

The Impact of Artisanal Surface Gold Mining on Socio-Economic Development of Residents of Rosterman Area, Kakamega County

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ABSTRACT

This paper evaluates the impact of Artisanal Surface Gold Mining (ASGM) on socio-economic development of Rosterman, Kakamega Central Sub-County. The study objective was to examine the impact of surface gold mining on income status of the people of Rosterman in Kakamega Central Sub-County. A sample size of 366 individuals was selected using Krejcie and Morgan, (1970) table representing 322 artisan miners and 44 key informants from various departments in the County. The study adopted the Resource Curse Theory and employed descriptive research design using questionnaires, in-depth interviews, literature review and observation as data collection methods. Data was analyzed using descriptive statistics and presented in form of figures and tables. The study found that there was a positive significance between ASGM activities and income status. ASGM activities however, affected learners in the surrounding schools whereby school enrollment remained the same, school dropout and transition to higher learning institutions dropped. Nevertheless, artisanal miners who were parents at the same time argued that the income they generated from ASGM activities enabled them to take their children in better learning institutions to further their studies.

KEY WORDS: Artisanal Surface Gold Mining, Income

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I. INTRODUCTION

Artisanal Surface Gold Mining (ASGM) has been practiced for the longest time whereby the mineral is removed from the surface or pits by simple extraction methods like barrowing (Telmer and Viega, 2009). ASGM is actually the basic way of gold extraction from its ore generally in small scale and for subsistence purposes. Millions of livelihoods emanate from artisanal surface gold mining around the world, that is, every continent except the Antarctic supporting tens of millions of communities (Telmer and Viega, 2009).

African countries like Ghana and South Africa have shown a successive economic growth due to mining activities, although health experts argue that the mining industry attributed to Ghana's environmental degradation and respiratory diseases (Agbesinyale, 2003). This might be explained further since gold mining here is practiced both at small scale level, where surface pits are barrowed and gold sold locally and the large scale level which in many cases is underground operated by big industries and enterprises for international markets.

Abura (2013), in her thesis report argues that gold mining in Kenya was predominantly exercised in Nyanza and Western regions. Areas such as Macalder in Migori and Central-Sakwa in Siaya counties have for many years cited as the common producers of Kenya since independence. Indices from the National Environmental Management Authority (NEMA, 2014) on Status of the Environment (SOE), there were cases of degradations up to levels of 70%. Such scenarios affect communities through food insecurity and socio-economic independence.

It is argued that the geographic review and valuation of surface gold mining sector in Kenya is relatively small (ILEG, 2003) and community participation as well as decision-making in relation to the surface gold mining activity like the social, economic and environmental impacts coming from the mining process is also wanting.

Interestingly, the mining of the precious metal (gold) in Kakamega dates back to 1892 along the Nyanza Rift Valley boundary. The mines were incorporated and licensed in January 1935 to a British Company called Rosterman Gold Mines, to map and source the gold for international markets. "By 1952, it had mined 655,000 tons of ore and which had produced 259,000 ounces of gold. By then it was one of the largest firms in western region. After the firm ceased operation, the mines were left in the hands of the local residents and small-scale miners. To date, villagers still scavenge the abandoned mines in search of the elusive mineral in Rosterman mines. Experts still argue that huge gold deposits remain embedded underneath the rocks in the region besides the immense impacts it brings to the society (Machandaria, 2011). The socio-economic

underpinnings in mining areas is even much higher than what many view as negligible and it was with this regard that the study intended to fill part of this gap by assessing the socio-economic impacts of surface gold mining activities as cited by Machandaria, (2011) hence, justifying the study.

