

Insight into Illegal Mining Phenomenon "Galamsey" in Ghana-causes, Effect, and Policy Challenges

Ofori Emmanuel
University of Tsukuba
Japan

Atakora Adams Ph.D
Indiana State University
USA

Abstract

The devastating effect of illegal mining has attracted general concern with many calling on government to find lasting solution to the canker. Regardless, of the many efforts and policy interventions by governments over the past decades the canker still. The study's objective was to understand the causes and effects of the galamsey phenomena. And to further examine the effects and challenges of government policy intervention at halting the phenomenon. Primary data was gathered using questionnaires, personal observation while utilizing purposive and snowball sampling techniques. The finding revealed that the main constraint to the illegality is sponsors who are mostly influential people and politicians. Again, disconnect between government and traditional authorities were identified as an impediment. Unemployment seems to have pushed many young people into illegal mining nonetheless, the government's alternative livelihood program initiated as employment option for the youth in mining is totally inadequate and unattractive to the youth. Solving the high unemployment rate in mining communities and applying the law appropriately without fear and favor is the major step. to fighting the canker. The paper concludes that galamsey is not a depraved endeavor; the problem lies with the unconventional methods and chemicals used in the activities, therefore the paper proposes that government should adopt an innovative approach to the operations of small-scale mining.

Keywords: Ghana, illegal, Land, Mining, Policy

1. Introduction and Background to the study

Galamsey is a descriptive term in Ghana meaning "gather them and sell." It is a method of mining where perpetrators used unconventional and illegal means to extract gold from water bodies and land. It can primarily be defined as the process of using unconventional means of mining gold without the appropriate regulations.

Galamsey activities have been spiral in Ghana since the last decade. With about 70% unregistered small-scale miners operating illegally. The high incidence of 'galamsey' or illegal mining and its socio-environmental effect in recent times have garnered serious concern among Ghanaians and the International Community. For example, the World Bank warned that Ghana risks losing its rivers and forest reserve to galamsey if immediate action is not taken to address the canker.

Ghana experienced a worrying dimension to the usually known effects of illegal mining as it was widely observed that farmers and landowners from over six regions of Ghana were selling their cocoa farms and farmlands to illegal mining operators for peanuts in a bid to acquiring instant monetary gains. These happenings raised threat to the entire economy since cocoa is an important foreign exchange earner for Ghana's economy. The cocoa industry in Ghana generates about two billion dollars in foreign exchange, which is worth thirty percent of all revenues generated from export. It also serves as a source of employment for over eight hundred thousand families.

To end the galamsey menace, the immediate past President of Ghana, John Mahama, in May 2013, inducted an Inter-Ministerial Task Force involving the Ministry of Lands and Natural Resources, Interior, Defense to find solutions to the illegal mining activities. The team was mandated to impound equipment used by the illegal miners, arrest, prosecute, deport all non-Ghanaians, and to revoke licenses of indigenes that have sold or lease their concessions to foreigners' (Wenyu, 2018).

The team dismantled many illegal mining concession sand ejected the mining operators from their sites (Wenyu, 2018). Report by the committee has it that over a total of 4500, illegal foreign miners were arrested and those found to be foreigners deported (Van de Camp, 2016). However, the menace persisted.

In 2017, the communications director of Ghana Water Company outlined polluted number of water bodies and suggested rationing of drinking water may be the consequences if immediate action is not taken that the illegal activities. To stop the scourge, the newly elected President of Ghana, Nana Akufo Addo, promised to put his presidency on the line to fight galamsey.

Like the predecessor, the new president outdoor' Operation Vanguard, 'task force consisting of 400 members of the security services, and an inter-ministerial committee made of the Minister of defense, the Minister for the Interior, the Chief of Defense Staff, and the Inspector General of Police. The first step was to put an embargo on all forms of small-scale mining for six months. The activities of the team saw the arrest of 1000 Ghanaian and illegal Chinese miners. Additionally, several mining equipment's were confiscated, while hundreds of mining sites demolished. Many illegal miners were arrested, fined, or jailed, while some foreign nationals were deported.

Nonetheless, evidence of destruction of water bodies has emerged raising serious concerns about the work of the task force. Allegations of corruption and under dealings leveled against key members of the task force, political interference and competing interest from traditional rulers, landowners, and influential conspirators has become a major concern.

For this reason, the paper investigates the causes and effects of galamsey in the communities, and the effects of the government's Operation Vanguard policy on the fight against galamsey and the challenges that mitigate against it. While there have been several studies on illegal mining, this is the first study to evaluate governments policy, its effects, and challenges.

