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MINING OUR LIVES OUT: A FOOD SECURITY APPROACH TO MINING OPERATION IN ASUTIFI DISTRICT OF GHANA

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ABSTRACT

Mining in the Asutifi district began in 2003 when Newmont Gold mining (GH) Limited started mining gold. Since then, the company's operations have continued to expand covering large areas of land that falls in their concessions. This study analyses the mining operations of Newmont in the Asutifi district and how their operations are affecting the livelihood of the residents of the district. Using a quantitative approach, self-administered structured questionnaires were distributed to 150 respondents and responses analysed. Focus group discussions members were also selected randomly but with much consideration to their social background. Seven people were selected to be on the group including an opinion leader in the district, three migrants but resident in the district and three other indigenous residents in the Asutifi District. An Independent Sample T-Test was used to test the relationship between mining operations and food production in the Asutifi district and a Chi Square ($\chi 2$) test used to test if there is a difference in how the livelihoods of both natives and non-natives are affected. For both tests, the result indicated a no statistically significant and difference between mining and food production and also how both natives and non-natives are affected since mining started. Although mining has affected residents in some ways, it cannot be concluded that it poses food security threat or risk to the residents of Asutifi district.

INTRODUCATION

Mining is an important component of the economy of many nations, particularly in the developing world. For example, 25% of Guinea's and 5.9% of South Africa's GDP as well as the majority of foreign revenues of these countries are mining related (**Aryee, 2001**). However, local livelihoods rarely profit from mining activities, although mining has widespread and drastic environmental and social effects on them (**Kumah, 2006**). Gold mining has become increasingly attractive during the last decades due to soaring gold prices. This has triggered a gold boom, both in industrialized countries (e.g., the United States, Australia, and Canada) and in developing nations (e.g., South Africa, Peru, Indonesia, or West Africa) (**Hammond *et al*., 2007**).

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Since gold is often extracted using toxic substances, the environmental consequences of gold mining can be devastating, particularly in fragile tropical ecosystems (**Akpalu and Parks, 2007; Kumah 2006; Sousa and Veiga, 2009**). As a consequence, gold mining activities in developing nations often lead to open; sometimes violent negotiations about the use of land (**Müller, 2004**). To mitigate such conflicts, governments, mining companies, and rural stakeholders sometimes react with resettlement and alternative livelihood programs, and former farmers engage in small-scale artisanal mining (**Banchirigah and Hilson 2010**). Ghana is Africa's second largest gold producer and gold mining in Ghana has been an economic success story for international investors and the country's economy (**Addy, 1998**). However, the question is how the recent gold rush has affected Ghana's environment and local livelihoods. Existing studies suggest widespread land transformations and degradation (**Agbesinyale 2003; Akabzaa and Darimani 2001**) and thus