1.1 Impact of Artisanal Surface Gold Mining on Economic Income of Miners

Morgan, (2009) cites economic development as a set of attainments ranging from income, education, financial security as well as social class based on activities one is engaged in. To Woolard and Leibbrandt (1999), global job distribution in the mining sector is mirrored in regional production of gold with greatest jobs being produced in Asia and South America. Contrary to this study, globalization has changed the trend as modernization and skill attainment around the world has enabled mobility of the miners from one continent or region to the other thus creating jobs worldwide i.e. Chinese nationals moving to Africa and vice versa. Incomes earned from ASM make significant socio-economic changes in lives of many especially in capital-intensive economies. Income earned from employment as a gold mine worker differs from country to country as well as skills required in the sector (Bloomberg, 2014).

Indices show that 6 million people are estimated to be engaged in small-scale mining thus, the sector is providing livelihoods for people living in the most poor or remote areas' (ILO, 1999; World Bank, 2008). In Ghana alone, an estimated 1.1 million people directly work in ASGM activities, representing nearly two-thirds of the country's total mining labor force (UNECA, 2015). Much of this activity is considered "informal", "unregistered", and illegal. Surface gold mining is therefore, an economic development-driven; it can reduce or can perpetuate socio-economic development (Casm, 2010).

In Tanzania, ASGM activities taking place in many regions of the country play a significant role both as a direct source of employment in mining communities and in generating additional jobs and revenues in the rural economy (Mwaipopo *et al.*, 2004). The Kenyan economy depends highly on service industry and agriculture. The mining sector currently contributes less than 1% of Kenya's GDP but has potential capacity to contribute 4% to 10%. This means that much of Kenya's natural resource wealth is yet to be exploited and there could be significant opportunity for growth. Many of the potential economic benefits of the small-scale mining sector are lost through poor practice in mining, processing and marketing the target minerals. Similarly, it is impossible in the meantime to evaluate the exact income generated from ASGM activities in Rosterman due to fluctuations in daily earned income (Maranga *et al.*, 2015).

It is estimated that over 500,000 locals are involved in ASM in Kenya alone with high interest in gold (NEMA, 2014). Nonetheless, surface gold mining is still a substantial source of employment to the locals, particularly to the people of Migori and Kakamega counties, whether directly as local miners or indirectly as marketers (middlemen), provision of food among other services. Interestingly, no exact figures exist on the number of people involved in ASM in Rosterman, this is due to localized mining areas which are sometimes exist in homesteads which are hard to access or know of.

II. METHODOLOGY

The study was conducted in Rosterman area, located in Shirere Ward, Kakamega Central Sub-County/Lurambi of the larger Kakamega County with an estimated area of 417.4 square kilometers. The Sub County lies on longitudes 34⁰20' and 35⁰ E, and latitude 0⁰ 15' and 1⁰ N of the Equator having a varying topography with altitudes ranging from 1250m to 2000m above sea level. The main economic activities in the area include; agriculture and mining (gold and sand) (ASDP, 2013). The Study targeted 2,000 local miners and 44 key informants. A sample population of 322 local miners was chosen (using Krejcie and Morgan, 1970) formula and 44 key informants using purpose sampling. A total of 366 respondents was adopted in the study. Furthermore, the study employed descriptive research design using questionnaires, in-depth interviews and observation as data collection methods. Data was analyzed using descriptive statistics and presented in form of figures and tables.

III. FINDINGS AND DISCUSSIONS

3.1 Respondents' Background

The respondents' background check constituted the gender, age, household size and education status as presented below.

3.1.1 Gender

Table 1: Gender of the Miners

Gender	Percentage (%)
Male	65
Female	35

Source: Field Data, (2017)

From Table 3 local miners constituted 65% male respondents and 35% female representation. It is obvious that women were less represented in the minefields. This could have been attributed to the hard labor needed in the mining process while women’s role constituted of cooking for the miners and taking care of the families.

