



Knowledge, Practices and Challenges of Rural Food Vendors Regarding Expired Food Products

Doris Eseoghene IKOGHO

Department of Health and Safety Education, Delta State University, Abraka Nigeria

ikogho.doris@delsu.edu.ng

Orcid no:0009-0007-2005-1699

Abstract

The purpose for the study was to examine the knowledge, practices, and challenges of rural food vendors regarding the handling and sale of expired food products in two rural university communities in Delta State, Nigeria. The design was descriptive cross-sectional research, with a structured questionnaire administered to 152 food vendors selected through multistage sampling. Data analysis was descriptive statistics of frequencies, means, and standard deviations. The findings revealed a moderate awareness of food safety, with participants showing the highest knowledge in proper food storage techniques ($M = 2.24$, $SD = 0.72$), but shows low awareness in detecting food spoilage ($M = 1.64$, $SD = 0.79$) and understanding the connection between hygiene practices and foodborne illnesses ($M = 1.74$, $SD = 0.71$). Practices indicated a dual trend of safety and risk: with some vendors adhering to safety practices such as separating expired from non-expired items ($M = 2.24$, $SD = 0.64$), high-risk behaviors such as selling expired food at reduced prices to avoid losses existed ($M = 2.65$, $SD = 0.55$). Cultural norms also had huge influence on food safety behaviors, with significant community expectations to avoid wastage of food ($M = 2.34$, $SD = 0.75$) and a reliance on traditional methods of preservation ($M = 2.08$, $SD = 0.78$). The study recommended the integration of targeted food safety education programs with improved access to safe water and sanitation facilities, and huge investment in infrastructure like storage and transportation. Additionally, there is need for government to strengthen food safety regulations to address cultural attitudes through community-based interventions for informal marketers. These are vital to reduce consumption of expired food items. These actions will support and promote public health, reduce foodborne illnesses, and will advance progress toward Sustainable Development Goals particularly those related to health, food security, and sustainable consumption.

Keywords: Food Safety Practices; Expired Food Products; Rural Food Vendors; Public Health; Food Handling Practices Vendor Awareness.

Introduction

Food safety is a fundamental pillar of public health, directly influencing individual and community well-being worldwide. In rural communities, particularly in Sub-Saharan Africa, food vendors play a vital role in ensuring access to food for local populations. However, these vendors are highly susceptible to selling or consuming expired food products due to a range of socioeconomic, infrastructural, and environmental challenges (Ahmad, Rahman & Rahman; 2015; Babor, et al., 2024). Factors such as unregulated supply chains, inadequate resources, and cultural attitudes toward food consumption contribute to this vulnerability, creating significant risks of contamination. Vendors often operate in unsanitary conditions, which, combined with poor hygiene practices and limited storage facilities, increase the prevalence of foodborne pathogens like *Salmonella*, *E. coli*, and *Listeria* (Adeyemi & Ogundare, 2020). These challenges pose a major public health concern, as highlighted by the World Health Organization (WHO), which reports approximately 600 million cases of foodborne illnesses annually, resulting in 420,000 deaths disproportionately affecting Sub-Saharan Africa and South Asia (Ayele & Mamu, 2018; Bravi et al., 2020). Economic pressures further exacerbate the situation, compelling rural vendors to sell low-quality or near-expiry products, thereby heightening risks for already vulnerable populations (Bravi et al., 2020).

Rural food vendors' vulnerability to selling expired food is driven by a combination of socioeconomic and infrastructural factors. Economic constraints, such as limited purchasing power and unstable employment opportunities, force vendors to rely on older stock to avoid losses (Koroma et al., 2024;). Similarly, marginalized communities face systemic barriers, including inadequate access to fresh produce (Kim et al, 2024). Poor infrastructure such as substandard roads and storage facilities further restricts vendors' ability to procure fresh stock, leading to increased reliance on older or suboptimal food supplies. Additionally, a lack of sanitation and potable water at market sites heightens the risk of food contamination (Ikogho & Igbudu, 2013; Salamandane et al., 2023). Inefficient government policies and limited regulatory oversight also hinder the implementation of food safety standards (Koroma et al., 2024; Zielińska et al., 2020).

