



East African Journal of Environment and Natural Resources

eajenr.eanso.org

Volume 6, Issue 1, 2023

Print ISSN: 2707-4234 | Online ISSN: 2707-4242

Title DOI: <https://doi.org/10.37284/2707-4242>

EANSO

EAST AFRICAN
NATURE &
SCIENCE
ORGANIZATION

Original Article

Environmental Health and Safety Practices in Petrol Stations in Nairobi County, Kenya

Andrew Sila Makiti^{1*} & Dr. Felix Ming'ate, PhD¹

¹ Kenyatta University, P. O. Box 43844-00100 Nairobi, Kenya

* Correspondence ORCID ID: <https://orcid.org/0000-0002-1192-5936>; email: makitisila@students.ku.ac.ke

Article DOI: <https://doi.org/10.37284/eajenr.6.1.1426>

Date Published: **ABSTRACT**

13 September 2023

Keywords:

*Environmental
Health and Safety,
Petrol Stations,
Petroleum Products,
Occupational
Health, Hazards,
Safety Awareness*

Globally, the effects of human activity on the physical environment have become more pronounced, especially in metropolitan areas, as a result of population growth and the expansion of businesses like petrol stations. In Nairobi, petrol stations are being built close to one another in populated locations and some cases, adjacent to residential areas, which is against the law and the recommended health and safety guidelines. The paper sought to assess the environmental health and safety practices in petrol stations in Nairobi County. Primary data was collected from questionnaires and key informant interviews based on purposive sampling, whereas secondary data was obtained from reports. Both quantitative and qualitative analysis of data was done. SPSS and Excel were used to code and analyse quantitative data. Relative frequencies were determined through descriptive statistics of data. Utilising percentages and frequency, data was compared and corroborated. Fisher's exact test and the chi test were used in inferential statistics to determine relationships between connected variables. The results indicate that the majority of employees undergo training regardless of their position within the organisation and have knowledge of safety awareness measures. Although the majority (90%) of the petrol stations provided employees with full protective gear, several station facilities provided their employees with footwear alone, exposing employees to the risk of injury. In addition, the majority of the petrol stations had a minimum of at least a fire extinguisher in readiness to handle fire emergencies. Some employees are not aware of the OSHA policies, fire extinguisher use, safety measures, safety standards and what to do in case of emergencies. This study recommends that EPRA should increase the inspections and ensure that petrol stations adhere to the recommended level of health and safety standards.

APA CITATION

Makiti, A. S., & Ming'ate, F. (2023). Environmental Health and Safety Practices in Petrol Stations in Nairobi County, Kenya. *East African Journal of Environment and Natural Resources*, 6(1), 311-324. <https://doi.org/10.37284/eajenr.6.1.1426>.

CHICAGO CITATION

Makiti, Andrew Sila and Felix Ming'ate. 2023. "Environmental Health and Safety Practices in Petrol Stations in Nairobi County, Kenya". *East African Journal of Environment and Natural Resources* 6 (1), 311-324. <https://doi.org/10.37284/eajenr.6.1.1426>.

HARVARD CITATION

Makiti, A. S., & Ming'ate, F. (2023) "Environmental Health and Safety Practices in Petrol Stations in Nairobi County, Kenya", *East African Journal of Environment and Natural Resources*, 6 (1), pp. 311-324. doi: 10.37284/eajenr.6.1.1426.

IEEE CITATION

A. S., Makiti & F., Ming'ate. "Environmental Health and Safety Practices in Petrol Stations in Nairobi County, Kenya", *EAJENR*, vol. 6, no. 1, pp. 311-324, Sep. 2023.

MLA CITATION

Makiti, Andrew Sila & Felix Ming'ate. "Environmental Health and Safety Practices in Petrol Stations in Nairobi County, Kenya". *East African Journal of Environment and Natural Resources*, Vol. 6, no. 1, Sep 2023, pp. 311-324, doi:10.37284/eajenr.6.1.1426.

INTRODUCTION

Spatial planning of an area aims to create and enhance environments that protect people from hazards while enhancing their safety. This is the reason businesses such as petrol stations are recommended away from residential areas and public institutions like hospitals and schools in metropolitan areas (Mshelia *et al.*, 2015). The location of petrol stations requires extreme caution due to their nature to prevent fires and explosions (Ahmed *et al.*, 2011). The hazards and risks within petrol stations imply that high regard has to be given to health and safety practices (Dalman & Özbek, 2020). Aulia *et al.* (2016) noted that a petrol station is a delicate structure that houses combustible materials and can have severe effects on its location, the environment around it, and the safety of nearby people.

Globally, there are rules and regulations by countries aimed at ensuring the safety of people and the environment is upheld. The regulations also aim to minimise hazards and risks to the public while ensuring there is provision of services. History shows that petroleum products have significantly influenced the expansion of the global economy (Njoku & Alagbe, 2015). Despite massive gains associated with petroleum products, the environmental risk and health-related effects like pollution and work-related incidents linked with petrol station locations create the requirement for environmental health and safety compliance practices and safe work strategies.

