Effects of Mining on Smallholder Agriculture in Asutifi District of the Brong Ahafo Region, Ghana

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Abstract: The study assessed the socio economic effects of mining on agriculture in the Asutifi district of the Brong Ahafo region. From 117 communities in the district, three communities namely Kenyasi, Ntotroso, and Ola Resettlement were randomly selected. Simple random sampling technique was used to select 120 farmers for the study. Data for the study were collected through a structured questionnaire designed based on the objectives of the study and from literature. The data collected was subjected to descriptive analysis with the use of bar charts and frequency distribution tables. The results of the socio-economic effect of mining on smallholder agriculture in the area include displacement of people and land, increased migration into mining areas, environmental damages related to water quality water quantity, tailing management, noise and dust pollution as well as ecosystem disturbances, shortage of labour availability to agriculture, and contamination of crops as well as reduction in crops' yield.
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Introduction

From gold to limestone and copper to oil, mining activities have been extracting commodities from the earth and providing means of livelihood to human societies for thousands of years. In recent years, the process of exploring, mining and processing various minerals, has come under tremendous pressure to improve its social, developmental and environmental performance (MMSD, 2003). In Ghana, mining started since pre-colonial times. Small-scale mining also known as "galamsey' was legalized by the Provisional National Defense Council (PNDC) law 218, of 1989. Both the small and the large scale mining contribute to economic growth in the form of taxes and royalties to the country. The nation derives the bulk of its foreign exchange earnings from gold mining which accounts for over 90% of the country's mineral export. Apart from gold, Ghana produces significant quantities of diamonds and bauxite and counted amongst the top five countries producing manganese ore in 2006. As of June 2006, sixty six (66) local and forty seven (47) foreign companies held prospecting/reconnaissance licenses in Ghana. Additionally, thirty one (31) companies had been granted mining concession leases to operate in the country. Many of the companies holding exploration licenses are focusing on gold exploration (Ghana Chamber of Mines, 2006). Mining operations compete for land use with agriculture.

Agriculture which is the back bone of Ghana's economy has suffered the most palpable neglect over the years especially in the mining areas. Many cocoa farmers have had to reluctantly give up their ancestral farmlands spanning from four to five generations to mining companies. It is usually the case that when mining companies acquire a land in a community for prospecting, the local farmers are required to abandon their farms. They are paid some compensation which never meets any economic or moral requirement for such huge losses (Agyei, 2007). Meanwhile, between 1993 and 1997 mining contributed 1.5% to Ghana's GDP as against 40% by agriculture. Again, the mining sector in 2007, 2008 and 2009 contributed 5.9%, 5.6% and 5.8% of the GDP respectively to the country's GDP, whilst the agricultural sector also contributed 34.3%, 33.9% and 35.4% to the GDP in these years respectively (GSS, 2009). In a developing country such as Ghana where about 65% of the population is engaged in agriculture as their source of livelihood, any activity like mining that claims vast arable lands will be an affront to national food security as well as sustainable economic gains and initiatives (GSS, 2009). The taxes and royalties accrued to the state from mining are insignificant compared to the gains from agriculture to the national economic development.

Several linkages have been reported by different authors between mining and socio-economic issues. Barry, (1996) noted that, employment

