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GHANA**

Assessing the Social Impacts of Illegal Gold Mining Activities at Dunkwa-On-Offin

by

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DECLARATION

I hereby declare that this work is the result of my own original research and this thesis has neither in whole nor in part been prescribed by another degree elsewhere. References to other people's work have been duly cited.

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ABSTRACT

Mining activities are undertaken in many parts of the world where mineral deposits are found. In developing nations such as Ghana, the activity is done both legally and illegally, often with very little or no supervision, hence much damage is done to the water bodies where the activities are carried out. This study sought to assess the social impacts of illegal gold mining activities at Dunkwa-On-Offin, the capital town of Upper Denkyira East Municipality in the Central Region of Ghana. The main objectives of the research are to identify factors that trigger illegal mining; to identify social effects of illegal gold mining activities on inhabitants of Dunkwa-on-Offin; and to suggest effective ways in curbing illegal mining activities. Based on the approach to data collection, this study adopts both the quantitative and qualitative approach. On the other hand, based on the approach to data analysis, this approach. Out of three hundred and eighty (380) questionnaires administered, three hundred and forty-four (344) were returned. Of the three hundred and forty-four (344) returned, twenty four were rejected because they were not filled out properly. In the end, three hundred and twenty (320) questionnaires were analysed. The result of the analysis, using the Statistical Package for the Social Sciences (SPSS), revealed that factors such as poverty, unemployment, illiteracy and peer influence triggered illegal gold mining. The social effects of illegal gold mining included increase in cost of living, increase in the rate of crime, increase in the rate of illiteracy, increase cases of ailments and increase in the population of residents in Dunkwa-on-Offin. Last but not the least, the proposed ways for curbing illegal gold mining included the implementing policies to regulate the small-scale mining sector, creation of alternative employment opportunities such as agriculture, impose sanctions aimed at deterring illegal mining, provision of training and technical support on how to mine properly, formation of a community-based task force to monitor illegal mining activities, prosecute chiefs who offer lands to illegal miners and provide financial reward to whistle blowers within illegal mining activities. In view of the above findings, it is recommended that other than cautioning chiefs against issuing out lands to people suspected to engage in illegal gold mining, government should establish district courts in the various mining communities to prosecute illegal gold miners including chiefs to deter others from venturing into this unlawful practice.

Keywords: Impact, Effect, Dunkwa-On-Offin, Assessment, Gold, Social, Status, Illegal, Mining

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DEDICATION

I dedicate this thesis to my wonderful family for their support, love and prayers.

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LIST OF ABBREVIATION

SPSS	–	Statistical Package for the Social Sciences
EPA	–	Environmental Protection Agency
ILO	–	International Labour Organization
FDI	–	Foreign Direct Investment
GDP	–	Gross Domestic Product
GSS	–	Ghana Statistical Service
MMSD	–	Mining Minerals and Sustainable Development
PMMC	–	Precious Minerals Marketing Company
MC	–	Minerals Commission
FC	–	Forestry Commission

CHAPTER ONE

GENERAL INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Ghana is gifted with large mineral wealth such as manganese, gold, diamond, limestone, bauxite, silica salt and salt which are currently being exploited in commercial quantities, with gold by far representing the most important mineral mined (Onumah, 2013). Mining is the world's second oldest and most important industry after agriculture (Down and Stocks, 1977). Mining is viewed as one of the important economic activities which have the potential of contributing to the development of a country. However, the social impacts of mining in mining communities have been a major concern to the government, stakeholder organizations and the general public.

Whereas the contributions of mining activities to economic development of Ghana is well recognized, others contend that the gains from the mining sector to the economy is achieved at the expense of health, environmental and social costs to the country. Illegal mining popularly known as “galamsey” (“gather them and sell”) is now widely recognized in Ghana as a national security threat due to its association with widespread degradation of lands and forests, pollution of water bodies and the consequent effect on food security and the environment. This menace has aroused national attention and concern due to its negative impacts on environment, water bodies, eco-system and the economy as a whole. Illegal mining is a poverty driven activity that is practiced in most developing countries where there is a poorly educated population and few employment opportunities (Osei-Bagyina, 2012; Yaro, 2010).

Dunkwa-on-Offin is a town and the capital of the Upper Denkyira East Municipal District in the Central Region of Ghana and has a population of about 33,379 people (Ghana Statistical Service, 2010). They depend on mining as a primary source of income or as a critical supplement to meagre farming revenues. This town is popularly known for its illegal mining activities. Pits are dug and left uncovered by unskilled youth confidently digging for gold to sell to prospective buyers, without considering the dangers being created for themselves, the inhabitants, the society and environment as a whole. Though the Ministry of Lands and Natural Resources had banned small scale mining and all forms of illegal mining across the country, there have been quite a lot of media reports on some illegal miners still operating on some key water bodies and forest reserves in the country.

Many countries consider their mineral wealth an asset, which could be used and, in fact, is being used to steer their economies into greater levels of development and also to stimulate or enhance their economic growth potential. In 2016, according to figures from the Mongolian government, the mining sector accounted for 21 percent of the GDP, over 30 percent of the national budget revenue, 85 percent of exports, and over 70 percent of the country's foreign direct investment, hence, making it the largest contributor to the Mongolian national economy (www.export.gov, 2018). In furtherance, mining has played a very vital role in the development process of a country like Ghana rated second after South Africa in terms of gold production on the African continent (World Gold Council, 2018). Mate stated that mineral wealth in the form of bauxite, gold, diamond and manganese thrive in larger quantities and have been a primary foreign exchange earner for the Ghanaian economy (Mate, 2002). Mining companies legally

operating in the country between them produced 2.81 million ounces of gold in 2017, representing 11 percent increase over the 2016 figure of 2.54 million ounces. This translates to an increase in total revenue of the companies by 13 percent to US\$3.68 billion (Ghana Chamber of Mines, 2018). This shows the noteworthy contributions the mining sector is playing in the lives of most countries, especially the developing ones, which have been blessed with abundance of precious metals and resources.

Nevertheless, just like all other sectors and industries, the mining sector is equally bereft with its own challenges and problems. The trails it usually leaves behind are incredible especially when the sector is not properly managed. Poorly managed mining sector impacts negatively on the environment or the social fabrics of society and as well reflect negatively on economic parameters countrywide (World Bank & International Finance Corporation, 2002). This accounts for many mining communities paradoxically becoming poorer with little access to resources especially when mining ventures fail (Kapelus, 2001). As a statement of fact, it has been observed that to date, mining has a poor record in respect of its contribution to sustainable development, with fewer communities receiving significant benefit and mining sites experiencing lasting negative ramifications (Miranda and Reed, 2007). Although in recent times most legal mining companies have taken giant strides in reducing or mitigating the devastating effects of their activities in the mining communities by developing comprehensive impact assessment studies and strategies for dealing with the effects as well as massive investment in infrastructure such as roads, schools, hospitals, electricity, water supplies etc, as a way of offsetting some of the cost of mining activities, it is noted that most of these communities have been victims of air and water pollution as well as other forms of environmental degradation

resulting from mining operations (Akabzaa and Darimani, 2001). Mining can therefore have dire impact on the communities in which or near which the mines are located.

Although it is factual that economies need these mineral resources and the proceeds accrued from them to satisfy their basic needs, it is true that the continual exploitation of the mineral resources is destroying the livelihoods and environments of the communities where mining activities are carried out and had been the root cause of civil unrest and wars, poisoning of people and environment, widespread human right abuses, deforestation as well as forest degradation in many communities and countries (Gualnam, 2008). Hence the question: to what extent is mining impacting on indigenous peoples and their communities? In order to have a firsthand understanding of the extent and nature of mining in respect of its impacts on indigenous mining communities, the researcher has chosen the topic: Assessing the Social Impact of Illegal Mining Activities at Dunkwa-On-Offin.

1.2 PROBLEM STATEMENT

‘Galamsey’ a term coined for illegal mining in Ghana, has been an issue of grave concern to most Ghanaians for many years now. A number of water bodies such as river Pra, Offin, Densu and tributaries of the Volta, among others which served as a major source of water supply to the populace have been heavily polluted and contaminated with hazardous chemicals. Attempts made over the years to curb or control the menace have ranged from targeted legislation to forced closure of mining sites. As reported by Hirsch (2013) and published in the International Edition of the Guardian Newspaper, UK, Ghana deported thousands in crackdown on illegal Chinese gold miners. A number of the illegal

gold miners arrested are from countries such as Angola, Cameroon, Burkina Faso, Togo, Benin, Niger, and Mali to mention all but a few.

Illegal mining activities pollute water bodies in communities since these water bodies are the source where minerals are extracted and washed (Aryee et al., 2003). Illegal mining has led to the destruction and pollution of the environment with the daily use of mercury. Farm lands are largely destroyed and also the road paths leading to farms are destroyed as a result of galamsey activities leading to inability to access food produce and leaving it in the farms. (Poku, 2016).

In recent times there have been serious concerns about physical changes in water bodies by community members. The illegal miners also leave behind uncovered holes and trenches which are dangerous for both human beings and animals. In extreme cases, illegal mines cave in killing several people. Farmers are also abandoning their farms to engage in galamsey because it is seen as a more lucrative venture. It is therefore essential that this study is conducted on the social impact of illegal gold mining activities on inhabitants and livelihood of Dunkwa-on-Offin. Researchers and policy makers have long expressed concerns over the illicit activities of artisanal mining, yet efforts to tackle the seemingly irreversible impacts have inadvertently stalled (Hilson, 2001).

1.3 RESEARCH QUESTIONS

This study seeks to answer the following questions:

1. What social and economic factors trigger illegal mining at Dunkwa-on-Offin?

2. What are the social effects of illegal mining activities on inhabitants of Dunkwa-on-Offin?
3. What remedial measures should be put in place to curb illegal mining activities in Dunkwa-On-Offin?

1.4 AIM OF THE STUDY

The aim of the study was to assess the social impact of illegal mining activities at Dunkwa-on-Offin and suggest its effective management.

1.5 OBJECTIVES OF THE STUDY

To achieve the aim for this study the following objectives were outlined:

- To identify factors that trigger illegal mining at Dunkwa-on-Offin;
- To identify social effects of illegal mining activities on inhabitants of Dunkwa-on-Offin;
and
- To suggest effective ways in curbing illegal mining activities.

1.6 SIGNIFICANCE OF THE STUDY

This topic is of much interest to the researcher, considering the heralding news headlines on both electronic and print media about the impacts of illegal gold mining operations in the country. The researcher believes that at the end of the research, the study will go a long way to contribute to the debate of bringing to light the menace of illegal gold mining not just only to the area of current study, but also to the entire communities in Ghana where gold is illegally mined. In addition, the study should complement government and

civil societies efforts at finding lasting solution/s to putting an end to illegal gold mining and curbing its impact on the social and economic aspects of human endeavours. Also, the quest to tackle the menace created by the activities associated with illegal gold mining just like other forms of mining can be regarded a major project for any government in power with the political will to nip in the bud illegal mining activities. With every project, whether infrastructural or otherwise, best practices in project management such as risk management, communication, scope management, schedule management and change management can be adopted. For this reason, there is the need to conceptualize this study as a project management objective. On the other hand, most projects are initiated based on a problem. The problems arising from illegal gold mining cannot be over emphasized, hence, the findings from this research would serve as a source of data for policy makers and researchers who will be interested in this area and a manual or source of information for illegal small scale mining communities, policy makers and government officials to initiate projects using the various project management practices to curb the menace.

1.7 SCOPE OF THE STUDY

Although the findings of this study may generally apply to most if not all mining communities in Ghana where illegal mining is prevalent, this study was geographically limited in scope to Dunkwa-On-Offin, a town in the Central Region of Ghana. With respect to the scope in activity, this study was limited to illegal mining and did not cover aspects of legal mining in the region under study. In respect of the scope on impact, this study focused on the social and economic impacts of illegal mining on the residents of Dunkwa-On-Offin.

1.8 RESEARCH METHODOLOGY

Considering that the 2010 Population and Housing Census Report as published by the Ghana Statistical Service (2014) revealed that majority of the residents of Upper Denkyira East Municipality, of which Dunkwa-On-Offin was a subset are not literates in English, there was the need to apply an empirical approach comprising a combination of both quantitative and qualitative data collection methods of interviews and focus group discussion to help the researcher present a balanced sample of target population to include views from both literate and illiterates. Literacy, as used here, was in direct consonance with the definition of literacy as used in the same Ghana Statistical Service report to mean a respondent's ability to read and write in any language.

1.9 ORGANISATION OF THE STUDY

This study was made up of five chapters with subheadings: Chapter One gave a general introduction to the study. These general introduction further dealt with a brief background, statement of the research problem, objectives of the research, research questions, significance of the study, scope of the study, and brief statement of methodology. The second chapter reviewed related works in newspapers, books, websites, journals, theses and dissertations, to mention a few. The review was necessarily not just to help form the theoretical and conceptual framework, but to sharpen the focus of the research, avoid incidental plagiarism, and more importantly to understand the approach with which the other authors adopted in carrying out their studies and how that affected their outcome. Chapter three presented the methodology used in the study. This included design of the research instrument, description of study area, population and

sample size, sampling technique and an explanation of how data collected was processed and analysed. Chapter four looks at the actual analysis and interpretation of the empirical data collected in line with the specific objectives and research questions was presented. Chapter five concluded the study in the form of a summary from which the researcher proffered recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This part of the study offers a review of literatures on the gold mining industry with focus on the world's top two producers (China and Australia) based on the 2018 report of the United States Geological Survey Department and the World Gold Council; Africa's top two producers of gold (Ghana and South Africa); and an overview of the gold mining activities in the study area (Dunkwa-On-Offin) in the Central Region of Ghana. Preceding the brief overview of the world gold mining industry, is a review of literature that covered the general effects of both legal and illegal gold mining activities on individuals, communities, governments, and the global community at large with particular interest in social and economic effects. The review of literature on the effect was done holistically and narrowed down to the study area. Also important in the framework was a review of studies on how illegal mining was effectively managed to minimise its negative effect, especially with respect to Ghana. The review was outlined thematically and done comparatively to identify gaps in the existing studies. It is important to mention that most of the literature reviewed were extracted from academic project journals, reports from organisations and agencies, theses and dissertations in the field of environmental science, engineering, social science, and project management. A review of the methodology adopted by existing studies was rather done in Chapter three.

2.2 BRIEF OVERVIEW OF THE GOLD MINING INDUSTRY

The history of mining and its economic benefits to the people of Ghana goes beyond a century. However, studies on the mining sector's role to economic progress have more often than not been woven around descriptive and spot data. Even though this provides useful historic information on the benefits of mining, it stymies efforts to premise policy decision making on robust analysis. It is a well-recognized fact that a comprehensive knowledge of the life cycle contribution of mining is key to realizing the shared objective of maximizing the spectrum of benefits induced by the presence of the mine. Ghana is often cited as an established mining nation and one of Africa's fastest growing economies. This report brings out another quality in Ghana – a country that is planning for its future (Ghana Chamber of Mines, 2015).