Literature Review

The theory of planned behavior (TPB)

This theory was propounded by Icek Ajzen in 1985 and re-affirmed in 2015. The theory explained the cognitive factors shaping behaviors, intentions and actions. The theory stated that behavior is driven by 3 constructs namely; attitude toward the behavior, subjective norms, and perceived behavioral control. Thus, this theory provided a theoretical lens to examine the cognitive and social determinants of expired food consumption. According to TPB, negative attitudes toward expired food, influenced by perceived risks and health concerns, reduce consumption, while economic pressures can foster acceptance. Subjective norms, including societal expectations, can normalize unsafe practices in rural settings. Perceived behavioral control, constrained by socioeconomic factors and infrastructure gaps, affects individuals' capacity to avoid expired products. This TPB underscored the need for targeted interventions addressing attitudes, social norms, and structural barriers to promote safer food practices in rural communities.

Knowledge and Awareness of Foodborne Illnesses

Limited knowledge of food safety practices among food vendors remains a key contributor to foodborne illnesses. Research from Nigeria (Córdova-Ramos et al., 2023; Ikogho & Akpokiniowo, 2025) highlights poor hygiene and inadequate understanding. Additionally, low educational attainment among rural vendors has been linked to insufficient knowledge of food safety and expiration dates (Salamandane et al., 2023). Surprisingly, Zielińska et al., (2020) found an inverse relationship between food safety knowledge and years of vending experience, underscoring the need for ongoing training initiatives.

While many vendors are aware of basic hygiene principles, this awareness often fails to translate into effective practices (Erah et al., 2024; Lokoja et al., 2024). Consumer preferences for the visual appeal of food frequently outweigh safety concerns, leading to the sale of expired goods perceived as visually acceptable (Kaboka et al., 2024). For instance, despite 86.8% of maize vendors in Kenya reporting awareness of aflatoxin risks, critical knowledge gaps persist (Cherotich et al., 2024).

Health education interventions are pivotal in addressing these deficiencies. Emphasis should be placed on recognizing spoilage, checking expiration dates, and maintaining proper hygiene practices. Such efforts align with the One Health approach, integrating human, animal, and environmental health to mitigate the interconnected risks of foodborne illnesses, environmental contamination, and ecosystem degradation (Cherotich, 2024; Woo & Kim, 2019; Ikogho & Onoharigho, 2025).

Challenges and Their Implications

Vendors face numerous challenges that compromise food safety, including limited access to refrigeration, poor transportation networks, and insufficient food safety education. These systemic inefficiencies result in spoilage and waste of perishable items such as fruits, vegetables, and dairy products, contributing significantly to food waste. Inadequate storage facilities and lack of access to refrigeration contribute to the deterioration of food quality, increasing the likelihood of selling expired products (Cook et al., 2024). Vendors frequently lack access to clean water and sanitation, which exacerbates food safety issues and can lead to contamination (Ibrahim & Adeola, 2024; Woo & Kim, 2019).

While these factors highlight the challenges faced by rural food vendors, it is also important to consider that some vendors may prioritize food safety when they have access to training and resources, indicating that improvements in education and infrastructure could mitigate these vulnerabilities (Koroma et al., 2024). The Food and Agriculture Organization (FAO) estimates that 1.3 billion tons of food are wasted annually, with 40% of losses in developing regions occurring during post-harvest and processing stages. Food vendors in rural areas typically operate in informal markets, where strict regulation and enforcement of food safety standards are often absent or minimal (Erah et al., 2024). In such environments, food safety becomes secondary to immediate economic pressures, such as the need to meet daily sales targets or maintain profitability (Grasso et al., 2019). Vendors frequently rely on wholesalers who may offer discounted, near-expiry goods, which they then sell to local consumers at lower prices, increasing the risk of selling food past its expiration date. The demand for affordable food, coupled with the economic challenges faced by rural populations, can further exacerbate the tendency to consume expired products, despite the potential health risks associated with doing so. A Study by Koroma et al., showed that many rural vendors



operate in low-income settings, limiting their ability to invest in fresh inventory and leading to the sale of expired products to avoid losses (Koroma et al., 2024).