generated indirectly by a mining operation amounts to between 2 to 25 times the number of direct employees, in certain cases even more than that. World Bank(2001) noted that every dollar spent by a mine on operations could generate an average of 2.8 US dollars in the local economy (World Bank, 2001). The implications of mining in terms of social impacts are that those who do not earn high income or are not employed in the mining sector, (wages in the mining sector are said to be higher than the average wage in Ghana) will not be in the position to afford decent accommodation for themselves and their families or fend for themselves and their families as well. Migration of young ladies into mining communities in search of non-existent jobs may lead to prostitution with its implications for the spread of transmittable diseases including HIV and AIDS (World Bank, 2010). Environmental damage can be caused by small-scale mining and large-scale mining. Water quality water quantity, tailing management, noise and dust pollution as well as ecosystem disturbances are issues that can adversely affect the health and livelihood of the poor and vulnerable in society. In the context of mine closure, abandoned or orphaned mines normally in open pit forms causes pollution and potential public danger. There is also a problem of deforestation and land degradation from the open cast mining system by both large scale companies and artisanal small scale miners. Having cleared the lands for extraction, some mining companies make the effort of reclaiming the land by reforestation, but changes in the natural ecosystem of the land and vegetation causes the destruction of the biodiversity. This situation is aggravated by artisanal miners who clear forest and dig large trenches leaving them bare, thus exposing the soil to erosion which cannot be used for agricultural purposes and also serving as breeding grounds for mosquitoes (Kusimi, 2007).

Agriculture is the main stay of the Ghanaian economy with 65% of the population engaged in it and Asutifi which is the study area has 77.4% of its population engaged in agriculture (GLSS, 2008). This means that any threat to any of the factors of production will have serious implication on the agricultural production sector with a consequential damage to the fragile economy. This is confirmed by the production trend of agricultural crops from 2003-2009 in the district which dropped by 1.9% together with a sharp increase in labour cost within the same period (SRID-MOFA, 2009). It is also estimated that about 9,575 individual farmers in the district with 7,500 hectares of their farmlands have been taken over by Newmont Gold Ghana Limited for gold exploration (Action Aid, 2005). This means that the practice of fallowing where farmers allow the land to regain its fertility by leaving it for a year or more without cropping on it can no longer be practiced since they are now restricted to small pieces of lands for farming if not completely lost to the miners. The main objective of this study is to assess the effects of mining on agriculture in the Asutifi District of the Brong Ahafo Region.

Materials and Methods

The Asutifi District which is in the Brong Ahafo Region occupies an area of about 1,500 square kilometers. The district is located between latitudes 6°40' and 7°15' North and Longitudes 2°15' and 2°45' West. It shares boundaries with Sunyani Municipal in the north and Asunafo in the south and to the west with Dormaa as indicated in Figure 2.