Data from the Bank of Ghana shows that export of gold increased from 3.84 million ounces in 2016 to 4.61 million ounces in 2017 (Bank of Ghana, 2018). The 20 per cent growth in exports was driven mainly by a combination of modest increase in gold price and an upturn in the output of large-scale producers as well as the volume of gold exported by Licensed Gold Exporting Companies.

By law, artisanal and small-scale gold mining in Ghana is 'reserved for Ghanaians' and has long been an indigenous livelihood activity using rudimentary methods. The involvement of foreigners in the small scale mining in Ghana was limited to nationals of neighbouring African countries only. However, from 2010, this was no longer the case as people other foreign nationals began to troop in, especially from China. The attraction was partly due to the high price of gold. However, reports on the violent clashes and the

problems that came with it between locals and Chinese miners took prominence in 2012 at a time when the devastating effect of illegal mining activities was clearly felt and seen in the environment, Crawford et al (2016). The global rush to extract resources for economic betterment took an unexpected twist in Ghana recently. With the increase in gold prices from 2008, and the large entry of foreign miners, notably from China, entering into the artisanal and small-scale mining sector, came an astonishing free-for-all scrambling for the access to gold. This situation described as 'out of control' and characterised by 'a culture of impunity' at its pinnacle from 2012. The tens of thousands of Chinese miners who rushed to the country to mine gold came along with new and advanced technology that ended up radically transforming the sector within the shortest possible time ever recorded in the history of the country. The mechanisation of the artisanal and small scale mining sector saw the increase or intensification of illegal mining, excessive environmental damage to both land and water bodies. There is no gain saying that the Chinese miners had a major effect in the sector. But for its negative, the Chinese miners deserve the credit for transforming the small scale mining activities to a more advance or mechanised form of the extraction of gold at that level. Against the crude way or approach to mining as practiced by the locals, some of the equipment and plants introduced were excavators, bulldozers and wash plants. The Chinese traders also sold or hired out the. One peculiar innovation introduced by the Chinese miners was mining directly within rivers by using of a barge or platform fitted with an equipment for suction, disregarding the illegality of mining in rivers or within 100 metres of a river bank (Crawford and Botchwey, 2016).

According to Dartey-Baah (2011), the mining sector of Ghana received much more attention compared to any other sector in the country under the Economic Recovery Programme (ERP) in 1983. This is a result of a number of reasons. Apart from the general macro-economic policy reforms for the nation, there were exact sector policy reforms that were designed to boost or sought to boost the interest of investors in the mining sector. As an example, between the year 1984 and 1995, there were notable institutional policy and development changes that offered attractive incentives to investors to capture the new shift. Following the formation of the Minerals Commission (MC) in 1984, the enactment of the minerals and mining code two years later, the promulgation of the artisanal small scale mining law in 1989 and the creation of the Environmental Protection Agency in 1994 were all to improve the mining industry in Ghana. Dartey-Baah and Amponsah-Tawiah (2011) added that in addition to the regulatory framework developed via the institutions and laws, generous incentives were provided to foreign investors to boost foreign direct investment in mining.

2.3 FACTORS THAT TRIGGER ILLEGAL GOLD MINING

In a study to investigate factors that influence the participation in illegal mining activities in Ghana, specifically along the corridor of Denkyira, Adu, Amponsah, and Osei (2016) after studying 160 respondents found that Age, sex, household size, perceived risk, educational attainment, and peer influence were key predictors of the respondents' decision to participate in illegal mining in the Denkyira corridor. Parry (2014) in his study on factors inhibiting illegal miners in the upper Denkyira East District in the central region from registering with the Minerals Commission in Ghana conclude that majority of the respondents alluded to the bureaucratic administrative procedures, corrupt security

officials and government officials, high cost of acquiring concession, and a more lucrative black market for gold.

According to Zindzy (2018), unemployment amongst Ghanaian youths is a major pushing factor to illegal mining. Reports indicate that scores of thousands of graduates from the various universities combined barely find work, even if they do, the stipends are rarely sufficient to meaningfully sustain them and give back to those that are now looking up to them to reap the benefit of their labour and support. The consequences is that these youth, in the quest to make ends meet, go the extra mile to get a living. For many of such people, venturing into illegal gold mining, where the prospect of earning well beyond the minimum wage is a far better option. Zindzy (2018) added that other than unemployment, the lack of job security is another highly contributory factor to the frequent re-emergence of ‘galamsey’ sites in Ghana. In a country where unemployment rate is so high, it may be hard to keep ones job. Moreover, the employers may pay poorly due to the abundance of skilled unemployed people ready to take up your position when you are relieved of your duties. This may push some people to go and work in the galamsey sites.

Table 2.1 shows the factors that trigger illegal mining of gold:

N^o	FACTORS THAT TRIGGER ILLEGAL MINING OF GOLD	REFERENCE
1	Age	Adu, Amponsah, and Osei (2016)
2	Gender	Adu, Amponsah, and Osei (2016)
3	Household size	Adu, Amponsah, and Osei (2016)
4	Perceived risk	Adu, Amponsah, and Osei (2016)
5	Educational attainment	Adu, Amponsah, and Osei (2016)
6	Peer influence	Adu, Amponsah, and Osei (2016)
7	Bureaucratic administrative procedures	Perry (2014)
8	Corruption	Perry (2014)
9	High cost of acquiring concession	Perry (2014)
10	Lucrative black market	Perry (2014)
11	Unemployment	Zindzy (2018)
12	Lack of job security	Zindzy (2018)

2.4 EFFECTS OF ILLEGAL GOLD MINING

2.4.1 Effects of Illegal Gold Mining in the World

Mahy and Lahiri-Dutt (n.d) in studying the effect of mining on women and youth in two mining locations Sangatta and Bengalon in eastern region of Kalimantan, Indonesia, found out that mining in the two locations has greatly altered original social and economic formations, resulting in major changes to ways of living or livelihoods. The economic competencies of the women in both communities were eroded as they lagged in cashing in on the economic gains. Although incomes in terms of cash from compensation, from jobs, or from businesses increased with the mining activity, they were mostly accessed and controlled by men, resulting in frivolous spending, disruptions to family life with increased spending on prostitutes and the marriages of many wives or mistresses, relegation of family responsibilities, and violence against women. In general,

in both study areas, the major effects were linked to poor training of women and education as compared to men, poor water and sanitation facilities, spread of prostitution, increased family disruption and domestic violence, poor health and the spread of sexually transmitted infections. For young people living in mining regions, lack of economic opportunities keep them in extreme poverty in the middle of riches and cash-flow all around; in the end, the resulting frustration often drive them to illegal activities, drugs, gambling and supporting conflicts with the company.

Unlike the study by Mahy and Lahiri-Dutt (n.d) just reviewed, Ndugai and Rivasi (2011) presented its findings on the social effect of mining in the African, Caribbean and Pacific States (ACP) in terms of working arrangements, rivalry and internal strife, and development. With respect to development, the researchers pointed out that people often do not benefit directly from the income of mining products. Considering the revenues from mining activities, nature of minerals as non-renewable resource, revenue should be invested in other forms of sustainable capital like in human physical, social and economic that can last long after the closure of the mines. Astonishingly, a lot of areas rich in minerals are also extremely poor. The study further showed that the lack of regulations and guideline in this area enables companies to reduce some production costs, including labour and security. Similar to many parts of mining communities, specifically in Africa, the nonexistence of official control and supervision, especially in small-scale mining, the lack of clothing and protective gear available to miners, the fact that the company will not assume complete responsibility for the welfare of the mine workers are among the leading causes of accidents in the workplace.

Comparatively, Ndugai and Rivasi (2011) also looked at the effect of mining on young children, but from the perspective of child labour and trafficking. With reference to statistics from the International Labour Organization (ILO), the study stated that about one million children work in mines and that their number keeps increasing. Quoting a World Bank report, Rivasi and Ndugai, (2011) found a strong connection between the onset of armed conflict and the dependence of a country on a number of resources easily exploited, such as gold or oil, diamonds.

The effects in relation to the social aspect on mining developments in communities in Australia as documented by Lockie, Petkova, Ivanova and Rolfe and (2009) took more of a positive outlook than negative as seen in the two literatures reviewed earlier. These positive effects from the findings included population growth, increase in incomes, increased financial support in towns diversification in communities; developers, house and land owners benefited from substantial increases in values; education of the mining communities; improvements in infrastructure such as roads and communications; improved service levels in town; mining companies and contractors hiring out equipment to communities and councils; development of town via the building or renovation of houses by the mining companies as a social responsibility; and various landlords benefiting by having access to portable water from pipelines established by mining companies.

From a unique viewpoint, Singh and Singh (2016) tied the key factors controlling social effects of mining in India to land, water, air, geology, community networking and biodiversity. The research indicated that the mining operations had extreme effects on soil fertility through putting off the topsoil; Acid mine drainage affected the water

through dissolved metals and contaminant leaching; airborne pollutants input the atmosphere and undergo physical and chemical modifications causing critical outcomes to humans' health and to the surroundings; blast power transmitted to the floor, created vibration waves that propagate through the diverse soil and rock strata to the foundations of close by homes, affecting the steadiness of infrastructures, buildings, and houses of human beings residing in and around the big-scale open-pit mining operations. The domesticated animals and wild fauna had been additionally effected. The alternative major social influences of mining could be seen in the form of size and composition of resident populace, new pattern of employment and profits, changes inside the use of land, lack of herbal habitat, way of life, cultural and health influences. They brought that the predominant affects which affect the society had been particularly the displacement and resettlement.

The social and monetary effects of gold mining as captured in a record commissioned under the auspices of world Gold Council enumerated wonderful positive effects to encompass support for global financial growth, aid for host international locations, contribution to national economy, support of higher governance, funding in peoples, especially with respect to creation of jobs, employment earnings, local employment possibilities, gender equality, building human capital, and the focus on healthcare.

Environmental and Social effects: Environmental effects may be transient (often acute, associated with accidental discharges or explosions), temporary (only during operational activities) or chronic (long-term, arising from mineral extraction and waste disposal).

Singh and Singh (2016) summarized the major environmental and social effects arising from gold mining activities to include: poor quality and accessibility of water, air and water pollution, land degradation, waste generation, loss of biodiversity, displacements of inhabitants, employment issues, health and Safety issues, disruption of the ecosystem, increased crime rate, and sociopolitical conflicts.

2.4.2 Effects of Illegal Gold Mining in Africa

In a more recent record on unlawful artisanal mining in South Africa, Mkhize (2017) drew particular attention to the reality that if the goal is not always reappraised it may result in unwanted social outcomes inclusive of crime, intercourse work and spread of sexually transmitted illnesses, alcoholism and substance abuse, abuse of human rights, conflict and shortage of safety, persistent child labour, denigration of cultural and moral values, destruction of cultural background websites, gender discrimination, and insufficient social facilities. This research stopped short of investigating further the real extent to which those vices had eaten into the values of the society.

The effect of mining with respect to livelihoods of indigenous inhabitants in Tanzania as found out in a field survey records analysed by using Kitula (2002) pointed to accumulated monetary benefits in buying and selling food crops, direct and obvious indirect employment, petty commercial enterprise enhanced road network, water and the construction of schools.

Likewise, the effects of artisanal gold mining on local livelihoods and the environment within the forested regions of Cameroon was documented rather differently from all the other literature reviewed so far. The researcher, a representative for the Centre for

worldwide Forestry studies, Funoh (2014) having given a historical past to the gold mining sector in Cameroon, delved deeper into secondary activities on account of the mining of gold in the vicinity. Those secondary activities as highlighted by the writer included fishing, portage, commercial enterprise, hunting of wildlife's, fishing and farming. It no longer became clear how the increased interest of mining improved the farming within the same region.

2.4.3 Effects of Illegal Gold Mining in Ghana

Despite Ghana's attempt to promoting small scale mining as a facilitator for the reduction of poverty and development that can be sustained coupled with the various attempts to formalise the sector through series of regulations and laws, illegal gold mining remains widespread and the environmental effects of small scale mining is still a major source of concern, Eshun and Okyere (2017). The continuous use of mercury for the extraction of gold from the ore, usually referred to amalgamation is widespread among many small-scale gold miners for a number of reasons: it is simple, not expensive, easily accessed, and has a long history of use in the region, Basu et al (2002). Following resettlement /relocation of host communities cum its negative effects; disturbance to plant and animal life (Fig. 2.3); disturbance to sacred places of worship such as shrines; degradation of land (Fig. 2.2); air, noise and water pollution (Fig. 2.1) are some of the disturbing effects of surface gold mining in Tarkwa (Yirenkyi, 2008).



Fig. 2.1: Illegal gold mining polluting air and water

Source: pulse.com.gh



Fig. 2.2: Illegal gold mining activity destroying lands

Source: ghanalive.com



Fig. 2.3: Illegal gold mining activity destroying farmland

Source: gbcghana.com

The major negative effects of artisanal and small-scale gold mining activities in Ghana are the degradation of land marginalisation of women and instances of conflict (Hilson and McQuilken 2016). It is equally important to pinpoint the peculiar pressures felt by women in the illegal mining of gold, who are often more highly disadvantaged compared to men. With the somewhat insulation of the informal economy— that is to say that the informal sector is not regularly policed or monitored by government authorities, donors and non-governmental organisations — efforts to mainstream gender often than not fail to reach women engaged in artisanal and small scale mining. With illegal mining activities come conflict and many other social vices. This can clearly manifest itself in varying forms, from communal unrest as a result of the dispossession of ancestral or family land and the awarding of extensive mining concessions to large-scale mining

companies, to localised violence over access to and the control of land and other natural resources (Yakovleva and Hilson, 2007; Okoh, 2014; Botchwey and Crawford, 2016). The most rampant forms of conflict are between large scale miners and artisanal and small scale miners, as these relationships are often characterised by extended histories of tensions, rifts and mistrust and failed promises that may have arisen as a result of poor communication and inherited corporate social responsibilities (Hilson, 2011).

In a related study, Kwateng (2012) profiled the illiteracy level in Akwatia to be high and that nobody seems to be ready or willing to address the issue by, for instance, providing both formal and informal learning process. Living standard in Akwatia is equally very low, and for that matter, the people rather think of how to irk a living say get three-square meal a day and not bother a bit about protecting the environment. The researcher further emphasized that many of the respondents bitterly complained about their ill-health, saying that majority of them suffered from malaria since they failed to cover the pits after mining, serving as a breeding ground for anopheles mosquitoes. Other than malaria, people also complained of suffering from cold, headache, cholera, flu, diarrhea, and skin rashes which might have emanated from the use of certain chemicals during mining which affect their water bodies.

Having assessed the environmental and social effects of illegal mining activities in River Bonsa, Boachie-Yiadom and Kusi-Ampofo (2012) stated that the main effect is ill-health and contamination of water bodies. A sizeable number of the residents complained of itching of the skin and the development of rashes on skin which they connected to the change in the turbidity of the river. A very significant but not so direct social effect is the increasing number of prevalence of teenage pregnancies in the municipality. Although

there had been no records cited indicating the upward thrust in incidence of teenagers being pregnant within the municipality, a number of the respondents reacted that the illegal miners entice the young ladies with cash with the intention to have sexual intercourse with them, and the worst form of the mishap as explained by a respondent is that many of those illegal miners are from Volta Region, as a result, can make up their mind to run away at any time leaving the women and their infants behind in the municipality.

