Determinants of Food Safety Standard Compliance among Local Meat Sellers in Ibadan Metropolis

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Abstract— Food safety is a critical public health concern, particularly in urban markets where meat handling practices directly impact consumer well-being. This study examined the determinants of food safety standard compliance among local meat sellers in Ibadan Metropolis, Nigeria. Using a mixed-method approach, data were collected from meat sellers across major markets and analysed through descriptive statistics, Principal Component Analysis (PCA), and probit regression. The study revealed that a significant majority (78.9%) of meat sellers exhibited low Food Safety Standard Compliance (FSSC). Older and more experienced meat sellers' demonstrated higher compliance, while low levels of formal education were strongly associated with poor hygiene practices. Although over 90% of respondents had access to water, only a portion utilised it effectively for maintaining hygiene standards. Market-level analysis showed that no market recorded more than 50% compliance, with some recording 100% low FSSC. The study identified four critical components influencing food safety behaviours: daily cleaning of tables, cleaning of tools, environmental sanitation, and availability of toilet facilities. Age, experience, and access to water significantly improved the likelihood of compliance. The study recommends targeted training, improved access to clean water and sanitation facilities, strengthened regulatory oversight, and market-specific interventions to enhance compliance and protect public health in Ibadan's meat markets.

Keywords— *Food Safety Standard Compliance, Meat seller, Principal Component Analysis*

I. INTRODUCTION

Food safety is a crucial component of public health and a key determinant of nutritional security, particularly in low-income countries like Nigeria. It is a universal concern, making it difficult to find individuals who have not experienced an episode of foodborne illness in recent years (United Nations, 2024). Foodborne illness results from consuming food contaminated with microorganisms or their toxins due to unhygienic practices (Adebayo and Oyetola, 2021). In Nigeria, meat is a vital source of dietary protein and essential nutrients necessary for human health. However, it can also facilitate microbial growth and disease transmission when not processed or handled properly (Bughti *et al.*, 2017). The safety of meat sold, especially in informal markets, continues to be a pressing public health concern due to unhygienic handling practices, inadequate sanitation, and weak enforcement of food safety regulations. These lapses greatly contribute to the prevalence of foodborne illnesses, thereby posing serious risks to consumer health (Ezenduka *et al.*, 2019; Food and Agriculture Organisation, 2020).

The risk of foodborne illness is exacerbated by the fact that meat sellers operate across diverse settings, ranging from regulated formal markets to unlicensed informal vendors (Bulama *et al.*, 2024). Informal markets play a critical role in ensuring food access for low-income populations (Adhikari *et al.*, 2024), yet they often lack sufficient safety oversight. This regulatory gap results in inconsistent compliance with hygiene standards. Food safety is essential to both consumer protection and public health. Given that meat is a perishable food item, serious health outbreaks can result from inadequate safety procedures (Gizaw, 2019; Singh and Puniya, 2024). A significant section of the populace is served by Ibadan's local meat markets, especially those with low and middle income brackets who rely on these markets for meat. To reduce the dangers to the public's health and enhance customer confidence, it is crucial to comprehend the elements that support (or

undermine) local meat vendors' adherence to food safety regulations.

The level of safety and hygienic standards among local meat sellers is still a major concern, even in the face of the increased demand for meat products in the metropolis. Public health hazards such as zoonotic infections, contamination, and foodborne illnesses are increased when food safety regulations are not followed (World Health Organisation, 2024; Kurotimipa *et al.,* 2023; World Bank Study, 2009). The hygiene and safety regulations have not been effectively enforced by the environmental health inspectors of the local government. There are differences in safety compliance, which is attributed to ignorance of meat sellers and or poor enforcement of the current regulatory frameworks (Martinelli, 2017). Moreover, the existing studies have acknowledged the prevalence of food safety issues such as poor hygiene and mishandling in informal markets (Abdullahi *et al.*, 2016; Odeyemi *et al.*, 2019); they tend to focus on broad concerns without investigating the specific determinants of compliance (Singh and Puniya, 2024; Obadina *et al.,* 2024; Thorsen *et al.,* 2025). Meat is a staple protein source in Nigerian diets, and local meat markets serve a large proportion of the urban population. Ensuring the safety of meat products in these markets is therefore crucial for public health (Akpan *et al*., 2025; Ingram *et al*., 2021; Petrozzi *et al*., 2016). Moreover, local meat sellers operate at the intersection of consumer safety and informal market dynamics, making them key actors in any food safety reform. This study intends to bridge a significant knowledge gap by identifying the primary determinants of FSSC among local meat sellers in this area. Policies and initiatives to increase food safety will be ineffective without a thorough understanding of these factors. This knowledge gap necessitates a detailed assessment of the socioeconomic and environmental factors that affect safety standard compliance in the local meat markets in the metropolis. This study is an attempt to come up with evidence-based suggestions that will enhance local market monitoring and enforcement of food safety. By identifying safety compliance gaps and suggesting context-specific treatments, the study will help reduce foodborne disease. To achieve the objective of the study, the following research questions are raised:

(i) What is the extent of compliance with food safety standards by meat sellers?
(ii) What is the level of FSSC in the sampled meat markets
(iii) What are the drivers of food safety standard compliance of the meat sellers?

II. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The theoretical framework of this study is based on the Health Belief Model (HBM). According to Champion and Skinner (2008), HBM posits that health behaviour is shaped by perceived susceptibility to health threats, severity of the consequences, perceived benefits of taking action, barriers to action, cues to action, and self-efficacy. In this study, the HBM provides a useful lens for examining FSSC practices among meat sellers. The model's core constructs include perceived susceptibility to foodborne illnesses, severity of consequences, benefits of compliance, and barriers to its implementation. This theoretical approach enables a comprehensive understanding of the cognitive and environmental factors influencing food compliance behaviour among meat sellers.

Literature reveals that the Likert scale (Gegeyehu and Tsegaye, 2022) and Perception index (Yeboah et al., 2023) approaches are common methods used to construct an index structure that captures underlying concepts in social sciences research. These approaches are useful for measuring attitudes, opinions, perception, and behaviour frequencies, with a composite index often generated to reflect such constructs. However, according to Joshi et al. (2015), Likert scales are prone to respondent bias, may oversimplify complex views, and assume equal intervals between response options, which may not hold. Similarly, the perception index may not accurately reflect the actual behaviour since it measures beliefs rather than practices, and their ordinal nature limits precise interpretation. To address these limitations, this study employed the Principal Component Analysis (PCA) to construct the FSSC index among meat sellers. PCA was applied to reduce the dimensionality of the food safety-related variables, allowing for the summarisation of interrelated indicators and the identification of underlying patterns. The resulting components are linear combinations of the original variables, capturing the maximum variance in the dataset (Greenacre *et al.*, 2022).

Furthermore, in examining the factors affecting FSSC and the likelihood of adopting proper hygiene practices among food handlers, studies have employed multiple regression (Bulama et al., 2024) and binary logistic regression (Geheyehu and Tsegaye, 2022; Teferi, 2023; Uzoama et al., 2023; Ojo et al., 2023). A key limitation of the multiple regression model is its assumption of linearity and sensitivity to outliers. Moreover, it is unsuitable for binary dependent variables, as it may produce biased estimates. Although binary logistic regression is widely used, it is sensitive to multicollinearity among independent variables, affected by outliers, and typically requires a large sample

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size for accurate estimation (Lukman et al., 2024). The probit model was adopted to examine the determinants of FSSC among meat sellers. The model is appropriate for binary outcomes under the assumptions of normally distributed error terms and offers a reliable alternative to logistic regression when the normal distribution better fits the data. It also provides stable probability estimates in smaller samples. Marginal effects from the probit model offer clear insights into how explanatory variables influence the probability of compliance (Rehal, 2024).

Analytical framework of the Probit model

The probit model is a nonlinear regression technique used when the dependent variable is binary. Its functional form ensures that the predicted probabilities lie between 0 and 1. If the dependent variable y_i is binary, then the probability P_r that $y_i = 1$ given predictor x is expressed as:

$$\mathrm{Pr} = E(y = 1 \mid x_i) = \phi(x_i\beta) \tag{1}$$

In the above expression, Φ is the cumulative distribution function of the standard normal distribution, and β denotes the coefficient estimated using the maximum likelihood method. The model assumes that the latent (unobserved) variable underlying the binary outcome follows a normal distribution (Guneri and Durmus, 2020). The probit model is particularly suitable when modelling a binary outcome, such as high and low FSSC among meat sellers. In this study, the dependent variable takes the value of 1 for high FSSC (HFSSC) and 0 for low FSSC (LFSSC).

To understand the effect of each explanatory variable on the probability of compliance, the marginal effect is computed. These marginal effect (M.E) represents the rate of change in the predicted probability due to changes in each explanatory variable and are given as:

$$M.E_{probit} = \frac{\partial E(y*_i \mid x_i)}{\partial x_{ik}} = \phi(x_i\beta)\beta_k \tag{2}$$

Where Φ is the probability density function of the standard normal distribution.

