Occupational Health and Safety Practice among Oil Palm Processing Workers in Delta State

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ABSTRACT
This study investigate Occupational Health and Safety practice among oil palm processing workers in Delta State. This study is descriptive correlational design in which cluster sampling and random sampling techniques were used to collect data from 205 palm oil processing workers in Delta State, using a validated Occupational Health and Safety Questionnaire (OHSQ) with a reliability index of 0.87. Out of 205 questionnaires administered, 198 questionnaires were retrieved for analysis representing 96.7% rate of return. The data were analyzed using descriptive and inferential statistical tools, including percentage, mean, and standard deviation. Multiple regression was employed to analyse the hypothesis. The study's respondents were mostly female (53.5%), indicating a higher proportion of female display screen users. Age distribution showed that 33.6% were aged 36-60, 30.9% were 31-35, 18.9% were 26-30, 10.5% were 18-25, and 6.0% were 41 and above. In terms of education, 48.6% had secondary education, 24.3% had primary education, 24.0% had tertiary education, and 3.0% had no formal education. Regarding work experience, 71% had 1-9 years, 27.3% had 10-19 years, and 0.9% had over 20 years of experience. The study found that the oil palm processing workers in Delta State collective mean score on practices of OHS was of 2.21 ± 1.163, with statistically significant relationships with age ($\beta = 0.390$, $p = 0.004$), gender ($\beta = 0.255$, $p = 0.009$), education ($\beta = 0.412$, $p = 0.002$), and work experience ($\beta = 0.352$, $p = 0.002$). The model shows a moderate positive relationship ($R = 0.382$) between demographic factors and OHS practices. About 14.6% variability is explained (R Square), with overall significance ($F = 4.132$, $p = 0.048$). Based on these a targeted OHS and hazard training and enhancement of OHS policy and enforcement were recommended.
Keywords: Oil Palm Processing Workers, OHS Practices, Occupational Health and Safety, Oil Palm.

INTRODUCTION
The palm oil industry plays a crucial role in Nigeria's economy, contributing significantly to its agricultural sector and providing numerous employment opportunities. Delta State, located in the southern region of Nigeria, is a key player in palm oil production (Iza & Ohimain, 2023), with a substantial number of workers engaged in palm oil processing activities (Foundation for Partnership Initiatives in the Niger Delta [FPIND], 2021). While the industry offers economic benefits, it also presents various occupational health and safety challenges for the workers involved.

The oil palm (*Elaeis guineensis*) is a valuable economic plant known for its oil production (Izah and Ohimain, 2023). It has been widely farmed in the humid tropical and sub-tropical regions of the world, including countries such as Indonesia, Malaysia, Thailand (Asia), Colombia (South America), and Nigeria (Africa). Oil palm is a significant species of the *Elaeis* genus, which is classified within the Palmae family (Rupani et al., 2020; Singh et al., 2020). Oil palm cultivation in Nigeria is mostly concentrated in the coastal zone, which spans along the valleys of the Niger and Benue rivers (Agbaike, 2023). The primary states in which oil palm production is concentrated are distributed among the nine states of the

Niger Delta region, namely Akwa Ibom, Abia, Rivers, Edo, Imo, Ondo, Bayelsa, Cross River, and Delta (FPIND, 2021). Additionally, oil palm cultivation is also observed in Ogun, Ekiti, Anambra, Enugu, and Oyo states (Agbaike, 2023).

The production and processing of palm serves as a means of sustenance for numerous households and contributes to the agricultural practises of a significant portion of the Nigerian population (Olagunju, 2018; Ohimain et al., 2022; Akangbe et al., 2021). According to Ohimain and Izah (2015), the palm oil industry holds significant importance in the Nigerian economy since it contributes to employment opportunities and the generation of income. There are multiple individuals that participate in the marketing of crude palm oil (CPO) and its associated products.