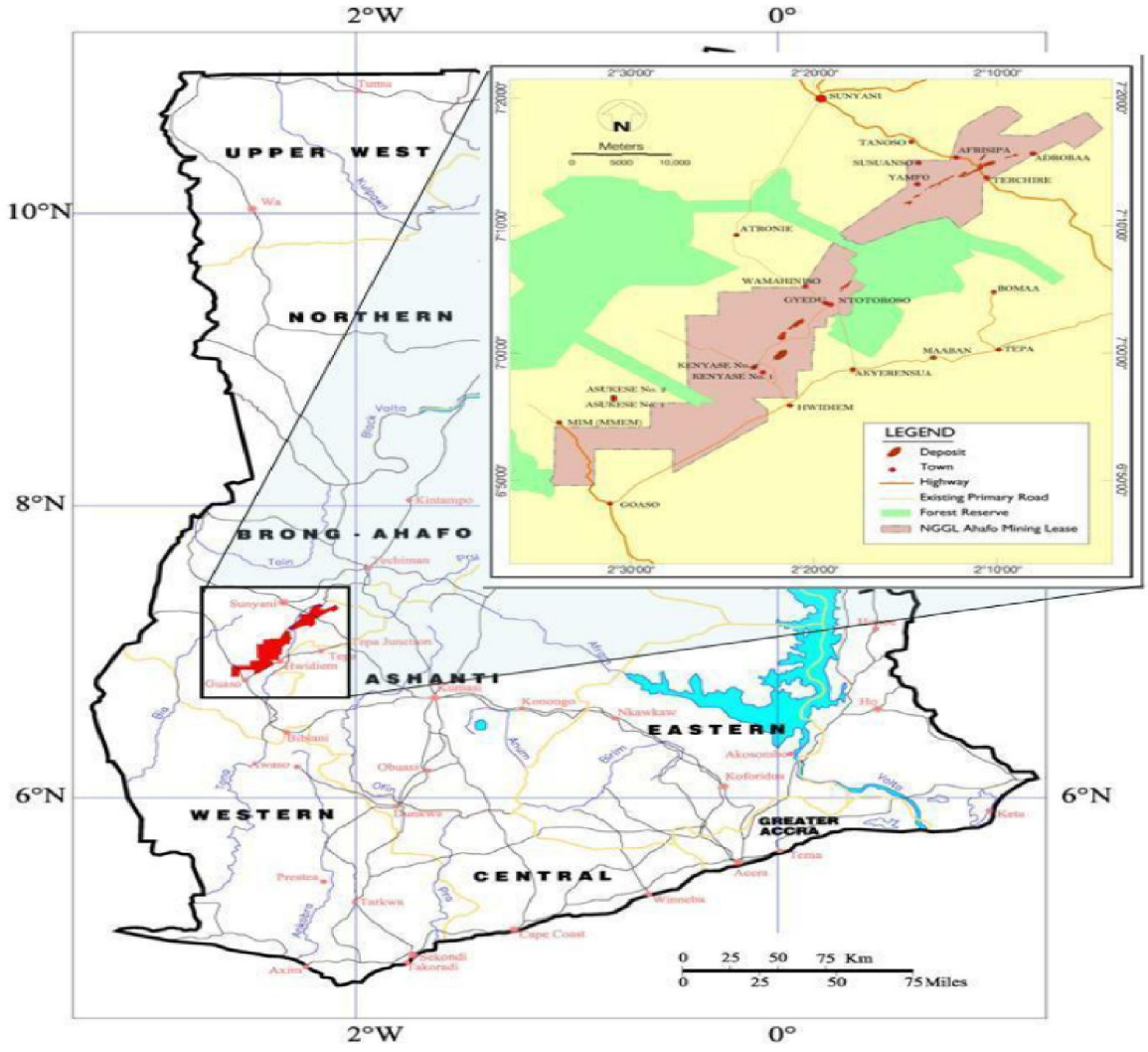
fundamentally changed livelihood foundations, but overall, land use changes due to mining remain poorly understood. Moreover, there is increasing evidence that Ghana may face a resource curse dilemma: economic diversification is lacking and the country's economic dependency on mineral resource export revenues grows (**Adler and Berke, 2006; Akabzaa and Darimani, 2001; Aryee, 2001**). It has been argued that a thorough cost/benefit analysis of the effects of the mining sector to the ordinary Ghanaian will provide a negative result (**Darimani, 2009; Akabzaa and Darimani, 2001**). 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**). So, to what extent is mining affecting agricultural lands and food security in Asutifi District? With farming being the common occupation of most people living in Asutifi District, how do mining on former agricultural lands in the Asutifi District guarantee the future livelihood of the residents of Asutifi District? What resource approach is used in ensuring the future sustenance of the livelihood of the people of Asutifi? This research is set out to investigate the scale of mining on agricultural lands that initially served as the ultimate livelihood source for the people of Asutifi and to identify how the scales in mining operations in the area correlates with the future survival of the people especially in food security that ensures their livelihoods. The study seeks to answer two main questions;

- Is there a relationship between mining activities and level of food production in Asutifi District? And
- Is mining operations affecting the livelihood of natives and non-natives differently in Asutifi District?

Study Area

Location and Size of the Study Area

The location for this research work is the Asutifi District in the Brong Ahafo Region of Ghana. It is located between latitudes $6^0$40' and $7^0$15' North and longitudes $2^0$15' and $2^0$45' West. Kenyasi, the district capital, is about 50 km from Sunyani, the capital of Brong Ahafo Region (**Suleman *et al*., 2013**). The district shares boundaries with Sunyani Municipality in the north, Tano South District to the north-east, Dormaa Municipality to the north-west, Asunafo North Municipality and Asunafo South District to the south-west and Ahafo Ano South and North districts to the south-east. The district is one of the smallest in Brong Ahafo Region, with a total land surface area of 1500 km^2 (**Suleman *et al*., 2013**).