III. MATERIALS AND METHODS

3.1 Study Area

The study was carried out in Ibadan Metropolis. Ibadan is the capital of Oyo State, Nigeria, and one of the largest cities in the country. Located in southwestern Nigeria, situated between latitudes 7°19′30″N to 7°27′30″N and longitudes 3°50′0″E to 3°58′30″E (Olatunji *et al.*, 2021), Ibadan Metropolis is divided into local government areas such as Ibadan North, Ibadan Northeast, Ibadan Northwest, Ibadan Southeast, and Ibadan Southwest. Ibadan serves as a major commercial, academic, and administrative hub. Occupational diversity is crucial in economic development, encompassing various sectors such as banking, administration, universities, transportation, and trading. It is known for its rich history, cultural heritage, and strategic economic significance. The metropolis is home to several markets, including Agbeni, Bodija, Aleshinloye, Ogunpa, Oja Oba, Bola Ige, Oje, Dugbe, Bashorun, Apete, Ojoo, Iwo Road, and Sango. These markets spread across the various LGAs are central to trade and distribution, particularly in agricultural products. There is high demand for agricultural products, including meat, because of the large population of the metropolis. Most of the identified markets have meat sections.

3.2 *Sampling Procedure and Sample Size*

A multi-stage sampling procedure was employed in this study. The first stage was the purposive selection of five urban Local Government Areas (LGAs) out of the eleven (11) LGAs that made up the Ibadan metropolis. The five LGAs were Ibadan North, Ibadan North-East, Ibadan North-West, Ibadan South-East and Ibadan South-West. The LGAs were chosen because of the presence of many markets with standard stalls for meat/beef sellers. The second stage involved the purposive selection of seven (7) popular markets with meat sellers' stalls that cut across the five LGAs (Bodija, Sango, Ojoo, Dugbe, Aleshinloye, Ogunpa, Iwo-road). Three markets were selected from Ibadan North because of the large size and well-established meat stalls, while one market was selected from other LGAs. In the third stage, meat vendors within each selected market were randomly chosen using the population lists obtained from their leaders (see Table 1). The sample sizes for the meat sellers were arrived at using proportionate sampling.
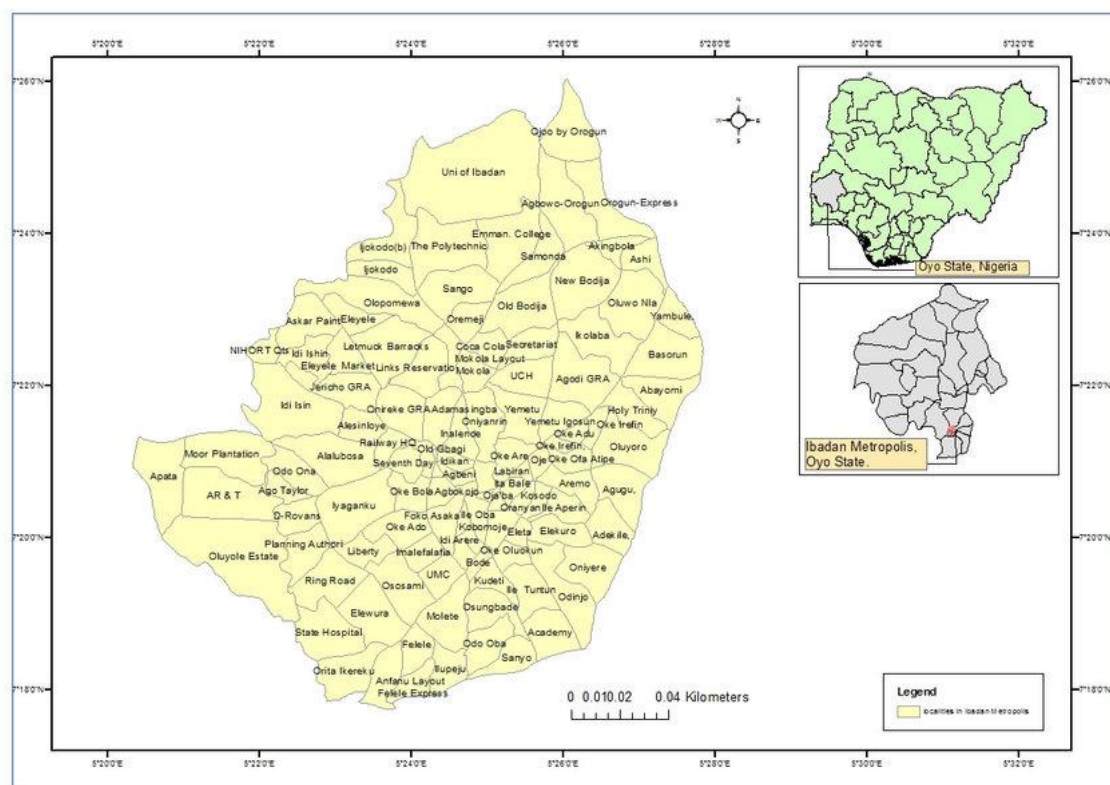
Fig.1: Map of Ibadan Metropolis