Cultural norms emphasizing resource conservation may also perpetuate health risks by normalizing the consumption of expired food, further endangering public health (Woo & Kim, 2019). The informal nature of rural markets, coupled with economic pressures, often prioritizes profitability over safety, leading vendors to sell discounted, near-expiry products to meet consumer demand.

Addressing these vulnerabilities require a multifaceted approach such as:

1. Implementing targeted health education programs to raise awareness among vendors and consumers about contamination risks and proper food handling.
2. Investing in better storage facilities, reliable transportation networks, and market sanitation to reduce spoilage and contamination.
3. Strengthening policies to monitor food supply chains and enforce safety standards in informal markets.
4. Promoting sustainable practices to minimize waste while safeguarding public health (Ikogho & Onoharigbo, 2025; Muyot, 2022).

These strategies will not only improve food safety and reduce waste but also contribute to achieving Sustainable Development Goals (SDGs), particularly those related to health, food security, and sustainable consumption (SDG 2: Zero Hunger, SDG 6: Clean Water and Sanitation, SDG 12: Responsible Consumption and SDG 13: Climate Action (Canova et al., 2020; Cook et al., 2024).

The objectives of this study are:

1. To assess the knowledge of rural food vendors regarding food safety and the sale of expired food items
2. To examine the practices of rural food vendors in handling, selling and consuming expired food products
3. To examine the socio-economic, infrastructural, and cultural factors influencing rural food vendors' vulnerability to selling and consuming expired food products.
4. To identify the socioeconomic challenges faced by rural food vendors in maintaining food safety
5. To determine the infrastructural challenges faced by rural food vendors

Statement of the Problem

Rural food vendors are always at the frontline of food distribution in many communities, yet they grapple with a web of challenges that undermine food safety particularly concerning the sale of expired food products. These challenges include inadequate refrigeration, unreliable transportation, insufficient food safety training, and lax regulatory

oversight. While awareness of food safety risks may exist, vendors often face economic pressures that drive them to sell low-quality or near-expiry products, placing public health at significant risk. Vulnerable groups, such as children, the elderly, and individuals with compromised immunity, are disproportionately affected, amplifying the urgency of addressing this issue. The gap between knowledge and practice, coupled with the absence of adequate infrastructure, further perpetuates the cycle of foodborne illnesses in these communities. This study looked at the intricate link between infrastructural deficits, cultural practices and socio-economic pressures as major drivers of the sale and consumption of expired food products. The insights gained are expected to inform targeted interventions that will support global efforts toward achieving the Sustainable Development Goals (SDGs), particularly in promoting public health, ensuring food security, and advancing sustainable agricultural practices. Addressing these issues is essential for safeguarding the health of rural populations and strengthening the resilience of food systems in Sub-Saharan Africa.

Research Questions

The following research questions were answered for the study;

1. What is the level of knowledge among rural food vendors regarding the risks associated with expired food products?
2. What are the prevailing practices of rural food vendors in handling, storing, and selling expired or near-expiry food products?
3. How do cultural beliefs and practices regarding expired food influence the sale and consumption of expired food?
4. In what ways do Infrastructural challenges impact Food Safety practices?

Methods

This study utilized a descriptive cross-sectional design to assess the knowledge, practices, and challenges of rural food vendors regarding expired food products. The research was carried out in two rural university communities in Delta State, Nigeria: Community A and Community B, were chosen due to their reliance on informal markets for food procurement and the high prevalence of foodborne illnesses reported in the region. The target was rural food vendors who sell perishable items such as fruits and vegetables. These vendors were selected based on their role in the food supply chain and their vulnerability in handling expired products due to infrastructural and economic challenges.