3.1.2 Age

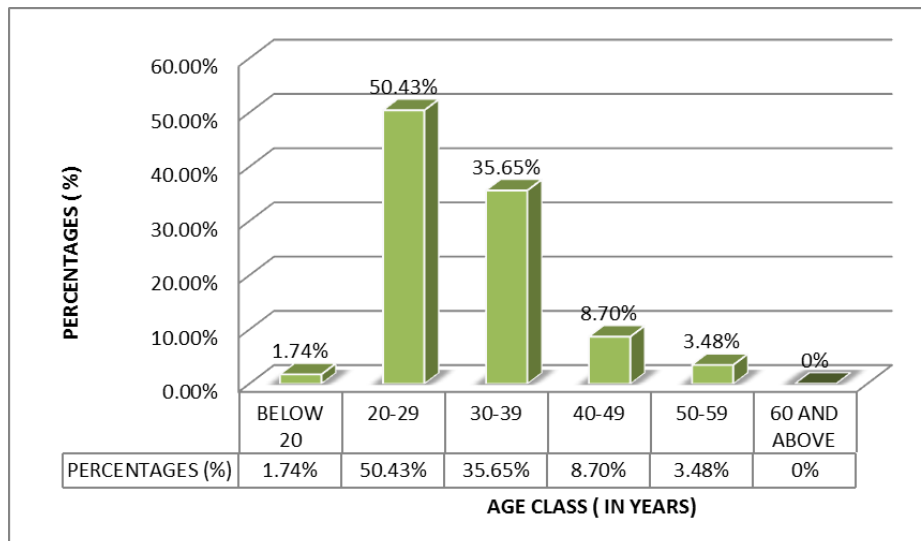


Figure 1 Ages of Respondents

Source: Field Data, (2017)

From Figure 1, the local miners of Rosterman constituted majorly youths with 50.43% and 35.65% representation, those who were above 40 years constituted only 3.48% miners while the under-age miners constituted only 1.74% miners. The whole processes and activities in minefields require young and energetic miners due to the intensive labor needed in mining gold. It is disturbing to learn that child labor still exists in civilized societies like Kenya; furthermore the elderly are believed to be indulging in the mining activities due to their experiences or perhaps poverty and lack of access to credit and social facilities the government is mandated to provide.

3.1.3 Education Status

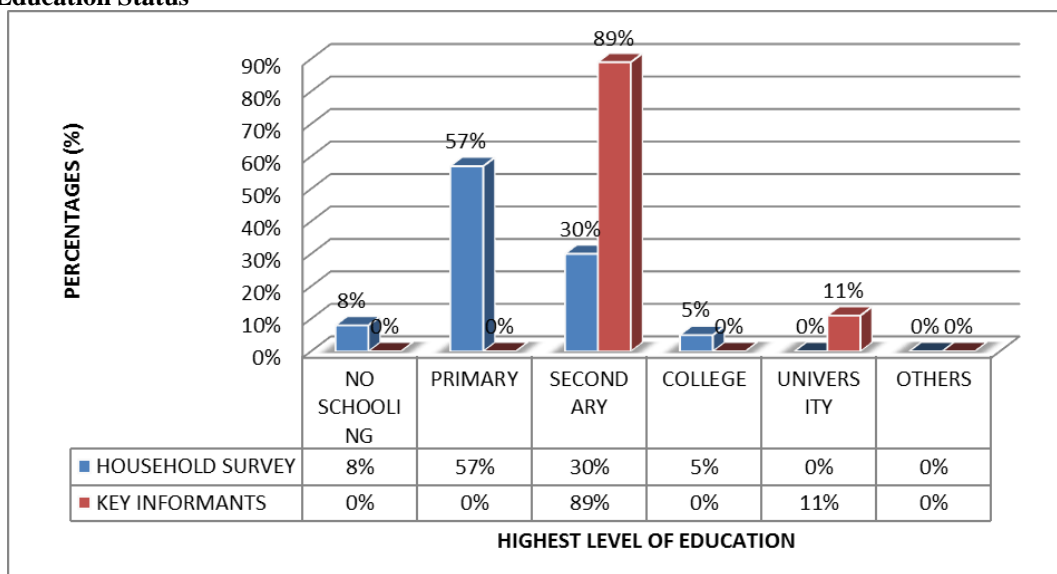


Figure 2: Education level of respondents

Source: Field Data, (2017)

From Figure 2, 57% of the local miners had completed primary education with 30% had completed secondary education and 8% had no schooling while 5% had completed college education. Other levels (others) of education included the technical and vocational training centers (TVET). Artisanal surface gold mining has

been practiced in Rosterman for a very long time and it always depended on cheap labor, miners have gained experience from their daily working on the mines thus, deeming education not a required skill in the activity. Furthermore, lack of job opportunities have forced many youths to indulge in the practice, having no choice and with the ever changing job market have forced even those with college certificates to down them and join the league of other miners in the search for an economic boost in their lives.