Nigeria presently ranks as the fifth most significant producer of Crude Palm Oil (CPO) globally, trailing behind Indonesia, Malaysia, Thailand, and Columbia. According to previous studies conducted by Sridhar and Adeoluwa (2019) and Singh et al. (2020), it has been shown that, on average, an oil palm plantation with an area of one hectare produces around 10 to 35 tonnes of fresh fruit bunches annually. In Nigeria, the current domestic production of crude palm oil (CPO) amounts to 930,000 metric tonnes, representing around 64% of the total demand. However, the remaining 36% of the need is fulfilled by importing from prominent oil palm producing countries.

Palm oil processing involves a range of labour-intensive tasks, including harvesting, fruit bunch sterilization, fruit threshing, oil extraction, and refining (Bamidele, 2015; Basiron, 2017). These tasks expose workers to various physical, chemical, and ergonomic hazards that can potentially jeopardize their health and safety (E-Vahdati et al., 2023; Igwe & Onyegbado, 2017). Despite the importance of the palm oil industry, there has been limited research and documentation on the occupational health and safety practices among palm oil processing workers in Delta State.

Myzebella et al. (2019) found that numerous routine activities performed by labourers in the process and harvesting oil palm crops are linked to heightened risks of musculoskeletal disorders (MSDs). Moreover, a majority of studies have reported a high prevalence of MSDs among these workers (Ego et al., 2012; Izah & Ohimain, 2013; Obodai et al., 2017; Oyekale et al., 2022). Furthermore, individuals employed in the palm oil industry face potential exposure to infectious diseases (Ohimain and Izah, 2023), as well as stress and mental disorders (E-Vahdati et al., 2023), due to the conditions in which they work and reside. Additionally, they are regularly exposed to various pesticides, notably paraquat. It is important to note that the labour-intensive nature of oil palm plantation work, which heavily relies on low-wage workers, contributes to an increased susceptibility to work-related injuries and illnesses (FPIND, 2021).

Factors such as, absence of proper training, exposure to hazardous chemicals used in the extraction and refining processes, repetitive motions leading to musculoskeletal disorders (Osei-Amponsah et a., 2022), and poor ergonomics in workplaces (Oyekale et al., 2022) can all contribute to the occupational health and safety concerns faced by palm oil processing workers (Myzabella et al., 2019). Furthermore, the predominance of small-scale processing units in Delta State might mean limited resources and awareness about implementing effective health and safety measures.

Addressing these challenges requires a thorough understanding of the existing occupational health and safety practices, identification of gaps in these practices, and the development of appropriate interventions to safeguard the well-being of palm oil processing workers. Ng *et al. (2013, P.1) having found that there is a severe cases of MSD among fresh fruit bunch (FFB) cutters, argued that there exists a pressing imperative to implement surveillance measures with the aim of ascertaining the present prevalence of ergonomic injuries. Subsequently, it is imperative to implement and assess ergonomics programmes that encompass a holistic and complete approach. These interventions should be evaluated for their effectiveness through integrated, participative, and cost-effective methodologies.* By conducting research and assessment in this domain, stakeholders such as governmental agencies, industry players, and worker unions can collaboratively devise strategies to enhance occupational health and safety standards, provide proper training, and establish a framework for regular monitoring and enforcement of safety regulations.

In light of these considerations, this study aims to investigate the current state of occupational health and safety practices among palm oil processing workers in Delta State, Nigeria. The insights gained from this research will not only contribute to filling the existing knowledge gap but also lay the foundation for

creating a safer and healthier work environment for these workers, ultimately promoting sustainable growth in the palm oil industry while prioritizing the well-being of its workforce. This study is designed to ascertain the OHS practice of palm processing workers in Delta State and its related factors. Therefore, the study answered the following questions: What is the current OHS practices among palm processing workers in Delta State? What factors are related to the current OHS practices of Palm processing working in Delta State? We also hypothesized that age, gender, education and work experience do not significantly correlate with OHS practices among oil palm processing workers in Delta State.