2. Research Design

The study examines the causes, effects of illegal small-scale mining, the effectiveness of Ghana government's strategy in dealing with the problem and the challenges thereof. Qualitative method was the principal tool for the study. Primary and secondary data was acquired through personal observations, interviews with structured and semi-structured questionnaire. Both open-ended and closed-ended questions were used obtain the needed information from the respondents as the combination of both approaches is vital to retrieving valuable data for social research (Roulston, 2012).

Hanson (2012) asserts that primary data helps to tap directly into the experiences of people. Since the study needed primary data, experience and perception of the respondents, the study conducted used interview and survey to attain the desired information. In addition, secondary data was gleaned from the findings of previous research, reports, stakeholder institutions and media sources.

Sampling was from five communities in Amemfi West District, listed by Ghana Statistical Service as predominantly hotspot for Galamsey activities. These communities include Saha, Ayiem, Amoamang, Breman, and OdaKotoamso. Sample sizes of 40 respondents were drawn from each of the five communities totaling 200.

The major limitation faced was the sensitive and illegal nature of *galamsey*; the willingness of respondents to participate in the study as well as locating respondents was a problem. Since respondents lived in the same communities with operators of the illegal activities, there was fear of intimidation and attacks for possibly disclosing sensitive information. Future studies will evaluate the gains and losses of the Operation Vanguard intervention on illegal mining in Ghana.

Among the respondents in the mining communities, non-probability sampling technique was used. Purposive sampling, as well as snowball sampling, was the technique adopted to sample the study's participants. These techniques were used in a similar study conducted by Onumah et al (2013). The use of purposive was to enable the researcher to get to the right respondents capable of providing the relevant information the research questions demand as indicated by (Oliver, 2011). The snowball technique was also useful in sourcing for the relevant participants. The topic touched on the sensitivity of the people in the community creating doubt and fear among the respondents, therefore, snowball sampling technique was appropriate for a study group that lacks the confidence to participate in a research project (Jupp, 2011).

Interview-based approach was adopted considering the low literacy level in the communities. Questionnaires were read and interpreted to respondents while the chief investigator recorded the conversation with approval by respondents. As explained by Meadows (2013), interview-based questionnaires are appropriate when the educational level of respondents makes it challenging to understand and answer questions themselves.

3. Data Analysis

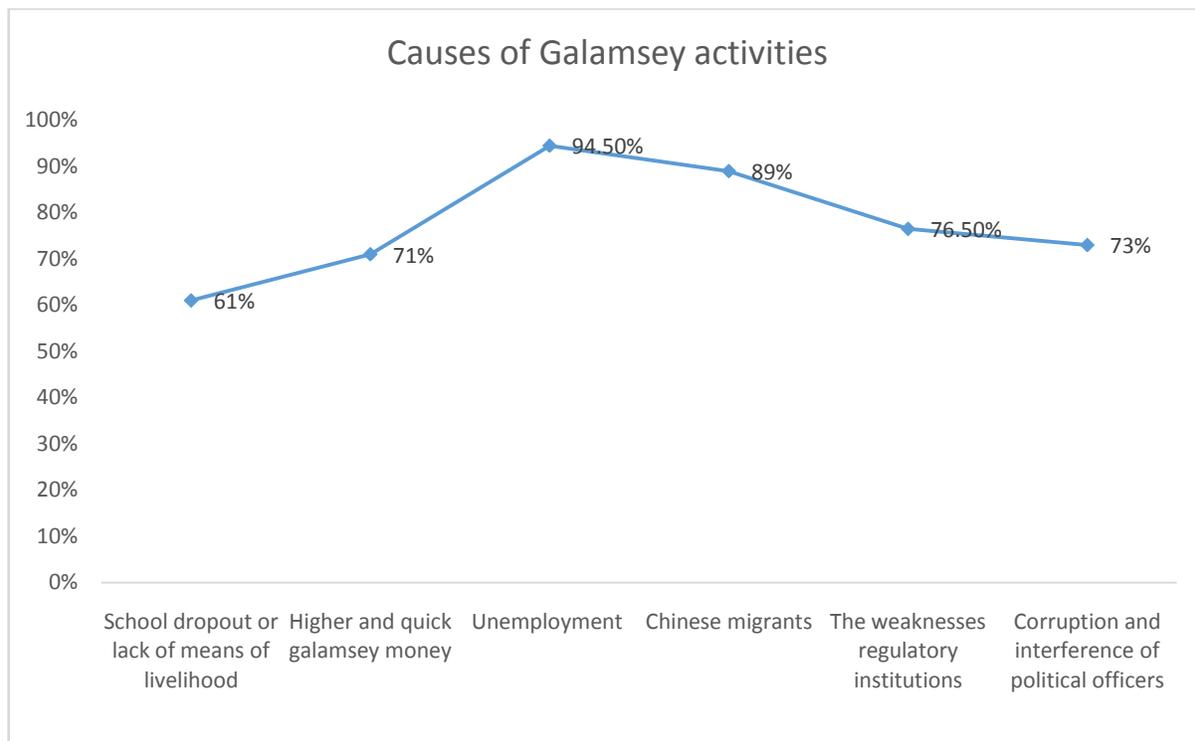
Content analysis¹, graphical interpretation, and pair wise comparison techniques were used to analyze the data. Content analysis is commonly used during the interpretation of interview transcripts and responses from the open-ended questionnaire (Julien, 2012). The study categorized the qualitative responses from the open-ended questions and the interview script into conceptual categories to enable easy identification of the consistent patterns and its relationship between the themes. Finally, the researcher summarized the results by using graphs and charts.

