

## CULINARY HYGIENE PRACTICES AND KNOWLEDGE OF READY-TO-EAT FOOD VENDORS AT THE UNIVERSITY OF NIGERIA, NSUKKA

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### ABSTRACT

*Foodborne diseases remain a significant public health issue in developing countries, Nigeria inclusive. This occurs when food safety is compromised along the food chain. The major objective of this paper was to evaluate the knowledge and practices of food hygiene among ready-to-eat food vendors in the University of Nigeria, Nsukka (UNN) community. The study raised four research questions. A descriptive cross-sectional survey design was employed. A total of 200 food vendors were purposively selected. A structured questionnaire and an observation checklist were used to collect data. A reliability test of the instrument was established through a pilot study. Data analysis was performed using IBM SPSS (version 23). Chi-square test was applied to assess associations at a significance level of  $p < 0.05$ . Findings revealed that majority had high knowledge of personal hygiene and environmental hygiene (81.5%; 83.5 %;) while only 42.5% had high knowledge of food hygiene and 56.5% had average knowledge. Ratings on hygiene practices showed that personal hygiene rated 23.5%, 18.5% and 58.0% for poor, average and high respectively. Environmental hygiene rating was poor (12.5%), average (38.5%), and high (49.0%). Food hygiene was 18.5% (poor) 61.5% (average) and 20.0% (high). A significant association was found between food hygiene knowledge and practice ( $p < 0.05$ ). The study concludes that while majority of the respondents have substantial knowledge and adherence to hygiene practices, gaps exists that could pose health risks to their patrons. Therefore, it is recommended that the university authority implement a mandatory hygiene training program for all food vendors.*

**Keywords:** Food safety, Environmental Hygiene, Food handlers, Foodborne diseases.

### INTRODUCTION

Food is one of the fundamental necessities of life, providing essential nutrients required for growth, repair, maintenance of body tissues, and the regulation of vital bodily functions (National Geographic Society, 2022). The consumption of food can take place either at home or outside the home, with the increasing proliferation of restaurants, street hawkers, and various food establishments offering convenience and accessibility. Beyond mere sustenance, these food establishments serve as social hubs where people gather not only to satisfy hunger but also to interact and build relationships (Ismail et al., 2016).

One significant category of food consumption outside the home is ready-to-eat (RTE) foods, which are foods and beverages that can be purchased directly from vendors or hawkers and consumed immediately or at a later time without requiring further preparation. These foods may be raw or cooked, served hot or chilled, and do not require

any additional processing before consumption (Iganga et al., 2023). Common examples of RTE foods include staple cooked meals such as boiled rice, moimoi, and okpa, as well as homemade beverages like zobo, soya milk, and kunu. Additionally, popular snacks such as puff-puff, buns, and meat pies fall under this category.

The demand for RTE foods has surged due to several biological, physical, economic, and psychological factors that influence food choices. Busy work schedules, urbanization, and changing lifestyles have contributed to the increasing reliance on street foods for quick and affordable meals. However, while RTE foods offer convenience and accessibility, concerns regarding their safety and hygiene have been raised. Many of these foods are prepared and sold in open environments where they are susceptible to contamination by physical, chemical, and biological agents, posing significant food safety risks (Eke-Ejiofor et al., 2020). Contaminants may include dust, pathogens from unclean handling, improper storage conditions, and exposure to harmful chemicals.

A critical aspect of food safety is food hygiene, which encompasses a set of principles and practices designed to ensure food remains safe for consumption. This includes maintaining clean and sanitary conditions during food storage, processing, and preparation (Zenbaba et al., 2022). Proper food hygiene practices play a crucial role in preventing food borne illnesses, safeguarding public health, and ensuring that consumers receive nutritious and uncontaminated food. Despite the importance of food hygiene, many food vendors lack adequate knowledge of proper food handling procedures, emphasizing the urgent need for training and awareness programs to improve food safety standards and minimize health risks (Kamboj et al., 2020).