3.2 Artisanal Surface Gold Mining and its Effects on Income Status

3.2.1 ASGM as Source of Employment

The study objective one sought information on the relationship between artisanal surface gold mining and income levels of local miners. In answering objective one, the study sought information from respondents whether Artisanal Surface Gold Mining was regarded as source of employment or not as displayed in Figure 3.

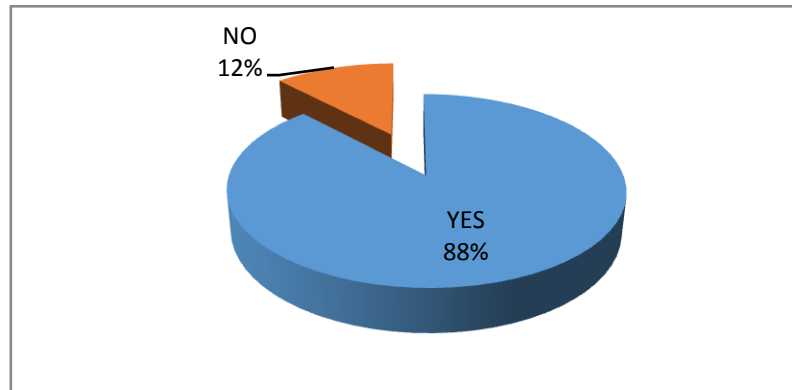


Figure 3: ASGM as a Source of Employment

Source: Field Data, (2017)

From the findings, 88% of those asked (both the miners and key informants) adamantly agreed that ASGM was truly a source of employment to residents of Rosterman especially the youth. Furthermore, 12% disagreed implying that ASGM has only created short-term jobs and that the risks associated in the whole process overtakes the benefits earned from mining. Those respondents who disagreed were engaged in farming and other entrepreneurial activities. ASGM as a source of employment to the community was manifested in the following four types of miners identified in Rosterman: individual miners, grouped workers, laborers and entrepreneurs. Individual miners generally occupy their own lands/holes with gold deposits. They work for their personal accounts. These set of miners either work with family members such as their wives, children, siblings or hired labor. Independent miners hire out their services in times of financial difficulties. Laborers are generally people who do not own areas or holes with gold deposits and work for individual miners for a daily, weekly or monthly payment, or they are hired on a contract basis (to dig out the tailings, wash and pan). Laborers are sometimes paid a percentage of their production through a verbal contract between the laborer and the employer before he commences the work. The duration of the job depends on the laborer's work rate. The terms of a contract can be changed in the course of time as deemed necessary and accepted by the two parties concerned. Grouped workers are those who work collectively. A group is made up of two or more people. Two types of groups were identified: a group made up of independent workers who form a *chamawhere* all members of the group help themselves especially during digging; the second type of group is made up of individuals who pool their resources together and work collectively. When washing has been done and the product is sold, the money is shared according to each person's contribution. Labor is shared accordingly to avoid quarrels during sharing. Those who invest more, receive more. The last type of miners is the entrepreneur. Entrepreneurs do not work in the mine fields. They are generally businesspersons, collectors, individuals (settled in the mines or not) who provide the materials and finances needed. They hire laborers who do the digging and washing for them. The laborers are then paid as agreed from the work contract. The contract is usually a verbal contract and miners respect it.

3.2.2 ASGM as a Source of Income

In analyzing the relationship between ASGM activities and income status of the miners, the study looked at the assets owned by the miners exclusively earned from ASGM income.

