability. If deemed appropriate, the area is then demarcated and site plans are prepared; a notice of intention to allocate the area for small-scale mining is published by the District Assembly for a period of 21 days, and if no objections are made, the applicant completes the necessary forms, which, along with an environmental impact assessment statement, are then submitted to the Minerals Commission in Accra. A Small-Scale Mining Unit comprised of some 35

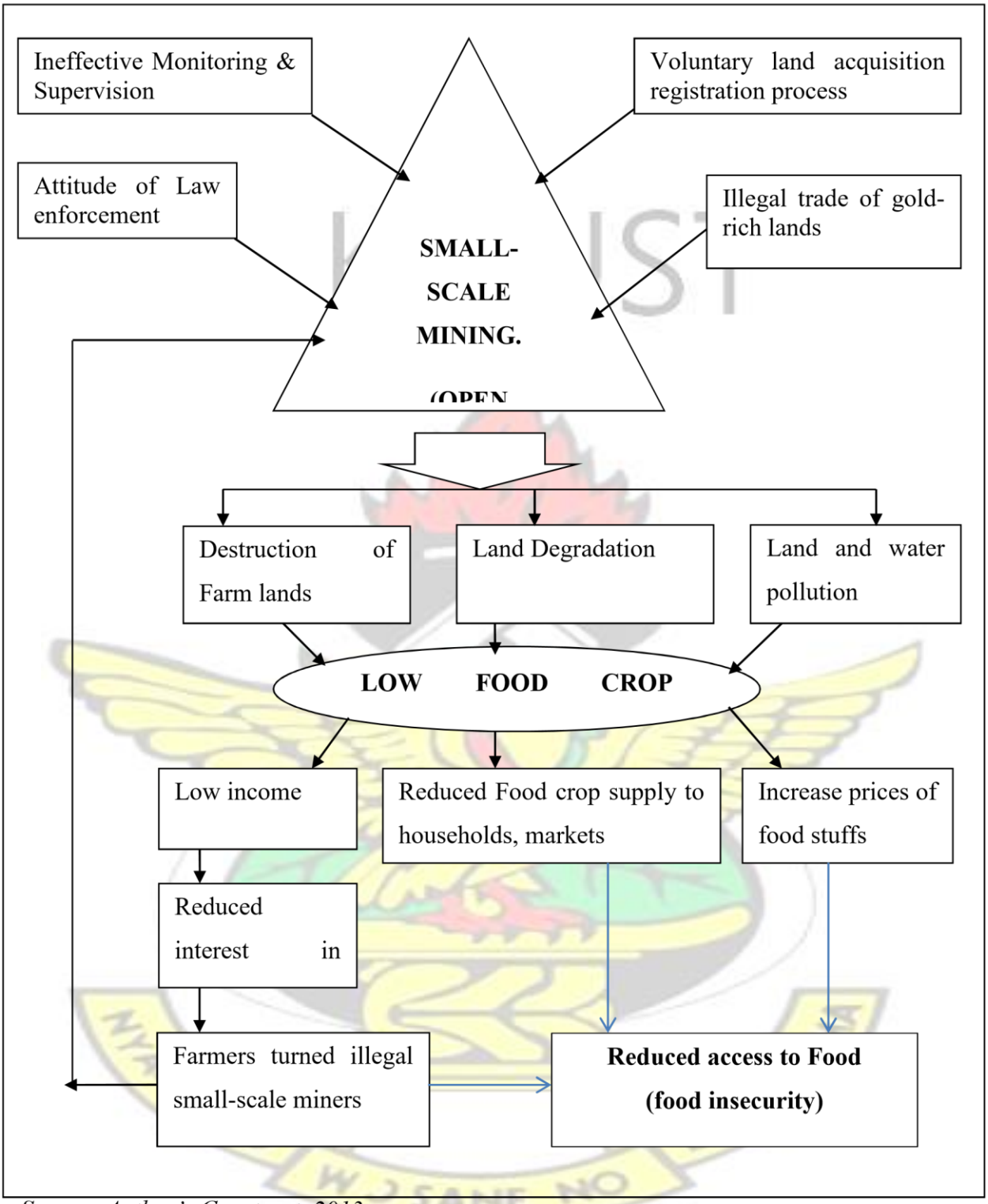
personnel was established in the Minerals Commission to handle these and related responsibilities.

Below are the summarized registration criteria for small-scale mining in Ghana as given by Hilson (2001)

- Licenses are granted only to Ghanaian nationals.
- A license issued to an individual shall not exceed three years but can be renewed for a period of no more than three years for two consecutive terms.
- A license issued to a cooperative shall last for a period of five years but is renewable for a period no longer than five years for two consecutive terms.
- A group of individuals not exceeding four shall be granted an area no more than three acres; a group exceeding four but not more than nine shall be granted an area no more than five acres; and a company or a cooperative society shall be granted an area not exceeding 25 acres.
- An applicant must complete the application form fully and have it endorsed by district administration.
- Although all small-scale miners are exempted from payment of taxes and royalties for the first three years of operation, they are not exempted from local imposts.
- After successful application, the mine operator must erect concrete posts at the four corners of the concession atop of the four discs (with number engraved) provided; the edges of the concession must be kept clear for concession purposes; and successful applicants must also erect a signpost within the concession with their name and number written on it.

However, the whole procedure by which individual obtains a small-scale mining license was described by Hilson (2001) as tedious requiring the completions of several forms and final approval from government authorities after meeting a number of criteria and restrictions. This procedure however, is largely voluntary and it is the reason why most small-scale miners in Ghana continue to operate illegally (Hilson 2001).

Figure: 2.1 Conceptual Frameworks



Source: Author's Construct, 2013

2.9: Conceptual Framework

The conceptual framework explains the impact of small-scale mining activities on food production as it is the case in the Amansie west district. The small-scale gold mining in the Amansie west district largely operate with open pit or what is normally referred to

as surface mining method. This method of gold mining involves digging of trenches and upturning vegetation. Such activities which are very destructive to arable land, are been supported by voluntary mine land acquisition registration process and illegal trade of gold rich lands on one hand and attitude of law enforcement agencies as well as ineffective monitoring and supervision of mining activities on other hand. These variables facilitate the destructive nature of small-scale gold mining activities in the district which leads to destruction of farms, land degradation and pollution.

The situation has a very high propensity to reduce the levels of food crop production because competition for land becomes inevitable. In the end, food supply to individual households and markets will experience drastic reduction. Farmers' income could be affected negatively and the price of food items available in the market will increase since demand will exceed supply.

The low income of local farmers as a result of the above trend also has the tendency to dissipate their interest in farming activities. Again the local farmers including young and energetic men and women having lost their livelihood and developed dislike for farming will have no alternative than to join the search for gold in their own way. This will be made possible by the easy entry into the gold mining work in the Amansie west district.

In the end the district will experience food insecurity as the local access to food will greatly be affected due to reduced crop production.

The seemingly cyclical nature of the situation continuously and gradually deprives the food crop production sector of manpower and access to arable land which will eventually cause a shortage of food in both households and markets.

This chapter has revealed some relevant lessons which will serve as the basis for proving whether small-scale gold mining, which predominantly take place in the farming areas, could have any effect on the trend of food crop production levels. In the literatures we identified that small-scale mining causes land degradation and pollution of water bodies which have higher propensity to reduce food crop production levels in

the mining areas. Also small-scale miners compete with farmers for the rich farmland thus reducing the hectares of cultivated land for food crop production.

The next chapter presents the methodology used to determine how these factors could have effect on food crop production in the Amansie West District over the years under consideration. The district profile is also presented in this same chapter.

CHAPTER THREE

RESEARCH METHODOLOGY AND DISTRICT PROFILE

3.1 Introduction

This section of the research study elucidates the methodology adopted in the study. A detailed procedure for the design of the research, collection of primary and secondary data required for the study are presented and discussed. The chapter in essence presents issues on research design, research process, sampling technique, data requirements and sources as well as data collection.

3.2 Research Design

Research design is the strategy, the plan, and the structure of conducting a research project. The function of a research design is to ensure that the evidence obtained enables a researcher to answer the initial question as unambiguously as possible. According to De Vaus (2001) there are two broad areas of research; these are descriptive research and explanatory research. This study is a descriptive research since it seeks to describe the pattern of relationship between small-scale gold mining activities and food production by elucidating the effects the of the previous on the former, thus a case study research design will be used. The choice of this model stemmed from the fact that the research will be carried out in the natural setting where the researcher has little control over the events. "The case study approach refers to an in-depth study of contemporary topic using multiple sources of evidence within the real life context" (Yin, 1984). According to Gummersson (1991) as cited in Lam

(2009) allows an increase in qualitative and quantitative data obtained. Miles and Huberman (1994) indicate that a case study allows the researcher to analyze relationships and social processes that are not possible through either a qualitative or quantitative approach alone. A case study analyzes the topic in its natural environment, and data is obtained by direct observation, interviews, document analysis among others.

The rationale behind selecting the case study approach is due to the fact that the approach allows the researcher focus on the topic as well as employs several data collection methods and techniques. Yin (1984) indicates that this approach guarantees

higher data validity as triangulation is possible through the use of multiple data collection methods which in essence ensures accuracy.

3.3 Research Process

The various stages undertaken in this research and the approaches used at each stage are discussed. The discussion takes into account the difficulties faced.

3.3.1 Problem Definition and Synopsis/Proposal Preparation

Like any other research, this study began with the definition of a problem. This involved mainly identification of researchable topic which is of interest to stakeholders and acceptable to the supervising lecturer. After, a final topic was decided on; a proposal was then written and submitted for approval. The proposal comprised an introduction to the study, background, research objectives and questions, scope and limitation, significance as well as organization of the study.