The result and discussion of the findings are in relation to the reasons people engage in galamsey activities, its effects and the role and effect of the government policy initiatives in fighting the canker.

Causes of illegal small-scale mining.

The reasons people participate in galamsey is analyzed, and below figure helps to understand the causes of galamsey in the various galamsey mining communities.

Figure 1: Causes of Galamsey in the Amenfi West District



Source: Authors survey results.

Unemployment is observed as the most critical cause of galamsey operation. 94.5% of the respondents indicated that unavailability of jobs is the reason galamsey remains attractive. Additionally, migration of small-scale Chinese miners is blamed for an increase in galamsey activities in Ghana as indicated by 89% of respondents. Furthermore, regulatory weakness was cited by 76% of the respondents. 73% of the respondents attributed the problem to political interference, corruption, and greed. The desire for quick money is also cited as the cause of illegal small-scale mining by 71% of respondents. Lack of means of livelihood and school dropout recorded 61%.

According to Yeboah-Banin (2019), the causes of galamsey in Ghana are multifaceted and interconnected, ranging from unemployment to poor regulation. Basic necessities of life need to be maintained for survival, and the availability of a job provides the means to satisfying those needs. Majority of the people believe that unemployment pushes many youths to engage in galamsey as an alternative source of employment in other to survive and to obtain the basic life necessities such as food, clothing and accommodation. It was unveiled that the peak of galamsey activities (2014-2016) was caused by high rate of unemployment caused by a ban on public sector recruitment as IMF conditionality.

¹Content analysis is an analytic method employed to reduce data and make sense or out of which meaning is derived.

This situation compelled many people with formal education to join the illegal trade. Interestingly, it was observed that unemployed graduates, nurses, and teachers found galamsey as an alternative employment avenue.

More so, school dropouts, uneducated and those without artisanal training found galamsey as the most accessible money-making opportunity. Since one does not need a certificate to commence galamsey many found the illegal mining as safe job haven.

Desire for quick money was found to be a driving force behind the surge of illegal mining. In all the communities visited, professionals such as accountants, teachers, nurses and many others were seriously involved in the galamsey activities. The main reason given was that Galamsey is lucrative compared to their mainstream jobs. Observation supports this argument since many provided physical evidence by showing their acquired properties after engaging in illegal mining in few years.

Again, few available jobs are mostly underpaid compared with the substantial money people make from galamsey over a short period. Most corporate and technical jobs in Ghana are underpaid, and with an unstable economy driven by inflation, goods and other necessities become merely unaffordable. For this reason, some employed people and artisans in mining communities abandoned their jobs to seek for higher income from galamsey.

Chinese migrants are observed as a major galamsey concern in Ghana. The Chinese has financial, technical resources and can apply complicated technology and machinery in small scale mining. This attracts many indigenous people to partner the Chinese in setting up illegal mining sites. The existing paradigm is that illegal mining operations in Ghana have increased significantly over the past years because of the Chinese.

Ghana attracted the attention of the Chinese for multiple reasons. First, Gold production in Guangxi province has shut down, creating a massive unemployment in the area, compelling many to search for related opportunities in Africa. Again, respondents believe that the mass Chinese migration to Ghana was influenced by indigenes. Many have the opinion that Ghanaian businessmen invited the Chinese to form business partnership to mine for natural resources. While the Chinese provides financial and technical resources, the Ghanaian counterpart delivers lands and protection.