Current Knowledge and Gap in Literature

There quite a lot that is currently known about palm oil processing in the world. However, within the local community communities in developing countries such as Nigeria and others, the manufacturing of palm oil is primarily carried out by female processors, who are often supported by male counterparts in tasks involving machine operation and physically demanding activities (Sosan & Akingbohungbe, 2019; Taiwo et al., 2020; Tening et al., 2023). Partial mechanisation has been implemented for two unit activities, namely digestion and extraction. However, the remaining procedures, including quartering, stripping, sterilising, and clarifying, are still carried out manually. Majority of the machine operators who were questioned lacked formal training in machine operation and maintenance (Taiwo et al., 2020). However, they acquired the necessary skills through observational learning and are now able to do these duties proficiently (Yasin et al., 2019; Taiwo et al., 2020; Teoh, 2020).

Most investigations findings suggest a pressing requirement to implement a comprehensive training programme for both machine operators and maintenance employees (Sosan & Akingbohungbe, 2019; Taiwo et al., 2020; Tening, 2022).

It is common knowledge that there is no existing OHS law or framework for oil palm processing industry unlike for construction. This situation is most likeky to be contributing to the poor health culture observed in some parts of Nigeria such as Ondo (Taiwo et al., 2020), Edo state (Oyekale et al., 2022), the entire Southwest states (Olagunju, 2018), Yenagoa metropolis, Bayelsa State (Ohimain & Izah, 2015), Nguru: Aboh Mbaise, Imo State (Verla et al., 2014). Unfortunately, the state of the art has not been uncovered for Delta. Hence the nexus of the current study.

METHODOLOGY

This study is a descriptive survey of correlational type. The study applied cluster sampling and random sampling techniques to draw 205 palm oil processing workers in Delta State. A validate self-structured questionnaire titled **"Occupational Health and Safety Practices Questionnaire (OHSQ)** with a reliability index of 0.87 was used or data collection. The researchers with the help a two research assistants and one informant administered the questionnaire at the various cluster regions and all 198 questionnaire were retrieved and collated further analysis. This represented 96.6% return rate. The data collected were computed with SPSS version 26 and analysed using descriptive and inferential statistical tools. The descriptive statistics included percentage, mean and standard deviation. Percentage was used in analysing the demographics while mean and standard were used in analysing the research questions. Finally, the inferential statistics that was employed was multiple regression which was utilized to analyse the hypothesis.

RESULTS

Table 1: Summary of Demographic Characteristic of Respondents

Demographic	Groups	f	%
Gender	Male	92	46.5
	Female	106	53.5
	Total	**198**	**100.0**
Age	18-25	21	10.5
	26-30	37	18.9
	31-35	61	30.9
	36-40	67	33.6
	41+	12	6.0
	Total	**198**	**100.0**
Highest Educational Status	No formal education	6	3.0
	Primary	48	24.3
	Secondary	96	48.6
	Tertiary	48	24.0
	Total	**198**	**100.0**
Years of Experience	1-9 years	142	71.8
	10-19	54	27.3
	20 and above	2	.9
	Total	**198**	**100.0**

From the result in table 4.1, majority of the respondents were female (53.5%) while 46.5% were male. Hence the oil palm processing were mostly females. In terms of age, 33.6% of the respondents were within the age bracket of 36-60, 30.9% were within the age bracket of 31-35, 18.9% were within the age bracket of 26-30, 10.5% were within the age of 18-25 while 6.0% constituted of those that were 41 years and above. Education wise, 48.6% of the respondents had secondary education, 24.3% had primary education, 24.0% had tertiary education and 3.0% had no formal education. In relation to working experience, a good number of the respondents (71.%) had 1-9 years of working experience, 27.3% had 10-19 years of working experience and 0.9% had 20 years working experience and more.

