

PRACTICE OF OCCUPATIONAL SAFETY AMONG ARTISANAL MINERS IN A RURAL COMMUNITY IN SOUTHWEST NIGERIA

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Abstract:

Background: An estimated 13-20 million people in developing countries are engaged in artisanal mining and are exposed to various health-related occupational hazards. This study seeks to find out the occupational safety practices among artisanal miners in a rural community in southwest Nigeria.

Methodology: It was a cross-sectional descriptive study carried out in Ijero-Ekiti area of Ekiti State using a semi-structured interviewer administered questionnaire to assess the occupational safety practices of artisanal miners. The analysis was done using EPI INFO version 4.3.1. The study population included all the artisanal miners that were involved in mining in Ijero. All the artisanal miners that consented to take part in the study were recruited.

Results: More than half of the respondents were above 30 years of age (52.5%). Of the 118 respondents interviewed 66 (56%) did not make use of protective measures. Respondents who said their employers did provide protective measures for them were 24 (20.3%), while those with a higher level of education appeared to use more of protective measures.

Conclusion: Provision and practice of occupational safety and health should be encouraged among artisanal miners and their employers in the mining industry.

Keywords: Artisanal miners, personal protective equipments, occupational safety.

Introduction

An artisanal miner (small-scale miner) is a subsistence miner who works independently.¹⁻³ Small-scale mining includes enterprises or individuals that employ artisanal workers for mining, who generally work with hand tools.¹ An estimated 13-20 million people from over 50 developing countries are directly engaged in this occupation.^{1,3} Nigeria, like most developing countries is undergoing industrialization, and this has brought with it lots of health-related problems as workers involved in the mining occupation are exposed to various hazards which affect them.² The massive demand for quarry stones (quarrying is cutting into rocks or the earth to obtain stones or other materials) in building and road construction has resulted in the establishment of quarrying industries often without due regard to occupational health and safety measures.² Artisanal miners, who are mainly from poor families are mostly involved in quarrying³ and the effects of non-use of personal protective equipment (PPE) has been found to have a spiraling effect on their livelihoods.³ This effect includes the cost of livelihoods lost and lack of income to dependants.³ There is therefore a need to know the practice of health and safety measures among miners as there are few studies conducted on the practice of occupational safety among them.^{2,4}

The effective practice of occupational health and safety among miners is deficient in most developing countries.⁴ In a study in Northern Nigeria, all the quarry sites had no preventive/safety measures for the workforce hence, non-use of PPE was 100%.² Also a study done in India among sandstone quarry workers also showed that none (100%) of the workers was using face mask to prevent silica inhalation.⁵ Another study done among salt workers in India showed about 67% of the respondents were not using face mask as a protective device,⁹ this was despite their knowledge about protective equipments and its use.⁹ A study done in Hong Kong also showed that 86.6% of the management team (supervisors) and 48.6% of frontline workers (diggers, laborers) do not use respiratory protective equipment while working on construction sites.⁶

The deficient practice of health safety measures is not limited to miners only, as studies in some other professions in Nigeria and other developing countries have shown varying patterns of use.^{7, 8} Examples include 78% use of protective devices in Kaduna refinery and petrochemical company⁷ and the 35.9% use among welders in Benin city.⁸ With the total

costs of occupational accidents and diseases being estimated at between 1-3% of GDP worldwide,³ implementing appropriate occupational safety practices among the 13-20 million workers would lessen the burden. Hence, results from this study seeking to find out occupational safety practices among artisanal miners in a rural community in southwest Nigeria can also serve as a basis for planning appropriate intervention methods to reverse the trend of its non-use in Nigeria.

Methodology

The study was carried out in Ijero-Ekiti, Ijero Local Government Area of Ekiti State. It was a cross-sectional descriptive study to assess the practice of occupational health safety among artisanal miners. The study population included all the artisanal miners that were involved in mining in Ijero. All the artisanal miners that consented to take part in the study were recruited.