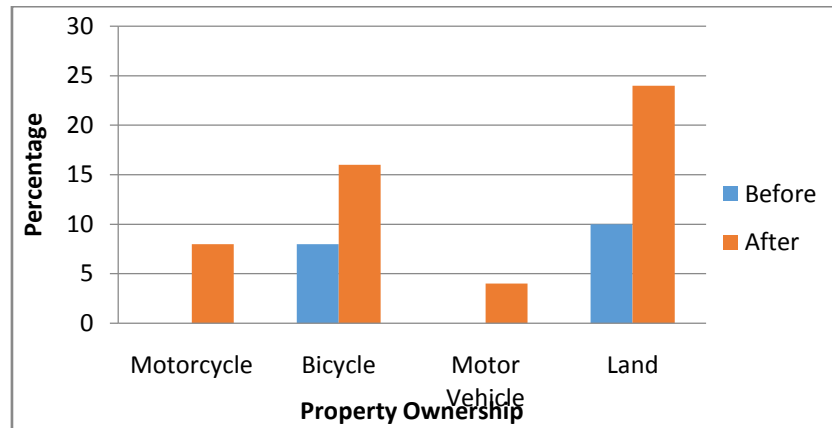


Figure 4: Property Owned from ASGM

Source: Field Data, (2017)

Results revealed that the miners had invested in various assets through the income earned from ASGM activities. Before the miners were engaged in surface gold mining, none of them owned a motorcycle. Afterwards, 7% had bought motorcycles to aid them move from one point to another or for business purposes. Furthermore, land ownership stood at 8.7% of the total ownership but after being engaged in the mining activities, the rate sharply rose to 20.87% and motor vehicle ownership also rose from 0 to 3.5%. Basically, surface gold mining has enabled local miners through the income earned to access property ownership which seemed to have been problematic to own in the past. Furthermore, not all miners were able to own a property, this attributed to differences in earning and family sizes. The researcher is of the view that mining has a potential for economic development for communities living with and practicing ASGM activities and a 2014 report by Bloomberg is in tandem with the findings by purporting that there's always an economic gain to people engaged such schemes whether as small-scale or large-scale mining.

3.2.3 Impact of Artisanal Surface Gold Mining on Education

The study objective two sought evidence on the relationship existing between artisanal surface gold mining and education attainment among learners in Rosterman area through the variables such as; school enrollment, drop-out and transition rates.

School Enrollment, Drop-out and Transition Rates

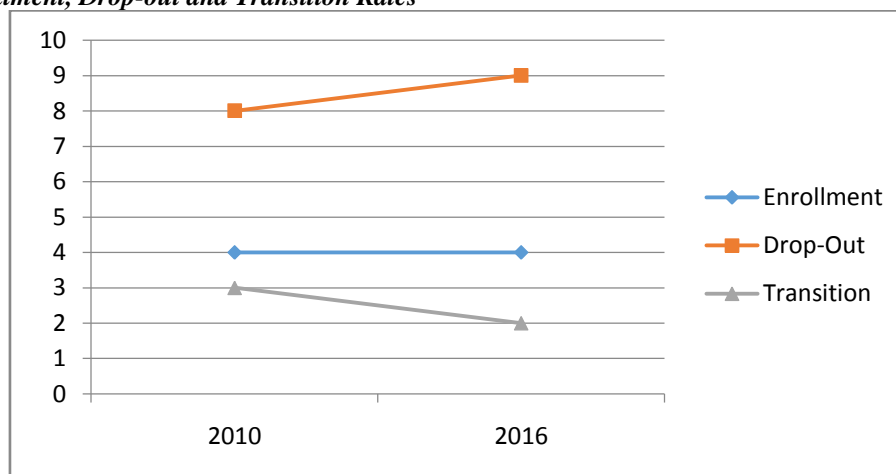


Figure 5: Education Attainment in Rosterman

Source: Rosterman Primary School, 2016

In Rosterman village alone, there are three learning institutions situated very close to where ASGM activities take place i.e. Rosterman primary school, Rosterman Rehabilitation Centre and Rosterman secondary school. According to statistics received from the school head of Rosterman primary school, it was evident that school enrollment into the learning institution was at a flat average of 40% while drop-out rate increased by 10% between the year 2010 and 2016 among standard 7 and 8 pupils. Furthermore, the transition rate from primary to secondary schools dropped significantly by 15% between 2010 and 2016. Meaning, pupils who had

