

# Awareness of Residents in Small-scale Mining Communities on the Perceived Environmental Impact of Small-scale Mining: A Case of Amansie West District in Ashanti Region of Ghana.

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## ABSTRACT.

This paper employed cross-sectional survey research design to examine the awareness of residents in small-scale mining communities on the perceived environmental impacts of small-scale mining, with particular emphasis on Amansie West District in Ashanti region of Ghana. Awareness is not only necessary predisposing factor for behavioural change but that knowledge can also dramatically improve attitude, misconception and consequently enhance small-scale mining practices. To achieve this objective, the investigator relies on information collected both quantitatively and qualitatively through in-depth interviews and questionnaires administration with 60 household heads sampled in stratified communities; based on common characteristics within small-scale mining communities in Amansie West District, coupled with documented data from published and unpublished articles. The study not only identify an inexplicably higher number of residents in the District engaged in small-scale mining but also realized that, 91.7 percent of the household heads sampled mentioned that the small-scale mining operations have had varied impacts on their environment, especially, their lands which are regarded as key element of physical capital in livelihood strategies for the dwellers in the (small-scale mining) communities. The residents however, showed awareness of varied degrees of potential health risks of small-scale mining activities in their respective communities. Although mitigation efforts have had limited impacts; it is expected that the policy recommendations in this paper if adopted and strictly adhere to will help reduce, if not completely ameliorate the environmental ramification of small-scale mining in Ghana.

**Key Words:** Awareness, Environmental impact, Small-scale mining, Sustainable development

## 1. INTRODUCTION

Mining has been identified to be one of the basic economic foundations of Ghana (Lombe, 2003). According to the 2010 Population and Housing Census, 16.5 percent of the employed population age 15 years and older in the Amansie West District are into small-scale mining and quarrying (GSS, 2014). In Ghana, most publications have continually emphasized the contributions of (small-scale) mining to foreign-exchange earnings, and are recognized by successive governments in the country and municipal authorities' as the cornerstones of a multimillion-dollar industrial sector. According to Aryee et. al (2002), since regularization of small-scale mining in Ghana (in May 1989 up to 2000); 870,000 ounces of gold valued at more than US\$ 280 million, and 4.9 million karats of diamonds, valued at more than US\$ 110 million representing 69 percent of Ghana's total diamond production, has been mined by the small-scale miners. However, these activities of the small-scale miners are without environmental ramifications. Consequentially, these small-scale mining activities have been identified with numerous impacts on the environment (Donkor et. al., 2006). Despite these widespread recognition of their adverse consequences; its costly to mitigate environmental impacts have largely been neglected even by municipal authorities as a lot of revenues are realized through taxing the small-scale mining operations since regularization of small-scale mining through the enactment of the Small-Scale Gold Mining Law, PNDC L 218.

The principal environmental problems caused by the small-scale mining operations do not only challenges sustainable development locally but a matter of priority for both international health and safety organizations. The environment which supports the survival of human beings if to be used requires that sustained measures of usage are adopted. The need to serve the current and future populations requires that, explicit measures are put in place to ensure that, decisions in current times and in the future are made considering the several alternative uses to which a piece of land could be put to, to achieve maximum benefits and any identified negative impacts if not totally made away with, are reduced.

The potential health risks of small-scale mining amongst the miners and to a large extent the residents of the mining communities have largely been compromised. According to Ashton et al. (2001), the hand dug tunnels and shafts created by the small-scale miners are shallow and have no logistical support. This makes them prone to various problems and dangers such as pit collapse and landslides. It is almost impossible to document quantity and frequency of fatal deaths and accidents which occurs in small-scale mines due to under-reporting and the clandestine nature of their work. According to a news item in Ghanaian Daily Graphic (2009), an estimate of 30 small-scale gold miners lost their lives as a result of a landslide at Dupoase in the Wassa Amenfi East District of the Western Region. In a similar vein, over 124 people were also trapped underground in a galamsey site at

Dunkwa in 2010. Not forgotten the unknown number of small-scale gold miners who were also trapped in a collapsed pit at Attaso in the Ashanti Region (Asare-Boadu, K. et. al. 2010).

