



## Factors Influencing Compliance with Occupational Safety Regulations and Requirements among Artisanal and Small-Scale Miners in Central Sakwa Ward, Siaya County

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### ABSTRACT

The paper emanates from a larger study on occupational safety compliance in artisanal and small scale gold mines in Siaya County, Kenya. One of the key objectives of the study was to establish the factors influencing compliance with occupational safety regulations and requirements, among artisanal and small scale miners in the study area. The study utilized a proportionate random sampling design to draw a sample of 97 miners. Primary data were obtained mainly through field interviews, observations and photography while secondary data were obtained from published and unpublished sources. Data were analysed using both descriptive and inferential statistical tools. Research findings indicate that compliance with occupational safety regulations and requirements is influenced by awareness of the regulations and requirements, the use and cost of personal protective equipment, the gender factor as well as administrative failure. The study concludes that artisanal and small-scale gold miners in Central Sakwa Ward, Siaya County, are not complying with the occupational safety regulations and requirements owing to these factors.

## 1. Introduction

Globally, artisanal and small scale mining (ASM) activities contribute significantly to the economies of host countries through national revenues, foreign exchange earnings as well as employment creation (World Bank, 2013; Wilson et al. 2015; Hilson & McQuilken, 2014; Amankwah et al., 2015; Marin et al., 2016, IGF 2017). For instance, it is estimated that in 2014 there were 9 million ASM operators in Africa and about 54 million people with livelihoods dependent on the sector (IGF 2017; Persaud et al. 2017). It has been established that ASM is an important economic sector in low income countries, where it generates more income than alternative rural livelihoods (Barreto et al. 2018). For instance, ASM gold mining was projected to contribute USD 1.9 million per year into the local economy of a mining village, Osiri in Migori County while gemstone mining in Taita Taveta generates a production value of USD 120 million per year (Barreto et al. 2018).

Despite its significant contribution to economic development, ASM is often viewed as being

environmentally damaging and having serious health and safety consequences for workers and surrounding communities (Hentschel 2003; Benedict et al. 2015; ILO 2012; Gykye 2003). This is generally due to poor practices in mining and processing target minerals as well as the lack of effective occupational safety (Wilson et al., 2015; Vingård and Elgstrand, 2013). Among the typical occupational hazards associated with mining operations include falls, entrapment, extreme temperatures, collapsing of mining tunnels, heavy manual work, explosions and injuries from machineries and other objects (ILO 1999; Calys-Tagoe et al., 2015; Kyeremateng-Amoah & Clarke, 2015; Kundu et al., 2016; Song & Mu, 2013; Human Rights Watch, 2011; Wilson et al., 2015; Marriot, 2008). Occupational health and safety policy, legal and institutional frameworks are key in addressing some of these hazards. For instance, according to Kenya's Occupational Safety and Health Act No. 15 of 2007 (Sections 101 and 102), it is the responsibility of employer to provide adequate, effective and suitable personal protective equipment (PPE) including clothing and appliances, and where necessary, suitable gloves, footwear, goggles and head coverings to the workers involved in hazardous work. The right use of PPE would minimize the risk of accidents and illness and therefore create a safer working environment (National Council of Law Reporting 2010).

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## 2. Materials and Methods

The sampling frame for the study consisted of a total population of 128 miners drawn from four selected mining sites, namely Kanaymala, Konduru, Karaudhi and Kopiyo. These sites were purposively selected because they are permanent and the ore deposits are economically viable. A sample size of 97 miners was drawn from the sampling frame using the proportionate random sampling design as shown in Table 1.

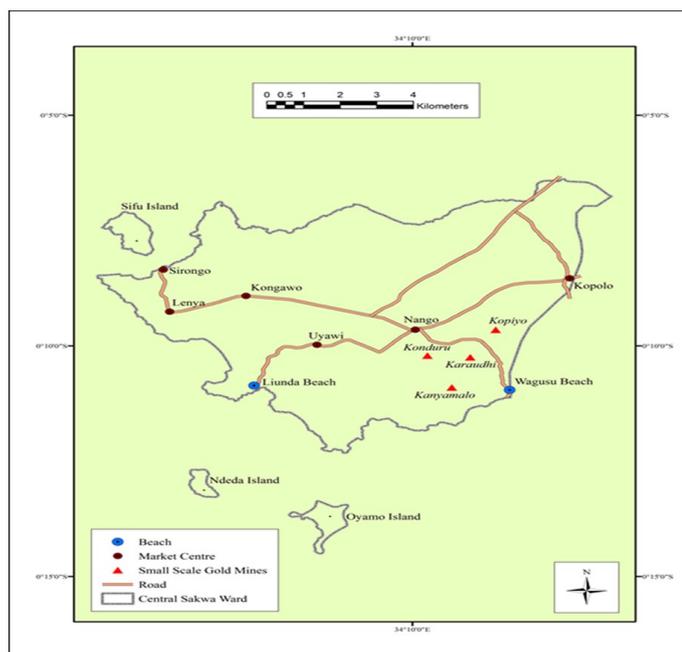
**Table 1:** Sample size from selected mining sites

Mining Site	Total population (N)	Selected sample size (n)
Kopiyo	47	36
Karaudhi	32	24
Kanyamalo	23	17
Konduru	26	20
Total	128	97

Source: Fieldwork 2018

The researcher then obtained the list of all the miners in each mining site. Using a table of random numbers, a total of 97 members of staff were proportionately drawn from the four mining sites and eventually 95 respondents (98%) were involved in the research. Research data were collected using various instruments namely: interviews, observation checklists and photography.

