

IMPACT OF SAFETY AWARENESS ON SAFETY PERFORMANCE OF WASTE WORKERS IN SELECTED GOVERNMENT HOSPITALS IN NIGER-DELTA

Orajiaka-Uchegbu, C.C.1;

Ugwoha, E. 1, 2;

Wejie-Okachi, C.1.

1Centre for Occupational Health, Safety and Environment,
Institute of Petroleum Studies, University of Port Harcourt, Rivers State, Nigeria

2Department of Civil and Environmental Engineering,
University of Port Harcourt, Rivers State, Nigeria

*Corresponding Author's Email: ugwohaej@gmail.com

ABSTRACT	KEYWORDS
This paper examined the impact of safety awareness on safety performance of waste workers in selected government hospitals in Niger-Delta region. Safety awareness was operationalized using modified safety awareness scores while safety performance was captured using leading and lagging safety performance. Cross-sectional and inferential designs were adopted. The population comprised hospital waste workers in three selected government hospitals in Imo, Rivers and Akwa-Ibom State. Data collection was done using questionnaire designed based on 5-point Likert scale. Data analysis were done using descriptive statistics and regression analysis. The results of the descriptive statistics using mean weighted average (WA) revealed that the waste workers have substantial level of safety awareness ($WA = 3.76 > 3.00$) and the safety performance of the waste workers is good ($WA = 3.54 > 3$). The regression analysis revealed that safety awareness had a positive and significant impact on safety performance of waste workers in selected hospitals in Niger-Delta. It was, therefore, concluded that safety awareness has positive and substantial impact on safety performance of waste workers in government-owned hospitals in Niger-Delta.	Safety Awareness, Safety Performance, Hospital Waste Workers, Niger-Delta region

Introduction

The World Health Organisation (WHO) reports that healthcare waste is a significant problem, with over 20% being infectious or anatomical and 10% hazardous (Simonsen et al., 2023). Medical waste management, which is the responsibility of medical waste workers, has become a crucial and critical issue as it poses potential health risks to the hospital workers, the patients, the general public and the environment (Oyekale & Oyekale, 2017). In developing countries like Nigeria, healthcare workers often lack awareness about the risks of poor waste management which can lead to environmental

pollution and public health hazards, this lack of safety and risk awareness is occasioned by lack of specific procedure by the hospital management to address the issue of ignorance among hospital workers. Proper management of hospital waste is crucial as most hospital wastes pose greater threat and hazards than the original diseases, if they are not managed properly (Awodele et al., 2016).

It has been established that hospitals and medical centers generates hazardous wastes because of the peculiarity of their work processes and activities (Harhay et al., 2014; Yves et al., 2019). Thus, medical waste workers need to operate at high level of safety awareness in other to prevent possible work-related accident and occupational disease while providing their waste collection and disposal service. Poor management of the hazardous waste in the hospital environment could cause threat toward both health personnel and patients, and also results to medical failures. So, having a good level of safety awareness by medical waste workers protects them as well as health personnel from these dangers and also protecting patients from medical failures. Hence, in other to minimize the potential risks, it is necessary to investigate and determine the factors that could affect the level of safety awareness of medical waste workers and also encourage them to comply with the accreditation standards in waste management particularly for infectious and hazardous wastes as such could help to enhance the safety performance of hospitals and health-centers.

