

OCUPATIONAL HAZARDS AND SAFETY MEASURES IN CASSAVA PRODUCTION AND PROCESSING IN AKWA IBOM AND OYO STATES, NIGERIA: A COMPARATIVE ANALYSIS

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ABSTRACT

Cassava production and processing in Nigeria expose workers to multiple occupational hazards, compromising health, productivity, and livelihoods. This study comparatively analyzed occupational hazards and safety measures among Cassava farmers and processors in Akwa Ibom and Oyo States. Specifically, it identified the hazards faced, assessed the utilisation of safety measures, and examined the contribution of selected socio-economic characteristics to hazard prevalence. A quantitative survey design was employed, with 200 respondents in Akwa Ibom and 110 in Oyo selected through multistage sampling. Data were collected via structured questionnaires and analyzed using descriptive statistics (frequency, percentage and mean) and multiple regression. Findings revealed that stress and fatigue (92.0%), insect bites (84.0%), and heat stress/dehydration (81.0%) were the most prevalent hazards, with higher musculoskeletal, skin, and respiratory problems reported in Akwa Ibom, and insect bites more common in Oyo. Safety measures such as PPE (85.2%), first-aid facilities (85.8%), and rest breaks (78.1%) were widely utilized, while participation in safety training (56.5%) and regulatory compliance (41.9%) were moderate to low. Regression analysis showed that sex ($\beta = 0.215$, $p = 0.009$) and household size ($\beta = 0.198$, $p = 0.011$) significantly predicted hazard prevalence ($R^2 = 0.182$, $p < 0.01$). The study concludes that gender roles and household composition influence occupational risk and recommends targeted, gender-sensitive training, strengthened regulations, and household-focused interventions to enhance safety in cassava value chains.

Keywords: Occupational hazards, safety measures, cassava production, Nigeria, comparative analysis

INTRODUCTION

Cassava is a staple crop in Nigeria, supporting millions of rural households and contributing to food security and income generation (Ekanem *et al.*, 2023). Beyond its dietary role, cassava is a critical raw material for agro-allied industries, reflecting its economic importance (Ekanem and Umoh, 2024). However, production and processing expose workers to occupational hazards such as stress, fatigue, injuries, respiratory problems, insect bites, and harmful substances, which undermine productivity and health (Rai *et al.*, 2021).

These hazards are not unique to Nigeria. Studies in Ghana and Ethiopia show that workplace risks significantly impair the productivity and welfare of agricultural workers (Baidoo *et al.*, 2025; Ayenew *et al.*, 2022). In Nigeria, cassava processing hazards range from physical injuries to chemical exposures and musculoskeletal disorders from repetitive tasks (Ewebiyi *et al.*, 2020). Although safety measures such as personal protective equipment, first-aid facilities, and health regulations exist, compliance remains low (Ejilude *et al.*, 2023; Ajala *et al.*, 2022).

Despite prior studies on Oyo (Ejilude *et al.*, 2023) and Kwara States (Ajala *et al.*, 2022), comparative evidence across states is limited. Socioeconomic factors affecting hazard exposure and safety utilisation remain underexplored (Isiaka *et al.*, 2025), highlighting the need for context-specific analyses. In Akwa Ibom, hazards such as heat stress, sawdust inhalation, and sharp-tool injuries threaten occupational health and livelihoods

(Ibanga *et al.*, 2025). In Oyo, workers face similar risks with limited access to protective equipment and safety regulations (Fapojuwo *et al.*, 2021). These challenges jeopardize food security, livelihoods, and cassava's economic contribution (Sowunmi *et al.*, 2021; Ndubueze-Ogaraku *et al.*, 2020). This study provides a comparative analysis of occupational hazards and safety measures in Akwa Ibom and Oyo, generating evidence to guide occupational health policy and practice in Nigeria's cassava sector.

The broad objective of the study was to conduct a comparative analysis of occupational hazards and safety measures in cassava production and processing in Akwa Ibom and Oyo States, Nigeria. The specific objectives were to:

1. identify the occupational hazards faced by respondents in Akwa Ibom and Oyo States; and
2. identify the safety measures and regulations utilised in mitigating occupational hazards in Akwa Ibom and Oyo States.

The study hypothesized that there is no significant contribution of selected socio-economic characteristics to the level of prevalence of occupational hazards among the respondents.

METHODOLOGY

The study adopted a quantitative, comparative survey design to analyze occupational hazards and safety measures in cassava production and

processing in Akwa Ibom and Oyo States. The choice of Akwa Ibom and Oyo was informed by their strategic importance in Nigeria's cassava economy, with Akwa Ibom representing a South-South hub and Oyo serving as a leading producer in the South-West (Ikuemonisan *et al.*, 2020; Borku *et al.*, 2025). The study population comprised cassava farmers and processors.

