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## Review of Risks and Hazards Assessment of Ready-To-Eat Street Vended Foods in Oyo State, Nigeria

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### ABSTRACT

In Oyo State, Nigeria, street-vended foods play a significant role in the local culinary landscape, offering convenience and cultural richness to residents. However, ensuring the safety of these ready-to-eat foods requires assessing various risks and hazards associated with their preparation and handling. Hazards such as microbial contamination, unsafe handling practices, and environmental pollution pose significant health risks to consumers. These challenges are compounded by factors such as inadequate infrastructure, limited hygiene education among vendors, and weak regulatory enforcement. A case study focusing on Oyo State provides insights into the specific issues faced in assessing the safety of street-vended foods in the region. To address these challenges, best practices such as vendor education and training, infrastructure improvements, and public awareness campaigns are essential. Additionally, a robust regulatory framework is crucial for monitoring and enforcing food safety standards in the street food sector. Collaboration between government agencies, non-governmental organizations, and vendors is necessary to effectively mitigate risks and ensure the safety of street-vended foods, ultimately safeguarding public health and promoting a thriving culinary culture in Oyo State.

**Keywords:** Review, Risks, Hazards, Assessment, Ready-To-Eat, Street Vended Foods, Oyo State, Nigeria

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### 1. INTRODUCTION

Street foods are an important element of the culinary environment in Oyo State, Nigeria, reflecting a diverse tapestry of local cuisines, traditions, and cultural history. From savoury snacks like puff-puff and akara to nourishing dinners like jollof rice and suya, these delicacies show case the creativity and inventiveness of local merchants who masterfully create and sell them in bustling marketplaces, roadside kiosks, and bright street corners. Street-vendor foods are an important part of the informal food industry because they not only contribute to the local economy but also provide a necessary source of nutrition for many locals and visitors.

However, amidst the noise and bustle of street food vending, there is an underlying concern about food safety and hygiene. Ready-to-eat street food, in particular, presents a unique combination of risks and hazards due to the wide range of factors influencing its preparation, handling, and storage. The fast-paced nature of street food vending, along with limited resources and infrastructure, can make it difficult to maintain basic sanitary measures, ensure food quality, and prevent contamination. As a result, ingestion of contaminated street-vended meals has been linked to foodborne illnesses, infectious disease outbreaks, and public health problems, emphasizing the critical need for comprehensive risk assessment and management techniques (Adedayo *et.al.* 2022).

Effective interventions and efforts targeted at minimizing hazards, promoting best practices, and protecting public health can be implemented through a joint effort involving government agencies, local authorities, community organizations, and street food sellers themselves (Savold *et al.*, 2021). By raising awareness, promoting education, and empowering stakeholders, we can help to create a safer, healthier, and more sustainable street food environment in Oyo State, Nigeria, (Adu *et al.*, 2015) ensuring that street-vended foods continue to delight palates and enrich culinary experiences for future generations.

## **2.1 Street-Vended Foods**

Street-vended meals are a diverse range of culinary delicacies served by vendors in public places, usually along sidewalks, streets or at open-air marketplaces. (Tuglo *et al.*, 2021) These delicacies are made and served in temporary stalls, carts, or even right from the vendor's hands. Street food vendors frequently represent the local gastronomic culture, (Huynh-Van *et al.*, 2022) offering a broad range of flavours, ingredients, and cooking methods to suit passersby's palates. (Richardson, 2021).

### **2.1.1: Popular Street-Vended Foods in Oyo State**

Street-vended dishes are an important element of the local culinary environment in Oyo State, Nigeria, delivering a diverse range of flavours and textures. Some of the most popular street-vended meals in Oyo State are:

- i. Suya is a popular Nigerian street snack made of skewered and grilled meat, usually beef, chicken, or fish, seasoned with a spicy mix of ground peanuts, peppers, and other spices. It is commonly served with sliced onions, tomatoes, and a spicy pepper sauce.
- ii. Akara, also known as bean cakes or fritters, is a popular street food prepared with peeled and mashed black-eyed peas or beans combined with onions, peppers, and spices. The mixture is deep-fried till golden brown, resulting in crispy, savoury fritters served with pap (fermented cornmeal) or bread.
- iii. Spicy Ponmo: Ponmo, or cow skin, is a popular street snack in Oyo State, often served spicy and chewy. It is normally cooked and then seasoned with a spice blend before being served with stew or eaten on its own as an appetizer.
- iv. Roasted plantains or boli: are a popular street dish. They are both tasty and nutritious. Ripe plantains are roasted over an open flame until caramelized and soft, then served hot with groundnut sauce or eaten alone.
- v. Amala and Ewedu: Amala, a savoury yam flour dough, is a popular street snack in Oyo State. It is typically served with an aromatic stew of ewedu (jute leaves) and various meats or fish.
- vi. Kulikuli: Kulikuli snacks are popular Nigerian snacks made from roasted peanuts (groundnuts) that are ground into a paste, mixed with spices, and deep-fried until crispy

- vii. Akara Ogbomoso: Akara itself is a popular Nigerian snack made from peeled and blended black-eyed peas or beans, mixed with spices, onions, and sometimes peppers
- viii. Soy cheese: Soy cheese is typically made by curdling soy milk and then adding flavorings, seasonings, and sometimes thickeners to create a cheese-like texture and taste.
- ix. Meat pie: It typically consists of a flaky pastry crust filled with a mixture of minced meat (such as beef, lamb, or chicken), vegetables (commonly onions, carrots, and peas), and savory seasonings.
- x. Kokoro snacks: Kokoro snacks are a traditional Nigerian snack made from corn flour and sugar. The name "kokoro" is derived from the Yoruba language, spoken in southwestern Nigeria, where this snack is particularly popular.
- xi. Plantain chips: Plantain chips are a popular snack made from thinly sliced plantains that are deep-fried or baked until crispy. Plantains are starchy fruits related to bananas but are typically larger and less sweet when ripe.

These street vendors not only provide easy and affordable food for locals and visitors, but they also serve as culinary ambassadors for Oyo State's unique food culture.

### **2.1.2 Significance of Street-Vended Foods in the Local Culture**

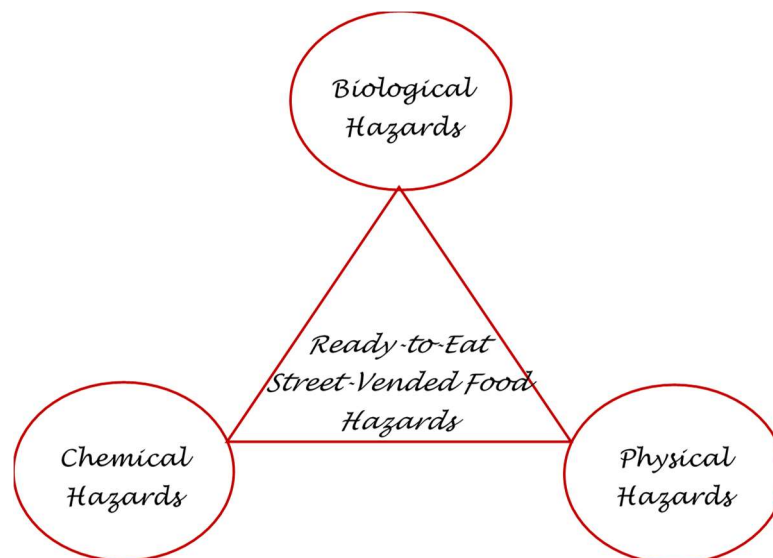
Street-vendor dishes have a deep cultural importance in Oyo State, functioning as more than just a source of nutrition (Adeosun *et al.*,2022). They represent a sense of community, tradition, and heritage, fostering relationships between sellers, customers, and the larger society. First, street-vended dishes represent a culinary legacy passed down through generations, maintaining time-honored recipes and cooking techniques (Tjarve and Zemite), that are firmly ingrained in the local culture. Vendors frequently acquire their art from family members or apprenticeships, giving each meal a feeling of history and authenticity. ( Dixon, and Isaacs) Furthermore, street-vended dishes reflect Oyo State's broad cultural past, demonstrating the blending of flavours and influences from numerous ethnic groups in Nigeria and beyond.( Ota and Ecoma).Whether it's the spicy suya, inspired by Northern Nigerian cuisine, or the savoury akara, with West African origins, these dishes showcase Oyo State's multicultural culinary culture. (Man, 2022).