In the context of medical waste management, safety performance entails avoidance of injuries, accidents and near-miss that could arise from exposure to medical waste such as needles, infected blood and body fluid, radiation waste and other hazardous medical waste. Safety performance of medical waste workers has deteriorated over the past few decades globally due to rapid increase in medical situation and medical cases (Andersen et al., 2012; Menzel, 2018). This was triggered by poor level of safety awareness of the waste workers in various sections of the hospitals and medical health centers (Andersen et al., 2012). Generally, it has been recognized that unsafe behavior such as poor safety awareness plays a major role in workplace accidents (Fadel et al., 2020; Si et al., 2020). According to researches by Martin et al. (2009) and Zahor et al. (2017), approximately 85% of occupational accidents are caused by dangerous behavior. According to Li et al. (2015) and Yin et al. (2017) safety awareness is the safety consciousness or alertness of a worker as concerns the risky and harmful nature of their work environment. It explains the ability of a worker to know and understand the hazardous and risky nature of their work environment, thus, an example of poor safety awareness would be a waste worker failing to use personal protection equipment knowing fully well the danger and risk level of their waste collection activities. Based on these definitions, safety awareness plays a crucial role in work-related accident and by extension safety performance (Fang et al., 2015; Mohammadfam et al., 2017).

In developing countries like Nigeria however, the situation of safety awareness and safety performance of the medical waste workers is not good. There is a lack of awareness regarding waste segregation, collection, storage, transportation and disposal procedures because medical waste management has not received much attention in developing countries (Priiss & Townsend, 2018). Segregation into risk and non-risk waste is usually not performed. Waste workers have little awareness of hazards associated, and disposal techniques are poor (Patience & Anton, 2008)). There is also lack of awareness at health policy and law levels. Hence it could be stated that safety awareness and safety performance are crucial factors that affect the occupational safety condition of medical waste workers. Therefore, one could hypothesize that enhancement of the safety awareness of medical waste workers could improve the

overall safety performance of the medical waste management of the hospital and health-centers while low level of safety awareness of the waste workers could trigger poor safety performance of the hospital and medical health-centers. Hence, these hypotheses gave credence to the base of this study which is focused on investigating the impact of safety awareness on safety performance of medical waste workers in selected hospitals operating in Niger-Delta. The objectives of the study are: to assess the level of safety awareness of the waste workers in selected hospitals in Niger-Delta, to determine the level of safety performance of the waste workers in selected hospitals in Niger -Delta and to investigate the impact of safety awareness on safety performance of the waste workers in selected hospitals in Niger-Delta.

2. Methodology

2.1 Study Area

The geographical area of coverage for this study was Niger-Delta States of Nigeria which comprises Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Imo, Edo Ondo, and Rivers and it is made up of different ethnic groups such as Igbos, Yorubas, Ijaw and others. According to Hogan (2013), the Niger Delta is the delta of the Niger River sitting directly on the Gulf of Guinea on the Atlantic Ocean in Nigeria, consisting of nine oil producing states of Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, and Rivers. Niger Delta is Nigeria centre for oil and gas exploration activities and home to Nigeria's MOA prolific oil and gas zones. The region has a land area of 70,000km², representing about 7.5% of the total land mass of Nigeria (Akalonu, 2019). In terms of coordinates, the region lies between lat. 5°19'12.0411"N of the equator and long 6°28'18.9911"E of the Greenwich meridian line. The region is densely populated with more than 40million people living in it and bounded on the south by the Gulf of Guinea within the Atlantic Ocean and on the east by Cameroon (Akalonu, 2019). Predominant occupation of the indigenous people is farming and fishing.