In Akwa Ibom State, a multistage sampling technique was used to ensure representativeness. Two agricultural zones (Abak and Etinan) were randomly selected from six zones. One block was randomly chosen from each zone, followed by the random selection of two cells per block, resulting in four cells. Fifty respondents were randomly selected from each cell, giving a total of 200 respondents. This sample size was considered adequate for comparative and regression analyses and is consistent with similar agricultural occupational health studies that recommend samples above 150 for reliable statistical inference (Ifeanyi-Obi and Uloh, 2025a; Ewebiyi *et al.*, 2020).

In Oyo State, a multistage sampling approach was also adopted. Three Local Government Areas (Atiba, Ibarapa, and Afijio), representing 9% of the state's 33 LGAs, were selected. Thereafter, 17.5% of registered cassava farmers and processors were proportionately sampled from each LGA based on official records, resulting in 110 respondents. The sample size met the minimum threshold for robust regression analysis and aligns with methodological recommendations for social science research (Ifeanyi-Obi and Uloh, 2025a; Ewebiyi *et al.*, 2020).

Primary data were collected using a structured questionnaire. Occupational hazards were measured by asking respondents to indicate the occurrence of specific hazards, coded as Yes or No, and summarized using percentages. The prevalence of occupational hazards was further measured on a 3-point Likert scale (High = 3, Medium = 2, Low = 1) to generate a composite index used for inferential analysis. Safety measures and regulations were operationalized as binary variables indicating utilisation or non-utilisation of specific practices.

Data were analyzed using descriptive and inferential statistics. Percentages were used to address the first two objectives, while multiple regression analysis was employed to test the hypothesis on the contribution of selected socio-economic characteristics to the prevalence of occupational hazards. Multiple regression was appropriate because the dependent variable was continuous and influenced by multiple predictors. Key assumptions of linearity, independence of errors, and absence of multicollinearity were reasonably satisfied.

The implicit regression model is given as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6) + e \quad (1)$$

Where Y represents the prevalence of occupational hazards, $X_1 - X_6$ denote the socio-economic variables (sex, age, marital status, level of education, household size, and religion), and e is the stochastic error term.

The regression model is expressed as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \mu \quad (2)$$

Where β_0 is the constant term, $\beta_1 - \beta_6$ are the coefficients of the explanatory variables, and μ represents the disturbance (error) term.

These explanatory variables were included based on evidence that socio-demographic factors significantly influence hazard exposure, health outcomes, and safety compliance among agricultural and industrial workers (Isiaka *et al.*, 2025; Ifeanyi-Obi and Uloh, 2025a). Thus, the methodological approach integrates both descriptive and econometric analyses to provide robust insights into occupational health and safety within Nigeria's cassava value chain.

RESULTS AND DISCUSSION

Occupational hazards faced by respondents in Akwa Ibom and Oyo states

The most prevalent occupational hazards among cassava farmers and processors were stress and fatigue (92.0%), insect bites and stings (84.0%), and heat stress/dehydration (81.0%), while exposure to hazardous chemicals (41.9%), noise-induced hearing loss (58.1%), and slips, trips, or falls (61.3%) were least reported (Table 1).

Respondents in Akwa Ibom reported higher prevalence of musculoskeletal disorders, skin irritation, respiratory problems, cuts, burns, exposure to hazardous chemicals, slips, trips or falls, noise-induced hearing loss, and dust than those in Oyo State. Heat stress/dehydration and stress and fatigue were similarly high in both states, whereas insect bites and stings were more common in Oyo State.

Cassava production and processing expose workers to multiple hazards, with stress and fatigue, insect bites, and heat stress being most common, consistent with observations by Obinaju *et al.* (2022) and Ndubueze-Ogaraku *et al.* (2020). High stress and fatigue likely result from long working hours and repetitive manual tasks (Fatai *et al.*, 2021), while heat stress reflects prolonged outdoor exposure (Ifeanyi-Obi and Uloh., 2025b).

Higher prevalence of musculoskeletal, skin, and respiratory issues in Akwa Ibom may stem from lower mechanization and limited use of protective equipment, echoing Fosu-Mensah *et al.* (2021). Greater incidence of insect bites in Oyo State may be due to environmental factors such as vegetation density.

