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**ASSESSMENT OF HYGIENE PRACTICES AND ENVIRONMENTAL
SANITATION CONDITIONS AMONG ABATTOIR WORKERS IN THE
FEDERAL CAPITAL TERRITORY**

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Abstract

This study assessed hygiene practices and environmental sanitation conditions among abattoir workers in the Federal Capital Territory (FCT), Abuja, Nigeria. A cross-sectional survey was conducted among 100 workers selected from four major abattoirs; Karu, Gwagwalada, Dei-Dei, and Kuje, between January and March 2025. Data were collected using a structured Likert-scale questionnaire and analysed using SPSS version 27. Descriptive statistics summarized hygiene practices and sanitation conditions, Pearson's correlation examined relationships among hygiene behaviours, and one-sample t-tests compared sanitation indicators against the adequacy threshold of 3.0. Results revealed strong positive correlations among handwashing, PPE use, tool cleaning, and post-shift bathing ($r = 0.80\text{--}0.92$, $p < 0.001$), indicating that hygiene behaviours cluster together among conscientious workers. However, environmental sanitation conditions were uniformly substandard. Mean scores for access to clean water ($M = 2.24$), waste disposal systems ($M = 2.55$), facility cleanliness ($M = 2.65$), and functional toilet facilities ($M = 2.40$) all fell significantly below acceptable levels ($p < 0.01$). Workers identified infrastructural deficits, infrequent regulatory inspections, and limited access to protective equipment as primary barriers. Notably, self-rated knowledge met acceptable levels ($M = 3.00$, $p = 1.000$), indicating that sanitation deficits stem from structural and institutional failures rather than worker ignorance. The study concludes that improving abattoir sanitation in the FCT requires urgent infrastructural investment, strengthened regulatory oversight, and provision of free protective equipment. Responsibility lies primarily with institutional stakeholders to create environments where workers' adequate knowledge can translate into consistent safe practices.

Keywords: *Abattoir hygiene, environmental sanitation, food safety, occupational health, Nigeria*

1.1 INTRODUCTION

Abattoirs represent a critical connection in the food production chain, where the interface between animal health, environmental integrity, and human well-being demands unwavering vigilance. In Nigeria's bustling Federal Capital Territory (FCT), Abuja, these facilities process thousands of livestock daily to meet the dietary needs of a growing urban populace, yet they often operate under conditions that undermine public health safety measures (Akpabio, 2024; Nwankwo et al., 2021). Studies reveal how such establishments, while economically vital, frequently harbor risks that extend from microbial contamination to broader ecological degradation.

The predominant issue lies in the persistent deficits of hygiene practices and environmental sanitation among abattoir workers, which perpetuate zoonotic transmission and foodborne illnesses in Nigeria. Recent investigations reveal alarmingly low adherence to personal protective measures such as glove and mask usage hovering below 20% in some settings and irregular cleaning of slaughter equipment, compounded by inadequate waste disposal systems that favor open dumping or uncontrolled burning (Edward, 2024; Iwu et al., 2025). In Abuja's FCT, where rapid urbanization strains rudimentary infrastructure, these lapses mirror national patterns documented across states like Abia, Ebonyi, and Rivers, with studies from 2020-2025 reporting tuberculosis prevalence in slaughtered cattle exceeding 14% alongside brucellosis and cysticercosis, directly linked to poor sanitation (Akpabio, 2024; Nwankwo et al., 2021). Without targeted interventions, workers face increasing occupational hazards, while consumers confront contaminated meat supplies, straining an already overburdened health system amid seasonal spikes in contamination during dry periods (Edward, 2024; Njoku et al., 2020).

Objectives of the study

General Objective

To assess the hygiene practices and environmental sanitation conditions among abattoir workers in the Federal Capital Territory, Abuja.

Specific Objectives

- i. To determine the prevalence and types of personal hygiene practices (e.g., handwashing, use of personal protective equipment) among abattoir workers in selected abattoirs within the Federal Capital Territory, Abuja.
- ii. To evaluate the environmental sanitation conditions (e.g., waste disposal, water quality, facility infrastructure) in abattoirs operated by workers in the Federal Capital Territory, Abuja.^{[4][2]}
- iii. To identify the factors influencing hygiene practices and sanitation conditions (e.g., knowledge levels, infrastructure barriers, regulatory compliance) among abattoir workers in the Federal Capital Territory, Abuja.

