Science Journal of Public Health
2025, Vol. 13, No. 6, pp. 330–337
https://doi.org/10.11648/j.sjph.20251306.12

Research Article

Level of Awareness on Prevention of Injuries Among Soapstone Mine Workers in Tabaka, Kisii County, Kenya

Medrine Yator[1, *], Alex Ontiri[2], Nickson Ogugu[1]

[1]Department of Medical Services and Public Health, Kisii County Government, Kisii, Kenya
[2]Department of Medical Services, Kisii University, Kisii, Kenya

Abstract

Mining is an industry that significantly contributes to the improvement of economic growth and development in many countries. The global rates of occupational injuries, illnesses and fatalities associated with mining are alarming. The international Labour Organization (ILO) estimates that quarrying activities accounts for 8% of the world work related fatalities. Quarrying in Kenya creates employment opportunities, support local construction and a major source of national economy. Kisii County is enriched with soapstone resources in Tabaka which are mined and carved to form different sculptures that are sold both locally and internationally. Despite the enactment of legal and institutional frameworks many workers in different sectors work in the presence of occupational hazards which lead to huge burden of accidents, and occupational injuries. The objective of the study was to assess the level of awareness on prevention of injuries among soapstone mine workers in Tabaka, Kisii County, Kenya. The research adopted cross sectional design from a population of 222 soapstone mine workers from five selected registered self-help groups involved in mining and carving of soapstone products. A sample of 174 was proportionately randomly selected from the five self-help groups. Structured questionnaires were used to collect data on nature and frequency of accidents and awareness on prevention measures on occupational hazards. An interview was conducted with the quarry managers and key informants involved in occupational safety and health. An observational checklist was used to record how quarry activities were performed. Data collected was cleaned, coded, tabulated and subjected to statistical analysis using SPSS version 21.0. It was established that 43.1% of the miners were involved in the main activity of cutting of soapstone into different sizes and shapes. More than half, 58.6% of the miners were aware mining has occupational hazards but were not trained (63.8%) to identify occupation hazards. Respondents were aware of use of protective equipment 55.2% but 53.3% had not been trained on occupational health and safety with 53.4% soapstone miners not reporting the accidents. The study revealed statistical significance on training and identification of hazards ($p<0.001$), awareness on prevention of occupation injuries ($p<0.001$), wearing PPE ($p<0.001$), type of PPE ($p=0.017$) and trainer of OSH with awareness on prevention of occupation injuries. The study concluded that the respondents could identify occupational health and safety hazards and related effects of soapstone quarrying activities. However, soapstone mine workers lacked awareness on prevention of injuries and occupation safety.

Keywords

Injuries, Occupational, Health, Safety, Awareness, Prevention, Kisii, Kenya

*Corresponding author: yatormedrine@gmail.com (Medrine Yator)

Received: 26 October 2025; **Accepted:** 8 November 2025; **Published:** 9 December 2025

1. Introduction

Mining industry plays an important role in the improvement of countries economic growth and influences sustainable development [1]. The world rates of occupational injuries, illnesses and fatalities are still alarming [2]. According to the U.S Bureau of Labor Statistics, mining fatalities rose by 21.8 percent from 2020 to 2021 with fatal injury rate for the overall mining industry in 2021 being 14.2 per 100,000. The mining sector accounted for approximately 3.7% of global GDP in 2019, with the value of mineral production exceeding $600 billion USD [3]. It is estimated that approximately 13 million people participate in small scale mining activities influencing livelihood of 80-100 million people in developing world [4]. About 75% of the global labour force lives in developing countries but approximately 5-10% have accessibility to occupational health and safety services [5]. Despite its contribution, mining industry has been blamed for high rates of fatality and accidents. Occupational Health and Safety encompasses all aspects of health and safety concerns in a workplace with emphasis towards primary prevention of hazards.