The high-risk nature of petrol stations implies that they need to be situated far away from residential areas. This is not the case however as some have defied operational procedures and gone against

suggestions for situating such disaster-susceptible facilities (Osorio-Tejada *et al.*, 2017). This causes other challenges such as traffic disruptions and an increase in risks and threats. The aspects of health and safety considerations should be tamed by assessing risks arising from hazardous substances, electric faults, injuries, diseases, and provision and effective use of personal protective equipment.

Flammable atmospheres are prominent in places such as petrol stations due to the products and services they offer (Kitur, 2019). The handling practices of staff and the level of safety knowledge instilled in them determine to a large extent, the environmental health and safety practices. Where the safety aspects have been taken for granted, risky incidents are likely to occur. Even though these practices are essential, safety in petrol stations remains a great area of concern. There are some incidences where staff are not aware of what needs to be done in case of accidents and other hazards. Spurred by these concerns, the study sought to assess the environmental health and safety practices in petrol stations in Nairobi County.

Study Hypotheses

- H_0 There is no statistically significant relation between the approved occupational health and safety practices and the assessed practices within petrol stations in Nairobi County.

LITERATURE REVIEW

As one of the blueprints and methods to deal with employee safety and health, the International Labour Organization (ILO) encourages safe, healthy, and decent working conditions under Convention No. 155. The necessity of having a

fair, healthy, and safe workplace was reasserted in both the 1944 Declaration of Philadelphia and the 2011 ILO Declaration on Social Justice for a Fair Globalization (ILO, 2017). Employers are obligated under Article 16 of OSHA (2007) policy to provide a safe and healthy work environment for their employees. This includes implementing and enforcing procedures to assure the security of all machinery, tools, and equipment used in the workplace (Charles, 2018).

It is in the jurisdiction of employers to provide, where necessary, appropriate personal protective equipment to prevent risks from accidents. An important part of the Occupational Safety and Health Act of 2007 is ensuring the health, safety, and welfare of workers (OSHA, 2007). The purpose of this law is to safeguard the safety, health and welfare of employees and anyone else lawfully present at a workplace from any hazards that may exist there. All workplace activities should be governed by a comprehensive safety and health policy, which the employer should create and make available to workers. The law mandates conducting risk assessments to pinpoint potential dangers in the workplace (GoK, 2007). Moreover, the Act mandates that workers must work with their employers to ensure their safety and must follow all applicable safety regulations. Employees have a responsibility to look out for their own and others' safety. Employees are also responsible for making proper use of all personal protective equipment (GoK, 2007).

The Work Injury Benefits Act of 2007 and the Occupational Safety and Health Act of 2007 govern OSH services in Kenya. The Occupational Safety and Health Act of 2007 (OSHA, 2007) was enacted to ensure the safety, health, and welfare of workers as well as to safeguard bystanders from the hazards of workplace operations. The purpose of the Work Injury Benefits Act (WIBA) is to make sure that workers who become sick or hurt on the job are financially reimbursed for their hardships. The Directorate of Occupational Safety and Health Services has established a number of rules and ancillary statutes to ensure worker safety on the job (DOSHS) (Gok, 2007).

The OSHA Act (2007) states each employee is responsible for ensuring his or her safety and health as well as the safety and health of others. Employees are also required to follow safety and health procedures, requirements, and instructions given by others for their own or anyone else's safety and report any accidents or injuries that occur at work to their supervisor. Any employee who violates the aforementioned regulations is guilty of an offence and subject to a fine of up to 50,000 shillings, up to three months in jail, or both.

The employer's responsibility is to have plans in place to guarantee safety and the absence of health risks associated with the use, handling, storage, and transportation of petroleum products. To ensure everyone hired is safe and healthy at work, provide information, teaching, training, and supervision. They should ascertain the safety and absence of any health concerns at the station, as well as the provision and upkeep of safe and health-free exit and entry points. In addition, they should create and maintain a working environment that is risk-free for everyone who is employed, with sufficient facilities and arrangements for their well-being. Additionally, the employer must make sure that every employee takes part in the application and evaluation of health and safety measures and should make all employees aware of any hazards and dangers from their station.

The emergency point is a safe location where staff and employees are expected to gather in the event of a fire, leakage, explosion, or other emergencies in a petrol station. The Assembly Point is sited based on the entry/exit routes and wind direction of a petrol facility (Dauda et al., 2022). The assembly point should be located far away from the building or facility to protect the people from heat and smoke in case of a fire. It should also be in a place that does not put staff, visitors, and users of the storage facility at risk from emergency vehicles responding to the incident or from general traffic. A petrol station should also have an emergency plan for any emergency, accident or hazard that might happen in the station. Volatile

organic compounds (VOCs) are a class of carbon-containing chemicals found in petroleum products. VOCs have an impact on human health and the environment. VOCs vaporise easily at ambient temperatures (Adebowale & Phan, 2017).