The estimated total number of artisanal miners in Ijero was 143 out of which 127 consented to participate in the study. A Pre-tested semi-structured interviewer administered questionnaire was used to generate quantitative data. The questionnaire was pretested in Igbeti, Oyo state among similar artisanal miners. Artisans above the age of 18 years who have been involved in mining activities in the last one year were recruited to participate in the study. Those that were below the age of 18 years and have not been involved in mining activities in the last one year were excluded from the study.

The analysis was done using EPI INFO version 4.3.1. Frequency tables and cross tabulations were generated. Chi-square test was used to determine statistical significance of observed differences in cross tabulated variables. Level of significance was predetermined at a p-value of less than 0.05. Clients' consent was obtained before interview. The nature of the study, participation status, benefits of the study and confidentiality issues was made clear to the respondents before obtaining their consent. Ethical clearance was obtained from the Research and Ethics Committee of Federal Medical Center of Ido-Ekiti, Ekiti state.

Results

There were a total of 118 respondents interviewed in this study. They were artisanal miners in a rural community in south west Nigeria. More than half of the respondents were above 30 years of age (52.5%), 39 (33.9%) were in the 21-30 years age group, while 17 (14.4%) were below 21 years. Majority of those interviewed were male 111 (94.1%) while 7 (5.9%) were females. Out of all the respondents 50.8% were single while 49.2% were married.

The number of respondents who had no formal education was 22 (18.6%). Those with primary education were 27 (22.9%), while the respondents who had secondary or tertiary education were 58 (49.2%) and 11 (9.8%) respectively. Respondents who had worked for or less than 12 months were 39 (33.1%), those who had worked for 13-48 months were 18 (15.3%), while 61 (51.7%) had been working on site for more than 48 months. Workers on the sites were divided into laborers 22 (18.6%), supervisors 29 (24.6%), machine operators 10 (8.5%), diggers 55 (46.6%) and lapidarist 2 (1.7%).

The responses of the workers to symptoms they had experienced in the last one year revealed that 39 respondents (33.1%) had chronic cough, 47 (39.8%) had chest pain, 21 (17.8%) had mucoid/bloody sputum and 27 respondents (22.9%) had progressive breathlessness. More than half of the respondents (77.1%) had experienced joint pains at one point during the year in review, while 58.5% had also experienced constant headaches. Physical injuries were found to have occurred in 54 (45.8%) respondents, while 23 respondents (19.5%) suffered from skin itching and rashes. None of the respondents however complained of having any hearing impairment.

A total of 66 (56%) respondents out of the 118 interviewed did not make use of protective measures. The educational level of respondents who did not make use of protective measures were 72.7%, 66.7%, 44.8% and 54.5% for no formal education, primary education, secondary education and tertiary education respectively. Respondents who made use of protective measures were 52. A total of 9 (9.9%) made use of overalls, 6 (6.6%) used earplugs, 20 (22%) used facemasks, while respondents who made use of goggles were 14 (15.4%) and those who used gloves were 33 (36.3%) each, and 9 (9.9%) for helmets. The response of the 118 workers to whether protective measures were taken by employers revealed that 37 (31.4%) respondents did not give a response to this question. Respondents who said first aid was provided by their employers (Feldspar Mining Company) on site were 22 (18.6%), 3 (2.5%) respondents said protective equipments was given to them, while 22 (18.6%) respondents said their employers bulldozed high places to make it safer for them to work. Protective measures of drilling/filling were said to be done by the employers by 3 respondents (2.5%), while 24 respondents (20.3%) said drugs were provided by the employer for their treatment.

Health seeking practices of respondents was found to be mostly self medication with 72 (61%) respondents engaging in this habit. Those that saw a doctor for treatment when sick were 40 (34%), while 6 (5%) respondents visited traditional healers for treatment.