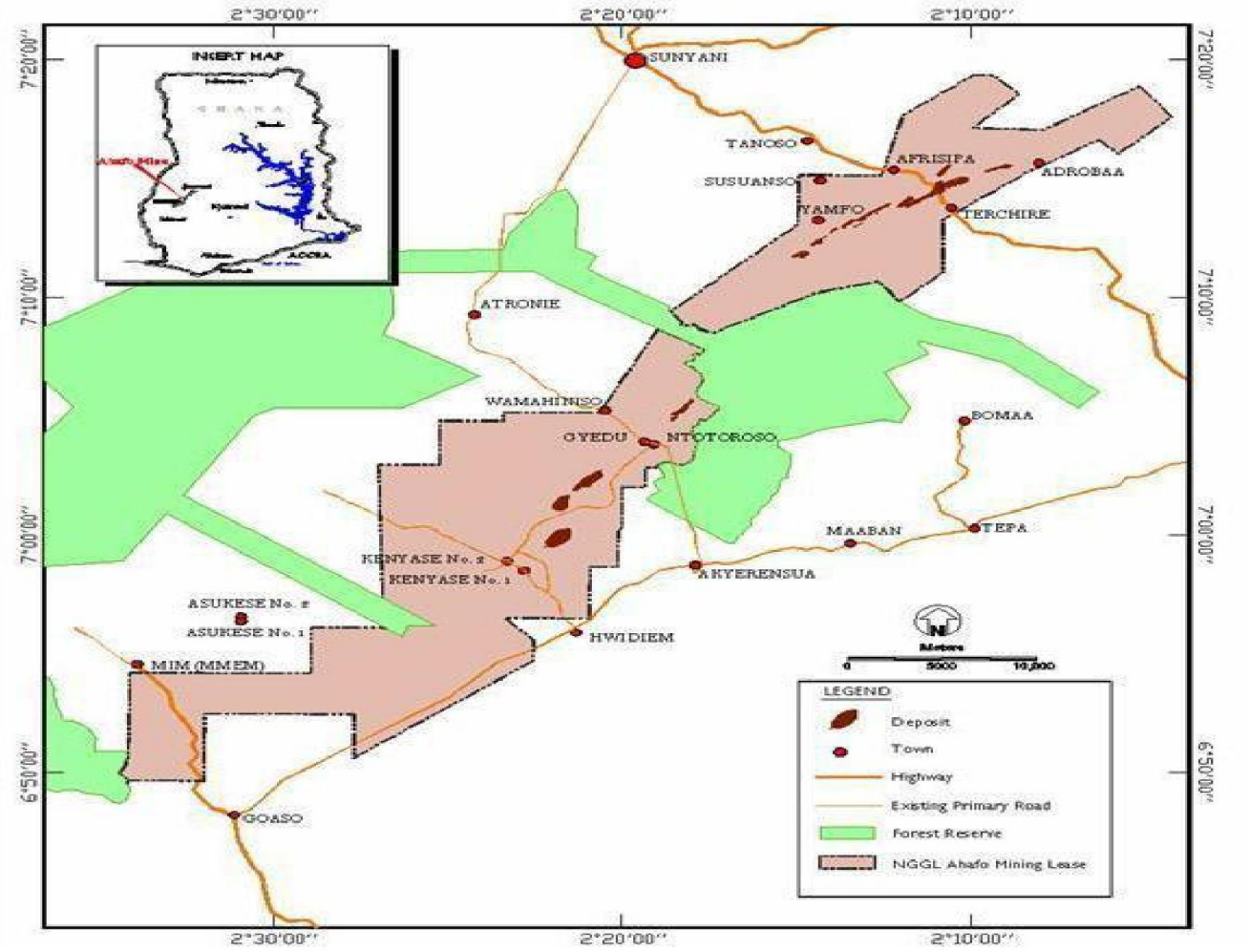


Source: Dotse, 2008

In respect of development, the district is mainly rural and one of the most deprived districts in the Brong Ahafo Region. About 31% of the people in the district live below the poverty line with 15% of them living under conditions of extreme poverty (**Suleman *et al*., 2013**). Four communities in the district, namely Gyedu, Ntotoroso, Kenyasi No.1 and No.2 are purposively selected for this study because of the presence of Newmont activities in these communities and the closeness of the open pits operated by Newmont to these communities. The topography of the study area consists of low hills with a maximum elevation of about 540m. The project area is drained by a number of seasonal streams and rivers that flow generally southeast and feed into the upper basin of the Tano River, which is perennial. From the project area, the Tano River flows southwards forming a section of the border between Ghana and Cote d'Ivoire before discharging into the Atlantic Ocean. The study area falls within the wet semi-equatorial climatic zone of Ghana (**Walker, 1962**). It is characterized by an annual double maxima rainfall pattern occurring in the months of May to July and from September to October (**Anon, 2005**). March is the hottest month of the year with a mean temperature of 27.8°C. August is the coolest month with a mean temperature of 24.6°C (**Anon, 2005**). **Hall and Swaine (1981)** included the area under the moist semi-deciduous zone northwest sub-type. This is characterized by a three-storey structure with emergent tall trees often exceeding 50 m in height. The upper canopy consists of a mixture of deciduous and evergreen species, sometimes with gregarious under storey. Ordination analyses based on species composition reclassified the Project area and placed it in the Dry semi-deciduous zone type (**Hall and Swaine, 1976**).

Geology and the Mine Area

The region is underlain by precambrain rocks of Birimain and Dahomeyan formations. The Birimian formations are known to be the gold bearing rocks. The Birimian rocks also have a high potential for Manganese and Bauxite. Currently gold is being mined in area where these rocks are found by Newmont Ghana Gold Limited one of the biggest mining companies in the world. These areas include Kenyasi No. 1 and 2, Ntotroso, Gyedu-Wamahinso and other smaller communities. However other exploration activities are on-going in other communities within the district (**Asutifi District Assembly, 2010**). The mining lease area extends over an area of 45 km from the Kenyasi area in the south to the Subenso area in the north. The lease area has been divided into two main blocks by the Bosumkese Forest Reserve and they are generally referred to as Ahafo South and Ahafo North Areas as shown in Fig.1.2 (**Dotse, 2008**). The Ahafo North Area is the northern half of the property and covers mainly areas to the north of the Bosumkese forest and the areas in and around Yamfo south, Susuanso, Terkyere and Adroba communities. The total tonnage defined over the Ahafo North Project Area is estimated as 32 Mt at 3.2 gm/t containing 3.2 Moz of gold



Source: **Dotse, 2008**

METHODS