Section 11 (g) of the Energy Act 2019 mandates the Energy and Petroleum Regulatory Authority to formulate, set, enforce and review environmental, health, safety and quality standards for the energy and petroleum sector. The Environmental Health and Safety (EHS) policy outlines the role of the organisation to create a secure and healthy workplace for the workers within petrol stations. It contains various rules that enhance the safety of the customers and the employees at a petrol station, hence providing a healthy and safe work environment for the employees and customers, helping the employees to develop safety awareness and identify and control safety and environmental hazards.

MATERIALS AND METHODS

Study Area

This study was carried out in Nairobi County, Kenya's capital city. Which is located between 1009'S 36039'E and 1027'S 37006'E. It covers an area of 703.9 km² and is 1661 metres above sea level. It has the largest population in the country at approximately 4 397,079 (GoK, 2016). The county's population expansion, which is over 4% annually, is mostly caused by a high birth rate and immigration to Nairobi in quest of employment.

Research Design

The study adopted a descriptive research design as it aimed to describe the environmental health and safety activities around petrol stations. It used both qualitative and quantitative research methods.

Sample Size and Sampling Procedure

The population of this study consisted of all classes of petrol stations that met the minimum requirements for the study in terms of their operations, licencing, oversight, and adherence to regulations provided by the Energy and Petroleum

Regulatory Authority (EPRA) and National Environment Management Authority (NEMA). The target population was staff at gas stations in Nairobi County.

There are 290 petrol station facilities with EPRA licences in Nairobi County. Managers and pump attendants were the main subjects of the study.

Sampling Technique

Petrol stations in the 17 Sub-counties of Nairobi County were chosen using stratified random sampling. The study used non-probabilistic purposive sampling to select 75 fuel stations and simple random sampling to select 150 pump attendants, 2 per petrol station. Using purposive sampling, important players and governmental organisations involved in licencing, approvals, regulating, and development control in petrol station siting and operations were chosen. Significant participants and informants in the study were EPRA, DOSHS and NEMA.

Data Collection

To enable the examination of environmental management practices and occupational health and safety practices used by petrol stations, primary data was directly collected and gathered using checklists and questionnaires. Secondary data was obtained from EPRA, the NCC Planning Department, and DOSHS publications. The observation checklist was structured to obtain information on the availability of emergency signs, provision of fire extinguishers, use of PPEs, leakage, and spills within the petrol stations. Key informant interviews were conducted at institutions based on knowledge and technical involvement about the environmental health and safety issues at petrol stations.

Data Analysis

Both quantitative and qualitative analysis of data was done. SPSS and Excel were used to code and analyse quantitative questionnaire data. Relative frequencies were determined through descriptive statistics of data. Utilising percentages and frequency, data was compared and corroborated. Fisher's exact test and the chi test were used in

inferential statistics to determine the connection between variables. The category variables tested were employee training versus their knowledge of fire extinguisher use and training of awareness and safety measures. When there are fewer than 5 cells in a 2 by 2 table, the Fishers exact test is applied. To compare the relationship between variables, Fisher’s exact test was applied. The degree to which the variables were related was demonstrated by Spearman’s rho correlation. Data were displayed in tables and graphs.

Validity and reliability

Data dependability was shown by a Cronbach alpha coefficient of 0.836. Values over 0.7 are preferable, but those over 0.8 are okay. Reliability tests were conducted using the Likert scale from strongly agree to strongly disagree.

RESULTS AND DISCUSSION

Environmental Health and Safety Practices in Petrol Stations in Nairobi County

The Laws of Kenya, Occupational Safety and Health Act OSHA (2007) Article 16 pp. 18, state that the management of a petrol station selling Liquefied petroleum (LPG) should make sure that the welfare, health, and safety at work of all personnel working in the facility. The employer should also ensure every worker takes part in the review and application of health and safety control measures. When petrol is not handled safely, it can result in a serious explosion with the presence of a nearby heat source, for example, an electrical spark or naked flame, hence the need to assess the safety practices used by petrol stations to mitigate these effects. *Table 1* shows the compliance of various stations with health and safety practices. Compliance with health and safety practices is based on training related to the job, provision of fire extinguishers and duration of training.

Table 1: Compliance of various stations to health and safety practices

Variables	Response	Frequency	Percentage (%)
Training related to job	Yes	70	93.3
	No	50	6.7
Duration of training	1-2 days	83	55.3
	3-4 days	34	22.7
	5-6 days	18	12.0
	More than 7 days	5	3.3
	Did not attend	10	6.7

Training Related to the Job

The results from the study indicate that 70 petrol stations out of 75 trained their staff. This represents 93.3 %, while only (6.7 %) have not trained their employees. This shows that most stations have tried to comply with the rule of training their employees. It indicates that the majority (93%) of the employees of the stations are equipped with the skills to handle any accident that may happen in the station; hence, they are safe. When the staff are not trained, the safety of other people is at risk.

Flammable and potentially dangerous fuels including diesel, petrol, and Liquefied Petroleum Petrol, are sold at petrol stations. The petrol station must be a secure environment for those

who work there and others who visit to buy fuel and other products. Hence, petrol stations should follow the relevant regulations. Training and documentation at the stations is one area where compliance efforts have been concentrated. There is a direct correlation between training and a decrease in the amount of money spent on things like accidental injuries and property damage (Ossei et al., 2023). Managers at every station must ensure that their whole team has received appropriate safety training.