These patterns highlight the need for targeted interventions, including provision of personal

protective equipment and context-specific safety training, as emphasized in studies by Adikwu *et al.* (2025) and Sapbamrer and Thammachai (2020). State-specific differences underscore that

occupational safety strategies must be adapted to local conditions rather than adopting a uniform approach.

Table 1: Occupational hazards faced by respondents in Akwa Ibom and Oyo States

Occupational Hazard	Akwa Ibom (n=200)		Oyo (n=110)		Total (n=310)	
	Yes - %	No - %	Yes - %	No - %	Yes - %	No - %
Musculoskeletal disorders	75.0	25.0	59.1	40.9	69.4	30.6
Skin irritation or rashes	72.5	27.5	54.5	45.5	66.1	33.9
Respiratory problems	70.0	30.0	54.5	45.5	64.5	35.5
Cuts or lacerations	72.5	27.5	54.5	45.5	66.1	33.9
Burns or scalds	70.0	30.0	50.0	50.0	62.9	37.1
Exposure to hazardous chemicals	65.0	35.0	45.5	54.5	58.1	41.9
Slips, trips, or falls	67.5	32.5	50.0	50.0	61.3	38.7
Noise-induced hearing loss	65.0	35.0	45.5	54.5	58.1	41.9
Heat stress/dehydration	80.0	20.0	81.8	18.2	81.0	19.0
Insect bites and stings	82.5	17.5	90.9	9.1	84.0	16.0
Machinery / Equipment injuries	67.5	32.5	50.0	50.0	61.3	38.7
Dust	70.0	30.0	50.0	50.0	62.9	37.1
Stress and fatigue	87.5	12.5	100.0	0.0	92.0	8.0

Percentages are based on row totals within each state.
Source: Field survey (2024)

Safety measures and regulations utilised

The total sample showed high utilisation of personal protective equipment (PPE) (85.2%), availability of first-aid facilities (85.8%), and provision of adequate breaks (78.1%). Moderate uptake was observed for utilisation of safer work practices (60.0%) and participation in safety training/awareness (56.5%), while reporting of incidents (44.5%) and government regulation enforcement (41.9%) were comparatively low (Table 2).

Comparison between states indicated similar patterns. PPE use was almost identical in Akwa Ibom (85.0%) and Oyo (85.5%). First-aid facilities and adequate rest periods were also comparable. Slight differences appeared in participation in safety training (Akwa Ibom 57.5%; Oyo 54.5%) and reporting of incidents (Akwa Ibom 45.0%; Oyo 43.6%), while utilisation of safer work practices was equal in both states (60.0%). Government regulation and enforcement were slightly higher in Akwa Ibom (42.5%) than in Oyo (40.9%) (Table 2).

The overall high utilisation of PPE, first-aid facilities, and provision of breaks suggests that cassava farmers and processors are aware of basic safety measures, reflecting similar trends observed in agro-processing and manufacturing studies (Adikwu *et al.*, 2025; Sapbamrer and Thammachai, 2020; Sehshah *et al.*, 2020). Moderate engagement in safer work practices and training indicates partial integration of formal occupational safety strategies, consistent with findings from Fosu-Mensah *et al.*

(2021) and Ndubueze-Ogaraku *et al.* (2020). Low levels of reporting incidents and reliance on government regulations highlight gaps in institutional support and enforcement, corroborating concerns raised by Gabriel *et al.* (2021) about weak regulatory frameworks in similar contexts.

The minimal differences between Akwa Ibom and Oyo States may reflect shared constraints in resources, training, and enforcement mechanisms. Slightly higher participation in safety training and regulation compliance in Akwa Ibom could be attributed to targeted extension programs and awareness initiatives documented in regional studies (Ifeanyi-Obi and Uloh, 2025a; Ndubueze-Ogaraku *et al.*, 2020). Overall, the findings underscore the importance of strengthening formal safety structures, enhancing regulatory oversight, and promoting consistent training programs to reduce occupational risks in cassava production and processing.

Testing of hypothesis

The regression analysis (Table 3) shows that sex and household size were significant predictors of occupational hazard prevalence in cassava production and processing. For the total sample, the model explained 18% of the variation ($R^2 = 0.182$, $F = 4.29$, $p < 0.01$), with sex ($\beta = 0.215$, $p = 0.009$) and household size ($\beta = 0.198$, $p = 0.011$) contributing significantly. Age, marital status, education, and religion did not show significant relationships.

