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Assessment of Knowledge, Attitude and Practice of Food Safety and Hygiene Procedure among Rural and Urban Food Vendors in Oyo State, Nigeria

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Abstract

Foodborne diseases are a major global health problem that kills millions of people each year, especially in low- and middle-income countries. In Nigeria, food contamination due to improper handling and poor hygiene by street vendors is a major cause of diseases such as diarrhea and cholera. The objective of this study was to assess the knowledge, attitudes and practices (KAP) of food vendors in rural and urban areas of Oyo State, Nigeria, on food safety and hygiene practices. A cross-sectional descriptive study was conducted among 350 food vendors in Oyo State, selected using multistage sampling techniques. Data were collected using a pre-tested self-administered questionnaire designed based on objectives and analysed using an IBM SPSS version 25.0. Findings were presented using charts and tables and the level of significance was at $p<0.05$. The study results showed that 96.6% of urban vendors had good knowledge of food safety, while 70.3% of rural vendors had knowledge of food safety. However, urban vendors had a higher negative attitude toward food safety (57.7%) compare to rural vendors. In terms of practice, 86.9% of urban vendors adhered to good hygiene practices, while rural vendors had a higher compliance rate (95.4%). Factors such as education level and marital status were significantly associated with food safety knowledge and practices. Despite high levels of knowledge, urban vendors showed low attitudes and hygiene practices, indicating a gap between knowledge and implementation. Targeted interventions aimed at changing behaviour and improving hygiene practices are recommended to improve food safety, especially in urban area.

Keywords: *Attitude, Food Safety, Food Vendors, Hygiene, Knowledge, Practice.*

Introduction

Many diseases around the world have food-borne infections as their primary cause. It is a growing public health issue in both developing and developed countries, contributing to general population morbidity and mortality, especially in vulnerable populations such as small children, the elderly, and people with impaired immune systems [1]. Despite the efforts made to protect the environment and ensure food safety, drinking contaminated water or eating contaminated food kills 2.1 million adults and 3 million children annually, two of whom are in emerging nations. The World Health Organization estimates that food and water contamination causes about 125,000 pediatric deaths annually in addition to 1.5

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billion illnesses. An estimated 70% of diarrheal episodes in developing nations are associated with eating contaminated food [2].

Food safety is a crucial component of good health and a prerequisite for sustainable development. In recent times, the street food vending business has drawn a lot of interest from public health practitioners, local and international organizations, and social science academics [3]. Food safety is a science of describing handling, preparation and storage of food in ways that prevent food borne illness [3, 4]. These include a number of routine practices that should be done to avoid potential health hazards. The need for avoidance of foods that are contaminated with harmful bacteria, viruses, parasites, toxins, chemical and physical contaminants are vital for healthy eating. Contamination can occur at any point through its preparation, handling, storage and consumption [5].

An estimated 40% of the urban populace in developing regions opt for street food due to its affordability [6]. Around 2.5 billion individuals globally frequent mobile food vendors, serving as a vital income source, particularly for women, with minimal initial investment [6]. Despite this, many vendors lack formal education, hindering their grasp of crucial food safety practices. As a result, consumers often face the repercussions of consuming unsafe food, making it challenging to gauge the full extent of the issue, especially in developing nations. The significant number of deaths, notably among children, due to diarrhea each year suggests that a considerable portion can be linked to food and water contamination [7]. While street food plays a crucial role in urban and rural diets, there are inherent public health risks in consuming it in developing countries. It is crucial for street food to not only meet consumers' nutritional needs but also undergo stringent safety measures to prevent contamination by harmful substances and microorganisms.

Enhancing food safety in low- and middle-income nations (LMICs) emerges as a pressing matter. It is estimated that foodborne diseases result in 600 million illnesses and 420,000 premature fatalities each year [8]. The brunt of this impact is borne by individuals residing in LMICs [9], accounting for approximately 75% of deaths due to foodborne ailments (in contrast to 41% of the global populace). This holds especially true for Africa, where the per-person toll of foodborne diseases exceeds that of Europe or North America by 27 times and the healthcare infrastructure grapples with limited capabilities for diagnosis and treatment [8]. Furthermore, foodborne illnesses incur economic repercussions amounting to about $20 billion USD annually [10].

Nigeria has experienced persistent annual endemic cholera. By July 21st, 2024, Nigeria had reported a total of 4,809 suspected cases with 156 deaths and a case fatality rate (CFR) of 3.2%, affecting all its thirty-five states comprising one hundred and ninety-two local government areas [11]. Street food, being affordably priced and easily accessible, fulfills a crucial requirement for the populace. The 'mama put' vendors, who offer ready-to-consume meals and drinks, may potentially trigger a foodborne illness outbreak due to their limited understanding of proper food safety practices [6].