These recurrent mayhems prevailing in the gold rush conditions of many small-scale gold mining sites means that health and safety considerations are often ignored. The mining operations also promote environmental modifications that support malaria vector growth, as their activities create open pits; divert watercourses and concomitantly effect in pools of stagnant water (Akabza and Dramani, 2001). Awareness is a necessary predisposing factor for behavioural change. Not only might that knowledge dramatically improve attitude, misconception and consequently enhance small-scale mining practices but also plays an important role to ensure environmental compliances.

Premised on the above; this paper is therefore nuance toward assessing the awareness of residents in small-scale mining communities in Amansie West District on the perceived environmental impact of small-scale mining; in addressing the following research questions;

- i. What are the residents in small-scale mining communities' perceived impact of small-scale mining on their physical environment?
- ii. Are the residents in Amansie West District aware of the potential health risks of small-scale mining?
- iii. What recommendation can be made to mitigate the potential health and environmental risk in the mining communities?

## 2. DELINEATION OF THE STUDY AREA

Before examining the perceived environmental impact of small-scale mining, it is important to first provide a brief, yet concise, overview of the geographical scope; the Amansie West District. The District is located in the south-western part of Ashanti Region, and falls within latitudes 6° 35 and 6° 51 North and Longitudes 1° 40 and 2° 05 West (AWDP, 2004). It shares boundaries with the Amansie East District in the west, Atwima Mponua District in the east, Atwima Nwabiagya District in the north and Amansie Central in the South. The entire district comprises 160 communities with Manso Nkwanta as the District capital.

## 3. DEFINITION AND CONCEPTS

The key concept, inter alia, to aid retrospective consideration of awareness of environmental consequences of small-scale mining activities are expounded below;

### 3.1 Small-Scale Mining

Small-scale mining has been defined differently around the world. However, in Ghana, small-scale mining is defined in the country Small-Scale Gold Mining Law of 1989 (PNDC Law 218), as; "mining by any method not involving substantial expenditure by an individual or group of persons not exceeding nine in number or by a co-operative society made up of ten or more persons".

The definition of small-scale mining embodiment what has been termed "artisanal" that is operations using only rudimentary or artisanal implements as well as more sophisticated mining activities operating at a relatively low level of production and which generally require limited capital investment.

### 3.2 Health:

The World Health Organization defines health as "a state of complete physical, mental and social well being and not merely the absence of disease or infirmity" (WHO, 2006). According to Wayne (2012), health is a reflection of ability to use the intrinsic resources and extrinsic resources with real dimension of health in order to participate fully in the activities that contribute to growth and development in each stage of the life cycle.

#### 3.2.1 Aspects of Health

There are a number of aspects when it comes to health, which in one way or the other have a correlation with the impact of small-scale mining activities. These definitions all apply for the purposes of trajectories into the environmental accounts of small-scale mining in this exploration. These include:

- 1) **Physical Health;** this is good bodily health resulting from regular exercise, proper diet and nutrition, and proper rest for physical recovery. This influenced the standard of living and quality of life.
- 2) **Mental Health;** Mental health refers to an individual's emotional and psychological well-being. Webster definition is well quoted in literature as "a state of emotional and psychological well-being in which an individual is able to use his or her cognitive and emotional capabilities, function in society, and meet the ordinary demands of everyday life".

- 3) **Public Health;** Refers to preventing of diseases, prolonging life and promoting health through the organized efforts and informed choices of society and organizations. The focus of public health intervention is to prevent rather than treat a disease through surveillance of cases and promotion of healthy behaviours.