Duration of Training

On average, about 55.3 % of the stations have trained their employees for two days, while a minority of 22.7 % have trained for 3 to 4 days, and the least of 12 % for 5-6 days; however, the

minimum of 3.3 % had training of more than 7 days while 6.7 % represented the stations that did not train their employees. This indicates that the majority of the attendants train for fewer days, with a few extending to more than 7 days. It is, however, worth noting that there are employees who are not trained regarding safety and, hence, are not aware of the measures to take in case of an incident.

Safety Measures in a Petrol Station

The safety measures in petrol stations were considered in terms of wearing of PPEs, fire extinguisher provision, safety standards, OSHA policies awareness, emergency point awareness, periodic training awareness and awareness of harmful volatile organic compounds. *Table 2* shows compliance with safety practices in petrol stations.

Table 2: Compliance of various stations with safety practices

Variables	Response	Frequency	Percentage (%)
Wearing of PPEs	Yes	68	90.7
	No	7	9.3
Visible Emergency signage	Yes	62	82.7
	No	13	17.3
Presence of signage	Yes	64	85.3
	No	11	14.7
Emergency numbers displayed	Yes	53	70.7
	No	22	29.3
Electric cables tacked	Yes	70	93.3
	No	5	6.7
Fire extinguisher provided	Yes	60	80.0
	No	15	20.0
The first aid box is complete	Yes	49	65.3
	No	26	34.7
Clear exit	Yes	69	92.0
	No	6	8.0

Results from the study indicate that in Nairobi, the only PPEs the employees wear are safety boots. According to a study, 90.7 % (68) of petrol station employees wear these safety boots, while 9.3 % (7) do not wear them. Petrol is harmful to health because it can damage the eyes and skin, and it may also cause dizziness and respiratory problems when inhaled (Mohsin *et al.*, 2022). This can be risky for employees who do not wear any PPEs. Wearing a mask is an important safety measure that should be common practice among petrol station attendants to safeguard them from inhaling petroleum fumes (Okafogu *et al.*, 2017).

According to the study, as shown in *Table 2*, 80 % (60) of the petrol stations have provided fire extinguishers, while 20 % (15) have not complied. This can be risky for the employees and the customers. The petrol stations should have an adequate means to contact the fire station in case of an emergency that cannot be handled. The

results also indicate that a majority (70.7%) of the petrol stations have emergency numbers displayed. They should also have the necessary equipment to deal with minor accidents, with 65.3% having a complete first aid box. The stations should also contain signs such as *highly flammable, no smoking and switch off the engine*. These signs should be kept close to the pumps to alert the customers. 82.7% (62) of the stations have these signs, while 17.3% (13) do not. Good housekeeping is essential in petrol stations to avoid accidents (Douti *et al.*, 2019).

Inferential Statistics for Safety Standards

Inferential statistics in the study aim to draw conclusions related to safety standards in petrol stations and suggest explanations for the phenomenon. The chi-square test and Fisher tests were used for the study to draw the relationship between the level of training and knowledge of

fire extinguishers to compliance with safety standards, as shown in *Table 3*. In the chi-square test and Fisher test, the p-value (significant), if it

is less than 0.05, means the factor directly affects the variable, and if it is more than 0.05, the factor has no direct effect.

Table 3: Chi-square tests for employee attendance and knowledge of fire extinguishers

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	2.285 ^a	2	.319	.283
Likelihood Ratio	1.529	2	.466	.399
Fisher's Exact Test	2.810			.283
N of Valid Cases	145			

a. 3 cells (50.0%) have an expected count of less than 5. The minimum expected count is .28.

The chi-square test and Fisher's exact test was conducted for those employees who attended training and their level of knowledge on fire extinguisher. The Fisher test was the one selected since the minimum expected county is less than 5.

The fisher test results were ($\chi^2 = 2.810, p = 0.283$); therefore, there is an insignificant relation between knowledge of fire extinguishers and training attendance among pump employees in a petrol station.

Table 4: Correlation between knowledge of fire extinguishers and training

			Knowledge of fire extinguisher usage	Induction Training related to the job.
Spearman's rho	Knowledge of fire extinguisher usage	Correlation Coefficient	1.000	.077
		Sig. (2-tailed)	.	.360
		N	145	145

There is a strong correlation between those employees who have attended training and their knowledge of fire extinguisher usage, as shown in *Table 4*. A correlation coefficient less than 0.5 indicates a stronger correlation between the variables tested.

organisation value training, which is aimed at enhancing their awareness of safety standards and measures, as shown in *Table 5*. Chi-square and Fisher's tests were also done, as shown in *Table 6*.

Analysis was done to determine the relationship between position in the company and training attendance. This is important in determining whether people at different levels within the

The Fisher test was the one selected since the minimum expected count is less than 5. The fisher test results were ($\chi^2 = 1.387, p = 1$); therefore, there is no significant relationship between position in the company and training attendance.