The study used a predominantly descriptive survey using self-administered structured questionnaires and extensive focus group discussion of mining operations and activities in the Asutifi District Newmont Mining Company. Specifically, the study parameters assessed included the socio-demographic characteristic of the respondents who were largely Asutifi district residents, impact of mining on land systems, domestic food production by residents who are predominantly farmers as well as local supply of food products to the local and district markets in the Asutifi District. In all, 150 residents of the districts were selected for the study. Households and their residents were using the simple random sampling technique. This technique was favourable because the district settlement pattern is such that people live in households of about eight (8) to about fifteen (15) and more closely knit and related family members living together in the same house. With such a pattern, I could easily move from one family or household to the other and administer the structured questionnaire to the residents in the selected households. Each resident in the sample were asked the same sets of structured questionnaire and their respective answers coded into Statistical Package for Social Sciences (SPSS, Version 16.0). For the focus group discussions, the members of the group were also selected randomly but with much consideration to their social background.

Seven people who were selected to be on the group. Seven (7) people included an opinion leader in the district, three migrants but resident in the district and three other indigenous residents in the Asutifi District. The results from the study (quantitative data) were analysed with the Statistical Package for Social Sciences using descriptive statistics such as frequencies and percentages. Comparative analysis, basically Chi Square ($\chi 2$) was used to determine associations between mining activities and current level of food production at 5% significance level whereas T-Test (Independent-Sample T-Test) was used to analyze the means of natives and non natives responses mining operations in the Asutifi District and food production and impact on livelihood of people in the community at a 5% significance level. This was used to determine the relationship between the responses of natives and non –natives on the variable of crop yield reduction with the start of mining and to determine whether those claims are statistically significant

RESULTS AND DISCUSSION

The results of the study are as follows:

From the study, 60.7% were males and 39.3% were females. This trend is not deliberate as respondents were selected randomly without any gender considerations. On the other hand, the age distribution of respondents was categorized into nine interval range or scales of ages from: 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59 and above 60 years age groups. The 45-49 year group constituted the highest respondents (21.3%), followed by the 50-54, 40-44, 35-39, 55-59, 30-34, 60+, and 25-29 years age groups with 18.0%, 17.3%, 14.0%, 10.7%, 8.7%, 7.3%, 2.0% of respondents respectively. The 20-24 year group (0.7%) had the least number of sampled respondents as presented in Table 1 above. With regards to results obtained, it was revealed that majority of the respondents were in the active age group and can therefore be regarded as active and physically disposed to pursue economic activities. This group of respondents was engaged in most farming activities in the communities. This confirms **Uddin (2008)** studies that the age of a person is a crucial determinant of the ability to perform a job with young people better able to apply their eagerness, dedication, consciousness and motivation towards achieving a target successfully.