Therefore the characterization of health in contextual terms encompasses several aspects of human life, be it mental, physical, and social, absence of disease and the utilization of resources or conditions that improve the safety, efficiency, and quality of health care. The essence of all this is geared towards promoting growth and development.

#### 4. REGULATORY FRAMEWORK OF SMALL-SCALE MINING IN GHANA

The small-scale mining sector contribution to the economy precipitated the government in 1989 to legalize the long criminalized small-scale gold mining activity. It is imperious to be underlined that during the times when small-scale gold mining was illegal, small-scale diamond mining was a legal activity. The activity of small-scale gold mining was legalized through the enactment of the following laws;

The Small-scale Gold Mining Law (PNDCL 218) provides for the registration of activity; the granting of gold mining licenses to individuals or groups; the licensing of buyers to purchase product; and the establishment of district-assistance centers.

The Mercury Law (PNDCL 217) legalized the purchasing of mercury (for mineral processing purposes) from authorized dealers.

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

#### 5. REGULATORY INSTITUTIONS OF SMALL-SCALE MINING IN GHANA

The legalization of the small-scale mining operation led to the establishment and reform of certain institutions to ensure that the sector is regulated. These institutions include the following;

##### 5.1 The Minerals Commission

The Minerals Commission was set up in 1986 by the enactment of the PNDCL 154 to ensure a one-stop service for investors and to minimize bureaucracy. It is responsible for formulating regulations, amending and modifying existing legislation as necessary to set up a sound regulatory framework for the sector. It develops guidelines and standards for monitoring of the environmental aspects of mining activities. The Commission also makes recommendations on minerals policy, advises the government on mineral matters and reviews, promotes and develops mining sector activity.

Through its Small-Scale Mining Department or Support Centre, which was established in 1989 under the PNDCL, 218, the Commission enhances small-scale mining operations by formulating and modifying the regulatory framework and improving the marketing of small-scale mineral production.

##### 5.2 The Environmental Protection Agency

The Environmental Protection Council was transformed into the Environmental Protection Agency (EPA) by an Act of Parliament, Act 490 of 1994. The Environmental Protection Agency aims at achieving environmental sustainability, which is in line with the seventh goal of the Millennium Development Goals (MDGs).

Act 490 made Environmental Impact Assessment (EIA) a mandatory requirement for all development projects and programmes, including mining. According Akabzaa and Darimani (2001), the Environmental Protection Agency however, lacks the required capacity in terms of personnel and finance to ensure compliance and enforcement of environmental quality standards.

##### 5.3 The Precious Mineral Marketing Corporation

The Precious Minerals Marketing Corporation (PMMC) was established in 1989 as part of the institutional reforms for the regularization of the small-scale mining sector. This was the sole governmental agency for the purchase of the produce of small-scale miners to enhance foreign-exchange earnings from the sector. The government has since opened up the marketing to private licensed buyers. The PMMC is said to have been carved out of the Diamond Marketing Corporation which was established in 1963 and shortly after incorporated by Legislative Instrument (LI) 401 of 1965 as a state corporation. The Precious Minerals Marketing Corporation Law (PNDC Law 219) of 1989 officially established the PMMC.

The PMMC was converted by Act 461 to a limited liability company to operate under the Ghana's company's code (Act 179 of 1963) as Precious Minerals Marketing Company Limited in the year 2000.

Other public sector organizations that provide support to the small-scale mining sector in Ghana include the Ministry of Lands, Forestry and Mines, the Geological Survey Department, the Chamber of Mines, the Lands Commission, Land Valuation Board and the Forestry Commission. These organizations are required to provide support to ensure optimal exploitation of the country's natural resources.

## 6. RESEARCH FINDINGS AND ANALYSIS

This section dilates on the background of residents sampled from the small-scale mining communities and their awareness of the potential environmental and health risks of small-scale-mining activities. In a sequel to these, it also focuses on the analysis of the empirical data which was generated from qualitative methods of data collection complemented by statistical description.