A study conducted by Omemu and Adereoju in Abeokuta, Nigeria focused on the Food safety Knowledge and practices of mobile food vendors in the city of Abeokuta, South West Nigeria. Merely 12% of the participants obtained knowledge of food preparation through formal education. 31% possessed annual medical health certificates signifying compliance with the recommended physical and medical assessments [12]. The prioritization of volume and price over freshness and cleanliness was noted in the procurement of raw materials. Another investigation in Owerri, Nigeria revealed that 23.8% of individuals prepared their food in

unhygienic settings. Furthermore, 42.8% did not utilize Aprons, 47.6% handled food with uncovered hands, and 52.4% did not use any hair covering. During food service, 61.9% and 19.5% managed money and jewelry, respectively [13].

Another study conducted in Owerri, Nigeria, vendors often lack basic hygiene practices, such as using aprons and hair coverings, and frequently handle money while serving food [14]. Similarly, in the Central State of Northern Nigeria, street food vendors demonstrate poor hygiene and sanitary practices, with a lack of formal training and non-compliance with food safety procedure [15]. In contrast, a study in a tertiary educational institution in South Western Nigeria found that while vendors had adequate knowledge of food safety, they often failed to implement safe hygiene practices [16]. This trend is also observed in rural northern Ghana, where street food vendors have a high knowledge level of food safety but struggle to put it into practice [30]. These findings suggest a need for targeted interventions to improve food safety and hygiene practices among street food vendors in both rural and urban areas of Nigeria.

The negative attitude of food safety and hygiene procedures among food vendors can lead to a range of problems, as evidenced by several studies. Khuluse (2020) found that food vendors often lack the knowledge and infrastructure to maintain proper hygiene and safety practices, leading to risks of cross-contamination and foodborne illnesses [17]. Amaami (2017) identified poor compliance with food safety measures, despite high awareness, due to financial challenges and inadequate regulation [18]. Reddy (2020) highlighted the failure of street-food vendors in India to follow basic food safety principles, particularly in low-income areas [19]. Qureshi (2016) reported that street food vendors in Kashmir often engage in unsafe practices, such as using the same surface for cooking multiple times and serving food with bare hands [20].

In Nigeria, urban residents allocate up to 50% of their food budget towards purchasing vended food items, a proportion higher than that observed in other developing nations. The vended food industry in Nigeria encounters various obstacles. The vending of food plays a crucial role in the food distribution system of nations such as Nigeria, Morocco, and Kenya, with research indicating that prominent street food vendors often earn wages surpassing the minimum set by their respective countries [21]. (Lois, Maduabuchi and Prince, 2023) asserted that Street food vending represents a prominent and distinct segment of the expansive informal economy, frequently visible in public spaces, particularly urban areas, offering essential sustenance to city inhabitants. This industry is rapidly expanding due to the evolving dietary preferences of urban residents seeking affordable food options amidst economic challenges. Many individuals prefer purchasing meals from vendors rather than preparing food at home [22]. This study explores the knowledge, attitudes, and practices of food vendors regarding food safety and hygiene procedure in urban and rural area in Oyo state, Nigeria.

Materials and Methods

A descriptive cross-sectional study was carried out among 350 food vendors. Food vendors in Oyo State, comparing rural and urban vendors' knowledge, attitude, and practice of food safety and hygiene procedures. There are numerous food vendors operating in both rural and urban areas, providing essential food services across the state.

Sample size for the study was 350, using formular for comparing two [23].

$$\frac{N}{per}\, group = \frac{2(Z\alpha+Z\beta)2.P(1-P)}{d2}$$

Based on a previous documented study done in Owerri (Nigeria) (6) and Ijebu ode (Nigeria) [24], the prevalence of good knowledge for urban was 60%, while the prevalence for rural was 40%.

Therefore, N = 131.2. To compensate for non-responses, a non-response rate of 10% will be calculated as follows N/ (1 – 0.1).

$N\ (actual)\ =\ 131\ 2/0.9\ =\ 145.8\ \approx$ 146.

This gives a sample size of 146 for each group, thus giving a total of 292 respondents in all. A total of 373 questionnaires were distributed, with 362 returned, yielding a 97.2% response rate. Of these, 350 questionnaires (96.7% of those returned) were deemed suitable for analysis. Twelve questionnaires were excluded due to substantial missing data (more than 20% of items unanswered). To address the issue of missing data in the included questionnaires, we employed a multiple imputation technique for cases where less than 20% of items were missing to maximize the use of available data while minimizing potential bias.

A multi-stage sampling technique was utilized to select a representative sample of food vendors from both rural and urban areas in Oyo State. The process involved three sequential stages: First, a predetermined number of Local Government Areas (LGAs) were randomly selected from Oyo State, stratified to include both rural and urban classifications. Second, within each selected LGA, a specified number of wards were randomly chosen and individual food vendors were conveniently selected from each chosen ward, ensuring equal representation from both rural and urban settings. A purposely designed self-administered questionnaire was used to obtain data from study participants after a pre-test done outside of the study area.

The Ministry of Health Oyo State, Nigeria, and the Ethics and Research Committee (NHREC/OYOSHRIEC/10/11/12) approved the study's conduct. Consent was obtained from each participant, who was assured of confidentiality.

