

Bachelor's thesis
International Business
International Business Management
2013

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MINING IMPACTS ON AGRICULTURAL LANDS AND FOOD SECURITY

– Case study of towns in and around Kyebi in the
Eastern Region of Ghana.



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TURUN AMMATTIKORKEAKOULU THESIS

Natural resources are very important for development and production processes however, they can never be substituted for agriculture, food and farmlands. Mining businesses or process seem to be taking the place of farming activities and in the process rendering the lands unproductive and not usable.

The evidence presented through out this research has shown the various impacts of mining activities on farmlands and the extent to which it has affected food production and security in towns in and around Kyebi in the Eastern Region of Ghana.

The influx of mining companies in the study area showed that mining activities within the region of study has in many ways affected the livelihood of the people by displacement, relocation and even resettlement. The socio-economic, environment, and the lives of the inhabitants of the catchment area are adversely affected by mining activities which has led to food shortages, land degradation, water pollution, high cost of living, food price hikes and many other factors.

The findings reveal the commonest problems in the study area were physiological disorders and bacterial diseases followed by scorch and fire. This was mostly because of the pollution caused by the chemical used in the mining processes. The chemicals pollute the soil and even the air leading to poor crop growths. Due to the vast nature of mining, many trees are cut down making the place bare for easy wind and water erosion thereby reducing soil fertility that has led to poor crop cultivation.

Though there has been instances of some settlements and cooperate responsibilities from the mining companies, it is yet to be established the engagement of the communities and mining firms to address the increasing effects of mining on agricultural lands and food security. It is therefore proposed that the various stakeholders must have an effective model of communication that leads to a co-operation in mining related farmland-enchroachment in the area.

KEYWORDS:

Mining, Mining Impact, Food Security, Agricultural Lands

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LIST OF ABBREVIATIONS (OR) SYMBOLS

PSI	Presidents Special Initiative
EPA	Environmental Protection Agency.
MoFA	Ministry of Food and Agriculture.
NLC	National Liberation Council
SHS	Seniour High School
MSCL	Middle School Leaving Certificate
GNA	Ghana News Agency
FAO	Food and Agricultural Organisation

1 INTRODUCTION

1.1 Background

For centuries, man has always been in search for food and ways to survive. It has become a great concern for governments and nations to focus on developing strategies and policies that will help maintain some form of food security and also to alleviate food scarcity.

Kenk E. and I. Cotic (1983) defined Agriculture as the systematic and controlled use of living organisms and the environment to improve the human condition. 'Agricultural land' is the land base upon which agriculture is practiced. Agricultural lands are the basis for food production and food production levels have been used as part of the poverty measuring paradigms. Globally, food availability is an essential function of cost of living. The World Food Summit (1996) defined food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life". Food security is seen the world over as an important principle in dealing with the food problems in society. It is the bases for ensuring healthy price levels, particularly in the developing countries. Ensuring food security has therefore been an essential component of development planning in many countries of which Ghana is not an exception. While food security continues to improve in the developed world, it dwindles yearly in the developing countries. This situation, therefore pose a major threat to millions of people in the developing world. According to the World Hunger Education Services (2011), more than 10% of the world's malnourished live in Asia and 26% in Africa. In effect about 1.02 billion people suffer from chronic hunger worldwide.

The precarious situation of food security was mostly due to subsistence farming characterized by the use of inefficient tools such as hoes and cutlasses, rain fed farming, to mention but a few. Research reveals that surface mining operations represents the major cause for land use change from cropland to mining land. Though measures are being taken to reduce the level of undernourished people, poverty levels among the rural population and especially among crop farmers have remained high in mining communities. (Djietror and Appiah 2012, 184-186)

There are varying reasons that account for food insecurity especially at the household level where it can easily be felt due to the impact of mining activities. These among others include deforestation leading to soil erosion, increase in downstream situation, mudslides and landslides, poor soil fertility etc.

Policies have been made by governments over the years to boost agricultural production in the country through several Initiatives. Example, Operation Feed Yourself by the National Liberation Council (NLC), the President Special Initiative (PSI) aimed at growing cassava on large scale for consumption and processing into starch for industrial use and export. All these policies were aimed at increasing and sustaining agriculture production

Mining is the process or business of extracting ore or minerals from the ground. Recent activities in Kyebi and its nearby towns have raised concerns about the increased competition between mining and agriculture. This concern has awakened global concern and has increased food prices within the area. These activities are gradually destroying agricultural lands as well as crop production, gradually resulting in a net food deficit in the area. These mining operations when critically examined, can be said to be an act of “mining ourselves out of existence”, because the basic human needs for survival, such as the need for clean water, clean air, and food, which are derived from agricultural lands, are being destroyed by the mining activities in the area.

The signs of the impacts of mining activities on agricultural lands within Kyebi and its nearby towns are gradually becoming evident. For instance the recent continuous flooding of the Birim River of farm lands greatly discourages farm activities.

It is against this background that there is the need to undertake a study on mining impacts on agricultural lands and household food security in Kyebi and its nearby towns in the Akyem Abuakwa Traditional Area in the Eastern Region of Ghana.

1.2 Location of the study

The area is located in the central part of Eastern Region, Ghana (Fig 1). It has a total land area of about 725km² approximately. It lies within longitude 0°56 West and 0° 15 West and latitude 6.03 North and 6°35 North .It is bordered by Kwahu South District to the North, Atiwa District to the North West, Kwabibirem District to the South West; Fantekwa to the East and New Juabeng and Suhum-Kraboia-Coaltar Districts to the South. (MOFA, 20011)



Figure 1. Location of the study area (Google Maps, 2012)

1.2.1 Relief and Drainage

The land is generally undulating and rises about 240 meters to 300 meters above sea level with the highest point being the Atiwa ranges rising over 350 meters above sea level. There are several different types of rock formation giving the different relief features ranging from flat bottom valleys to steep-sided highlands which are usually covered with iron pans, bauxite and kaolin. The underlying rocks are of the Birimian formation covering over three-fourths of the closed forest zone. Also found are masses of granite which occur in parallel belts. This rock group contains several mineral deposits including gold, diamond, bauxite and kaolin. The area has rivers such as the Birim, Pra, Densu, Kua, Adenchensu and Merepong most of which have their catchment areas within the area and Apedwa Forest ranges. Several other seasonal streams are found in the area. The pattern is larger dendritic flowing in the north-south direction. (MOFA, 2011)

1.2.2 Climate, Vegetation and Soil

The area lies in the west semi-equatorial zone characterized by double rainfall maxima occurring in July and October; the first rainy season from March to July and the second from September to December. The mean annual rainfall is between 1250mm and 1750mm. Temperature is found to be fairly uniform, between 26°C in August and 30°C in March. Relative humidity is generally high between 70% – 80% in the dry season and 75% – 80% in the wet.

