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**Effect of Small Scale Mining on Agricultural Land in Gare Gbane in the Upper East Region, Ghana**

Noel Bakobie<sup>1</sup>, Raymond Abaare<sup>1</sup>, Ziblim A. Imoro<sup>2</sup>, and Abudu B. Duwiejuah<sup>1\*</sup>

<sup>1</sup>Ecotourism and Environmental Management, Faculty of Natural Resources and Environment, University for Development Studies, Nyankpala Campus, Tamale, Ghana.

<sup>2</sup>Biodiversity Conservation and Management, Faculty of Natural Resources and Environment, University for Development Studies, Nyankpala Campus, Tamale, Ghana.

<sup>1\*</sup>Correspondence: [abalu096@gmail.com](mailto:abalu096@gmail.com)

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**Abstract**

Small scale mining is engaged by hundreds of people in Ghana and their activities render many farmlands unproductive and deny some residents of their livelihoods. This study investigated activities of illegal surface mining and its effects on agriculture land as well as its related implications on crop production in the Gare Gbane community. A total of 140 respondents, (farmers and miners) were interviewed. The activities of illegal small scale mining have negatively affected the agricultural lands. A total of 48.30% of the respondents own an average farm size of 1 - 3 hectares, 34.20% possess 4 - 6 hectares, 10% own 7 - 9 hectares whilst 7.50% have 10 and above hectares. The challenges faced by farmers from small scale mining activities were severe land degradation, flooding of farmlands and difficulty to access farms and transportation of farm produce to the community. Open pit is the dominant operational method used by miners in the community. It is recommended that authorities should exercise their powers by enforcing laws to drive away illegal operations so that the agriculture sector will be improved and attract the youth into farming in the community. It is recommended that authorities should act within the laws of the land to regularize small scale mining in the area and closely monitor its operations to ensure total compliance.

**Keywords:** crop production, farmers, farmlands, miners, small scale mining

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## INTRODUCTION

Small scale mining is one of the paramount agents of land degradation, and destruction, about 13% of Ghana's total forested land has been destroyed by this activity (Tetteh, 2010). Surface mining in the Western Region of Ghana has resulted in a considerable loss of 45% farmland and nearly 58% deforestation within mining concessions (Schueler et al., 2011). The activities of illegal surface miners in Nagondi have occasioned in the degradation of land through vegetation loss and soil erosion (Tom-Dery et al., 2012). The Upper East Region is greatly visited by environmental degradation with the subsequent loss of agriculture lands, wildlife, and vegetation cover as a result of gold mining (Gyasi et al., 2006).

In 2014, 54% of the working population of Ghana was engaged in agriculture activities (Food and Agriculture Organisation of the United Nations, 2015). Ghana attracted about 50, 000 illegal miners, excluding the indigenous illegal miners as of 2017 (Burrows and Bird, 2017) and this led to the growth of small scale mining operations. In Ghana, there has been public outcry over the unprecedented destruction of the environment by the activities of illegal miners and this led to the ban of all practises of small scale mining on April 1<sup>st</sup>, 2017 (Ministry of Lands and Natural Resources, 2017).

Most mining concessions are usually on agricultural lands, forests and human settlements which generally result in a competition for land amongst users including farmers' access to farmlands (Tetteh, 2010). Small scale mining undoubtedly, has been main threat to the livelihood of people in mining areas that could bring about hunger, diseases and poverty to both the present and future generations.

The Gare Gbane community has been noted for the on-going exploitation of precious mineral resources. It is noted that most of the miners in the area lack the requisite skills

and technology to engage in legal mining practices and therefore, uses crude and unprotected methods in their operation which causes adverse effects on the fertile agricultural lands. The activities of these miners lead to the destruction of forest cover and farmlands, water pollution and the pits which serve as death traps to human and animal life. The study, therefore, sought to assess the effect of small scale mining methods on agricultural lands in the Gare Gbane community.

## **METHODOLOGY**

### *Profile of study area*

The Gare Gbane is a community in the Talensi district of the Upper East Region of Ghana. The District experiences 950 mm annual rainfall with a mean of 88 mm to 110 mm. The vegetation type of the District which lies within the Guinea Savannah woodland consists of deciduous trees such as baobabs, dawadawa, ground flora grasses and shea (Ghana Statistical Service, 2014). The main employment source for the people is agriculture as 90% is actively engaged in production of crops to earn a livelihood (Ghana Statistical Service, 2014). The soil types, vegetation, and geological structure in in the District support the production of crops such as maize, millet, potatoes, vegetables, groundnuts and guinea corn. Other economic activities engaged in by the indigenes are food processing, fuel wood extraction, shea picking and mining (Ghana Statistical Service, 2014).