### 6.1 Background of Household heads

The District was stratified based on the common characteristics within the small-scale mining communities, and 60 household heads were recruited from the communities where small-scale mining is peculiar. The dominant method used to involve the rural communities to gain control over the process of defining these environmental impacts of small-scale mining on their health was in-depth interview.

Accessible information from the questionnaire administration indicates that greater percentage (70%) of the household heads that were recruited from the small-scale mining communities were between the age group 20 to 40 years. Only 10 percent were below 20 years. It has to be noted that the majority (90%) of the household heads aged 20 years and above could be regarded as matured to furnish balanced and informative responses.

Based on the defined categories of levels of education; a verification test was run using a four-point research question to assess the educational status of household heads in the various communities chosen for the study as a way of determining their possible level of knowledge on some specific impact of small-scale mining in their communities. The findings show that, an overwhelming majority (72.7%) of the households sampled highest level of education is basic level, of which 21.1 percent had never schooled before. The preponderance of residents with lower levels of educational background translates the fact that the entirely district is made up of mostly rural communities with inadequate social amenities such as electricity, motorable roads, potable water and health centers as well as lack of other job opportunities apart from farming and small-scale mining; induced out-fluxes of educated people with employable skills outside the District. Hence, majority of the responses (to questionnaires) were given by the residents with low level of education.

The rural nature of communities in the District does not render the communities homogenous category or do the residents earn their living similarly. Rather they adopt a range of survival strategies to confront the challenges of rural life.

**Table 1: Major Occupation of Household Heads**

SEX	OCCUPATION			
	Agricultural Related	Trading	Service	Small-scale Mining
Male	22.1	5.5	6.8	25.5
Female	8.5	13.6	3.4	13.6
<b>TOTAL</b>	<b>30.6</b>	<b>19.1</b>	<b>10.2</b>	<b>39.1</b>

**Source: Authors Construct, Field Survey 2014.**

It can be inferred from table 1 that agricultural related economic activities and small-scale mining are the dominants occupation in which the sampled community's dwellers found themselves. As far as responses to questionnaire are concerns, 39.1 percent of the sampled household heads depend mostly on small-scale mining as an economic activity. It was unveiled that, 30.6 percent of the sampled household heads were subsistence food crop farmers. The few rural non-farm inhabitants were mostly teachers, nurses and administrative officers in the District. In an attempt to verify why majority of the residents were involved in small-scale mining, Kwabena Asiedu in an in-depth interviewed recounts thus:

*"In our community; farming is our major occupation. However, those who do not have land and adequate capital to farm and trade mostly go into the small-scale mining. The farmers are now the poorest in our community due to encroachment of our land by the small-scale miners. I am currently unable to feed my family likewise the other farmers".*

As a consequence of this, the survey did not only identify an inexplicably higher number of household heads in the communities engaging in small-scale mining but also realized that, 89.8 percent of the sampled household heads had no regular monthly income due to the nature of their occupations. It is imperious to note that 30 percent of the sampled household heads in the communities' who were mostly farmers have lost their lands because of the operation of the small-scale miners. An informal conversation with one of the affected resident



recounts thus: “Mr., the small-scale miners had invaded the land which my late father bequeathed to me without any compensation. I am unable to work on my own farm land to feed myself and my family or send my children to school”.

It was gathered from this man demonstration that, the small-scale mining has had indeed untold impacts on the lands which is regarded as a key element of physical capital in livelihood strategies for the dwellers in the (small-scale mining) communities.

### 6.2 Perceived Impact of Small-Scale Mining on Physical Environment

As far as responses to questionnaire administration are concern, 91.7 percent of residents sampled said the operations of small-scale miners are implicating their natural environment. The first choice response of the sampled household heads perceived environmental problems associated with the small-scale mining for the purpose of this study can be broadly grouped into the following taxonomical category;

**Table 2: Perceived Impact of Small-Scale Mining on Physical Environment**

EFFECTS OF MINING	PERCENTAGE
Land Degradation	32.7
Water Pollution	30.3
Atmospheric Impact	28.7
No Effect	8.3
<b>Total</b>	<b>100</b>

**Source: Authors Construct, Field Survey 2014.**

About 92 percent of the household heads noted that environmental problems such as land degradation, water pollution and atmospheric impact are associated with the small-scale mining activities in their respective communities whereas about 8 percent of household heads sees no effects of mining activities on their environment.