The area lies within the moist semi-deciduous forest. There are few forest reserves covering about 108.8sq. Km, including part of the Atiwa Forest Reserve. The forest reserves constitute about 15% of the entire surface area of the area. Some commercial species of trees found in the forest are Odum, Wawa, Ofram, Mahogany, Kyenkyen etc. The major soils in the area are the Asikuma-Atiwa-Ansum/Oda Compound Association. Dominating this soil group is the Atiwa series which is mainly red, well drained, deep gravel-free silty loams and silty- clay loams. The Peki series are brown to reddish yellow, moderately well drained, very shallow and rocky. The valley bottoms are occupied by the Oda series which are poorly drained alluvial silts clays. The soils are suitable for the cultivation of both food crops (cassava, plantain, yam, cocoyam, maize) and cash crops (cocoa, coffee, oil palm, citrus, cola) which are grown in the area. (MOFA, 2011)

1.2.3 Natural Resources

The area has a fairly large land mass of which cultivable area is 435km² representing 60%. The area has mainly mineral and forest products as well as water bodies. Mineral resources include deposits of gold, diamond, bauxite and kaolin. The gold and diamond deposits are found in the Birim river basin, Asikam, Abekoase, Agyapoma, Enyiresi, Abreponso, Kwabeng and Kibi. Kaolin deposits are found at the Atiwa Ranges whilst bauxite and manganese are found in Asamama and Apapam. The forest reserves are found at Atiwa (158 sq.miles.) and Apedwa (25 sq.miles). The rivers and streams are potential resource base for fishing and small scale irrigation schemes. The area is also rich in ground water resources as a result of light rainfall and underlying rock formation in the region, a potential source for bore-hole water.

Approximately 60% of the areas labour force is engaged in agriculture. Agriculture is practiced at the subsistent level by 62% of the population with the remaining 38%

involved in some form of large scale agriculture. Land holdings for agricultural purposes in the area are done through permanent ownership (family inheritance, outright purchases) and leasing arrangement (Abunu & Abusa). Majority of the farm lands are held through the Abunu and Abusa land leasing arrangements.

Some small scale irrigation farming is practiced along the banks of the Birim River and its tributaries, especially for the cultivation of vegetables. There is also animal rearing in the area which is generally at the subsistent level with most reared domestically. These include cattle, sheep, goat, rabbit and poultry. (EASTAKIM, 2006).

1.3 Problem Statement

Mining companies that started operations in Ghana acted as beacons in the industry and in the economy of Ghana, leading to several successes and attracting many other privately-owned mining companies into the field. The objectives of these companies do not vary much from one another, and include:

- Attracting foreign exchange through gold export.
- Diversifying agricultural activities.
- Extracting minerals for the local industries.

All the objectives aim at the general development of the people of which food security is paramount. However, this activity needs large tracts of land for mining and human labour. Despite the fact that the companies have achieved some level of their stated objectives, these achievements have worrying issues accompanying them as captured in the following:

- Rapid deforestation, including wild economic trees.
- The shift of labour from food crop farming to mining.
- Reduction of soil fertility through erosion.
- Effect on the health status of people in the mining communities which reduce the productivity of farmers, for example, abandoned pits become death traps and breeding grounds for mosquitoes, thus increasing the incidence of malaria.

Against this background, the question that needs to be answered is “can the people undertake mining activities while at the same time sustain high food production levels?” Do the mining activities in the area serve as a reliable alternative for food production? What interventions do the mining companies make to improve food security?

How has mining activities affected the lands? This study therefore seeks to find out the impacts the increasing mining activities in Kyebi and its nearby towns have on agricultural lands and food security.

1.4 Objective of the Study

The general objective of the study is to investigate the mining impacts on agricultural lands and household food security.

1.4.1 Specific Objectives

- To find out food situation of the area.
- To identify the impacts of mining on agricultural lands and how it affects food security.
- To assess the efforts made by mining companies in ensuring food security in the area.

In order to make a thorough investigation of the issues raised above, the researcher in this study intends to find answers to the following questions:

- Do households whose members engage in mining suffer food shortages during some periods of the year?
- What measures have been put in place to help deal with the food situation in the area?
- How has mining activities impacted agricultural lands in the area?
- How effective are the measures put in place in helping to deal with the food security situation in the area?

This problem has assumed alarming proportions as a result of the increased number of mining companies in the area. The fast shift of labour from agriculture to mining, has consequently led to a fall in the general level of food production although there is a marked increase in population in the area. It is hoped that the study will help improve upon the food production levels in the area. It will also inform government and stakeholders on key issues of food security in the area. Again it will also serve as a reference for researchers in academic field.

2 LITERATURE REVIEW

2.1 Introduction

The impact of mining in Kyebi and its nearby towns has attracted different views from people in the area. Some of the people view the advent of mining as having created a positive impact in their lives. Others have their views on health, social, environmental, cultural and economic issues relating to surface mining, (Adu-Yeboah et al 2008).

Surface mining is simply the process of removing the vegetation of a place and the use of heavy equipment to mine the mineral. In the process pits and dumps are created that result in the degradation of the land.(Ntiamoah 2000).

The negative impact of mining may include unemployment and dislocation of families. It creates unemployment because people lose their farmlands to the mining companies. In effect their source of livelihood is taken over by the mines. In spite of these adverse effects, mining companies provide good drinking water; build clinics and schools and other infrastructure for the communities. Mining companies also provide capacity building workshops for some workers in the operational area as well as provide extension services to the farmer.

2.2 Social Impact

Mining activities in the area has seen massive migration of all kinds of people to the area. The population growth rate has increased according to the district statistics office. This has been so because individuals converge there to carry out small scale illegal mining popularly known as “Galamsey”. Farmlands have been taken over by estate developers as well as mining support companies who have also acquired vast lands for construction and other purposes. Also the displacement of farming communities in the area has resulted in the migration of unemployed youth to the nearby towns such as Nkawkaw, Koforidua and Suhum. Others have moved to areas such as Kyebi, Kwabeng, Asikam, Enyiresi and Agyapoma where the ‘Galamsey’ is mostly in operation. The reason for this migration usually stems from the fact that compensation packages from the mining companies to the communities mostly do not benefit the youth but end up benefitting a few influential people within the communities. The result has been an increase in social problems in the area. Some of the problems include

drug abuse, high cost of living, prostitution and other environmental problems such as air pollution, ground and surface water pollution and physical assaults (Fusseini, 1996).