Source: Areola and Ikporukpo (2018)

The sample size for the meat sellers (n = 125) was determined using the International Fund for Agricultural Development (IFAD) procedure, as outlined in Equation 1. The final sample size (150) used included allowances for the design defect and contingency. The allowance for design defect is expected to correct for the difference in design, while the allowance for contingency accounts for contingencies such as non-response or recording error.

$$n = \frac{Z^2 P(1-P)}{M^2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where:

n represents the sample size;

Z represents the confidence level at 95% (1.96);

P represents the estimated percentage of meat/beef sellers in the market (90.5%),

M represents the margin of error (5% or 0.05).

Moreover, a total of 150 copies of the questionnaire were administered to egg and meat/beef sellers in the study area. One hundred and twenty-three (123) copies of the completed questionnaire were successfully collected. Data were collected on the socio-economic characteristics of meat/beef sellers and characteristics of meat/beef markets.

Table 1: Distribution of meat (cow sellers) based on sampling technique.

Markets	Population of meat sellers	Sampled meat sellers
Bodija	175	58
Sango	18	6
Ojoo	13	4
Dugbe	50	16
Aleshinloye	100	33
Ogunpa	50	16
Iwo road	50	16
Total	456	150

Source: Authors' computation (2025)

3.3   Analytical Techniques

Descriptive statistics, principal component analysis (PCA), and probit regression were employed to achieve the objective of the study.

3.3.1   Descriptive statistics

Descriptive statistics included the use of frequency distribution, measures of central tendency (mean), measures of dispersion (standard deviation), and figures

were used to profile the socioeconomic characteristics of meat sellers as well as the categorise of Food Safety Standard Compliance (FSSC) among the meat sellers.

3.3.2   *Principal Components Analysis*

Principal component analysis was used to generate an FSSC index for each meat seller. In this context, each meat seller is treated as a case, and each food safety practice is a variable. PCA transforms these variables into components that reflect underlying compliance patterns. The FSSC Index (FSSCI) equation is:

$$FSCi = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8$$
$$+ \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13}$$

(2)

Where: $FSSC_i$ represent food safety index for each respondent, X_1 represent daily cleaning of table (Yes=1, No=0), X_2 represent toilet facility (Yes=1, No=0), X_3 represent regular supply of water in the toilet and other uses (Yes=1, No=0), X_4 represent regular cleaning of toilet (Yes=1, No=0), X_5 represent washing of hands (Yes=1, No=0), X_6 represent regular medical checkup (Yes=1, No=0), X_7 represent specific day for sanitation (Yes=1, No=0), X_8 represent wearing of apron or specific clothes (Yes=1, No=0), X_9 represent covering of meat with net (Yes=1, No=0), X_{10} represent access to first aid (Yes = 1, No=0), X_{11} represent disposal of meat waste (Yes=1, No=0), X_{12} represent daily cleaning of tools (Yes=1, No=0), and X_{13} represent sweeping of the environment (Yes=1, No=0). The FSSC index of each meat seller was predicted, and meat sellers whose index was zero (0) to 0.5 scores were classified as low FSSC, and those whose index was greater than 0.5 to 1 were classified as having high FSSC.

3.3.3   *Probit regression*

Probit regression was employed to determine the factors influencing FSSC among meat sellers in the study area. The model is explicitly expressed as:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 \ldots$$

Where: Y_i represents FSSC (Yes =1, No =0), X_1 represent the age of seller (years), X_2 represent Years of education (years), X_3 represent educational status (Educated=1, otherwise=0), X_4 represent Marital status (Married=1, otherwise=0), X_5 represent the years of experience (years), and X_6 represent access to water (Yes=1, otherwise=0).