Research Questions

- i. What is the prevalence and pattern of personal hygiene practices (e.g., handwashing, PPE usage) among abattoir workers in the Federal Capital Territory, Abuja?
- ii. What are the prevailing environmental sanitation conditions (e.g., waste disposal, water access, facility cleanliness) in abattoirs within the Federal Capital Territory, Abuja?
- iii. What factors (e.g., knowledge, infrastructure, regulatory oversight) influence hygiene practices and sanitation conditions among abattoir workers in the Federal Capital Territory, Abuja?

Research Hypotheses

H1: Less than 50% of abattoir workers in the Federal Capital Territory, Abuja, consistently adhere to recommended personal hygiene practices such as handwashing with soap and PPE usage.

H2: Environmental sanitation conditions in abattoirs of the Federal Capital Territory, Abuja, fall below national standards, with over 60% exhibiting poor waste management and inadequate water infrastructure.

H3: Key influencing factors such as limited training, infrastructure deficits, and infrequent inspections significantly predict suboptimal hygiene and sanitation practices among abattoir workers in the Federal Capital Territory, Abuja ($\beta > .30$, $p < .05$).

2.0 LITERATURE REVIEW

Assessing Hygiene Practices and Environmental Sanitation Conditions

Abattoirs in urban Nigeria, particularly in the Federal Capital Territory (FCT) Abuja, sit at an unstable connection of food security and public health, where daily livestock slaughter to feed millions often occurs amid conditions that foster contamination. Over the years, there has been economic pressures rising demand from Abuja's increasing population clash with outdated infrastructure, creating environments ripe for zoonotic spillover. Studies from the past decade consistently show that while workers grasp basic hygiene principles, systemic lapses turn potential safety measures into mere formalities (Agu et al., 2021). This broad assessment, then, becomes not just an academic exercise but highlights the need for improvement, mirroring patterns seen from Lagos to Enugu where poor sanitation correlates with spikes in foodborne outbreaks during harmattan seasons.

Personal Hygiene Practices Among Abattoir Workers

When it comes to personal hygiene, the literature reveals a familiar Nigerian paradox: workers know better, but circumstances conspire against doing better. In Ebonyi State's slaughter slabs, Agu et al. (2021) surveyed 384 personnel and found 82% aware of handwashing protocols before carcass handling, yet direct observation pegged actual soap-and-water compliance at just 38% during peak hours often because soap rations ran dry midway through shifts. Gloves and aprons, meant to shield against bloodborne pathogens, appeared in under 20% of cases, a figure echoed in Owerri North where Iwu et al. (2025) linked irregular PPE use to *Salmonella* residues on 65% of sampled hands post-evisceration. This gap seems to stem from more than forgetfulness; it's the toil of 12-hour days under equatorial heat, where sweat-soaked gear chafes and costs deter consistent adoption. Training helps marginally sites with quarterly sessions showed 15% higher glove uptake but without steady supplies, knowledge evaporates into aspiration. Abuja's abattoirs, facing similar urban-rural livestock influxes, likely perpetuate this cycle, demanding the investigation of not just claims but observed routines to expose the true prevalence.

Environmental Sanitation Conditions in Abattoirs

Environmental conditions in abattoirs reveal an even blatant story of neglect, with Nigerian studies painting abattoirs as inadvertent pollution hubs. Njoku and Onyenweaku (2020) evaluated 12 Rivers State sites, revealing open-air paunch manure dumps in 72%, non-functional boreholes forcing reliance on contaminated streams for rinsing, and floors caked in coagulated blood that bred flies by midday. In Enugu, Omeh et al. (2024) rated just 18% of facilities as "satisfactory" for drainage, noting how effluent pools during rains leach into groundwater, elevating nearby *E. coli* counts by 40-fold. Akpabio (2024) quantifies the zoonotic toll: 16% bovine TB prevalence tied directly to lairage filth where stressed animals shed mycobacteria unchecked.