3.3.2 Review of Relevant Literature

In line with the scope and problem defined in the proposal, relevant literature on small scale mining and food crop production were reviewed. This provided an idea of the direction and the extent of works that have been undertaken on the subject to enable the identification of further research requirements. The literature review includes issues concerning food security, food production, small-scale mining among others.

Also case studies on the effect of small scale mining were considered.

3.3.3 Research Methodology and Design of Field Survey Instruments

The methodology for the study involved a description and explanation of the design used; in this instance the case study research design. The case study research design was chosen in order to provide an in-depth understanding of the phenomenon under study. Following this, instruments for data collection were designed to obtain data for the research study. The tools used for this study included interview guides and questionnaires. Thus questionnaires were designed to collect data from the units of enquiry.

3.3.4 Data Collection

Field surveys to the case District was undertaken to obtain primary data as well as secondary data for the study. Respondents from which data were solicited included officials of the District Assembly, small-scale miners, farmers, officials of environmental agencies and non-governmental organizations located in the District.

3.3.5 Data Analysis and Reporting

This involved quantitative as well as qualitative analysis of the data collected from the field. The use of statistical programmes such as Statistical Package for Social Scientist and Microsoft Excel were employed in analyzing the data and also generating graphs, tables and charts. Findings of the research were reported using a combination of varied approaches and techniques.

3.4 Data Requirements and Sources

This section indicates the data utilized for this study and the sources from which it was obtained. It helped in the preparation of the survey instruments since it outlined the various sources from which data can be obtained and hence the different sets of survey instruments prepared for the data collection from the various data sources. Data for this projected were obtained from both secondary and primary data sources. The detailed data collected for the projected as well as the sources from which they were obtained is duly presented in Table 3.1. **Table 3.1: Data Sources and Requirements**

Data Requirement	Sources
Review of major literature about food security, small-scale mining, and food production among others.	Libraries, Internet resources from UN, World Bank, published documents, journals District Strategic Environmental Assessment Report, Ghana Chamber of mines, among others.
Profile of district, major food crops cultivated in the district, annual crop yields, the number of small-scale miners operating in the District, the size of arable land involved in gold mining activities and number of farmers who have lost farms and lands, effects of mining on crop production.	District Assembly, District Agricultural Development Unit, Environmental protection Agency
Farm sizes, farm practices, inputs used, output levels, crops cultivated effects of mining on farm activities and output levels.	Farmers, Farmer Based Organizations

Type of mining activity, type of mining practices used, size of concession, number of people employed, machinery utilized, effects of activities, challenges in mining operation etc.	Small scale miners, Association of small scale miners

Source: Authror's Construct, 2013.

3.5 Sampling Techniques and Procedure

A sample is a small part of the whole intended as representative of the whole. Sampling is that part of statistical practice concerned with the selection of an unbiased or random subset of individual observations within a population of individuals intended to yield some knowledge about the population of concern, especially for the purposes of making predictions based on the sample frame (Kazentet, 2011). Simple random sampling and purposive sampling techniques were adopted and used to undertake this research study. Purposive sampling technique was used to select the institutions to be interviewed for the purposes of this research study. The institutions include the District Assembly, District Agricultural Development Unit, Mining and Farmer Based Organizations. Simple random sampling and purposive sampling were used in selecting the farmers and small scale miners interviewed. The survey instruments used to conduct the research study can be found in appendix A of this report.

In the first phase of sampling, the sample size for the study was determined. The sample size formula below was used:

$$n = \frac{N}{1 + N\alpha^2}$$

Where:

n is the sample size

N is the total population α is the margin of error defined at 95 percent confidence level (α =0.05).

The population for the district obtained from the District Planning Coordinating Unit is 134, 331. However according to the 2010 Population and Housing census, the Amansie West District analytical report, about 76.5% of the population between the ages of 15years and above are economically active. Thus 76.5% of the total District population was the target population for the study. The sample for the study was thus derived as follows:

$$n = \frac{102{,}763}{1 + 102{,}763\ (0.05)^2}$$

$$n = \frac{102{,}763}{1 + 102{,}763\ (0.0025)}$$

$$n = \frac{102{,}763}{1 + 256.91}$$

$$n = \frac{102{,}763}{257.91} = \frac{102{,}763}{258} = 398$$

The sample size for the study was 398.

In the second phase of sampling, six farming communities were selected from mining operational areas in the district. They included Keniago, Asamang, Dunhura, Tontokrom, Datanor and Watreso. These are communities the District Assembly's Office as well as the District department of food and agriculture indicated were predominantly farming communities which have been badly affected by small-scale gold mining exploration in the entire district. Again data obtained from the institutions (AWDADU, AWDA) indicated that 6.15% of the labour force in the 6 communities was engaged in agriculture whereas 38.5% were engaged in small scale mining.

The third phase of sampling involved using the proportion of labour force engaged in farming and mining in the 6 communities to extract from the sample the number of farmers and miners to be interviewed out of the 398 sample size for the study. Total number of farmers to be interviewed was calculated as follows:

Farmers to be interviewed = Proportion engaged in farming * Sample size

Farmers to be interviewed = 61.5 % * 398

$$\text{Farmers to be interviewed} = \frac{61.5 * 398}{100}$$

Farmers to be interviewed = 0.615 * 398 = 244.77 = 245

Farmers to be interviewed = 245

Total number of miners to be interviewed was calculated as follows:

Miners to be interviewed = Proportion engaged in miners * Sample size

Miners to be interviewed = 38.5 % * 398

Miners to be interviewed = $\frac{38.5 * 398}{100}$

Miners to be interviewed = 0.385 * 390 = 153.23 = 153

Miners to be interviewed = 153

Having determined the total number of farmers and miners to be interviewed for the study, the next step was to determine the number of farmers and miners to be interviewed from each community. In order to obtain a fair idea of issues across the 6 communities, the samples determined were divided by the 6 communities to ensure the same sample sizes were interviewed from each of the 6 communities.

In view of this, 67 respondents comprising of 41 farmers and 26 small scale miners were interviewed from each of the six communities. The selection was based on purposive sampling technique. This was based on regular and genuinely affected farmers. The selection was done with assistance from opinion leaders, and assemblymen in the communities.

3.6 Data Analysis and Presentation

As indicated under data types and sources, the study used both primary and secondary data. Secondary data was collected through desk studies and internet exploration. Here libraries and the internet were visited to collect secondary data relevant to this study. Primary data were collected through a field survey. Here, formal and informal interviews were conducted to obtain empirical data from the field. For formal interviews, questionnaires and institutional questionnaires were used whiles interview guides and check lists were used for informal interviews. Samples of these survey instruments are provided in the Appendix.

3.7 Data Rationalization, Analysis, Presentation and Reporting

Data from the field were edited, rationalized and collated. Qualitative data were coded with each sentence given a unique code using the SPSS software. Subsequently, data were categorized and tabulated to respond to the study objectives. Quantitative data

collected were also coded using the SPSS software. It was analyzed and used to support the qualitative data for clearer understanding of the subject. The data collected were analyzed with the aid of Excel and Statistical Package for Social Scientists (SPSS) computer software to provide descriptive statistics and frequency tables, and bar graphs etc.

Findings of the research will be reported using a combination of varied approaches and techniques. Quantitative and Qualitative analyses will be undertaken with reference to the study's objectives. The use of tables, figures and plates will be employed to support the analysis of data. The major findings will also be summarized in line with the objectives of the study.

3.8 The District Profile

3.8.1 Location and Size of Amansie West District

The Amansie West District was carved out of the former Amansie District in 1988. The District shares common boundaries with eight districts namely: Atwima Nwabiagya and Atwima Mponuah to the west, Bekwai Municipality, Amansie Central and Obuasi Municipal to the east, Atwima Kwawhoma to the north and Upper Denkyira and Bibiani to the south (see Figure 4.1). The District serves as a regional boundary between Ashanti Region on one side and Central and Western Region on the other side. Specifically, the district is located within latitude 6.05^{o} West: 6.35^{o} North: 1.40^{o} South and 2.05^{o} East. The Amansie West District spans an area of about 1,364 square kilometers and it is the one of the largest districts in Ashanti covering about 5.4 percent of the total land area of the Ashanti Region. Manso Nkwanta is the District Capital and it is about 65 km from Kumasi. There are other larger settlements which include Abore, Agroyesum, Ahwerewa, Ankam, Antoakrom, Aponapon, Datano, Esaase, Esuowin, Keniago, Mpatuam, Moseaso, Nipankyeremia, Odaho, Pakyi No. 1 and 2 and Watreso (MOFA, 2011).

Figure 3.1: Map of Amansie West District

Source: Ghana Statistical Service, GIS

3.8.2 Relief and Drainage

The topography of the district is generally undulating with an elevation of 210 metres above sea level. The most prominent feature is the range of hills, which stretches across the north-western part of the district, especially around Manso-Nkwanta and Abore. These hills have an elevation of between 560 meters and 630 metres. The district is drained in the north by the Offin and Oda rivers and their tributaries such as Jeni, Pumpin and Emuna. The drainage pattern of the district can be harnessed for irrigational cultivation of rice vegetable farming and aqua culture (MOFA 2011).

3.8.3 Climate, Vegetation and Soil

The climate of the district is wet semi-equatorial climatic. It has a double rainfall maxima regime with the major rainy season occurring between March and July.

The minor rainfall season occurs between September and November. Mean annual rainfall ranges between 855mm and 1,500mm. The average number of rainy days for the year is between 110 and 120 days. The months, December to March are usually dry and characterized by high temperatures, and early morning moist/fog and cold weather conditions. Temperatures are generally high throughout the year with mean monthly temperature of about 27^{o}c. Humidity is high during the rainy season. In the months of December to February, however, very low humidity temperatures are recorded. This climatic condition is suitable for the cultivation of cash and food crops such as cocoa, citronella, oranges, plantain and vegetables to feed the agro based industries in the

district and beyond. It must be stressed however that, current trends in the climatic conditions of the district is becoming unpredictable as a result of climate change. This in turn adversely affects agriculture planning (MOFA 2011).