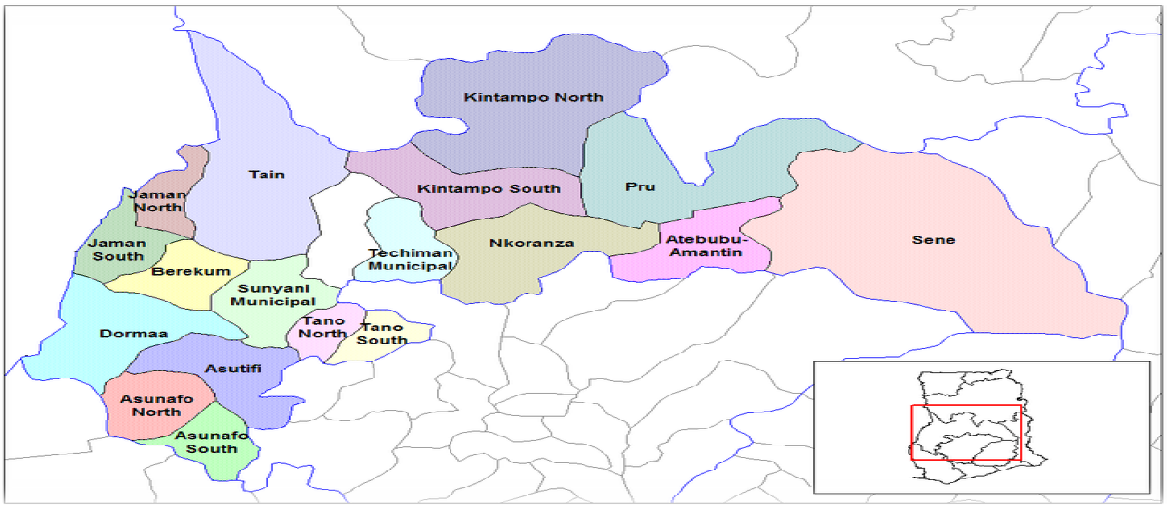

Figure 1: Map of the Study Area

The district lies within the wet semi-equatorial zone marked by double rainfall maxima with a mean annual rainfall between 125cm and 200cm. The first rainy season is from May to July and the second rainy season is from September to October when the district comes under the influence of the Wet Maritime Airmass. There is a sharp dry season between the two rainy seasons the main one coming between November and March when the tropical continental Air mass in the country sweep over the area (DDP, 2002). The district has Newmont Mining Corporation, which is a leading gold producer with operations in five continents, and developed its first project in Ghana in 2006, and it is the only mine operations of the company in Africa, which at the end of 2007 had over 17 million ounces of gold reserves, representing nearly 20% of its global gold reserves. This is expected to last for 20 years especially in the Ahafo mines (WBCSD, 2009). It operates the open pit system and currently mines from three open pits but with about 17 pits in total. It employed a total of 3,528 employees including Ghanaians contractors in 2008. Newmont have just started operations too at Akyem in the Eastern Region of the country though with low concession as compared to the Ahafo mines (WBCSD, 2009).

Newmont launched a community development fund to contribute an estimated US$ 500,000 annually via a community foundation to support community development programs. Newmont Ghana Gold has also embarked on other community development initiatives including the provision of water, sanitation, upgrading of the local clinics and training centers, school construction, HIV/AIDS programs for the communities as well as a program on malaria prevention in the district. Again, the Ahafo Linkages Program by Newmont which operates in 12 communities has been able to generate about $4.7 million since 2008 within these communities through local content use and involvement (WBCSD, 2009). The population of the study is all farmers in Asutifi district. From 117 communities in the district, three communities namely Kenyasi, Ntotroso, and Ola Resettlement were randomly selected. Simple random sampling technique was used to select 120 farmers for the study. Sarantakos, (1997) argues that a bigger sample size gives better accuracy than smaller sample sizes. Data for the study were collected through a structured questionnaire designed based on the objectives of the study and from literature. The data collected was subjected to descriptive analysis with the use of bar charts and frequency distribution tables.

Results

The socio demographic characteristics discussed include age, sex, education and employment status of respondents as presented in Table 1 while Table 2 shows comparison of yield levels of some selected crops with achievable yields standards. Figure 2 presents the types of labour respondents use and Figure 3 the perception on labour shortages for agricultural activities.

Table 1 Personal characteristic of farmers

Variables	Frequency	Percentages
Gender		
Female	54	45
Male	66	55
Age		
18-25	7	5.8
26-35	28	23.3
36-45	70	58.4
46-55	10	8.3
Above 55	5	4.2
Education		
Primary	70	58
Junior High school	56	47
Senior High school	14	12
Tertiary	4	3
Monthly income(GHc)		
500-1000	78	65
1001- 1500	18	15
1501 – 2000	5	4
2001 – 4999	13	11
5000 and above	30	25
Years of farming experience		
15 years ago	38	32
10 years ago	44	37
5 years ago	42	35
1 year ago	19	16
Difficulty of land acquisition		
Increased demand for land	69	57.50
Don't know	3	2.50
High cost of land	20	16.67
Land was lost to miners	28	23.33

Table 2 Comparison of Yield Levels of Some Selected Crops with MOFA Achievable Yields Standards

ESTIMATED YIELD OF SELECTED CROPS PER HECTARE(HA) IN THE ASUTIFI DISTRICT YIELD MT/HA						
CROP	2006	2007	2008	2009	Achievable Yields	Actual Yields
Maize	2.3	4.0	2.2	2.1	6.0	2.0
Rice	1.7	2.7	1.9	1.8	6.5	1.5
Plantain	13.1	13.1	13.5	14.0	20.0	13.3
Cocoyam	7.9	7.9	8.0	9.0	10.0	8.0
Cassava	18.0	16.6	16.8	17.0	48.7	18.1
Cocoa	11.2	10.3	10	10.1	12.2	10.1