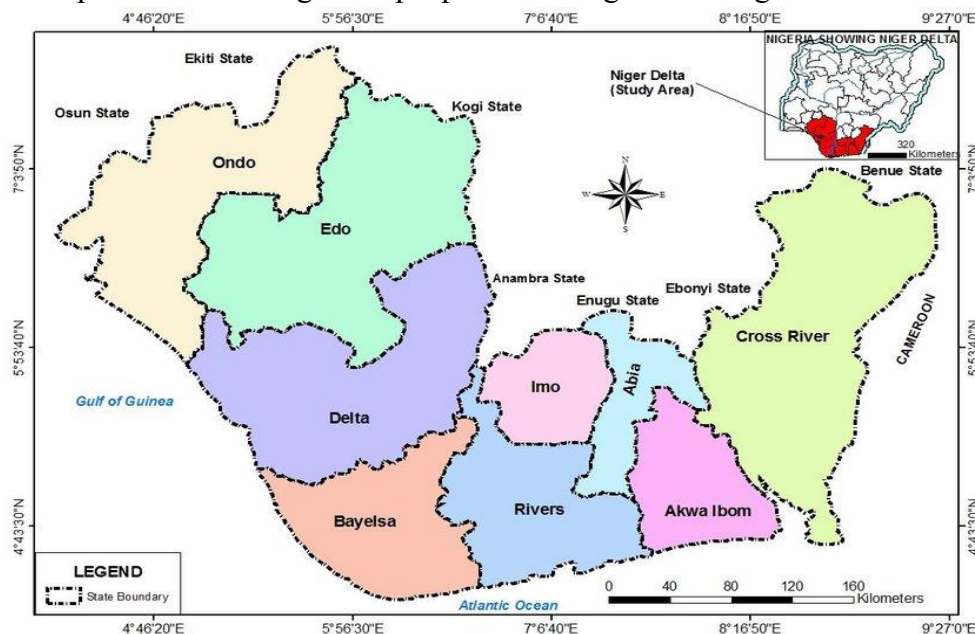


Figure 1: Map of Niger-Delta Showing all the Selected States

2.2 Population, Sampling technique and sample size determination

The population of this study comprised all medical waste workers in the selected hospitals in the Niger-Delta region. However, Multi-stage sampling technique was used to sample the respondents needed in this study.

Stage 1: A random sampling technique was used to sample three states out of the nine states that make up the Niger Delta and the three states were Akwa-Ibom, Imo State and Rivers States.

Stage 2: Purposive sampling technique was used to select the most popular government-owned hospitals in the states gotten from the first stage, namely; University of Uyo Teaching Hospital, Uyo. (UUTH), Federal University Teaching Hospital, Owerri (FUTHO) and University of Port-Harcourt Teaching Hospital (UPTH)

Stage 3: Involved sampling only waste workers working in the hospital mentioned in stage two. Table 1 below shows the states and the hospitals sampled from the states along with the population of waste workers in the hospitals.

The sample size was evaluated using the Taro Yamane sample size determination formula expressed in Equation 1. The population of the medical waste workers is shown in Table 1 and the sample size for the hospitals combined were evaluated based on the total sample size of the study.

$$n = \frac{N}{(1 + N)(\varepsilon)^2} \quad (1)$$

Where n is the Sample size, N is the total population of the respondents under study (638) and ε is the level of significance (0.05). Then, the sample size is 400, adding 10% of the sample size to cover for the possibility of errors in the questionnaire, the final sample size becomes 440. This sample size was distributed to the three sampled hospitals in the States as a ratio to their population. Thus, UUTH with 197 waste workers was allotted 135 respondents, FUTHO with 203 medical waste workers was allotted 140 respondents, while UPTH with 238 waste workers was allotted 165 respondents.

Table 1: Sampled States, their population and sample sizes for waste workers

S/N	States	Sampled Hospitals	Population of waste workers	Sample Size
1	Akwa-Ibom State	University of Uyo Teaching Hospital Uyo. (UUTH)	197	135
2	Imo State	Federal University Teaching Hospital Owerri (FUTHO)	203	140
3	Rivers State	University of Port-Harcourt Teaching Hospital (UPTH)	238	165
Total			638	440

2.3 Data Collection

Cross-sectional and inferential research designs were adopted in this study. Survey data was used to obtain data from the waste workers, these were provided by the respondents through questionnaire. The respondents were sampled waste workers in the sampled hospitals across the sampled States. The

questionnaire comprised close-ended questions which is rated on a 5-point Likert scale, as well as questions on socio-demographic profiles of the respondents.

2.4 Validity and Reliability of Study Instrument

Test and pre-test reliability of the questionnaires were carried out with sample size of 10% and their reliability was ascertained using Cronbach's alpha reliability test. A Cronbach's alpha coefficient on a scale above 0.70 was considered "Suitable" for the research.