Discussion

This study investigated the practice of occupational safety among artisanal miners in a rural community in southwest Nigeria. The prevalence of using occupational safety practices among the respondents was 44%. This was similar to the finding in the study done among welders in Benin city⁸ where safety practices was 35.9% and higher compared to the study done in United Arab Emirate (UAE) amongst cement workers where 28.8% used face masks during working hours⁴. This mining study showed a higher compliance with PPE use probably because the duration of working at the mining site influenced their use of PPE. This is evidenced in this study where 57.4% of respondents who had worked for more than 48 months at the mine made use of protective measures. However the higher level of safety practice (78%) in the study done in Northern Nigeria among refinery workers⁷ was higher compared to this study probably because majority of the refinery workers (92.1%) had training in occupational safety⁷.

Prevalence of a lack of use of safety practices among the respondents was 56%. This finding is similar to the finding from the study done in Hong Kong which showed that 48.6% of frontline workers (diggers, laborers) did not use respiratory protective equipment.⁶ However this was in contrast to the study done in Northern Nigeria where there was a 100% non-use of preventive/safety measures for the workforce in all the quarry sites visited². In another study in India among workers in a sandstone quarry the non-use of face mask to prevent silica inhalation was also 100%⁵. A possible reason for the lower value of 56% non-use of safety measures among the workers in this mining study compared to that of the Northern Nigeria study could be the preventive measures taken by the employer in this southwestern study as alluded to by the 75.6% of respondents.

Protective measures taken by respondents included the use of overall (9.9%), hand gloves (36.3%) and eye goggles (15.4%). This was different to findings of the study done among welders in Benin City, Nigeria which showed overall use 31.2%. The use of eye goggles was seen in 35.9% while the use of hand gloves was 20.8%⁸. The result from this study was in total contrast to that done in northern Nigeria,² where no form of protective measures were taken by their respondents.

Some (2.5%) of the respondents in this study said their employers put in place certain protective measures. This was in contrast to the study in northern Nigeria where no protective measures was put in place by the employers.²

The findings from this study revealed that it is a male dominated occupation (94%). This is consistent with the findings in other studies both in Nigeria and globally^{2, 5 & 6} among quarry and construction workers. This is not surprising considering the nature of strenuous work involved in artisanal mining. Respondents with no formal education was found to be 19%, this is higher than the value from the study done in northern Nigeria where 4%² had no formal education. This value is also slightly higher than the study done in UAE where 12.4% had no formal education⁴. However it is in contrast with the finding of the study in India among sandstone quarry workers where 71.5% were illiterate.⁵ It would be expected that a higher percentage of workers in artisanal mining would have no formal education as shown in the latter study since they are said to be mainly from poor families.³ The high percentage (81%) of those with one form of formal education as shown in our study and 96% in the northern Nigeria study² shows that there is probably a lack of opportunities for jobs for those that are educated. The implication of this finding is the inability of the public and private establishments to provide jobs to Nigerians that is commensurate to their academic qualifications.

The study showed that workers were exposed to various physical, chemical/dust inhalation and ergonomical hazards. The common occupational hazards among respondents included physical injuries (45.8%), chronic cough (33.1%) and other respiratory symptoms like mucoid/bloody sputum (17.8%) and progressive breathlessness (22.9%). This is comparable with the study done in northern Nigeria that showed cuts (68.9%), cough (17.6%) and other respiratory symptoms (64.9%).² Skin irritation was also found to be present among artisanal miners. This is probably due to the effects of the chemicals in the dust generated from mining on the skin. This study revealed skin rashes and itching in 19.5% of respondents. This was comparable with the findings in the northern Nigeria study that showed 10.8% of respondents had skin irritation². The finding of chest pain in this study (39.8%) was higher than the finding in the Northern Nigeria study which was 10.8%. With the myriad of clinical symptoms, it is therefore important that efforts be made to encourage employers to put in place programs for pre-employment medical examination, periodic medical examination and worksite inspection for the use of PPE. These will help in curtailing the incidence and prevalence of the common symptoms like cough, respiratory symptoms and skin irritations among the miners.

More than half of the respondents were found to have experienced joint pains (77.1%) and constant headache (58.5%) at one point or the other. This could be explained by the strenuous

activities involved in this occupation. Health seeking practices of respondents was mostly self medication (61%), this was consistent with the study done in northern Nigeria.² But higher than that of the study done in India among sandstone quarry workers where about 32.7% were involved in self medication⁵. The higher practice of self medication in this study may be due to a reduced provision of first aid services by their employer as alluded to by the 18.6% of respondents who said their employer provided medical attention to them.