Question 1: *What is the current OHS practices among palm processing workers in Delta State?*

Table 2: Summary of descriptive analysis OHS practice among oil palm workers in Delta State

S/No	Items	Mean	SD	Remark
1	Had a pre-employment training when i was newly employed	2.45	1.286	Poor
2	I had a pre-employment health examination when I was newly employed	2.33	1.235	Poor
3	I use personal protective Equipment (PPE) such as hand glove, like safety boot etc	2.51	0.961	Good
4	Hazards are eliminated once discovered	2.24	1.122	Poor
5	Personal protective equipment (PPE) is provided by the management that is safe	2.44	1.103	Poor
6	We have health examination periodically	2.46	1.137	Poor
7	Hazardous substances are substituted with less hazardous ones	2.35	1.276	Poor
8	There is first aid box at work	2.33	1.222	Poor
9	There is a proper/timely treatment of medical issues of workers	2.21	1.129	Poor
	Aggregate Mean	**2.21**	**1.163**	**Poor**

Table 2 revealed that the oil palm processing workers in Delta State collective mean score on practices of OHS was of 2.21 ± 1.163. This mean score is lower than the critical mean of 2.50. This implies that the oil palm workers in Delta State had a poor practices. However, the result equally revealed that the workers makes use of PPE (2.51 ± 0.961).

Question 2: *What factors are related to the current OHS practices of Palm processing working in Delta State?*

Hypothesis 1: Age, gender, education and work experience do not significantly correlate with OHS Practice.

Table 3: correlational Matrix of study variables analysed

		Average of OHS practices	Age	Gender	Education	Work Experience
Pearson Correlation	Average of OHS practices	1.00*	.174*	.163*	.321*	.277*
	Age	.174*	1.000*			
	Gender	.163*	.	1.000*		
	Education	.321*			1.000*	
	Work Experience	.277*				1.000*

*Correlation is significant at 0.05

Table 3 presents correlation coefficients indicating relationships among variables in the study. The average of occupational health and safety (OHS) practices demonstrates a positive correlation with age (0.174) and work experience (0.277), suggesting that individuals with better OHS practices tend to be older and have more work experience. Age and OHS practices have a slight positive correlation (0.174), while gender exhibits a weak positive correlation (0.163) with OHS practices. Education is positively correlated with work experience (0.321), implying a connection between higher education levels and increased work experience. Overall, the correlations underscore how age, gender, education, and work experience interplay with OHS practices, providing insights into potential influencing factors.

Table 4: the regression coefficients

Model		Beta	t	Sig.
1	(Constant)		12.573	.000
	Age	.390	3.404	.004
	Gender	.255	2.98	.009
	Education	.412	4.882	.002
	Work experience	.352	3.653	.002

Table 4 displays the regression coefficients for the model examining the relationship between the dependent variable, Occupational Health and Safety (OHS) practices of oil palm processing workers, and the independent variables: age, gender, education, and work experience.

The findings reveal that all four independent variables have statistically significant relationships with OHS practices. Specifically, age ($\beta = 0.390$, $p = 0.004$), gender ($\beta = 0.255$, $p = 0.009$), education ($\beta = 0.412$, $p = 0.002$), and work experience ($\beta = 0.352$, $p = 0.002$) are positively associated with OHS practices. The coefficient values indicate the strength and direction of these relationships. The model's constant term is not significant ($p = 0.083$), suggesting that other variables better explain the variance in OHS practices.

Table 5: summary of regression analysis of the combined correlation between demographic factors and OHS practices

Model	R	R Square	Adjusted R Square	F	P.val
1	.382a	.146	.122	4.132	0.048

a. Predictors: (Constant), Age, Gender, Education, and Work Experience of the respondents

Table 5 provides a summary of the regression analysis exploring the combined correlation between demographic factors (age, gender, education, and work experience) and Occupational Health and Safety (OHS) practices.

The model's multiple correlation coefficient (R) is 0.382, suggesting a moderate positive relationship between the demographic factors and OHS practices. The coefficient of determination (R Square) is 0.146, indicating that approximately 14.6% of the variability in OHS practices can be explained by the combined influence of age, gender, education, and work experience. The adjusted R Square (0.122) accounts for the complexity of the model by adjusting for the number of predictors and provides a more accurate representation of the explained variance.

The model's overall significance is indicated by the F-statistic (4.132), with a corresponding p-value of 0.048. This p-value suggests that the model as a whole is statistically significant at a significance level of 0.05, indicating that at the predictors (age, gender, education, work experience) had significant effects on OHS practices.