Quoting a Chinese miner interviewed“ A Ghanaian businessman approached me in China and proposed mining business potentials to me. Before then I did not know Ghana and had never travelled outside China”. Others explained that after witnessing the gold potentials in Ghana, they invited their friends and family to mine for gold at a cheaper cost and export back to their country for higher profits.

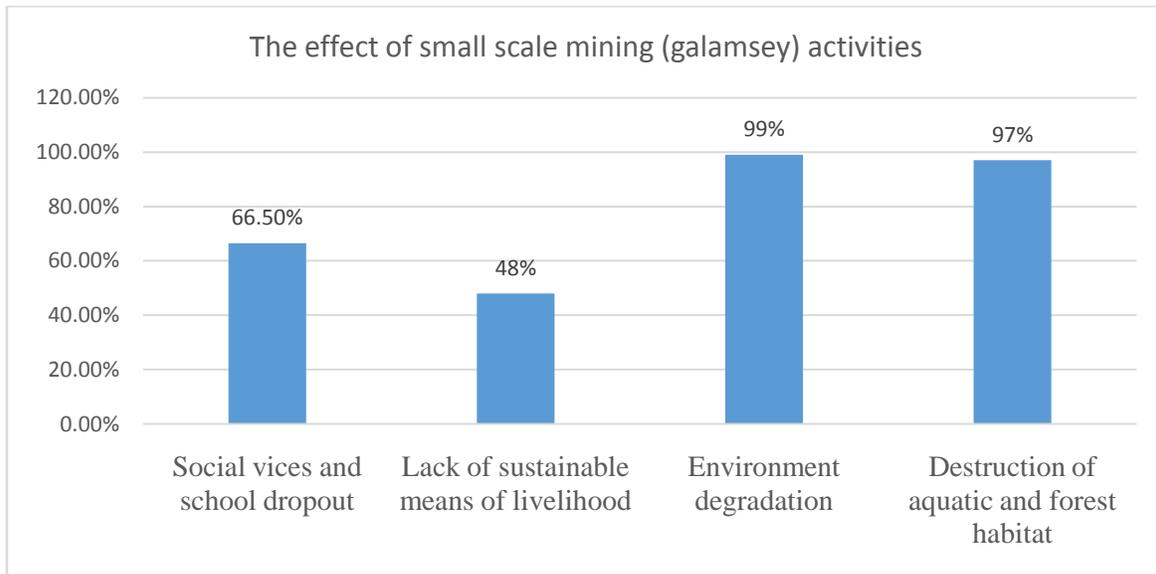
More so, a study by Moyo (2012) concluded that China's voracious appeal for gold is to sustain its growing economy and to meet the increasing demand for gold by the wealthy class. The high gold demand by China is the primary reason it has remained the global gold leader for six consecutive years (World Gold Council, 2019). China's gold consumption has risen by 5.73 percent between 2017 and 2018, a development caused by the increasing demand for jeweler and gold bars.

Lack of regulations for cement within the small-scale mining sector in Ghana encourages indigenes to conspire with their foreign partners. The small-scale mining law in Ghana bars foreigners from mining. Since the Chinese are unwilling to go through the formal processes of mining in large scale, they focus on providing services to small scale mines but covertly mine concessions which is diverse to the laws of Ghana (Ahiadeke et al., 2013)

Corruption and Political influence area major factor to the galamsey menace. Many of the Chinese's illegal operatives are working hand in hand with politicians and public officials, thereby enjoying protections from law enforcement officer. Foreigners are excluded from owning mining concessions as discussed earlier, nevertheless, we found out that many mining concessions were dully registered and owned by Chinese immigrants, and evidence point to corruption.

Effects of Illegal Small-Scale Mining (Galamsey) activities in the communities

The respondents identified social vices and school dropouts, lack of sustainable means of livelihood, environment degradation, and destruction of aquatic life and forest habitat as the primary effects of galamsey.

Figure 2: The effect of small-scale mining (Galamsey) activities

Source: Author 'survey results.

Majority of the respondents (99%) indicated that galamsey operations result in environmental degradation. Destruction of aquatic and forest has also been cited by 97% of respondents. Another 66.5% of respondents said galamsey result in social vices and school dropout while 48% of respondents said, galamsey create unsustainable means of livelihood.