The sample size was calculated using the Taro Yamane formulae;

$$n = \frac{N}{1 + N(e)^2}$$

2 was added to sample size to account for likely non-responses resulting in a final sample size of 152 participants. A multistage sampling technique was adopted as follows;

1. Community members: Two communities were purposively selected based on the high prevalence of informal food markets.



2. Vendor Selection: Vendors were randomly sampled from a list provided by local market associations in both communities. The proportional allocation was used to ensure representation from both communities:

Community A: 80 vendors, community B: 72 vendors. The structured questionnaire with Likert-scale questions (Always=3, Sometimes=2, Never=1) were administered to assess vendors' knowledge, practices, and challenges regarding food safety consumption of expired food.

The questionnaire was validated by 2 experts in health and safety education, while reliability was established by a pilot test with 20 food vendors in a similar community which was not part of this study, yielding coefficient of $r = 0.81$. Data was collected over a 4 weeks period, with questionnaire administered with the help of 2 research assistants with informed consent obtained from all respondents. Analysis of data was done with descriptive statistics of frequencies, means, and standard deviations to interpret severity of challenges with mean as follows;

Mean above 2.1 = major challenge, mean between 1.6–2.0 = moderate challenge while mean less than 1.5 = minor challenge

Results

Research Question 1: what is the level of knowledge among rural food vendors regarding the risks associated with expired food products?

Table 1: Knowledge of risks of consuming Expired Food

S/N	Knowledge and Awareness of Food Safety	Mean	SD	Remark
1	Are you aware of the health risks associated with consuming expired food?	2.08	0.67	moderate awareness
2	Do you know how to identify signs of food spoilage?	1.64	0.79	Low Awareness
3	Do you regularly check expiration dates on food products?	1.97	0.75	Moderate Awareness
4	Are you knowledgeable about proper food storage techniques?	2.24	0.72	High Awareness
5	Are you aware of the relationship between hygiene practices and foodborne illnesses?	1.74	0.71	Low Awareness

Table 1 revealed that $M = 2.24$, $SD = 0.72$ had highest score for item 1 which states – if respondents are knowledgeable about proper food storage techniques, followed by awareness of the health risks associated with consuming expired food scoring $M = 2.08$, $SD = 0.67$, regular checking of expiration dates scored $M = 1.97$, $SD = 0.75$, both scoring moderate awareness. Contrastingly, lower means were recorded for identifying signs of food spoilage with $M = 1.64$, $SD = 0.79$ while awareness of the relationship between hygiene practices and foodborne illnesses recorded score; $M = 1.74$, $SD = 0.71$, suggesting gap in knowledge. Overall, findings indicated that although some basic food safety knowledge existed, there is a need for educational interventions, especially on spoilage detection and illness prevention strategies to promote food safety.

Research question 2: What are the prevailing practices of rural food vendors in handling, storing, and selling expired or near-expiry food products?

Table 2: Practices in handling food products

S/N	Practices in Handling Food Products	Mean	SD	Remark
1	Do you check expiration dates before selling food products?	2.11	0.79	Moderate Practice
2	Do you separate expired products from non-expired ones during sales?	2.24	0.64	Good Practice
3	Do you throw away expired food products that you cannot sell?	2.39	0.68	Good Practice
4	Do you rely on personal judgment (e.g., smell, texture) rather than expiration dates to assess safety?	2.39	0.68	High-Risk Practice
5	How often do you sell expired products at a reduced price to minimize financial losses?	2.65	0.55	High-Risk Practice

Table 2 showed that selling expired products at a reduced price to minimize financial losses with $M = 2.65$, $SD = 0.55$, was mostly reported. Similarly, reliance on personal judgment to assess safety of food products scored $M = 2.39$, $SD = 0.68$. Practices aligning with recommended food safety standards like throwing away expired food products that cannot be sold was $M = 2.39$, $SD = 0.68$, separating expired products from non-expired ones during sales recorded score of $M = 2.24$, $SD = 0.64$ showing some adherence to safety norms. Notably, the practice of routinely checking expiration dates before selling food ($M = 2.11$, $SD = 0.79$) revealed inconsistency in monitoring behaviors, with economic considerations prioritized over safety of consumers.