2.5 Data Analysis

The descriptive statistics (means, percentages, weight average) and regression were the methods used in the analysis. Descriptive statistics was used to ascertain the level of safety awareness and safety performance while regression analysis was used to investigate the impact of safety awareness on safety performance of the waste workers in the sampled hospitals.

3.Results and Discussions

3.1 Level of safety awareness of the waste workers in selected hospitals in Niger-Delta

The level of safety awareness of the waste workers in the selected hospital was operationalized using eight safety awareness scores modified into eight statement items, Table 2 presents the outcome of the descriptive statistics analysis conducted on the sampled waste workers in the hospitals exploring the level of safety awareness of waste workers regarding occupational health and safety in the study areas. The results showed that the sampled hospital waste workers agreed to seven out of the eight statement item because the weighted average score 3.89, 3.00, 3.69, 3.76, 3.38, 3.78, 3.36 and 3.26 for the first, third fourth, fifth sixth, seventh and eight items respectively were higher than 3.00 minimum critical level for agreeing or accepting any item in a constructs at 5-point Likert scale and they were undecided on the second item because the weighted average is 3.00 which is equal to the 3.00 critical point suggesting that there are equal number of workers who accepted and rejects or agreed and disagreed to the position of the second item, hence the respondents are undecided. These results implied that the most of the hospital waste workers agree that they have substantial level of safety awareness on the occupational health and safety regarding hospital waste management in the hospital. Moreover, the mean weighted average score of 3.38 affirms the facts that most of the hospital waste workers agree that they have level of safety awareness concerning occupational health and safety of waste management in the hospital.

The outcome of this study aligned with the work of Dogbla et al. (2023) who carried out empirical study on Occupational Risk Factors by different Sectors using observational Study of 20,000 Workers. Occupational risk factors were assessed by workers followed by the Occupational Health Service of Chart, using self-reported questionnaires. The sectors of activity were grouped into seven sectors; manufacturing, construction, Trade and repair of motor vehicles and motorbikes, administration, transportation, and public administration. The occupational risks factors were grouped into six occupational exposure groups; physical, bio-mechanical, biological, chemical, atypical-hours and Psychosocial factors. Comparisons were made using the Chi-squared test and Cramer's V, and the odds ratios were calculated by using logistic regression. The results revealed that construction sector had the highest prevalence of exposure to physical (76%) and biomechanical factors (82%), as well as

chemical risks (75%). Human health and social work sector were the sector with the highest prevalence of exposure to biological factors (69%), psychosocial factors (90%), and atypical working hours (61%). With workers from administrative and support sectors as the reference, construction workers had more chance of declaring exposure to physical factors, biomechanical factors, and chemical agents. Workers from the human health and social sectors had more chance of being exposed to biological agents, atypical working hours and psychosocial factors. It was concluded that Psychosocial risk factors were commonly reported in all sectors. Workers in the construction, human health, and social sectors seem to report more exposures than those in other sectors. The analysis of occupational exposures is a necessary basis to build an efficient preventive strategy for occupational health.

The outcome of this study also aligned with the work of Patrick et al (2019) who carried out study aimed to determine whether occupational safety and health (OSH) awareness among health workers and health management hindered implementation of OSHA in public dispensaries and health centres, using Machakos County. They adopted cross-sectional descriptive survey conducted in February 2018 and involved 107 health workers in public dispensaries and health centres and 42 members of the Health Management in Machakos County. It involved physical observations, collection of data from respondents, and analysis of the data. Linear regression results indicated strong negative relationship between safety awareness and hindrance in the implementation of OSHA. The prediction factor was - 0.6400, $p < 0.05$. These showed that one-unit increase in safety awareness predicted a decrease of 0.64 units of hindrance in the implementation of OSH Act. The null hypothesis, Implementation of Occupational Safety and Health Act is not affected by OSH awareness among health workers and health management, failed in favour the alternative hypothesis. They concluded that lack of OSH awareness among health workers and management hindered implementation of OSHA in the selected facilities. The health workers and management should be trained in OSH. Regular OSH refresher seminars should be conducted and OSH information disseminated and displayed throughout the health facilities. OSH policy should be communicated through trainings and displays in health facilities.