Table 5: Relationship between position in the company and training attendance

Position in the company	Attended training			
	Yes		No	
	Frequency	%	Frequency	%
Fuel attendant	84	60	7	70
Supervisor	32	22.9	2	20
Manager	7	5.0	0	0
Cleaner	1	0.7	0	0
Mechanic	16	11.4	1	10
Total	130	100.0	10	100.0

Table 6: Chi-Square Tests showing the relationship between position in the company and training attendance

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	.776 ^a	4	.942	1.000
Likelihood Ratio	1.303	4	.861	.934
Fisher's Exact Test	1.387			1.000
N of Valid Cases	150			

a. 5 cells (50.0%) have an expected count of less than 5. The minimum expected count is .07.

Safety Measures Awareness

Awareness of existing safety measures within the stations is based on knowledge of fire extinguisher usage, awareness of OSHA policies,

emergency plans, safety measures, safe assembly points, practices that pose health hazards and harmful VOC for petrol stations, as shown in Table 7.

Table 7: Safety measure awareness

Variables		SA	A	NAD	D	SD
Knowledge of fire extinguisher usage	f	103	38	9	0	0
	%	68.7	25.3	6.0	0.0	0.0
Aware of OSHA policies	f	56	39	43	11	1
	%	37.3	26.0	28.7	7.3	0.7
Aware of emergency plans	f	103	34	12	1	0
	%	68.7	22.7	8.0	0.7	0.0
Aware of safety measures	f	122	22	6	0	0
	%	81.3	14.7	4.0	0.0	0.0
Aware of the safe assembly point	f	83	43	22	2	0
	%	55.3	28.7	14.7	1.3	0.0
Aware of practices that pose a health hazard	f	87	39	24	0	0
	%	58.0	26.0	16.0	0.0	0.0
Aware of harmful VOC in a petrol station	f	39	42	57	12	0
	%	26.0	28.0	38.0	8.0	0.0

SA = Strongly Agree, A = Agree, NAD = Neither agree nor disagree, D = Disagree, SD = Strongly disagree

Safety measures awareness by the staff is an important thing as it determines the knowledge they have regarding measures to be taken to preserve the health and safety of the public. Results from the study indicate that 68.7% of staff strongly agree that they are knowledgeable regarding the use of fire extinguishers. This indicates that the majority of the staff know how to use fire extinguishers. The remaining 25.3% who moderately agree imply that there is a need to train all staff on the use of fire extinguishers so that everyone is fully aware of actions to take in case of risks and hazards.

According to the study, there is a significant percentage of people (8%) who are not aware of OSHA policies, which is not good for a working environment, especially petrol stations. Knowledge of OSHA policies is essential to

prevent health risks. Regarding awareness of emergency plans, whereas the majority (68.1%) of the employees are aware of what to do in emergency plans, the presence of staff who disagree (8.7%) indicates that a lot needs to be done to raise awareness of emergency plans.

Regarding awareness of safety measures in petrol stations, the majority (81.3%) agree that they are aware of what should be done in case of an incident, with none disagreeing. This is a strong indication that staff know the actions to be taken in case of accidents in the workplace. The results also indicate that the majority (55.3%) of the employees that were interviewed strongly agree that they were aware of safe assembly points in the petrol stations. This shows that the employees are well-equipped to handle any fire accident. The results are similar to Mohsin *et al.* (2022), who

found that the high risk of fires in petrol stations and their deadly impacts prompts training on safety awareness and what should be done in case of accidents.

Regarding awareness of practices that pose health hazards, the study indicates that the majority (58%) of staff are aware of practices. One of the things to note, however, is that there is a number (8%) of employees who are not aware of harmful VOC in the station. Knowledge of OSHA policies is essential to prevent health risks. According to Moke (2020), attendants in petrol stations are aware of health hazards in their nature of work; however, their knowledge of other important volatile compounds is limited. The reason behind this rationale is that its risks are negligible; however, over time, it may pose health and safety risks. Most volatile organic compounds (VOCs) found in petroleum products are carcinogenic and toxic in nature. Serious exposure to high concentrations of VOCs can affect the central

nervous system, causing dizziness, nausea and headache (Anyakudo *et al.*, 2018).

All staff should receive a set of comprehensive training on the procedures and approaches for dealing with each incident. The emergency plan's purpose is to minimise the negative impacts of any incident that takes place at a location where more dangerous commodities are handled and stored in higher quantities. The emergency plan ought to be equipped to handle the worst-case plausible scenario. However, careful preparation should focus on the more probable scenarios.

Inferential Statistics of Safety Awareness

Chi-square tests and Fisher tests were used to determine the relationship between the variables. In the chi-square test and Fisher test, the p-value (significant), if it is less than 0.05, means the factor directly affects the variable, and if it is more than 0.05, the factor has no direct effect. *Tables 8 and 9* show the relationship between training attendance and awareness of safety measures.

Table 8: Relationship between training attendance and awareness of safety measures.