Data collected were analyzed using IBM SPSS Statistics version 25.0 software. Results were presented using tables and charts, and chi-square and logistic regression analyses were generated, with confidence levels set at 95% and a P-value <0.05 considered significant. There were total of 29 questions for knowledge-related statements, where correct responses were scored as one and incorrect responses were scored as zero. The scores were summed up to obtain an overall score for each respondent, with a range of 0 to 29.

Attitude had a total of 14 questions, with correct responses assigned one and wrong responses assigned zero. The total summed-up scores ranged from 0-14. Practices had a total of 15 questions, with correct responses assigned one and wrong responses assigned zero. The total summed-up scores ranged from 0-15.

Knowledge, attitude, and practices were further categorized using the median or 50% percentile score as the cut-off point. This was done to assess and grade respondents' knowledge (good or poor knowledge), attitude (positive or negative attitude), and practice (good and poor practices) toward food safety and hygiene. Good knowledge, positive attitude and good practices were adjudged as those who scored equal to or above 50%, while poor knowledge, negative attitude and poor practices were considered for those who scored below it.

Results

Table 1. Sociodemographic Characteristics of the Respondents. (n=350)

Variables	**Settlement**		**Statistics**
	Rural (n =175)	**Urban (n =175)**	**χ2, p**
Age			
Mean± SD	37.53± 8.924	36.27±9.796	
16-24 years	5(2.9)	10(5.7)	χ2= 4.904#

25 – 39 years	91(52.0)	92(52.6)	p = 0.179
40-59 years	79(45.1)	71(40.6)	
60 and Older	0(0.0)	2(1.1)	
Sex			
Female	155(88.6)	167(95.4)	χ2= 4.697*
Male	20(11.4)	8(4.6)	p = 0.030
Marital Status			
Single	19(10.9)	30(17.1)	χ2= 13.380#
Married	123(70.2)	133(76.0)	p = 0.004
Divorced	14(8.0)	4(2.3)	
Separated	19(10.9)	8(4.6)	
Educational Level			
No formal Education	8(4.6)	1(0.6)	χ2= 15.386#
Primary	53(30.3)	48(27.4)	p = 0.002
Secondary	102(58.3)	95(54.3)	
Tertiary	12(6.9)	31(17.7)	

Continuity Correction, #- Likelihood Ratio

The socio-demographic characteristics of the respondents were diverse, the data revealed that of 155 (88.6%) rural food vendors were female, compared to 167 (95.4%) among urban vendors. Male vendors comprised 20 (11.4%) in rural areas and 8 (4.6%) in urban areas. In terms of marital status, 19 (10.9%) rural vendors were single, whereas 30 (17.1%) of urban vendors were single. Married individuals made up 123 (70.2%) of rural respondents and 133 (76.0%) of urban respondents. Divorced vendors were more prevalent in rural areas, with 14 (8.0%) compared to only 4 (2.3%) in urban areas, while separated individuals included 19 (10.9%) in rural areas and 8 (4.6%) in urban settings (Table 1).

Regarding the education level of the vendors, 8 (4.6%) rural vendors had no formal education, compared to only 1 (0.6%) among urban vendors. Primary education was attained by 53 (30.3%) of rural vendors compared to 48 (27.4%) of urban vendors. Secondary education was fairly balanced with 102 (58.3%) rural vendors and 95 (54.3%) urban vendors. However, tertiary education showed a marked difference, with 31 (17.7%) of urban vendors compared to only 12 (6.9%) of rural vendors achieving this level.

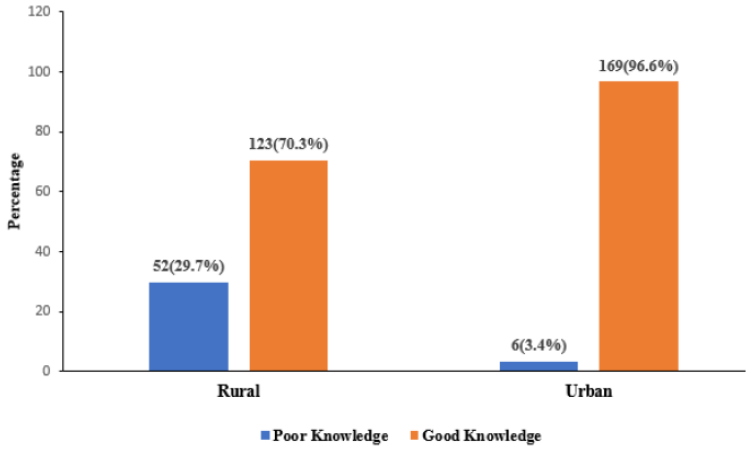

Figure 1. Knowledge of Food Safety and Hygiene Procedure Among Rural and Urban Food Vendors