#### 6.2.1 Land Degradation

The degradation of the land is one of the major effects of small-scale mining according to the household heads interviewed. As far as response to questionnaires are concern, only 30 percent of the residents sampled said the small-scale mining do not implicate their lands whilst the overwhelming preponderance (70%) agreed that small-scale mining contributes to degradation of their lands.

A further retrospective analysis was embarked upon to ascertain the residents in the small-scale mining community’s perceptions of actual causes of land degradation. It is high handed to note that the overwhelming majority attribute it to clearing of the vegetation whilst 30 and 20 percent attribute it to the uses of heavy machines and uses of toxic materials by the small-scale miners respectively

In addition, the sampled household heads complained that large tracts of agricultural lands are also destroyed as a result of excessive vegetation removal and disturbance of soil structure. Growth supporting topsoil is usually removed during mining, and the land is rendered virtually incapable of supporting plant growth, in addition to being left exposed to erosion. The Field observations also confirmed this assertion.

**Plate 1: Impact of Small-scale Mining on Agricultural lands**



**Source: Field Survey 2014.**

A further dissection indicate that, of 90 percent of sampled household heads which some strongly agree and others agree to small-scale mining activities affecting their household in terms of farm lands, the rest of the sampled household heads were not sure about the above statement.

**6.2.2 Water and Drainage System**

A preponderance (60%) of the household heads sampled from the small-scale mining communities in the Amansie West District attested that the small-scale mining activities pollute their water bodies. As high as 70 percent of the above strongly agreed that small-scale mining activities affects their household in terms of water resources.

This research revealed that the small-scale mining activities have been a major source of both surface and underground water pollution. Rivers and streams in the District such as the Offin river, Oda river and their tributaries such as Gyeni, Nwene, Adubia, Subin, Pumpin and Emuna are polluted by solid suspensions and mercury, which are commonly discharged into resident water bodies during the sluicing process and amalgamation, respectively. Majority of the residents sampled in these towns recount that they do not anymore depend on ground water and streams for drinking; and those who do so are at risk of water-borne diseases. The extent of pollution of the surface water was confirmed by field observation.

**Plate 2: Impact of Small-scale Mining on Drainage and Water Resources**



**Source: Field Survey 2014.**

This in turn leads to siltation and coloration of such waters. Improper disposed tailings also find their way into streams and rivers during heavy rains, creating sedimentation problems and rendering streams unusable for both domestic and industrial purposes.

**6.2.3 Atmospheric impacts.**

It is imperious to note that 40 percent of the sampled household heads interviewed established a positive correlation with the small-scale mining activities affecting their household in terms of air quality.

Accordingly, the household heads sampled mentioned that a common practice of small-scale gold miners in the District is the burning of gold amalgam in the open air. This practice produces mercury fumes, which are released into the atmosphere. In some instances, the burning of amalgam is conducted in poorly ventilated rooms, exposing miners to the dangers of mercury contamination.

It is important to note that many small-scale miners have rejected the use of a protective apparatus—the amalgam retort—that effectively separates gold from mercury without emitting fumes into the atmosphere.



### 6.3 Awareness of Small-scale Mining Health Implication

The household heads sampled in the small-scale mining communities demonstrated in-depth knowledge of the potential health risks of small-scale mining activities in their respective communities. All the residents' sampled (100%) were aware of the operation of small-scale miners in their respective communities.