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¹ FSSC categorization was based on the index generated using Principal Component Analysis. The negative indices were categorized low FSSC while the positive indices were categorized high FSSC

IV.   RESULTS AND DISCUSSIONS

4.1   *Socio-economic characteristics of meat sellers*

Figure 1 shows that most of the respondents had low Food Safety Standard Compliance (FSSC)[1] (78.9%). In a similar study in Ethiopia by Tegegne and Phyo (2017), they found that the food-handlers' knowledge and safety practices were below an acceptable level, with the mean score of 13.12±2.33 and 7.7±2.1, respectively. The finding agrees with Enuwaonye and Olugbade (2020), who reported a low percentage of food handlers following good food safety practices. This is unlike the UK, with a high level of FSSC among the meat establishments. According to the Food Standards Agency (2023), 99.3% of meat establishments were rated high in England and Wales. The disaggregation of Table 2A shows that most of the respondents with low and high FSSC were in the age brackets of 36 - 44 and 45 – 53years, respectively. The average age of the meat sellers with high FSSC was 41.0years. The higher age bracket of the respondents with high FSSC aligns the study with Hasan *et al.* (2024). They affirmed that older meat handlers with training exhibited better knowledge and practices of meat hygiene compared to their younger counterparts. Moreover, the majority of the respondents with low (52.1%) and high (53.8%) FSSCs were within 6-10 years of experience in meat selling.
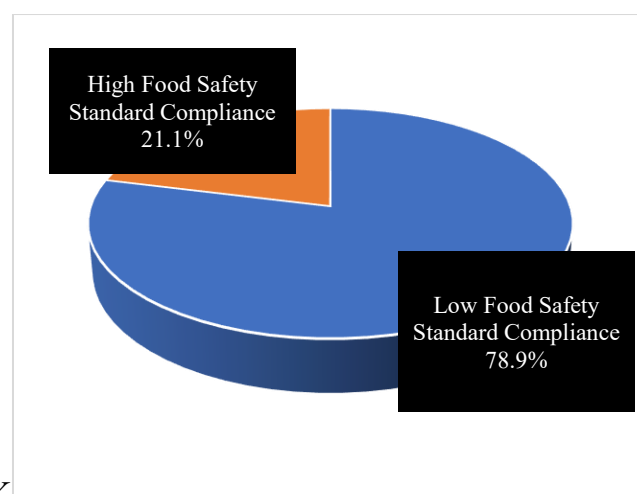

Fig.2: Respondents' Food Safety Standard Compliance

Source: Author's Compilation (2025)

The average year of experience in meat selling was higher (9.4) among the respondents with high FSSC (see Table 2A). Adejimi *et al.* (2020) revealed that older meat handlers with more years of work experience (>20 years) had better knowledge and practice of meat hygiene

compared to their younger colleagues. Table 2A shows that the majority of the respondents with low and high FSSC had at most 6 years of education. Low education might have contributed to the large proportion of respondents having low FSSC. There was a significant difference (p<0.05) in the average years spent in school between respondents with low and high FSSC. According to Zemachu *et al.* (2023), meat sellers with secondary education or higher were significantly more likely to have a good level of meat hygiene knowledge than those with only primary education.

Table 2A. Socioeconomic characteristics of meat sellers by FSSC (Quantitative)

Socioeconomic Characteristics	Pooled data			FSSC (FSSC)				Equality test (p-value)
	Freq.	%	Mean SD	Low FSSC Respondents		High FSSC Respondents		
				Freq.	%	Freq.	%	
Age (years)				Mean age: 43.4		Mean age: 41.0		
18 - 26	8	6.7	43.7	2	2.1	6	25.0	0.3893
27 - 35	14	11.7	-1.1	11	11.5	3	12.5	
36 - 44	47	39.2		43	44.8	4	16.7	
45 - 53	35	29.2		28	29.2	7	29.2	
More than 53	16	13.3		12	12.5	4	16.7	
	120			**96**		**24**		
Years of Experience				Average: 8.0		Average: 9.4		
Less than 5	28	23.3	8.3	25	26.0	3	12.5	0.1600
6 - 10	64	53.3	-5.2	50	52.1	14	58.3	
11 - 15	19	15.8		14	14.6	5	20.8	
16 - 20	7	5.8		5	5.2	2	8.3	
21 - 25	1	0.8		1	1.0	0	0.0	
More than 25	1	0.8		1	1.0	0	0.0	
	120			96		24		
Years of Educational								
0 - 6	52	42.3		42	43.3	10	38.5	0.048**
10 - 12	47	38.2		39	40.2	8	30.8	
13 - 15	22	17.9		14	14.4	8	30.8	
16 and above	2	1.6		2	2.1	0	0.0	
	123			97		26		

Source: Author's Computation (2025)