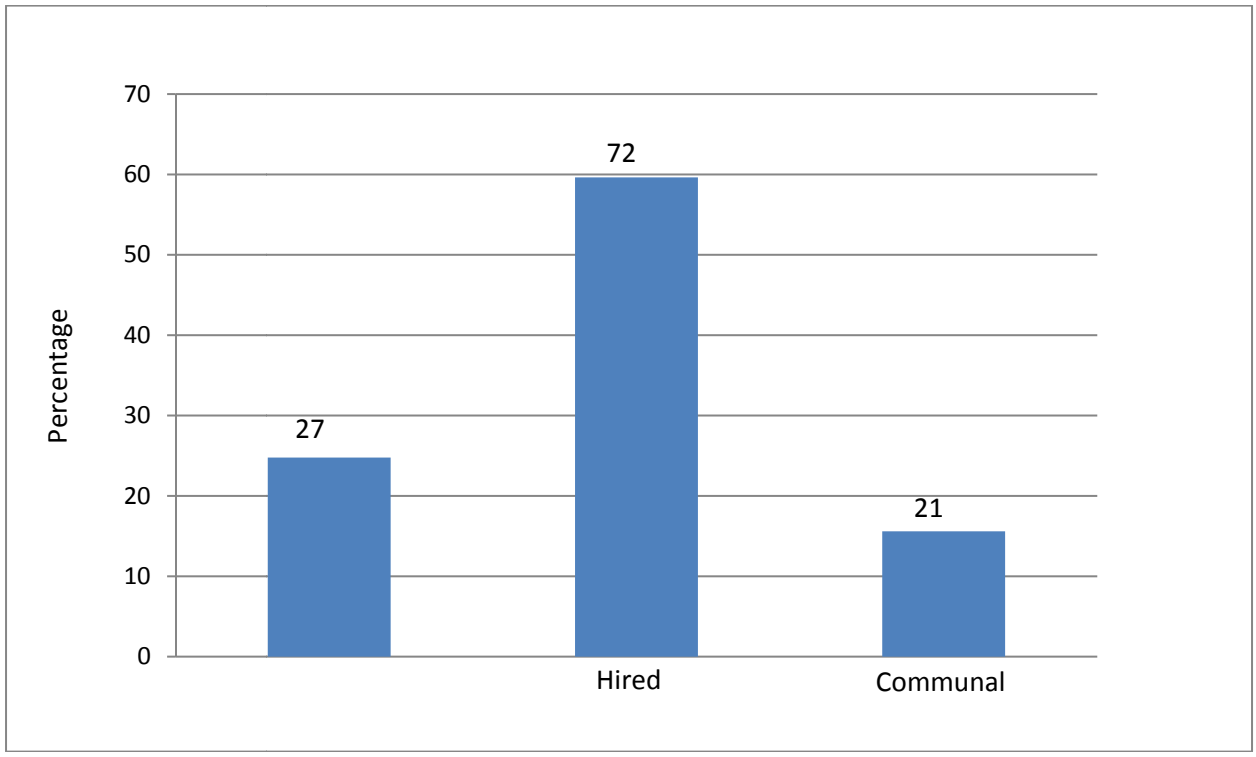

Figure 2 Types of Labour Respondents Use

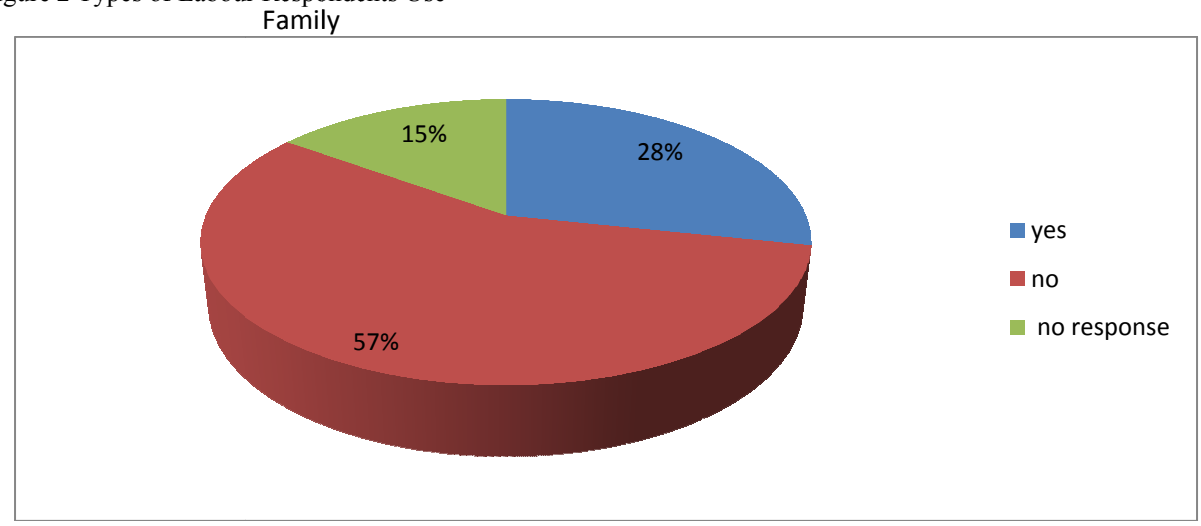

Figure 3a: Labour availability

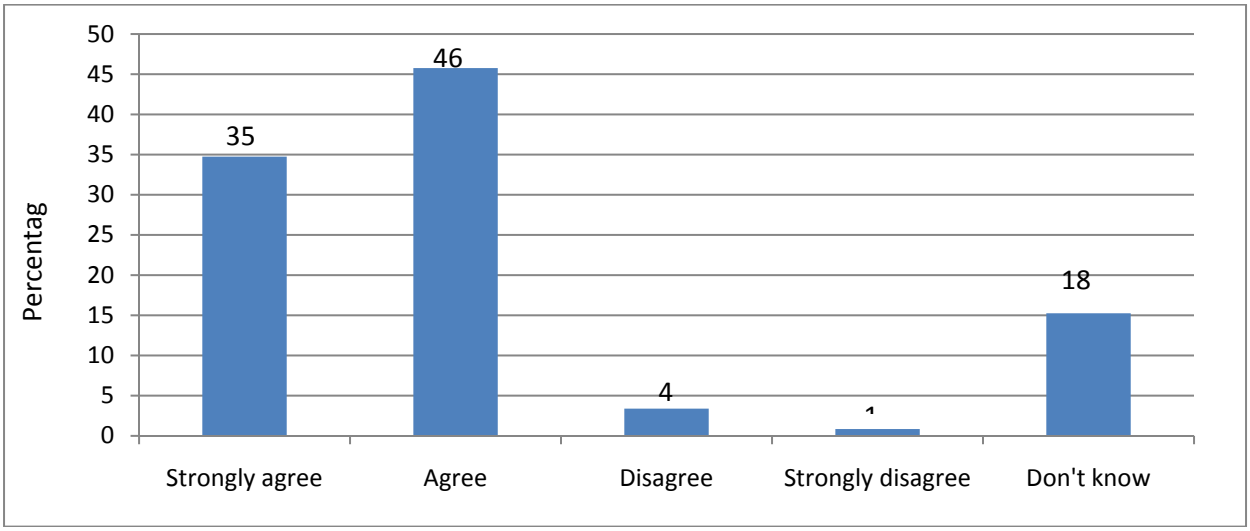

Figure 3b: Perception on Labour Shortages for Agricultural Activities

Discussion

Table 1 shows the features of farmers in the study area. Out of the total respondents 45% were women while 55% were men. This also confirms other studies that men constitute the general active agricultural working force and that of the mining sector (Amma *et al,* 2006), though with a fair representation of women. The age of the respondents was categorized into five (5) age categories as shown in table 1 below. The age category with the highest frequency was the 36 to 45 age group with about 58.4% of the total respondents. This shows that majority of the farmers in the study areas are within this category. The survey revealed that 48.9% had primary education with 39.1% attaining the Junior High School level. This indicates that most of the farmers interviewed did not have high education. Monthly income levels of respondents revealed that 54.2% earns between GH¢500 to GH¢1000 per month which constituted the majority from the study, however 9.4% of respondents earn more than GH¢2000. It was realized that farmers in this category were cultivating both cash and non-cash crops (cocoa, maize, rice cassava, plantain etc) and hence their higher monthly returns.

About 31% indicated that they started their agricultural practices about 10 years ago, whilst (32) of them making 26.7% started farming 15 years ago. Majority of the youth (35) representing 29.2% of the total respondents started farming within the last 5 years. From the survey, about 10 to 15 years ago, farmers could secure more farm lands (4 acres