### *Sampling size, technique and data collection*

The study used 140 respondents that constitutes 120 farmers and 20 miners. Data was collected between February - April, 2017. Farmers were selected for the interview using simple random sampling technique. Farmers were sampled to assess their knowledge, the effects of small scale mining on the crop production and farm accessibility. Purposive

sampling technique was used to sample the miners. The miners were also sampled to ascertain the mining methods employed in their operations. The total sample size of 140 were arrived at based on the size of the local population. A population of a community less than 500, intensity of 10% sampling is used, populations stuck between 500 to 1000, intensity of 5% sampling is used and intensity of 2.5% sampling is used for a population above 1000 (Diaw et al., 2002).

Primary data was collected by observation through field visit, face to face interviews with respondents using semi structured questionnaire. Field visits and observations on the sites were to observe the abandoned pits, degraded land and various mining methods used. Key informants were interviewed as a lot of in-depth information was required on the effects of mining activities on agriculture. Data collected were processed using the Statistical Package for Social Sciences (SPSS) version 23.

## RESULTS AND DISCUSSIONS

### *Demographic characteristics of respondents*

The gender, age, and educational level of the farmer respondents are presented in table 1. Majority (83.30 %) of the farmers were males and who were basically no formal education. The age group with the highest number of respondents was 40-59 years. Generally, the educational level of the respondents was very low.

Table 1: Demographic characteristics of farmer respondents

Variable	Frequency	Percent (%)
Sex		
Male	100	83.30
Female	20	16.70
Total	120	100

*Age of farmers*

15 - 28 years	10	8.30
29 - 39 years	10	8.30
40 - 59 years	71	59.20
60 years and above	29	24.20
Total	120	100

*Educational level*

No formal education	100	83.33
JHS/ basic level education	16	13.33
Senior High School / Vocational / Technical	4	3.33

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Out of the 20 miners interviewed, 75% respondents were males and the remaining 25% were females. The miners with age between 29 - 39 years were majority. Forty percent (40%) of the miners respondents had attain junior high school / basic level education, 30% had senior high school / vocational school / technical levels education, 20% had no formal education and 10% had tertiary education (Table 2). The low level of education of the youth is view as the primary reason why the youth are mostly engaged in illegal mining activities.

Table 2: Miners demographic characteristics

Variable	Frequency	Percent (%)
Sex		
Male	15	75
Female	5	25
Miners		
15 - 28 years	6	30
29 - 39 years	10	50
40 - 59 years	4	20
Educational level		
No formal education	4	20
Junior High School / basic level education	8	40
Senior High School / Vocational / Technical	6	30
Tertiary	2	10

#### *Mode of operations by small scale miners*

Though small scale mining operations in Ghana and other developing countries offers opportunities for the support of rural livelihoods but the fact of the matter is that, its activities had caused severe havoc on the environment.

In small-scale mining operations, there are substantial differences stuck between the elementary, manual methods of hand panning and sluicing, use of pick axe and shovel and the sophisticated methods involving the use of heavy equipment, controlled blasting, processing plants among others (Gavin, 2002). Depending on the type of mineral to be exploited, all these methods have their own strengths and weaknesses.

Table 3: Miners mode of entry and operations

Variable	Frequency	Percent (%)
Mode of miners entry		
Relatives	6	30
Friend	11	55
Own interest	3	15
Land acquisition		
Land from chiefs	16	80
Do not consult anybody	4	20
Methods of operations		
Hand panning	7	35
Open pit	13	65
License		
Mining without licenses	16	80
Don't know	4	20

Most of the miners were introduced into the small-scale mining operations by their friends. This influence was due to either the direct involvement of their friends in the mining activities or the display of money generated from mining by their friends. The quick money generated and the display of the riches (money) from mining activity by the youth has influence their colleagues into mining. These findings learn support from Owusu and Dwomoh (2012) who reported that attitude of the youth, poverty, get rich quick, especially as portrayed by friends who are in the operations, were the main motivational factors for entering into illegal mining activities.