Galamsey operations involve alluvial mining techniques which is primarily dependent on water. The operations causes grave destruction to lands and pollute lakes, streams, and rivers. Banned toxic chemicals used in illegal mining such as mercury with grave health implications on humans and aquatic habitats are released into these rivers. These poisonous chemicals and heavy metals destroy both the biophysical environment and its inhabitants like fish, mollusks, crustacean, other forest animals and humans. The paper findings are inconsonant with Aidoo (2016) that mercury and cyanide has polluted many rivers that use to serve as drinking water for many communities. A visit to the mining communities confirms Quartey's conclusions that rivers have turned muddy and brownish due to the activities of illegal miners (2013).

The sale of forests reserves, and farmlands has garnered concerned among the local people. The development has affected agricultural production since farmers are selling their farms and farmland to miners for instant monetary benefits. Again, the financial gains in mining entice many farmers to abandon farming to work in galamsey sites which is affecting the production of food and cocoa.

In agreement with evidence submitted by Ahiadeke et al (2013) on effects on galamsey in Ghana, it was established that illegal miners evade tax and uses unconventional ways to smuggle their gold out of the country. Yet, leave open pits and destroyed forests for the government to use taxpayer's money to fill and embark on reforestation.

The respondents also revealed that illegal mining is unable to provide sustainable means of livelihood. The respondents opined that income generated by young miners is unsustainable since many lack financial education and consequently live ostentatious lifestyle by spending all their revenue without savings. This was confirmed as many young people interviewed were visible broke and admitted to the assertion. The net effect of not having access to money as they use to, lead many to engage in social vices such as armed robbery, substance abuse and prostitution.

It is established that the youth are the soul and blood of a country and as discussed earlier in previous section, illegal mining has lured many young people from the classroom to pursue quick money. The idea of earning huge income within a short time is the critical source of motivation leading young people to engage in illegal mining activities and consequently dropping out of school. Additionally, teenage pregnancy, arm robbery, and substance abuse are high in the communities.

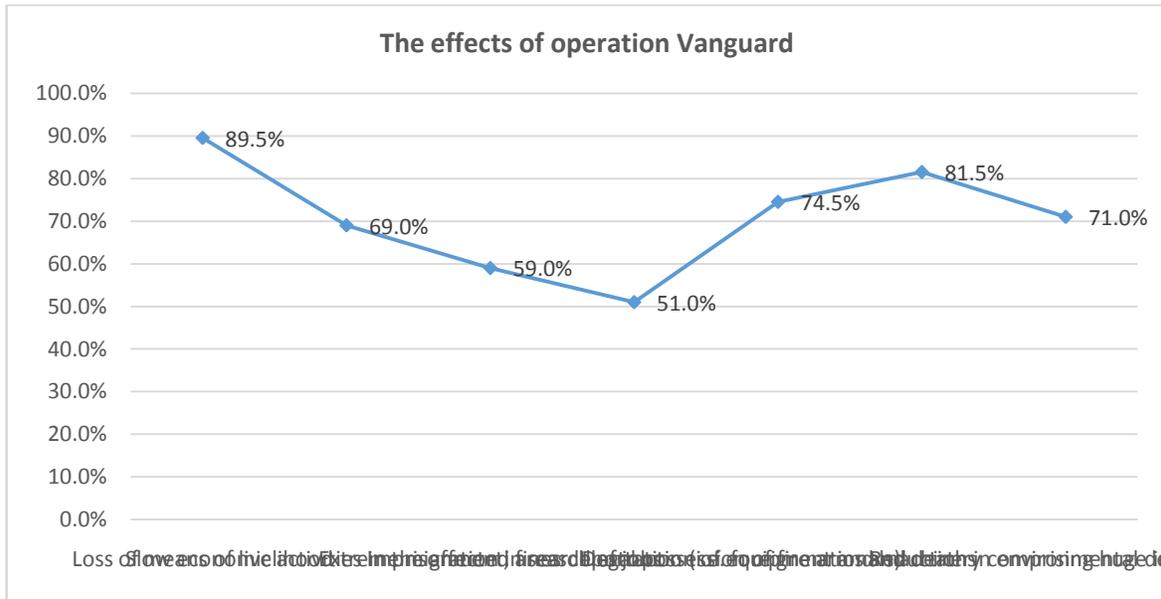
Increase in arm activities is a common feature in the communities under study. Local gangs rob Chinese mining companies during transmission of gold to the urban center. The fear of robbery has influenced the Chinese miners to purchase and use of sophisticated weapons for protection.

The brandishing of arms by the Chinese miners has created further confrontation with the natives who feel threatened. These have caused proliferation of arms and increase in clashes leading to deaths. Reports of labor abuses, neglect of the environment after operation, and loss of livelihoods such as farms caused by the mining activities further irritate the indigenes leading to physical confrontations with foreign miners.