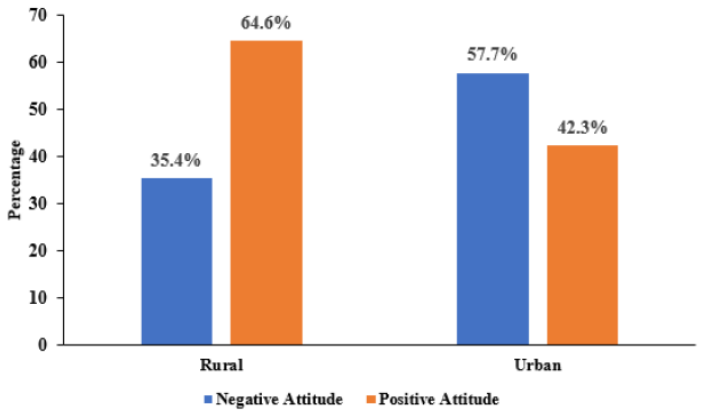

Figure 2. Attitude Towards Food Safety and Hygiene Procedure Among Rural and Urban Food Vendors

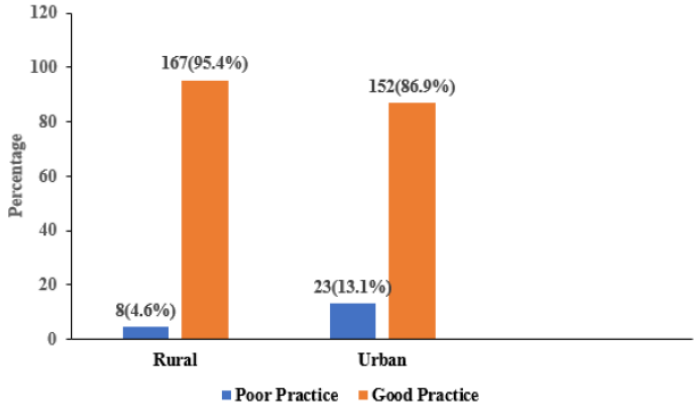

Figure 3. Practices of Food Safety and Hygiene Procedure Among Rural and Urban Food Vendors

Table 2. Association between Knowledge of Food Safety, Hygiene Practices and Sociodemographic Characteristics of Rural and Urban Food Vendors

Variables/Sub-variables	**Rural**		**Statistics χ2, p**	**Urban**		**Statistics χ2, p**
	Level of Knowledge			**Level of Knowledge**		
	Poor n=52	**Good n=123(%)**		**Poor (n=6)**	**Knowledge (n=169)**	
Age						
16-24 years	2(40.0)	3(60.0)	χ2= 2.831# p = 0.243	1(10.0)	9(90.0)	χ2= 1.105# p = 0.776
25 – 39 years	22(24.2)	69(75.8)		3(3.3)	89(96.7)	
40-59 years	28(35.4)	51(64.6)		2(2.8)	69(97.2)	
60 and Older	0(0.0)	0(0.0)		0(0.0)	2(100.0)	
Sex						
Female	46(29.7)	109(70.3)	χ2= 0.001* p = 0.967	4(2.4)	163(97.6)	χ2= 5.944* p = 0.015
Male	6(30.0)	14(70.0)		2(25.0)	6(75.0)	
Marital Status						
Single	8(42.1)	11(57.9)	χ2=5.875 # p = 0.142	1(3.3)	29(96.7)	χ2= 0.881# p = 0.830
Married	30(24.4)	93(75.6)		5(3.8)	128(96.2)	
Divorced	6(42.6)	8(57.1)		0(0.0)	4(100.0)	
Separated	8(42.1)	11(57.9)		0(0.0)	8(100.0)	

Educational Level						
No formal Education	0(0.0)	8(100.0)	$\chi2$= 15.582# p = 0.001	1(100.0)	0(0.0)	$\chi2$=9.005 # p = 0.029
Primary	16(30.2)	37(69.8)		2(4.2)	46(95.8)	
Secondary	36(35.3)	66(64.7)		3(3.2)	92(96.8)	
Tertiary	0(0.0)	12(100.0)		0(0)	31(100.0)	

Continuity Correction, #- Likelihood Ratio

Table 2 shows that there was a statistically significant association between food safety knowledge and certain sociodemographic characteristics among both rural and urban respondents. Among rural food vendors educational level had a significant association with food safety knowledge, (p=0.001) compared to urban food vendors, both sex and educational level were significantly associated with knowledge of food safety practices (p=0.015, p=0.029) (Figure 1).