finished their primary education were unable to join secondary schools due to poverty and the pressure to join colleagues in ASGM sector as a source of income. The findings are therefore suggesting that education status among learners in Rosterman has issues of low enrollment, high drop-outs and poor transition rates. This could be attributed to the existence of ASGM activities in the area as cited by Sarraf and Jiwanji, (2007). Moretti, (2010) further argues that learners can be impacted on heavily by artisanal gold mining activities as they may prefer to earn money immediately rather than to invest in their education, possibly because they perceive the returns from education to be too uncertain. On the other hand, gold miners in the area confirmed that they were able to pay school fees for their children through incomes earned from ASGM activities. Weber-Fahret *al.*, (2002) is in tandem with the miners in that gold mining activities can bring positive effect on educational attainment by increasing household incomes. The higher incomes that can be earned in the mining sector (compared to e.g. agriculture) should enable households to keep children in school.

3.2.4 Impact of Artisanal Surface Gold mining on Health

Activities compounded with mining have always been the most difficult, dirtiest and hazardous in the sector and they have been argued to be causing more losses compared to other sectors. In study objective three, the study sought information on the impact of ASGM activities on health in Rosterman village. The study variables were; exposure to Mercury compound, disease prevalence, mining-related injuries and deaths as well as health insurance cover in the minefields.

3.2.4.1 Application and Exposure to Mercury and Sodium Cyanide Compounds

From the field study conducted within Rosterman village alone, 98% of the amalgamation process used Mercury compound while 2% used Sodium Cyanide in extracting gold from its ore. Mercury compound was typically applied in processes conducted in homesteads and in small-scale gold production places. Foreign firms like the East African Trading Company and Ajabu East African Limited have also set up their businesses in the area. Such companies use a process known as gold VAT leaching plants, which in most occasions use Sodium Cyanide in extracting gold from the gold tailings left behind previously by British Gold Mining Company, Rosterman. The exposure to both Mercury and Sodium Cyanide has not been well captured in the area, therefore, there were no results captured in regard to exposure to such compounds. However, in an Environmental Impact Assessment (EIA) Report captured from NEMA offices, the report cited that there could reasons to believe that the use of Mercury in the amalgamation process has impacted negatively to both miners and community members since, 60% of the Mercury used in the process finds its way into the atmosphere. Furthermore, NEMA officials noted that the gold VAT leaching plant had not complied with all statutory and legal frameworks put in place i.e. licenses from NEMA and the Kenya Pharmacy and Poisons Board, meaning it was running an illegal business in the area as it was located near a water body, River Isiukhu. Sodium Cyanide is known of its lethal effects to both surface and marine environments. It is for this reason that the VAT leaching plants have been stopped from operating in the area before they obtain relevant licenses from relevant administrative offices. Studies around the world have shown considerable negative impacts of mercury and Sodium Cyanide (Park, 2001) though similar studies were not carried out due to lack of technology but it would be wiser to consider the impacts of mercury compounds on human health.

3.2.4.2 Exposure to ASGM related Diseases in Rosterman

The study sought information from Rosterman Health Centre on the exposure to ASGM related diseases as well interviewed miners on the same.