### *Land acquisition for small-scale mining*

The survey revealed that 20% of the miners acquired land from chiefs for operation, whilst the remaining 80% said they do not consult anybody but invade areas where gold is discovered (Table 3).

### *Methods of small-scale mining*

The survey shows majority (65%) of the miners were engaged in open pit method of extraction whilst the minority (35%) were engaged in hand panning method (Table 3). Under the surface mining method, various sub-methods were identified with respect to the land nature and mineral deposit. Majority of them were engaged in open pit method of extraction. This finding is in line with that of Hinton (2005) that stated that in small-scale mining, open pit mining is the utmost common form of mining of both secondary and primary ore deposits. The study also revealed that simple tools such as hoes, pick axes, hammers, chisels and shovels and other basic tools were adopted. This finding learns support from that of Hinton and Beinhoff (2004).

### *Acquisition of a valid mining license*

Out of 20 miners, 16 (80%) were without licenses and the remaining 4 (20%) did not disclose their information (Table 3). Those without valid licenses were interviewed and 56% mentioned inadequate information on license acquisition, 31% said licensing procedures were too complex and 13% indicated high cost involve in license acquisition (Figure 1). It is clear from the study that majority of the miners have no legal permits to operate. As a result, their operations do not conform to standard processes as stipulated in the Mineral and Mining Regulations Act of Ghana, 2006 (Act 703). It was also confirmed from observation and interviews that, regulatory agencies do not regularly check these illegal miners' activities. Hence, the increasing case of environmental



degradation and all forms of pollution from mining activities continues to rise in the community.

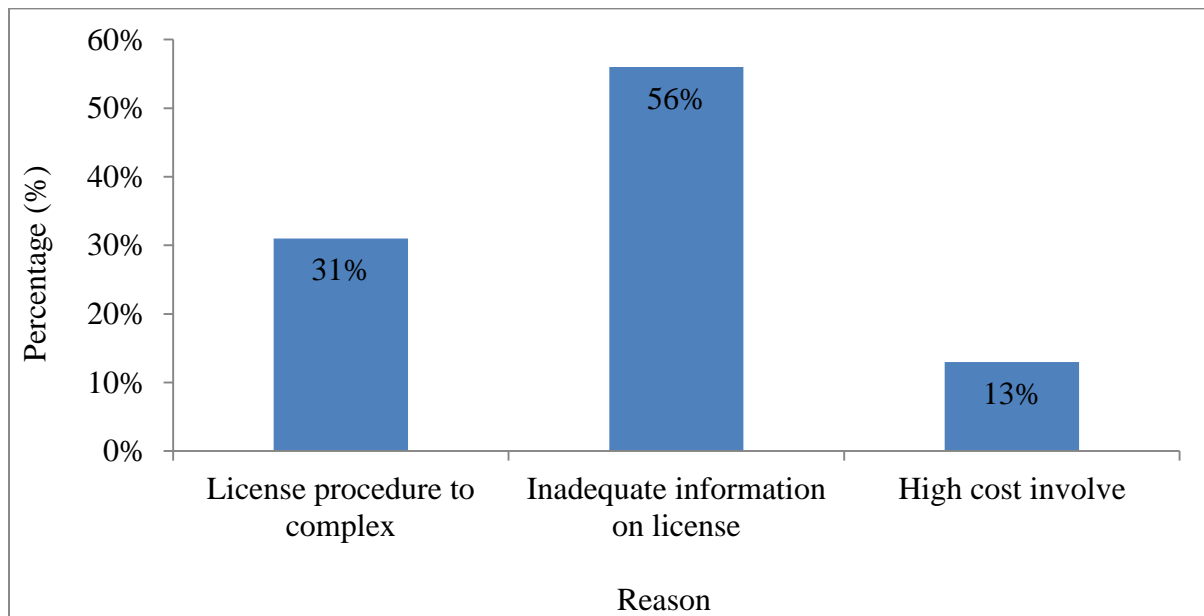


Figure 1: Reasons for not acquired a valid license

#### *Agriculture activities in the community*

Millet and maize were the dominant crops grown in the study community. Other crops such as groundnuts, sweet potato, rice and vegetables were also grown in the study area (Figure 2).