Data obtained from the field were analysed using both descriptive and inferential statistical tools. The descriptive analytical tools used in the study were frequency distributions and percentages. On the other hand, the Pearson's chi-square was the main inferential statistical tool. As far as data presentation is concerned, graphs, tables and charts were utilised.



**Figure 1:** Location of the mining sites  
Source: Survey of Kenya, (2017)

As already noted, this study was conducted at four gold mines in Central Sakwa Ward, Siaya County. The ward is among the six wards forming Bondo sub-County under the current Siaya County. The ward is bordered by South- Sakwa Ward to the East; Yimbo West Ward to the West; Lake Victoria to the South, North-Sakwa Ward to the North. Figure 1 shows the location of the mining sites within the study area.

## 3. Results and Discussions

### 3.1 Awareness of occupational safety regulations and requirements

Regarding awareness of occupational safety, the respondents were asked to state whether they were aware of occupational safety regulations and requirements at the work place and their sources of information on occupational safety issues. Accordingly, a significant proportion of miners (78.9%) expressed lack of awareness about occupational safety regulations and requirements with 21.1% indicating some awareness of the regulations. Their main sources of information were fellow miners, social media, radio, television and mine site managers. A cross tabulation of occupational safety regulations and requirements awareness variable with the education level of miners indicates correlation between the two variables as shown in Table 2. Accordingly, 10.2 % of the miners who expressed awareness of occupational regulations and requirements had tertiary level of education as compared to only 2.1% of the miners who expressed lack of awareness of regulations and requirements. Conversely, the highest percentage of miners expressing lack of awareness of the regulations and requirements (43.2%) had only primary education. Research results are therefore indicative of the strong positive linkage between the level of education and awareness of occupational safety regulations and requirements.

**Table 2:** Relationship between level of education and awareness of occupational safety regulations and requirements among miners

Education Level	Occupational safety awareness		Total	
	Yes	No	N	%
No formal schooling	0	3	3	3.2
Primary	1	41	42	44.2
Secondary	9	29	38	40.0
Tertiary	10	2	12	12.6
Total	20	75	95	100

Source: Fieldwork 2018

Research findings indicate there is a predominant lack of awareness of occupational safety regulations and requirements among miners in the study area. This is therefore a major variable influencing compliance with occupational safety regulations and requirements. Miners cannot be expected to comply with regulations and requirements that they are not aware about.

The research findings concur with those of MacEachen & Kosny, (2016) and Hu (1998). In a study on compliance rates with regulations amongst small businesses, MacEachen & Kosny (2016) established that inaccessibility of the regulations as well as the inability to comprehend the regulatory requirements affected compliance rates. Inaccessibility directly affects awareness and knowledge thus influencing compliance. Hu *et al.* (1998) have shown that the level of education was highly associated with employer awareness of occupational health and safety and that awareness and this awareness was warranted to enhance better compliance especially in small-sized industries in Taiwan.

### 3.2 Knowledge of the importance, cost and use of personal protective equipment

The study respondents were asked whether they used personal protective equipment (PPE) when carrying out mining activities. An overwhelming majority (78%) indicated that they did not use PPE while only 22% used. The most prevalent type of PPE used was gumboots. Table 3 indicates the reasons for not using PPEs among the different age-groups.

**Table 3:** Reasons for not using PPE among different age-groups

Age group	Reasons for not using PPE								Total	
	Not provided		Not provided		Not affordable		Not aware of their importance			
	N	%	N	%	N	%	N	%	N	%
<18	0	0.0	0	0.0	0	0.0	8	10.8	8	10.8
18-35	3	4.1	3	4.1	34	45.9	0	0.0	40	54.1
36-50	2	2.7	1	1.4	18	24.3	0	0.0	21	28.4
>50	1	1.4	0	0.0	4	5.4	0	0.0	5	6.8
<b>Total</b>	<b>6</b>	<b>8.2</b>	<b>4</b>	<b>5.4</b>	<b>56</b>	<b>75.6</b>	<b>8</b>	<b>10.8</b>	<b>74</b>	<b>100</b>

Source: Fieldwork 2018

It is apparent from the research findings that the most important reason for not using PPE is that it is not affordable to the miners. This factor alone accounts for 75.6% of the miners as compared to only 5.4% of the miners who indicated that PPE is not required. Only child miners (below 18 years) indicated that they were not aware of the importance of PPE. The lack of provision of PPE accounts for a comparatively low percentage of the miners. It may therefore be concluded that the non-affordability of PPE is a key factor influencing their use and therefore compliance with occupation safety at their work place.