These conditions reflect systemic regulatory failures rather than isolated incidents, as national guidelines exist but enforcement weakens due to bureaucratic fragmentation (Federal Ministry of Environment, Housing and Urban Development, 2005). In Abuja's FCT, rapid peri-urban expansion worsens the situation through prevalent waste burning, evident in smoke plumes visible from major roads, and lack of fumigation (Adedayo et al., 2019; original study). Objective assessments must therefore examine water quality, waste management systems, and structural integrity against overdue standards (Federal Ministry of Environment, Housing and Urban Development, 2005).

Factors Influencing Hygiene and Sanitation Practices

Unpacking the drivers behind these shortcomings reveals a web of modifiable levers, where infrastructure often outplays individual resolve. Agu et al. (2021) carried out logistic regressions across Ebonyi data, isolating lack of piped water (OR=4.2) and

infrequent vet inspections (OR=3.1) as top predictors of hygiene non-compliance, while self-rated knowledge scores above 4/5 barely nudged behaviors upward. Iwu et al. (2025) explored deeper in Imo State, ascribing 55% bacterial exceedances to absent PPE subsidies and training lapses, only 28% recalled interventions in the prior year coupled with time pressures from quota-driven slaughter. Akpabio (2024) frames it socio-economically: low-wage migrants, wary of reporting hazards, internalize risks amid regulatory voids where fines rarely materialize. Regulatory apathy compounds this; Njoku and Onyenweaku (2020) note just 22% of sites passed annual audits. In my experience supervising field teams, these factors interlock knowledge alone falters without boreholes or boots, suggesting Abuja workers will cite water scarcity and oversight gaps foremost. Interventions blending free gear, on-site clinics, and empowered local monitors could shift the odds, but only if policies evolve beyond rhetoric.

3. METHODOLOGY

3.1 Study Design and Setting

A cross-sectional survey design for data the collection on hygiene practices and environmental sanitation conditions was utilized among abattoir workers in the Federal Capital Territory (FCT), Abuja, Nigeria. We selected the FCT as our study area, given its strategic importance as one of Nigeria's key livestock slaughter and meat distribution centres serving a rapidly growing urban population with thousands of animals processed daily between multiple facilities.

Data were collected over a 3-month period from January to March 2025. Geographical representation was ensured by collecting data from four mainstream abattoirs within the territory, incorporating differences in operational scale and management (Table 1). They are comprised of Karu Abattoir, Gwagwalada Abattoir; both from Gwagwalada Area Council, Dei-Dei Abattoir (Bwari Area Council) and one the Kuje abattoirs (Kuje Area Council).

3.2 Study Population

The target population included all workers directly engaged in slaughtering, carcass processing and meat handling activities at abattoirs operating within the FCT. This included butchers, slaughtermen and meat processors as well as general workers who came into contact with animals or meat products during the course of their everyday jobs.

3.3 Sample Size and Sampling Technique

A target sample of 100 workers was determined using Cochran's formula ($p=0.5$, 95% confidence interval, 10% margin of error, with an additional 10% adjustment for

anticipated non-response). The study employed a purposive quota sampling strategy. Four major abattoirs within the Federal Capital Territory, Karu, Gwagwalada, Dei-Dei, and Kuje, were purposively selected based on their high operational volumes and status as primary meat distribution centers serving the urban population. Within each facility, quotas were allocated proportionally according to the estimated workforce size to ensure balanced representation across sites. Finally, individual participants were randomly selected from official duty rosters within each quota using a random number generator to minimize selection bias at the worker level.

3.4 Data Collection Instrument

The questionnaire was designed mainly from existing literature and refined from other studies in Nigeria (Agu et al., 2021; Nwankwo et al., 2021). The instrument had four parts; Section A included demographic variables, items on personal hygiene practices found in Section B (measured with Likert-type scale), Section C measured environmental sanitation conditions, and Section D examined factors influencing hygiene and sanitation. Three experts in environmental health and public health face-validated the questionnaire, which was pretested on 20 abattoir workers in a neighboring state for clarity and reliability. The internal consistency reliability (Cronbach's alpha coefficient) was 0.87.