The vegetation of the District on the other hand is mainly of the rain forest type and exhibits moist semi deciduous characteristics. This makes the land very fertile and suitable for agricultural activities. Food and cash crops such as cassava, rice, maize, cocoa, citrus, oil palm, citronella grass, and others are widely grown in the area. As a result of the bad practices such as shifting cultivation, slash and burn method of farming, illegal mining and illegal logging, the rain forest has gradually been destroyed and replaced by a mosaic of secondary forest.

The district is surrounded with four main forest reserves, these are the; Oda River Forest Reserve, Apanprama Forest Reserve, Jimira Forest Reserve and Gyeni River Forest Reserve. There are six (6) key different soil types in the district. These are Bekwai-Oda Compound Association. This series is a deep well drained, red gravelly soil and normally occur in valley bottoms. This series is found in the northern part of Abore and areas around Dome-Keniago, Antoakrom, Odaho and a large portion of the land beyond the river Offin. The second type of soil is the Ahawam-KakumChichiwere Association. This series is reddish brown in colour, deep well drained loam to clay loam. This series is found in the south western part of the district and Nyamebekyere, Britcherkrom and Adagya area. The third series found in the district is the Mim-Oda Compound. This is slightly different from the Bekwai-Oda because of the presence of abundant stone gravels. This soil occurs in the southern part of Datano and Aboaboso. The forth is the Bekwai-Zongo-Oda Complex found mainly in the northern part of Esaase. Nyanoo-Tinkong Association is the fifth soil type. This series are very shallow in nature soil on eroded hill tops and flanks. They are found in the hilly areas of Abore.

The sixth is the Kobeda-Eschiem-Subinso-Oda Complex. The outstanding feature of this series is its limited use due to shallow depth hence making it susceptible to draught. They are found in the northern part of Manso-Nkwanta and areas around Essuowin and Bayerebon. The above mentioned soil types have the potential of supporting both food and cash crops such as cassava, plantain, coca, citronella, oil palm etc. No wonder the district is ranked third in the cocoa production business. However, where soil fertility

is low there is the need for soil fertility practices and the use of fertilizer for increased and sustainable production and productivity (MOFA, 2011).

3.8.4 Natural Resources

Among the resources identified in the district are potentially rich mineral (gold) deposits. Areas with such deposit include Bonteso, Gyeninso, Mpatuam, Essuowin, Tontokrom and others. Quite a large area of the district has been acquired with concessions by some licensed mining companies given for prospecting.

There are however other areas in the district with gold deposits which have not been acquired. Notable among such areas is the Jeni Bonte Rivers Placer Deposits. It has been estimated that there are about 21,361,400 cubic meters of soil containing 5,209,866 grams of gold in the Jeni Bonte River. Apart from the companies with large concessions in the district, there are other interested parties in the mining industry. There are pockets of small scale mining groups in the district which employ very crude methods to win gold. The activities of these various groups are not properly regulated and not well organized to be seen as part of a total package of development efforts in the district (MOFA, 2011).

3.8.5 Economic Characteristic

The local economy made up of agriculture, service (Industrial, manufacturing and mining). For the purpose of the study, emphasis is laid on the agriculture sector of the economic.

The agriculture sector of the economy is made up of crops and livestock production. While there are a few large farms and cocoa and oil palm plantations, small scale agriculture is predominantly practiced in the district. The average farm size is 12.8 acres or 5 hectares, with more than half of the households (63%) having holdings of about 10 acres or 4 ha. Farm size ranges from 1 acre (0.4 ha) to 74 acres (30 ha), with a median of 9 acres. Wealthier households tend to have larger farms almost twice as big as those in lower income. Staple crops include cassava, cocoyam, plantain, yam and maize. Vegetables like garden eggs, tomatoes are also cultivated but to a lesser extent than staples. Cocoa is the main cash crop cultivated in the district and the ranked third in the nation. The table below indicates the production levels in food crops.

Vegetables are usually produced along the banks of rivers and at the valley bottoms during the minor season. Buckets, cups, watering cans, and sometimes small irrigation pumps and pipes are used to irrigate these gardens. The types of vegetables grown include pepper, garden eggs, okra, tomatoes, and cabbage.

Free animal rearing (mostly poultry, sheep and goats) is done on very small basis at the household level. The sub sector can be promoted on large scale basis such as ranches poultry farms etc. however, high cost of investment has prevented farmers from venturing into larger scale production in that subsector.

The first part of this chapter elucidated the total number of respondents (Farmers and Small-scale miners) to be interviewed on the field for primary data to complement the secondary data collected from relevant institutions in the study area.

In the next chapter all the data collected, both primary and secondary, have been analyzed and the results presented in tables and charts to guide discussions on effects of small-scale mining on the trend of major crop production in the study area.

CHAPTER FOUR

DATA ANALYSIS ON THE EFFECTS OF SMALL SCALE MINING ON FOOD PRODUCTION

4.1 Introduction

This chapter seeks to provide detailed analysis on the effects of small scale mining on food crop production in the study area (Amansie West District of the Ashanti Region). It provides analysis on the legal and regulatory frameworks of small scale mining activities in the study area and how these frameworks contribute to the protection of agricultural activities in the sampled communities.

Based on this an assessment of major food crop production trend over a five year period in the study area was carried out. This was aimed at identifying the effects of the small-scale mining activities on major crop production in the district in terms of land acquisition for small scale mining activities, destruction of cultivated farmlands to pave way for the mining activities and destruction of water bodies meant for domestic consumption and agriculture production.

Lessons drawn from the analysis in this chapter will serve as inputs to formulate policy recommendations to control the small scale mining activities in the food growing areas.

The outline of the chapter therefore includes analysis on the categories and characteristics of respondents (both farmers and small scale miners), food and Smallscale mining in the Amansie West District. The chapter thus finally outlines the effects of small scale mining activities on major crop production.

4.2 Categories and Background Characteristics of Respondents

4.2.1 Categories of Respondents

Data was collected from five categories of respondents namely the food crop farmers, small-scale miners, the District Assembly, the District Agriculture Development Unit (DADU) and the Environmental Protection Agency. Table 4.1 shows the number of people interviewed during the survey.

Table 4.1: Categories and Number of Respondents

Category	Number
Food Crop Farmers	240
Small-Scale Miners	150
District Assembly	1
District Agricultural Development Unit	1
Environmental Protection Agency	1
Total	**393**

Source: Field Survey, November, 2013

Table 4.1 provides information on the categories and number of respondents that provided data on small-scale mining and food productions. Data were taken from five categories of respondents namely food crop farmers, small-scale miners, District Assembly, District Agriculture Development Unit (DADU) and the Environmental Protection Agency (EPA). Data on food production, land cultivation and other relevant information relating to food crop were taken from Food crop farmers and DADU. The EPA and the small-scale farmers mainly provided data on the effects of mining on the environment and the food crop production among other vital information. Data on legal framework regulating the small-scale mining activities were also provided by the District Assembly.

4.2.2 Age and Sex Composition of Respondents

Data on age and sex composition of respondents were taken. The aim is to assess the age composition of the two sexes found in agriculture production and small-scale mining activities. This helped to identify the dominance of the youth in each of the activities. It was identified to have the youth dominated in small-scale mining activities than into the food crop production. As indicated in Table 4.2

Table 4.2: Age and Sex Composition of Respondents

Age (Years)	Farmers			Small-Scale Miners		
	Sex		Total Percentage (%)	Sex		Total Percentage (%)
	Male	Female		Male	Female	
15-20	-	-		14	4	12
21-25	-	-		29	7	24

26-30	6	10	7	14	4	12
31-35	18	8	11	9	9	12
36-40	20	12	13	20	4	16
41-45	22	13	14	10	2	8
46-50	30	15	19	12	-	8
51-55	30	13	18	9	-	6
56-60	15	9	10	2	-	1.3
60+	13	6	8	1	-	0.7
Total	**154(64%)**	**86(36%)**	**100**	**20(80%)**	**30(20%)**	**100**

Source: Field Survey, November, 2013

As indicated earlier, the small-scale mining activities in the study area are dominated by the youth as compared to the farming activities. From Table 4.2, it can be observed 60 percent of those between the ages of 15 and 35 years are into small-scale mining as compared to 18 percent of those into agriculture. The dominance of the youth in small-scale mining can be attributed to its attractiveness in terms of higher revenue generation and how these revenues are quickly generated compared to farming

activities.

This has left farming in the district in the hands of (69%) representing adults above the age of 40years who do not normally have the adequate strength to undertake large scale food crop production. This has a serious repercussion on food crop and agriculture production as a whole, especially in communities which predominantly undertake small-scale farming.

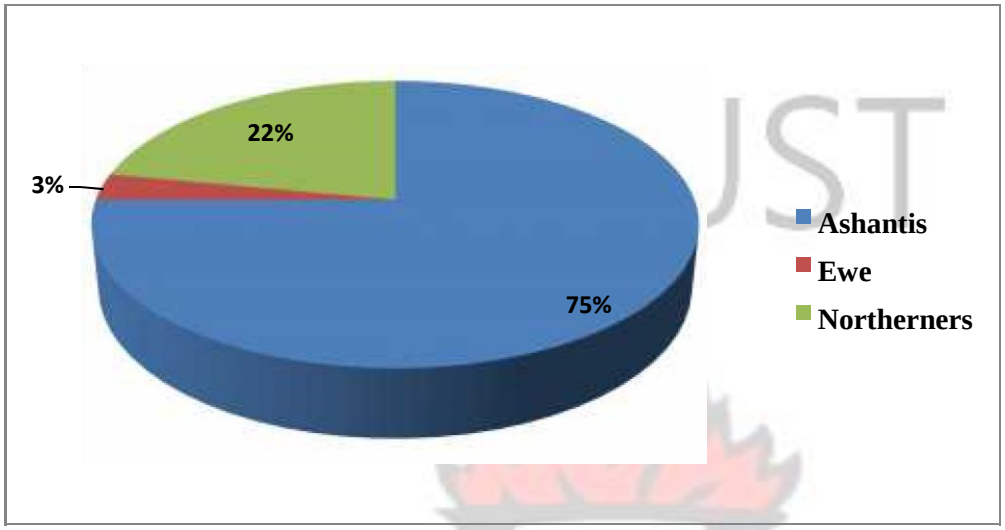
In terms of the sex composition, it was revealed that males dominate in both the small-scale mining activities and farming activities constituting 80 percent and 64 percent respectively. The highest number of males in economic activities as revealed by the study is in line with the revelation in the District Medium Term Development Plan which indicates that males constitute 63 percent of those engaged in economic and productive activities as compared to their female counterparts.