Research Question 3: How do cultural beliefs and practices regarding expired food influence the sale and consumption of expired food?

Table 3: Cultural beliefs and practices regarding Expired Food

S/N	Cultural Beliefs and Practices	Mean	SD	Remark
1	Do you believe that traditional preservation methods (e.g., drying, fermenting) make expired food safe for consumption?	2.08	0.78	Moderate Cultural Belief
2	How frequently do customers' cultural attitudes influence your decision to sell expired or near-expiry products?	1.96	0.81	Moderate Cultural Influence
3	How often do community practices emphasize minimizing food waste over adhering to expiration dates?	2.34	0.75	Strong Cultural Practice
4	Do cultural expectations in your community discourage the discarding of expired food products?	2.29	0.74	Strong Cultural Norm
5	How often do you encounter health issues in your community that may be related to consuming expired food?	2.24	0.73	Frequently Observed Issue

Table 3 recorded high influence of community practices over compliance with expiration dates with $M = 2.34$, $SD = 0.75$ as well as cultural norms discouraging the discarding of expired products ($M = 2.29$, $SD = 0.74$). Thus, belief in the efficacy of traditional preservation methods like drying and fermenting expired food, revealed moderate agreement between respondents ($M = 2.08$, $SD = 0.78$), showing a reliance on indigenous knowledge systems in spite of potential health risks. The influence of customers' cultural attitudes on vendors' decisions scored $M = 1.96$, $SD = 0.81$ while frequency of health issues potentially related to expired food had mean = 2.24, $SD = 0.73$.

Research question 4: In what ways do Infrastructural challenges impact Food Safety practices?

Table 4: Infrastructural Challenges in Ensuring Food Safety

S/N	Infrastructural Challenges in Ensuring Food Safety	Mean	SD	Remark
1	How often does the lack of proper refrigeration facilities contribute to the spoilage of food products you sell?	1.80	0.78	Moderate Challenge
2	How frequently does poor road infrastructure delay the transportation of fresh food to your market?	1.98	0.74	Moderate Challenge
3	How often does limited access to clean water at your vending site hinder proper food handling and hygiene?	2.27	0.79	Major Challenge
4	To what extent do storage limitations force you to sell food that is close to or past its expiration date?	2.20	0.83	Major Challenge
5	Do you find it challenging to access reliable suppliers who deliver food products within their expiration dates?	2.16	0.81	Major Challenge

Table 4 revealed that most critical infrastructural barriers identified were *limited access to clean water* ($M = 2.27$, $SD = 0.79$), *storage limitations* that compel vendors to sell near-expiry food ($M = 2.20$, $SD = 0.83$), with *difficulty accessing reliable suppliers* ($M = 2.16$, $SD = 0.81$). These challenges represented major constraints with vendors' ability to maintain hygienic conditions and ensure timely access to safe, consumable products. Moderate challenges recorded *poor road infrastructure* ($M = 1.98$, $SD = 0.74$), which may deter the distribution of perishable items, and the *lack of refrigeration facilities* ($M = 1.80$, $SD = 0.78$), may continue to reduce the shelf-life and quality of food products in market settings.

Discussions

The data analysis from this study suggests that while rural food vendors possess some knowledge of basic food safety such as general storage practices and awareness of expired food risks critical gaps remain in technical areas. Many vendors lacked the ability to accurately detect signs of food spoilage and demonstrated limited understanding of the relationship between hygiene practices and foodborne illnesses. These deficiencies indicate a partial understanding that may hinder effective risk prevention strategies. Limited formal education among many rural food vendors likely affects their ability to interpret expiry dates and understand microbial hazards. This finding supports previous research showing that food handlers often rely on personal experience rather than formal training, underscoring the need for targeted sensitization efforts in rural communities. It also aligns with studies emphasizing that inadequate food safety training results in poor hygiene and limited awareness of contamination risks (Córdova-Ramos et al., 2023; Salamandane et al., 2023). This partial

understanding is consistent with the Theory of Planned Behavior (TPB), which highlights how perceived behavioral control is influenced by limited knowledge and access to training.