DISCUSSION OF FINDINGS

The study's findings revealed that Occupational Health and Safety (OHS) practices among oil palm workers in Delta State were notably poor, and these practices exhibited significant correlations with demographic factors, including age, gender, education, and work experience. Comparing these results with existing empirical studies focusing on OHS practices in the palm oil industry, a comprehensive picture emerges.

Agbaike's (2023) exploration of palm kernel cracking plants underscores practical challenges faced by workers and the need for improved safety measures. Akangbe et al. (2021) highlight constraints faced by palm oil extractors, emphasizing training needs for enhanced OHS practices. Bamidele (2015) explores occupational hazards for palm oil processors, echoing concerns about adverse health effects that is escalated by poor OHS practices with only 35% of the participant practicing effective OHS measures. Myzabella et al. (2019) conduct a systematic review, and discovered that OHS in the palm oil industry is still heavily neglected most especially among informal sector. Ng et al. (2013) found a high prevalence of ergonomic disorders among oil palm workers. The study further explained that the problems was associated with poor OHS practices especially poor lifting techniques.

The poor OHS practices observed in these study in Nigeria calls for urgent need to improve OHS enforcement. The Foundation for Partnership Initiatives in the Niger Delta (2021) report, Giacomin (2018), and Henderson and Shorette (2017) underline broader sustainability issues and institutional challenges associated with the palm oil industry. Furthermore, Myzabella et al. (2019) and Sosan and Akingbohungbe (2019) stress the importance of OHS in agricultural contexts, resonating with the focus on palm oil workers in our study.

While many studies acknowledge the significance of OHS practices, few directly link them to demographic factors. Our study aligns with E-Vahdati et al. (2023), who investigate workers' well-being in palm oil industries and discovered a significant associate between age and gender and OHS practices among the oil palm workers. Similarly, Ng et al. (2013), observed a significant relationship between gender, age, educational attainment and hazard prevention practices among oil palm workers.

On the contrary, Henderson and Shorette (2017) and Sosan and Akingbohungbe (2019) found not relationship between OHS practices and demographic factors such as age, marital status, and education. This difference, might be due to level of development of the society and Malaysia has witnessed a

remarkable development in recent years compared to Nigeria, Ghana where these other studies were conducted.

Collectively, the selected studies emphasize the importance of addressing poor OHS practices within the palm oil industry. Our findings enrich this discourse by demonstrating the significant correlation between demographic factors and OHS practices among oil palm workers in Delta State. By aligning our results with these empirical studies, a broader understanding of the challenges, concerns, and potential interventions related to OHS practices in the palm oil sector emerges. Addressing these issues is crucial to ensure the well-being and safety of workers while advancing the sustainability of the industry.

CONCLUSION

Based on our result, the OHS practices of the oil palm workers in Delta state is poor. This sheds light on the inadequate Occupational Health and Safety (OHS) practices among oil palm workers in Delta State. With significant correlations observed between these practices and demographic factors such as age, gender, education, and work experience, this study contributes to the existing body of knowledge by highlighting the specific demographic factors that influence OHS practices in this sector.

RECOMMENDATIONS

Based on the study's findings, two recommendations emerged:

There is need for targeted Training and Education of oil palm processing workers in Delta State. Given the significant correlation between education levels and OHS practices, it is crucial to design and implement targeted training programs for palm oil workers. These programs should focus on raising awareness about occupational hazards, safety protocols, and the proper use of protective equipment. Additionally, educational campaigns can empower workers to recognize risks and adopt safe work practices, ultimately improving their overall well-being.

There is also need for Policy Enhancement and Enforcement. Recognizing the influence of demographic factors such as age and work experience on OHS practices, regulatory bodies and policymakers should collaborate to establish and enforce robust safety standards in the palm oil industry. Regular inspections, stringent compliance monitoring, and penalties for non-compliance should be implemented to ensure that employers prioritize the safety and health of their workers. Additionally, policies could be tailored to address specific challenges faced by different demographic groups, ensuring a more inclusive and effective approach to OHS.

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