4.2.3 Places of Origin of Respondents

The study area, just like any other district in the Ashanti, has most of its residents being Ashantis. The Ashanti's constitute 75 percent followed by the Northerners representing

22 percent with the least being Ewes with 3 percent of the total number of respondents. This is depicted in Figure 4.1

Figure 4.1: Ethnic Affiliation of Respondents



Source: Field Survey, November, 2013

Even though Ashantis dominate as shown with 75 percent of the respondents in, the figure does not constitute only those who come from within the Amansie West District as the emergence of the mining activities in the district has resulted in migration of people from other districts within the Ashanti to the district. This constitutes 40 percent of the number of Ashantis in the district.

The Northerners however have majority (70%) of them into faming particularly into cocoa production with the remaining being in the district because of the mining activities. It therefore means that the influx of small-scale mining activities in the district have influenced the migration of people from within and outside the Ashanti region into the Amansie West District for such purpose.

4.3 Food Production in the Amansie West District

4.3.1 Trend of Major Food Crop Production in the District

This section seeks to find out the trend of food production in the district over a given period specifically within the past five (5) years. The objective is to establish whether food production has been increasing or decreasing in the district. This assessment was done with reference to the 2008 to 2012. For the purpose of this study, selected food crops include

cassava, cocoyam, maize, plantain, rice and vegetables such as garden eggs, pepper, okra, tomatoes and cabbages. Details of such trend are presented in Table 4.3.

Table 4.3: Trend of Food Production in Amansie West District

Type of Food Crop	**Production Levels from 2008 -2012 (in Metric-tonnes)**								
	2008	**2009**		**2010**		**2011**		**2012**	
	Output	**Output**	**Per (%) Change**	**Output**	**Per (%) Change**	**Output**	**Per (%) Change**	**Output**	**Per (%) Change**
Cassava	18,957	11,352	40 (-)	10,300	9 (-)	10,200	1 (-)	11,298	8 (+)
Cocoyam	8,607	5,557	35 (-)	5,200	6 (-)	4,880	6 (-)	5,230	7 (+)
Maize	4,005	4,997	25 (+)	4,425	11 (-)	2,980	33 (-)	3,388	12(+)
Plantain	-	28,443	-	27,925	2 (-)	26,286	6 (-)	31,272	16(+)
Rice	112	95	15 (-)	256	169 (+)	507	98 (+)	513	1 (+)
Yam	4,451	1,070	76 (-)	946	12 (-)	836	12 (-)	1,260	51 (+)
Total Output	36,132	51,516		49,052		45,689		52,961	

Source: AWDADU, 2013

As indicated in Table 4.3 the trend of the major food crop production in Amansie West District has not been stable. For instance, cassava production shows a decrease from 18,957 metric-tonnes in 2008 to 10,200 metric-tonnes in 2011 representing a percentage change of 46 percent between these periods. A similar trend can be observed in the production of cocoyam, plantain and yam between these same periods, that is, from 2008 to 2011 with percentage changes in crop production of 43, 8 and 82 percent respectively.

Maize and rice production however depicted a different picture with maize showing an increase from 2008 to 2009 and decreases from that period to 2011. Rice production has been much of positive changes rather than negative with a just a year decrease (from 2008 to 2009) and increases for the rest of the periods (from 2009 to 2012). This was attributed to the reason that rice farming communities were not the most affected areas in the district.

One of the important attributes of a decrease in food crop production in mining areas was found in Ocansey (2013) who revealed that food crop production levels drop as more and more people opt for mining jobs either than farming leading to low food crop

production level in the farming communities. This means that the youth who should take up farming as occupation are engaged in the mining sector and this has contributed to the precarious food insecurity problem in the areas where mining activities are rampant. This buttresses the point made by Aragon and Rud (2012) that mines have the potential to generate significant negative spillovers to farmers such as pollution and competition for key inputs such as land and labour. A similar situation was observed in the study area as 84% of the correspondents involved in small-scale mining were youth between the ages of 15 and 45 years.

The reductions in the food crop production could also be attributed to a lot of factors as found in literature. For instance, Aragon and Rud (2012) established that because mining operations in Ghana are located in areas where agricultural production is done, an increase in pollution of air and water would seriously affect farmers' ability to produce. Also, Ocansey (2013) indicated that release of chemical substances by the mining processes into the soil discourages and destroys crops and in effect not much crops are cultivated in the mine areas. However there was no available evidence from the study area to determine how these factors contributed to the reduction in the food crop production levels.

However, the year 2012 presented a positive change in food crop production in the Amansie West District. Although most of the crops did not increase up to or more than their original output in 2008 but the increases have been positive throughout with reference from 2011 to 2012. This has been attributed to the media attention smallscale (illegal small-scale) received prior to the 2012 general elections and the fear it put in people who were into these activities. This situation helped to suspend some of the activities of these small-scale (illegal) miners and hence the return of farmers among them to their farms thereby providing positive results for the period.

4.3.2 Size of Land under Cultivation

Another important feature associated with small-scale mining areas is the issue of land acquisition also known as "land grabbing". It was therefore very necessary to assess the extent of loss of agricultural land due to small-scale mining activities in the Amansie West district. This was done with respect to the size of land under cultivation for the

five year period (2008 to 2012) for the various major food crops produced in the district as indicated below in table 4.4.

Table 4.4: Size of Land under Cultivation

Type of Food Crop	Size of Land and Average Output from 2008 -2012 (in Metric-tonnes)									
	2008		2009		2010		2011		2012	
	Land Size (Ha)	Average Yield (Mt/Ha)	Land Size (Ha)	Average Yield (Mt/Ha)	Land Size (Ha)	Average Yield (Mt/Ha)	Land Size (Ha)	Average Yield (Mt/Ha)	Land Size (Ha)	Average Yield (Mt/Ha)
Cassava	3009	6.3	2911	3.9	2870	3.5	2720	3.7	2811	4.0
Cocoyam	1484	5.8	1482	3.8	1400	3.7	1355	3.7	1359	3.8
Maize	2670	1.5	2630	1.9	2380	1.8	2280	1.3	2380	1.4
Plantain	-	-	2994	9.5	2696	11.1	2554	12.2	2500	17.7
Rice	101	1.1	95	1.0	205	2.5	207	2.4	507	1.7
Yam	856	5.2	856	1.3	825	1.1	721	1.3	884	1.4
Total	8,120	19.9	10,968	21.4	10,376	23.7	9,837	24.6	10,441	30

Source: AWDADU, 2013

It can be observed from Table 4.4 that Land under cultivation for the various crops reduced by 10.3% between 2008 and 2011 farming seasons. Generally, the total average yield per metric tonnes of the various crops did not see a reduction. However average yields per metric tonnes of the individual crops such as Cassava, Cocoyam, Maize and Yam were affected. The study also revealed that the size of Land under cultivation has decreased from 12,911Ha to 7,873Ha representing a percentage change of 39 percent for the four period. To buttress this, 51 percent of the farmers indicated that their farm lands have been taken over from them for the mining activities with 59 percent of the figure claiming inadequate compensation.

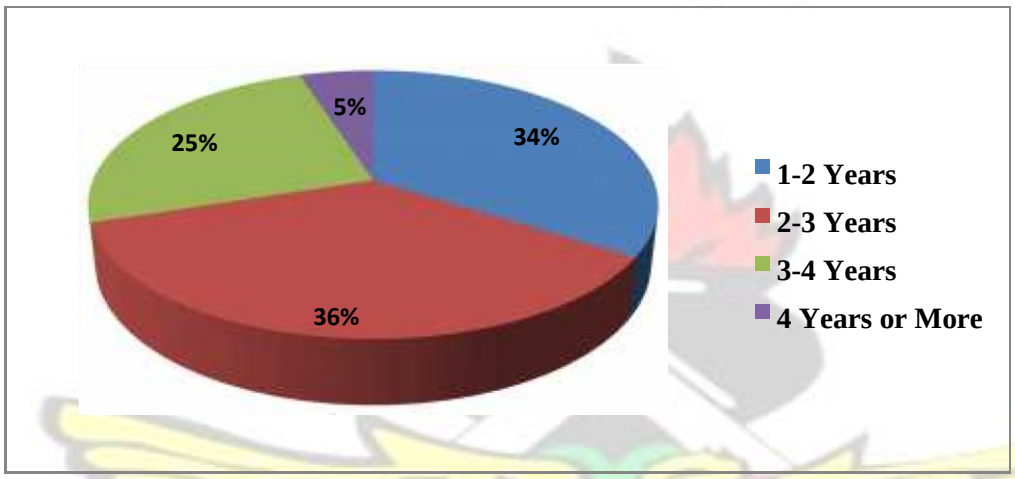
4.4 Small-Scale Mining Activities in the Amansie West District

4.4.1 Years of Involvement

This aspect of the study sought to identify the years of active involvement by the small-scale miners so as to establish a relation between when the mining activities started and its effects on food crop production. A majority of (95%) of the respondents interviewed indicated they have spent less than five (5) years in the activity. This can be attributed to the proliferation of the small-scale (illegal) mining activities between 2009 and 2012.