Conclusion and Recommendations

Workplace risks, which are almost entirely preventable according to the World Health Organization¹⁰ were observed in this study. The hazards documented in this study calls for concerted efforts by the management in charge of mines to institute and enforce measures to prevent these hazards from happening at the workplace. In addition appropriate practice of occupational safety and health should be raised among artisanal miners as well as all individuals responsible for the operations in the mining industry. Employers should therefore be instructed to provide protective measures for all their workers.

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Table 1: Socio demographic characteristics of respondents

Variable	Frequency	Percent
Age Group		
≤ 20 yrs	17	(14.4)
21 - 30 yrs	39	(33.1)
> 30 yrs	62	(52.5)
Sex		
Male	111	(94.1)
Female	7	(5.9)
Marital Status		
Single	60	(50.8)
Married	58	(49.2)
Educational Status		
None	22	(18.6)
Primary	27	(22.9)
Secondary	58	(49.2)
Tertiary	11	(9.3)
Religion		
Christianity	79	(66.9)
Islam	36	(30.5)
Traditional	3	(2.5)
Tribe		
Yoruba	61	(51.7)

	Igbo	30 (25.4)
	Hausa	24 (20.3)
	Others	3 (2.5)
Mining Aspect		
	Laborers	22 (18.6)
	Supervisor	29 (24.6)
	Operator	10 (8.5)
	Diggers	55 (46.6)
	Lapidarist	2 (1.7)

Table 2: Work duration and site of work

Variable	Frequency	(Percent)
Working Duration on mining site (months)		
≤ 12	39	(33.1)
13 – 48	18	(15.3)
> 48	61	(51.7)
Average working hours/day		
≤ 6	57	(48.3)
> 6	61	(51.7)
Does work take you away from family		
Yes	41	(34.7)
No	77	(65.3)
How long in a week does work take you away from family (days)		
Not at all	74	(62.7)
≤ 3	17	(14.4)
> 3	27	(22.9)
Site of work		
Underground	53	(44.9)
Above Ground	16	(13.6)
Both	49	(41.5)

Table 3: Socio-demographic characteristics and use of protective measures

Variables	Use of Protective Measures	
	No (%)	Yes (%)
Age		
≤ 20	11 (64.7)	6 (35.3)
21-30 yrs	16 (41.0)	23 (59.0)
> 30 yrs	39 (62.9)	23 (37.1)
	$\chi^2 = 5.269$, $df=2$, $P_{\text{value}} = 0.072$	
Sex		
Male	60 (85.7)	51 (45.9)
Female	6 (85.7)	1 (14.3)
	$\chi^2 = 2.678$, $df=1$, $P_{\text{value}} = 0.102$	
Marital Status		
Single	31 (51.7)	29 (48.3)
Married	35 (60.3)	23 (39.7)
	$\chi^2 = 0.901$, $df=1$, $P_{\text{value}} = 0.342$	
Educational Status		
None	16 (72.7)	6 (27.3)
Primary	18 (66.7)	9 (33.3)
Secondary	26 (44.8)	32 (55.2)
Tertiary	6 (54.5)	5 (45.5)
	$\chi^2 = 6.690$, $df=3$, $P_{\text{value}} = 0.082$	
Duration on mining sites (months)		
≤ 12	25 (64.1)	14 (35.9)
13 – 48	15 (83.3)	3 (16.7)
> 48	26 (42.6)	35 (57.4)
	$\chi^2 = 10.923$, $df=2$, $P_{\text{value}} = 0.004$	

Table 4: Protective Measures taken

Variable	Frequency	(Percent)
Protective Measures on Site		
Helmet	9	(9.9)
Gloves	33	(36.3)
Goggles	14	(15.4)
Facemasks	20	(22.0)
Earplugs	6	(6.6)
Overall	9	(9.9)
Measures Taken by Employer		
Drugs	24	(20.3)
Drill and Fill	3	(2.5)
Bulldoze High Places	37	(31.4)
Gave out Protective Equipment	3	(2.5)
Medical Attention	22	(18.6)
No response	29	(24.6)