Table 3. Association Between Attitude Levels Towards Food Safety, Hygiene Practices and Sociodemographic Characteristics of Rural and Urban Food Vendors

Variables/Sub-variables	**Rural**		**Statistics**	**Urban**		**Statistics**
	Level of Attitude		**$\chi2$, p**	**Level of Attitude**		**$\chi2$, p**
	Negative n= 62(%)	**Positive n=113 (%)**		**Negative n=101 (%)**	**Positive n=74 (%)**	
Age						
16-24 years	1(20.0)	4(80.0)	$\chi2$= 4.768# p = 0.092	1(10.0)	9(90.0)	$\chi2$= 14.962# p = 0.002
25 – 39 years	39(42.9)	52(57.1)		60(65.2)	32(34.8)	
40-59 years	22(27.8)	57(72.2)		38(53.5)	33(46.5)	
60 and Older	0(0.0)	0(0.0)		2(100.0)	0(0.0)	
Sex						
Female	50(32.3)	105(67.7)	$\chi2$= 5.673* p = 0.017	95(56.9)	72(43.1)	$\chi2$= 0.418* p = 0.518
Male	12(60.0)	8(40.0)		6(75.0)	2(25.0)	
Marital Status						
Single	8(42.1)	11(57.9)	$\chi2$=14.954 # p = 0.002	11(36.7)	19(63.3)	$\chi2$= 21.905# p = <0.001
Married	44(35.8)	79(64.2)		82(61.7)	51(38.3)	
Divorced	0(0.0)	14(100.0)		0(0.0)	4(100.0)	
Separated	10(52.6)	9(47.4)		8(100.0)	0(0.0)	
Educational Level						
No formal Education	6(75.0)	2(25.0)	$\chi2$= 15.498# p = 0.001	0(0.0)	1(100.0)	$\chi2$= 20.327# p = <0.001
Primary	11(20.8)	42(79.2)		27(56.3)	21(43.8)	
Secondary	37(36.3)	65(63.7)		66(69.5)	29(30.5)	
Tertiary	8(66.7)	4(33.3)		8(25.8)	23(74.2)	

Continuity Correction, #- Likelihood Ratio

The table above shows the attitudes toward food safety and hygiene practices, a significant difference was observed in marital status. In rural areas, married respondents had a higher positive attitude (64.2%) compared to other marital groups (p=0.002). Similarly, among urban food vendors, single respondents a significantly have a positive attitude (63.3%) than other groups (p<0.001) (Table 3).

In terms of age, urban vendors aged 16-24 years were significantly more likely to exhibit a positive attitude toward food safety practices, with 90% demonstrating a positive attitude compared to older age groups (p=0.002). Regarding educational level, vendors with no formal education had a predominantly negative attitude towards food safety and hygiene practices, with this association proving statistically significant (p=0.001). In urban areas, educational level also influenced attitudes significantly, as those with tertiary education were more likely to show a positive attitude (p<0.001) (Figure 2).

Table 4. Association Between Practices of Food Safety, Hygiene Practices, and Sociodemographic Characteristics of rural and Urban Food Vendors

Variables/Sub-variables	**Rural**		**Statistics**	**Urban**		**Statistics**
	Level of Practice		**$\chi2$, p**	**Level of Practice**		**$\chi2$, p**
	Poor n=8 (%)	**Good n=167(%)**		**Poor n=23 (%)**	**Good n=152 (%)**	
Age						
16-24 years	0(0.0)	5(100.0)	$\chi2$=0.517#	7(70.0)	3(30.0)	$\chi2$= 19.581#
25 – 39 years	4(4.4)	87(95.6)	p = 0.772	10(10.9)	82(89.1)	p = <0.001
40-59 years	4(5.1)	75(94.9)		6(8.5)	65(91.5)	
60 and Older	0(0.0)	0(0.0)		090.00	2(100.0)	
Sex						
Female	8(5.2)	147(94.8)	$\chi2$=0.222*	23(13.8)	144(86.2)	$\chi2$= 0.349*
Male	0(0.0)	20(100.0)	p = 0.637	0(0.0)	8(100.0)	p = 0.555
Marital Status						
Single	2(10.5)	17(89.5)	$\chi2$=4.150 #	11(36.7)	19(63.3)	$\chi2$= 16.772#
Married	4(3.3)	119(96.7)	p = 0.246	10(7.5)	123(92.5)	p = 0.001
Divorced	0(0.0)	14(100.0)		0(0.0)	4(100.0)	
Separated	2(10.5)	17(89.5)		2(25.0)	6(75.0)	
Educational Level						
No formal Education	0(0.0)	8(100.0)	$\chi2$= 2.323#	0(0.0)	1(100.0)	$\chi2$= 0.858#
Primary	2(3.8)	51(96.2)	p = 0.508	6(12.5)	42(87.5)	p = 0.835
Secondary	6(5.9)	96(94.1)		14(14.7)	81(85.3)	
Tertiary	0(0.0)	12(100.0)		3(9.7)	28(90.3)	

Continuity Correction, #- Likelihood Ratio

Concerning the factors associated with good food safety and hygiene practices, a significant difference was observed in age among urban food vendors, aged 16-24 years shows a poorer level of practice (70.0%) compared to older age groups, which was statistically significant (p<0.001). Additionally, marital status was significantly associated with the level of practice among urban food vendors; single respondents were more likely to have poor practices (36.7%) compared to other marital groups (p=0.001) (Table 4 and Figure 3).