All measures and conditions necessary and purposefully taken to certify the safety of food from the stage of production to consumption is regarded as food hygiene (Kamboj et al., 2020). Food hygiene is a critical aspect of public health, especially in university environments where large populations rely on food vendors for daily meals (WHO, 2020). Poor food hygiene practices can lead to foodborne diseases, which may cause serious health consequences, economic burdens, and academic disruptions. In Nigeria, studies have shown that foodborne diseases are prevalent due to inadequate food handling knowledge, unsanitary environments, and lack of regulatory oversight (Ajayi & Ogunbayo, 2019). The study aims to assess the level of food hygiene knowledge and practices among ready-to-eat food vendors in the University of Nigeria Nsukka community. Food hygiene practices include maintaining cleanliness, proper handwashing, safe food storage, and preventing cross-contamination (FAO, 2021). Previous studies have shown that while some vendors adhere to these practices, many lack proper facilities and training (Jones et al., 2020; Ibrahim et al., 2023). The study is guided by the Health Belief Model (HBM), which states that messages or information achieves desired behavior changes if such message successfully focuses on the perceived barriers, threats, benefits and self-efficacy (Jones, et al., 2015). This model is applicable in understanding food vendors' motivation to adopt hygiene practices. Despite the increasing awareness of food safety regulations, outbreaks of foodborne illnesses remain a concern in university environments (FAO, 2021). Many food vendors operate without formal training, leading to unsafe food handling practices that endanger the health of students and staff. Understanding the knowledge and practices of these vendors is crucial for designing interventions that will enhance food safety standards.

Food hygiene encompasses all measures taken to ensure the safety of food from

production to consumption (WHO, 2020). According to the World Health Organization (WHO), poor hygiene practices are among the leading causes of foodborne diseases, which affect millions of people globally. Knowledge of food hygiene involves an understanding of contamination sources, personal hygiene, food storage, and cooking temperatures (Jones et al., 2017). Studies suggest that food vendors with higher educational backgrounds tend to exhibit better hygiene knowledge and practices (Ajayi & Ogunbayo, 2019). According to a study done on major streets, markets and schools in three districts of Nsukka: Ibagwa-Aka, Obollo-Afor and Nsukka metropolis by Asogwa et al. (2015), bacteria counts on dish washing waters, drinking water served in jugs and kettles, naira notes and utensil surfaces, showed presence of large number of food related pathogens such as coliforms, *Staphylococcus aureus* and *Salmonella* species. Another study carried out by Saka et al. (2022) in Yankaba market in Kano State Nigeria, showed that ready-to-eat vegetables harboured high microbial load majorly *E. coli*, *S. aureus* and *Aspergillus* species which could pose a potential health hazard to consumers. The results obtained highlights the need for good hygiene practice in the handling of ready to eat vegetables and foods, hence the need for application of critical control point of washing with brine and vinegar during preparation. Based on the foregoing, the study investigated the assessment of the knowledge and practices of food hygiene among ready-to-eat (RTE) food vendors in the University of Nigeria, Nsukka.

### Research Questions

The following research questions were raised to guide the study

- i. What are the personal characteristics of the food vendors?
- ii. What is the level of knowledge of personal, environmental and food hygiene practices of the food vendors?
- iii. What are the levels of food handling hygiene practices among the food vendors?
- iv. What are the observed food and personal hygiene practices among the food vendors?

### METHODOLOGY

The study adopted a descriptive cross-sectional survey design to assess knowledge and practice among food vendors. The target population consisted of 200 RTE food vendors within the University of Nigeria Nsukka. Due to the manageable size, no sampling was conducted. Hence, the whole population was used as the sample size. A structured questionnaire and an observational checklist were used to elicit information. The questionnaire was administered to 10 ready-to-eat food vendors randomly selected at Ogige Market in Owerre Nsukka Enugu State. The instrument was piloted with 10 vendors, yielding a Cronbach's alpha score of 0.75, indicating acceptable reliability (Taber, 2018). The questionnaire assessed vendors' knowledge, while the checklist evaluated hygiene practices. All data collected were described with means and percentages and presented in frequency tables and figures.