There are documented instances of the presence of heavy metallic pollutants in soil and water in a few selected areas of the town in Dunkwa-on-Offin District in Central Region of Ghana because of small scale gold mining. Kpan, Boadu and Anukwah (2014) detected the presence of heavy metals in water samples collected at varying concentrations from Aduman, Ayamfori, Acquahkrom, Kyekyewere, Atekyem, Akyempem, Kwameprakrom, Mfuom, Babiaraneha, Nkronya, Asikuma, Tikyakrom, and Manukrom, all towns inside the district. With chemical and mineral pollution of water in rivers come some number of implications on human beings, and the atmosphere.

The Bank of Ghana, (2003) documented some of the major effects of mining activities to include the loss of farmlands, the destruction of crops and forest cover, displacement of people, the misuse of royalties by the local authorities, and pollution of water bodies. The bank also documented that the mining companies did well in pursuing effective and purposeful, although not foolproof, environmentally friendly policies to mitigate the menaces of mining activities on the environment and on the lives of the locals. The effects of mining and mineral exports were believed to permeate all sectors of the economy. Mining has not only boosted the country's foreign direct investment (FDI), but

has also drastically contributed to increasing the volume of Ghana's trade with the outside world, as well as helped in providing the necessary foreign exchange needed for the development of the economic.

Illegal gold mining effects the environment, agriculture, water bodies, humans and many other sectors of the economy as outlined below was published by the Forestry Research Institute of Ghana, (2017):

Vegetation and wildlife

- Unprecedented destruction of plant life and rivers
- Destruction of plantations of cash crops such as cocoa and oil palm as well as farms of food crop. The deleterious effects on agricultural activities - a major source of livelihood for the rural people and also key contributor to GDP is direly costing the nation.
- The loss of habitat for some species of plants and wildlife will ultimately affect the ecosystem processes and biogeochemical cycles, which pose as threats to the life of some plants and animals.

Environmental pollution

- The release of toxic chemicals such as methane and carbon dioxide from the incineration from activities of illegal mining increases the greenhouse gases concentration and in the end plays key contributing roles to worsening of the problems with climate change.
- The increased turbidity of water bodies and in addition to the accretion of heavy metals in water bodies and soils. When water from these contaminated water bodies are used to irrigate farmlands, it leads to the introduction of traces of heavy metals and chemical residues in the crops produced to consumption. Subsequently, this can give rise to a range

of ailments including cancers, brain, heart, kidney and liver diseases, muscle and general weakness.

Social implications

- The negative after effect of illegal gold mining on the livelihoods of rural people transforms into social conflicts and misunderstanding in the mining areas.
- With the influx of illegal miners into these rural areas, a very significant indirect social effect could be an increase in pregnancy of teenagers.
- Considering that the mining activities often can be a source of quick or instant money, the number of school drop-outs in these mining communities is expected to increase drastically.

The Centre for Environmental Effect Analysis in a study conducted to determine the occurrence of mercury in the environment, reported that the occurrence was as a result of its use in the gold recovery process. During this process the raw form of the metal is either washed into rivers or freely vaporised into the atmosphere. The United States Environmental Protection Agency (n.d.) documented that the concentrations of mercury found in fish were alarmingly three times higher than levels deemed safe. Moreover, chemicals in the river can be harmful to the organs even the entire human body.

Also deeply taking root particularly amongst illegal and small scale miners in Ghana is the use of illicit drugs such as marijuana and cocaine as stimulants to work harder. Other social and health effects resulting from general mining activities includes loss of hearing and silicosis, conditions created by the blasting and drilling activities. With their resultant noise and dust, which have become nuisance in the mining regions. Unlike the

underground mining, large scale surface mining has taken up large expanses of farmlands from mining communities. Notwithstanding, an operation in this aspect is more capital intensive than it being labour intensive. Thus it requires less as well as very skilled labour to operate the very complex equipment used in the exploitation and minerals processing. This situation combined with the increased migration to mining communities in search of jobs has made worse the situation of unemployment in these areas. This has also created other social problems such as overpopulation, congestion, and the pressure on social amenities to mention but a few. Consequently the achievements from the sector in the form of increased foreign exchange earnings and investment comes with some significant environmental, health and social costs on the people living in mining communities and the nation as a whole Dartey-Baah and Amponsah-Tawiah (2011).

Table 2.2 Shows the effects of illegal gold mining:

N^o.	EFFECTS OF ILLEGAL GOLD MINING	REFERENCE
1.	Poor quality and accessibility of water	Crawford et al (2016); Singh and Singh (2016)
2.	Air, noise and water pollution	Bank of Ghana, (2003); Kitula (2004); Yirenkyi, 2008; Kpan, Boadu and Anukwah (2014); Singh and Singh (2016); Forestry Research Institute of Ghana, (2017)
3.	Land degradation	Kitula (2004); Hilson and McQuilken 2016; Singh and Singh (2016)
4.	Waste generation	Singh and Singh (2016)
5.	Loss of farmlands and biodiversity	Bank of Ghana, (2003); Kitula (2004); Singh and Singh (2016); Forestry Research Institute of Ghana, (2017)
6.	Displacements of inhabitants	Bank of Ghana, (2003); Singh and Singh (2016)
7.	Employment issues	Dartey-Baah and Amponsah-Tawiah (2011); Singh and Singh (2016)
8.	Health and Safety issues	Kpan, Boadu and Anukwah (2014); Boachie-Yiadom and Kusi-Ampofo (2012); Kwateng (2012); Singh and Singh (2016); Forestry Research Institute of Ghana, (2017); The United States Environmental Protection Agency (n.d.)
9.	Disruption of the ecosystem	Singh and Singh (2016); Forestry Research Institute of Ghana, (2017)
10.	Increased crime rate and Conflicts	Yakovleva and Hilson (2007); Hilson (2011); Okoh (2014); Botchwey and Crawford (2016); Hilson and McQuilken (2016); Singh and Singh (2016); Forestry Research Institute of Ghana, (2017)
11.	Rise in teenage pregnancies	Boachie-Yiadom and Kusi-Ampofo (2012); Forestry Research Institute of Ghana, (2017)
12.	Illiteracy due to increased number of school dropouts	Forestry Research Institute of Ghana, (2017)
13.	Congestion and increased pressure on social amenities	Dartey-Baah and Amponsah-Tawiah (2011)

2.5 EFFECTIVE MANAGEMENT OF ILLEGAL MINING

2.5.1 Effective Management of Illegal Mining in the World

The key mitigation measures to reduce and protect the socio-environmental effects described, according to Singh and Singh (2016) begins with the protection of environmental quality coupled with respect of pure air, soil and water is important for the sustainability of the environment. They proposed the reduction of carbon foot print with plants could help reduce the effects of mining on environmental components, which in the end has effect on human and animal health.

2.5.2 Effective Management of Illegal Mining in Africa

Mkhize (2017) drew attention to the several strategies that have already been implemented internationally to address illegal artisanal mining. One outstanding strategy, it indicated, is the global initiative Charter launched in March 2001 with the following aims:

- Reduction in the occupational health and safety risks to all miners;
- Improvements in the institutional arrangements and policy environment governing small-scale mining;
- Increments in the productivity and improvement of the livelihoods of miners; and
- Advancement of alternative livelihoods through effective use of natural resource capital by safeguarding of biodiversity in the mining areas.

Two other strategies Mkhize (2017) discussed are the Mining Minerals and Sustainable Development (MMSD) in the year 2002 and the Yaoundé Vision introduced by the

African Union which was published in the same year. Both strategies provided a roadmap of how governments on the African continent could assist to enhance and sustain mining initiatives. To be specific, the Yaoundé Vision aimed at putting into operation the vision of mining of Africa, designed towards the transformation of mining activities into a knowledge-based economy. It identifies the initiative as the pillar of many rural economies and a source of livelihoods. It pursued to strengthening of the capacity and growth of the grassroots as well as encouraged cross-linkages with the broader social economies. The latter would lead to a more sustained employment which in the long run would undoubtedly translate into improvements in the livelihoods of illegal miners. It claimed that the creation of jobs for low-skilled workers engaged in illegal mining especially in rural areas would prevent them from the act. Since the initiative is principally about the search for lasting solution through employment, Banchirigah and Hilson (n.d) have recommended strong support for agrarian-orientated activities in Sub-Saharan Africa.

According to Kitula (2004), mining activities have already rendered serious negative social and environmental effects in some mining communities and towns in Tanzania, including the Geita District. These problems include damage to water quality, land degradation, harm to livestock and wildlife biodiversity and pollution. In spite of the ever-increasing awareness of the importance of thorough environmental management amongst government officials and mining stakeholders in Tanzania, mitigation strategies are possibly not so enforced due to conflicts of interest on both economic and political grounds at both central and local levels. His suggestions to reduce or manage the negative effects of mining are as follows:

- The government should focus on the provision of technical support to local mine stakeholders through training in facilitation and management tasks. New technology that will require fewer chemicals during extraction and processing should be developed, and the waste generated from mines should be regulated and properly treated and turned into a non-harmful form before it is discharged to waste ponds.
- It has to be made mandatory for all mining activities taking place in Tanzania to submit environmental effect assessment reports before a license to mine or exploration can be granted. Independent monitoring teams and improved regulations should be commissioned to intervene to put social and environmental problems in check.
- Alternative sources of livelihood such as agriculture should be promoted to the miners as a strategy to eliminate illegal mining, thus help to improve the economic, environment and social competences of the illegal miners.

Major recommendations by Funoh (2014) to help manage illegal artisanal gold mining are as follows:

- Proper monitoring and control to check environmental friendly mining practices and imposition of sanctions on defaulters.
- Reduction in taxes as incentives to those who carry out the best practices as well as give compensation.
- Improve livelihoods of miners by:
 - ✓ Educating them on sustainable mining techniques in order to mitigate the negative environmental and social effects that mining generates;
 - ✓ Providing them with technical assistance such as carrying out prospection and fairly allocating zones for small scale mining activities;

- ✓ Providing secured retirement packages to the miners through social insurance; and
- ✓ Creating workshops and seminars to teach the miners how to diversify their activities and how to manage their finances. This may lead to some of the miners turning towards alternative sources of livelihood.
- Enablement of procedures for obtaining small scale mining permits to lead to a formalisation and regularisation of many miners in the sector.

2.5.3 Effective Management of Illegal Mining in Ghana

According to Yirenchi (2008), the Gold Fields Model centres on continuous community engagement and conflict resolution as well as comprehensive environmental monitoring programme designed to lead to effective relations within the community. The specific strategies to ensure socio-economic development involved livelihood restoration programme, community development programme, and community training and employment.

Other than the Gold Field's Model, the government, in order to ensure peaceful co-existence between the mining company and its host communities as well as control illegal mining activities, has put in place certain measures to mitigate the effects. Such measures are:

- Minerals and Mining Law: this law presents the legal and regulatory framework of mining in the country. It promotes to a very great extent, peaceful co-existence between mining companies and their host communities and empowers agencies meant for regulation.

- The establishment of regulatory agencies such as Minerals Commission, Mines Department, Environmental Protection Agency, Water Resources Commission among a number of others;
- Putting up of a Minerals Development Fund for the development of the mining communities; and
- Payment of royalties and taxes to the government for the development of mining areas.

Anukwah, Kpan, and Boadu (2014) suggested that to control environmental pollution as a result of the activities of the small scale gold miners in the following ways:

- Government provide adequate fund and support the Minerals Commission as a form of empowering it to exercise its mandate;
- Enact legislations to regulate small scale mining;
- The Commission conducts proper and much more detailed and comprehensive research to determine the level at which the environment has degraded as a result of the activities of the small scale miners;
- The key players in the sector engaged in both small and large scale operations should adopt proper environmental management tools;
- The commission viciously monitors and controls illegal mining activities by the small scale miners;
- The government provides avenues and encourage the licensed small scale mining operators to access funding from financial institutions to enhance their operations;
- The funding of their operations will enable the licensed small scale miners to abandon traditional techniques such as shallow alluvial mining which leads to the massive

deforestation and excavation of the earth surface and adopt safe modern mining techniques;

- Funding will go a long way to enabling the miners procure modern tools for mining which can enable them crush hard rocks containing gold without causing dust and noise;
- The government, non-governmental organizations, the civil society, and the Minerals Commission, should carry out proper campaigns to enhance awareness on the effects of illegal gold mining operations on the environment; and
- Last but not the least, the initiative should aim at educating the small scale miners on the effects of their activities on all facets of life.

Table 2.3 shows the effective management of illegal gold mining in Ghana:

N^o	EFFECTIVE MANAGEMENT OF ILLEGAL GOLD MINING IN GHANA	REFERENCE
1	Provision of alternative forms of employment, especially in agriculture	Banchirigah and Hilson (n.d)
2	Implementation of policies and sanctions to effectively manage the environment	Kitula (2004); Funoh (2014)
3	Provision of technical support to local mine stakeholders through training in facilitation and management tasks	Kitula (2004)
4	Formation of independent monitoring teams	Kitula (2004)
5	Enablement of procedures for obtaining small scale mining permits to lead to a formalisation and regularisation of many miners in the sector	Funoh (2014)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The purpose of this chapter is to explain how the study was conducted in order to achieve the stated aim and objectives. According to (Kothari, 2004), research methodology is a way to systematically solve the research problem. This chapter covers the following units: research paradigm, research strategy, unit of analysis and data sources, population, and data collection instruments. The research methodology used is one of the fundamentals of the research activity as it enumerates the procedures, methods and logical and theoretical keystones employed to gather the requisite knowledge towards answering the research question.

3.2 RESEARCH DESIGN

3.2.1 Research Approach

Chetty (2016) explains that research approach is a plan and procedure comprising the steps of broad assumptions to detailed method of data collection, analysis and interpretation. It is therefore, based on the nature of the research problem being addressed. In order to conduct the research in a precise way by following a standard of appropriate philosophy, it is necessary to follow a correct research approach. Research approach allows the researcher to define and apply research methodologies in an effective

way. There are two major approaches in research methodology. These approaches are: deductive approach and inductive approach.

The main difference between inductive and deductive approaches to research is that whilst a deductive approach is aimed at testing a theory, an inductive approach is concerned with the generation of new theory emerging from the data. (Gabriel, 2013).

This research adopts an inductive approach.

3.2.2 Research Strategy

Datt (2016) with references to Saunders et al. (2009; p. 90) explains that within research methodology, research strategy assumes as the “general plan of how the researcher will go about answering the research questions”. Datt enumerated seven research strategies: experiments, surveys, case studies, ethnography, grounded theory, action research and archival research. Of these seven, this study primarily adopts the case study and survey strategy.