According to International Labour Organization (ILO) and World Health Organization (WHO), occupational safety and health is a fundamental right of workers all over the world. Occupational Health and Safety aims to protect the health, safety, and welfare of workers in order to promote a safe working environment. Kenya has achieved significant progress in occupational safety and health through the promulgation of the new Constitution of Kenya and the enactment of the Occupational Health and Safety Act No 15 of 2008 [6]. Despite the enactment of legal and institutional frameworks that address various work safety and health related issues, many workers in different sectors work in the presence of occupational hazards which lead to huge burden of accidents, injuries and occupational injuries [5].

Kisii county is enriched with soapstone resources in Tabaka which are mined and carved to form different sculptures. Tabaka soapstone miners and handicrafts are known all over the world for artistic prowess over the years [7]. However, the individuals who participate in the various mining processes often lack the training, skills, and knowledge needed to practice safely [4]. The great demand for soapstone products both locally and internationally coupled with low-income levels, increasing unemployment rate, and poverty makes small-scale soapstone mining an attractive venture for many to engage in. The small-scale mining sector provides employment for a large proportion of unemployed individuals in Tabaka, Kisii County. The exploitation of the soapstone deposits in Kenya, is characterized by the usage of relatively simple tools. The industry is often undercapitalized and occurs within informal settings generally characterized by intense manpower with rudimentary equipment such as shovels, pickaxes, and poor methods of extraction, some operators have engaged the use of excavators, bulldozers, and other sophisticated equipment [7].

Soapstone mining is an economic activity and source of livelihood for many people in Kisii [8]. Lack of safety and health measures and poor implementation of OSH policy cause occupational health and safety problems with high rate of injuries, incapacitation, and fatalities [9]. Lack of data and underreporting of incidents in small scale mining distorts mining's safety record and makes it harder to detect and improve potential hazards [10]. Soapstone mining operations cause slope instability resulting in quarry accidents that cause injuries and death to miners. Too often, the preventable incidents of landslides burying miners catch the public awareness and the language that criminalizes illegal miners and reports of fatalities are normalized without effecting long term committed actions. For instance, two miners died and others hospitalized in Bonchari, Kisii county after the quarry collapse in 2018 [11]. According to Kisii County department of environment, most of the mines are privately owned, unregulated and operate in unsafe and dangerous conditions without any periodic independent evaluation on the status of the mines as required by law. As a result, the miners work in physically demanding environment and are exposed to hazards such as noise, dusts, heat among others. Tabaka ward had the highest incidence cases of above 5 years of 9,277 of upper respiratory tract infections, 339 eye infections, and 379 ear infections in 2019 compared to other five wards in the sub county [12]. This may be contributed to soapstone mining activities. The informal nature of how soapstone mining activities are conducted was the key motivation of assessing the status of occupation safety and health of soapstone mine workers in Tabaka with an objective of determining the level of awareness on prevention of injuries among soapstone mine workers in Tabaka, Kisii County.

2. Materials and Methods

The study involved a cross-sectional design. Those in the study population who gave informed consent were included in the study while those in the study population, who did not give informed consent, were cognitively impaired were excluded from the study. Independent variable included variables related to study population's level of awareness on prevention of injuries such as safety awareness, training and level of knowledge. The research adopted cross sectional design from a population of 222 soapstone mine workers from five selected registered self-help groups involved in mining and carving of soapstone products. A sample of 174 was proportionately randomly selected from the five self-help groups. Structured questionnaires were used to collect data on nature and frequency of accidents and awareness on prevention measures on occupational hazards. An interview was conducted with the quarry managers and key informants involved in occupational safety and health. An observational checklist

was used to record how quarry activities were performed. Data collected was cleaned, coded, tabulated and subjected to statistical analysis using SPSS version 21.0.

3. Results

3.1. Socio-Demographic Characteristics of the Respondents

Table 1. Sociodemographic Characteristics of the Respondents.