Note: SD, standard deviation, ***p<0.01

Furthermore, Table 2B shows that meat selling was male-dominated (97.5%) in the study area. The breakdown shows that 97.9% and 95.8% of the respondents had low and high FSSC, respectively. This finding aligns with Adzitey *et al.* (2020), Alimi *et al.* (2022), Yeboah *et al.* (2023. The male domination may be attributed to the physical nature of activities involved in the beef processing and marketing. According to Alonge *et al.* (2006), the more energy-intensive and more financially rewarding activities like slaughtering, bleeding, evisceration and sales of livestock carcasses were done by men, while women dominated those

activities that deal with processing and sales of visceral organs of livestock animals.
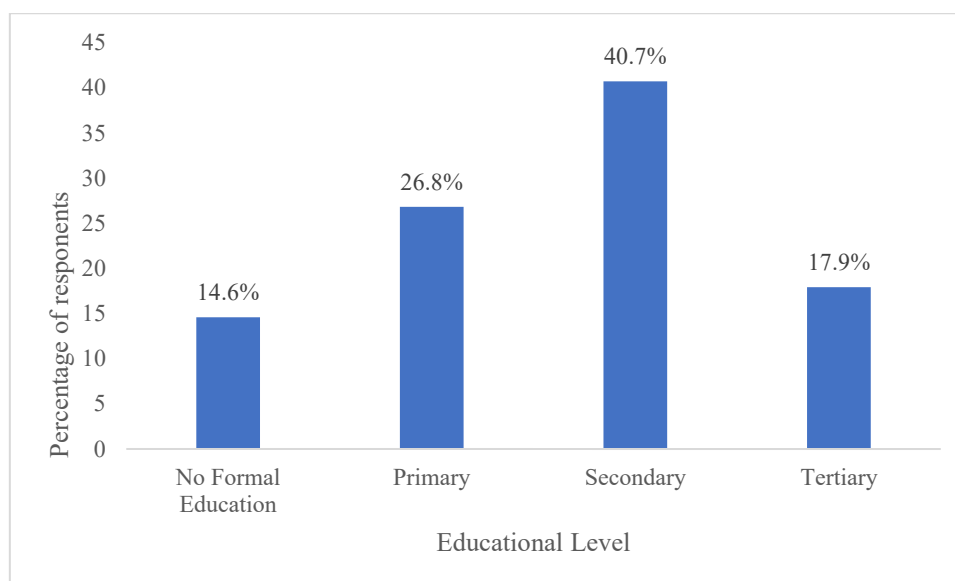

Fig.2: Educational status of the respondents

Generally, the respondents had a low level of education. This might have contributed to the large proportion of respondents having low FSSC. This finding corroborates Hasan *et al.* (2024) that there was a significant correlation between knowledge and the practical application of meat hygiene among meat sellers and slaughterhouse workers. Only 17.9% of the respondents had an Ordinary National Diploma certificate. The majority of the respondents had secondary school education, and 14.6% had no formal education. The study showed that 83.3% of the respondents with no formal education had low FSSC, while respondents with tertiary education had the highest percentage (33.3%) of meat sellers with high FSSC (see Figure 3). Formal education plays a vital role in raising awareness among meat sellers about proper hygiene and food safety practices (Yeaboah *et al.*, 2023), as it often exposes individuals to the health implications of poor sanitary conditions.

Table 2B. Socioeconomic characteristics of meat sellers by FSSC (Qualitative)

Socioeconomic Characteristics	Pooled data			FSSC (FSSC)			
	Freq.	%	Mean SD	Low FSSC Respondents		High FSSC Respondents	
				Freq.	%	Freq.	%
Sex							
Male	117	97.5		94	97.9	23	95.8
Female	3	2.5		2	2.1	1	4.2
	120			**96**		**24**	
Marital status							
Not married	29	24.2		21	21.9	8	33.3
Married	91	75.8		75	78.1	16	66.7
	120			**96**		**24**	
Access to water							
Yes	109	90.8		86	89.6	23	95.8
No	11	9.2		10	10.4	1	4.2
	120			96		24	
Source of Water							
Borehole	54	45		44	45.8	10	41.7
River	3	2.5		2	2.1	1	4.2
Tap	50	41.7		41	42.7	9	37.5
Well	13	10.8		9	9.4	4	16.7
	120			96		24	