3.2.3 Research Method

Research method is essentially divided into two categories: approach of data collection and approach of data analysis or reasoning. Qualitative Research is basically an exploratory research. It gives an understanding of opinions, reasons, and motivations. It provides insights into the problem as well as helps to develop ideas or hypotheses for potential quantitative research. Qualitative Research is also used to reveal patterns in thought and opinions, and delves deeper into the problem. Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods

include focus groups (group discussions), individual interviews, and participation/observations. The sample size is typically small, and respondents are selected to meet a certain quota.

Quantitative Research is mostly used to quantify the problem by means of generating numerical data or data that can be transformed into statistics that can be interpreted. It is used to quantify opinions, attitudes, behaviors, and a number of other defined variables – and generalize results from a larger sample population. Quantitative Research uses data that can be measured to formulate facts and uncover patterns in research. Quantitative data collection methods are much more structured than Qualitative data collection methods. Quantitative data collection methods include various forms of surveys – paper surveys, online surveys, face-to-face interviews, online polls, mobile surveys and kiosk surveys, longitudinal studies, telephone interviews, website interceptors, and systematic observations.

Based on the approach of data collection, this study adopts both the quantitative and qualitative approach.

3.3 DESIGN OF RESEARCH INSTRUMENT

As part of the measures to achieving the aim and objectives of this study, the researcher after a thorough desk survey of existing related works discussed under literature review, resorted to using semi-structured interview schedule and focus group discussions comprising both close and open-ended interview guide questions as an instrument to collect the required data from the target population. This method with open-ended questions allows for adjusting the questions depending on the attributes of the specific

firm/client/institution/ professional and the given type of problems in their knowledge area (Kissi, 2013). The importance of developing any form of research instrument after performing desk survey cannot be overemphasised as indicated by Giesen et al., (2012). Other than the reliance on the methodology applied by the preceding authors who carried out research in similar study, the current researcher's decision to adopt the semi-structured interview approach stems partly from the fact that the majority of residents in the target area are not literate in English (Ghana Statistical Service (2014). Literacy, as used here, was in direct consonance with the definition of literacy as used in the same Ghana Statistical Service report to mean a respondent's ability to read and write in any language.

These questions were not just ethical and feasible, but constructed in very simple terms and wordings not just to enable the researcher ask the questions with ease, but to also enable the respondent to easily understand the question, be able to respond, and also be willing to do respond in whatever language of choice. The provision of multiple choice options for every question was for two reasons: first, to guide the respondents to present their ideas without having to struggle to express themselves; and secondly, to enable easy analysis of the data. For response not initially captured by any of the options provided by the researcher in the semi-structured interview question guide, the respondent is given room to respond accordingly. The framework for this research as captured in the literature review was empirical and combined both quantitative and qualitative approaches.

3.4 DATA COLLECTION

3.4.1 Description of Study Area

The area under study is Dunkwa-On-Offin. The town is the capital of the Upper Denkyira East Municipal District in the Central Region of Ghana. The main reason this area was selected for the study is due to the high incidence of illegal artisanal gold mining activities seen in the later part of 2016 prior to the temporal ban on ‘galamsey’ by the ruling National Patriotic Party in 2017. The Upper Denkyira East Municipal District is one of the thirteen administrative districts of the Central Region and lies within latitudes 5° 30’ and 6° 02’ north of the equator and longitudes 1° W and 2° W of the Greenwich Meridian (Marfo and Darko, 2016). As at 2010, Dunkwa-on-Offin has an approximate settlement population of about 34,000 (Ghana Statistical Service, 2014).

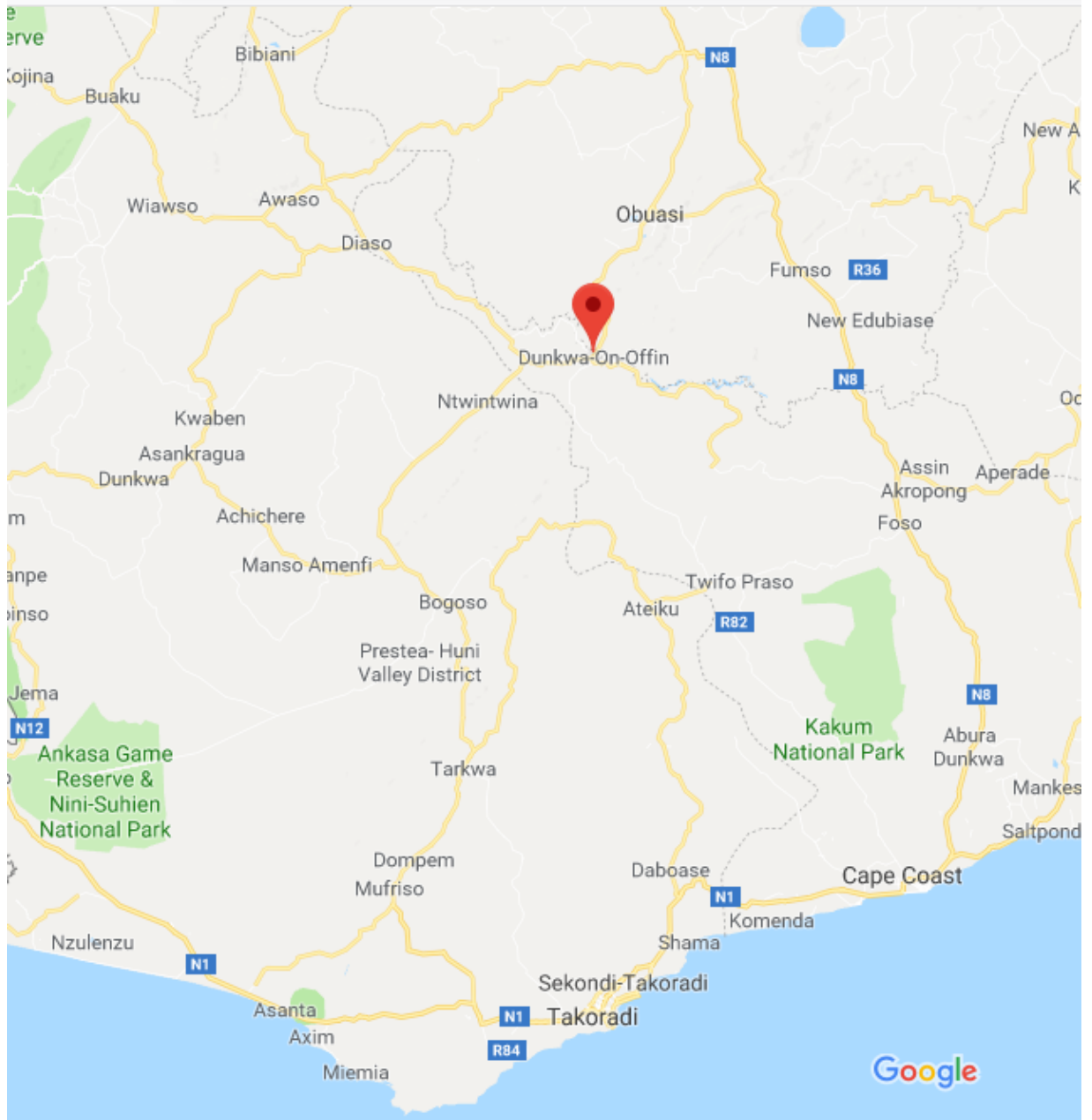


Figure 3.1 Shows the location of Dunkwa-on-Offin and its neighboring towns.

Source: Google Maps

3.5 POPULATION

The ever increasing demand for research has created a need for an efficient method of determining the sample size needed to be representative of a given population (Krejcie and Morgan, 1970). The population for this study is based on the population size of Dunkwa-On-Offin as at 2010 provided by the Ghana Statistical Service (GSS) which is approximately 34,000.

3.5.1 Sample Size

From Table 3.1 (refer to appendix), which gives the relationship between the population (N) and required sample size (S) assuming a 5% degree of accuracy, the stated population size yields a sample size of 379 respondents comprising children and adult, however, the researcher preferred a rounded number of respondents, thus the sample size of 380 was chosen.

3.5.2 Sampling Techniques

Bryman (2008) referred to the simple random sample as the most basic form of probability sample. This is to ensure that every member in the population (children and adult; male and female) of the study has an equal chance of inclusion in the study. With this study, the households that were selected for the interviews were randomly picked because the residence pattern of Dunkwa-On-Offin as shown in the satellite image in Figure 3.2 made it relatively easy for the researcher to enter into houses and interview them with little difficulty. Although in the houses, male heads in most cases responded first to the interview questions as a result of the traditional family structure of male

dominance over females, the researcher ensured a fair balance of responses by occasionally randomly directing the question to females and children.



Figure 3.2 Google satellite image of Dunkwa-On-Offin and surrounding town

Source: Google Maps taken by author August 2, 2018.

3.6 DATA PROCESSING AND ANALYSIS

There is no question that business, education, and all fields of science have come to rely heavily on the computer (Arkkelin, 2014). Data of all sought can be statistically analysed using computer programmes such as MATLAB, QlikSense, Minitab 18, Statistix, Stata, SAS Business Intelligence, Analyse-it, SigmaPlot, Whatagraph, MaxStat, DataHero, Scilab, TIBCO Enterprise Runtime for R, Analytica, Plug&Score Modeler, ESBStats, XLSTAT, ISNetworld, Statwing, DataMelt, CART, Forecast Pro, General Audit Tool, GraphPad InStat, Online Stock Wise Predictor, STATGRAPHICS Centurion, STEM, The Unscrambler X, Explorer, PolyAnalyst, BMDP Statistical Software, AcaStat, AlterWind Log Analyzer, AM, Analysis Studio, ASReml, ATAC Workstation, ChemStat, CoPlot, Cornerstone, Cricket Statz, DakStats Baseball, Data Desk/XL, Decision Analyst STATS, Deep Log Analyzer, Develve, Dragonglass, EasyFit, Genesys, GeneXproTools, Information Center, IntellectusStatistics, Kingland, Lumenaut Statistics, Magnum Opus, MarketSight, MedCalc, NLREG, Number Analytics, NumXL, Oriana, PASS, Power and Precision, Predictive Suite, Pro Plus, QMSys GUM, RFM FOR EXCEL, Sales Controller, Smart Operational Analytics, StatistiXL, StatPac, StatTrac Software, StatXact, SUDAAN, The Chemometrics Toolbox, TurboStats, UNISTAT, XLfit and SPSS. The list is in-exhaustive.

For this particular study, the SPSS was used for the analysis. SPSS stands for Statistical Package for the Social Scientists. It is a data management and statistical analysis tool which has a very wide application and data processing capability. In recent years, the use of SPSS for the data analysis in graduate papers, such as this, is evaluated higher than the use of appropriate methodology for the data analysis (Paura and Arhipova, 2012).

3.7 SUMMARY

In conclusion, this chapter of the study has explained the methodology to include design of research instrument, data collection, description of study area, population and sample size, sampling technique, and data processing and analysis. The research instrument was semi-structured open and close-ended interview questions as interview guides administered within eight days by the researcher with the assistance of an opinion leader. From a total approximate population of 34,000, a sample size of 380 was targeted for the study. The study adopted both the qualitative and quantitative approach.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSIONS

4.1 INTRODUCTION

Previous chapters addressed the introduction, the review of relevant literature, and the research methodology adopted. This chapter is a presentation of the results of the empirical data collected using the structured questionnaire and how it was analysed with SPSS. Before the analysis was done, the Cronbach Alpha test was used to validate the questionnaire. The questionnaire comprised four sections as follows:

Section A: Background data which indicated general information on respondents such as gender, age, residency, family size and dependency, gross monthly income, and education; Factors that trigger illegal gold mining;

Section B: Factors that trigger illegal gold mining

Section C: Social effects of illegal gold mining, and

Section D: Ways to curb illegal gold mining

This study adopts descriptive and inferential data analysis techniques. According to Gelston and Abbott (n.d), descriptive and inferential data analyses are the two general types of statistical analyses in quantitative research. Descriptive includes simple calculations of central tendency (mean, median and mode), spread (quartile ranges, standard deviation and variance) and frequency distributions displayed in graphs. Inferential includes more complex calculations of statistical significance usually

associated with probability-based analysis. A t-test and Cronbach's analysis are typical example of inferential analysis.

4.2 CRONBACH ALPHA RELIABILITY TEST

The Cronbach Alpha Test was developed in 1951 by Cronbach Lee as a means to objectively measure how reliable a data collection instrument is. In most cases, it is used when there is the need for multiple-item measures of a concept. The Cronbach's Alpha index ranges from 0 to 1. A value closer to zero implies that there is little or no consistency in the measurement, whilst a value closer to 1 implies consistency in measurement (Adefioye, n.d). The generally acceptable range for the test is between 0.70 and 0.90 or higher depending on the type of research under consideration (How2Statsc, 2015). The result of the test is shown in Table 4.1.

SECTION	HEADING	Cronbach Index	Number of Items
B	Factors that Trigger Illegal Gold Mining	0.794	14
C	Social Effects of Illegal Gold Mining	0.955	13
D	Ways to Curb Illegal Gold Mining	0.703	12

Table 4.1 Summarises the result of the reliability test for all the sections.

Source: Author's Construct

As can be seen in Table 4.1, of the three sections subjected to the test, section C has a higher value of Cronbach index. This implies that the set of questions asked to determine the social effects of illegal gold mining in Dunkwa-on-Offin were highly reliable, consistent and reflected how well the multiple-question Likert scale asked elicited the right kind of responses with minimal covariance for each set of questions asked. The number of items indicate the number of questions asked under each section.

4.3 RESPONSE RATE

Out of a total of 380 targeted respondents based on the sample size determined using Table 3.1 (refer to appendix), only 344 of the questionnaires were retrieved due to a number of reasons. One of the reasons can be linked to the challenge with language barrier. Not so many of the respondents could speak and write English. For such respondents, the researcher with the help of three assistants in the community who served as guides and interpreters had to read and explain each of the questions to the understanding of the respondents before they could answer them. This exercise which lasted for 8 days was not only laborious but also required a lot of time and patience. For the respondents who were assisted to complete the questionnaire, the researcher collected all the questionnaires. The difference in the number of questionnaires issued to that received was traced to those who had to take the questionnaire and promise to return them in a later time when they had had time to fill them. Another reason had to do with the limited time set by the institution for the submission of the draft of the thesis.

After going through the 344 questionnaires collected, the researcher discarded 24 because they were not properly filled. In most instances, the respondents chose more than one

Likert scale in the option. In the end, responses from 320 were analysed, representing 84.2%. Fig. 4.1 summaries the response rate of the research instrument.