			Aware of safety measures							
			SA		A		NAD		Fisher's Exact Test	
			f	%	f	%	f	%	x ²	df
Attended training related to job	Yes	114	93.4	21	95.5	0	0	6.22	2	0.76
	No	8	6.6	1	4.5	1	100			

SA = Strongly Agree, A = Agree, NAD = Neither agree nor disagree,

Table 9: Correlation between training attendance and awareness of safety measures

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	13.711 ^a	2	.001	.070
Likelihood Ratio	5.584	2	.061	.076
Fisher's Exact Test	6.220			.076
N of Valid Cases	145			

a. 3 cells (50.0%) have an expected count of less than 5. The minimum expected count is .07.

The Fisher test was the one selected since the minimum expected county is less than 5. The fisher test results were ($\chi^2 = 6.220$, $p= 0.076$); therefore, there is no significant relationship between those who have attended training and awareness of safety measures.

The study also sought to determine the awareness amongst different levels of staff in the company, and the results are shown in *Tables 10 and 11*.

Table 10: Relationship between awareness of safety measures and position in the company

Position in the company	Aware of safety measures					
	Strongly agree		Agree		Neither agree nor disagree	
	F	%	F	%	F	%
Fuel attendant	71	78	17	18.7	3	3.3
Supervisor	29	85.3	3	8.8	2	5.9
Manager	6	85.7	0	0.0	1	14.3
Cleaner	0	0.0	1	100	0	0.0
Mechanic	16	94.1	1	5.9	0	0.0

The results from *Table 10* indicate that the majority, 78% of the fuel attendants, are aware of the safety measures. Employees at all levels are aware of safety measures in petrol stations, including supervisors, managers and mechanics.

Armes (2020) states that the safety aspects of delivering, storing and dispensing petroleum products have to be emphasised to reduce risks. Safety procedures are important for all individuals and should be taken with utmost seriousness.

Table 11: Correlation between awareness of safety measures and position in the company

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	13.022 ^a	8	.111	.129
Likelihood Ratio	12.274	8	.139	.113
Fisher's Exact Test	11.615			.147
N of Valid Cases	150			

a. 10 cells (66.7%) have an expected count of less than 5. The minimum expected count is .04.

The Fisher test was the one selected since the minimum expected county is less than 5. The Fisher test results were ($\chi^2 = 11.615$, $p = 0.147$); therefore, we support the null hypothesis that there is no significant relationship between position in the company and awareness of safety

measures and OSHA policies, as shown in *Table 11*.

Tables 12, 13 and 14 show the relationship between awareness of safety measures based on the types of petrol stations.

Table 12: Awareness of safety measures based on types of petrol stations.

Type of petrol station	Aware of safety measures					
	Strongly agree		Agree		Neither agree nor disagree	
	F	%	F	%	F	%
Multinational	91	83.5	16	14.7	2	1.8
Individual (private)	24	72.7	6	18.2	3	9.1
State-owned	7	87.5	0	0	1	12.5

Results from *Table 12* indicate that staff in state-owned petrol stations are more aware of safety measures (87.5%) in comparison to staff at multi-national companies (83.5%) and private stations (72.7%). A similar study by Moke (2020)

indicates that state-owned petrol stations and multi-national companies tend to train more of their staff on safety measures. The difference, however, in safety measures awareness in all petrol station types is minimal.

Table 13: Relationship between awareness of safety measures based on types of petrol stations

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	9.020 ^a	4	.061	.074
Likelihood Ratio	8.537	4	.074	.070
Fisher's Exact Test	8.404			.051
N of Valid Cases	150			

a. 5 cells (55.6%) have an expected count of less than 5. The minimum expected count is .32.

According to *Table 13*, the Fisher test was selected with the minimum expected count as less than 5. The Fisher test results were ($\chi^2 = 8.404$, $p = 0.051$); therefore, we reject the null hypothesis

that there is no significant relationship between the type of petrol station and awareness of safety measures.

Table 14: Correlation between awareness of safety measures based on types of petrol stations.

	Type of petrol station	Correlation Coefficient	Type of petrol station	Aware of safety measures
Spearman's rho			1.000	.093
		Sig. (2-tailed)	.	.257
		N	150	150

The results in *Table 14* indicate that there is a strong correlation between the type of petrol station and awareness of safety measures.

Safety plays a significant role in the prevention of accidents in the petrol station. Employees in a petrol station may be exposed to hazards that can cause injuries, which is why they should be aware of safety standards and measures. To minimise unforeseen risks that could hurt the environment and human health, safety procedures at petrol stations are crucial for both customers and service providers. Customers and service providers must closely abide by some statutory safety regulations, such as the prohibition of smoking inside petrol stations. It is required that petrol stations that store highly combustible goods have firefighting equipment on hand (Douti *et al.*, 2019).