3.5 Data Collection Procedure

The questionnaires were administered by trained research assistants in face-to-face interviews with participants. This method was used to cater to low-literacy workers and clear up any confusing questions. To minimize the impact of work operations, each interview lasted about 20-25 minutes and were conducted during break periods. Participation was voluntary, and workers were guaranteed confidentiality.

3.6 Data Analysis

Inferential statistics were used to analyze the data using SPSS version 27. For Objective 1, relationships among various personal hygiene practices were investigated using Pearson's correlation coefficient. Descriptive statistics are provided, and one sample t-tests were conducted to test the mean score against a specified test value that indicated adequate performance for Objectives 2 and 3. Significance was defined as $p < 0.05$ and all statistical tests were two-tailed.

Likert-scale responses were treated as approximately continuous variables for statistical analysis, a common approach in public health research when composite perception scales are analysed using mean scores.

3.7 Ethical Considerations

The Director of Environmental Health and Safety Department of Abuja Environmental Protection Board provided authorization for the study as part of routine environmental health assessment activities. Permission was also obtained from the management of the participating abattoirs before data collection began. All participants were informed about the purpose of the study, participation was voluntary, and verbal consent was obtained before administering the questionnaire. No personal identifiers were collected, and responses were kept confidential.

3.8 Limitations of the Study

The present study has several limitations that should be considered when interpreting the findings. First, the use of purposive sampling to select the four abattoir facilities based on high operational volume limits the generalizability of the results. The findings may not fully represent conditions in smaller, informal slaughter slabs or backyard operations located in peri-urban and rural areas of the Federal Capital Territory. Second, the cross-sectional design captures hygiene practices and sanitation conditions at a single point in time and therefore cannot establish causal relationships or account for seasonal variations in slaughter activities and sanitation challenges. Third, data collection relied on self-reported hygiene behaviors, which may be subject to social desirability bias, potentially leading to overreporting of recommended practices compared to direct observational methods. Despite these limitations, the study provides valuable insights into the conditions of high-capacity abattoirs serving the majority of the FCT population.

4.0 RESULTS

4.1. Introduction

This chapter presents the findings from the statistical analysis of data collected from 100 abattoir workers across four facilities in the Federal Capital Territory, Abuja. The results are organized according to the three specific objectives that guided this study. First, the study examined the prevalence and patterns of personal hygiene practices among workers, exploring how different behaviors such as handwashing, PPE use, and tool cleaning relate to one another using Pearson's correlation analysis. Second, the study also assessed the environmental sanitation conditions in these abattoirs, including waste disposal systems, water access, and facility infrastructure, presenting one-sample t-test results that compare current conditions against acceptable standards. Finally, the study identified the factors influencing both hygiene practices and sanitation conditions, examining how knowledge levels, infrastructure barriers, and regulatory compliance shape what happens on the ground. Each section includes relevant statistical tables followed by narrative interpretations that highlight significant findings and their implications for understanding hygiene and sanitation in these critical food handling facilities.

4.2. The prevalence and types of personal hygiene practices (e.g., handwashing, use of personal protective equipment) among abattoir workers in selected abattoirs within the Federal Capital Territory, Abuja [Objective 1]

Table 1 [Pearson’s Correlations]. The prevalence and types of personal hygiene practices among abattoir workers in selected abattoirs within the Federal Capital Territory, Abuja.

Correlations						
How often do you wash your hands with soap before handling animals or meat?	Pearson Correlation	1	.918**	.907**	.908**	.802**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	100	100	100	100	100
Do you consistently use personal protective equipment (PPE) such as gloves, aprons, or boots while working?	Pearson Correlation	.918**	1	.911**	.895**	.860**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	100	100	100	100	100
What is your usual method of cleaning tools and knives after use?	Pearson Correlation	.907**	.911**	1	.887**	.695**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	100	100	100	100	100
How frequently do you shower or bathe after completing your shift at the abattoir?	Pearson Correlation	.908**	.895**	.887**	1	.749**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	100	100	100	100	100
Have you received training on personal hygiene practices specific to abattoir work in the past year?	Pearson Correlation	.802**	.860**	.695**	.749**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	100	100	100	100	100

** . Correlation is significant at the 0.01 level (2-tailed).

Table 1 presents Pearson correlation coefficients examining relationships among personal hygiene practices among abattoir workers.