More than ninety percent (90.8%) of the respondents had access to water. The breakdown shows that 41.7% and 45.8% of the respondents who utilised borehole water had high and low FSSC, respectively. Also, 37.5% of the respondents who made use of tap water had high FSSC. Water availability is essential for maintaining proper sanitation and hygiene in meat handling. According to Bagayas (2024), cleaning and sanitising food products require water. This process is an essential part of processing operations in food production, which makes water a requirement for food processing operations.
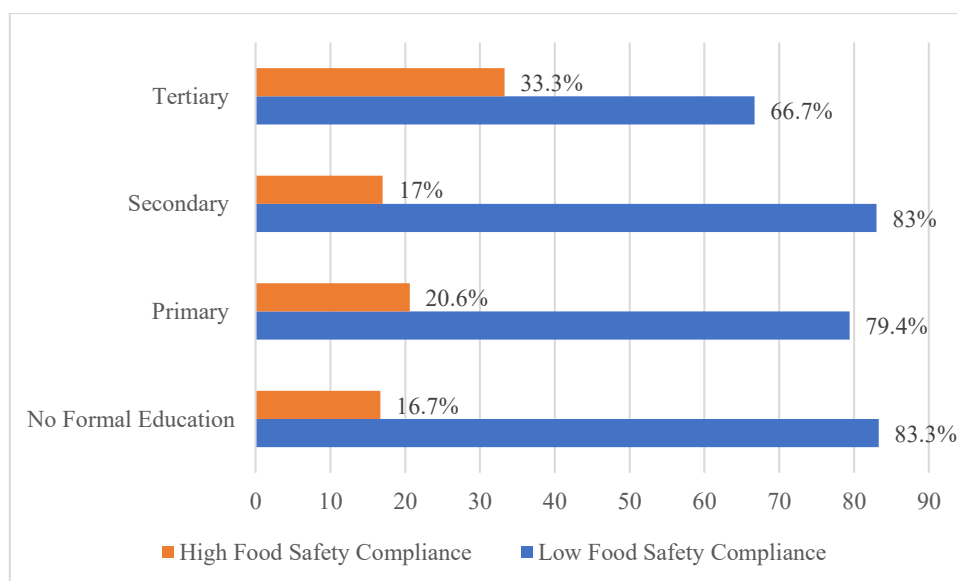
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Fig.3: Educational level of respondents by FSSC

4.1.1 Distribution of Food Safety Standard Compliance by Markets

Table 3 shows the distribution of meat sellers' compliance with FSS by market in the study area. The table affirmed the general low FSSC in the Ibadan metropolis. None of the markets recorded up to 50% high FSSC among the meat sellers. Sango and Ojoo markets had 100% low FSSC, while the majority (35.7%) of meat sellers in Ogunpa market had high FSSC. In the Bodija market, with the highest number of respondents, 82.2% of the meat sellers had low FSSC.

4.2 Principal Component Analysis Result

Principal Component Analysis (PCA) was utilised to identify the key food safety practices influencing compliance among meat sellers and to reduce the dimensionality of 13 observed hygiene-related variables. This multivariate technique enabled the extraction of the most significant components responsible for variations in compliance behaviours. According to the Kaiser criterion, components with eigenvalues greater than 1 were retained, in line with Sabau *et al.* (2020).

Table 3: Respondents' Food Safety Standard Compliance by Market

Meat Market	Low Food Safety Standard Compliance		High Food Safety Standard Compliance	
	Freq.	Percent	Freq.	Percent
Iwo road	12	85.7	2	14.3
Dugbe	12	85.7	2	14.3
Sango	5	100.0	0	0.0
Ogunpa	9	64.3	5	35.7
Ojoo	4	100.0	0	0.0
Aleshinloye	18	66.7	9	33.3
Bodija	37	82.2	8	17.8

Source: Author's computation (2025)

The analysis revealed four principal components with eigenvalues above 1, cumulatively explaining 60.74% of the total variance. This indicates a moderate yet meaningful level of data reduction and highlights the presence of dominant underlying patterns in food safety practices. The first component, with an eigenvalue of 2.8323, accounted for 21.79% of the total variance and was primarily associated with daily cleaning of tables before and after

use—a key indicator of hygiene compliance. The second component, linked to daily cleaning of tools, contributed 14.87% of the variance (eigenvalue: 1.9326). The third component, tied to sweeping of the environment, had an eigenvalue of 1.8583, explaining 14.29% of the variance (see Table 4). The fourth component, associated with the availability of toilet facilities in the market, accounted for 9.79% (eigenvalue: 1.2729).

Other variables, such as handwashing, regular water supply, and meat covering practices, had lower eigenvalues and therefore less influence on the overall structure of FSSC. These four dominant factors were thus identified as the most critical dimensions shaping food safety behaviours among meat sellers. Based on the component scores, a compliance index was generated and used to categorise respondents into low and high compliance groups for further disaggregation.