O'Neill (1993) has noted that, while the mining companies and to a lesser extent the government, reap the benefit, the communities enjoy few benefits and bear the greater part of the negative impact. It is this imbalance within these groups that bring about the persistent social conflicts in mining sites.

O'Neill (1993) further stated that such conflicts are centered on the following:

- Unfair distribution of benefits of mining projects.
- Struggle for self-determination and control of resources.
- Struggle between small scale miners (galamsey operators) and the large companies.

Land use conflicts, which are struggles for basic rights, usually are met with police brutalities by the dominant beneficiaries; the companies and the government.

2.2.1 High Cost of Living

AduYeboah *et al* (2008) have stated that one of the major negative impact 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.

2.3 Health Impact

Abugre and Akabzaa (1997) have stated that, the process of mining and processing of minerals involve various activities which give rise to environmentally related diseases. In Ghana. These diseases include:

- Respiratory tract diseases such as Tuberculosis, Pulmonary diseases and Silicosis.
- Water - borne diseases such as Shistosomiasis and Onchocerchiasis.
- Skin diseases of all types, eye diseases and mental illness (Adu-Yeboah et al, 2008).

2.3.1 Drug Abuse

It has been found out that drug abuse is rampant among illegal small-scale miners, who believe that drugs can help them work harder. The commonest drug in the study area has been 'marijuana' (Adu-Yeboah et al, 2008).

2.3.2 Prostitution

According to Dogbe (1995), there are two main types of sex workers. These are mobile sex workers and resident sex workers. The resident ones service the local "galamsey" operators and the low ranking workers employed by the companies. The mobile sex workers come from Nkawkaw, Oda, Koforidua, Accra and Kumasi. These ones target the expatriate workers, high ranking officials in the companies and those they refer to as "buyers" who come to buy gold from the 'galamsey' operators.

Adu-Yeboah et al, (2008) stated that young women and girls migrate to mining areas with the intention of trading or to find jobs, and when they are unsuccessful they resort to prostitution which they claim is more lucrative than the trading. This has resulted in an increase in HIV/AIDs cases in the area.

2.4 Physical / Environmental Impact

Surface mining is the main source of air-borne particulate matter which is one of the problems in the study area. It comes about as a result of site clearance and road construction, top soil stripping and dumping. According to Hilson (2001), an estimated 15,000 hectares of land is potentially affected by small-scale mining activities on the

land. It has been reported by the Environmental Protection Agency (1996) that a heavy rainfall may detach as much as 100 tons of soil from a hectare of exposed land surface. The same report points out that representative rate of erosion on an abandoned surface mine is 2,400 tons per square kilometer, which is 10 times greater than an equal area of forest.

2.4.1 Noise and Ground Vibration Impacts

Ground vibration and noise occur as a result of blasting. According to Agbeno (2001), blasting is the loading of explosives into drilled holes using detonating technique to achieve the desired fragmentation of the rock. Noise can interfere with human wellbeing such as hearing, sleep and speech and can cause stress-related diseases such as hypertension. The blasting of rocks in the study area has also caused some buildings to crack.

2.4.2 Chemical Pollution

The main concern of the communities in the area has been contamination of surface and ground water resources. This comes from cyanide by large-scale mining operation and mercury contamination from small-scale and 'galamsey' operations (Iddrisu and Akabzaa, 1996). However, chemical pollution could also come from explosives mishandling and sulphur dioxide (SO₂) from the companies.

Apart from these chemicals, heavy metals from mining operations find their way to streams and rivers and percolate into ground water. Contamination of a high level may cause farm crops destruction with resultant injuries to humans as well as fish, (Iddrisu and Akabzaa, 1996).

According to Songsore, et al; (1994), increase in surface mining has had considerable impact on ground water resources. The aquifer, when dried up renders a number of boreholes, streams and hand-dug wells in mining areas either unproductive or with reduced yield. They explained that under normal conditions these bore-holes and wells situated on a slope or ridge are recharged by ground water flowing from higher ground open mining pit. Extensive excavation cause large craters which removes the sources of recharge from some of these bore-holes and wells, and ultimately reverses the ground water flow direction causing active dewatering. The same dewatering process reduces recharge to streams, especially during the dry season.

2.4.3 Environmental Disaster

Poulin and Singing (1993) have stated that surface mining usually involves the clearance of large areas of land and the displacement of communities that occupy such land. The activities of mining companies usually come in direct conflict with other economic activities undertaken by the people such as forestry, fishing, hunting and agriculture. They further pointed out that surface mining by companies normally involves three different stakeholders that is, the mining companies and their investors, the government and the public.



Figure 2. Some small-scale miners, galamsey (GNA, 2012)

From (Fig 2), we can see the extent to which mining activities can destroy farmlands. In the process of mining, large holes are created on the lands using explosives and machinery that destroy vast land areas. These activities can lead to flooding, landslides and deforestation.

2.4.4 Mining Activities and Rural Settlement

Akabzaa (1997), again pointed out that, the advent of large-scale open-pit gold mining with its attendant destruction of large land surface and displacement of settlement is a major source of conflicts between the local people and the mining companies. The areas under study have seen resettlements over lands which were mostly used for

farming. The affected farmers have had confrontations with the mining companies but the government has mostly intervened and solved the problem. The major causes of the confrontations were:

- Disagreement over value of compensation for affected farm crops and other structures.
- Employment opportunities for the affected people in the mines.
- Continuing relationship between the people and the companies.
- Alternative farm sites to be allocated to the people affected.

2.4.5 Land Use Conflict

According to Zo (1997), the coming of surface mining in an area does not only abuse the human rights of the indigenous people but also brings different problems about land use. The mining companies have large tracts of land for their operations and farming is not allowed in their concession areas unless authorized by the companies. Even if permission is granted, the farmers are allowed to grow seasonal crops such as cassava, maize, vegetables and plantain, Cash crops or perennial crops such as cocoa, coffee and oil palm are not allowed. These are the main crops that fetch the people in the area a lot of money. Allowing the people to grow perennial crops means when the companies activities reach such areas they may have to pay more in compensations when its time to mine on the lands. It is noted that mining activities both large and small share space with agriculture, timber and other activities.

2.4.6 Physiological Disorders of Crops

Physiological disorders are largely the results of unfavorable environment with a negative impact on plant growth even though they are not infections.