From Table 2 above, the respondents' educational levels were determined in terms of the highest educational level reached by respondents. Majority of the respondents had received different levels of education (69.4%), whiles a minority (30.7%) had received no education. For the majority who have been educated, a greater percentage have been educated to the primary level (38.7%), followed by the JHS level (23.3%), SHS (4.7%) and tertiary level (2.7%). Since there is a high correlation between education and ability to gain employment (**Weir, 1999**), it is expected that increased levels of education among the general population would impact on work output (**Asadullah and Rahman, 2005; Adebiyi *et al*., 2009**). It can be concluded that with many of the respondents having received some form of basic education, good farming practices with the potential of good crop yield and output can be employed by the farmers as part of their agricultural activities. Furthermore, most of the respondents constituting 64.6% are married, 14.2% are not married and as such are single, 13.6% are married but now divorced whiles 8.6 are widowed. This finding is very instructive as it could mean a lot for the household labour availability and even size and extent of farm cultivated. **Oladele (2007)** for instance notes that couples engaged in cooperative effort in farming activities use mainly household head, wives, children and relations and hence, the possibility of more availability of family labour (**Adebiyi *et al*., 2009**). However, in understanding how the respondents are distributed in terms of their occupation, a cross tabulation analyses between the gender and occupation variables is made. Table 2 present the findings.

It is to be emphasized that although the sex of the respondents was not deliberate in terms of being included in the sample, a cross tabulation analysis of the gender and occupation of respondents indicated that 68 (male) respondents were farmers with 44 (females) respondents being farmers as shown in Table 3 above. This trend largely confirms findings from **Sarfo-Katanka *et al*. (2006)** that men constitute the general active agricultural working force especially in rural communities although there is a fair representation of women who also engage in farming. It can be concluded that even if the same number of male and female respondents were deliberately selected in the sample, there is a likelihood more males in the sample would be farmers compared to the females. Again, in assessing the familiarity of the respondents to mining operations in the district particularly before and after it started and the differing views on them, a cross tabulation analysis of their years of living in the district was assessed.

The results indicated that majority of the respondents (102) are natives of the Asutifi District and 48 of the respondents being non-indigenes. This was reflected in the number of years that the residents have lived in the district. It can be inferred from Table 4 that majority of the respondents who have lived in the

Table 1. Gender and Age Distribution of Respondents

AGE	SEX				TOTAL	
	Male		Female			
	Frequency	Percent	Frequency	Percent	Frequency	Percent
20-24	1	1.1	0	-	1	0.7
25-29	2	2.2	1	1.7	3	2.0
30-34	10	11.0	3	5.1	13	8.7
35-39	14	15.4	7	11.9	21	14.0
40-44	18	19.7	8	13.6	26	17.3
45-49	19	20.9	13	22.0	32	21.3
50-54	14	15.4	13	22.0	27	18.0
55-59	7	7.7	9	15.2	16	10.7
60+	6	6.6	5	8.5	11	7.3
Total	91	100	59	100	150	100

Table 2. Socio-Demographic Profile of Respondents

Variable	Frequency	Percentage (%)
Education		
Primary	58	38.7
JHS	35	23.3
SHS	7	4.7
Tertiary	4	2.7
No education	46	30.7
Marital Status		
Single	21	14.2
Married	97	64.6
Divorced	9	12.6
Widowed	3	8.6
Native/Non-Native		
Yes	102	68.0
No	48	32.0
Years lived in district (in years)		
1-10	1	7
11-15	26	17.3
16-20	44	29.3
Above 20	79	52.7

Table 3. Gender * Occupation Cross tabulation

		Farmer	Trading	Newmont workers	Government workers	Others	
Gender	Male	68	17	2	2	2	91
	Female	44	8	3	1	3	59
Total		112	25	5	3	5	150