Food crop production was also reduced within these periods as elucidated earlier. This means the reduction of food crop production for the four years period (2008-2011) could be associated with the number of years for active involvement implying that small-scale mining activities have direct impact on food production in the district. Figure 4.2 therefore depicts there years actors involvement in small-scale mining activities.

Figure 4.2: Years of Involvement

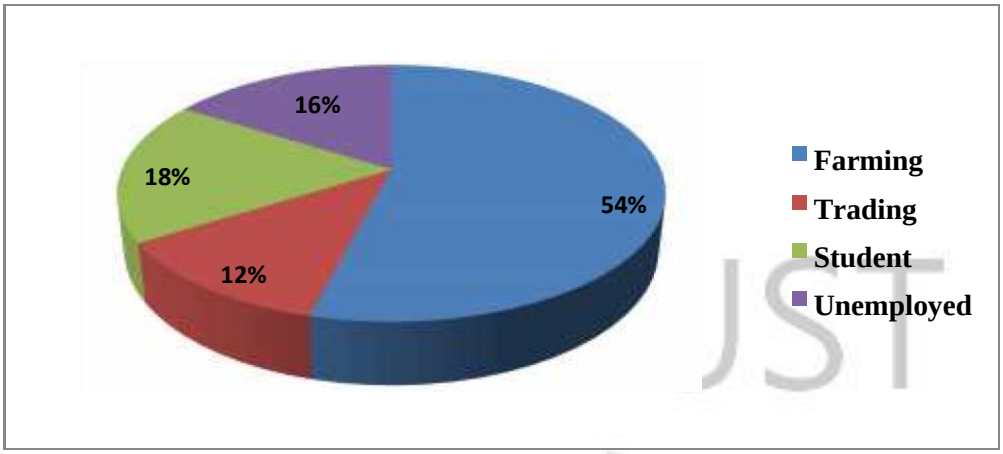


Source: Field Survey, November, 2013

4.4.2 Occupation before Entry

Respondents' occupations before entering into small-scale mining activities were also identified to have a link with food production in the district. They were identified to be engaged in activities such as farming, trading, and schooling. Some were also unemployed. This is represented in Figure 4.3.

Figure 4.3: Occupation before Entry



Source: Field Survey, November, 2013

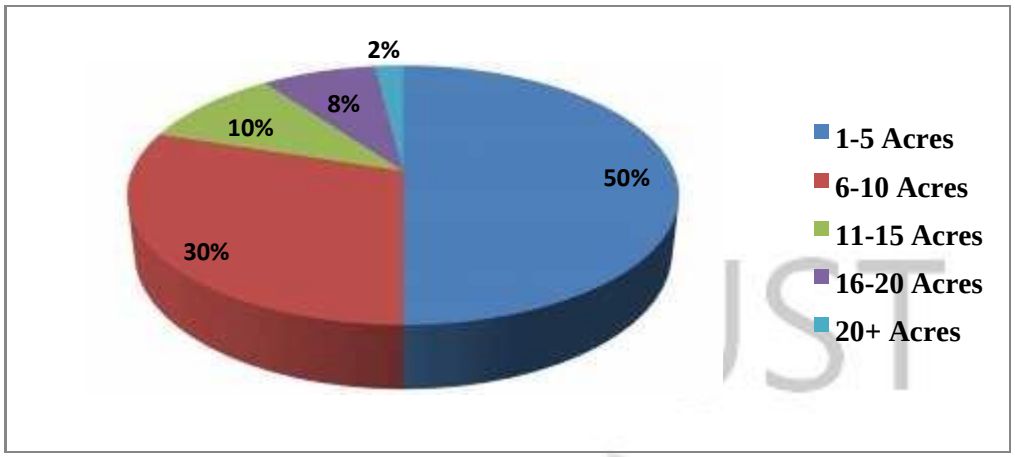
From Figure 4.3, it has been revealed that small-scale mining activities have helped in providing jobs for the unemployed (16%) and alternative jobs for those who were already into economic activities (66%). This however has been identified to negatively affect food crop production by drawing labor from the agriculture sector the mining sector. This is because 54 percent of the respondents were revealed to have moved from farming to the small-scale mining activities.

The youth who could have contributed significantly to agriculture production also constitute the majority (76%) of the people involved in small-scale mining. This further served as a major deteriorating factor affecting food crop production. This revelation goes to confirm the finding of Ocansey (2013) who revealed that the youth who should take up farming as occupation are engaged in the mining sector and this has contributed to the precarious food insecurity problem in mining areas.

4.4.3 Size of Concession

Mining areas tend to provide a keen competition between land needs for agricultural activities and that of mining activities. With the huge amount of money normally generated from mining, the activity tends to attract large size of land from the agricultural sector, hence its effects on food crop production. There was therefore the need to determine and assess the size of concession involved in mining activities in the district and this has been shown in Figure 4.4.

Figure 4.4: Size of Concession



Source: Field Survey, November, 2013

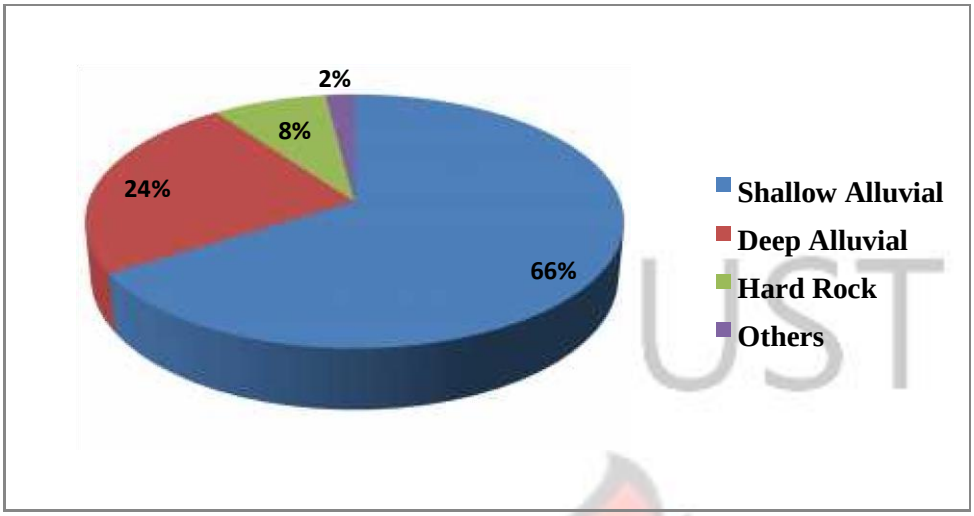
The study revealed that large acres of land have been acquired for the small-scale mining activities. It was identified that over 50 percent of the actors involved in mining have concessions over five (5) acres. This revelation confirms why size of farm land under cultivation has reduced (39%) for the periods between 2008 and 2011.

Most of the Land grabbed for mining activities unlike those for used for food crop production cannot be reused in the short to medium term because of the extent of which these lands are depleted. It was observed through the field survey that 85 % of the miners interviewed did not have land reclamation plans. Large acres of mined land were left unattended to with big holes filled with waste water were seen in the as depicted in Plate

4.4.4 Techniques Used

Small-scale miners in the study area employ varied mining methods according to the type of deposit being exploited and its location. A great majority of small-scale miners in Amansie West district rely solely on traditional and manual methods of mining, which are largely artisanal, featuring simple equipment like shovels, pickaxes, pans, chisels and hammers due to their poor financial base. For the purpose of the study, methods used were categorized into shallow alluvial; deep alluvial, hard rock and other methods was observed to be employed by the miners in their operations. Figure 4.5 represents the proportion of people and the various methods employed.

Figure 4.5: Techniques Used



Source: Field Survey, November, 2013

From the figure, majority (66%) of the miners are into shallow alluvial mining methods. This can be attributed to the low lying nature of the district which makes it possible for this method to be employed than others. Since this method is associated with initial clearing of vegetation and excavating of the soil until the gold-rich layer is reached, it usually depletes the natural land and thereby makes unfit for farming after the mining activities. This method according to Ofosu-Mensa & Ababio (2011) is described as the most common form of indigenous gold mining and therefore not surprising it is common in the study area.

4.4.5 Legal and Regulatory Frameworks for Small-Scale Mining in the Study Area

The regulation of small-scale mining activities in Ghana and in the Amansie West district started in the 1980s when the Economic Recovery Programme (ERP), which resulted to years of careful planning and regularization through the enactment of the small-scale Gold Mining Law, PNDCL 218, in May 1989. The following three laws [3] were passed :

- The Small-scale Gold Mining Law (PNDCL 218): provides for the registration of activity; the granting of gold-mining licenses to individuals or groups; the licensing of buyers to purchase product; and the establishment of districtassistance centres;
- The Mercury Law (PNDCL 217): legalized the purchasing of mercury (for mineral processing purposes) from authorized dealers; and

- The Precious Minerals Marketing Corporation Law (PNDC Law 219): transformed the Diamond Marketing Corporation into the Precious Minerals Marketing Corporation (PMMC), which was authorized to buy and sell gold.

Since then different measures have been put in place to aim at regulating and controlling small-scale mining activities especially the illegal ones. A major activity that has been put in place is the issuing of license to small-scale miners on concessions registered in their names and such miners should be 18 years and above. These licenses on issued on the basis meeting certain environmental and other basic requirements aimed at protecting the environment. However, this was not so as in the district as only 28 percent of the small-scale miners have license for their operations implying that most of them operate on illegal basis.

Another important activity to regulate small-scale illegal mining activities in Ghana is the introduction of the Inter-Ministerial Taskforce in May, 2013 aimed at restoring sanity and order to galamsey-prone areas such as the study area. This has helped in removing over 4, 000 foreign nationals from illegal mining sites across the country and also putting fear in local ones from engaging in the activity.