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 (Ceponis, 1987; Chiang et al., 1993; Guerena, 2006; Jarvis and McKeen, 1991). These disorders involve both genetic (G) and environmental (e) interactions and this complex interplay of (G x E) factors are poorly understood for most disorders, and in some cases contradictory results have been reported apart from numerous names for many disorders (Becker and Bjorkman, 1991). Physiological disorders can be

divided into groups: nutrient imbalances (internal tipburn); genetic predisposition (blindness, buttoning, head splitting and bolting) and watering disorders (head splitting, buttoning) (Norman, 1992).

2.4.7 Land and Vegetation Degradation

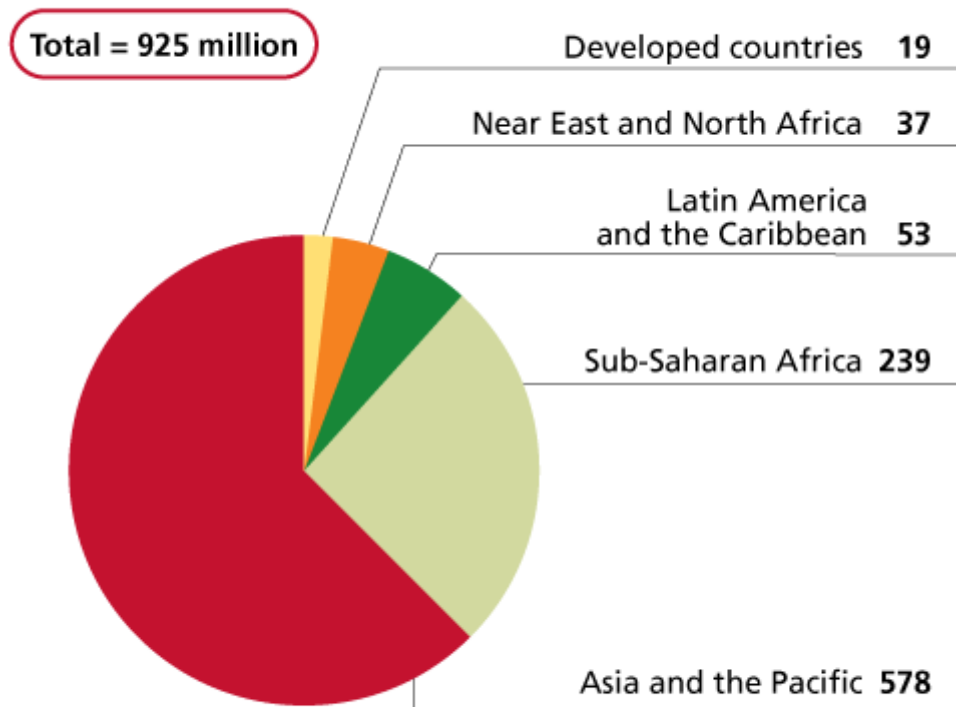
Another area that needs emphasis is land and vegetation degradation. Graham (1996) stated that one reason why surface or open-pit gold mining is not the best or should be condemned by residents of an area is the destruction of large acreage of land for various purposes associated with mining. It is estimated that at the close of the mines its total land space acquired would be used for other purposes such as sitting of mines, heap leach facilities, residential and large tract of the land is cleared with the removal of topsoil and vegetation. These leave the land at the mercy of the weather.

Kasanga (1997) has noted that, the result of the land destruction, particularly the series of ridges, is that the beautiful scenery of the area presented by the ridges is destroyed. The extensive land clearance associated with open-pit mining has also resulted in the destruction of vegetation, cultural sites, biodiversity and some water, it also destroys the natural habitat of wild life and the rich-tropical forest with its economic timber species. This has been supported by Adu-Yeboah et al, (2008).

2.5 Food Security

The World Food Summit (1996) defined food security as existing “ when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life”. Food security the world over is increasingly becoming a global concern. With the continuous food shortages leading to price hikes, malnutrition, hunger and even deaths in some parts of the world. Arable farmlands are being substituted for mining which is becoming a global challenge. The hunt for minerals and resources has led to many arable farmlands destroyed and destitute.

According to FAO report, in 2010 more than 925 million people globally were undernourished. Meaning they did not have access to food. It is seen from Fig 3. what the state of worlds hunger stands. (FAO, 2010).



Source: FAO.

Figure 3. World Hungry People (FAO, 2010)

2.5.1 Low Food Production as a result of soil Degradation

One of the most intensively debated issues in projections on directions that agricultural policies should take over the next 25 years is the extent of land degradation and its effect on food production.(Oldeman 1998,4).

Soil degradation among others is one of the leading factors to low food productivity by mining activities. The nutrients in the soil are depleted leading to an infertile land thus no farming being done. The soil is a natural resource which is not renewable in the

short or very difficult to renew, or expensive to reclaim or to improve, following erosion, physical or chemical degradation. (Stoops and Chevery 1992).

The release of chemical substances by the mining processes into the soil discourages and destroys crops. Due to this phenomenon 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 faming communities.

3 METHODOLOGY

3.1 Research Methodology

Research is a scientific and systematic search for pertinent information on a specific topic . It is also an art of scientific investigation. (Sanjeev 2010,10)

According to Saunders et al (2007), there are several techniques and methods in data collection and data analyses such as: interviews, questionnaires and observation. These methods can be divided into two main categories that is qualitative and quantitative.

Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in quantity terms. Qualitative research on the other hand is based on qualitative phenomenon, i.e., phenomena relating to or involving quality of a kind. (Sanjeev 2010,14)

Qualitative and quantitative methods were both used in the designing of the questionnaire in other to acquire the needed information to make accurate analyses.

The data used in the research is both primary and secondary data. Where primary data refers to data that is collected for a particular research. Secondary data, however is data that has been collected for some other purpose. It includes anything on documentary, government reports, TV programs and public records. (Saunders et al 2007). Online journals, articles, books and websites were some of the secondary data used in the theoretical framework in relation to the research.

3.2 Research Design

A research design is the arrangement of conditions for collection and analysis of data in a manner thus to combine relevance to the research purpose with economy in procedure. It is also the conceptual structure within which research is conducted. It constitutes :

- Blueprint for the collection of data
- Measurements of data (Sanjeev 2010,45)

There are different research designs that can be used in carrying out a research.