## RESULTS

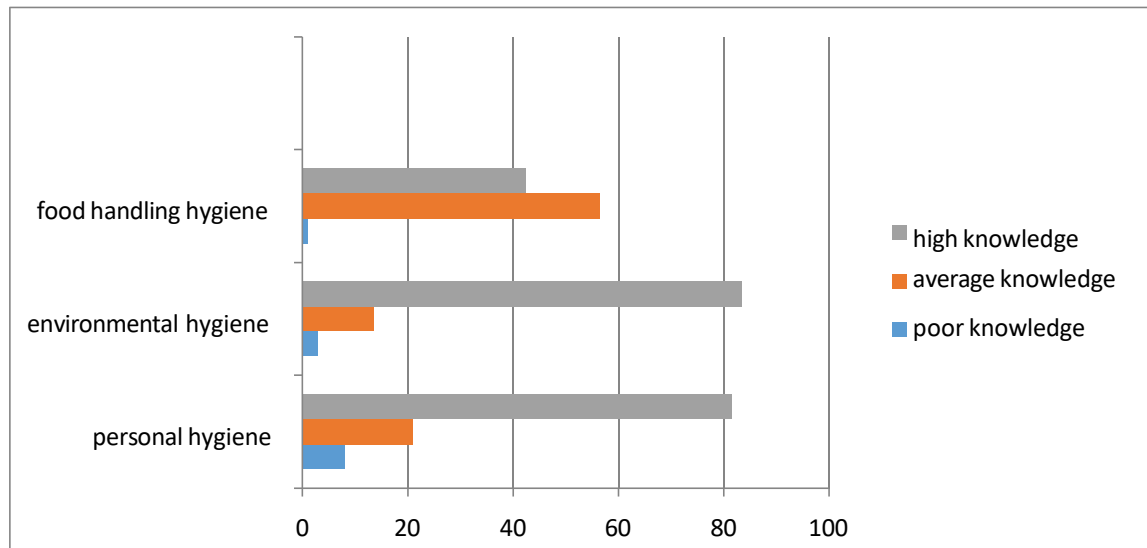
**Research Question One:** What are the personal characteristics of the food vendors?

**Table 1: Demographic characteristics of the respondents**

Parameter	Frequency (F)	Percentage (%)
<b>Sex</b>		
Male	50	25
Female	150	75
<b>Total</b>	<b>200</b>	<b>100</b>
<b>Age</b>		
Less than 18	2	1
18-39	140	70
40-60	56	28
Above 60	2	1
<b>Total</b>	<b>200</b>	<b>100</b>
<b>Education</b>		
No formal	3	1.5
Primary	8	4
Secondary	141	70.5
Tertiary	48	24
<b>Total</b>	<b>200</b>	<b>100</b>
<b>Religion</b>		
Christianity	100	100
Others	0	0
<b>Total</b>	<b>200</b>	<b>100</b>
<b>Residence</b>		
Urban	198	99
Rural	2	1
<b>Total</b>	<b>200</b>	<b>100</b>
<b>Selling Experience</b>		
Years: <1	31	15.5
Years: 1-5	116	58
Years: 6-10	42	21
Years: >10	11	5.5
<b>Total</b>	<b>200</b>	<b>100</b>

Table 1 shows the demographic characteristics of the respondent. Results revealed that majority of the respondents were females (75.0%); 70% were between the ages of 18 - 39; 70.5% had secondary education; all respondents were Christians; 99% resided in urban area and 58% had between 1-5 year experience of vending food in the area of study.

**Research Question Two:** What is the level of knowledge of personal, environmental and food hygiene practices of the food vendors?