Hygiene practices were further examined using Pearson’s correlation analysis to determine whether different behaviours were related. Strong positive correlations were observed between several practices, including handwashing, use of personal protective equipment, tool sanitation, and bathing after work (r values ranging from 0.80 to 0.92, p < 0.001). These findings suggest that workers who reported one protective practice were more likely to report other hygiene behaviours as well.

While correlations do not imply causation, the pattern suggests conscientious workers adopt multiple protective behaviors simultaneously. Training's broad associations across behaviors support targeted interventions that could simultaneously address multiple hygiene domains, maximizing efficiency in resource-constrained settings. These findings align with the study's first objective and provide a foundation for clustered intervention strategies.

Hypothesis Testing (H₁)

H₁: Less than 50% of abattoir workers in the Federal Capital Territory, Abuja, routinely practice recommended personal hygiene practices including handwashing with soap and PPE use.

Decision Rule and Results

The alternative hypothesis (H₁) is rejected based on correlation patterns and supporting frequency data. Strong inter-correlations ($r > 0.90$) among hygiene behaviors indicate consistent practice clustering rather than random, low-level compliance expected under H₁.

Statistical Rationale

High correlations ($r = 0.907-0.918$, $p < 0.001$) suggest a substantial subgroup demonstrates comprehensive hygiene adherence across multiple domains. Uniformly low compliance (<50%) would produce weaker, more dispersed correlations due to inconsistent individual behaviors. Training associations ($r = 0.802-0.860$, $p < 0.001$) further support elevated adherence where interventions reach workers.

Evidence supports the null hypothesis that $\geq 50\%$ adherence exists among surveyed workers, providing foundation for targeted interventions leveraging existing compliance clusters.

4.2 The environmental sanitation conditions (e.g., waste disposal, water quality, facility infrastructure) in abattoirs operated by workers in the Federal Capital Territory, Abuja[Objective 2].

Table 2[**One-Sample T- test**]. The environmental sanitation conditions in abattoirs operated by workers in the Federal Capital Territory, Abuja

Test Value = 3

	T	Sig. (2- Df tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
Is there access to clean running water for washing hands and equipment at your abattoir?	-9.023	.99.000	-.76000	-.9271	-.5929
How is waste (e.g., animal remains, blood) disposed of at your abattoir?	-4.180	.99.000	-.45000	-.6636	-.2364
Rate the cleanliness of the abattoir floors and slaughter areas	-2.818	.99.006	-.35000	-.5965	-.1035
Are there functional toilet facilities available for workers at the abattoir?	-9.000	.99.000	-.60000	-.7323	-.4677
How often is the abattoir premises disinfected or fumigated?	6.119	.99.000	.75000	.5068	.9932

Table 2 presents one-sample t-test results comparing mean scores for five environmental sanitation indicators against a test value of 3.0, representing the adequacy threshold. The analysis revealed consistently poor ratings across most indicators. Mean scores for access to clean running water ($M = 2.24$), waste disposal systems ($M = 2.55$), cleanliness of floors and slaughter areas ($M = 2.65$), and availability of functional toilet facilities ($M = 2.40$) all fell below the adequacy benchmark. The negative mean differences confirm workers perceived these conditions as deficient, with the largest shortfall observed for clean water access. Notably, disinfection and fumigation frequency received a mean rating above the test value ($M = 3.75$), suggesting this practice occurs more regularly than the minimum acceptable standard. All differences were statistically significant (facility cleanliness $p = 0.006$; other indicators $p < 0.001$). These findings provided the empirical basis for formal hypothesis testing.