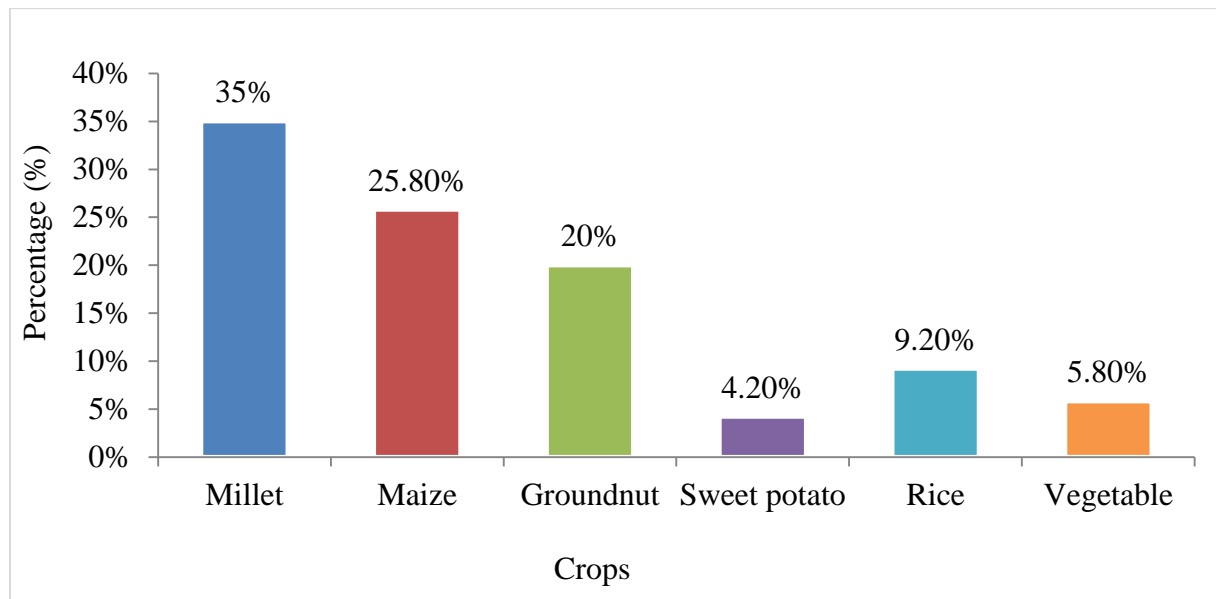


Figure 2: Types of crops grown in the Gare Gbane community

#### *Farm sizes of respondents*

The average farm size of the farmers with 1 - 3 hectares was 48.30%, 4 - 6 hectares represent 34.20%, 7 - 9 hectares represent 10% and 10 hectares and above was 7.50% (Table 4). Farmlands were taken over by the illegal miners which hinders the cultivation of these crops and other cash crops in the community. Mango and cashew were also gaining footholds but were on very small scale due to the unavailability of fertile land. Majority of the respondents have farmland size between 1 - 3 hectares and this could be as a result of the mining activities. Large portions of farmlands have been takeover by illegal small scale miners. This could put the community in a state of food insecurity as farming is done on smaller basis. This is in line with the findings by Schueler et al. (2011) that reported surface mining in the Western Region of Ghana to have resulted in a considerable loss of 45% farmland and nearly 58% deforestation within mining concessions.

The infertility of the farmlands resulted in low production of crops and also influences the type of crops grown. Besides, others had to apply fertilizer on the land before it could support crops growth which they said is very expensive to purchase. Some farmers travel on long distances before they could get a place to farm.

Table 4: Average farm size

Hectare	Frequency	Percent (%)
1 – 3	55	48.30
4 - 6	41	34.20
7 – 9	12	10
10 & above	9	7.50
Total	120	100

*Type of farming systems practiced in the Gare Gbane community*

The study showed 63% respondents practice mixed farming, 30% mixed cropping, 17% mono cropping and mono culture constitute 10% (Figure 3).