Table 5. Binary Logistics Regression of the Outcome Variable "Level of knowledge on Food Safety and Hygiene among Rural Food Vendors "and their Selected Sociodemographic Predictors

Predictor Variables	Categories of Variables	Odds Ratio	Rural Settlement		
			p-value	95% Confidence Interval	
				Lower	Upper
Age	16-24 years (Reference)	6.945	0.005*	1.797	26.839
Sex	Female (Reference)	2.198	0.121	0.811	5.955
Marital Status	Married (Reference)	2.458	0.109	0.819	7.376
Educational Level	Primary Education (Reference)	2.675	0.139	0.726	9.852

A binary logistic regression analysis showed that vendors in rural area aged 16-24 years had about 6.94 times higher odds (OR=6.945, 95% C.I=1.797-26.839 and p=0.005) of having a higher level of knowledge on food safety and hygiene compared to those in the reference age group (Table 5).

Table 6. Binary Logistics Regression of the Outcome Variable "Level of knowledge on Food Safety and Hygiene among Urban Food Vendors "and their Selected Sociodemographic Predictors

Predictor Variables	Categories of Variables	Odds Ratio	Urban Settlement		
			p-value	95% Confidence Interval	
				Lower	Upper
Age	16-24 years (Reference)	3.397	0.024*	1.179	9.788
Sex	Female (Reference)	0.744	0.522	0.300	1.841
Marital Status	Married (Reference)	11.921	0.005*	2.150	66.084
Educational Level	Primary Education (Reference)	58.226	0.001*	9.256	366.086

A binary logistic regression analysis showed that urban food vendors aged 16-24 years had about 3.40 times higher odds (OR=3.397, 95% C.I=1.179-9.788 and p=0.024) of having a higher level of knowledge on food safety and hygiene compared to those in the reference age group. Additionally, married individuals exhibited significantly higher odds, approximately 11.92 times greater (OR=11.921, 95% C.I=2.150-66.084 and p=0.005), of possessing a higher level of knowledge than unmarried individuals. Furthermore, food vendors with primary education had about 58.23 times higher odds (OR=58.226, 95% C.I=9.256-366.086 and p=0.001) of demonstrating a higher level of knowledge compared to those with no formal education (Table 6).

Discussion

This study assessed the knowledge, attitude, and practice of food safety and hygiene procedures among food vendors in rural and urban areas of Oyo state, Nigeria. Most vendors, regardless of location, were between the ages of 25-39, indicating that food vending is a common occupation for individuals in their prime working years. This is consistent with findings from similar study conducted in Benin City, Nigeria, where the majority of food vendors were also in their 30s [25]. In both rural and urban settings, food vending provides an accessible means of income generation for middle-aged individuals, many of them may have limited access to formal employment opportunities. More than half of vendors were female, accounting of the total sample in both

rural and urban areas. This reflects a common trend in many parts of Africa, where women dominate the informal food vending sector. Studies conducted in Ethiopia, Nigeria and Ghana with other part of African have shown that women are traditionally involved in food preparation and trade, which may explain their significant presence in the sector [26–29]. The near-equal representation of women across both rural and urban areas shows that food vending is a vital livelihood for women, providing financial support and stability for their households.

In this study, the majority of the respondents had good knowledge of food safety, On the food safety knowledge, the study showed that urban food vendors scored 96.6%, while those in rural areas scored 70.3%. This result agrees with previous findings by Akabanda et al., (2017), in Northern Ghana, which asserted that urban food vendors possess better knowledge on issues concerning food safety because they have good exposure to educational background and information access about the safety practices of food [30]. These findings, however, are in contrast with the related research carried out in Northern Nigeria among vendors by Nurudeen et al. (2014), which demonstrated a lower level of food safety knowledge among the food vendors [15]. Higher levels of knowledge in the study could, therefore, be related to the fact that urban vendors are nearer to regulating bodies, just like food safety campaigns, often centered in cities.

Interesting enough, however, is that though knowledge levels were higher in urban areas, attitudes toward food safety were less positive in the urban area than in rural areas. The current study shows that 57.7% of urban vendors had negative attitude toward food safety, differed from the 64.6% positive attitude obtained from rural vendors. This is in agreement with the findings of Iwu et al. (2017), who reported that vendors, though devoid of formal knowledge, tend to have better attitudes toward food hygiene because their culture places a high value on cleanliness [13]. The negative attitude observed to prevail more among urban vendors could be explained by the fast pace of life in the urban setting, where economic pressure contributes to vendors prioritizing profits above safety practices which is similar to a study by Chukuezi 2010 in Owerri, Nigeria observed that vendors would normally neglect safety measures while rushing up to have as much customers as possible to reduce losses [14].

Food safety practices were found to be poor in 13.1% of the urban vendors, while in rural areas, it was only 4.6%. This is somewhat an unexpected result, given the higher levels of knowledge in urban areas, and indicates that there are gaps between knowledge of food safety measures and proper implementation. The findings are similar to various other studies, for example, Andy et al (2015) and Tuglo et al (2021), which have documented comparable discrepancies in developing economically pressured environments where knowledge concerning food safety does not translate into proper hygiene practices [27, 31]. Better practices were seen to be exerted in rural areas, probably on account of the smaller-scale operation radius and the closer vendor-customer relationship, which may force a rural vendor to apply more stringency in its food safety practices.