This study's findings are consistent with a study on costs of compliance in relation to the benefits of compliance amongst Small and Medium-sized Enterprises (SME's) by Chan *et al.*, (2016) which similarly established that regulatory compliance is usually very low when the costs of complying with rules in terms of time, money and effort are considered to be high. In another similar study Kalidin, (2017)

found out that the cost of compliance is embedded in the complex nature of rules and the general regulatory structures that raise compliance cost in relation to turnover consequently affecting compliance rates. However, Munyua (2017), in a study on factors influencing the use of PPE among motor vehicle repair workers in Thika, established that the most important factors were unavailability of PPE, work experience and age. The cost of PPE accounted for only 13.8% of the respondents. This was probably due to the low cost that was associated with the most prevalent PPE, namely overalls/dust coats. Plate 1 shows the non-compliance related to the use of PPE in the study area.



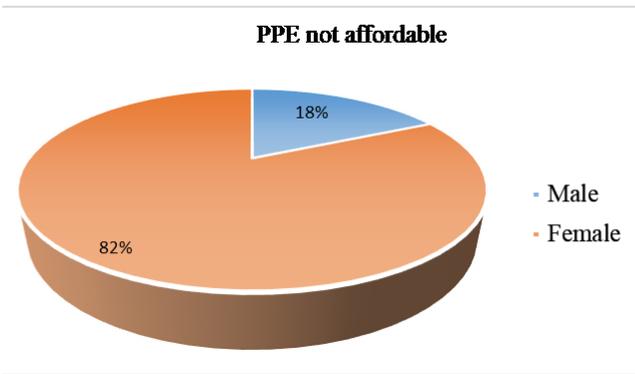
**Plate 1:** Non-compliance on the use of PPEs; (a) & (b) Children miners working on site without appropriate PPEs and (c) & (d) adult miners working on site without relevant PPEs

Source: Fieldwork 2018

### 3.3 Gender and compliance with occupational safety regulations and requirements

Of the 95 study respondents, 41.1 % (39) were female and the rest, 56% (56) were male. Research results clearly indicated female workers were less likely to comply with the safety regulations and requirements as compared to their male counterparts. For instance, it was observed that no female worker was using PPE and this was mainly due to unaffordability of PPE. Figure 2 shows that 82% and 18% of females and males respectively, indicated unaffordability as the reason for not using PPE. The female gender also indicated that their earnings were channelled more towards family upkeep unlike their male counterparts. The inability to comply with the regulations among females was also linked to the tasks performed at the mines. Male miners were involved in excavation and blasting which was relatively more paying than the female tasks that revolved around processing of the excavated ore.

This study's findings have been collaborated by the European Agency for Safety and Health at Work (2003) Factsheet. Accordingly, gender issues play a major role in safety and health at the work place. For instance, many work clothes and PPE have been designed for the 'average male' and therefore inappropriate for female workers, hence affecting their ability to comply with the regulations and requirements.



**Figure 2:** Gender and affordability of PPE

Source: Fieldwork 2018

### 3.4 Administrative failure/incompetence and compliance with occupational regulation and requirements

The study has established that administrative failure affects compliance with the regulations and requirements in areas of accident reporting, staff training as well as inspection and licencing. The study established that only 11.6% of accidents were reported and even then, the reporting protocol was not followed. Although the regulations provide that accidents are reported to the County Director of Environment, these were instead only reported to the local area chief. It was also established the mining operations in the four study sites were neither licenced nor inspected, despite the provisions of the Mining Act 2016. They were also not registered as work places, as per the Occupational Safety and Health Act 2007. The fact that these mining sites were allowed to operate is indicative of administrative failure on the part of the mining site managers, the County Director of Environment and the County Occupational Safety and Health Officer. As far as staff training is concerned, 95.8% of the miners indicated they had not undergone any type of formal training on mining operations. As indicated earlier, their source of information were fellow miners (who were equally untrained), the electronic and social media (with a likelihood of inaccurate information). From the foregoing, it is therefore apparent that administrative failure contributed to non-conformity to occupational safety regulations and requirements.

### Conclusion

On the basis of research findings, it may be concluded that artisanal and small scale gold miners in Central Sakwa Ward, Siaya County, are not complying with the occupational safety regulations and requirements owing to lack of awareness of the regulations and requirements; the high cost of PPE; the gender factor as well as administrative failure. There is therefore urgent need for relevant interventions (whether policy, legal or institutional) to address the non-compliance in such a critical sector, for the development of Siaya County and Kenya as a whole.

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