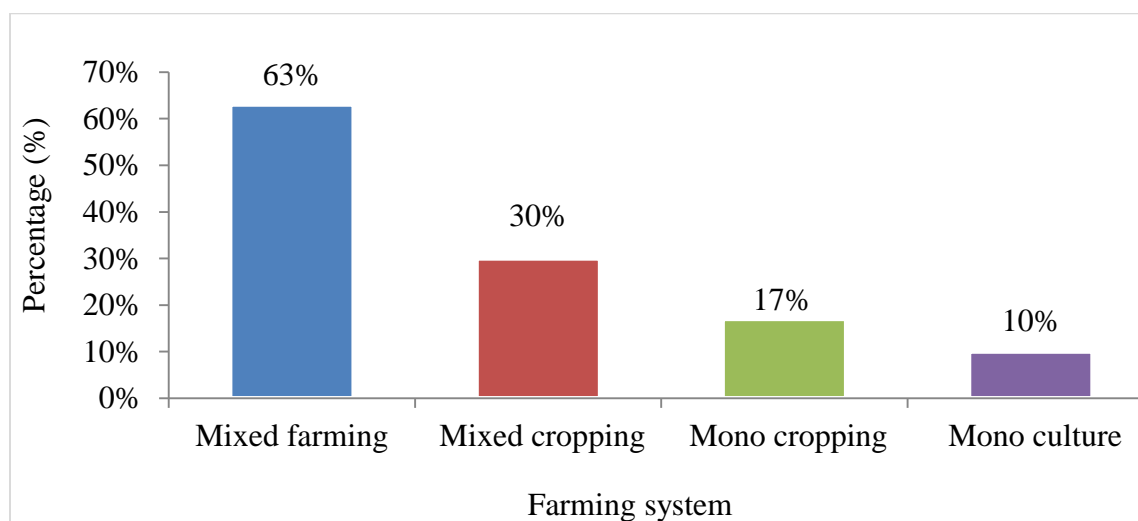


Figure 3: Farming system in the Gare Gbane community

Most of the farmers (65.83%) attributed the reduction in their crop yields to the mining activities due to their impact on land degradation in the community whilst 16.67% attributed the reduction in yield to the unfavorable climatic factors aside the mining activities. Other respondents that attributed their yield reduction to poor management of farms were 11.67% and 5.83% attributed it to old age of farmers (Table 5). Farmers who ascribed reduction of crop yield to mining activities gave some reasons such as the destruction of parts of their farmland by the small scale miners, serious degradation of their farmlands and the occurrence of flooding on farmlands as several hole and pits have been left uncovered. Farmers also indicated that some of their crop fields are located at old mined sites and agricultural productivity at old mined sites is low because of degradation of the land. This lends support to Tom-Dery et al. (2012) and Gyasi et al. (2006) that reported that the Upper East Region is highly degraded with the resultant loss of agriculture lands, vegetation cover and wild faunal species.

Table 5: Factors responsible for yield reduction

Factors	Frequency	Percent (%)
Land degradation due to mining	79	65.83
Unfavorable climatic condition	20	16.67
Poor farm management	14	11.67
Old age	7	5.83
Total	120	100

#### *Effects of small scale mining on the agriculture land*

One of the main effects of small scale mining in the community is land degradation. The study shows 69.17% respondents affirmed loss of soil fertility (land degradation) of farmlands, 20% affirmed flooding of farmlands and 10.83% affirmed to destruction of

farm crops (Table 6). Respondents believed the mining activity removes the top soils, trees and vegetation from the land surface and this renders the land infertile for agricultural purposes. This finding learn support from that of Tom-Dery et al. (2012) that reported that illegal small-scale miners activities in Nangodi in the Nabdam District of Upper East have caused land degradation through land erosion, vegetation loss and adverse climatic trends as well as negative factors influencing degradation of the environment. Field observations also confirmed that, dangerous pits were found with depths of about 20-80 m deep which are likely dead trapped to humans and animals in the community.

Table 6: Effects of mining on agriculture lands

Effect	Frequency	Percent (%)
Loss of soil fertility (land degradation)	83	69.17
Flooding of farmlands	24	20
Destruction of farm crops	13	10.83
Total	120	100

#### *Influence of small scale mining activities on farmland size*

Most farmers (79%) said their farm size has reduced, 34% of them have farm size unchanged and 7% were not able to tell (Figure 4). Small scale mining activities have an influence on farm size for crop production. A study by Ocansey (2013) showed that release of chemical substances in the processes of mining destroys crops and soil discourages leading to low productivity. Levels of food production drop as more people opt for mining activities instead of agricultural production in the farming communities.