Training is necessary for the protection of employees and customers. When the staff are not trained, the safety of each person who visits the petrol station is at risk. Even though accidents and spills cannot happen all the time, managers need to train their staff to prevent and eradicate the issues in case they arise (Armes, 2020). Staff should not be employed to store, convey, or dispense petroleum until he/she has received adequate training. Additionally, thorough training on emergency response protocols should be provided to all employees who deal with emergencies. This training should be provided to the newly engaged staff as part of the induction process employed (Health and Safety Authority, 2021).

Physical risks connected to petrol stations can result in several health issues, accidents, and even

fatalities. Although the range of physical hazards should be understood, the following are agents that can result in occupational disorders: Microclimatic conditions in extreme cold and heat, as well as noise, illumination, vibration and radiation (Mohsin *et al.*, 2022). Staff training, a fire risk assessment, a vapour recovery process, the testing of alarm systems, emergency response, and the clearing of escape routes are additional safety precautions used in the petrol station area.

Numerous occupational diseases, mishaps, and fatalities are reported each year. However, due to a lack of effective reporting and monitoring methods, the exact number of incidences and accidents cannot be determined and is most likely substantially higher (Kitur, 2019). Inadequate technical capacity, scarce financial and human resources, a lack of specialised training and equipment, and the absence of good governance linked to corruption are considered to be threats to the vital role of labour inspectors in enforcing legal compliance in African and Sub-Saharan countries (ILO, 2017). The results of the study, therefore, support the null hypothesis that there is no statistically significant relation between the approved occupational health and safety practices and the assessed practices within petrol stations in Nairobi County.

Environmental Health Safety (EHS) Policy

Petrol stations should practice Environment Health and Safety by performing risk assessment reviews to eliminate and reduce the hazards that can occur in a station (Ahmed *et al.*, 2011). Results from the study indicate that 39 % of the petrol stations have displayed the EHS policy,

while 61 % of the stations have not displayed the policy; this can be risky for the stations. *Table 15*

shows the environmental health safety risks and periodisation in petrol stations.

Table 15: Environmental Health Safety Risk

No.	EHS Risk	Risk Periodisation (%)
1	Carelessness	47
2	Slips, trips, and falls	24
3	Electrical Fault	9
4	Transportation Hazard	10
5	Fire Risks	2
6	Housekeeping	6
7	Medical Treatment Cases	2
8	Miscellaneous Cases	3

The topmost EHS hazard, as shown in *Table 15*, was carelessness, calculated at an overall risk value of 47%. The second-ranked EHS risk was slips, trips, and falls within the petrol stations with a risk value of 24%. Transportation hazards ranked third on the list of risk factors with 10%, followed closely by Electrical fault at 9% and housekeeping at 6%. According to Ahmed, Khamid & Kutty (2011), a risk score ranging from 80-100 % is considered critical, and the threat should be recognised immediately and the corrective action taken immediately with the utmost urgency. Similarly, a risk score of 50-79% is considered major, and the threat should be contained as soon as possible and monitored till the issue is resolved. However, one should keep an eye on it. A moderate risk is given a score of 30-49%. The reason or causes must be addressed as soon as time and resources permit. Lastly, a risk score of 29% and below is considered minor; hence, the action recommended is monitoring and evaluation with constant administrative oversight and wearing of the appropriate PPEs.

CONCLUSION

The objective of the study was to assess the environmental health and safety practices in petrol stations. The parameters that were explored to measure the level of health and safety practices are awareness of safety measures and safety standards. Results from the study indicated that the majority (60%) of employees undergo training regardless of their position within the organisation. The results further indicate that there is a significant relationship between the

training of employees and knowledge of fire extinguishers. There is a positive relationship between the position of employees and safety awareness.

Although the majority (90.7%) of the petrol station management provided employees with full protective gear, several teams were provided with footwear alone, exposing employees to the risk of injury to other body parts. Also, the majority (80%) of the facilities were provided with fire extinguishers. Regardless of this, the majority of the petrol stations had, at the bare minimum, at least a fire extinguisher in readiness to handle fire emergencies. Several attendants were not aware of the OSHA policies, fire extinguisher use, safety control measures, safety standards, and emergency evacuation plans or attended any kind of training. This is a worrying trend since people who work in high-risk environments should be fully aware of safety measures to safeguard the environment, health and safety of fellow staff and the public.

Recommendations

According to the findings of this study, the environmental, health and safety practices of the petrol stations that were sampled did not match the acceptable threshold set by EPRA. In light of the findings of this study, the regulatory body is urged to increase the rigour of its inspections and compliance enforcement and ensure that the offending stations are brought up to the recommended level of health and safety procedures. Apart from having the fire extinguishers, all the emergency equipment

should be located strategically and within the reach of all the staff. All operations and emergency procedures should be reviewed regularly. In addition, the managers should also amend and take into account any modifications and any practical experience arising from accidents.