The research was designed and carried out as diagnostic survey involving an interview schedule with crop farmers in five selected communities. Questionnaires with close and open-ended items were used to collect data. The questionnaire was designed to collect and provide information on:

- Socio-economic profile of respondents:
- Socio-economic and environmental impact of surface mining on crop production.
- Identifying ways of alleviating the negative impact of the surface mining on farms in the study area.
- Developing an alternative means to solve food situation in the area;
- Finding alternative means of livelihood in the communities;
- Finding ways of peaceful co-existence between the mining companies and the farmers

3.3 Sample Techniques and Sample Size

A two-stage sampling technique was used in carrying out the task. In the first stage, five communities were selected from mining operational areas. These were randomly and proportionally selected after receiving a list of names of communities from the Local District Office.

In the second stage, 12 respondents were selected from each of the five 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. A total of sixty (60) respondents were interviewed in the study area.

3.4 Data Collection and Analyses

The data used in this study was obtained from the questionnaires administered. The data was collected usually on the market days which were Tuesdays for Kyebi, and Enyiresi Wednesdays for Agyapoma, Asikam, and Kwabeng and. sometimes Sundays were included. These were the days the majority of the respondents were available.

In administration of the questionnaires, rapport was first established between the researcher and the respondents. For instance where the respondents could not

express themselves in both the local language (Twi) or English, an interpreter was used to assist during the interview.

There are several ways to analyse and interpret data. In this research, the responses received from the farmers were grouped into items and each item responses were tallied. The data were summarized and expressed as frequencies and percentages.

3.5 Reliability, validity and Generalisation

Validity and Reliability are essential ways by which any research is evaluated. Reliability is, "the extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the result of a study can be reproduced under any similar methodology, then the research instrument is considered to be reliable" (Joppe 2000,1).

The research presented in this paper can under any methodology be reproduced. Generalisation refers to if the findings in a research can equally be applied in any other circumstance i.e, whether or not the results can be generalized.(Saunders et al, 2007).

The validity, generalization and reliability can only be limited to the study. Though data was collated from five different communities it was a simple random technique approach of 60 respondents which may reflect the general trends of mining impacts of other regions.

4 RESULTS AND DISCUSSIONS

4.1 Sex of respondents

There were sixty farmers who were interviewed from the selected communities in the mining operational areas. Thirty-seven of the respondents, representing 62% of the total number were males and the remaining twenty-three representing 38% were females (Table.1). This indicates that both males and females have suffered from the impact of mining in the study area.

Since both sexes have suffered from the mining activities, any programmed designed to reduce the impact of mining on food security in the area must be such that it covers both genders.

Sex	Total number	Percentage
Male	37	62%
Female	23	38%
Total	60	100%

Table 1. Respondents of the survey

4.2 Age Distribution of farmers

Majority of the farmers were within the age group of 40 – 59 years which represented 43% of the total number (Fig. 4). The 60 years and above age group were represented by an appreciable number of 15 representing 25% of the total number of members. The youth who have much strength to take up farming constituted 22% of the farmers. This could be attributed to the youths' attitude of getting rich overnight and so preferring mining to farming. If these trends continue to persist, the area is likely to face more food insecurity in the years to come.

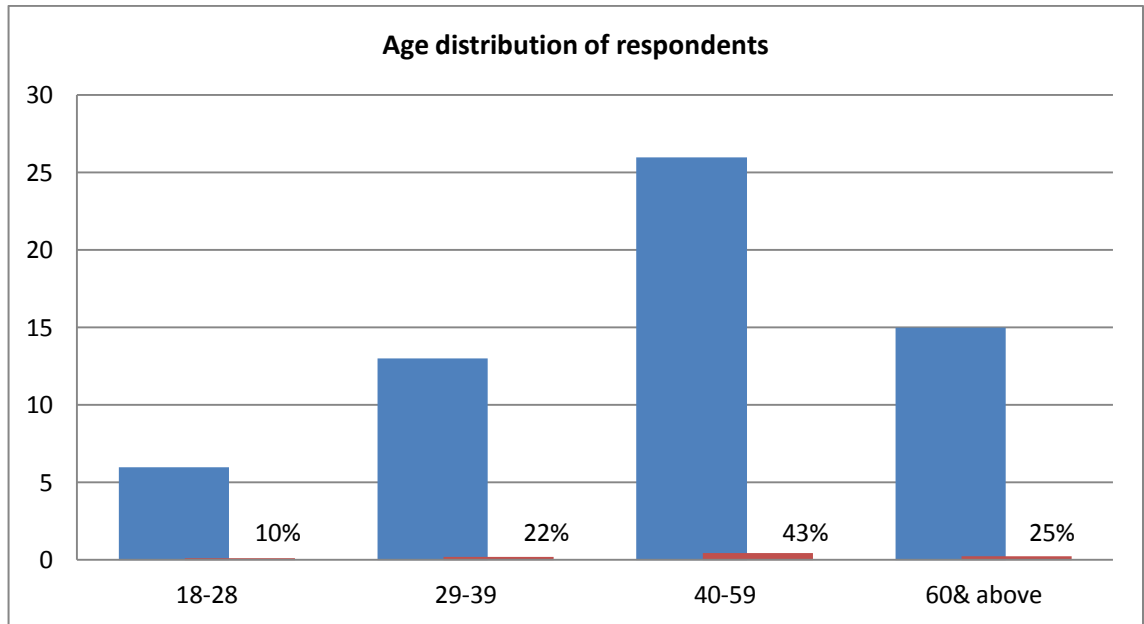


Figure 4. Age distribution of respondents

Mean age = 15

4.3 Level of education

The respondents with Middle School Leaving Certificate (MSLC) or Junior High School formed the bulk of the population, representing 38% (Table 2). Those with no formal education formed 36%, graduates / Diplomas and “O” Level or S.H.S graduates were few. Due to the greater number of respondents who have low level of formal education, any new innovation or technology that would be introduced must be simple, less expensive and directly related to their farming activities in order to produce much food so the household may not experience seasonal food shortage. According to Kodwo (1984) a country, region or community is said to be self-sufficient in food if it produces within its borders enough of various food staff. This is however not seen in the area.

Level of education	Total number	Percentage
No formal	18	36%
MSLC/JHS	19	38%
O/A level	10	20%
Diploma/graduates	3	6%
Total	60	100%

Table 2. Educational background of respondents

4.4 Crop Production

Cocoa was the dominant cash crop in all the surrounding areas of the study. These were on lands mainly owned by the inhabitants. Although there were other crops such as cassava, maize and vegetables being cultivated, they were on small scale and most of the farm land is been taken over for mining activities. Figure 5 shows the different types of crops grown in the study area.