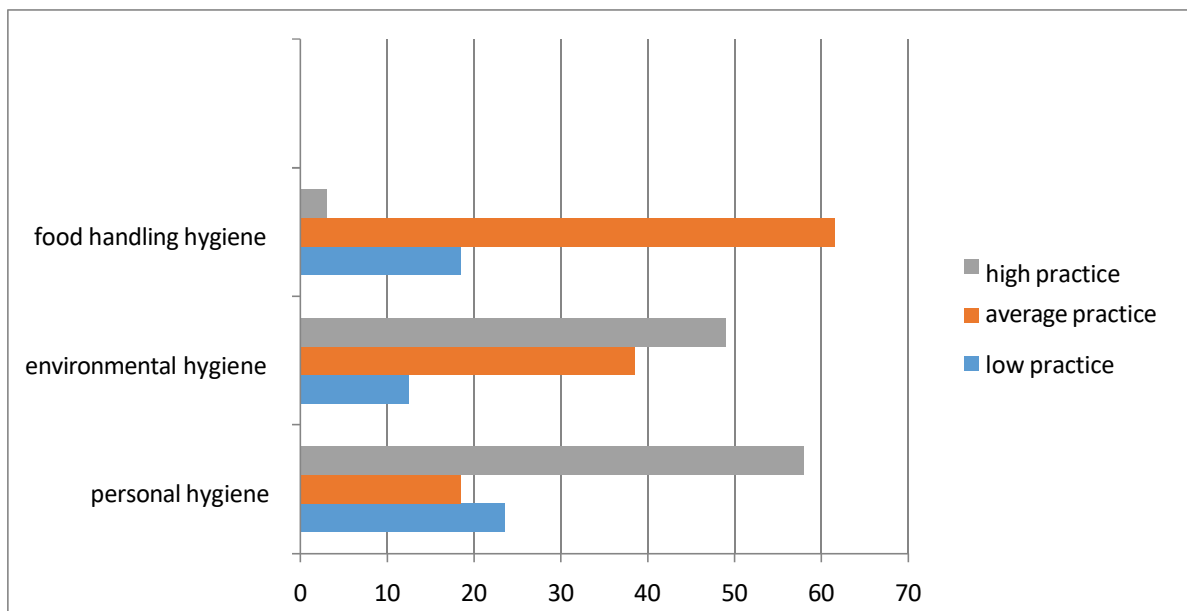


**Figure 1: Level of Knowledge of personal, environmental and food hygiene practices of the food vendors**

Figure 1 shows the level of knowledge of personal, environmental and food hygiene of the vendors. Results showed the highest percentage (56.5%) of the respondents had average knowledge of food hygiene, 42.5% had high knowledge while 1% had poor knowledge. Majority also had high knowledge of environmental and personal hygiene (83.5% and 81.5% respectively).

### Research Questions Three

**What is the level of food handling hygiene practice among the food vendors?**



**Fig 2. Level of food handling hygiene practices among the food vendors**

Figure 2 illustrates the level of food handling hygiene practices among food vendors at the University of Nigeria, Nsukka. The data reveal that 23.5% of vendors exhibited poor personal hygiene practices during food handling, 18.5% demonstrated an average level of practice, while the majority (58.0%) maintained good personal hygiene. Regarding environmental hygiene practices, 12.5% had poor adherence, 38.5% demonstrated an average level of practice, and 49.0% exhibited high compliance with environmental hygiene standards when handling food. Additionally, findings on food handling hygiene practices indicate that 18.5% of respondents had poor hygiene practices, 61.5% demonstrated an average level of adherence, and 20.0% maintained good food handling hygiene practices.

**Research Question four: What is the observed food and personal hygiene practices among the food vendors?**

**Table 2: Observed food and personal hygiene practices among the food vendors**

Parameters	Yes F(%)	No F(%)	Not applicable F(%)
Wearing clean clothes	200(100.0)	0(0.00)	0(0.00)
Hair is covered	29(14.5)	171(85.5)	0(0.00)
The hair cover is looking neat	41(20.5)	130(65.0)	29(14.5)
Hair is neatly packed	163(81.5)	18(9.0)	19(9.5)
Putting on an apron/overall	101(50.5)	99(49.5)	0(0.00)
The apron/overall is looking very neat	107(53.5)	75(37.5)	18(9.0)
The hands look clean	182(91.0)	18(9.0)	0(0.00)
The fingernails are well trimmed	177(88.5)	23(11.5)	0(0.00)
Painted/fixed fingernails	49(24.5)	150(75.0)	1(0.5)
Any sign of illness (cough, catarrh, injury, rashes etc)	8(4.0)	192(96.0)	0(0.00)
Wipes hands on his/her clothes	21(10.5)	173(86.5)	6(3.0)
Uses food warmers for storing food that should be served hot	97(48.5)	38(19.0)	65(32.5)
The food containers look neat	128(64.0)	42(21.0)	29(14.5)
The surface for selling food is neat	155(77.5)	45(22.5)	0(0.00)
The floor is free from litters	109(54.5)	91(45.5)	0(0.00)
Has a covered waste bin	33(16.5)	167(83.5)	0(0.00)
Has a clean container for storing water	68(34.0)	132(66.0)	0(0.00)
Wears hand gloves/nylon when storing finger foods	56(28.0)	144(72.0)	0(0.00)
Touches foods with bare hands	21(10.5)	179(89.5)	0(0.00)
Covers foods immediately after dishing out	167(83.5)	15(7.5)	18(9.0)
Washing hands before serving customers	50(25.0)	150(75.0)	0(0.00)
Handles money while dishing out food	189(94.5)	11(5.5)	0(0.00)
Touches hair, nose, mouth etc, randomly while serving food	52(26.0)	147(73.50)	1(0.5)
Washes up the plates and spoons immediately after use	32(16.0)	60(30.0)	107(53.5)