The findings of this study indicated that gender and levels of knowledge were significantly associated, more than half of female food vendors in urban areas had good knowledge compared to male food vendors. This has also been reported by Reddy et al., 2020, in India, where female food vendors were more knowledgeable in food safety practices compared to their male counterparts [19]. The difference in the knowledge level among female respondents could be because they are predominantly engaged in food preparation and handling and thus tend to expose themselves to more education and practice in food safety.

The relationship between education and food safety practices was significant, with more than

half of vendors with tertiary education in both rural and urban areas practicing good hygiene. However, vendors with only primary education had lower adherence to food safety practices, particularly in urban areas (87.5%). This finding is consistent with previous studies by Nurudeen et al. (2014), which showed that food handlers with higher levels of education were more likely to adopt safe food hygiene practices [15].

Conclusion

The majority of food vendors in this study displayed good food safety knowledge. However, urban food vendors displayed higher knowledge of food safety when compared with rural vendors, although the rural food vendors had higher positive attitudes. This indicates a gap between knowledge and implementation. This is especially true in urban areas where economic pressures are causing retailers to prioritize profits over safety. Food safety practices were poor among both urban and rural food vendors, although poorer among the urban food vendors, this indicates that targeted interventions such as food safety education are needed to improve attitudes and adherence to safety measures among urban and rural food vendors. Public health agencies should implement training programs that promote positive attitudes towards food safety and provide sellers with practical skills that can be used regularly.

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Conflict of Interest

The Authors declare no conflict of interest.

Source of Funding

None declared.

Author Contribution

All authors contributed equally to the conception, design, analysis, and writing of this paper.

Ethical Approval

The study involving human participants was reviewed and approved by the Oyo State Ministry of Health Research Ethics Committee (Approval No: NHREC/OYOSHRIEC/10/11/22). Written informed consent was obtained from all participants prior to their inclusion in the study.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

[1]. Funmilola, F., Olatubi, M., & Nnabuife, G., 2018, Food Safety and Hygiene Practices among Food Vendors in a Tertiary Educational Institution in South Western Nigeria. 8(2):59–70, *European Journal of Nutrition & Food Safety.*

[2]. World Health Organization, 2019, Food safety. p. 1–12, https://www.who.int/news-room/fact-sheets/detail/food-safety

[3]. Fasoro, A. A., Faeji, C. O., Oni, O. I., & Oluwadare, T., 2016, Assessment of food safety practices in a rural community in Southwest Nigeria. *Food and Public Health*, (3), 1-6.

[4]. Nordhagen, S., Lee, J., Onuigbo-Chatta, N., Okoruwa, A., Monterrosa, E., Lambertini, E., & Pelto, G. H., 2022, What is safe and how much does it matter? Food vendors' and consumers' views on food safety in urban Nigeria. *Foods*, *11*(2), 225.

[5]. Pepple, N., 2017, Environment and food poisoning: Food safety knowledge and practice among food vendors in Garki, Abuja–Nigeria. *J Health Educ Res Dev*, *5*(217), 2.

[6]. Aluh, F. O., & Aluh, D. O., 2017, Knowledge, attitudes and practices of food hygiene among mobile food vendors in a Nigerian rural settlement. *Int J Community Med Public Health*, 4, 4025-4030.

[7]. Ababio, P. F., & Lovatt, P., 2015, A review on food safety and food hygiene studies in Ghana. *Food Control*, *47*, 92-97.

[8]. Kirk, M. D., Pires, S. M., Black, R. E., Caipo, M., Crump, J. A., Devleesschauwer, B., & Angulo, F. J., 2015, World Health Organization estimates of the global and regional disease burden of 22 foodborne bacterial, protozoal, and viral diseases, 2010: a data synthesis. *PLoS Medicine*, *12*(12), e1001921.

[9]. Havelaar, A. H., Kirk, M. D., Torgerson, P. R., Gibb, H. J., Hald, T., Lake, R. J., & World Health Organization Foodborne Disease Burden Epidemiology Reference Group., 2015, World Health Organization global estimates and regional comparisons of the burden of foodborne disease in 2010. *PLoS Medicine*, *12*(12), e1001923.

[10]. Jaffee, S., Henson, S., Unnevehr, L., Grace, D., & Cassou, E., 2018, The safe food imperative: Accelerating progress in low-and middle-income countries. *World Bank Publications*.

[11]. Eneh, S., Onukansi, F., Anokwuru, C., Ikhuoria, O., Edeh, G., Obiekwe, S., & Okpara, C., 2024, Cholera outbreak trends in Nigeria: policy recommendations and innovative approaches to prevention and treatment. *Frontiers in Public Health*, *12*, 1464361.

[12]. Omemu, A. M., & Aderoju, S. T., 2008, Food safety knowledge and practices of street food vendors in the city of Abeokuta, Nigeria. *Food Control*, *19*(4), 396-402.