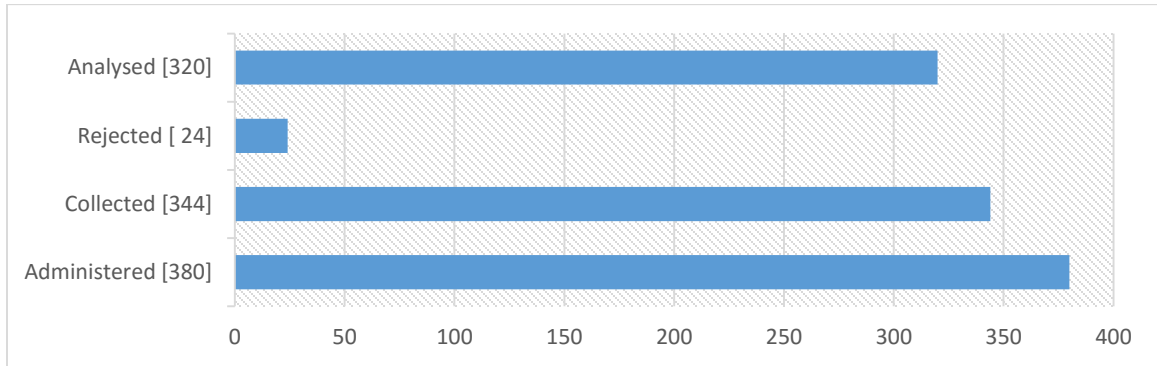


Fig. 4.1: Response rate of research instrument

Source: Author's Construct

4.4 BACKGROUND OF RESPONDENTS

This section of the questionnaire gathered information on the respondents to include gender (Fig. 4.2), how long they have lived in the study area (Fig. 4.3); their age (Fig. 4.4); the number of people the respondent is depending on or the number of people depending on the respondent to meet their primary needs such as food, clothing, and shelter (Fig. 4.4); employment status (Fig. 4.4); approximate gross monthly income (Fig. 4.7); and highest level of education completed (Fig. 4.8).

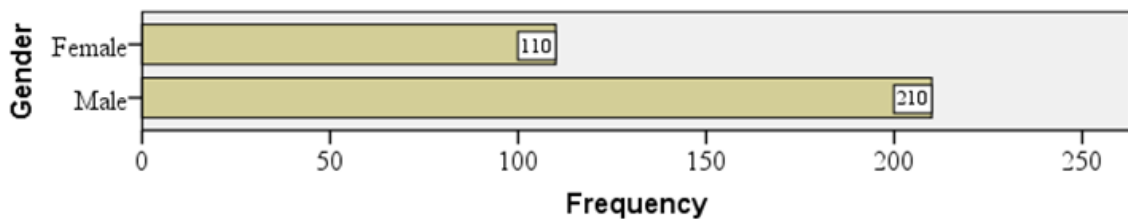


Fig. 4.2: Gender of respondents

Out of the 320 recorded respondents, 65.6% are men and 34.4% are women. The variance in the gender of the respondents is primarily due to the reason that more men were rather willing to participate in the survey than women. In some cases, a sizeable number of them said they needed to seek permission from their spouse. So was with a number of children who needed to seek permission from their parents/guardian.

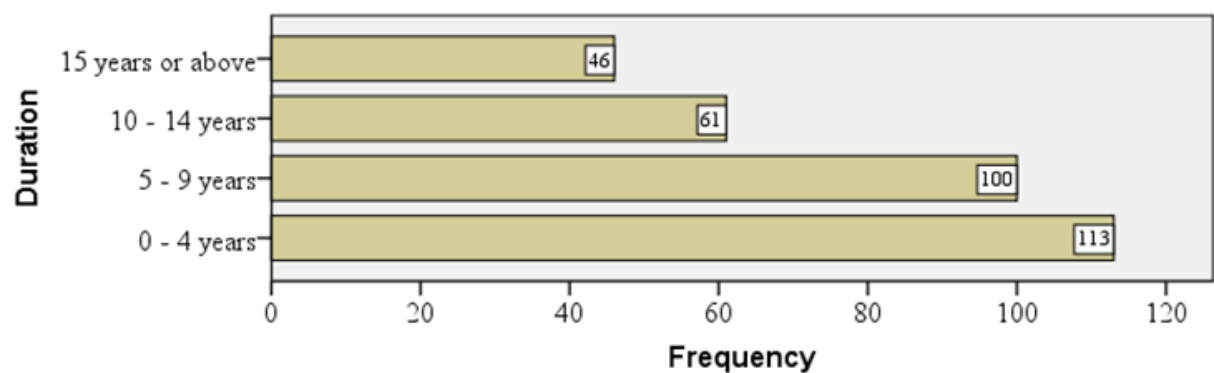


Fig. 4.3: How long have you lived in Dunkwa-On-Offin?

This responses to this question shows that 35.3% of the respondents settled in the community during the last four years when the rush for gold had increased and the illegal mining had intensified with the arrival of the Chinese miners.

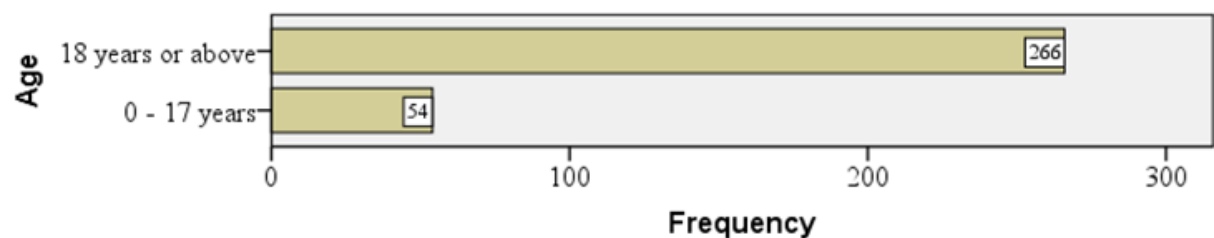


Fig. 4.4: Age of respondents

83.1% of the respondents comprising both male and female were 18 years or above. Whilst the remaining 16.9% were below 18 years. The inclusion of all sex and age group of the population was to ensure that the assessment of the impact of the illegal gold mining in the community was all inclusive. As will be seen later, a number of respondents within school-going age partook in the illegal mining activity in a way or another, most of whom had to drop out of school to fully partake in the activity.

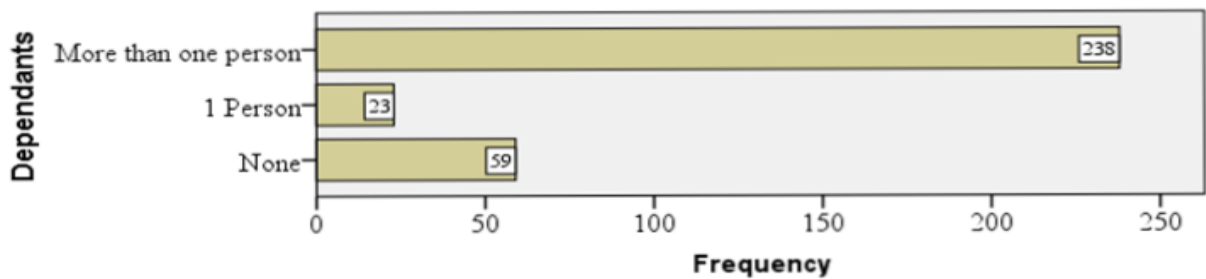


Fig. 4.5: Other than you, how many people live with you?

This question was asked to gain an insight into how the household size contributed to the illegal mining activity in the community. With larger family size came increased burden and responsibility to cater for the need of the dependent on the breadwinner. The 74.4% of the respondents claimed they lived with more than one person in the same household. In a community where there was little economic activities prior to the era of the massive exploitation of the metal, it is understandable that many of the residents would cash in on the boom to better their lots and ease the burden of responsibility on their shoulder.

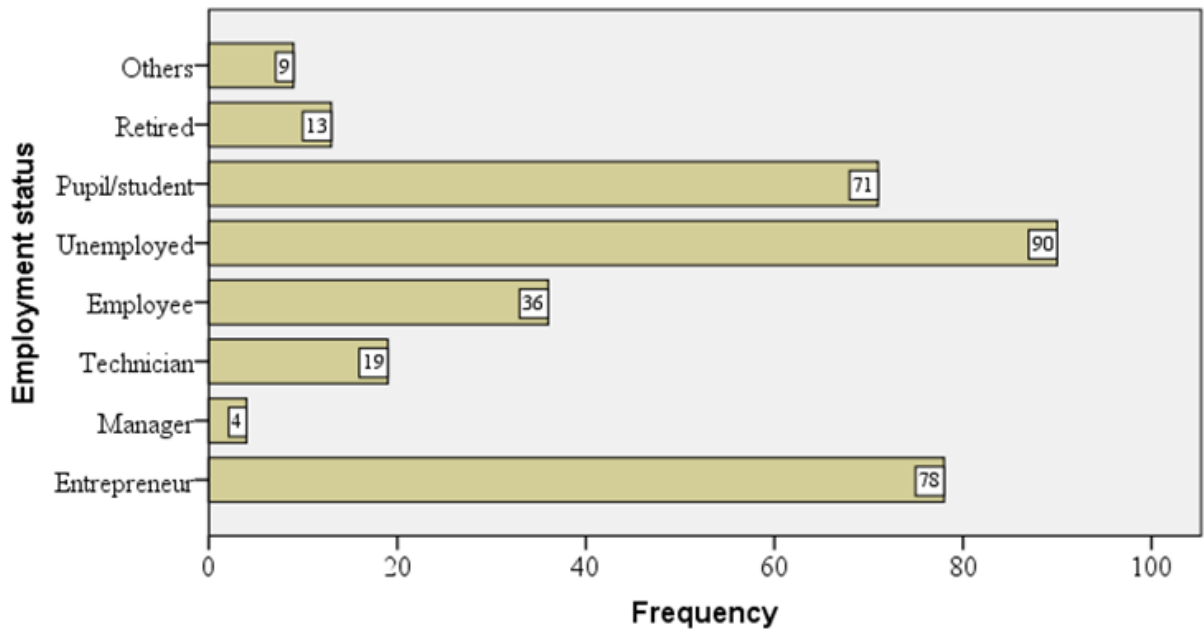


Fig. 4.6: Employment status

28.1%, 24.4%, and 22.2% of the respondents were respectively unemployed, entrepreneurs, and students. During the data collection process, the researcher whilst interacting with the respondents realized that majority of them were unemployed prior to the increased involvement in the illegal mining of gold in the community. Entrepreneurs as used here refers to anyone who runs his/her own business. Interestingly, majority of them who considered themselves entrepreneurs were those who engaged in petty trading. This has a direct bearing on the income level of the respondents as can be seen in Fig. 4.7.

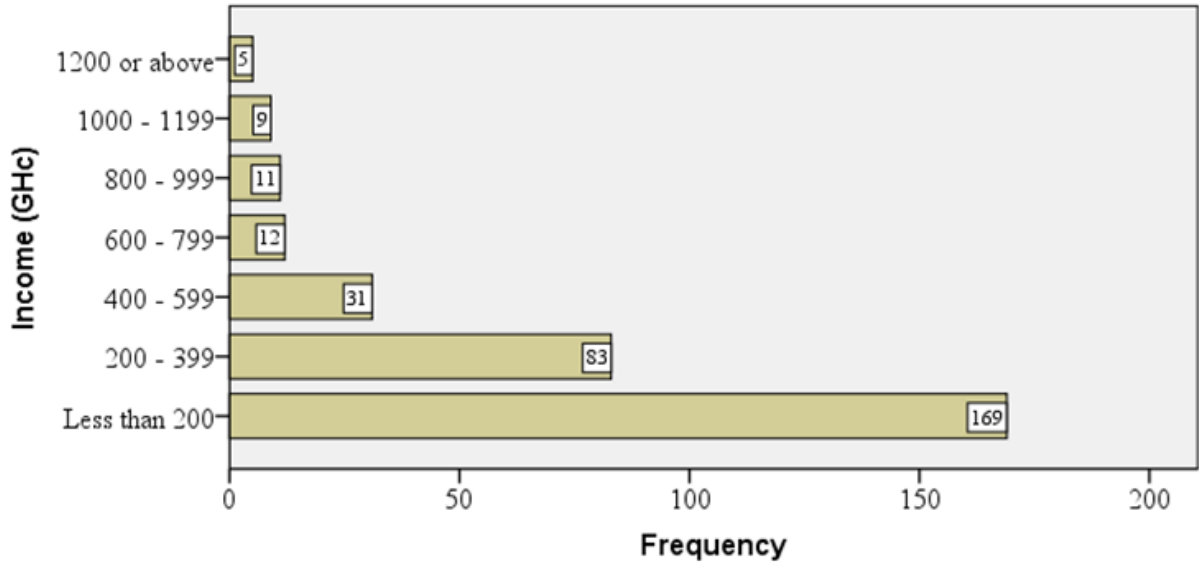


Fig. 4.7: Gross monthly income in Ghana Cedis

The approximate gross income as shown in Fig. 4.7 reveals that most of the respondents on the average earned less than the required national minimum wage of GHc9.68 announced by government on the 26th of June 2018 after a 10% increase (Yen.com, 2018). Considering that the Government of Ghana, in an attempt to curb illegal gold mining in all mining communities in Ghana, instituted a ban on all artisanal and small scale mining activity established a joint police-military task force to clamp down on the illegal miners early 2017 (Ghanaweb.com, 2018). At the time of the ban, the minimum wage was GHc8.80, which implied that expected minimum wage per month was pegged at GHc272.80. With this in mind and referring to the Fig. 4.7, it is clear that more than half the respondents earned far less than the minimum wage.

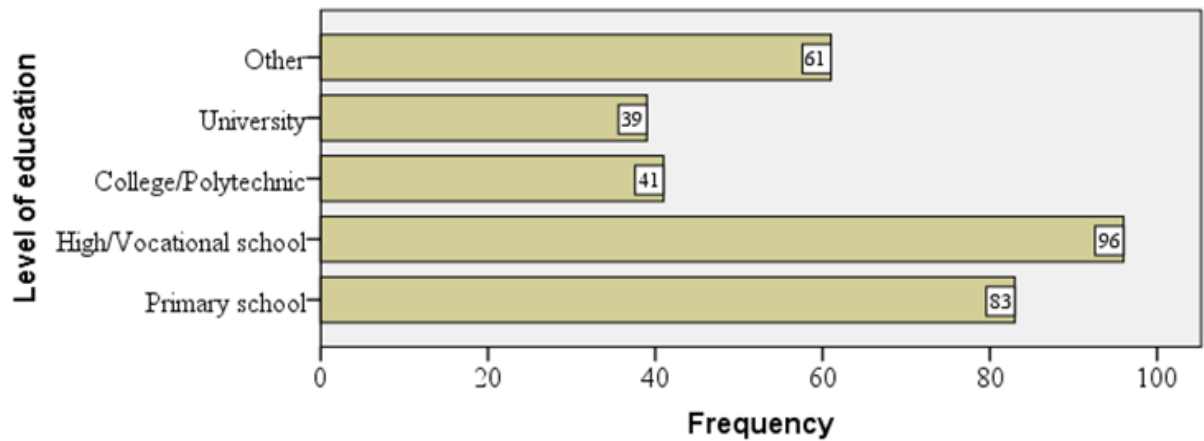


Fig. 4.8: Highest level of education attained

The level of education as can be seen in Fig. 4.8 played a very critical role in the involvement with illegal mining. ‘Others’ as used in the table refers to respondents who do not have any formal education. 45% of the respondents either had no formal education or ended their formal education at the primary level. For such people, it is evident that getting a well-paid white collar job is almost untenable. The only available option is either to establish their own business or risk the odds to taking the advantage of mining illegally.