The household heads sampled showed awareness of varied degrees of potential health risks of small-scale mining activities in their respective communities. A further dissection indicates that the small-scale miners leave behind "moonlike" landscapes consisting of unstable piles of waste, abandoned excavations and vast stretches of barren land. Excavated pits are also typically left unfilled and abandoned to become receptacles for water. Such areas become breeding grounds for mosquitoes and potential dangers to both humans and animals.

Questions were asked to confirm or decline the claim that people feel their health condition relate to the small-scale mining in their respective communities. The results established that about 80 percent of the sampled household heads perceived that the high prevalence of some diseases in the District is strongly correlated with the small-scale mining activities. It is also high-handed to be underlined that, the residents feel cyanide and mercury contamination of the groundwater could be attributed to cases of paralysis, blindness and numerous miscarriages in surrounding communities.

#### Plate 3: Unstable Piles of Waste created by the Small-scale Miners



**Source: Field Survey 2014.**

The nexus between small-scale mining activities and health status of the residents in the small-scale mining communities was illuminated by Maame Akua Atta, a household head sampled, in an in-depth interviewed thus; *"My household members normally suffer from malaria and skin diseases, and we practice self-medication and on rare occasions seek traditional medical care because we have no money to register for the Health Insurance in the District"*.

It is imperious to note as a recap that these health implications of small-scale mining also ramify heavy dependency on traditional health care providers, self-medication or 'quack' doctors as coping strategies because of scarcity of health facilities in the small-scale mining communities in the District.

### 7. DISCUSSION OF RESULTS

The small-scale miners in the Amansie West District mostly the illegal operators who work without a license and have no concessions of their own has not only make positive contribution to the District economy and livelihood of the residents but has also caused its share of environmental impacts in the District.

From the survey, about 92 percent of the total sampled population admitted that the small-scale mining activities had affected their environment. Surprisingly, educational levels of household heads did not show any significant relationship regarding the awareness of small-scale mining effects on their environment, as preponderances of responses to questionnaire were given by residents with low level of education. Majority of residents with smaller level of educational background translates the fact that the entire district is made up of mostly rural communities with influx of residents with low level of education because of the small-scale mining and agricultural related activities which do not require higher education.

The researcher found some biased response from some of the residents since most of their head of households were either small-scale miners or benefiting directly from the small-scale mining activities, hence, refused to be objective on the issue. However, there was a clearer picture when household heads' assertion that, the small-scale mining activities have affected their environment was compared with their years of stay in the communities. Those who have stayed relatively longer period within the mining area gave a hundred percent attestation that the small-scale mining activities affect their environments. However, few of those who have stayed for relatively shorter period in the District responded 'no' to the question.

Questions to confirm or decline the claim that people feel their health condition relate to the small-scale mining in their respective community's shows that about 80 percent of household heads sampled perceived the high prevalence of malaria, whooping cough, skin diseases, diarrhoeal, cold and catarrh to the small-scale mining activities in the District. It is also high-handed to be underlined that, the residents feel cyanide and mercury contamination of the groundwater could be attributed to cases of paralysis, blindness and numerous miscarriages in surrounding communities.

From hindsight one would say that the highly prevalent diseases are common to all the study communities. Such an exposition is true from the results of the study and it confirms the general similarities that exist amongst the small-scale mining communities in the District as regards environmental conditions, water and nature of occupation (small-scale mining) which underline the relatively high incidence of malaria, whooping cough, skin diseases, diarrhoeal diseases, intestinal disorders and measles.

The majority of the households (90%) recounts that the small-scale miners removed vast amounts of vegetative cover through their mining activities which resultantly exposed their lands to the direct rays of the sun. Field observations also confirmed that large tracts of agricultural lands are destroyed as a result of excessive vegetation removal and disturbance of soil structure. Growth supporting topsoil is usually removed during mining, and the land is rendered virtually incapable of supporting plant growth, in addition to being left exposed to erosion. As a result, the land lost its fertile nutrients that help in facilitating farming activities in the area and this has led to the degradation of the fertile land of the residents in the small-scale mining communities in the District.