Al-Jundi *et al.*, (2020) reported that aside from their culinary appeal, street-vended meals serve an important role in the informal economy, providing income for numerous vendors and their families. For many entrepreneurs, selling street food is a means of achieving economic independence and empowerment by providing prospects for self-employment and revenue generation. (Salamandane *et al.*,2023). Furthermore, street food vendors contribute to Oyo State's social fabric by functioning as bustling areas of activity where citizens dine, socialise, and exchange news and gossip. Leshi and Leshi, (2017). Whether it's a roadside suya stand teeming with discussion or a crowded market stall serving steaming bowls of *amala*, these communal places generate a sense of connection and friendship among locals.

### **2.2 Hazards and Risk Factors in Ready-to-Eat Street-Vended Foods**

Understanding these hazards is crucial for both consumers and vendors to ensure food safety and prevent adverse health effects. In this review, the basic hazards are classified as: biological, chemical and physical hazards as shown Figure 1.

- i. **Biological Hazards:** Street-vended foods may contain germs like bacteria, viruses, parasites, and fungi. These bacteria can contaminate food at several stages, including production, handling, and storage. Inadequate hygiene measures, inappropriate temperature management, cross-contamination, and the use of polluted water or ingredients are all factors that contribute to biological hazards. (Khalek *et al.*,2021).
- ii. **Chemical Hazards:** Food may contain dangerous compounds such as pesticides, heavy metals, additives, and natural poisons. Chemical contamination in street-vended foods can arise as a result of using contaminated water to wash components, inappropriate chemical storage, pesticide residues on crops, and additives used to enhance or preserve flavours. Additionally, using unauthorized food colours or adulterants puts consumers at danger.



**Figure 1: Types of Hazards in Ready-to-Eat Street-Vended Foods in Oyo State**

- iii. **Physical Hazards:** Foreign items or substances mistakenly present in food might cause choking or damage during ingestion. Glass, metal shards, plastic, hair, insects, and bones are common physical pollutants found in street cuisine. (Simiyu *et al.*,2021). These pollutants can enter food during manufacturing, handling, or packaging, emphasizing the significance of effective quality control procedures. (Grok *et al.*,2021).

### **2.2.1 Common Sources of Hazards in Street-Vended Foods:**

- i. **Poor Hygiene Practices:** Inadequate handwashing, inappropriate food handling, and lack of sanitation facilities can lead to the spread of biological pollutants.
- ii. **Unsafe Water Sources:** Contaminated water used for washing, cooking, or cleaning can cause foodborne illnesses.
- iii. **Inadequate temperature control** during food preparation, storage, and display leads to bacterial development and increased risk of foodborne infections.

- iv. Cross-Contamination: Contacting raw and cooked foods, as well as contaminated surfaces or utensils, can spread hazardous bacteria, chemicals, or physical contaminants.
- v. Unsanitary conditions, such as congested or polluted places, increase the risk of food contamination among street sellers.

### **2.2.2 Potential Health Risks Associated with Consuming Contaminated Foods**

Consuming contaminated foods increases the risk of foodborne illness, which can be caused by bacteria, viruses, parasites, or chemical pollutants. Symptoms can range from minor gastrointestinal discomfort to severe sickness, including vomiting, diarrhoea, fever, and even death in rare situations (Cudjoe et al., 2022). Vulnerable populations include youngsters, the elderly, pregnant women, and those with impaired immune systems. Consuming polluted street food can pose health dangers, (such as:

- i. Foodborne Illnesses: Pathogenic bacteria, such as Salmonella, E. coli, or Staphylococcus aureus, can produce symptoms like diarrhoea, vomiting, abdominal discomfort, and fever.
- ii. Food Poisoning: Consuming foods contaminated with toxins from bacteria or moulds can cause symptoms like nausea, dizziness, and dehydration.
- iii. Allergic Reactions: Unknown allergens or cross-contact with sensitive foods can cause allergic reactions, ranging from mild itching to severe anaphylaxis.
- iv. Chemical Toxicity: High amounts of chemical pollutants, including heavy metals or pesticide residues, can cause acute or chronic toxicity in the neurological, gastrointestinal, and reproductive systems.
- v. Foreign objects or impurities in food can cause choking, oral damage, or gastrointestinal obstructions, especially in youngsters and the elderly.

### **2.2.3 Risk Factors in Street-Vended Foods**

Street-vended foods provide a variety of culinary pleasures, but they are frequently connected with distinct risk considerations. (Seo and Lee, 2021). These foods may contain contaminants that cause foodborne diseases due to improper handling or poor hygiene procedures. Understanding the risk elements in street-vendor goods is critical to protecting consumer safety and public health. (Austin et al., 2020). This study investigates the multidimensional nature of these dangers, which include obstacles in food handling, environmental circumstances, and regulatory monitoring.(Ahmad et al., 2023). Effective risk management is critical for improving the safety and quality of street-vended foods, protecting consumer health, and instilling faith in this thriving culinary heritage.(Madario et al.,2023).

Identifying risk factors in the preparation and handling of street-vended meals, understanding the impact of environmental factors on food safety, (Rohith, 2021), and recognizing the critical role of food vendors in risk and hazard mitigation are all critical for public health protection. ( Parikh et al.,2022). The risk factors include:

- i. Poor Hygiene Practices: Street food vendors frequently work in locations with limited access to clean water and sanitation services. (Mwove et al.,2020). This can lead to vendors not following proper handwashing standards, raising the risk of disease infection.
- Unsafe Food Sources: Many street food vendors get their supplies from informal markets or unregulated suppliers, where food safety regulations may not be followed. Contaminated or rotten components can bring dangerous germs, viruses, or poisons into the food supply chain.



- ii. **Inadequate Food Storage:** Street food vendors frequently lack proper refrigeration and storage facilities, resulting in the poor storage of perishable products. Inadequate temperature management can encourage bacterial development and food spoiling, endangering consumers' health.
- iii. **Cross-Contamination:** Because of the limited workspace and equipment available in street food vendors, raw and cooked foods are more likely to be contaminated. Using the same utensils or surfaces to handle raw and cooked products can spread germs and allergies, potentially resulting in foodborne diseases.
- iv. **Inadequate Cooking and Reheating:** Due to time restrictions and limited resources, street food vendors may not cook or reheat food to the required temperature to kill hazardous bacteria. Undercooked or improperly reheated foods can harbour pathogens, posing health risks to consumers.
- v. **Lack of Food Safety Knowledge:** Street food vendors often lack formal training in food safety practices and may not be aware of proper hygiene, storage, and cooking techniques.

#### **2.2.4 Impact of Environmental Factors on Food Safety**

The impact of environmental factors on food safety is profound and multifaceted. Environmental conditions encompass a broad spectrum, including temperature, humidity, air quality, water quality, and the presence of pests and pollutants. (Subedi *et al.*, 2023). These factors significantly influence the safety and quality of food throughout the production, processing, distribution, and consumption stages. Understanding their impact is essential for mitigating risks associated with microbial contamination, chemical hazards, and physical hazards. (Gallo *et al.*, 2020). This work provides a brief overview of how environmental factors shape food safety outcomes, highlighting the importance of proactive measures to maintain a safe and sustainable food supply chain (Oladipo-Adekeye and Tabit, 2021).