Table 4. Are you a native? * Years in District

	Years in district				
Are you a native?	0-10	11-15	16-20	above 20	Total
Yes	0	4	20	78	102
No	1	22	24	1	48

Table 5. Nature of land given out to Newmont for mining by farmers

		Land Size			
		1-2 acres	3-4 acres	5-6 acres	Total
Land given out for mining	yes	80(53.3%)	60 (40.0%)	10 (6.7%)	150
		Partial/Entire land			
		Part of land Released to Newmont		Entire Land Released	Total
Land given out for Mining	Yes	122 (81.3%)		28(18.7%)	150

district for 20 years and above are actually native or indigenes of the district. Only 1 non-native respondent has actually lived in the district for more than 20 years. Although the number of non-native respondents were more than the native respondents in the other years, 1-10, 11-15 and 16-20 years, that is to be expected since Non-natives may have migrated to the district within specific time frames as opposed to the natives who were born and bred in the district and have lived their entire lives there. The trend could impact on the views that would be given by the respondents on various variables that the study would analysed especially those that may be time-bound.

Considering the relationship between mining activities and levels of food production, a number of variables were identified and included consequences of mining related land cover changes on residents' livelihoods, access to land for farming purposes and crop yields and output trends. The respondents indicated that they owned various acreages of land that were used for farming purposes. 53.3% owned 1-2 acres of farmlands, 40.0% had 3-5acres of land whereas 6.7% had about 5-6 acres of land for farming. All respondents, however, indicated they have given land to Newmont Gold Ghana Limited for mining purposes with 81.3% giving part of the land to the company and 18.7% giving their entire lands to the company (See Table 5 below). Considering that majority of the district residents depend on these farmlands as their main source of livelihood as farmers, it could be concluded that their entire livelihood is taken away since they are left with little or no lands to farm on. This confirms a study by **Johnson and Tanner, 2000; Anane, 2003; Butler *et al*., 2004** that gold mining deprive 86.5% of food crop farmers of arable farmlands, creating food shortages and dependence on imported food as well as increasing hunger. Considering land loss to the resident farmers due to mining as shown in Table 6 below, the overall acreage of land cultivated for food production is affected in terms of production output for both domestic consumption and for market. In determining the actual reduction in food and crop production due to loss of land to mining by district residents, crop and food production output by the various respondents in the district before and after mining started was analysed. Major crop produced by the farmers constituted the major targets for assessment and comparative analyses made. From the study, it was noticed that farmers generally cultivated cocoa, cassava, plantain, maize, oil palm and citrus particularly. Although, other crops are grown and produced in the district, the stated crops constitute the major staples that are produced on a larger scale largely for sale.

From Table 6, it was revealed that food crops cultivated before mining started in Asutifi district and current level of food crop produced has reduced. For instance majority of respondents produced an average of 26-30 bags of maize before mining commenced, but after mining had commenced, majority of respondents could only produce an average of 16-20 bags of maize. However, this reduction in production of the crops grown was attributed to a number of reasons. Majority of the farmers attributed the reduction to farmlands released to miners, people shifting their focus on farming to ancillary mining jobs and some farmers abandoning farming as a result of compensation received from the Newmont Gold (Gh) Limited , largely in the form of cash. But, does this trend adequately determine if mining indeed has resulted in a reduction in the livelihood of the residents in Asutifi District? In answering this puzzling question, a cross tabulation of the views of both the natives and non-natives residents in the district is analysed on the variable of crop yield reduction over time with the start of mining in the district.

Table 6. Average annual yield before mining and after mining started in the district