In the district some of the measure put in place includes enactment of by-laws aimed at making illegal mining unattractive, encouraging and providing incentives to the youth to go into farming rather than illegal mining activities and formation of farmers co-operatives in all farming areas to make farming attractive to the youth. Apart from the government, some of other institutions in the district that help in addressing the challenges associated with small-scale mining activities and farming in the district include The Millennium Villages Project and Care International. However, despite these interventions, illegal small-scale mining activities still exist in the district.

Again there was no evidence of effective collaboration and co-ordination among governmental agencies such as the MMDAs, Environmental Protection Agency, the Ghana Minerals Commission and the Forestry Commission in the fight against the problems associated with small-scale mining activities within the affected communities.

4.4.6 Awareness of Effects of Small-Scale Mining on Food Crop Production

Small-scale mining has many implications on food crop productions. As indicated in literature, this activity, irrespective of the scale of operation has some degree of impact on the environment and productive resources and this largely depends on whether it is legal or illegal. However, the extent of damage depends largely on the mining and processing methods being used. The Illegal mining activities characterized in the study area tend to pose environmental challenges due to lack of monitoring and supervision of their operations. It also affects other productive resources needed to ensure production in other sectors especially in agriculture. These include its effects on lands for food production, effects on the food crops produced, movement of labour from the agriculture sector to the mining activities. Respondents' views on the effects of their activities on farming were sought for and some of these effects they are aware.

There was also the need to find out first their awareness of any effects of the activity on farming. With this, all the respondents (both small-scale miners and the farmers) indicated their awareness of the effects of mining on food production in the district. Some of the responses include land degradation, contamination of food crops and pollution of water bodies and reduction of the population of active labour engaged in farming activities. Details of such responses are shown in Table 4.5.

4.5: Effects of Small-Scale Mining on Farming

Effects	**Aware**		**Not Aware**		**Total**	
	No. of Respondents	**Per (%)**	**No. of Respondents**	**Per (%)**	**No. of Respondents**	**Per (%)**
Land degradation	380	97	10	3	**390**	**100**
Destruction of forest reserves	350	90	50	10	**390**	**100**
Contamination of Food Crops	268	69	122	31	**390**	**100**
Pollution of Water bodies	375	96	15	4	**390**	**100**

Reduction of number of people into farming	290	74	100	26	**390**	**100**

Source: Field Survey, November, 2013

As indicated from literature small-scale mining has serious effects on the environment and the environmental resources needed to ensure food production. Apart from its effects on food contamination and that of labour for farming which recorded 69 and 74 percent respectively, the rest recorded over 90 percent of awareness from the respondents.

From the survey, it was observed that the mining activities have caused serious damages on the lands needed for food production. This is attributed to the clearance of the vegetative cover of the land before the minerals are extracted. This leaves the land bare for any agricultural activities. Uncovered pits sometimes filled with stagnant water have also been left in the areas where the minerals have been extracted which make it difficult to use the land for food crop production.

It was not surprising that 90 and 97 percent of the respondents affirm their awareness of such effects on the natural forest and the land respectively. Degraded lands imply that land available for food crop production will be affected since land by nature is fixed and portions of them destroyed cannot be replaced. Plate 4.1 and 4.2 shows the extent to which small-scale mining activities degrade agriculture lands in the Amansie West district.

Plate 4.1: Farm Land with uncovered pits after Mining at Manso Datanor

Source: Field Survey, November, 2013.

Plate 4.2: Small-scale Mining and Land Degradation at Manso Datanor

Source: Field Survey, November, 2013

Plate 4.3: Effects of Small-scale Mining on Natural Forest at Manso Watreso

Source: Field Survey, November, 2013

The revelation from the study confirms the assertions from literature on mining and land degradation. For instance, Ntiamoah (2000) indicated that surface mining processes involves removal of the vegetation of a place and the use of heavy equipment to mine the mineral. This process, he noted, leave behind pits and dumps that are created and result in the degradation of the land. FORIG report (2009) also added that this type of mining has caused the degradation of about 15000 hectors of arable land across the country signifying the extent of which small-scale mining activities can cause degradation to the land.

Another significant effect as observed from the field and confirmed by the respondents (96%) is the effects of the activity on water bodies. As displayed in Plate 4.3 (Effects of Small-scale mining on Water Bodies), the small-scale mining activity has polluted most of the water bodies district. This has not only made it unwholesome for domestic use but also for agricultural activities such as irrigation. As indicated by Duncan and Kuma (2009) rivers and streams are polluted by solid suspensions and mercury, which are commonly discharged into resident water bodies during the sluicing process and amalgamation respectively. This in turn leads to siltation and coloration of such waters. Improperly disposed tailings also find their way into streams and rivers during heavy

rains, creating sedimentation problems and rendering streams unusable for both domestic and industrial purposes.

Plate 4.4: Effects of Small-scale mining on Water Bodies at Manso Datanor

Source: Field Survey, November, 2013

Besides, all these negative impacts of mining on food crop production and its effects on food security is the movement of the active labour force to the mining activities at the detriment of farming activities. Food production levels will continue to drop as more and more people opt for mining jobs either than farming leading to low food production level in the Amansie West district.

It is therefore worth noting that the final chapter takes precedence of this particular chapter which is based on a comprehensive analysis and overview of the effects of small-scale mining on food crop production. These analysis and overview include the characteristics of the respondents, food production in Amansie West district, small scale-mining activities and its effects in the study area.

CHAPTER FIVE

SUMMARY OF FINDINGS AND RECOMMENDATIONS

5.1 Introduction

This section presents the final chapter of the study. It seeks to summarize findings emanating from the analysis. The findings are summarized under the various research

objectives. This is to ensure that there is a correlation between the findings and the research questions set for the study. Based on the findings, appropriate recommendations were made to aid in policy formulation and implementations towards reducing the effects of small scale mining on food production in the Amansie West district.

The content of this final chapter includes the summary of the key findings, suggested policy recommendation and final conclusion for the research.

5.2 Summary of Findings

As already indicated the findings are grouped under the various research objectives to ensure that each of the objectives of well tackled in this study. The findings as emanated from the previous chapter include the following:

5.2.1 The Legal Framework for Regulating Small-scale Mining in the Amansie West District

The study reveals that the activities of the small-scale mining were not given much attention to in the district. This is because mostly land acquisition for Small-scale gold mining activities in the district was more of a negotiation between land owners and the one acquiring the land of which compensations are paid. Mining exploration activities the commenced without going through the approved license acquisition processes to acquire valid license. This situation confirms what the study revealed, that only 28 percent of the small-scale miners had license for their operations.

Again, apart from the legal framework backing the small scale mining activities at the National level, there are no effective and specific by-laws put regulate these activities. The only measure put in place at the district level is providing alternative livelihood support system to the youth by making agriculture attractive. However, the alternative solutions are not as attractive as the gains from the gold mining activities thereby relegating this measure into the background.

The lack of proper regulation of the small-scale miners' activities was identified to have resulted in miners employing various methods particularly traditional methods which

are not usually environmentally friendly. This has deteriorated the environment not making it only unfit for farming activities but also dangerous for human habitation.

5.2.2 Trend of Major Food Crop Production in the Amansie West District

Major food crop production has not been stable in the district especially during the peak (2008-2011) of the proliferation of small-scale mining activities in the district as these years saw a reduction of many of the major food crops production levels in the district. It was revealed that the food crop production reduced in line with the loss of farms and agriculture land as a major input to small scale mining activities. For instance the study revealed that the size of land under cultivation has decreased from 12,911ha to 7, 873ha representing a percentage change of 39 percent for the four year period. Also it was identified that over 50 percent of the actors involved in mining have concessions over five (5) acres. Furthermore, it was revealed that most of the local farmers farm close to the rivers and streams to easy access to water for their farm and other activities. Incidentally small-scale mining also take place close and sometime in the rivers as their mining activities equally requires large volumes of water. This situation has created strong competition for farm land in the study area. To buttress this, 51 percent of the farmers indicated that their farm lands have been taken over from them for the mining activities with 59 percent of the figure claiming inadequate compensation. This implies that if the trend continues, agriculture lands will be lost to the small-scale mining activities and there will be very limited rich farm lands available for farming activities in the study area. Food crop production will therefore be costly in future as huge sums of money will have to be used to construct irrigation dams for farming.

It was also revealed that the total output for the food crops cassava, cocoyam, maize, plantain, and yam showed a percentage reduction of 46, 43, 32, 8, and 82 percent for the periods between 2008 and 2011. Again vegetable productions reduced for the same periods. For instance, the production of cabbage, garden eggs, okra, pepper and tomatoes showed a reduction from 3,879 to 1,598; 1,756 to 887; 578 to 465, 2,568 to 1,358 and 3,855 to 2,843 metric-tonnes respectively.

Media attention on small-scale (illegal) mining in the late 2011 to the year 2012 prior to the general elections gave a boost to food production in the district. This implies that with the stringent measures now put in place such as the establishment of the

presidential task force to combat the illegal aspects, food productions are likely to increase for the subsequent years.

5.2.3 Small-scale Mining and Food Production in the Amansie West District

Small-scale mining has serious effects on the environment and the environmental resources needed to ensure food production. This activity was identified to have a serious repercussion on food crop production in the Amansie West District. The following factors from the small scale mining activities were revealed to affect food production in the district.

Effects of Small-scale Mining on Labour

Small-scale mining activities were identified to move active labour from the food production sector to the mining activities. For instance, it was revealed that more than 60 percent of those between the ages 15 to 35 years are into small scale mining compared to 18 percent of those into agriculture. Again, it was revealed that 54 percent of the small scale miners were identified to have moved from farming to the small-scale mining activities. Besides, 74 percent of the respondents indicated their awareness of mining attracting active labour from the agriculture sector.