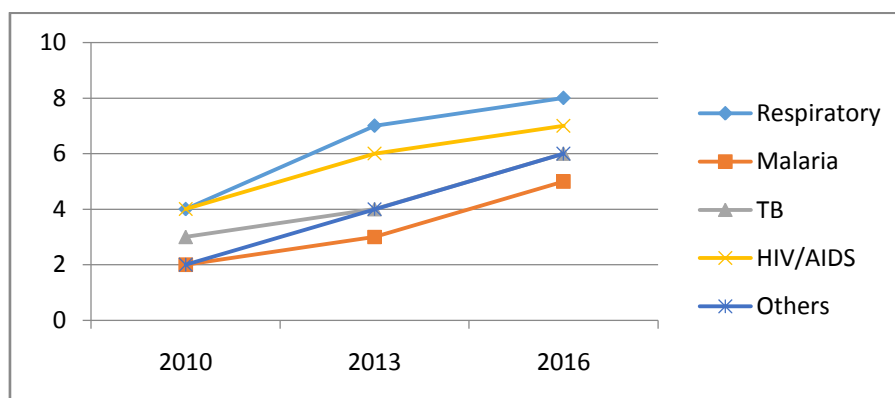


Figure 7: Disease Prevalence in Rosterman

According to health records from Rosterman Health Centre, disease prevalence in the years between 2010 and 2016 indicated that diseases such as respiratory problems, tuberculosis, malaria and HIV/AIDS are on the rise with each showing a slight increase in prevalence. ASGM activities involve a lot of labor while toiling in heavy dust containing quartz (silicosis) and mud. Studies by Williams and Campbell in 1998 and 1999 respectively, are in agreement with the findings alluding that the level of interaction with locals and non-locals in the fields play a pivotal role in the transmission of communicable diseases. Rosterman has seen a stream of new friends in the areas in search of the elusive mineral thus posing risks of spread of diseases due to high levels of socialization. Other diseases included skin diseases, injuries and muscular pains. Kyalo *et al.*, (2015) is in tandem with the findings citing that precious results from Rosterman indicated that miners reported a series of health problems, notably body pains associated with the difficult nature, hard work and long hours which mining requires. Skin diseases are very common among miners due to long hours spent in muddy water. The open mines left behind by mining carry stagnant water, which are favorable breeding grounds for mosquitoes. Malaria caused by these mosquitoes is one of the diseases which affect artisanal miners. According to Community Health Workers (CHWs) interviewed, community members are feared to have experienced respiratory and allergy-related problems due to dust (quartz) coming from the ASGM activities. According to a study carried out by the Hesperian Organization in 2012, mining is considered to cause serious problem to communities and people living near mines, even if the mining process was closed down long time ago. 'The chemicals used could still have contaminated the environment such that communities will still be exposed to health threats from mining waste and chemicals that remain in the soil and water'. The Directorate for Occupational Health and Safety (DOSHS) further asserts that allergies from harmful fumes, dusts, oil spillage and heavy metals could have a lifelong impact on the health of community members thus putting future generations in a dangerous spot. In conclusion, ASGM activities have significantly increased health problems in Rosterman village both to miners and other community members.

IV. CONCLUSIONS AND RECOMMENDATIONS

The findings of the study revealed positive impacts of ASGM activities on the income of miners in Rosterman area. In conclusion, ASGM activities have supported miners' incomes as a source of employment and livelihood to fend and also own property like land which is pivotal in economic development. However, these were immediate positive impacts; long-term impacts such as overexploitation of the resources and health status could impact negatively.

4.1 RECOMMENDATIONS

Communities in mining areas are urged to seek useful information from departments related to their needs especially NEMA, mining and health authorities. In such a way community sensitization; which is vital is actualized. Community sensitization is as useful as the mining process itself whereby all stakeholders interact on cost effective, efficient, modern and state of the art technologies to be incorporated in order to salvage on the derailed socio-economic and environmental profile. Furthermore, communities are required to take ecological conservation measures with a keen eye from which they acquire resources which make their lives count. Apart from the frequent search of the elusive mineral (gold), communities are urged to take other Income Generating Activities (IGAs) such as agriculture, pottery and financial enterprises without putting more pressure on the other. This way shocks from the gold market would not affect livelihoods. are required by law thus easily anticipate future problems and prospects and deal with them in due time.

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