Crops grown	Yield before mining	Percentage (%)	Yield after mining	Percentage (%)
Maize	11-15 bags	1.3	5-10 bags	4.7
	16-20 bags	8.7	11-15 bags	29.3
	21-25 bags	31.3	16-20 bags	36.0
	26-30 bags	43.3	21-25 bags	23.3
	Above 30 bags	15.3	26-30 bags	6.7
Cocoa	11-15 bags	0.7	5-10 bags	4.7
	16-20 bags	9.3	11-15 bags	25.3
	21-25 bags	25.3	16-20 bags	44.7
	26-30 bags	50.7	21-25 bags	19.3
	Above 30 bags	10.7	26-30 bags	2.7
	No response	3.3	No response	3.3
Plantain	11-15 bunches	2.0	5-10 bunches	2.7
	16-20 bunches	4.0	11-15 bunches	31.3
	21-25 bunches	27.3	16-20 bunches	40.0
	26-30 bunches	48.7	21-25 bunches	23.3
	Above 30 bunches	18.0	26-30 bunches	2.7
Cassava	11-15 bags	2.7	5-10 bags	8.0
	16-20 bags	8.0	11-15 bags	37.3
	21-25 bags	30.7	16-20 bags	41.3
	26-30 bags	40.7	21-25 bags	12.0
	Above 30 bags	18.0	26-30 bags	1.3
Oil palm	21-25 bunches	3.3	11-15 bunches	3.3
	26-30 bunches	3.3	16-20 bunches	4.0
	Above 30 bunches	0.7	No response	92.7
	No response	92.7		
Citrus	11-15 bags	4.0		
	16-20 bags	2.0	5-10 bags	6.0
	21-25 bags	0.7	11-15 bags	1.3
	26-30 bags	0.7	No response	92.7
	No response	92.7		

The aim is to compare from both sets of native and non-native respondents whether a change could be observed for crop yield reduction respectively. From the results in Table 6 below, 99% of residents who are natives of the district indicated that their crop yield have reduced with the start of mining in the district and 1.0% of the indicating that crop yields have not reduced in any way since mining started. On the other hand, 91.7% of non-natives in the district also confirmed that their crop yields have reduced with mining in the district and 8.3% of them stating that their crop yields have not reduced with the start of mining.

Table 7. Native and Non-Native * yields decreasing with time

		yields decreasing with start of mining		Total
		Yes	No	
Are you a native?	Yes	101	1	102
		99.0%	1.0%	100.0%
	No	44	4	48
		91.7%	8.3%	100.0%

To ascertain the significance of these claims by the natives and non-natives respondents to crop yield reduction with the start of mining and to ultimately conclude that mining has indeed affected negatively the livelihoods of the people in the district especially in terms of overall food availability for household consumption, an Independent T-test is used to test the claims that mining has affected the livelihood of district residents particularly in relation to food consumption levels in the various households of respondents and residents. The claim is that with a reduction in crop yields, the levels of food available for consumption at the various households would be largely reduced and hence, affect the number of times food is prepared and served to the household.

reduction in crop yield. For native (N) and non-natives (NN), the mean (M) and standard deviation (SD) were (*M* (*N*) *=1.12, SD=0.324, M* (*NN*) *= 1.10, SD=0.309)* respectively. On the same variable for the same groups, the T-test and Probability (P) values are $t(148) = 0.241$, $P = 0.810$, $\alpha = .05$. This shows a no statistically significant difference in the number of times food is prepared and served to the households of both native and non-native respondents even after mining started in the district. The result shows that claims by respondents that the number of times food is prepared and served for the household has reduced due to mining are rejected. The implication is that even though mining has resulted in a reduction in crop yields over the years, it has not translated into a significant reduction in food availability for household consumption.

It can therefore be concluded that to a larger extent, the livelihood for most residents have not been largely affected negatively at the household level even though there are widespread perceptions of falling standards of livelihoods. To further this test claim of a no statistically significant relationship in mining and availability of food in the household for consumption, a chi square ($\chi 2$) test to determine any relationship (association) between the respondents residential status, that is being a Native or non-native of the district and the availability of food in the household all year round was carried out. The idea basically is to determine if the "no statistically significant" relationship between mining and reduction in the livelihood of the residents in the Asutifi district is same for both native and non-natives. In doing this, the Chi Square ($\chi 2$) test involved analyzing the association between natives and non-natives and availability of food all year in their respective households. From the test, a similar pattern as observed in the Independent Sample T-Test was recorded for the Chi Square ($\chi 2$) test.

Table 8. Independent Samples Test for Native and Non-native * Number of times eaten before and After mining

	Are you a native?	N	Mean	Std. Deviation	Sig. (2-tailed) P Values	*t*(df)
number of times eaten a day before mining	Yes	102	1.97	.170	*P=0.233*	$t(148) = 0.198$
	No	48	2.00	.000		
number of times eaten a day after mining	Yes	102	1.12	.324	*P=0.810*	$t(148) = 0.241$
	No	48	1.10	.309		