or more) with GH¢5 or GH¢10, or an equivalent of produce from land owners and sometimes at no cost at all. But now, the highest number of acreage a farmer could access was 3 at a cost of GH¢ 180 for a season which is unaffordable by farmers. Some of the reasons given for the changes were, land being lost to the mining firm, increasing number of farmers in the area leading to higher demands for land and cost simultaneously in addition to general increase in land usage for other things like buildings and settlements. About 58% of the farmers attributed the difficulty in land acquisition to increase in demand of land as a result of increase in farmer numbers, whilst 23.3% attributed it to the loss of their arable lands to mining companies. It could be assumed to have contributed indirectly to the increase in the cost of lands and land fragmentation leading to more demand of land by farmers. Shortages of arable lands have been worsened by the acquisition of over 2,992 hectares of land by Newmont Ghana Gold Limited operating gold mines in the area. This has led to the increase in cost of acquiring the existing scarce arable lands for farming, implying that 77.4% of the population engaged in agriculture in the district have lost out their source of livelihood. Some of the respondents confirmed that the presence of the mining company though has created jobs for some of the people in the area have bequeathed them to small land holdings for agricultural activities limiting their ability to embark on large scale farming. Hence further expansion of existing mines or future discoveries of gold in the area could further reduce the agricultural land size in the area. According to the Ministry of Mines and Energy, approximately 30 percent of Ghana's land is currently under concession to gold mining firms, and each year more arable farming land are diverted to this use (IRIN, 2008).