The dominance of the youth in small-scale mining was identified to be attributed to its attractiveness in terms revenue generation and how these revenues are easily generated compared to farming activities. This has left farming in the district in the hands of the adults and the aged (69%) that are predominantly small-scale farmers thereby affecting food crop production in the district. This affects food crop production, hence a reduction in total output for the four year period since more than 60 percent of the miners have spent less than four years in the activities.

Effects of Small-scale mining on Agricultural Land

Another important effects of small-scale mining on food production as identified in the Amansie West district is its effect on agricultural lands. The usage of rudimentary tools, low technology and labour intensive instead of capital intensive methods does not support the miners to undertake meaningful environmental management activities. The cost of managing the environment manually is prohibitive.

The study revealed that crude and manual methods of mining involve the use of largely artisanal, featuring simple equipment like shovels, pick-axes, pans, chisels and hammers due to their poor financial base. It was also revealed that crude shallow alleviate method dominates in the study recording 66 percent of the miners. The methods and the implements used for the mining have caused serious damages to the land used for farming activities. For instance, the crude shallow alluvial method mostly used for the activity has led the removal of the top soil leaving the soil bared with part of the areas having small and large pits left on the lands where the mining activities have taken place.

This has resulted in the reduction in agricultural lands needed for food production since the condition of the land after the mining activities makes it difficult to the land into any good use especially for food production. This was identified to have caused a reduction of 39 percent reduction in agricultural land for the period between 2008 and 2012.

The activities were also identified to affect the natural forest causing serious threats on reserved lands needed for food production in the future. 70 percent of the farmers were revealed to lack reserved lands needed for future agriculture activities. Besides, 97 and 90 percent of respondents were identified to have confirmed that small-scale mining has negative effects on lands needed for food production.

Effects of Small-scale mining on Water bodies

Small scale mining activities in the Amansie West District were identified to pollute water bodies needed for irrigational activities. 96 percent of the respondents confirmed that small scale mining activities have negative effects on water bodies used for agricultural activities. The chemicals used for the mining operations have been a major cause of water pollution in the district. This makes it difficult to use the water for farming activities thereby having a serious repercussion on food production. Such polluted water when used for farming normally contaminates the farming outputs which also have negative health implications.

5.3 Recommendations

The main findings of the study brought forth a number of critical issues that negatively affect food production. The findings further brought to light the need to embark on

measures to help deal with the issues identified. The following policy recommendations are therefore suggested to curb the effects of small-scale mining on food production.

- The legal framework formulated at the national level should give more autonomy to the local authorities to regulate the small scale mining activities in their local areas. The local authority should be empowered and resourced to undertake periodic assessments of small-scale mining activities. These assessment reports should be considered in the renewal of licenses and permit. This is because these activities take place at the local levels and regulating them at the local level will be more effective than at the national levels. The local authority should be charged to develop training curriculum or manuals for educating small scale gold miners on the direct link between their operations and environmental degradation. Also a well-resourced local taskforce should be established in the Districts where mining occur which will monitor activities on miners.

- Again, there is the need for an effective collaboration and co-ordination among governmental agencies such as the MMDAs, Environmental Protection Agency, the Ghana Minerals Commission, the Forestry Commission and others so that they can perform their roles effectively in dealing with the environmental problems associated with small-scale mining activities within the affected communities. This implies that the state should make conscious efforts to bring together all the stakeholder agencies to effectively fight the negative impact of small-scale mining activities on the environment. A committee made up of representatives of all stakeholder agencies should be established at the local area to regulate the activities of small-scale mining activities. This committee should be well resourced to carry out its work effectively.

- Stringent and rigorous efforts at re-afforestation and land reclamation of affected communities and other measures aimed at restoring degraded lands to its original state after mining activities should be intensified by the government especially in places where the harm has already been caused. These will not only reduce the negative environmental and health impacts on the people but also land would be available particularly to farmers for agricultural purposes.

This will make lands available for farming activities which will help boost food production in the long run.

- Environmental management advocacy groups could be formed by residents of the affected communities' particularly farmers who are mostly affected by these activities. These groups can serve as watch dogs aimed at protecting the environment at the community levels. The advocacy groups could also bring moral pressure to bear on chiefs mostly responsible for giving lands to small scale miners and members of their communities who are damaging the environment through the mining activities. This therefore calls for the empowerment of these advocacy groups where necessary through the provision of the necessary resources by the government and environmentally concerned NGOs to ensure that they are able to operate effectively.

- Obviously unemployment is a major contributor to the involvement of the youth in the small scale (illegal) mining activities. This calls for measures to be put in place in addition to the other policy measures suggested to discourage them from engaging in the mining activities. Apart from regulating the activities which will serve as a major boost to youth employment, there is the need to put in place measures aimed at making agriculture attractive to the youth. The provision of basic inputs and other incentives such as credit facilities and ready market for farm produce to mention but a few will not only attract the youth into farming but boost food production in places where minerals are deposited.

5.4 Conclusion

It is obvious from the study that small-scale mining activities in Ghana are environmentally unfriendly and therefore affects environmental resource needed for food crop production. The decrease in food crop production which results from environmental and land degradation is not the only adverse effect of small scale mining activities in the study area but also the arguably highly paid mining work attract the active labour required for food production. This means that small scale mining activities, aside their adverse effects on the environment, also pose a threat to food security in affected areas. It is therefore necessary to call for stringent measures to be put in place to help reduce this trend if not a complete eradication.

The issue of small-scale mining can be effectively dealt with by investigating and understanding the complex nature and characteristics of the activities and issues relating to them. This will give a better appreciation of what these issues entail and the required solutions to tackle these issues. For instance, the issue of small scale mining on food production does not only cause negative effect on the environment but also on labour needed for food production. This implies that efforts to tackle the issue of small scale mining should not only be directed to the environment but also addressing the push factors that drive the youth into the mining activities.

This study is therefore concluded on the basis that in addressing challenges in environmental management posed by small-scale mining in Ghana, a paradigm shift is required to make small scale mining activities environmentally friendly and sustainable devoid of any negative effects on food crop production. It could even provide a solid basis for a boost in food crop production in the mining communities thereby enhancing food security in the affected areas.

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APPENDIX

DEPARTMENT OF PLANNING

COLLEGE OF ARCHITECTURE AND PLANNING

Kwame Nkrumah University of Science and Technology

RESEARCH STUDY: EFFECTS OF SMALL SCALE MINING ON FOOD PRODUCTION IN THE AMANSIE WEST DISTRICT OF THE ASHANTI REGION.

Questionnaire for Farmers

This questionnaire is prepared to collect data on the above research topic for academic purpose. Your kind co-operation is much needed and any information given will be handled with confidentiality.

NAME OF INTERVIEWER.....

NAME OF INTERVIEWEE.....

DATE OF INTERVIEW.....

Questionnaire for Farmers

SEECTION A: PERSONAL INFORMATION

1. Name……Age…… Home town……..……

2. Ethnicity

   a. Akan [ ] b. Ga [ ] c. Northerner [ ] d. Ewe [ ] e. Other Specify……

3. Gender Male [ ] Female [ ]

4. Religion

   a. Christian [ ] b. Islam [ ] c. Traditional [ ] d. Other Specify……

5. Marital status

a. Married b. single c. Divorced d. Widow/Widower

6. Which of the following categories do you belong to?

a. Relative of Owner of house/ Rent Free [ ] b. Tenant [ ] c. Percher [ ]

d. Caretaker [ ] f. Landlord/lady [ ] g. Other (specify) _____

7. How many households are in this house? _____

8. How many people are in your household? _____

9. What is your educational attainment? a. No Education [ ] b. Primary [ ] c. JHS [ ]

d. SHS [ ] e. Voc/Tech [ ] f. Tertiary [ ]

SECTION B: SMALL-SCALE GOLD MINING ACTIVITIES AND

AGRICULTURE

10. When did you enter farming? a. Before the time of the small-scale mining [ ]

b. After the take small-scale mining intensified [ ]

11. What crop(s) do you cultivate? a. Coco yam [ ] b. Yam [ ] c. Cassava [ ]

e. Plantain [ ] f. Maize [ ] g. Vegetables [ ] h. Other specify)……

12. Please complete this table

Crops	**Farm size**	**Qty harvested Annually**	**Qty consumed**	**Qty sold**
Coco yam				
Yam				
Cassava				
Plantain				
Maize				
Vegetables				
Other				

13. If vegetables, which type? a. Garden eggs [ ] b. Pepper [ ] c. Okra [ ]

d. Tomatoes [ ] e. Cabbage [ ] f. Carrots [ ] g. Other (specify)……

Crops	Farm size	Qty harvested Annually	Qty consumed	Qty sold
Garden eggs				
Pepper				
Okra				
Tomatoes				
Cabbages				

14. What is the size of your farmland? a.1-5 ha [ ] b. 6-10 ha [ ] c. 11-15 ha [ ] d. 16 & above ha [ ]

15. What is the size under cultivation? a. 1-5 ha [ ] b. 6-10 ha [ ] c. 11-15 ha [ ] d. 16 & above ha [ ]

16. Which of the following farm inputs do you use? a. Tractor/Plough machine [ ]

b. cutlass /hoe c. weedicide [ ] d. fertilizer [ ] e. others (specify)……..…

17. What are the key challenges and problems you face as a farmer in the district?

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18. What are some of the challenges you face from small scale mining activities?