These environmental factors include:

- i. **Temperature and Weather Conditions** Extreme temperatures and bad weather conditions might compromise the safety of street-vendor foods. (Cortese *et al.*, 2016). Hot and humid settings encourage bacterial growth, whereas direct sunshine can hasten food spoiling. In contrast, low temperatures can impair effective food storage and heating, increasing the risk of foodborne illness.
- ii. **Air and Water Quality:** Pollution and pollution of urban air and water sources can have an indirect impact on the safety of street food vendors. Airborne contaminants like dust and exhaust fumes can land on food surfaces, and polluted water used for cleaning and food preparation can introduce pathogens into the food supply chain.
- iii. **Inadequate infrastructure and waste management systems** in cities can lead to environmental contamination and food safety hazards. Improper trash disposal, especially food scraps and packing debris, can attract bugs and vermin, which can spread diseases to food.
- iv. **Crowded and Unsanitary Conditions:** Overcrowding in metropolitan settings, particularly at popular street food markets, can worsen food safety concerns. Congested areas and unclean circumstances enhance the risk of cross-contamination and the transmission of foodborne diseases between vendors and customers.

- v. Chemical pollutants can enter the food chain through environmental pollution caused by industrial activity, agricultural runoff, and poor waste disposal. Street-vended foods may be particularly prone to contamination with pesticides, heavy metals, and other toxic chemicals, causing long-term health hazards for customers.

#### 2.2.4 Role of Food Vendors in Mitigating Risks and Hazards

Food vendors play an important role in the food supply chain, especially in street food situations where they serve as the first line of ready-to-eat food for millions of consumers worldwide (Hilim,2020). Amidst the bustling streets and vivid markets, these vendors not only provide convenience and culinary diversity, but they also bear responsibility for the safety and quality of the foods they sell. Food vendors play a critical role in reducing the risks and hazards connected with street-vended foods, as their actions have a direct impact on public health and food safety results. (Rakha *et al.*,2022). In Oyo State, street food vending is an important source of income for many people, frequently operating in informal economies with no governmental monitoring.( Olatunji *et al.*,2021).

Despite confronting numerous problems such as restricted access to resources, inadequate infrastructure, and insufficient training in food safety measures, (Wang *et al.*, 2019) street food sellers play an important role in reducing the risk of foodborne illness and other dangers. Henson and Jaffee (2008). Understanding the critical role of food sellers and the complexities of their operating contexts allows us to build targeted interventions and support mechanisms to improve food safety,(Khair *et al.*, 2018) safeguard public health, and promote the long-term viability of street food vending globally.(Okocha *et al.*,2018).

Some of the ways by which food vendors can mitigate risks and hazards are:

- i. **Adherence to Hygiene standards:** Street food vendors play an important role in ensuring good hygiene standards to reduce food safety hazards. Mukwevho,(2018) This involves regularly washing your hands with soap and water, using clean utensils and surfaces, and wearing suitable protective apparel, such as gloves and aprons. (Mahopo *et al.*, 2023; Reddy *et al.*,2020).
- ii. **Getting Safe Products:** Vendors should prioritize getting products from trustworthy suppliers who follow food safety guidelines and laws.(Cortese *et al.*, 2016).Regular inspections of food sources and ingredients can help reduce the danger of contamination while also ensuring the quality and safety of street-vended foods.
- iii. **Proper Food Handling and Storage:** Street food vendors must adhere to best standards for food handling, storage, and preparation to avoid contamination and foodborne illnesses.( Straw *et al.*,2011). This includes properly storing perishable materials, keeping raw and cooked foods separately, and thoroughly cooking and reheating food to the proper temperature.
- iv. **Education and Training:** To improve their knowledge and skills, street food vendors must participate in ongoing food safety and hygiene training programs. (Nkosi and Tabit, (2021) Government authorities, non-profit organizations, and industry groups can help educate vendors about safe food handling procedures and regulatory compliance. (Addo-Tham *et al.*,2020).
- v. **Community Engagement:** Working with local communities and consumers can increase transparency and confidence in the street food industry. Vendors can communicate their commitment to food safety through signs, labelling, and interactive demonstrations, encouraging customers to make informed food selections. (Reddy *et al.*, 2020).

- vi. **Collaboration with Regulatory Authorities:** Street food sellers and regulatory authorities must work together to establish and enforce food safety regulations. Vendors should collaborate during inspections, permit applications, and compliance checks to ensure that specified standards and regulations are followed.( Asiegbu et al.,2020).