Effects of Government Intervention (Activities of Operation Vanguard) on the mining Communities

Figure 3 below shows the effect of the activities of operation vanguard comprising military and police operatives.

Figure 3: The effect of government intervention (operation vanguard).



Authors survey results.

A proportion of 89.5% of the respondents indicated that operation vanguard has resulted in the loss of livelihood. Galamsey operations serve as a means of livelihood for most communities in the affected area. The stoppage of galamsey through operation vanguard has resulted in the livelihood loss for most inhabitants. Imprisonment, fines, and sometimes deportation are some of the punishments meted out to groups and individuals caught in galamsey as indicated by a proportion of 51% of respondents. Culprits in galamsey are not let to go scot-free. They are fined vast sums of money, and defaulters are imprisoned. Those imprisoned end up being alienated from their families and children.

More so, 59% of the respondents indicated that due to the activities of operation vanguard, many youths who depend on galamsey for livelihood are constantly migrating from one place to the other in a bid to outsmart the taskforce. The young people are always on the run in search of places where the task force is not in operation. Due to logistical challenges, the operation vanguard task force is unable to be present in the entire illegal small-scale mining site simultaneously. Thus, as they move to one mining site, the illegal miners also move to another site leaving their families (children and wives) unattended for a long time.

Additionally, 69% of the respondents said that the operation vanguard activities have resulted in a slow economic activity in the community. Economic slowdown has occurred because money made from galamsey serves as a mover of the local economy. When people lack money to buy goods, it becomes difficult for other sectors of the economy to survive. The galamsey activities brought an influx of migrants from many adjoining West African nations such as Nigeria, Togo, Senegal, and Liberia. The influx of this group influenced trading activities positively since access to money increases purchasing power. It created a boom in the local economy; however, we observed that many of these communities have become ghost towns with abandoned businesses such as gas filling stations, drinking pubs and hotels. Many of the market women complained of slow economic activities due to the clampdown.

Another 81.5% concluded that the activities of operation vanguard have led to waste of resources resulting from the destruction of machinery and equipment with huge investment. To discourage galamsey activities by Chinese and indigenous financiers, machinery and equipment used in galamsey activities such as excavators and trucks are burnt by the taskforce.

These machines and equipment involve substantial capital investments and are wasted when destroyed by operation vanguard. Some of the respondents opined that these excavators are sometimes bought on hire purchase and destroying them brings serious financial loss to the owners.

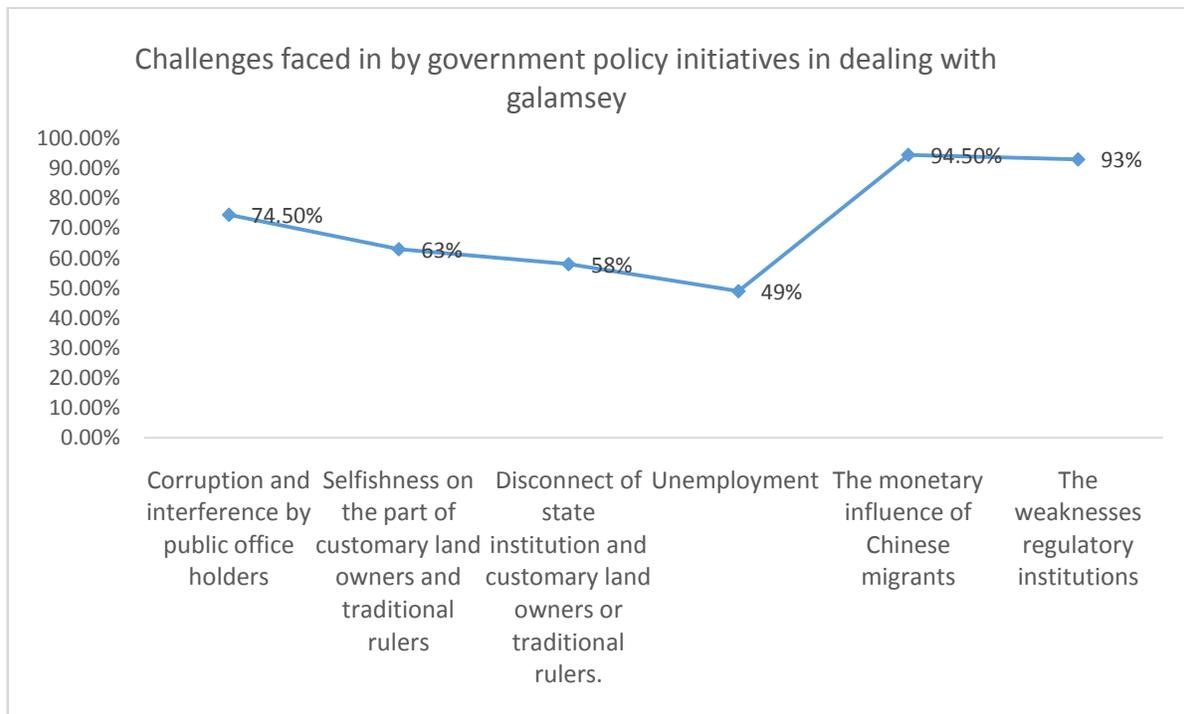
Again, it was indicated by 74.5% of the respondents that operation vanguard has resulted in the confiscation of firearms especially among Chinese gamamsey operators which was creating problems between the local people and the Chinese. To protect their investment Chinese gamamsey operators are accused of brandishing sophisticated firearms which has become a source of conflict in many mining communities. Many indigenes feel threatened and disgusted by the open display of arms by Chinese miners. These have led to clashes between the locals and Chinese in many mining communities leading to loss of lives. However, the presence of operation vanguard has assisted in confiscating of firearms and calming of tension.