The results of the socio-economic effect of mining on smallholder agriculture in the area include displacement of people and land, increased migration

into mining areas, environmental damages related to water quality water quantity, tailing management, noise and dust pollution as well as ecosystem disturbances, shortage of labour availability to agriculture, and contamination of crops as well as reduction in crops' yield. The operation at the Ahafo mines displaced about 823 households (5,185 people) of both residential buildings and cropped fields in the mine area. In addition, 878 households (4,390 people) will be economically displaced through the loss of cropped fields located in the mine area. The total number of impacted households is 1,701 consisting of 9,575 people (Planning Alliance, 2005). According to the Ghana Chamber of Mines, the mining and mineral industry injected a total of US$2.9 billion into the economy in 2009, representing an increase of 27 percent from the2008 figure of US$2.3billion. In Obuasi, Tarkwa and Kenyasi of Ghana, influx of migrants from other parts of the country to these areas are higher for works like small scale mining (galamsey) putting pressure on the social services and other amenities in these communities. Weber-Fahr, (2002) revealed in a cross-study analysis of environmental damages as a result of mining operations in 51 mining countries across the globe, that about 60% of the residents in these communities were at risk of environmental pollution. The concentration of mining operations in Tarkwa has been a major source of both surface and groundwater pollution. Four main problems of water pollution have been noticed in Tarkwa mining areas.