The drainage systems in many small-scale mining communities in the Amansie West District are adversely affected by the operation of the small-scale miners. This was attested by 60 percent of the sampled household heads. Rivers and streams in the District such as the Offin river, Oda river and their tributaries such as Gyeni, Nwene, Adubia, Subin, Pumpin and Emuna are polluted by solid suspensions and mercury, which are commonly discharged into resident water bodies during the sluicing process and amalgamation.

This in turn leads to siltation and coloration of such waters. Improper disposed tailings also find their way into streams and rivers during heavy rains, creating sedimentation problems and rendering streams unusable for both domestic and industrial purposes. Drainage of lubricants and other oils into streams also causes problems such as de-oxygenation of water, which threatens aquatic life.

The effect of small-scale mining on the atmosphere has generally been considered to be insignificant since operations are carried out in ambient air. Nevertheless, emissions of gaseous pollutants do occur. Small-scale mining operations that involve size reduction of ore generate some dust that could be hazardous to human health since the particles generated from such sources fall within the respirable dust range and are capable of causing dust-related diseases.

The research revealed that 40 percent of the sampled household heads perceived that the small-scale mining activities affect their household in terms of air quality. It is imperious to note by way of recap that, a common practice of small-scale gold miners in the District is the burning of gold amalgam in the open air. This practice produces mercury fumes, which are released into the atmosphere. In some instances, the burning of amalgam is conducted in poorly ventilated rooms, exposing miners to the dangers of mercury contamination.

## **8. POLICY RECOMMENDATION**

After a thorough and meticulous study and analysis of the problem and all its ramifications as indicated above, the following recommendations are made to address the environmental and health problems created by the small-scale mining operations;

Addressing the roots causes of environmental impact of small-scale mining requires reconsideration of the fundamentals of governance and the rules governing small-scale mining operations. The Small-scale Minerals Department of the Minerals Commission should revise its environmental management policy for the small-scale miners to ensure that the environmental effects of mining activities in the area are reduced to the barest minimum.

Stringent and rigorous efforts at re-afforestation in affected communities and other measures aimed at restoring back degraded lands to its original state after mining activities should be intensified by the small-scale miners. These will not only reduce the negative environmental and health impacts on the people but also land would be available particularly to farmers for agricultural purposes.



The Government of Ghana, who holds right to all minerals in trust for all Ghanaians, through the Amansie West District Assembly, should build health centres, principally in the small-scale mining communities. In addition, the District Health Directorate should institute periodic free medical check-up's for mining related diseases so that serious cases can be detected and cured early enough before they escalate into mortality situations. This is necessary because despite several efforts and measures put in place, environmental and health effects of small-scale mining activities continue to remain a huge predicament, particularly to those living in the small-scale mining communities in the District.

The small-scale miners in the District should be educated to use protective apparatus—the amalgam retort—that effectively separates gold from mercury without emitting fumes into the atmosphere. However, individuals and households in the communities should also be educated on the need to use mosquito nets in their rooms to avoid malaria infections through biting by mosquitoes.

More importantly, further research into the extent of pollution of the water resources in the small-scale mining communities in the District is highly recommended.

## 9 CONCLUSION

This paper acknowledged the need to recognize the environmental and health hazards of small-scale mining activities in Ghana in order to find ways of dealing with them. After a thorough investigation into the awareness of environmental and health implications of small-scale mining in Amansie West District; it has come to light that small-scale mining activities have resulted in land degradation leading to limited land available for local food production within the District. There are also incidences of pollution of varied kinds (that is, air and water) to the environment. All of the major streams and rivers in the small-scale mining communities within the District have been polluted by the small-scale mining activities.

The combined effects of above problems have culminated into health problems with high prevalence of diseases such as malaria, respiratory tract infections and skin diseases endemic in the area. These could indirectly affect food production in the area.

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