Regardless of the adverse effects of operation vanguard, 71% of the respondents indicated that operation vanguard has led to a reduction in the destruction of the environment and the water bodies. During the field study, some water bodies were observed to be returning to their natural state.

Challenges faced by Government policy intervention in dealing with Illegal Mining.

Public office holders and political corruption, interference, local authority selfishness, disconnect between state institution and customary landowners, unemployment, monetary influence by Chinese migrants, and weaknesses weak regulatory institution were have identified as challenges faced by regulatory institutions and land policy in curbing gamamsey policy interventions at illegal mining.

Figure 4: Challenges faced by government policy initiatives in dealing with gamamsey.



Source: Survey results.

Monetary influence of Chinese migrants and the weak regulatory institutions and land laws are identified as significant challenges facing policy interventions aimed at fighting gamamsey as indicated by 94.5% and 93% respondents, respectively. A proportion of 74.5%, respondents indicated that corruption and interference by public office holders is a significant challenge faced in curbing gamamsey. Selfishness on the part of customary landowners and traditional rulers has been cited by 63% of respondents. Comparatively, a lesser proportion of 58% of respondents indicated that disconnect between state institutions and customary landowners or traditional rulers is a challenge. While 49% cited unemployment as potential constraint to policy interventions aimed at fighting the canker.

Under resourced staffs and infrastructure is cited as the main cause of weak enforcement and supervision in regulatory institutions. It is believed that the sector ministry and the mineral commission do not have the necessary manpower and financial allocation to effectively conduct supervision.

Additionally, respondents indicated that local government authorities, traditional rulers', custom landowners connive with illegal small-scale miners notably, the Chinese by providing them with permits and protection from regulatory authorities. This is similar to conclusions by Armah et al. (2013). The researcher's observed that quite often, crucial information regarding ways by which one can navigate specific local laws and outsmart the authorities are provided by the aforementioned people to Chinese miners. Respondents alleged that illegal Chinese miners are often concealed by Chiefs, opinion leaders, and other influential people in the localities from government taskforce.

The study found that though the number of illegal Chinese miners is reduced by the crackdown, illegal mining could not entirely be eradicated by the task force. According to the locals, some politicians are discreetly engaged in the galamsey activities. It was alleged that many high-ranking political actors and public officers have mining concessions while others owned excavators that were working for the Chinese immigrants. Some Municipal or District Chief executives whose responsibility is to superintend over the local security operations and to coordinate with the operation vanguard team were fingered to be involved in the illegal activities.

According to Ahiadeke et al. (2013), one significant difficulty facing policy interventions aimed at curbing galamsey is disjoint and non-coordination among state institutions and traditional land custodians. The disconnection facilitates network of individuals both locals, and foreign migrants to perpetuate illegal mining business. This study's conclusion is in tangent with to the assertions made by Ahiadeke.

Article 267(1) and (2) of the 1992 Constitution entrust lands in the possession of traditional rulers and stool land bearers (Hilson et al., 2014). The law has entrusted almost 80 percent of the lands to various traditional authorities, with the state owning only 10 percent for public good. The constitution also makes additional provision for the state to own all lands identified with natural resource. Meaning chiefs right to land is automatically revoked when natural resources are identified. The fear of losing their lands and royalties create mistrust among the state and the chieftaincy institutions, which motivates the latter to conspire with the illegal miners.