Hypothesis Testing and Decision

The null hypothesis (H_0) of no significant difference between mean sanitation scores and the adequacy threshold of 3.0 was tested against the alternative hypothesis (H_2) that scores fell below acceptable standards. H_0 was rejected for four of five indicators: access to clean water (Mean Difference = -0.76 , $p < 0.001$), waste disposal (Mean Difference = -0.45 , $p < 0.001$), floor cleanliness (Mean Difference = -0.35 , $p = 0.006$), and functional toilets (Mean Difference = -0.60 , $p < 0.001$). Confidence intervals excluded zero in all cases, confirming these deficits were statistically robust. However, disinfection and fumigation frequency exceeded the threshold (Mean Difference = $+0.75$, $p < 0.001$), meaning H_0 could not be rejected for this indicator. This finding warrants cautious interpretation, as positive fumigation ratings contrast sharply with

uniformly poor infrastructure assessments, suggesting periodic fumigation represents a visible but superficial intervention rather than meaningful structural improvement.

Determination

Based on the preponderance of evidence across key sanitation indicators, H_0 is rejected and H_2 accepted. The data provide substantial statistical support that environmental sanitation conditions in surveyed FCT abattoirs fall significantly below acceptable public health standards, underscoring the urgent need for infrastructural investment and strengthened regulatory oversight.

4.3 The factors influencing hygiene practices and sanitation conditions (e.g., knowledge levels, infrastructure barriers, regulatory compliance) among abattoir workers in the Federal Capital Territory, Abuja.

Table 3[**One-Sample T - test**] The factors influencing hygiene practices and sanitation conditions among abattoir workers in the Federal Capital Territory, Abuja.

Test Value = 3			
T	Df	Mean Sig. (2-tailed)Difference	95% Confidence Interval of the Difference

					Lower	Upper
What is the main barrier to maintaining good personal hygiene at work?	-3.497	99	.001	-.58000	-.9091	-.2509
Rate your knowledge level on hygiene and sanitation risks in abattoirs	.000	99	1.000	.00000	-.2185	.2185
Does your abattoir receive regular inspections by health or environmental authorities?	-8.181	99	.000	-.55000	-.6834	-.4166
How does inadequate infrastructure (e.g., poor drainage) affect sanitation practices?	-12.186	99	.000	-1.20000	-1.3954	-1.0046
Would provision of free PPE and training improve hygiene compliance?	-7.508	98	.000	-.82828	-1.0472	-.6094

Table 3 presents one-sample t-test results comparing mean scores for five factors influencing hygiene and sanitation against a test value of 3.0. Workers rated the main barrier to maintaining good hygiene significantly below acceptable levels ($M = 2.42$), indicating clear recognition of obstacles to proper practice. Health and environmental inspection regularity was rated poorly ($M = 2.45$), while inadequate infrastructure received the lowest rating ($M = 1.80$), underscoring severe structural deficiencies. Workers strongly agreed that providing free PPE and training would improve compliance ($M = 2.17$). Notably, self-rated knowledge ($M = 3.00$) did not differ from the benchmark, suggesting workers perceive themselves as adequately informed. All differences except knowledge level were significant at $p \leq 0.001$.

Hypothesis Testing and Decision

The null hypothesis (H_0) of no significant difference from the adequacy threshold was tested against the alternative hypothesis (H_3) that factors fall below acceptable levels. H_0 was rejected for four indicators: main barrier to hygiene (Mean Difference = -0.58, $p = 0.001$), infrequent inspections (Mean Difference = -0.55, $p < 0.001$), inadequate infrastructure (Mean Difference = -1.20, $p < 0.001$), and perceived benefit of free PPE and training (Mean Difference = -0.83, $p < 0.001$). Confidence intervals excluded zero, confirming statistical robustness. For knowledge level (Mean Difference = 0.00, $p =$

1.000), H_0 could not be rejected. This contrast between adequate knowledge and deficient infrastructure indicates barriers are structural and institutional rather than educational.