The study revealed a blend of both safe and unsafe food practices among rural vendors. While some vendors engaged in commendable behaviors such as discarding unsellable food or separating expired items from fresh stock, there was also a notable occurrence of high-risk practices. These included selling expired products at discounted prices and relying on personal judgment rather than checking expiration dates. Such behaviors consistently reflect a prioritization of economic survival over consumer safety. The reasons for these may be due to economic survival to avoid losses and the consumer need for cheap food. These patterns are largely driven by severe economic constraints, as highlighted in the works of Grasso et al., (2019), Koroma et al., (2024), Kim et al., (2024), and Erah et al., (2024).

Cultural factors appear to play a significant role in shaping vendor behavior. The findings suggest a strong cultural inclination toward minimizing food waste, which often leads to the continued use and in some cases, the sale of expired food items. Community norms may also support the use of traditional preservation methods, based on the belief that such practices can render expired food safe for consumption. Likewise, consumer expectations grounded in these cultural beliefs may further influence vendor behavior. While these indigenous preservation techniques reflect resourcefulness, they are often perceived as adequate substitutes for expiration labels. This underscores the need for culturally sensitive interventions that promote safe food practices without disregarding community values. These findings are consistent with Koroma et al., (2024) who observed that indigenous norms can inadvertently normalize the consumption of expired food.

Infrastructural deficits emerged as a major challenge to food safety. Vendors faced limited access to clean water, inadequate storage capacity, and weak supply chains. These issues compromised hygiene, encouraged the sale of near-expiry food items, and ultimately diminished the overall quality and safety of food sold. Furthermore, poor road networks and a lack of refrigeration worsened distribution delays and shortened the shelf life of perishable goods. These findings align with the studies of Cook et al. (2024) and Ibrahim & Adeola (2024), who linked food spoilage and contamination to deficient market infrastructure. Similarly, FAO statistics highlight significant post-harvest losses, while Koroma et al. (2024) reinforce the idea that transport and storage limitations often compel vendors to compromise on food quality.

Conclusion

The findings have shown the complexity of the interplay of poor knowledge, cultural norms, risky practices, as well as infrastructural deficiencies contributing the challenges of food safety in rural markets. Although some safe practices existed, several unsafe behaviors enhanced by economic and cultural factors remain a threat to consumer health. Comprehensive strategies such as health education, engagement to community and improvements in infrastructural are key to promoting safer food environments in such communities.

Recommendations

1. Government and Regulatory Agencies should enforce and monitor food supply chains, and implement policies to support rural food vendors. They can also enhanced infrastructural support and capacity-building for vendors. This can be achieved in collaboration with the Ministries of Health, Agriculture, and Trade.



- They can also Increase inspections of rural markets, enforce penalties for selling expired food, and support compliance through vendor education.
2. Health and Safety Education Practitioners can target food safety education programs with improved access to safe water and sanitation facilities, and huge investment in infrastructure like storage and transportation. Additionally, they can also support initiatives to provide resources like storage facilities, clean water, and access to affordable food products and facilitate training sessions for rural vendors.
 3. The government can also help to subsidize storage and hygiene facilities in rural markets. State ministries of trade provided low-cost access refrigeration units, and storage solutions to minimize spoilage and contamination. They can also launch public awareness campaigns on expired food risks. public health educators can work with community leaders to tailor food safety messages that can respect traditional beliefs while promoting safer alternatives
 4. There is also a need for government to strengthen food safety regulations to address cultural attitudes through community-based interventions for informal marketers. These are vital to reduce consumption of expired food items. These actions will support and promote public health, reduce foodborne illnesses, and will advance progress toward Sustainable Development Goals especially those related to food security and health.



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