4.5 FACTORS THAT TRIGGER ILLEGAL GOLD MINING

The respondents were required to indicate, based on their experience, how certain factors provided in the questionnaire triggered illegal gold mining in Dunkwa-On-Offin. These factors provided was based on literatures reviewed. The factors are poverty, lack of enforcement of laws against illegal gold mining, high cost of living, unemployment, illiteracy, age of miners, gender of miners, household size, greater desire to meet economic needs irrespective of risk, peer influence, bureaucratic administrative procedures in acquiring permit or concession, high cost of acquiring mining permit, and a lucrative black market for selling of gold illegally mined. Respondents were to indicate the level of these factors based on a Likert scale of 1–5. Where 1, 2, 3, 4, and 5 respectively indicated not important, less important, moderately important, important, and most important. Fig. 4.9 and Table 4.2 summarize the result of the findings.

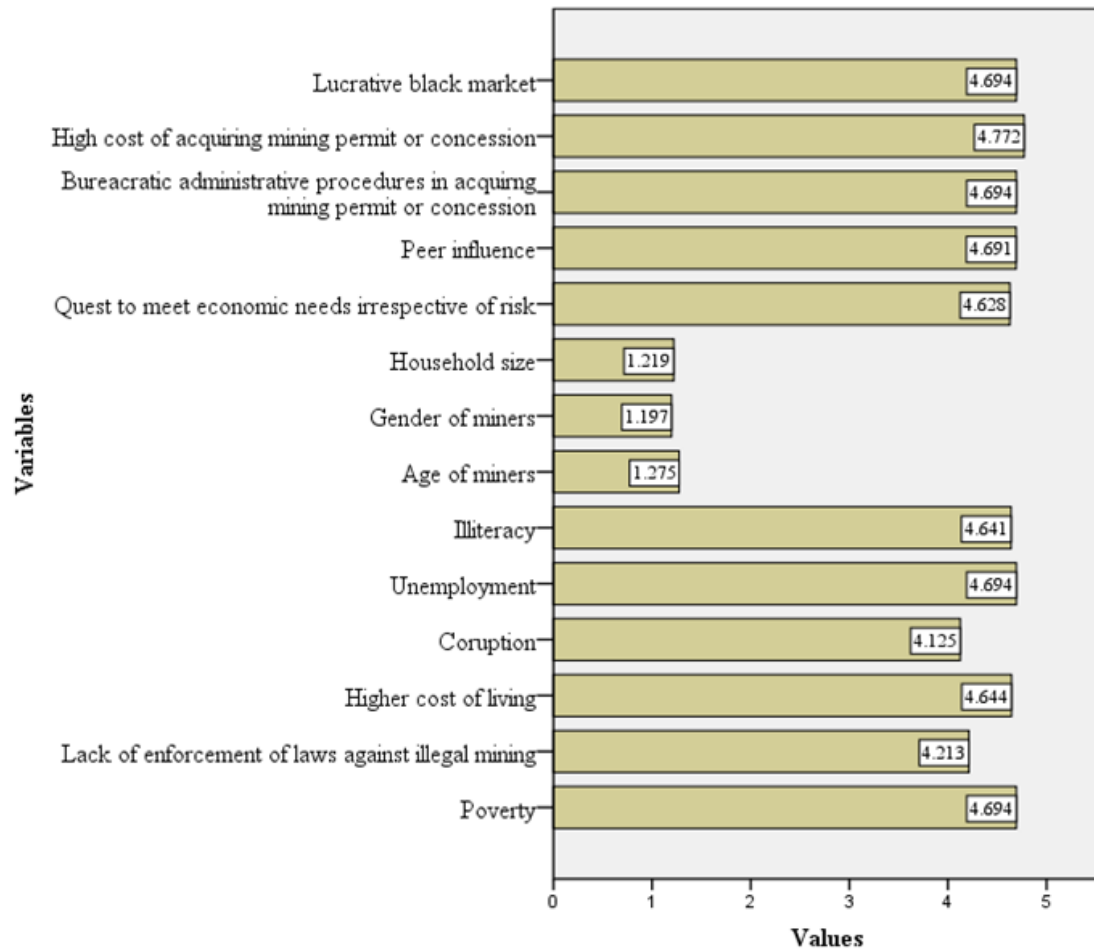


Fig. 4.9: Mean values of factors that trigger illegal gold mining

Factor	Mean Score	Ranking
High cost of acquiring mining permit or concession	4.772	1 st
Poverty	4.694	2 nd
Unemployment	4.694	2 nd
Lucrative black market	4.694	2 nd
Bureaucratic administrative procedures in acquiring mining permit	4.694	2 nd
Peer pressure	4.4691	3 rd
High cost of living	4.644	4 th
Illiteracy	4.641	5 th
Quest to meet economic needs irrespective of risk	4.628	6 th
Lack of enforcement of laws against illegal mining	4.213	7 th
Corruption	4.125	8 th
Age of miners	1.275	9 th
Household size	1.219	10 th
Gender of miners	1.197	11 th

Table 4.2: Mean score of factors that trigger illegal gold mining with ranking

Considering a Likert scale of 1 – 5 where the greater the scale, the more relevant or important the factor. The mean value of the scale from each variable 1 – 5 is 3. Any variable with a mean greater than 3 can be considered critical. With a mean values of 4.722, the most critical factor is the high cost of acquiring permit to mine. Poverty, unemployment, bureaucratic administrative procedures in acquiring mining permit or concession, and lucrative black market were all ranked the same with a mean value of 4.694. Peer influence was ranked the next critical followed by rising cost of living, illiteracy, quest to meet economic need against all odds, lack of enforcement of existing mining laws and corruption were ranked in the respective orders with means ranging

from 4.125 to 4.691. The remaining variables: household dependency, age, and gender were considered irrelevant, considering that their respective mean fell far below the average of 3.0.

4.5.1 Discussion of factors that trigger illegal gold mining

Poverty plays a very important role in determining whether people took part in illegal gold mining or not. Two hundred and thirty (230) out of three hundred and twenty (320) of the respondents representing 73.1% ranked poverty a very high trigger to illegal mining. Prior to the intensification of mining in the area, farming activity was a major source of generation of income for the residents of the community. According to the official Central Region government website, centralregion.gov.gh, about 60%-65% of the working population engaged in vibrant farming while only 15% engage in small scale mining and 10% could be found in trading and other varied economic activities. The situation however changed as the economic boom in the illegal mining gave rise to the rush into the illegal mining section. As at the period when this research was conducted, most of those who relied on farming had abandoned their farming activity. In the first place, the age-long primary source of livelihood for the community was neglected. By 2017 when the government imposed a ban on all activities that can be linked to artisanal and small scale mining, a lot of the farmlands have been destroyed.

Failure to enforce existing laws was seen as a contributing factor to illegal gold mining. Two hundred and twenty-two (222) respondents, representing 69.4% chose the scale 4 (higher) whilst 88, representing 27.5%, other respondents chose the fifth scale (highest). The attempt to control the menace of illegal gold mining only came later when the level

of destruction of water bodies, farmland and the ecosystem had gone critical. It is believed that had the government taken a step to check the activities of illegal mining, the negative social and environment impact would have been minimal.

Similar to the level of poverty is the higher cost of living. With the boom in the activities of the illegal gold mining came the enhancement of a lot of business transactions and economic prospects within the mining towns. This lead to the migration of people to the mining communities. The demand for goods and services increased considerably. Close to 99% of the respondents attribute the rank of this factor highly.

Corruption at all level was seen as another factor that spurred the activities of the illegal gold mining. According to the respondent who spoke to the interviewers, they claimed that the dishonest and fraudulent act by those in power, typically involving bribery was traced to the way those who had the money to pay bribe could easily acquire permit to enter into small scale mining without supervision. There have been reported cases of where officials who are supposed to check illegal gold are rather implicated in bribery scandals.

Illiteracy and unemployment as can be seen in Fig. 4.9 has a link with the level of income and economic independence. Both variables were considered to play key roles in the rush for gold in the last four years in the mining communities, including Dunkwa-On-Offin. There are fewer job available as the dominant forms of occupations in the municipality are mining, farming, and trading. Trading is mainly carried out in the urban town which is Dunkwa. Small scale mining is an activity engaged in almost all the towns within the municipality.

Although respondents are quite aware of the dangers and risks of illegal mining to include dying from explosions, cave-ins and equipment accidents, exposure to fatal and chronic conditions that are linked to their toxic work environment. The strong quest to meet economic needs irrespective of the risks or danger associated with mining as a factor is evident in the response gathered from the questionnaire. 213 respondents, representing 66.6% strongly associate the desire to make ends meet irrespective of whatever risks is attached a significant driving force to entering into illegal mining. 99 others, representing 30.9% of the respondents share the same opinion but not as strong as the majority. In all, the total of 312 respondents, representing 97.5% of the entire respondents agree to a great extent that the factor is key.

Fig. 4.9 shows that peer influence played a role in the decision for individuals to venture into illegal gold mining in the municipality. The more the number of family and friends already engaged in illegal mining, the more the tendency for one to join in the venture, considering the gains. 225 respondents, representing 70.3% strongly believe that peer influence as an important factor for joining illegal mining. 92 others, representing 28.8% of the respondents share the same opinion on a slightly lower scale. In all, the total of 317 respondents, representing 97.5% of the entire respondents agree to a great extent that the factor is key. This result is in agreement with the findings of a similar study undertaken by Adu, Amponsah and Asantewaa, 2016.

Although the Minerals Commission of Ghana has repeatedly stated that its procedure for granting small-scale mining license to mine is neutral, transparent and based on merit, the illegal miners argue otherwise. According to 234 respondents, representing 73.1%, the bureaucratic administrative procedures in acquiring mining permit or concession is one of

the key factors why they practice illegal mining instead of following the required procedure to first acquire permit to be able to mine gold. This factor can be linked to the points bothering on corruption by state institutions and agencies in charge of mining. Other than the procedure for acquiring the permit, cost of acquiring mining permit in itself was a matter of concern to the respondents. Over 78% of them complained about the cost of acquiring the permit. They argue that the cost was just too exorbitant and intended to keep them away from mining the gold in their community. Considering other factors, they stated that the only option they had was to venture into the sector illegally.

One practice common to all mining communities is the ease with which the illegally mined gold is sold. Majority of the illegal miners sell the gold they get from mining on site to individuals with ready cash. There are private companies and established institutions and agencies that buy the gold on behalf of government for processing and export. Such companies, agencies and institutions include Precious Minerals Marketing Company (PMMC) Limited and Duty Free Lounge or Diamond House, Accra. However, the miners do not sell their products to them. The reason for this is obviously the strong presence of a black market ready to buy the gold even at higher prices. Considering the background of the miners and for want of quick cash, these illegal miners, in selling the gold onsite promote a chain of black marketers who move from one mining site to the other to buy gold at cheaper prices. Over 73% of the respondents attribute the ease with which they can easily and quickly sell their findings an enticing factor contributing to the boom in illegal mining.

4.6 SOCIAL EFFECTS OF ILLEGAL GOLD MINING

With respect to the social effects of illegal gold mining, the respondents indicated how illegal mining affected the cost of living, business opportunities, rate of crime, rate of Illiteracy, school dropouts, health, economic conditions, migration, farming, water portability, teenage pregnancies, human rights, and land degradation as found in literatures during the review. The response was based on a Likert scale of 1 – 5, where unlike the factors that triggered illegal gold mining which ranked the scale from least to highest, the scale for effects were ranked from not important to most important. Fig. 4.10 and Table 4.3 summarize the result of the findings.

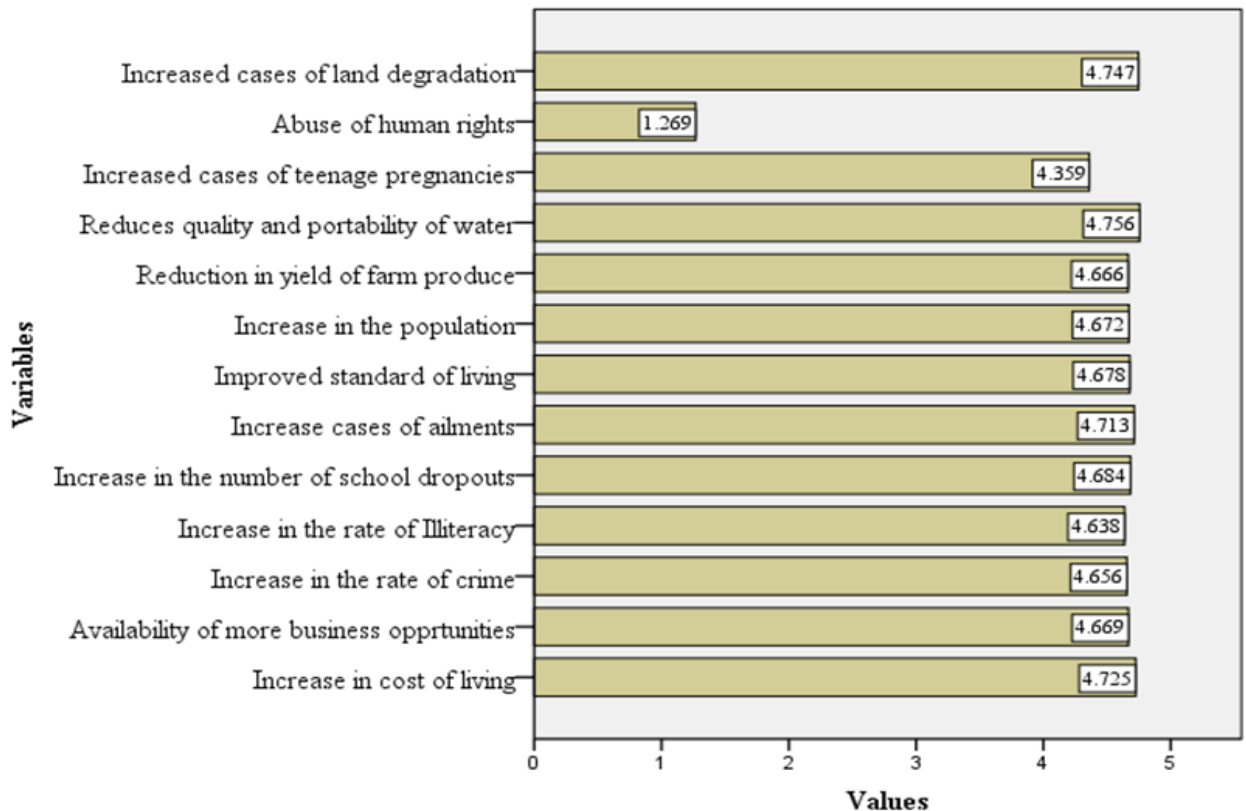


Fig. 4.10: Mean values of social effects of illegal gold mining

Factor	Mean Score	Ranking
Reduces quality and portability of water	4.756	1 st
Increased cases of land degradation	4.747	2 nd
Increase in cost of living	4.725	3 rd
Increase cases of ailment	4.713	4 th
Increase in the number of school dropouts	4.684	5 th
Improve standard of living	4.678	6 th
Increase in population	4.672	7 th
Availability of more business opportunities	4.669	8 th
Reduction in yield of farm produce	4.666	9 th
Increase in the rate of crime	4.656	10 th
Increase in the rate of illiteracy	4.638	11 th
Increase cases of teenage pregnancies	4.359	12 th
Abuse of human rights	1.269	13 th

Table 4.3: Mean score of social effects of illegal gold mining with ranking

As explained in the immediate previous section, the higher the value of the mean, the most important the factor considered and vice versa. A critical look at the Fig. 4.9 reveals that the most critical effect is the reduction in quality and portability of water with a mean value of 4.786. Other than the abuse of human rights which had the lowest mean ranking of 1.269, all the other effects had average mean from 4.359 to 4.756. For the purpose of this analysis, the least critical effect is to be considered irrelevant and excluded in the description of the social effects of gold mining in Dunkwa-On-Offin.