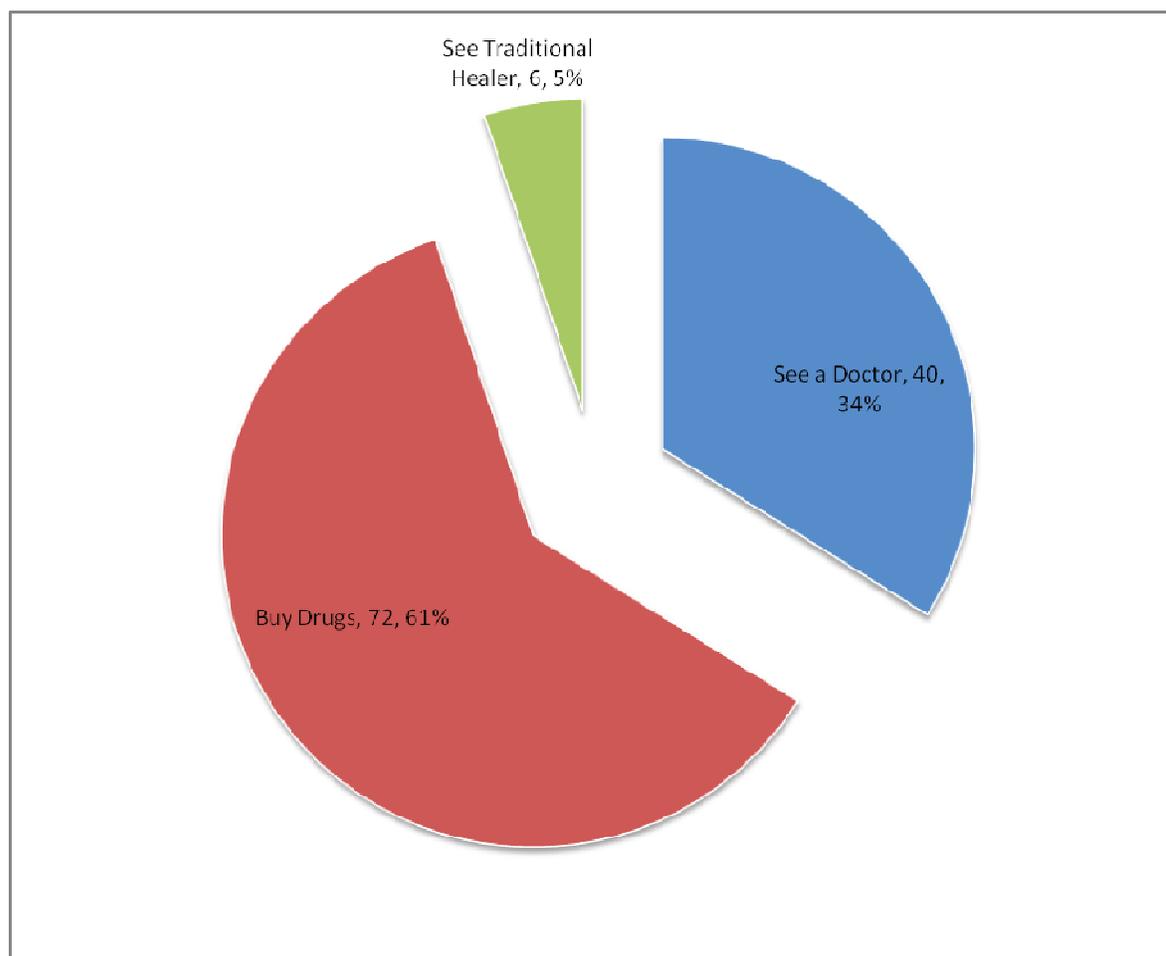


Figure 1:
Health seeking practices of respondents