Variable	Category	Frequency	Percent%
Gender	Male	129	74.1
	Female	45	25.9
Age	18-35	52	29.9
	36-50	114	65.5
	>50	8	4.6
Education	No formal education	3	1.5
	Primary	103	59.2
	Secondary	40	23
	Tertiary	28	16.1
Marital status	Single	6	51.7
	Married	153	76.9
	Separated	14	8
	Widowed	1	0.6

The socio-demographic analysis shows that majority of the respondents were male 129 (74.1%) and female were 45 (25.9%) with the majority 114 (65.5%) being the age-group of 36-50. This means that most of the respondents were male aged from 36-50. This could be attributed by the perception that quarry activities were considered men's job.

About 3 (1.7%) of the miners had no formal education, 103 (59.2%) had primary education, 40 (20.1%) had secondary education and 28 (16.1%) had tertiary education as the highest level of education. The findings also indicated 6 (3.4%) were single, 153 (87.9%) were married, 14 (8.1%) had separated and 1 (0.6%) were widowed.

3.2. Awareness on Prevention of Injuries

The study findings indicated that 96 (55.2%) of the respondents have heard about prevention of injuries at the workplace compared to 78 (44.8%) of the respondents.

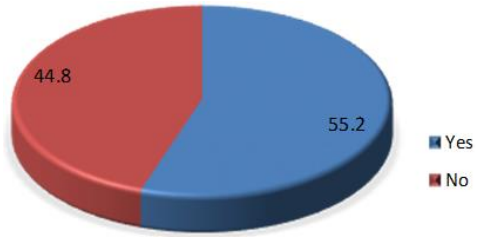

Figure 1. Awareness on Prevention of Injuries.

3.3. Source of Information

Table 2. Source of Information.

Variable	Category	Frequency	Percentage
Source of information	Mine site manager	4	2.3
	Radio/TV	6	3.4
	Friend/family	4	2.3
	Fellow miner	21	12.1
	Newspaper	10	5.7
	Training	60	34.5
	Experience	69	39.7

The major source of information was through experience 69 (39.7%) and training at 60 (34.5%) and fellow miners at 21 (12.1%).

3.4. Awareness and Use of PPE Among Respondents

Table 3. Knowledge and Use of PPE.

Variable	Category	Frequency	Percent%
Wear PPE	Yes	116	66.7
	No	58	33.3
Type of PPE	Protective helmets	43	37.1
	Face shields/masks	21	18.1
	Gloves	20	17.2
	Safety boots	19	16.4
	Aprons	13	11.2
Source of PPE	Bought for myself	71	61.2
	Given by family/friend	10	8.6
	No provider	35	30.2

Variable	Category	Frequency	Percent%
Reason for not using PPE	Not provided	12	20.7
	Not required	10	17.2
	Not comfortable	13	22.4
	Not affordable	22	37.9
	Forget to use	1	1.7

The study revealed that majority of the respondents 116 (66.7%) wore personal protective equipment when working compared to 58 (33.3%) who did not. Protective helmets were the most use type of PPE at 62 (30.5%), followed by face shields at 33 (15.5%), gloves 30 (14.4%), safety boots 25 (5.2%) and aprons 24 (6.3%). The respondents indicated that they bought for themselves the PPE 107 (61.5%). For those who did not wore the PPE, majority claimed they were not affordable 55 (27.6%), not comfortable 49 (24.6%), not provided 35 (20.1%), forgot to use at 7 (3.5%) and not aware of importance at 2 (1%).

3.5. Trained on Basic Occupational Health and Safety

Majority of the respondents had not been trained on basic prevention measures and occupation safety at 91 (52.3%) while 82 (47.1%) had been trained. This shows that majority of the quarry workers were susceptible to occupational hazards and injuries at the workplace.