The mining regulations makes owning small-scale mining concession in Ghana illegal for foreigners however, foreigners can provide services to Ghanaian concession holders. According to Crawford and Agyeyomah (2017) since the indigenes lacks the financial capacity to acquire heavy duty machinery and technology to operate small-scale mining sites the Chinese are able to provide juicy offers during takeovers and partnership negotiations. Crawford & Agyeyomah identified Shaanxi Mining (Ghana) Limited, a Chinese mining company for transforming from service provider to owning two local licensed concessions in Talensi district, Upper East region of Ghana. Others believed excessive bureaucracy in procuring mining license may have caused foreign individuals to engage discreet buyout of mining companies (Hilson, Hilson, Adu-Darko, 2014).

Collection and negotiating of royalties by chiefs and traditional authorities featured prominently in our discussions with respondents. In many villages, chiefs are the final authority and their concern and endorsements are needed for business commencement. Even legal operations with appropriate licenses must consult the chiefs for final clearance before commencement. These consultations involve cash. The payments continue periodically as the chiefs occasionally make cash demand (Botchwey, Crawford Loubere, and Lu, 2017; Kane, 2013). Mostly the informal interactions and engagements remain the only avenue customary landowners may get involved in the mining process particularly when formal institutions are involved.

Further information suggests that some mining concessions are acquired only through the engagement of chiefs, family heads, and farmers' similar to conclusion made by Bofo-Arthur (2003). The Chinese miners believe that the acquisition of lands from the formal institutions is cumbersome. Due to the powers vested in the traditional rulers as custodians of lands, Chinese miners perceive traditional rulers as people with equal authority as the formal authorities responsible for the administration of lands. Therefore, by acquiring land from the chiefs and paying all the necessary royalties, they assume requirement for commencement is met. Again, many remote areas where there are no formal offices of the minerals commission; the Chiefs automatically remains the sole authority that supervises the provision of mining. For instance, in Amansie West, Abdulai, (2017) indicated that the Chinese miners visit communities and make claims to lands insisting of having been granted permission by the paramount chiefs.

Unemployment remains a huge hindrance to any attempt at dealing with the phenomenon. Illegal mining is the source of income for many unemployed people. A visit to some of these mining communities shows young people have migrated from many towns and cities to work in these illegal mining sites to earn a living.

Since there is high unemployment rate in Ghana and government has not been able to provide other source of employment to the teeming youth unemployment situation, many young people defy the laws and engage in illegal mining.

4. Conclusion and Recommendations

The causes of illegal mining are diverse, multifaceted, and interconnected, and therefore the paper applauds the government efforts in fighting the illegal mining activities. Nonetheless, we also caution that the major constraints to illegal mining are politicians especially people closer to government in power. Again, we support the suggestion by some industry players that the proliferation of small-scale mining and the blatant abuse of the mining laws are caused by non-coordination between formal institutions mandated to govern the sector and informal institutions who are vested with land custodial power. A key observation is that while Ghana's Constitution bestows natural resources to the state, the same constitution gives the traditional leaders, families, and individual ownership to lands. This creates unnecessary confusion as to who are the rightful administrators. Chief and landowners believe they have the right to administer lands for mining activities, and they often give sites for mineral concessions without recourse to the state institutions. The conditions where formal institutions disconnect with local authorities pave the way for the citizens to lease their licenses or lands to foreigners who have the financial capacity and technology. Per the findings and analysis of the study; we recommend that a strengthened effort is made between the formal and informal institutions to perform their designated functions.

Again, an independent body should be mandated to supervise and regulate all mining policies at all levels. The membership of this body should comprise of all stakeholders, and they should be mandated with the capacity to ensure adherence, monitoring, and institute punishment. To prevent the institution from being just another incompetent public organization, its vital role must be to help deepen the rules that guide the sectors, including coordinating with traditional authorities.

The paper also recommends that the government as a matter of urgency, needs to find solutions to youth unemployment and abject poverty in mining communities. Though the alternative livelihood program embarked by the government is commendable, the study suggests that the program should be expanded to cater for a more significant proportion of the people living in these communities. Again, the program managers should intensify education on the benefits of the project to entice the youth to enroll. We also believe that galamsey is not a deprave endeavor. The problem is with the unconventional methods and chemicals used in the illegal mining activities. We therefore employ authorities to find innovative approaches embedded with technology to support the small-scale mining industry. The industry has the potential of solving unemployment and can also remain as a source of revenue generation for the government.

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