Table 2: Level of safety awareness of the waste workers in selected hospitals in Niger-Delta

	Safety Awareness	SA	A	UN	D	SD	WA	Remarks
1	Workers and employers must share the responsibility for occupational health and safety	160.00 41.5%	105.00 27.30%	68.00 17.60%	24.00 6.20%	29.00 7.50%	3.89	Agree
2	I am aware of existence of Safety and Health policies	35.00 8.10%	97.00 23.10%	142.00 39.40%	88.00 25.60%	24.00 3.9%	3.00	Undecided
3	I have a right to know about any potential hazard to which I may be exposed at the workplace	175.00 47.20%	45.00 12.20%	83.00 21.4%	41.00 10.00%	38.00 9.20%	3.69	Agree
4	I have a right to be part of the process of identifying and resolving workplace health and safety concerns	132.00 33.90%	118.00 30.80%	72.00 20.00%	40.00 11.10%	23.00 4.20%	3.76	Agree
5	It is important to know and follow safe work procedures.	153.00 40.20%	40.00 8.20%	82.00 22.70%	43.00 11.50%	48.00 11.8%	3.38	Agree
6	It is important to report injury or illnesses immediately.	130.00 33.20%	120.00 30.60%	79.00 20.30%	37.00 10.30%	20.00 5.50%	3.78	Agree
7	I have had a training on occupational health and safety at the workplace	150.00 40.00%	35.00 8.20%	86.00 22.50%	50.00 12.10%	50.00 12.1%	3.36	Agree
8	I have a right to refuse hazardous work	135.00 36.01%	49.00 12.20%	76.00 21.4%	48.00 11.90%	67.00 17.20%	3.26	Agree
Mean of WA score							3.51	Agreed

2 Level of safety performance of the hospital waste workers in selected hospitals in Niger -Delta

The level of safety performance of the hospital waste workers on the was operationalized using two safety performance indicators, namely leading safety performance indicators and lagging safety performance indicator, Table 3 present the outcome of the descriptive statistics analysis conducted on the sampled waste workers in the hospitals on their level of leading safety performance and lagging safety performance in the sampled hospitals in the study areas.

On the leading safety performance, the concept of leading safety performance was operationalized using seven statement items and the results revealed that the hospital waste workers agreed to six out of the seven items because their weighted average score of the six items 3.87, 3.73, 3.73, 3.33, 3.69, and 3.20.

The values for the first, third, fourth, fifth and sixth and seventh items respectively were higher than 3.00 minimum critical level for agreeing or accepting any item in a constructs at 5-point Likert scale and they were undecided on the second item because the weighted average is 3.00 which is equal to the 3.00 critical point suggesting that there are equal number of workers who accepted and rejects or agreed and disagreed to the position of the second item, hence the respondents are undecided. This results means that the most of the hospital waste workers disagree that they have substantial level of pro-active safety performance level with respect to aforementioned leading safety performance factors during their daily activities in the hospitals Moreover, the mean weighted average score of 3.51 confirms that most of the hospital waste workers agree that they have substantial level of pro-active safety performance as concerns their activities in their hospital.

On the lagging safety performance, four statement items were used to operationalize the lagging safety performance of the hospital waste workers and the results in Table 3 revealed the hospital waste workers agreed to two out of the four items, because their weighted averages of 3.57 and 3.51 for the second and third items respectively were greater than 3.00 critical limit for agreeing or accepting item of any construct and they disagreed to first item and undecided on the fourth items because their weighted average of 2.53 and 3.00 were less than 3.00 and equal to 3.00 respectively. This result implied that notable number of hospital waste workers agreed that they are substantially level of reactive safety performance in the hospitals. Also, the mean of the weighted average score of 3.15 also confirms that most of the hospital waste workers accept that they have substantial level of reactive safety performance in terms of low level of accidents and injuries during the discharge of their daily responsibilities in the hospital.