Table 2 presents the observed food and personal hygiene practices among food vendors using a checklist. All respondents (100%) wore clean clothing. However, only a small percentage (14.5%) covered their hair, while the majority (85.5%) did not. Most vendors (81.5%) had neatly packed hair. Approximately half (50.5%) wore an apron or

overall, while the other half did not. A significant majority (83.5%) covered food immediately after serving. A small proportion (11.0%) had soiled hands, while 11.5% did not maintain well-trimmed fingernails. Additionally, 26.0% were observed touching their hair, nose, or mouth while serving food. Alarming, 75.0% did not wash their hands before serving customers, and 94.5% handled money while serving food.

## DISCUSSIONS

The demographic characteristics of the respondents showed that majority are females and young people in their youth with secondary educational qualification, live in urban area and are all Christians. This finding is in similar to that of Ikuemonisan et al., 2024; Akinbule et al., 2019 who reported that majority of RTE vendors in tertiary institutions in Ondo state and Federal University of agriculture, Abeokuta, respectively that majority of RTE food vendors were females, had secondary education and mostly youth living in urban areas.

The result indicating majority having average to high knowledge of personal and food hygiene aligns with the study conducted by Tuglo et al. (2021), which emphasized that food handling hygiene knowledge refers to the extent to which food vendors understand essential precautions and measures required before, during, and after food preparation.

The finding is also consistent with Desye et al., 2023, that observed a pooled proportion of good knowledge of hygiene of street food vendors toward food safety to be 62% (95% CI: 51–73;  $I^2 = 97.76\%$ ) in a systemic review however, the values from this study is much lower (56.5% : 81.5%). Similarly, knowledge of environmental hygiene was relatively high, with majority (83.5%) demonstrating high knowledge of environmental hygiene practices. This knowledge serves as a critical defense against the transmission of foodborne diseases and other health risks. A comprehensive understanding of food hygiene practices significantly impacts public health, particularly in environments where ready-to-eat food is widely consumed (Desye et al., 2023). Given the high patronage of food vendors in university settings, ensuring that vendors possess adequate knowledge of food hygiene is crucial in preventing foodborne illnesses and promoting a healthier community. Therefore, continuous education and enforcement of hygiene standards among food vendors remain essential in safeguarding the health and well-being of both students and staff at the university.

Data on the level of food hygiene practices among food vendors at the University of Nigeria, Nsukka, indicated that some of the vendors demonstrated poor personal hygiene practices (23.5%), while a little above average of them maintained good personal hygiene during food handling. Also in the practice of environmental hygiene not up to half of the respondents (49%) demonstrated high adherence to environmental hygiene standards (WHO 2020) as advocated by the World Health Organization since 2003 for use to prevent food borne diseases (FAO 2021). In a related study, the hygienic practice of street food vendors towards food safety was found to be 53% in Ethiopia (Adane et al., 2019) and 62.9% in Ghana (Tuglo et al., 2021)

The findings of this study highlight a relatively high level of awareness and implementation of food hygiene practices among food vendors, which aligns with the results of previous research conducted by Odo and Onoh (2018) within the same region. The majority of vendors exhibited at least an average level of compliance with food handling hygiene protocols, while a smaller proportion lacked adequate awareness of essential hygiene measures. This underscores the ongoing need for targeted education and training programs focused on enhancing food hygiene practices among vendors.