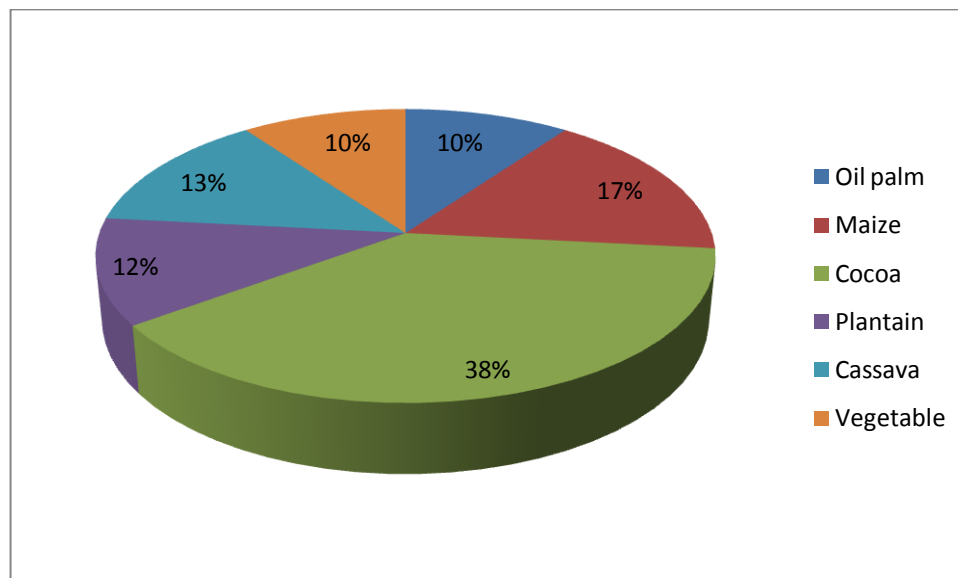


Figure 5. Types of crops grown in the area

4.5 Total farm size (Hectare)

Table 3 below gives an account of the sizes of farms of the respondents in the various communities. It is observed from the table that majority of the respondents farm size

were between 1-5 hectares which was 43%, the rest of the people cultivated farm sizes in hectares representing 25%, 20% and 12% of farm land area respectively. There may be many factors responsible for these small holdings; but the major was the mining activities that had claimed almost all their farmlands.

This has become very difficult for the rural dwellers to secure food for future use. Newmont Ghana one of the largest mining company in the area, claimed most of their farm lands for their mining operation. It is clear that food production has reduced drastically in the communities after the onset of mining operations. The reduction in the production of food in the study area could be attributed to the takeover of farmlands by mining operations. The destruction of farm lands by small-scale minners 'galamseys' is also another factor. Its effect can be seen from Figure 6. Some small-scale miners, galamsey (GNA, 2012).

Other contributing factors were soil degradation, erosion, destruction of vegetation and the pollution of the environment all caused by mining activities in the area.

Nyamekye (1996) has pointed out that where mining is practiced, there is the effect of reduction in food production in general that leads to increases in prices of all kinds of foodstuffs, hence the rising cost of living and the low standard of living in general. This is also supported by Akabzaa (1997).

Hectare	Total number	Percentage
1-5	26	43%
6-10	15	25%
11-15	12	20%
16 & above	7	12%
Total	60	100%

Table 3. Total farm size (Hectare)

Mean farm size = 15

4.6 Occurrence of common problems on crops

The occurrence of problems on crops in the various communities in the study area is presented in Figure 6. The commonest problems in the study area were physiological disorders and bacterial diseases followed by scorch and fire. Some of the respondents complained that some of these problems were unknown to them during the pre- mining era. Dust contaminants from crushers, smoke from blasting; roadwork can be sources of contamination of the environment (Yeboah, 1999). These have become common perhaps, due to the toxic emissions from the mines. Another possible cause may be air pollution resulting from the activities of mining and mining support companies. Chemical pollution might also be another possible cause. This is particularly concerned with mercury contamination from small-scale mining operations. This could be a serious source of water pollution.

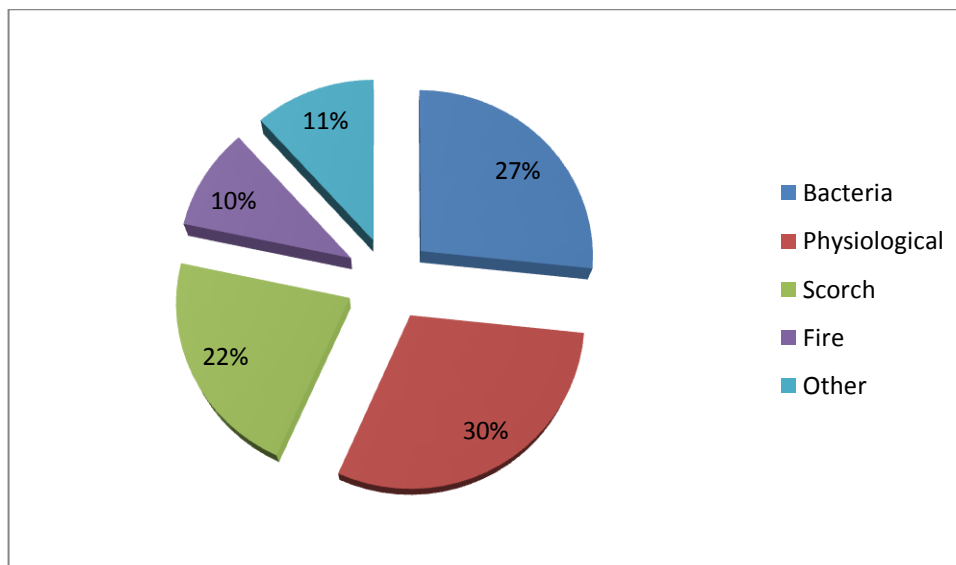


Figure 7. The occurrence of problems on crops in the various communities

4.7 General problems associated with crop production

It is seen from the table below that high labour requirement and low output pose a major challenge to food production which is the reason some are withdrawing from farming. Due to the vast nature of mining, many trees are cut down making the place bare for easy wind and water erosion thereby reducing soil fertility. Important economic trees such as odum, wawa and many edible ones used during periods of food shortage are being continuously destroyed.