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19. For how long have you experience these problems? a. 1 -5 years ago [ ]

b. 6-10years ago [ ] c. 11- 15years ago [ ] d. 16-20 years ago [ ]

20. Have you ever been confronted with eviction or displacement from land?

Yes [ ] No [ ]

21. If 'Yes' were you paid any compensation? Yes [ ] No [ ]

If 'Yes' what form was the compensation? a. Fiscal cash [] b. Land [ ]

c. Other (specify)……

22. Was the compensation paid substantial enough to sustain you?

a. Yes [ ] b. No [ ]

23. Do you still have reserved land for future farm extension? a. Yes [ ] b No [ ]

24. If 'No' what is the cause?

a. Part of the land has been taken by mining activities [ ]

b). Due to extended family system, land is divided into small units [ ]

c). Others (specify)……

25. If the mining activities have taken the land, how much was the acreage?.....

26. Were you allocated a new farmland? a. Yes [ ] b. No [ ]

27. If 'No' did you report to the immediate authority? a. Yes [ ] b. No [ ]

28. Do you normally find it difficult to acquire land? a. Yes [ ] b. No [ ]

29. What is the distance of your farm from the mining site?

a. 1-3 km [ ] b. 4-6 km [ ] c. 7-9 km [ ] d. 10 & above km [ ]

SECTION C: ALTERNATIVE FOOD PRODUCTION MESURES

30. Do extension officers visit you? a. Yes [ ] No [ ]

31. If 'No' what is the cause? a. Farmer-extension officer ratio very larg=\ [ ]

b. Lack of means of transport on the part of extension officer [ ]

c. Other (specify)…..……

32. Have you been introduced to the use of improved methods and planting materials? a. Yes [ ] b. No [ ]

33. If 'Yes' what are some of the improved techniques you have adopted?

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34. What measures will you suggest to address the

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THANK YOU.

DEPARTMENT OF PLANNING

COLLEGE OF ARCHITECTURE AND PLANNING

Kwame Nkrumah University of Science and Technology

RESEARCH STUDY: EFFECTS OF SMALL SCALE MINING ON FOOD PRODUCTION IN THE AMANSIE WEST DISTRICT OF THE ASHANTI REGION.

Interview Guide for Farmer Based Organizations

This questionnaire is prepared to collect data on the above research topic for academic purpose. Your kind co-operation is much needed and any information given will be handled with confidentiality.

NAME OF INTERVIEWER.....

NAME OF INTERVIEWEE.....

DATE OF INTERVIEW.....

Interview Guide for Farmer Based Organizations

1. What is the name of the Farmer Based Organization?

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2. What are the roles and functions of the organization?

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3. What are the major crops cultivated in this District?

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4. What farming practices do you use in this District?

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5. What are the effects of small scale mining activities on food production in the District?

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6. What will happen to agriculture and food production in the District if these effects are not addressed?

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7. What are the causes of these effects in the District?

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8. Does the Assembly help in addressing these effects on agriculture in the District?

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9. What are some of the measures undertaken by the Assembly to address the negative effects of small scale mining on agriculture?

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10. What other institutions help in addressing these challenges in the District?

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11. What are some of the efforts made by these institutions?

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DEPARTMENT OF PLANNING

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Kwame Nkrumah University of Science and Technology

RESEARCH STUDY: EFFECTS OF SMALL SCALE MINING ON FOOD PRODUCTION IN THE AMANSIE WEST DISTRICT OF THE ASHANTI REGION.

Questionnaire for Small Scale Miners

This questionnaire is prepared to collect data on the above research topic for academic purpose. Your kind co-operation is much needed and any information given will be handled with confidentiality.

NAME OF INTERVIEWER.....

NAME OF INTERVIEWEE.....

DATE OF INTERVIEW.....

Questionnaire for Small Scale Miners

SEECTION A: PERSONAL INFORMATION

1. Name…… Age…… Home town……..…

2. Ethnicity

a. Akan [ ] b. Ga [ ] c. Northerner [ ] d. Ewe [ ] e. Other Specify……

3. Gender Male [ ] Female [ ]

4. Religion

a. Christian [ ] b. Islam [ ] c. Traditional [ ] d. Other Specify……...

5. Marital status? a. Married b. single c. Divorced d. Widow/Widower

6. Which of the following categories do you belong to?

a. Relative of Owner of house/Rent Free [ ] b. Tenant [ ] c.Percher [ ]

d. Caretaker [ ] f. Landlord/lady [ ] g. Other (specify)

_____

7. How many households are in this house? _____ 8. How many people are in your household? _____

9. What is your educational attainment?

a. No Education [ ] b. Primary [ ] c. JHS [ ]

d. SHS [ ] e. Voc/Tech [ ] f. Tertiary [ ]

SECTION B: SMALL SCALE MINING ACTIVITIES

10. When did you enter into small-scale mining?

a. 1year ago [ ] b) 2years [ ] c) 3years and above [ ]

11. What was your occupation before you became a small-scale miner?

a. Farming [ ] b) Trading [ ] c) Others specify..... 12 . Do you have license for gold mining? a) Yes [ ] b) No [ ]

13. Do you belong to any small-scale gold mining association?

a) Yes [ ] b) No [ ]

14. What is the size of your mining concession?

a) 1- 4 acres [ ] b) 5- 9 acres c) 10 plus

15. What type of small-scale gold mining technique do you practice?

a) Shallow alluvial [ ] b) Deep alluvial [ ] c) Hard rock [ ].

16. How many people do you work with?

a) 1- 4 [ ] b) 5- 9 [ ] c. 10 and above [ ]

17. What mining machinery or tools do you use for mining?

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18. Are you aware of any effect of your mining activities? a) Yes [ ] b) No [ ]

19. If YES mention any three of them?

a)……
……...

b)……
……...

c)……
……...

20. Are you aware of any effect of your mining activities on food production?

a) Yes [ ] b) No [ ]

21. If Yes, mention any three of them?

a)……
……...

b)……
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c)……
……...

22. Are some of the challenges you face in your mining operations?

a)……
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b)……
……

c) ……
……...

DEPARTMENT OF PLANNING

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Kwame Nkrumah University of Science and Technology

RESEARCH STUDY: EFFECTS OF SMALL SCALE MINING ON FOOD PRODUCTION IN THE AMANSIE WEST DISTRICT OF THE ASHANTI REGION.

Questionnaire for Small Scale Miners Association

This questionnaire is prepared to collect data on the above research topic for academic purpose. Your kind co-operation is much needed and any information given will be handled with confidentiality.

NAME OF INTERVIEWER..... .....

NAME OF INTERVIEWEE.....

DATE OF INTERVIEW.....

Interview Guide for Small Scale Miners Association

1. What is the name of the association?.....
2. When was it formed?…….
3. Is your association duly registered under the laws of the country?

   a. Yes [ ] b. No [ ]

4. If No, why?

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5. How many members do you have? …….

6. What mining methods do you use?.....

7. What chemicals do you use to extract your gold from the ore?

   a. Mercury [ ] b. Cyanide [] c. Other specify ……..

8. What are your major challenges?

a)……

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b)……

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c)……

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d)……

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9. Are you aware that your members' activities could cause negative effect on agriculture and food production? a. Yes [ ] b. No [ ]

10. If Yes, what are some of the adverse effects?

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11. What measures have you taken to address these effects on food production?

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DEPARTMENT OF PLANNING

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Kwame Nkrumah University of Science and Technology

RESEARCH STUDY: EFFECTS OF SMALL SCALE MINING ON FOOD PRODUCTION IN THE AMANSIE WEST DISTRICT OF THE ASHANTI REGION.

Questionnaire for District Agricultural Development Unit

This questionnaire is prepared to collect data on the above research topic for academic purpose. Your kind co-operation is much needed and any information given will be handled with confidentiality.

NAME OF INTERVIEWER.....

NAME OF INTERVIEWEE.....

DATE OF INTERVIEW.....

DISTRICT AGRICULTURAL DEVELOPMENT UNIT

1 . What types of farming are practiced in the District?

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Crop	Prod (MT) 2005	AC (HA) 2005	Prod (MT) 2006	AC (HA) 2006	Prod (MT) 2007	AC (HA) 2007	Prod (MT) 2008	AC (HA) 2008

2. How many farmers are in the District? ……

3. What crops are cultivated, what are the areas under cultivation and production levels in the District?

NB: Prod = Production Level MT = Metric Tonnes AC= Area under Cultivation HA = Hectares

Crop	Prod (MT) 2009	AC (HA) 2009	Prod (MT) 2010	AC (HA) 2010	Prod (MT) 2011	AC (HA) 2011	Prod (MT) 2012	AC (HA) 2012

NB: Prod = Production Level MT = Metric Tonnes AC= Area under Cultivation HA = Hectares

4. How many small-scale miners are in the District?.....

5. What is the procedure involved for an individual to engage in small scale mining in this district?

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6. Which institution grants permits or certificates for gold mining in the District?

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7. What is the size of arable land used in gold mining?.....

8. What is the size of land that has been lost to mining in the District?.....

9. What are the effects of small scale mining on food production and overall agricultural development in the District?

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10. Are there any land rehabilitation activities in place? a. Yes b. No

11. If yes, please specify :

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12. If No, why?

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13. What programmes or projects have been instituted by the District Assembly to address the problems?

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14. What suggestions will you propose to address these challenges?

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DEPARTMENT OF PLANNING

COLLEGE OF ARCHITECTURE AND PLANNING

Kwame Nkrumah University of Science and Technology

RESEARCH STUDY: EFFECTS OF SMALL SCALE MINING ON FOOD PRODUCTION IN THE AMANSIE WEST DISTRICT OF THE ASHANTI REGION.

Interview Guide for Amansie West District Assembly

This interview guide is prepared to collect data on the above research topic for academic purpose. Your kind co-operation is much needed and any information given will be handled with confidentiality.

NAME OF INTERVIEWER.....

NAME OF INTERVIEWEE.....

DATE OF INTERVIEW.....

DISTRICT ASSEMBLY

12. What farming practices do you use in this District?

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13. What are the effects of small scale mining activities on food production in the District?

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14. What will happen to agriculture and food production in the District if these effects are not addressed?

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15. What are the initiatives and interventions undertaken by the District Assembly to address the negative effects of small scale mining on agriculture?

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16. What other institutions help in addressing these challenges in the District?

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17. What are some of the efforts made by these institutions?

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18. What suggestions will you propose to address these challenges?

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