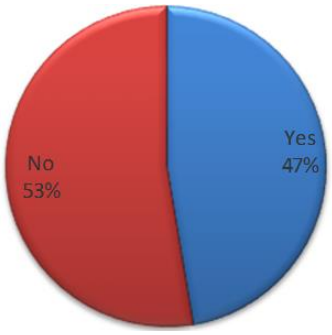

Figure 2. *Trained on Occupational Safety.*

3.6. Trainer of Prevention of Injuries and Occupational Safety and Health

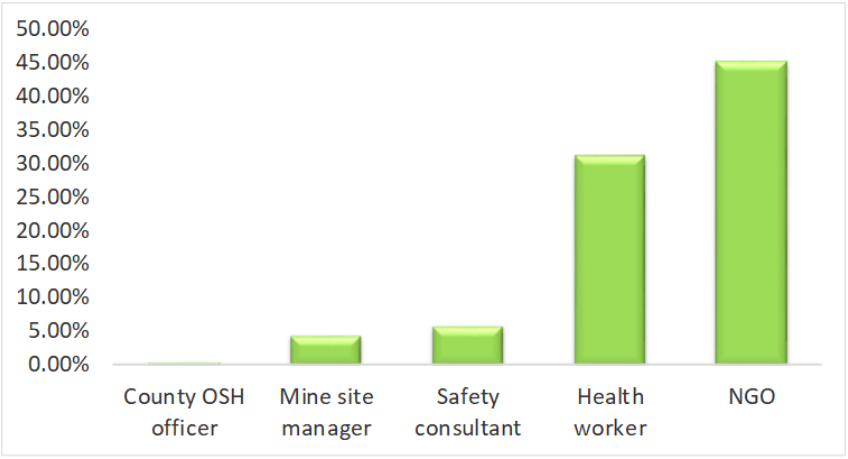

Figure 3. *Trainer of Prevention of Injuries.*

NGO present within the region had trained most respondents at 90 (45.2%) and health workers had trained them at 62 (31.2%). Mine site manager at 4.5% and County OSH office at 0.5%.

3.7. Bivariate Analysis on Awareness of Occupational Safety in Prevention of Injuries

A bivariate analysis showed that source of occupation safety information at the mines ($\chi2$=109.776, p=0.000, df=6), wearing of PPE ($\chi2$=12.653 p=0.000, df=1), type of PPE ($\chi2$=12.653 p=0.000, df=1), source of PPE ($\chi2$=25.486, p=0.000, df=2), ever been trained on OSH safety ($\chi2$=77.363, p=0.000, df=2) and trainer of occupational safety ($\chi2$=82.291, p=0.000, df=4) are statistically significant to a miner being aware of prevention of occupation injuries as indicated in the table below. The reason of not wearing protective equipment ($\chi2$=6.156, p=0.291, df=5) was not statistically significant to being aware of occupation safety and prevention of injuries. The findings reveal the use of protective equipment has significance influence on awareness of occupation safety and

health and prevention of injuries. There was need to adhere to Occupational Health and Safety Act, 2007 to enhance safe work environment.

Table 4. *Association of Safety Equipment and Awareness of Prevention of Injuries.*