Illegal small scale mining activities have affected farmland size for crop production. The initial farm size either remained unchanged or changed over a period of time. Majority of the farmers have affirmed reduction in farmland size since the insertion of the mining. Many farmers lost greater portions of their farmlands to small scale mining activity. Consequently, none of the farmers have been able to extend their farm size. Due to the scarcity of land for farming, the land is not allowed to fallow to regain its fertility for a better farming. This finding to an extent agrees with Tetteh (2010) that reported most mining concessions in and around agricultural lands, human settlements, and forests resulting in competition for land and which limits farmers' access to farming land as large acreages are usually destroyed.

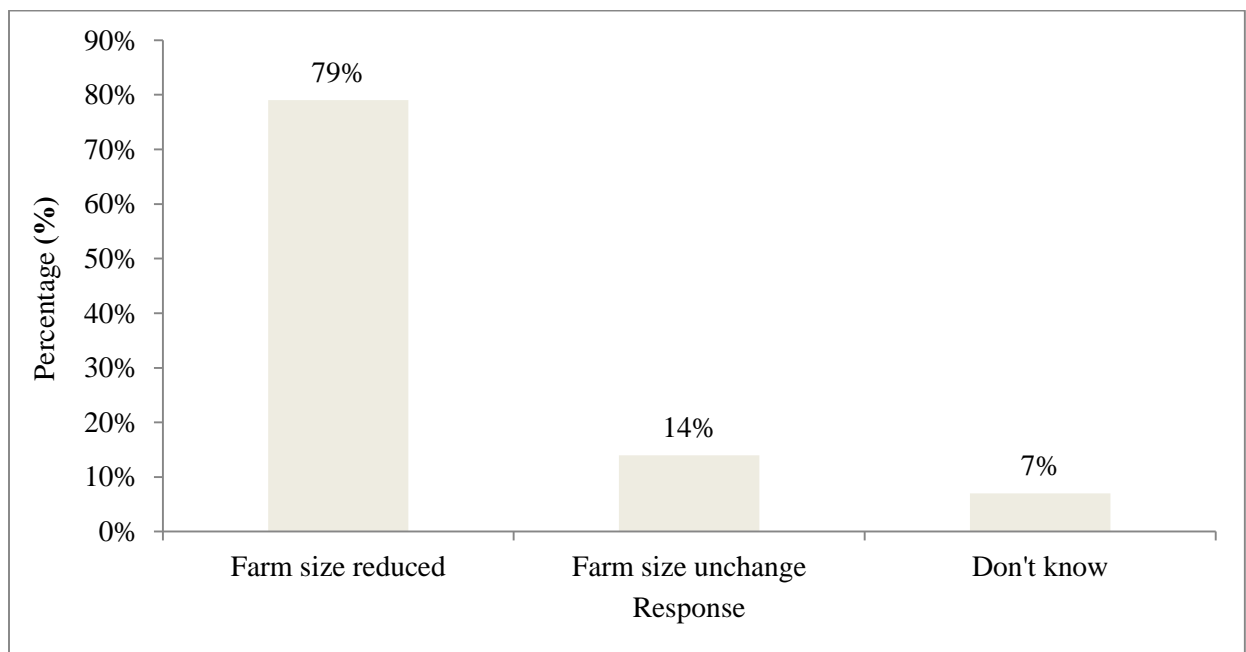


Figure 4: Change of farm size of respondents

*Accessibility to farms and produce transportation to the community*

From the survey, 78 farmers (65%) had challenges in accessing their farmlands and transporting their produce to the communities whilst 42 respondents representing 35% do not encountered any forms of difficulties. Mining activities in the community generally hinder farmlands accessibility and transport of produce to the communities. Majority of farmers had difficulties with respect to holes and pits excavation on routes by illegal miners linking their farmlands to the communities. Water logged and eroded route on some routes linking farmlands were also some problems faced by other farmers in the study area. According to the farmers, some narrow streams have been created by the activities in so doing causing flooding and water logged routes when it rains.

**CONCLUSIONS**

Small scale mining has affected agricultural activities as well as human's livelihood. The study showed that the activities of small scale mining has resulted in a widespread loss of agriculture land and denied some farmers access to their farmlands. The study also observed that majority of the respondents engaged in open pit method and most of the miners were operating without a valid mining license. Problems of low yield of crops were a major concern by farmers as their yield drops significantly in every season. It is recommended that the District Assembly should revise its environmental management policies and encourage the illegal small scale miners to formalise their mode of operations to ensure that the effect on the agriculture lands are minimise or reduce to the barest level.

### **Acknowledgement**

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### **Conflict of interest**

There is no competing interest among authors of this research article.

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