4.6.1 Discussion of Social Effects of Illegal Gold Mining

With increased activity in illegal mining in the last few years came the boost in economic activities followed by the expansion of business opportunities, and the improvement in the standard of living. All these geared towards the improvement of the wellbeing of the people in the mining community and the macro economy at large. For the people in the mining communities, however, this has led to the increase in cost of living. At the initial stage of the research, prior to collecting empirical data, the researcher undertook a survey of comparing the prices of common goods in a number of mining communities in the Central, Eastern and Ashanti Region. The outcome was obvious – prices of consumables in all the mining communities visited were significantly higher compared to places where there were no mining activities. Also prior to the commencement of data collection for this study, interactions between the prospective respondents and the researcher during the pilot stage of the study also confirmed the fact that the cost of living in mining community is relatively higher when compared to similar settings where no mining activities are taking place. Analysis of the empirical data collected by the questionnaires shows that 237, representing 74.1% of the valid sample indicated that the increase in the mining activities in the area has amongst other factors increased the cost of goods and services, thereby increasing the cost of living in the community.

The Ministry of Local Government and Rural Development (2013), stated that there has been significant reduction in the reported cases of robbery or thievery in the communities where illegal gold mining activities are undertaken. This the Ministry attributes to the fact that majority of energetic youth who would have otherwise engaged in these social vices had rather resorted to illegal gold mining. Two hundred and twenty-four (224) and eighty

three (83) representing seventy percent (70%) and twenty-five point nine percent (25.9%) respectively considered ‘most important’ and ‘important’ the reduction in crime rate as an impact of illegal gold mining in the community.

Although this study did not attempt to determine the number of children who drop out of school to engage in the illegal gold mining activities, there has been documented report that a great number of children drop out of school for the purpose of engaging in the activity. Seventy-one point nine percent (71.9%) of the respondents admitted that the mining activities had a toll on the commitment to education with respect to dropping out of school. Dropping out of school, especially at the basic level, has a direct impact on the level of literacy.

One of the critical impact of illegal mining is eminent on health. Statistics from the Inspectorate Division of the Minerals Commission on occupational health problems caused by mining activities from 2000-2004 includes malaria and upper respiratory tract infection, the two topmost causes of outpatient morbidity between 2000-2006 (Ghana Health Service, 2007). Quite enlightening on the indicators of diseases is the inclusion of sexually transmitted diseases. Most mining towns in Ghana harbour a number of commercial sex workers, some of whom migrate to these towns in search of jobs or with the intention of trading, the failure of which compels them to turn to prostitution as the last resort. The trend for reported cases of HIV in mining communities has been on the increase since 1992. It is believed that the growing incidence of HIV cases in the mining communities is due to the increased reported cases of sex trade in the area, which could be traced to the concentration of mining companies in the area.

Just like many other mining communities, increase in the population of Dunkwa-on-Offin is partly attributed to illegal mining. Figure 4.11, extracted from the District Analytical Report of the Upper Denkyira East Municipality prepared by the Ghana Statistical Service (2010) shows that, the population among urban and rural localities are 35,790 (49.2%) and 37,020 (50.8%) respectively. This shows that majority of the population in the Municipality reside in the rural communities. Rural dwellers are slightly higher and this may be attributed to the predominance of mining and farming activities in the rural area.

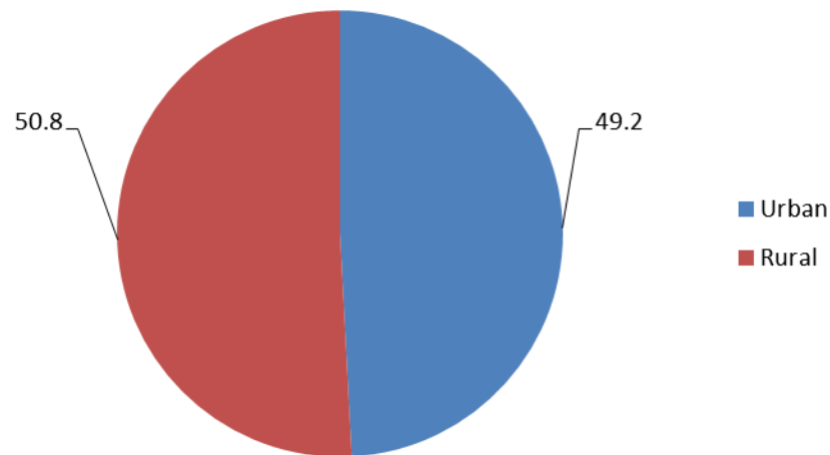


Figure 4.11: Population Distribution by locality

Source: Ghana Statistical Service, 2010 Population and Housing Census

With respect to the empirical data collected 231(72.2%) of the respondents strongly link the emigration of people to the community to the illegal gold mining operations.

The number of people who actively engaged in farming has significantly reduced since the coming into full gear of illegal mining. This is primarily due to the higher economic gains and the ease with which income is realized with illegal mining than farming.

Reports indicate that in most cases, farmers convert their farmlands to mining sites for the exploration of gold. This clearly translate into reduction in farming activities and yield of crops. 218 (68.1%) of the respondents strongly acknowledge how significant illegal mining had negatively impacted farming activities and the yield of crops in the mining communities.

The impact of illegal mining on the quality and portability of water as well as degradation of land in Dunkwa-On-Offin, just like all other mining communities, cannot be overemphasised. The imminent threat of Ghana's water resources running dry in a few years was emphasised by the Ghana Water Company as a warning of what the future of the water bodies in Ghana might become if urgent steps were not taken to stop the activities and operations of the illegal gold miners. The situation got worse in 2016 when water treatment plants were being shut down one after the other almost every time, due to the pollution, largely by the activities of illegal gold miners.

The respondents indicated that there has been an increase in the cases of teenage pregnancies reported in the community. On a Likert scale of 1 – 5, 198 (61.9%) and 119 (37.2%) of the respondents respectively ranked the effect as 'important' and 'most important'. Although this variable may not be a direct but rather an indirect impact, the fact remains that the illegal mining activities has boosted economic activities in the community. This boost has led to the influx of people from other communities, region, and countries to the mining communities. With such alarming influx comes many social vices. Increased cases of teenage pregnancies is a result of such change in dynamics of any society.

The abuse of human rights, such as child trafficking into mining communities for cheap labour was considered least of all the impacts with only 8 people, representing 5.6% ranking the impact from 3 to 5.

4.7 WAYS TO CURB ILLEGAL GOLD MINING

Twelve (12) variables or questions were provided in this section of the questionnaire. They are identification and protection of areas most susceptible to illegal gold mining; establishment of police-military task-force; implement policies to regulate the small-scale mining sector; creation of alternative source of employment such as agriculture; imposition of sanctions aimed at deterring illegal mining; empowering the Environmental Protection Agency (EPA), the Forestry Commission (FC) and other regulatory bodies to effectively manage the environment; provision of training and technical support on how to mine properly; formation of a community-based task force to monitor illegal mining activities and report to appropriate authorities for immediate action; intensifying stakeholder training and public education on the effect of illegal mining; restructuring the Minerals Commission to be proactive and responsive technically to technological changes in the small scale sector; caution, if not prosecute chiefs who offer lands to illegal miners; and provide financial reward to whistle blowers within illegal mining communities.

Just like the other two sections discussed above, the respondents were required to indicate, based on their experience, how the aforementioned variables in the questionnaire, if adopted could curb illegal gold mining operations in Dunkwa-On-Offin. Respondents were to indicate the level of importance of the proposed variables based on

a likert scale of 1–5. Where 1, 2, 3, 4, and 5 respectively indicated not important, less important, moderately important, important, and most important. Fig. 4.11 and Table 4.4 summarise the result of the findings.

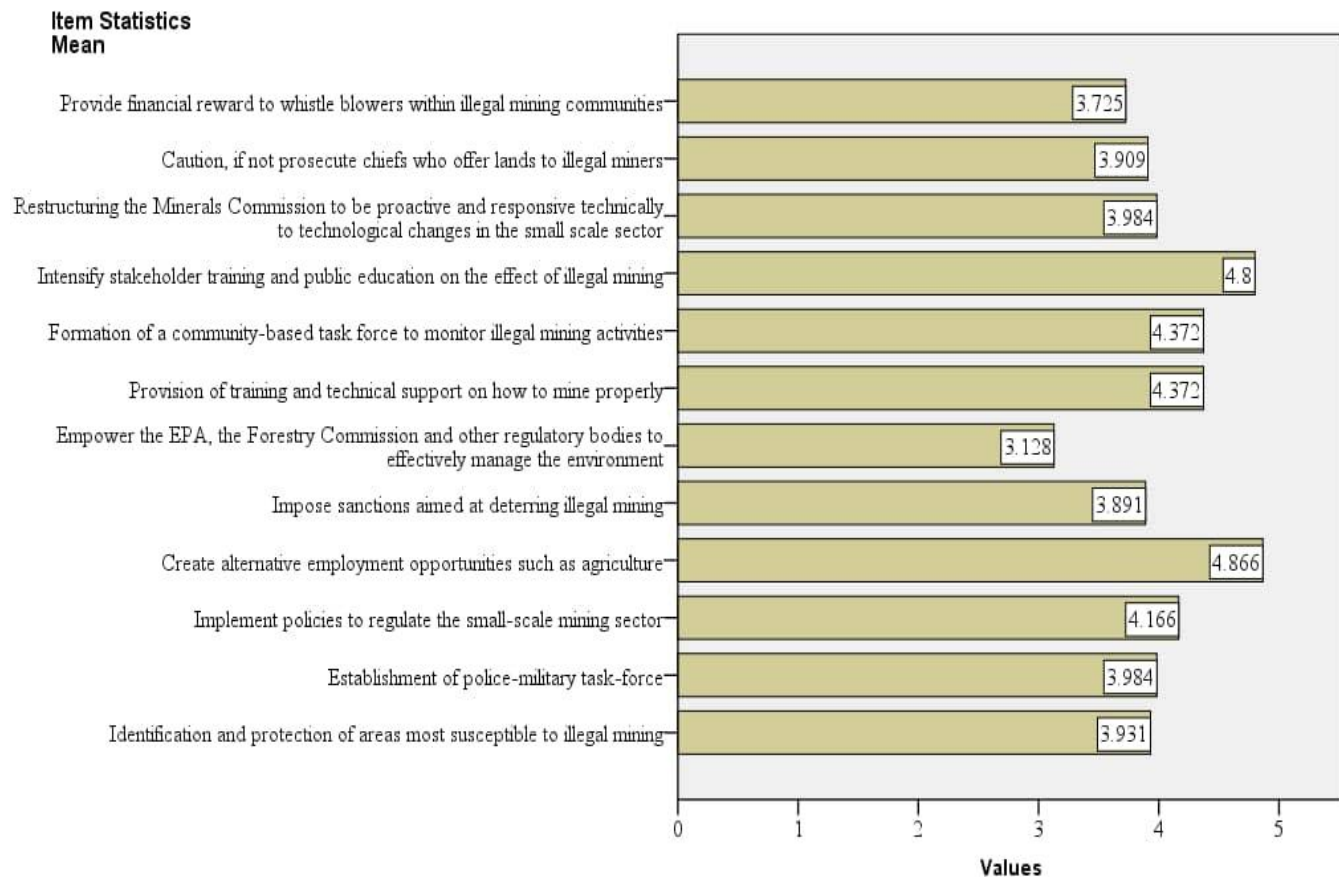


Fig. 4.11: Mean values of ways to curb illegal gold mining

Variables	Mean Score	Ranking
Create alternative employment opportunities such as agriculture	4.866	1 st
Intensify stakeholder training and public education	4.800	2 nd
Formation of a community based task force to monitor illegal gold mining activities	4.372	3 rd
Provide training and technical support on how to mine properly	4.372	3 rd
Implement policies to regulate the small-scale mining sector	4.166	4 th
Establishment of police-military task force	3.984	5 th
Restricting the minerals commission to be proactive and responsive technically to technological changes in the small scale sector	3.984	5 th
Identification and protection of area most susceptible to illegal gold mining	3.931	6 th
Prosecute chiefs who offer lands to illegal miners	3.909	7 th
Impose sanctions aimed at deterring illegal mining	3.891	8 th
Provide financial reward to whistle blowers within illegal mining communities	3.725	9 th
Empower the EPA, the Forestry Commission and other regulatory bodies to effectively manage the environment	3.128	10 th

Table 4.4: Mean values of ways to curb illegal gold mining with ranking

With a mean value of 4.866, the most critical factor is the creation of alternative source of employment such as agriculture. This is followed by the intensification of stakeholder training and public education that has a mean value of 4.8. The formation of a community-based task force to monitor illegal mining activities and the provision of technical support on how to mine responsibly are both ranked the same with a mean value of 4.372. The next in ranking is strict implementation of existing policies on the

regulation of the small-scale mining sector with a mean value of 4.166. The establishment of police-military task force and the restructuring of Minerals Commission to be proactive and responsive technically to technological changes in the small scale sector both have an average mean of 3.984. The remaining variables, beginning with the identification and protection of areas most susceptible to illegal mining, have mean values ranging from 3.391 to 3.128 were ranked the less important, with the suggestion that the EPA, the Forestry Commission and other regulatory bodies be empowered to effectively manage the environment being the least.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter is aimed at presenting the conclusion, brief summary of findings and the limitations of the research. Recommendations that would potentially help the government to curb the menace created by illegal gold mining in recent time from the view point of the researcher are also presented.