For both number of times (both and after the start of mining in the district), the test showed no statistically significant difference in the number of times that food is prepared and served to the households of the respondents. Specifically, the T-test failed to show any statistically significant difference for the number of times food is eaten by the natives and non-natives before the start of mining in the district with the Mean (M) and Standard Deviation (SD) for natives (N) and Non–natives (NN) respondents being (*M*(*N*)*=1.97, SD=0.170, M*(*NN*)*=2.00, SD=0.000*) respectively. For these same groups, i.e. Native (N) and Non-native (NN), the T-test values and Probability (P) values *are* $t(148) = 0.198$, $P = 0.233$, $\alpha = .05$. This result is indicative of a no statistically significant difference in the number of times food is served to the native and non-native respondents before the start of mining in the district. On the other hand, the T-test also showed a similar trend as before the start of mining in the district. For both natives (N) and non-native (NN), the T- test revealed a no statistically difference in the number of times that food is prepared and served to the households of respondents after mining started in the district even though there has been a

Table 9. Chi Square Test

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.397[a]	1	.529
Continuity Correction[b]	.153	1	.695
Likelihood Ratio	.389	1	.533
Fisher's Exact Test			
Linear-by-Linear Association	.395	1	.530
N of Valid Cases[b]	150		

From the top row of table 9, the Pearson Chi-Square statistic for the association between natives and non-natives and the availability of food in the various households throughout the year after mining began in the Asutifi District shows the Chi Square as ($\chi 2$) *=0.397* with a 1 degree of freedom, with the P value of *P= 0.529* at a significant level of 0.05 ($\alpha = .05$). The test result indicates a no-statistically significant association between being a native or non-native and the availability of food in the household all year after mining started. This means that the availability of food in a household is not depended on

whether the resident is a native or non-native of the Asutifi district. Therefore, mining in the Asutifi district is not affecting the residents differently, i. e. being a native of the district or non-native but that any possible effect of mining on the livelihood of the residents may be evenly experienced by natives and non-natives alike.

Conclusion

The main purpose of the study was to answer two fundamental questions of whether there is a relationship between mining activities and the level of food production in the Asutifi district and if mining operations in the district affect the livelihood of natives and non-natives differently. The study found that majority of the respondents (68) main occupation was farming with a high number of males engaging in farming as opposed to the females (44) in the district who are engaged in farming solely as a support activity to their husbands and households. However, a larger proportion of the residents of Asutifi are natives or indigenes (68.0%) of the district while only 32.0% of the respondents are non-natives of the district who migrated to the district for farming purposes or to find jobs at the mines. Largely, most of the residents indicated that the start of mining in the district has resulted in them losing large parcels and acres of land to the mining company for mining purposes. This has impacted significantly on the average food production before mining started in the district. In fact, major crop and staples such as maize, cocoa, plantain, cassava, oil palm and citrus yields have reduced since mining started and this largely attributable to the reduced acreage of land available to the residents for farming since mining started in the district.

However, using an Independent Sample T-Test and a Chi Square ($\chi 2$), the means, standard deviation and *P* values were recorded for the variables of interest to the study. The Independent Sample T-Test was used to test the relationship between mining operations and the number of times food is prepared and consumed at the various households. This test was necessitated by the responses of the residents that the start of mining has reduced crop yield and invariably affected their food consumption patterns at their homes and hence, negatively affecting their livelihood. The Independent Sample T-Test of natives and non-natives on the number of times food is prepared and consumed at the households as measure of mining impact on livelihood revealed no statistically significant relationship between mining operations and the number of times food is prepared and consumed in the households before and after the start of mining in the district recording *P* values of $P=0.233$ and $P=0.810$ respectively at a significance level of 0.05 ($\alpha = .05$).

A further test using Chi-Square ($\chi 2$) to determine the existence of association between natives and non-natives and the availability of food in their households also showed no statistically significant association or difference in being a native or non-native and the availability of food at the household throughout the year since mining started. The Chi-Square ($\chi 2$) test *P* value recorded was $P= 0.529$ at a significant level of 0.05 ($\alpha = .05$) indicating a no significant relationship between natives and non-natives and the availability of food in the household throughout the year. The overall effect is that availability of food in the households do not depend on whether the resident is a native or non-native of the Asutifi district and that any likely effect of mining would be experienced by both the natives and non-natives at a relatively similar scale. In short, despite the fact that the start of mining in the Asutifi district has affected residents in a number of ways such as reduced land size for farming, average annual crop yield reductions and land cover changes, these have not necessarily affected the livelihoods of the residents significantly relative to food availability in the households, consumption patterns in the households and differences on natives and non-natives respectively.

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