[13]. Iwu, A. C., Uwakwe, K. A., Duru, C. B., Diwe, K. C., Chineke, H. N., Merenu, I. A., & Ohale, I., 2017, Knowledge, attitude and practices of food hygiene among food vendors in Owerri, Imo State, Nigeria. *Occupational Diseases and Environmental Medicine*, *5*(1), 11-25.

[14]. Chukuezi, C. O., 2010, Food safety and hygienic practices of street food vendors in Owerri, Nigeria. *Studies in Sociology of Science*, 1(1), 50.

[15]. Nurudeen, A. A., Lawal, A. O., & Ajayi, S. A., 2014, A survey of hygiene and sanitary practices of street food vendors in the Central State of Northern Nigeria. *Journal of Public health and Epidemiology*, *6*(5), 174-181.

[16]. Faremi, F., Olatubi, M., & Nnabuife, G., 2018, Food safety and hygiene practices among food vendors in a tertiary educational institution in South Western Nigeria. *European Journal of Nutrition & Food Safety*, *8*(2), 59-70.

[17]. Khuluse, D. S., & Deen, A., 2020, Hygiene and safety practices of food vendors. *African Journal of Hospitality, Tourism and Leisure*, *9*(4), 597-611.

[18]. Amaami, A. J., Dominic, D., & Collins, D., 2017, Factors associated with poor food safety compliance among street food vendors in the Techiman Municipality of Ghana. *African Journal of Food Science*, *11*(3), 50-57.

[19]. Reddy, A. A., Ricart, S., & Cadman, T., 2020, Driving factors of food safety standards in India: learning from street-food vendors' behaviour and attitude. *Food Security*, *12*(6), 1201-1217.

[20]. Qureshi, S., NaheedVaida, Azim, D. H., 2016. Hygiene practices and food safety knowledge among street food vendors in Kashmir. *International Journal of Scientific Research*, 4:1–9. Available from: https://api.semanticscholar.org/CorpusID:114939807

[21]. Onyeaka, H., Ekwebelem, O. C., Eze, U. A., Onwuka, Q. I., Aleke, J., Nwaiwu, O., & Chionuma, J. O., 2021, Improving food safety culture in Nigeria: A review of practical issues. *Foods*, *10*(8), 1878.

[22]. Lois, N. I., Maduabuchi, E., and Prince, E. N., 2023, Food Safety Knowledge, Attitude and Practice of Food Vendors in Abia State, Nigeria. *The International Journal of Operational Research in Management, Social Sciences & Education*, *9*(1):166–85.

[23]. Charan, J., & Biswas, T., 2013, How to calculate sample size for different study designs in medical research?. *Indian Journal of Psychological Medicine*, *35*(2), 121-126.

[24]. Adebukola, O. C., Opeyemi, A. O., & Ayodeji, A. I., 2015, Knowledge of food borne infection and food safety practices among local food handlers in Ijebu-Ode Local Government Area of Ogun State. *Journal of Public Health and Epidemiology*, *7*(9), 268-273.

[25]. Okojie, P. W., & Isah, E. C., 2014, Sanitary conditions of food vending sites and food handling practices of street food vendors in Benin City, Nigeria: implication for food hygiene and safety. *Journal of Environmental and Public Health*, *2014*(1), 701316.

[26]. Okon, R. E., Okon, A. J., Inah, S. A., Olanrewaju, O. E., & Nji, E. L. B., 2022, Food hygiene knowledge, attitude and practices among food handlers in Calabar Municipal, Cross River State, Nigeria. *World Journal of Advanced Research and Reviews*, *16*(1), 088-101.

[27]. Tuglo, L. S., Agordoh, P. D., Tekpor, D., Pan, Z., Agbanyo, G., & Chu, M., 2021, Food safety knowledge, attitude, and hygiene practices of street-cooked food handlers in North Dayi District, Ghana. *Environmental Health and Preventive Medicine*, *26*(1), 54.

[28]. Bamidele, J. O., Adebimpe, W. O., Oladele, E. A., & Adeoye, O. A., 2015, Hygiene practices among workers in local eateries of Orolu community in south Western Nigeria. *Annals of Medical and Health Sciences Research*, *5*(4), 235-240.

[29]. Fekadu, Y., Kinde, M. Z., Dagnaw, G. G., Dessalegn, B., Dejene, H., & Gessese, A. T., 2024, Knowledge, Attitude, and Practices on Food Safety among Food Handlers Working in Public Food Service Establishments in Lemi Kura Subcity, Addis Ababa, Ethiopia. *BioMed Research International*, *2024*(1), 2675894.

[30]. Akabanda, F., Hlortsi, E. H., & Owusu-Kwarteng, J., 2017, Food safety knowledge, attitudes and practices of institutional food-handlers in Ghana. *BMC Public Health*, *17*, 1-9.

[31]. Emmanuel, A., Mangai, J. M., Kayong, E. A., Afoi, B. B., Goshit, J. D., Naman, K., & Innocent, O., 2015, Assessment of practice of food safety and hygiene among food vendors within Jos North Local Government Area of Plateau State, Nigeria.