Problems	Frequency of respondents	Percentage
High input cost	10	16%
High output price	15	25%
High labour cost	16	27%
Depletion of the soil fertility	7	12%
Destruction of economic trees(eg.cocoa)	6	10%
Pollution of water bodies	6	10%
Total	60	100%

Table 4. General Problems associated with crop production

4.8 Displacement / Eviction

Table 5 shows the respondents or farmers who were displaced from their farm settlements. Fifteen (15) farmers representing 25% of the farmers were displaced as against 45 (75%) who were still living on their settlements. The highest number of displaced persons took place in Kyebi. This may be attributed to the fact that the largest operating company in the area has its settlements and field in the area. The other communities which are farther away from the Newmont operating field have least or no displacements.

Settlement	Total number	Percentage
Displacement	15	25%
Non-displacement	45	75%
Total	60	100%

Table 5. Respondents or farmers displaced from their farm settlements

4.9 Type of compensation paid to inhabitants

There were two main forms of compensation. These were resettlement and relocation. The resettlement refers to those who had their buildings and land replaced. Relocation pertained to those victims who were given cash in compensation. Other compensations referred to those who were given some training in some trades or employed in the largest company, Newmont Ghana Company Limited.

Type of compensation	Total number	Percentage
Resettlement	18	30%
Relocation	21	35%
Others	21	35%
Total	60	100%

Table 6. Forms of compensation paid to the farmer

From Table 6 above, it can be deduced that most of the respondents opted for relocation. They therefore collected the money and left while others opted for the trade and training which led to their employment by some of the mining companies. Few people opted for resettlement and were given some farm land and houses. Some irresponsible household heads decided on relocation instead of resettlement and hence collected compensations in money form, some abandoning their homes and headed for urban towns. Another sad impact is the increase in social vices such as prostitution, theft, high cost of living and tension between the local folks and the mining companies due to the influx of the youth from the urban areas.

4.10 Alternative means for food apart from crop production.

From Table 7 below it is observed that (25%) of the respondents preferred the livestock industry. It is followed by poultry production. Grasscutter received the lowest number of the respondents. On the individual level each area has its preference. For example in Enyiresi community, piggery received no recognition. This may be due to the fact that majority of the people are Moslems. Fish farming also received no recognition in Kyebi and Asikam, because urbanization is catching up with Kyebi since it is the District capital and Asikam perhaps due to the Newmont settlements in the town. Beside these the people have their own preference considering the micro-climate in their locality.

The extensive land clearance and also open-pit had also resulted in the destruction of vegetation, biodiversity of natural water such as stream, rivers, ponds etc and restricted farming activities to very small holdings. The people in the study area are likely to be engulfed by poverty since the farming which is the major source of livelihood for the indigenous people in the area has been relegated to the background. This is another avenue to help break the poverty chain of the farmers in such communities.

Farming	Total number	percentage
Snail	7	12%
Fish farming	8	13%
Piggery	10	16%
Grass cutter	7	12%
Livestock	15	25%
Poultry	13	22%
Total	60	100%

Table 7. Alternative to crop production

5 CONCLUSION AND RECOMMENDATION

5.1 Conclusions of Findings

In concluding the findings and answers to the research questions, it can be said that there is some consistency in relating the results to the Literature presented in the research.

The goal of the research was to find out how mining activities impact agricultural lands and food security in Kyebi and surrounding towns through the following questions:

- Do households whose members engage in mining suffer food shortages during some periods of the year?
- What measures have been put in place to help deal with the food situation in the area?
- How has mining activities impacted agricultural lands in the area
- How effective are the measures put in place in helping to deal with the food security situation in the area?

Many governments especially in developing countries are faced with the challenge of how to manage arable lands and forest areas to help in the sustenance of food production and also to reduce poverty. The introduction of mining in the study area has seriously caused land degradation. This research finding can be linked to one conducted by Graham (1996) which stated that one reason why surface or open-pit gold mining is not the best or should be condemned by residents of an area is the destruction of large acreage of land for various purposes associated with mining. According to him, it is estimated that at the close of the mines its total land space acquired would be used for other purposes such as sitting of mines, heap leach facilities, residential and large tract of the land is cleared with the removal of topsoil and vegetation. These leave the land at the mercy of the weather.

The environment is polluted with chemicals, smoke and fumes from the mines and their supporting companies. The environmental pollution has affected on a whole farming in the study area. The results as proven from the data analysis indicating 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.

Majority of the respondents in Table 3 owned just some small hectares of farmlands meaning they were mostly into extensive farming. Any mining operation that was started rendered their farming activities ineffective. They 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. Furthermore, the activities of the small scale miners leave the lands destroyed as shown in fig 2. In the Literature review. Some of the other problems included high labour cost, input cost presented in the findings as contributing to food shortages in the communities.

From the result, it is deduced that alternative measures to crop productions had been adopted by some of the residence of the communities.

The results showed common problems that are associated with crop production of which physiological disorders according to Ceponis, 1987; Chiang et al., 1993; Guereña, 2006; Jarvis and McKeen, 1991, 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 drainages which and bacterial infections were the highest in the communities affected by the mining operations. Because of this effects, some farmers in the communities have adopted alternative means of farming and varieties of farming occupations which include poultry keeping, bee-keeping, aquaculture and snail / mushroom farming and piggery in other to earn a living and ensure food availability. This way they are not only dependant on their farmlands which may never be cultivable as a result of the mining operations.

Conversion of farmlands to mining has brought about losses in arable land areas, it has also deprived smallholder farmers the capacity of food production. From the study , it is seen that majority of the respondents opted for relocation as a result of the negative impact the mining operations have had on their farmlands. This shows that the mining companies or the agencies involved in ensuring that the right measures are put in place for the farmers to either continue farming with different approaches or techniques is unavailable. If there is no farming, it means food has to be imported from other neighbouring towns which is in turn going to be higher in price to food grown in those communities.

Also, 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. Land degradation as a result also has contributed to their relocation and resettlement therefore losing arable farm lands.

The findings reveal that inhabitants only had small holdings in farmlands. The mining farms have acquired lands that are being used or to be used for mining operations. It is seen that majority of the respondents only had holdings of just about 1-5 hectares which represented a 43% of the respondents. It can also be concluded that due to the illegal mining activities on farmlands, the farmers might have given up ownership or forced to relocate accounting for their loss of farm lands. This finding buttresses the study conducted by Akabzaa (1997), which pointed out that, the advent of large-scale open-pit gold mining with its attendant destruction of large land surface and displacement of settlement is a major source of conflicts between the local people and the mining companies

There is a poor rapport between the mining companies and the local farmers. A cordial relationship needs to be established between the indigenous people and the mining companies. This will ensure peaceful co-existence for the development of the area. In conclusion the impact of the mining activities on agricultural land has led to reduction in food production in the area (food insecurity). This has directly or indirectly affected the lifestyle of the people in the area both economically and socially.