Variable	Category	Aware of prevention of occupation injuries		Chi Square, p value, df
		Yes (%)	No (%)	
Source of OSH safety at workplace	Mine site manager	4 (4.2%)	0 (0%)	$\chi2$=109.776 p=0.000, df=6
	Radio/Tv	0 (0%)	6 (7.7%)	
	Fellow miner	21 (21.9%)	0 (0%)	
	Family/friend	3 (3.1%)	1 (1.3%)	
	Newspaper	0 (0%)	10 (12.8%)	
	Training	55 (57.3%)	5 (6.4%)	
	Experience	13 (13.5%)	56 (22.2%)	
Wear PPE	Yes	75 (78.1%)	41 (52.6%)	$\chi2$=12.653 p=0.000, df=1
	No	21 (21.9%)	37 (47.4%)	
Type of PPE	Helmets	44 (45.8%)	18 (23.1%)	$\chi2$=12.103 p=0.017, df=4
	Glasses/face shields	15 (15.6%)	18 (23.1%)	
	Gloves	17 (17.7%)	13 (16.7%)	
	Safety boots	9 (9.4%)	16 (20.5%)	
	Aprons	11 (11.5%)	13 (16.7%)	
Source of PPE	Bought for self	70 (72.9%)	37 (47.4%)	$\chi2$=25.486 p=0.000, df=2
	Given by family/friend	11 (11.5%)	2 (2.6%)	
	Provided by manager	0 (0%)	0 (0%)	
	Other	15 (15.6%)	39 (50.0%)	
Reason of not using PPE	Not provided	23 (65.7%)	12 (15.4%)	$\chi2$=6.156 p=0.291, df=5
	Not required	17 (17.7%)	9 (11.5%)	
	Not comfortable	28 (29.2%)	21 (26.9%)	
	Not affordable	24 (25.0%	31 (39.7%)	
	Forget to use	3 (3.1%)	4 (5.1%)	
	Not aware of importance	1 (1%)	1 (1.3%)	
Trained on basic occupation safety	Yes	74 (77.3%)	9 (10.9%)	$\chi2$=77.363 p=0.000, df=2
	No	22 (22.9%)	69 (88.5%)	
Trainer of OSH	County OSH officer	1 (1%)	0 (0%)	$\chi2$=82.291 p=0.000, df=4
	Mine site manager	9 (9.4%)	0 (0%)	
	Safety consultant	11 (11.5%)	1 (1.3%)	
	Health worker	55 (57.3%)	7 (9.0%)	
	NGO	20 (20.8%)	70 (89.7%)	

4. Discussion

4.1. Socio-Demographic Characteristics of the Respondents

The finding implies that the most active reproductive age was involved in mining activities. This study supports the findings of Arasa et al., [13] that the male dominate artisanal mining activities at 65.17%. However, it contradicts findings of Beth [14] that small-scale gold mines in Siaya is female dominated.

This demonstrated that the sector attracted workers with a blend of knowledge and skills. Furthermore, it was observed that soapstone quarrying activities did not require advanced skills since most of the work was informal. Many soapstone mine workers may have lacked finances to further their education and secure better jobs. This implied that majority of the respondents were family individuals with responsibilities of dependents which could be the major reason for their engagement in soapstone activities. The results concur with Ayoo and Moronge [15], research findings of majority of (60.1%) of the artisan gold mining being married.

4.2. Awareness on Prevention of Injuries

According to Occupational Safety and Health Act 2007, employment of a worker in any process that may cause ill health or bodily injury is prohibited unless worker has been fully instructed about the hazards involved and precautions that must be observed. Worker should be properly trained or required to work under supervision of experienced persons to prevent injuries. This contrast with the findings of Beth [14] of majority gold miners 78.9% in Siaya County lacking awareness about occupation safety. Makokha [16] noted that majority of mine workers are ignorant and do not follow instructions even for their own safety.

4.3. Source of Information

According to Occupational Safety and Health Act 2007, employer should ensure that all the workers receive appropriate instructions regarding safety and health risks including emergency procedures during their activities at the workplace and actions to be taken in case of an emergency. This finding concurs with Chepchumba [17] that the main source of information of occupational hazards are colleagues (45.2%) and personal experience (32.6%). This shows that more awareness on occupation safety is needed. MacEachen & Kosny, [18] also noted that the compliance rates with regulations among small enterprises is majorly affected by inaccessibility of the regulation and the inability to comprehend regulatory requirements. Inaccessibility impacts awareness and knowledge which affect compliance.

4.4. Awareness and Use of PPE Among Respondents

Even though majority of the miners indicated the use of helmets (33.3%) and face shields (15.5%), the researcher observed the usage of protective equipment was poor. Majority claimed they could not afford (27.6%) the protective gears since they bought for themselves (61.5%). This could be attributed to the reason that most of the earnings are channelled for family upkeep. Administrative incompetence and noncompliance of Mining Act and Occupational Health and Safety Act, 2007 was observed.