5.2 FINDINGS

5.2.1 Factors that Trigger Illegal Gold Mining

The following factors were discovered as the cause of illegal gold mining; Lack of enforcement of laws against illegal gold mining, high cost of living, unemployment, illiteracy, age of miners, gender of miners, household size, greater desire to meet economic needs irrespective of risk, peer influence, bureaucratic administrative procedures in acquiring permit or concession, high cost of acquiring mining permit, and a lucrative black market for selling of gold illegally mined. Two hundred and thirty (234) out of three hundred and twenty (320) of the respondents representing 73.1% ranked poverty a very high trigger to illegal mining. The study found out that 60%-65% of the working population engaged in vibrant farming while only 15% engage in small scale mining and 10% could be found in trading and other varied economic activities. By 2017, when the government imposed a ban on all activities that can be linked to artisanal and small scale mining, a lot of the farmlands have been destroyed. Failure to enforce existing

laws was seen as a contributing factor to illegal gold mining. Close to 99% of the respondents ranked migration very highly. Corruption at all level was seen as another factor that spurred the activities of the illegal gold mining. There have been reported cases of where officials who are supposed to check illegal gold miners are rather implicated in bribery scandals.

Illiteracy and unemployment has a link with the level of income and economic independence. Both variables were considered to play key roles in the rush for gold in the last four years. There are fewer job available as the dominant forms of occupations in the municipality are mining, farming, and trading. Trading is mainly carried out in the urban town which is Dunkwa. Small scale mining is an activity engaged in almost all the towns within the municipality.

The strong quest to meet economic needs irrespective of the risks or danger associated with mining as a factor is evident in the response gathered from the questionnaire. A total of 213 respondents, representing 66.6% strongly associate the desire to make ends meet irrespective of whatever risks is attached a significant driving force to entering into illegal mining. 99 others, representing 30.9% of the respondents share the same opinion but not as strong as the majority. In all, the total of 312 respondents, representing 97.5% of the entire respondents agree to a great extent that the factor is key. Peer influence played a role in the decision for individuals to venture into illegal gold mining in the municipality. 225 respondents, representing 70.3% strongly believe that peer influence is an important factor for joining illegal mining. 92 others, representing 28.8% of the respondents share the same opinion on a slightly lower scale. In all, the total of 317 respondents, representing 97.5% of the entire respondents agree to a great extent that the

factor is key. According to 234 respondents, representing 73.1%, the bureaucratic administrative procedures in acquiring mining permit or concession is one of the key factors why they practice illegal mining instead of following the required procedure to first acquire permit to be able to mine gold. Over 78% of them complained about the cost of acquiring the permit. They argue that the cost was just too exorbitant and intended to keep them

5.2.2 Social Effects of Illegal Mining

With respect to the social effects of illegal gold mining, the respondents indicated how illegal mining affected the cost of living, business opportunities, rate of crime, rate of Illiteracy, school dropouts, health, economic conditions, migration, farming, water portability, teenage pregnancies, human rights, and land degradation. With increased activity in illegal mining in the last few years came the boost in economic activities followed by the expansion of business opportunities, and the improvement in the standard of living. Analysis of the empirical data collected by the questionnaires shows that 237, representing 74.1% of the valid sample indicated that the increase in the mining activities in the area has amongst other factors increased the cost of goods and services, thereby increasing the cost of living in the community.

There has been significant reduction in the reported cases of robbery or thievery in the communities where illegal gold mining activities are undertaken. This the Ministry attributes to the fact that majority of energetic youth who would have otherwise engaged in these social vices had rather resorted to illegal gold mining. Two hundred and twenty-four (224) and eighty three (83) representing seventy percent (70%) and twenty-five point

nine percent (25.9%) respectively considered ‘most important’ and ‘important’ the reduction in crime rate an impact of illegal gold mining in the community.

A great number of children dropped out of school for the purpose of engaging in the activity. Seventy-one point nine percent (71.9%) of the respondents admitted that the mining activities had a toll on the commitment to education with respect to dropping out of school. Dropping out of school, especially at the basic level, has a direct impact on the level of literacy.

One of the critical impact of illegal mining is eminent on health. Occupational health problems caused by mining activities from 2000-2004 includes malaria and upper respiratory tract infection, the two topmost causes of outpatient morbidity between 2000-2006 (Ghana Health Service,2007). Quite enlightening on the indicators of diseases is the inclusion of sexually transmitted diseases, reported cases of HIV has been on the increase since 1992. Just like many other mining communities, increase in the population of Dunkwa-on-Offin is partly attributed to illegal mining.

The number of people who actively engaged in farming has significantly reduced since the coming into full gear of illegal mining, due to high economic gains and the ease with which income is realized with illegal mining than farming. Reports indicate that in most cases, farmers convert their farmlands to mining sites for the exploration of gold. This clearly translates into reduction in farming activities and yield of crops. 218 (68.1%) of the respondents strongly acknowledge how significant illegal mining had negatively impacted farming activities and the yield of crops in the mining communities. The impact of illegal mining on the quality and portability of water as well as degradation of land in

Dunkwa-On-Offin, just like all other mining communities, cannot be overemphasised. The abuse of human rights, such as child trafficking into mining communities for cheap labour was considered least of all the impacts with only 8 people, representing 5.6%.

5.2.3 Ways to Curb Illegal Gold Mining

The following are recommended to help curb illegal gold mining in Dunkwa-On-Offin, and by extension, to all other mining communities.

- Identification and protection of areas most susceptible to illegal gold mining;
- Establishment of police-military task-force;
- Implement policies to regulate the small-scale mining sector;
- Creation of alternative source of employment such as agriculture;
- Imposition of sanctions aimed at deterring illegal mining; empowering the EPA, the Forestry Commission and other regulatory bodies to effectively manage the environment;
- Provision of training and technical support on how to mine properly;
- Formation of a community-based task force to monitor illegal mining activities and report to appropriate authorities for immediate action;
- Intensifying stakeholder training and public education on the effect of illegal mining;
- Restructuring the Minerals Commission to be proactive and responsive technically to technological changes in the small scale sector; caution, if not prosecute chiefs who offer lands to illegal miners; and
- Provide financial reward to whistle blowers within illegal mining communities.

5.3 CONCLUSION

This thesis sought to assess the social impacts of illegal gold mining activities at Dunkwa-On-Offin, the capital town of Upper Denkyira East Municipality in the Central Region of Ghana. The research main objectives are to identify factors that trigger illegal mining; to identify social effects of illegal mining activities on inhabitants of Dunkwa-on-Offin; and to suggest effective ways in curbing illegal mining activities.

This study is very important considering that its timing coincides with a time the government is highly in quest for a lasting solution to the menace of illegal gold mining nationwide. Based on the approach to data collection, this study adopts both the quantitative and qualitative approach. On the other hand, based on the approach to data analysis, this study adopted the inductive approach. The result of the analysis, using the SPSS, indicated that poverty, lack of enforcement of laws against illegal gold mining, high cost of living, unemployment, illiteracy, age of miners, gender of miners, household size, greater desire to meet economic needs irrespective of risk, peer influence, bureaucratic administrative procedures in acquiring permit or concession, high cost of acquiring mining permit, and a lucrative black market for selling of gold illegally mined are factors that triggered illegal gold mining. The social effects of illegal gold mining included increase in cost of living, availability of more business opportunities, increase in the rate of crime, increase in the rate of Illiteracy, increase in the number of school dropouts, increase cases of ailments, improved standard of living, increase in the population of residents in Dunkwa-on-Offin, affected farming activities, reduction in yield of farm produce, reduction quality and portability of water, increased cases of

teenage pregnancies, increase in reported cases of abuse of human rights and increased cases of land degradation.

Last but not least, the proposed recommendations for curbing illegal mining are identification and protection of areas most susceptible to illegal mining, establishment of police-military task-force, implementation policies to regulate the small-scale mining sector, creation of alternative employment opportunities such as agriculture, impose sanctions aimed at deterring illegal mining,

empower the EPA, the Forestry Commission and other regulatory bodies to effectively manage the environment, provision of training and technical support on how to mine properly, formation of a community-based task force to monitor illegal mining activities, intensify stakeholder training and public education on the effect of illegal mining, restructuring the Minerals Commission to be proactive and responsive technically to technological changes in the small scale sector, prosecute chiefs who offer lands to illegal miners, and provide financial reward to whistle blowers within illegal mining activities.

5.3 RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made:

- It was established that the absence of unemployment for most youth at Dunkwa – on-Offin triggered them to indulge in illegal gold mining activities, hence, it is recommended that the government should deliberately create additional alternative sources of employment such as encouraging the youth to actively engage in agriculture and other forms of sustainable livelihood;

- Also, it was observed that some chiefs practice illegal gold mining and give out lands in exchange for huge sums of money and other favours. The researcher recommends that other than merely cautioning chiefs against issuing out lands to people suspected to engage in illegal gold mining, government should establish district courts in the various mining communities to prosecute illegal gold miners including chiefs; and
- Finally, it was revealed that most illegal gold miners when caught, have more than enough funds to bail themselves out when granted bail, in view of this it is recommended that stringent sanctions be imposed to perpetrators aimed at deterring them from illegal gold mining activities.

5.4 LIMITATIONS OF STUDY

This section presents the limitations of the study:

- One of the reasons can be linked to the challenge with language barrier. Not so many of the respondents could speak and write English. For such respondents, the researcher with the help of three assistants in the community who served as guides and interpreters had to read and explain each of the questions to the understanding of the respondents before they could answer them.
- For the respondents who were assisted to complete the questionnaire, the researcher collected all the questionnaires. The difference in the number of questionnaires issued to that received was traced to those who had to take the questionnaire and promised to return them in a later time when they had time to fill them, which they failed to do.
- After going through the 344 questionnaires collected, the researcher discarded 24 because they were not properly filled. In most instances, the respondents chose more than one

Likert scale in the option. In the end, responses from 320 were analysed, representing 84.2%. Fig. 4.1 summaries the response rate of the research instrument.

- This exercise which lasted for 8 days was not only laborious but also required a lot of time and patience, however, there was limited time set by the institution for the submission of the draft of the thesis.
- With respect to social impacts of illegal gold mining, only minimal number of recent related relevant literatures were available as compared to literature on economic and environmental impacts.

5.5 DIRECTION FOR FUTURE RESEARCH

The researcher proposes that further studies should be conducted on how project management practices can be applied to enhance the artisanal and small scale mining industry in the country.

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APPENDIX

Appendix I: Introductory Letter

Judith Selassie Garr

P.O .Box KN 4327

Accra

Dear Respondent,

COLLECTION OF DATA

I am pursuing a Masters' degree in Project Management at the Kwame Nkrumah University of Science and Technology, KNUST. As part of the requirement for the award of the degree, I am undertaking a research on:

ASSESSING THE SOCIAL EFFECTS OF ILLEGAL GOLD-MINING ACTIVITIES AT DUNKWA-ON-OFFIN

I'm therefore seeking your assistance to fill the questionnaires attached. The response you will provide will be used for research purpose only and your identity will remain confidential.

Your co-operation will be appreciated.

Yours faithfully,

Judith Selassie Garr

Appendix II: Questionnaire

SECTION A: BACKGROUND DATA

1. Gender ☐ Female ☐ Male
2. For how long have you lived in Dunkwa-On-Offin?
☐ 0 - 4 years
☐ 5 - 9 years
☐ 10 - 14 years
☐ 15 years and above
3. Age ☐ 0 - 18 years ☐ 18 years and above
4. Other than you, how many people live in your household?
☐ None
☐ one person
☐ More than one person
5. Employment and Professional Status

<input type="checkbox"/> Entrepreneur	<input type="checkbox"/> Student
<input type="checkbox"/> Manager / Professional	<input type="checkbox"/> Pupil
<input type="checkbox"/> Technician /associate professional	<input type="checkbox"/> Retired
<input type="checkbox"/> Employee	<input type="checkbox"/> Other, please specify
<input type="checkbox"/> Unemployed	_____
6. Gross monthly income (*an estimate of the combined monthly income of your household in Cedi*)

[] Less than 100

[] 200 – 499

[] 1,000 – 2,999

[] 100 – 199

[] 500–999

[] 3,000 Cedis or more

7. Education (*The highest level of education completed*)

☐ Primary school

[] University

[] High school or vocational school

[] Something else, please specify

[] College or Polytechnic

8. What is the field of your vocational or higher education?

[] Education /teaching

[] Health care and social services

[] Arts and Humanities

☐ I don't have a vocational education

[] Business and economics

☐ Something else, please specify

[] Tourism and/or catering

[] Transports

[] Social sciences

[] Natural sciences, mathematics and statistics

[] Technical education

[] Agriculture and forestry

SECTION B: FACTORS THAT TRIGGER ILLEGAL GOLD MINING

9. Based on your experiences, how does each of the following factors trigger illegal gold mining in Dunkwa-on-Offin? Please indicate the level of by ticking the appropriate boxes.

1= Least 2 = Lower 3 = High 4 = Higher 5 = Highest

Factors	1	2	3	4	5
Poverty					
Lack of enforcement of laws against illegal gold mining					
Higher cost of living					
Corruption					
Unemployment					
Illiteracy					
Age of miners					
Gender of miners					

Household size					
Greater need to meet economic need irrespective of risk					
Peer influence					
Bureaucratic administrative procedures in acquiring permit or concession					
High cost of acquiring permit concession					
Lucrative black market					
<i>If other (please specify)</i>					

SECTION C — SOCIAL EFFECTS OF ILLEGAL GOLD MINING

10) Based on your experiences, how does illegal gold mining in Dunkwa-on-Offin affect each of the following factors? Please indicate the level of importance by ticking the appropriate boxes.

1=not important, 2=less important 3= moderately important, 4 =important, 5=most important.

	1	2	3	4	5
Increase in cost of living					
Availability of more business opportunities					
Increase in the rate of crime					
Increase in the level of unemployment					
Increase in the rate of illiteracy					
Increase in the number of school dropout					
Increased cases of health conditions					
Improve standard of living					
Increase in the population of residents in Dunkwa-on-Offin					
Affects farming activities and reduces yield of farm produce					
Reduces quality and portability of water					
Increased cases of teenage pregnancies					
Increase in reported cases of abuse of human rights					
Increased cases of land degradation					
<i>If other (please specify)</i>					

SECTION D — WAYS TO CURB ILLEGAL GOLD MINING

11) Based on your experiences, what should be done to curb illegal gold mining activities in Dunkwa-on-Offin? Please indicate the level of appropriateness by ticking the appropriate boxes.

1=not important, 2=less important 3= moderately important, 4 =important, 5=most important

	1	2	3	4	5
Identification and protection of areas most susceptible to illegal mining					
Establishment of police-military task-force					
Implement policies to regulate the small-scale mining sector					
Create alternative employment opportunities such as agriculture					
Impose sanctions aimed at deterring illegal mining					
Empower the EPA, the Forestry Commission and other regulatory bodies to effectively manage the environment					
Provision of training and technical support on how to mine properly					
Formation of a community-based task force to monitor illegal mining activities					
Intensify stakeholder training and public education on the effect of illegal mining					
Restructuring the Minerals Commission to be proactive and responsive technically to technological changes in the small scale sector					
Caution, if not prosecute chiefs who offer lands to illegal miners					
Provide financial reward to whistle blowers within illegal mining communities					
<i>If other (please specify)</i>					

Thank you for taking the survey.

Appendix III: Population and sample size

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.
S is sample size.

Table 3.1 Population and sample size

Source: Krejcie and Morgan (1970)