5.2 Recommendations

There should be collaborations leading to good policies in managing the resources of the country among the various stakeholders. The Minerals commission, Environmental Protection Agency, small-scale and large-scale miners and the various bodies associated with mining especially should be involved in the collaboration at every stage. It would also help to reduce the tension over encroachment of farmlands.

Stringent measures should be taken in enforcing mining laws so as to duly punish companies, or persons that flaunt them or do not abide by the laws. On the spot fines or sanctions could be imposed on culprits.

It is also recommended that the mining companies be mandated to provide equal housing structures in new settlements and also to those that existed in the old

settlements for the indigenous people. This will help reduce the tension between the communities and the mining companies.

The mining companies should increase the number of sources of drinking water and improve the quality of the water in the affected communities. They should also ensure they fulfil their social responsibilities to the farming communities.

Also some of the indigenes should be given training in the maintenance operations of both bore-holes and stand-pipes so that they can maintain them when the mines withdraw their services.

- Organizing workshops, seminars and training for the farmers in the area on current farming techniques.
- Introducing farmers to different varieties in the mining business as a sort of alternative means of livelihood and help them to at least adopt one.

5.3 Limitation of the study

The main limitation of the study was the difficulties reading the true opinions and impressions of the respondents through the use of questionnaire. Language was also a challenge since there had to be some interpretation of some questions on the questionnaire for the respondents in the local dialects.

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APPENDIX 1. Questionnaire

PERSONAL DATA

Note: respondents should please tick (v) the correct answer in the box.

1. Location/Place

.....

2. Sex (a) Female [] (b) Male []

3. Age

(A) 18-28 years [] (b) 29-39 years [] (c) 40-59 years [] (d) 60 years
and above []

4. Marital status Married [] Divorced [] Single [] Widowed []

5. Do you have dependants? Yes [] No []

6. If 'Yes' number of

Children [] Wives []

7. Level of education

Non-formal education [] O' Level, 'A' Level / SSS [] MSLC / JSS [] Diploma []
Graduate [] 7.How many of your children are in school?

.....

8. How many of your children are not in school...

9. Why are these children not in school?

No money to cater for them []

Using them as farm hands []

Distance from school to village / town is too long []

Others (specify).....

Objectives

Identification of the social and environmental impacts of mining on agricultural lands and household food security.

10. When did you enter farming?

Before the time of the surface mining []

After the take off of the surface mining []

11. What is / are the crop(s) cultivated?

Cocoa [] Citrus [] Oil palm [] Cassava [] Plantain [] Maize [] Vegetables []

If any,
(specify).....

12. If vegetables, which type? Garden eggs [] Pepper [] Okra []

Any other
(specify).....

13. Total farmland acquired

1-5 ha [] 6-10 ha [] 11-15 ha [] 16 & above ha []

14. Acreage under cultivation 1-3 ha [] 4-6 ha [] 7-10 ha [] 11
& above ha []

15. What was your average yield per year of oil palm before the take off of the mining?

.....

16. What was the average yield per year of oil palm after the take off of the mining?

.....

17. What was the prevalent problem before the take-off of the mining?

Bacteria disease []

Physiological disorder []

Scorch []

Fire []

Others (specify).....

18. What do you think is the probable cause?

.....

.....

.....

19. Have you ever been confronted with eviction or displacement?

Yes [] No []

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

If 'Yes' what form?

Fiscal cash [] In land []

Any other (specify).....

.....

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

Yes [] No []

22. Have you ever experienced any security police / military brutality?

Yes [] No []

23. Have you observed cracks in your residential building / farm house?

Yes [] No []

24. If 'Yes' what do you think is the cause?

Temperature difference [] Vibration by blasting []

Any other (specify).....

25. When was that?

Before the take off of the mining [] after the take off of mining []

26. Identification of the ways to alleviate the negative impact of mining on food production

27. Do you still have reserved land for future farm extension?

Yes [] No []

28. If 'No' what is the cause?

Part of the land has been taken by mining company []

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

Any other (specify).....

29. If the mining company has taken the land, how much was the acreage?

.....

20. Were you allocated a new farmland?

Yes [] No []

31. If 'No' did you report to the immediate authority?

Yes [] No []

32. Do you normally find it difficult to acquire land?

Yes [] No []

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

1-3 km [] 4-6 km [] 7-9 km [] 10 & above km []

34. Alternative means to solve food situation problem in the area.

35. Do extension officers visit you?

Yes [] No []

36. If 'No' what is the cause?

Farmer-extension officer ratio very large [] Lack of means of transport on the
poor of extension officer [] any other (specify)

.....

37. Have you been introduced to the use of improved methods and planting materials?

Yes [] No []

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

.....

39. What are some of the planting materials you have adopted?

.....

40. If 'No' improved technology has been adopted what is the cause?

Complex of technology []

Farmer has no money []

Any other (specify)

41. Have you been introduced to intensive farming practices instead of extensive?

Yes [] No []

If 'Yes' for both questions 44 and 45 is what the average is yield per year?

.....

42. Do you store your farm produce?

Yes [] No []

If 'No' why?

Farmer needs money promptly [] Storage problem []

43. Do you belong to any crop association?

Yes [] No []

If 'No' why?

Non-existence of association []

Any other (specify)

44. If 'Yes' what are some of the benefits you have gained?

Farm input supply []

Attending agric seminars / workshop []

Elimination of the exploitation by middlemen []

Enjoying government financial assistance []

Any other (specify)

45. To find alternative means of livelihood in the area Apart from your normal crop farming, what other area may you want to enter if offered the option?

Snail / Mushroom [] Bee keeping [] Poultry-keeping [] Fishing farming []

Any other (specify)

46. Why did you not choose the same area of farming?

47. Ways of peaceful co-existence between the companies and the farmers?

Yes [] No []

48. What is the source of drinking water? Borehole [] Dug well [] Pipe-borne []

49. If it is pipe-borne / well/ borehole who provided it?

District Assembly []

Mining company []

NGOs []

Self-help project []

Any other (specify)

50. Have you ever attended an agricultural seminar / workshop / training organized sponsored by the mining companies?

Yes [] No []

51. If 'Yes' what sort of farm assistance?

Farming input supply []

Fiscal cash []

Technical supervisor []

Any other (specify)

52. What is the relationship between farmers and the mining companies in terms of communication?

In your view, what should the mining companies do to enhance peaceful co-existence between the companies and the farmers?

.....