This relate with findings of Calys-Tagoe *et al*., [19] on impacts of under-resourced inspectorate on safety of small-scale mines in Tarkwa Mining in Ghana and findings of Ezisi *et al* [20] that stone quarry workers were aware that they should wear protective equipment but most of them do not utilize.

4.5. Trained on Basic Occupational Health and Safety

This disagrees on International Organization for Standardization that to reduce health exposure, both individual and collective preventive measures should be adopted. According to International Labour Organization, multi-disciplinary approach should be used in prevention of occupational hazards and injuries. Health hazards should be controlled at source by engineering measures, administrative control, use of suitable personal protective equipment (PPE), education, training and supervision of workers, environmental monitoring and health surveillance. The findings relate with the quarry workers of Mutonga where majority 98% had not been trained but relied on observational and on job training [21].

5. Conclusions

The study concludes that in Kisii County, Soapstone mine workers lacked awareness on prevention of injuries and occupation safety. The miners were insufficiently equipped with personal protective equipment to prevent occupation injuries and accidents. Unaffordability of protective equipment was the main hindrance.

6. Recommendations

The study recommends the following Allocate budget and resources to create awareness and determine knowledge and awareness gaps to quarry workers and community on importance of prevention of occupation injuries and support soapstone mine workers to adhere and comply to the Occupational Health Safety regulations and guidelines that prevent and control small scale mining health related problems.

Abbreviations

ILO	International Labour Organization
SPSS	Statistical Package for Social Science
PPE	Personal Protective Equipment
U.S	United States
GDP	Gross Domestic Product
USD	United States Dollar
WHO	World Health Organization
OSH	Occupational Safety and Health
NGO	Non Government Organization
IDSR	Integrated Disease Surveillance and Response
CLTS	Community-Led Total Sanitation
ODF	Open Defecation Free (ODF)
WASH	Water Sanitation and Hygiene

Funding

This work is not supported by any external funding.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Pavolová, H., Čulková, K., Šimková, Z., Seňová, A., & Kudelas, D. (2022). Contribution of mining industry in chosen EU countries to the sustainability issues. *Sustainability*, *14*(7), 4177. https://doi.org/10.3390/su14074177

[2] Kainat, S., & Shahzadi, A. (2021). Managing Occupational Health and Safety in the Mining Industry. *Agriculture and Environment*, *2*(2), 17-22. AEN-2021-02-02-006

[3] Ayuk, E., Pedro, A., Ekins, P., Gatune, J., Milligan, B., Oberle, B.... & Mancini, L. (2020). *Mineral Resource Governance in the 21st Century: Gearing extractive industries towards sustainable development.* International Resource Panel, United Nations Envio, Nairobi, Kenya.

[4] Hilson, G., & Maconachie, R. (2020). Artisanal and small-scale mining and the Sustainable Development Goals: Opportunities and new directions for sub-Saharan Africa. *Geoforum*, *111*, 125-141. https://doi.org/10.1016/j.geoforum.2019.09.006

[5] Kumar, C. R., Verma, K. C., & Neetika, A. (2016). An assessment of the knowledge, attitudes and practices about the prevention of occupational hazards and utilization of safety measures among meat workers in a city of Haryana state of India. *Indian Journal of Applied Research*, *6*(3), 40-48. https://doi.org/10.36106/ijar

[6] Mitullah, W. V., & Wachira, I. N. (2011). Informal labour in the construction industry in Kenya: A case study of Nairobi.

[7] Rumbe, O. G. (2021). *An Assessment of the Effects of Artisanal Mining in Tabaka, Kisii County, Kenya* (Doctoral dissertation, University of Nairobi).

[8] Akama, J. S., & Onyambu, M. M. K. (2020). The role of the Gusii soapstone industry in promoting sustainable livelihoods: A historical perspective. *African Journal of Hospitality, Tourism and Leisure*, *9*(1), 1-12. https://doi.org/10.34548/asm.44.1

[9] Wachira, W. B. (2017). *Status of occupational safety and health in flour milling companies in Nairobi Kenya* (Doctoral dissertation, COHES, JKUAT).