Decision

Based on the preponderance of evidence, H_0 is rejected and H_3 accepted. Infrastructure deficits, infrequent inspections, and limited access to protective equipment significantly contribute to suboptimal hygiene practices. The finding that workers possess adequate knowledge yet face profound infrastructural constraints indicates education-only interventions will prove insufficient. Systemic responses including infrastructure investment, strengthened inspections, and free PPE provision are urgently needed.

4.4 Discussion of Findings

Personal Hygiene Practices Among Abattoir Workers

This study revealed strong positive correlations among personal hygiene practices reported by FCT abattoir workers. Regular handwashing was significantly associated with consistent PPE use, proper tool cleaning, and post-shift bathing ($r = 0.80-0.92$, $p < 0.001$), suggesting hygiene behaviours cluster together among conscientious workers. The significant association between training and these practices underscores the value of educational interventions.

These findings contrast with existing Nigerian literature. Olawuyi et al. (2025) noted that despite Nigeria producing the highest volume of abattoir research in Africa, studies consistently document poor hygiene practices. Bello et al. (2015) found good hygienic practices entirely absent across seventeen northern Nigerian slaughterhouses, with none meeting Codex Alimentarius standards. Similarly, Ihekwoaba et al. (2025) documented complete absence of handwashing stations in Anambra State. The clustered behaviours observed in FCT abattoirs may reflect the influence of structured training programmes.

The knowledge-practice gap aligns with other Nigerian studies. Agu et al. (2021) found that while 75.5% of Abakaliki workers possessed good hygiene knowledge, only 44.1% reported consistent handwashing and merely 6.9% adhered to proper waste disposal. Salisu et al. (2025) reported Bauchi butchers understood occupational hazards yet demonstrated deficiencies in changing protective clothing. Oluwafemi et al. (2026) found fewer than one-third of trained Ogun State handlers could identify common foodborne pathogens. Kehinde et al. (2020) similarly reported that despite 71.1% of Lagos handlers demonstrating good knowledge, only 66.6% practiced accordingly. The present finding that self-rated knowledge met acceptable levels ($M = 3.00$, $p = 1.000$) while sanitation remained substandard mirrors this persistent gap.

Environmental Sanitation Conditions in Abattoirs

The assessment revealed substantial infrastructure deficiencies essential for hygienic operations. Access to clean running water was rated significantly below acceptable standards ($M = 2.24$, $p < 0.001$), echoing Bello et al. (2015), who documented absent potable water across all seventeen northern Nigerian slaughterhouses assessed. Similarly, Ihekwoaba et al. (2025) found Anambra State lairage facilities lacked roofing and flooded regularly, with slaughtering conducted on bare floors. Olawuyi et al. (2025) identified infrastructure deficits as a continent-wide barrier.

Waste disposal systems were also rated poorly ($M = 2.55$, $p < 0.001$), aligning with Bello et al. (2015), who described disposal practices as indiscriminate and hazardous. Nwachukwu et al. (2025) reported 60% of Ubakala operators burned waste, 95% lacked infrastructure, and only 5% used pest control. Musa and Malami (2025) documented similar deficiencies in Sokoto State. Floor cleanliness showed a less pronounced deficit ($M = 2.65$, $p = 0.006$), suggesting rudimentary cleaning occurs. However, Obiukwu et al. (2025) found post-sanitation bacterial loads in Owerri North exceeded pre-sanitation levels (67.4×10^5 cfu/cm²), attributed to unwashed hands, contaminated equipment, and non-potable water. Functional toilet availability was markedly inadequate ($M = 2.40$, $p < 0.001$), with Nwachukwu et al. (2025) reporting 90% of respondents cited infrastructure deficits. Although fumigation frequency exceeded acceptable levels ($M = 3.75$, $p < 0.001$), this likely reflects periodic visible interventions rather than sustained programmes. Ogundairo et al. (2024) further demonstrated that abattoir effluent significantly degraded Yemoja River water quality, underscoring broader environmental impacts.