Overall, the means of the weighted average of the leading and lagging safety performance are 3.51 and 3.15 which means that the overall mean of weighted average for safety performance is 3.33. This is also greater than 3.00 critical limit for agreeing or accepting item of any construct and they disagreed to first item. This implies that safety performance of the waste worker on overall is good.

The outcome and finding of this study aligned with the work of Uzuntarla et al. (2020) carried out study to ascertain the relationship between safety awareness and safety behaviors (leading safety performance) of healthcare professionals, Ankara/Turkey. They adopted descriptive research design and carried out the study on 418 healthcare professionals working in a training and research hospital in Ankara/Turkey using survey method for data collection. They used questionnaire that consists of three sections and 18 questions. First section consisted of questions on sociodemographic characteristics and, second section consisted of the awareness scale and third section consisted of

safety behaviour scale based on five-point Likert scale. The outcome revealed that safety awareness and safety behaviours have an average score of 3.85 ± 0.81 and 3.56 ± 0.82 , respectively thus, meaning that safety awareness and safety behaviour levels of healthcare professionals were high

Table 3: Level of Safety Performance of Waste Workers in Selected Hospitals in Niger-Delta

Leading safety performance		SA	A	UN	D	SD	WA	Remark
1	I constantly and religiously follow safety rules and procedures during my work routines	155.00 41.7%	105.00 27.80%	74.00 18.80%	24.00 5.30%	28.00 6.40%	3.87	Agree
2	I help to co-workers in issues concerning the safety rules and procedure in my workplace	34.00 8.10%	97.00 23.10%	147.00 39.40%	88.00 25.60%	20.00 3.9%	3.00	Undecided
3	I communicate and report any safety related concern to the appropriate authorities.	175.00 47.20%	49.00 12.20%	83.00 21.4%	41.00 10.00%	37.00 9.20%	3.73	Agree
4	I do everything within my power to prevent any form of accident during my work routines	127.00 33.90%	116.00 30.80%	78.00 20.00%	45.00 11.10%	18.00 4.20%	3.73	Agree
5	I put extra effort to improve the safety of the workplace when working	148.00 40.20%	35.00 8.20%	88.00 22.70%	48.00 11.50%	47.00 11.8%	3.33	Agree
6	I voluntarily carryout functions that help to improve workplace safety when working	126.00 34.20%	115.00 31.60%	76.00 21.30%	42.00 9.30%	25.00 5.50%	3.69	Agree
7	I use all necessary safety equipment to do my job.	145.00 40.00%	35.00 8.20%	88.00 22.50%	30.00 12.10%	50.00 12.1%	3.20	Agree
Mean of WA score							3.51	Agree
Lagging safety performance		SA	A	UN	D	SD	WA	Remark
1	I have not witnessed injury from sharp wastes during work routines.	54.00 13.6%	76.00 19.70%	73.00 18.80%	65.00 16.60%	118.00 31.30%	2.53	Disagree
2	I have not accidentally had body contact with biological or chemical waste in my workplace	126.00 35.30%	110.00 30.60%	73.00 20.30%	37.00 10.30%	14.00 3.9%	3.57	Agree
3	I have called in sick due to illness or injuries from my workplace	140.00 40.00%	30.00 8.20%	80.00 22.50%	45.00 12.10%	45.00 12.1%	3.51	Agree
4	I barely absent or loss some work time due to illness, tiredness or injuries related to my workplace	28.00 8.10%	92.00 23.10%	140.00 39.40%	85.00 25.60%	15.00 3.9%	3.00	Undecided
Mean of WA score							3.15	Agree

3.3 Impact of Safety Awareness on Safety Performance of Hospital Waste Workers in the Niger-Delta.

Linear regression analysis was adopted to examine the impact of safety awareness (SA) on the two indicators of safety performance of the hospital waste workers in Niger Delta, Nigeria. The indicators of safety performance considered were leading safety performance and lagging safety performance. The safety performance indicators were the dependent variables while safety awareness was the independent variable. Hence, two simple linear regression models were developed separately for each of the indicators of safety performance to help understand the impact of safety awareness on these indicators.