[10] World Bank. (2020). *2020 State of the Artisanal and Small Scale Mining Sector*. Washington, D. C.: World Bank.

[11] Health and Safety Executive. (2018). Benefits of good health and safety. Retrieved from http://www.hse.gov.uk

[12] Kenya Health Information System (2019). KHIS for aggregate reporting and analysis Retrieved from https://hiskenya.org/dhis-web-reporting/index.action

[13] Arasa, R., Achuora, J., & Okello, C. (2020). Artisanal mining practices: A study of selected counties in Kenya.

[14] Beth, A. A. (2018). *Assessment Of Occupational Safety Compliance In Small-Scale Gold Mines In Siaya County, Kenya* (Doctoral dissertation, University of Nairobi).

[15] Ayoo, B. A., & Moronge, J. (2019). Factors influencing compliance with occupational safety regulations and requirements among artisanal and small-scale miners in central sakwa ward, Siaya County. *Journal of Sustainability, Environment and Peace*, *1*(1), 1-5. https://doi.org/10.53537/jsep.2019.02.001

[16] Makokha, W. R. (2021). *Determinants of Occupational Injuries among Workers in Artisanal and Small-Scale Gold Mining Activities in Kakamega County, Kenya* (Doctoral dissertation, Kenyatta University).

[17] Chepchumba, J. (2020). *Assessment of Occupational Hazard Awareness and Safety Measures among Quarry Workers in Bomet County, Kenya* (Doctoral dissertation).

[18] MacEachen, E., & Kosny, A. (2016). Qualitative Evidence in Occupational Health. *Handbook of Qualitative Health Research for Evidence-Based Practice*, 225-241. https://doi.org/10.1007/978-1-4939-2920-7_14

[19] Calys-Tagoe, B. N., Ovadje, L., Clarke, E., Basu, N., & Robins, T. (2015). Injury profiles associated with artisanal and small-scale gold mining in Tarkwa, Ghana. *International journal of environmental research and public health*, *12*(7), 7922-7937. https://doi.org/10.3390/ijerph120707922

[20] Ezisi, C. N., Eze, B. I., Okoye, O., & Arinze, O. (2017). Correlates of stone quarry workers' awareness of work-related ocular health hazards and utilization of protective eye devices: Findings in southeastern Nigeria. *Indian journal of occupational and environmental medicine*, *21*(2), 51-55. https://doi.org/10.4103/ijoem.IJOEM_171_16

[21] Wanjiku, M. W. (2015). *Occupational health and safety hazards associated with quarrying activities; A case of Mutonga Quarry, Meru County, Kenya* (Doctoral dissertation).

Biography

Medrine Yator is a Public Health Officer and Field Epidemiologist with over nine years of experience in disease surveillance, outbreak response, and health systems strengthening. She serves with the County Government of Kisii, Kenya, as a Sub-County Disease Surveillance Coordinator and Public Health Officer, where she leads public health emergency preparedness and implementation of Integrated Disease Surveillance and Response (IDSR) strategies. She has coordinated impactful public health interventions, including Community-Led Total Sanitation (CLTS) programs that enabled communities to attain Open Defecation Free (ODF) status, and has strengthened community health structures through the training and supervision. Medrine has collaborated with partners such as AMREF to advance disease prevention and health promotion. She holds an MSc in Occupational Health and Safety from Jomo Kenyatta University of Agriculture and Technology and a BSc in Environmental Health from Kenyatta University. Her research interests include epidemiological surveillance, infectious disease control, WASH and community-based public health interventions.

Research Field

Medrine Yator: Epidemiology, Public Health, Community Health, Occupational Health and Safety

Alex Ontiri: Clinical Medicine, Clinical Research, Epidemiology, Public Health, Community Health, Occupational Health and Safety

Nickson Ogugu: Epidemiology, Public Health, Community Health, Occupational Health and Safety