Existing literature has consistently established a strong correlation between knowledge of food hygiene and its practical application (Oseyemi, 2023). Therefore, implementing strategies to improve awareness and compliance with food hygiene standards remains crucial. Recognizing poor hygiene practices as a key concern is essential, as addressing this issue is fundamental to reducing the risk of foodborne illnesses and ensuring a safer food environment for consumers. By reinforcing hygiene training and implementing regulatory measures, the university community can further promote safe food practices among vendors, ultimately enhancing public health outcomes.

On the observed practice of food hygiene among the food vendors under study, all respondents (100%) wore clean clothes, indicating a basic adherence to hygiene standards. However, only a small proportion (14.5%) covered their hair, while the majority (85.5%) left it uncovered. Most vendors (81.5%) had neatly packed hair, and half (50.5%) wore an apron or overall while handling food. Encouragingly, a significant majority (83.5%) promptly covered food after serving. However, concerns emerged as a little fraction of respondents had visibly soiled hands, untrimmed fingernails. Additionally, the exhibition of poor hygienic habits such as touching their hair, nose, and mouth while serving food raise some implications for food contamination. Surprisingly, with the high knowledge of food hygiene of the vendor, 75.0% of respondents did not wash their hands before serving customers, and an overwhelming 94.5% handled money while serving food, further raising concerns about cross-contamination risks.

Furthermore, findings from this study suggest that while more than half of the respondents demonstrated commendable personal hygiene standards, lapses in crucial hygiene practices persist. These gaps indicate a pressing need for targeted interventions to address hygiene deficiencies and mitigate potential health risks. Environmental hygiene standards among the vendors were relatively high, with many maintaining clean selling surfaces and proper storage of food and water. However, the presence of vendors with poor or average environmental hygiene practices highlights the need for enhanced sanitation measures to prevent food contamination.

In terms of personal hygiene observations, a considerable number of vendors maintained acceptable standards, such as wearing clean clothes, keeping their hands clean, trimming their fingernails, and neatly packing their hair. However, some exhibited poor hygiene practices, including wearing painted or artificial fingernails and wiping hands on clothes, which pose contamination risks. Observations of environmental hygiene showed that most vendors used clean food warmers, kept their selling areas tidy, and made efforts to maintain a litter-free environment. They also utilized covered waste bins and clean water storage containers, demonstrating an awareness of sanitation practices.

Further observations of food handling practices revealed that many vendors maintained good hygiene, such as promptly covering food containers after serving. However, major concerns arose as many vendors did not use gloves when handling finger foods, continued to handle money while serving food, and frequently touched their body without washing their hands. These findings align with that of Kwoba et al. (2023), which emphasized that empowering food vendors with essential knowledge and practical tools is crucial for maintaining proper hygiene standards. Overall, improving personal, food and environmental hygiene practices is vital for safeguarding public health, enhancing vendor confidence and ensuring sustainable business growth of these RTE eateries.

## **CONCLUSION**

The study evaluated the food hygiene knowledge and practices of Ready-to-eat food vendors in the University of Nigeria, Nsukka community. Findings showed that some vendors demonstrated a commendable understanding of personal hygiene practices such as hand washing, proper attire, and maintaining cleanliness. Others displayed gaps in knowledge and inconsistent adherence to these practices. Although, some of the vendors possess high knowledge of food hygiene, gaps still exist in food handling and environmental hygiene practices. Iwu et al., 2017 also reported this same trend among food vendors in Owerri. Therefore, addressing these gaps is essential to preventing foodborne illnesses in the university community.

## **RECOMMENDATIONS**

This paper recommends that:

- i. The university management implement mandatory hygiene training programme for all food vendors and make the training a prerequisite for the registration of new food vendors in the community.
- ii. Periodic monitoring and evaluation of the RTE vendors should be conducted to sustain hygienic practices.
- iii. Finally, the vendors should be provided with access to pipe borne water and proper waste disposal facilities. This will ensure that clean water is used in meal preparation and wastes from the activities of the vendors are properly disposed of to prevent vectors from preying on them.

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