Table 4 shows the summary of the simple regression models and it shows that the models were significant in predicting the dependent variables which are leading and lagging safety performance with respect to possible changes in safety awareness as the independent variable with model p-values equal to 0.000 which is less than 0.05 significant level. The estimate coefficient of safety awareness in the models were 0.268 and 0.164. This implied that one-unit change in safety awareness will results to 0.268- and 0.164-unit changes in leading and lagging safety performances respectively. These values revealed that safety awareness showed higher impact on leading safety performance at impact coefficient of 0.268 than lagging safety performance at impact coefficient of 0.164.

The R-square values of 0.193 and 0.115 for the two safety performance indicator showed that 19.3%, and 11.5% change in leading and lagging safety performance are due to change in the safety awareness

while the other 80.7% and 88.5% were as a result of change in other variable and factors that were not operationalized or included in the current model. The p-values of 0.000 and 0.001 for the two models representing lagging safety performance and leading safety performance respectively showed that safety awareness have statistically significant impact on both the leading and lagging safety performance because their p-values are less than 0.05 significant value. Also, the t-values of 6.169 and 2.311 for the two models representing lagging safety performance and leading safety performance respectively showed that safety awareness have statistically significant impact on leading safety performance and lagging safety performance respectively because their t-values are greater than 1.96 critical level.

The findings aligned with the work of Ibrahim et al. (2017) who carried out study to determine effects of occupational safety and health awareness on work environment in the Kenyan Kisumu County Water Service industry. The study utilized a descriptive research design. The target population consisted of employees of Kisumu Water and Sewerage Company (KIWASCO) and Lake Victoria South Water Service Board (LVSWSB) working in water treatment works, waste water treatment plants and construction sites. The study analyzed the relationship between staff awareness of occupational safety and health and work environment using Spearman's rho coefficient and it was established that there is a significant moderate positive relationship between staff awareness of occupational safety and health and work environment in the water service industry in Kisumu County which meant that by enhancing awareness among staff on the occupational safety and health, the work environment would become more conducive.

The findings also aligned with work of Patrick et al (2019) who carried out study aimed to determine whether occupational safety and health (OSH) awareness among health workers and health management hindered implementation of OSHA in public dispensaries and health centres, using Machakos County. They adopted a cross-sectional descriptive survey conducted in February 2018 involving 107 health workers in public dispensaries and health centres and 42 members of the Health Management in Machakos County. It involved physical observations, collection of data from respondents, and analysis of the data. Linear regression results indicated strong negative relationship between safety awareness and hindrance in the implementation of OSHA. The prediction factor was - 0.6400, $p < 0.05$. These showed that a unit increase in safety awareness predicted an increase of 0.64 units of implementation of OSH Act.

Table 4: Results Showing the Impact of Safety Awareness on Safety Performance

S/N	Dependent variables	Estimate coefficient of Safety Awareness	R-square value	t-value	p-value
1	Lagging safety performance (LASP)	0.268	0.193	6.169	0.000
2	Leading safety performance (LESP)	0.164	0.115	2.311	0.001

Independent variable Safety Awareness (SA)

4. Conclusion

The impact of safety awareness on safety performance of hospital waste workers in the Niger-Delta has been examined and based on the findings, it was concluded that the waste workers in the government-owned hospitals in Niger-Delta have substantial level of safety awareness as regards to

their work environment and work conditions and also have a good level of safety performance in terms of both proactive and reactive safety factors. Finally, safety awareness has positive and substantial impact on the safety performance of waste workers in the government-owned hospitals in Niger-Delta.

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