Table 4: Principal Component Analysis Result

Component	Eigenvalue	Difference	Proportion	Cumulative
Daily cleaning of tables before and after use	2.8323	0.8996	0.2179	0.2179
Daily cleaning of tools before and after use	1.9326	0.0744	0.1487	0.3665
Sweeping of the environment	1.8583	0.5853	0.1429	0.5095
Toilet facilities in the market	1.2729	0.2770	0.0979	0.6074
Regular supply of water in the toilet	0.9959	0.1187	0.0766	0.6840
Regular cleaning of the toilet	0.8772	0.1347	0.0675	0.7515
Washing of hands	0.7425	0.1590	0.0571	0.8086
Regular medical checkup	0.5834	0.0111	0.0449	0.8535
A specific day for sanitation	0.5723	0.0882	0.0440	0.8975
Wearing of apron or specific clothing	0.4841	0.1255	0.0372	0.9347
Covering of meat with a net	0.3586	0.0718	0.0276	0.9623
Access to first aid	0.2868	0.0837	0.0221	0.9844
Disposal of meat waste	0.2031	-	0.0156	1.0000

Source: Author's computation (2025)

4.3 Determinants of Food Safety Standard Compliance

Table 5 presents the probit regression result. The model demonstrates statistical significance (likelihood ratio LR chi^2, p < 0.01), indicating that all estimated coefficients were statistically different from zero. This confirms the model's appropriateness. Out of the six variables included in the model, the coefficients of three variables significantly influenced FSSC. These variables are the age, years of experience and Access to water.

Table 5 shows that age positively influenced FSSC among meat sellers. This finding agrees with Yeboah *et al.* (2023) and Anderson *et al.* (2011). They found that adults were more likely to follow recommended food safety practices. Older meat handlers tend to demonstrate better knowledge

and practices related to meat hygiene, potentially due to a combination of experience and training. Similarly, years of experience had a positive relationship with FSSC (p<0.05). These findings suggest that both maturity and accumulated practical experience contribute to improved food safety practices. This aligns with Adzitey *et al.* (2020); they reported that almost all meat sellers are aware of food safety practices, for example, washing their hands reduces the risk of contamination, hence the positive effect of work experience on FSSC. The coefficient of Access to water was positive and significant (p<0.10). This aligns with the a priori expectation, as reliable water access facilitates proper hygiene and sanitation measures for food safety. According to Maria (2023), access to safe water, sanitation, and hygiene (WASH) is a fundamental human right and essential for public health.

Table 5: Probit regression result

Variables	Coefficient	Std. Err.	z	p-value	Marginal effect
Age	0.039***	0.136	2.93	0.003	0.004
Years of Education	0.014	0.044	0.34	0.737	0.004
Educational status	0.050	0.609	0.08	0.934	0.014
Marital status	-0.141	0.269	-0.52	0.599	0.040
Years of experience	0.080**	0.025	3.20	0.001	0.011
Access to water	0.514*	0.273	1.88	0.060	0.031

Source: Author's computation (2025)

Number of Observations = 123, LR Chi² (6) = 24.3, Prob > Chi² = 0.0034 Pseudo R² = 0.0540 level of significance ***, **, *, 1%, 5%, 10% respectively

Conclusion and Recommendations

This study investigated the determinants of food safety standard practices among local meat sellers in Ibadan Metropolis, with a focus on socio-economic characteristics, hygiene practices, and enabling infrastructure. The findings revealed a generally low level of Food Safety Standard Compliance (FSSC) among meat sellers, with 78.9% classified as having low compliance. Critical factors influencing compliance included age, years of experience, and access to water, each having a statistically significant and positive effect on FSSC. Older meat sellers and those with more years of experience were more likely to adhere to food safety standards, likely due to accumulated knowledge and practical skills over time. Access to clean water also played a pivotal role, as it enabled basic hygiene practices such as washing tools and cleaning workspaces. Principal Component Analysis (PCA) further identified four dominant food safety practices contributing to FSSC: daily cleaning of tables, cleaning of tools, sweeping of the environment, and the presence of toilet facilities in markets. Education levels were generally low among the respondents, with the majority having at most secondary education and a notable proportion having no formal education. This educational disadvantage was strongly associated with poor compliance, as those with tertiary education exhibited better food safety behaviours. The study also confirmed the gendered nature of meat selling, with the industry overwhelmingly dominated by males. Market-level differences showed consistently low FSSC across all markets, with Sango and Ojoo markets having the poorest compliance.

Based on the study's findings, it is recommended that government agencies such as the Oyo State Ministry of Health and Veterinary Services should design and implement periodic, market-based training programmes (in the local language) focused on practical meat hygiene practices, particularly targeting younger and less experienced sellers. Also, Local government authorities should prioritise investments in water and sanitation infrastructure in major meat markets. The provision of reliable boreholes, running tap water, and functional toilet facilities will significantly enhance the capacity of meat sellers to meet hygiene standards. Moreover, awareness campaigns emphasising the health risks of poor hygiene and the benefits of food safety compliance should be carried out using mass media and market sensitisation programs. The need for sustainable inspections and monitoring by environmental health officers should be enforced, with clear guidelines and penalties for non-compliance.

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