Table 2. Safety measures and regulations utilise in mitigating occupational hazards in Akwa Ibom and Oyo States

Safety Measure	Akwa Ibom (n=200)		Oyo (n=110)		Total (n=310)	
	Yes - %	No - %	Yes - %	No - %	Yes - %	No - %
Use of personal protective equipment (PPE)	85.0	15.0	85.5	14.5	85.2	14.8
Utilisation of safer work practices	60.0	40.0	60.0	40.0	60.0	40.0
Participation in safety training/awareness	57.5	42.5	54.5	45.5	56.5	43.5
Reporting of incidents to authorities	45.0	55.0	43.6	56.4	44.5	55.5
Government regulations and enforcement	42.5	57.5	40.9	59.1	41.9	58.1
Availability of first-aid facilities	86.0	14.0	85.5	14.5	85.8	14.2
Provision of adequate breaks and rest periods	78.0	22.0	78.2	21.8	78.1	21.9

Percentages are based on row totals within each state.
Source: Field survey (2024)

When disaggregated by state, Akwa Ibom exhibited similar trends: sex ($\beta = 0.228, p = 0.014$) and household size ($\beta = 0.202, p = 0.016$) were significant, with the model explaining 17.6% of the variation ($R^2 = 0.176, F = 3.82, p < 0.01$). In Oyo State, household size remained significant ($\beta = 0.194, p = 0.037$), while sex was marginal ($\beta = 0.204, p = 0.058$), with the model accounting for 18.9% of the variance ($R^2 = 0.189, F = 3.14, p < 0.05$). These results indicate that gender roles and household composition are key determinants of exposure to occupational hazards in cassava production and processing.

The analysis confirms that sex and household size are significant contributors to occupational hazard prevalence across cassava production and processing. The significance of sex reflects gendered divisions of labor, where women in Akwa Ibom undertake intensive processing tasks that heighten exposure, aligning with prior evidence on gender-specific occupational risks in rural Nigeria (Ifeanyi-Obi and Uloh, 2025a). In Oyo, the marginal role of sex suggests a more balanced participation of

men and women, reducing the direct effect of gender on hazard outcomes.

Household size consistently predicted hazard prevalence, supporting findings by Ajala *et al.* (2022) that larger households rely heavily on family labor, increasing exposure risk. This underscores that labor intensity within households amplifies vulnerability, emphasizing the need for family-focused interventions.

Other socio-economic variables, including age, marital status, education, and religion, were not significant, contrasting studies where these factors influenced occupational safety (Sehsah *et al.*, 2020; Ayenew *et al.*, 2022). This may reflect the pervasive nature of hazards in cassava production, which affect workers across socio-economic categories.

The variation in the strength of determinants between states highlights the role of local production practices and labor dynamics (Ajala *et al.*, 2022). These findings imply that occupational health interventions should be gender-sensitive and household-centered, promoting awareness, training, and safety measures at both individual and family levels to mitigate hazard exposure effectively.

Table 3: Multiple Regression of Selected Socio-economic Characteristics and the Prevalence of Occupational Hazards

Variable	Akwa Ibom (n=200) β (p-value)	Oyo (n=110) β (p-value)	Total (n=310) β (p-value)
Sex	0.228 (0.014*)	0.204 (0.058)	0.215 (0.009**)
Age	0.081 (0.179)	0.066 (0.360)	0.072 (0.185)
Marital status	-0.037 (0.605)	-0.045 (0.579)	-0.041 (0.515)
Level of Education	-0.061 (0.269)	-0.052 (0.408)	-0.058 (0.240)
Household Size	0.202 (0.016*)	0.194 (0.037*)	0.198 (0.011*)
Religion	0.029 (0.667)	0.034 (0.655)	0.032 (0.603)
R²	0.176	0.189	0.182
F-value	3.82 (p<0.01)	3.14 (p<0.05)	4.29 (p<0.01)

* $p < 0.05$, ** $p < 0.01$. NS = Not significant.

CONCLUSION AND RECOMMENDATIONS

The study revealed that cassava producers and processors in Akwa Ibom and Oyo States face multiple occupational hazards, with stress, fatigue, heat stress, and insect bites most common. Akwa Ibom workers reported higher musculoskeletal, skin,

and respiratory problems, while Oyo workers experienced more insect bites. Safety measures like PPE, first-aid facilities, and rest breaks were widely used, but formal safety practices, reporting, and regulatory compliance were moderate to low. Sex and household size significantly influenced hazard

prevalence, highlighting the roles of gendered labor and household composition in exposure risk.

Agricultural extension services and farmer associations should provide gender-sensitive training on safe cassava production and processing, emphasizing the specific risks faced by men and women. Local government and policymakers should strengthen occupational health regulations and support household-level interventions, ensuring first-aid facilities, safety reporting systems, and labor management strategies to reduce hazard exposure, particularly in larger families.

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