According to Amoah, (2003), chemical pollution of ground water and streams, siltation through increased sediment load and increased fecal matter and dewatering effects were the major water pollution problems from mining activities. Akabzaa and Darimani (2001) argued that, considerable areas of land and vegetation in Tarkwa for instance were cleared to accommodate surface mining activities which constitute over 70% of the total land area of Tarkwa. The tailing dam of one mine took a total of 6.3ha of land given an estimated per acre yield of cassava of 108,000 bags. This means the tailings dam has denied the farmers a minimum of 275,351 bags of cassava per annum. The tailings dam, plant site and feed stockpile of Ghana Australia Goldfields Limited alone affected a total of about 315 farmers currently cultivating around the area. In Akabzaa and Darimani's, view, the takeover of the dam had significant implications on the farmers' income and food security of the families due to the presence of tailing dams. Contamination of crops through poisoning as a result of waste from mining is a problem in the Obuasi area (Action Aid, 2005). TWN Africa indicates 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'. "Mercury values were up to 5 times more than EPA limits and 26 times more than World Health Organization limits. Zinc concentrations were also up to 5 and 8 times more than EPA and WHO limits in the soils and in plants. In addition, arsenic values were 24 and 1,226 times more than the EPA and WHO limits respectively as a result of the mining activities (Action Aid, 2005). With these deposits in the soil in higher concentrations, crops directly absorb the substances and assimilate it to the roots and fruits which are not safe for human consumption.

Prominent crops grown in the study areas include Cassava, maize, plantain, cocoa and rice. About 76.3% of the farmers cultivate three (3) or more acres of crops with 26% of the respondents having two acres each, with 36.4% cultivating less than two (2) acres of food crops. Almost all respondents interviewed cultivate many of the crops but 44% of the 120 respondents were growing more maize than other crops with an average yield of 2.02 metric tons per hectare. The yield trend over the past four (4) years from MOFA compared to the yield estimates from this study are captured in Table 2 below. Apart from 2007 where the yield level for maize was 4.02Mt/ha, which was quite high, the average yields for the district for maize was 2.6Mt/ha for the past five years. Other crops over the years in review showed marginal changes both in reduction and on increase as seen below.

Labour is an indispensable input in agricultural production cycle. Hired labour dominated the responses with (72) of them representing 59.6% affirmed that, it is a source of labour supply for their agricultural activities . This is a drain on the farmer's purse as an increase in the use of hired labour can lead to an increase in the cost of production. Hired labour is more effective if there is a supervision or involvement of either the farmer or the family. As a traditional practice, family labour is still being used as (27) of the farmers representing 24.7% of the respondents confirmed the use of the family labour, though it was lower than the hired labour. Communal labour use was quite low as only (21) of the farmers making 17% of the respondents resorted to using the communal system for their farming activities. It clearly showed the fading out of the "nnobua" and other communal benefits being enjoyed by the people in these communities. There is a gradual shift of family and communal labour supply to hired form of labour which is increasing the cost of crop production in the area. Cost of labour per man day of work respondents say was GH¢5 and at a peak

period could go as high as GH¢6 or more which to them is expensive because the frequencies required to undertake all the cultural practices in the farms.

Apart from being expensive for farmers to pay, 57% of the respondents said labour was not even available for farming as most of the able working youth are engaged in mining activities in the area. Twenty eight (28%) responded yes to show that there was available labour for their farming works .One respondent remarked that " during farming season, it is extremely difficult to get labour for our farming activities as most of those we used to hire are now mine workers who are earning more than the farmers could afford''. To confirm this, the respondents were asked whether mining activities were creating labour shortages in their communities. The response showed 38.3% and 29.2% of the farmers respectively in Figure 3, indicating they agree and strongly agree with the perception that, the mining activities have created shortages of labour for their farming activities in the area.

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