Factors Influencing Hygiene Practices and Sanitation Conditions

Workers identified infrastructural deficits, particularly poor drainage, as the most significant barrier to maintaining sanitary conditions ($M = 1.80$, $p < 0.001$). This aligns with Bello et al. (2015), who documented dilapidated infrastructure across all seventeen slaughterhouses assessed in northern Nigeria, and Olawuyi et al. (2025), who cited weak policies, insufficient funds, and poor enforcement as primary obstacles. Regulatory oversight also proved inadequate, with workers reporting infrequent health inspections ($M = 2.45$, $p < 0.001$). Nwachukwu et al. (2025) similarly found that despite 50% of respondents reporting veterinary visits, overall infrastructure deficiencies indicated insufficient enforcement, while Musa and Malami (2025) recommended improved monitoring and personnel training.

Notably, self-rated knowledge of hygiene risks did not differ significantly from acceptable levels ($M = 3.00$, $p = 1.000$), indicating workers perceive themselves as adequately informed. This mirrors Oluwafemi et al. (2026), who found 74.5% of handlers believed their practices adequate despite observed unsafe behaviours. Although Agu et al. (2021) confirmed knowledge significantly predicts good practice (AOR: 4.6, $p=0.001$), persistent substandard conditions demonstrate knowledge alone is insufficient. Workers strongly agreed that providing free PPE and training would improve compliance ($M = 2.17$, $p < 0.001$). Olawuyi et al. (2025) recommended comprehensive solutions including policy development, enforcement, infrastructure provision, and One Health collaboration. Bello et al. (2015) emphasized that northern Nigerian abattoirs could not support safe meat production without comprehensive reforms. These findings underscore that responsibility for improving abattoir sanitation rests primarily with institutional and governmental stakeholders rather than individual workers who possess adequate awareness but lack the environmental support necessary for consistent implementation.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study assessed hygiene practices and environmental sanitation conditions among abattoir workers in the Federal Capital Territory, Abuja, revealing a complex picture of behavioural strengths amid profound infrastructural weaknesses. The findings demonstrated that personal hygiene practices tend to cluster among workers, with strong positive correlations observed between handwashing, PPE use, tool cleaning, and post-shift bathing. This pattern suggests that conscientious workers adopt multiple protective behaviours, and the significant association with training underscores the value of educational interventions. However, environmental sanitation conditions across the surveyed facilities were uniformly substandard. Access to clean water, functional waste disposal systems, adequate toilet facilities, and general facility cleanliness all fell significantly below acceptable thresholds. Notably, workers possessed adequate knowledge of hygiene risks, indicating that the persistent sanitation deficits stem not from ignorance but from structural and institutional barriers beyond individual control. Infrastructural decay, infrequent regulatory inspections, and limited access to protective equipment emerged as the primary factors undermining hygienic operations. These findings underscore that responsibility for improving abattoir sanitation rests primarily with institutional and governmental stakeholders rather than individual workers.

5.2 Recommendations

1. Infrastructure Investment: The Federal Capital Territory Administration, in collaboration with the Federal Ministry of Agriculture and Rural Development, should

prioritize urgent rehabilitation of abattoir infrastructure, including installation of reliable potable water supply systems, construction of proper drainage networks, and provision of functional toilet facilities across all major abattoirs in the territory.

2. Strengthened Regulatory Oversight: Environmental health and veterinary authorities should increase the frequency and rigor of abattoir inspections, moving beyond periodic visits to establish routine monitoring systems that ensure sustained compliance with national sanitation standards.

3. Provision of Protective Equipment: Abattoir management and local government authorities should establish sustainable supply chains for free personal protective equipment, including gloves, aprons, boots, and soap, to address the economic barriers faced by low-wage workers.

4. Enhanced Training Programmes: While workers demonstrated adequate knowledge, refresher training should be conducted quarterly to reinforce proper practices and introduce emerging food safety protocols, with particular emphasis on translating knowledge into consistent action.

5. Waste Management Systems: Environmental protection agencies should mandate and support the installation of modern waste disposal and treatment systems to prevent environmental contamination of surrounding water bodies and communities.

6. Multi-Stakeholder Collaboration: A coordinated One Health approach involving government agencies, facility operators, worker unions, and public health institutions should be adopted to ensure comprehensive and sustainable improvements in abattoir hygiene and sanitation across the Federal Capital Territory.

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