REFERENCES

- Adebowale, A., & Phan, T. (2017). Volatile Organic Compounds in Crude Coconut and Petroleum Oils in Nigeria. *American Journal of Analytical Chemistry*, 8, 371–379. <https://doi.org/10.4236/ajac.2017.86028>
- Ahmed, M. M., Kutty, S. R. M., Shariff, A. M., & Khamidi, M. F. (2011). Petrol Fuel Station safety and risk assessment framework. *2011 National Postgraduate Conference - Energy and Sustainability: Exploring the Innovative Minds, NPC 2011, September*. <https://doi.org/10.1109/NatPC.2011.6136346>
- Armes, D. (2020). Why Training Your Staff is so Important for Petrol Stations. Servo Skills.
- Anyakudo, F., Adams, E., & Schepdael, A. Van. (2018). Analysis of volatile organic compounds in fuel oil by headspace GC-MS. *International Journal of Environmental Analytical Chemistry*, 98(4), 323–337. <https://doi.org/10.1080/03067319.2018.1466878>
- Aulia, S. A., Sukati, I., & Sulaiman, Z. (2016). A Review: Customer Perceived Value and its Dimension. *Asian Journal of Social Sciences and Management Studies*, 3(2), 150–162. <https://doi.org/10.20448/journal.500/2016.3.2/500.2.150.162>
- Dauda, S., Billa, G., & Sobie, A. (2022). Assessing the Adequacy of the Emergency Assembly Points in Fuel Filling Stations in Ghana: The Perspective of the Public. *The International Journal of Humanities & Social Studies*, June. <https://doi.org/10.24940/theijhss/2022/v10/i5/HS2205-019>
- Dalman, A. N., & Özbek, M. O. (2020). A Wet-Stock Management and Leak Detection System for Fuel Tanks. *Journal of Graduate School of Natural and Applied Sciences*, 6(2), 303–316.
- Douti, N. Abanyie, S., Ampofo, S. & Amuah, E. (2019). Spatial Distribution and Operation of Petrol Stations in the Kassena-Nankana District (Ghana) and Associated Health and Safety Hazards. *Journal of Toxicology and Environmental Health Sciences*, 11(5), 50-61
- GoK. (2007). The Occupational Safety and Health Act, 2007 arrangement of sections part i— preliminary. *Safety And Health*, 1–128.
- GoK. (2016). “ Sustainable Urban Land Use Planning to realise: internationally competitive, livable, functional, economically vibrant, environmentally resilient and socially inclusive Cities and Urban Areas .”
- Health and Safety Authority. (2010). *Emergency Response Plans for Petrol Stations*. Retrieved from: Health and Safety Authority. (2010). *Emergency Response Plans for Petrol Stations*.
- ILO. (2017). World Social Protection Report 2017–19. Universal social protection to achieve the Sustainable Development Goals. In *World Social Protection Report 2017-19*.
- Kitur, R. C. (2019). *Barriers to implementing urban plans in Kenya*. PhD thesis, Walden University. Retrieved from: <https://scholarworks.waldenu.edu/dissertations/7233/>
- Mohsin, M., Yin, H., Huang, W., Zhang, S., Zhang, L., & Mehak, A. (2022). Evaluation of Occupational Health Risk Management and Performance in China: A Case Study of Petrol Station Workers. *International Journal of Environmental Research and Public Health*, 19(7). <https://doi.org/10.3390/ijerph19073762>
- Mokey, E. G. (2020). Adherence to safety practices and the effect of petroleum products on petrol

- station attendants in Abraka, Delta State, Nigeria. *Journal of Applied Sciences and Environmental Management*, 23(11).
- Mshelia, A. M., Abdullahi, J., & Dawha, E. D. (2015). Environmental Effects of Petrol Stations at Close Proximities to Residential Buildings in Maiduguri and Jere, Borno State, Nigeria. *IOSR Journal Of Humanities And Social Science (IOSR-JHSS)*, 20(4), 1–8. <https://doi.org/10.9790/0837-20440108>
- Njoku, C. G., & Alagbe, A. O. (2015). Site Suitability Assessment of Petrol Filling Stations (PFSs) in Oyo Town, Oyo State, Nigeria: a Geographic Information Systems (GIS) Approach. *IOSR Journal of Environmental Science*, 9(12), 2319–2399. <https://doi.org/10.9790/2402-091230819>
- Okafoagu Nneka, C., Oche Mansur, O., & Gana Godwin, J. (2017). Knowledge of occupational hazards and safety practices among petrol station attendants in Sokoto metropolis, Sokoto State, Nigeria. *Journal of Occupational Health and Epidemiology*, 6(3), 122–127. <https://doi.org/10.29252/johe.6.3.122>
- Osei-Asibey, D., Ayarkwa, J., Acheampong, A., Adinyira, E., & Amoah, P. (2023). Impacts of accidents and hazards on the Ghanaian construction industry. *International Journal of Construction Management*, 23(4), 708-717.
- Osorio-Tejada, J. L., Llera-Sastresa, E., & Scarpellini, S. (2017). A multi-criteria sustainability assessment for biodiesel and liquefied natural petrol as alternative fuels in transport systems. *Journal of Natural Petrol Science and Engineering*, 42, 169–186. <https://doi.org/10.1016/j.jngse.2017.02.046>
- Yamane, T. (1967). *Statistics: An Introductory Analysis*. 2nd Ed. New York: Harper and Row