### 3. RISKS AND HAZARDS ASSESSMENT METHODS USED IN STREET-VENDED FOODS

Street food vendors are an important part of urban food systems around the world, providing convenient and culturally diverse gastronomic options (Lee,2020). However, the eating of street-vented meals entails inherent risks due to the many hazards related to their preparation, handling, and storage.(Eke and Elechi, 2021; Saputro et al.,2022). To ensure food safety and public health, thorough evaluation procedures are required to detect and successfully manage these hazards.(Rohith, 2021).

Some of the methodologies used to assess risks and hazards in street-vendor foods include:

- i. **Hazard Analysis and Critical Control Points (HACCP):** The food sector relies on Hazard Analysis and Critical Control Points (HACCP) to identify possible risks and execute safety measures. (Dlamini and Adetunji, 2023).Its application in street-vented foods necessitates a methodical strategy that takes into account every stage of the food manufacturing process, from component procurement to final consumption. (Ibrahim, 2020). HACCP reduces the risk of microbiological contamination, chemical hazards, and physical hazards by identifying important control points such as cooking temperatures, storage conditions, and hygiene standards.( Kamboj, 2020; Owusu-Apenten and Vieira, 2022).
- ii. **Microbiological Testing:** Microbiological testing is crucial for determining the safety of street-vented meals by identifying harmful microorganisms.(ED and BC, 2024). Sampling and testing food products for bacteria, viruses, and parasites provides essential information on microbial contamination levels, allowing authorities to implement suitable hygiene standards and preventive measures. (Mohammed and Shehasen, (2020). Common microbiological tests include total plate count, pathogen identification (e.g., Salmonella, Escherichia coli), and hygiene indicator analysis.(Sabbithi et al., 2021).
- iii. **Chemical Analysis:** Chemical dangers in street-vendor foods represent serious health risks if they exceed allowed levels.(Badr and Arafa, 2023). Chemical analysis techniques such as chromatography, spectroscopy, and mass spectrometry can detect and quantify pollutants such as pesticides, heavy metals, mycotoxins, and food additives. Regular monitoring of chemical residues maintains regulatory compliance and protects consumers from acute and chronic health impacts caused by chemical exposure. (Ejaz et al., 2020: Hassan and Farooq, 2022).
- iv. **Physical Inspection:** Visual inspection is an immediate assessment tool for identifying physical concerns that could jeopardize the safety and quality of street-vented foods. (Sameen et al.,2022).Inspectors examine food facilities, equipment, and food handling techniques to identify potential sources of contamination, foreign objects, and unsanitary conditions. Observations made during inspections help to determine regulatory measures such as issuing warnings, imposing penalties, or withdrawing permits in order to reduce hazards and safeguard public health (Adedayo et.al. 2022).



- v. Surveillance and Epidemiological Data: Surveillance systems and epidemiological research provide useful information about foodborne illness outbreaks and trends in street-vended foods.(Ajayi and Oluwoye, 2015). Surveillance data analysis allows health authorities to discover common diseases, high-risk food products, and vulnerable groups, resulting in focused interventions and risk communication techniques. (Imathlu, 2017). Authorities can assess the success of food safety interventions and prioritize public health initiatives by tracking epidemiological indicators such as incidence rates, hospitalizations, and fatality rates associated with foodborne illnesses. (Osei- Tutu and Anto, 2016).

### **3.1 Challenges Faced in Conducting Assessments in Street Food Settings**

- i. Street food vending is generally informal and uncontrolled, with a decentralized administration, (Molai, 2019) minimal inspection, and different levels of food safety requirements. (Jacxsens et al.,2010). Street vending's informal character makes it difficult to create systematic assessment methods, perform inspections, and enforce regulatory requirements.(Tang and Zheng, 2023).
- ii. Street food vendors' movement complicates frequent assessment and monitoring efforts. Vendors' locations may move regularly, (Bengtsson et al., 2011) making it difficult for regulatory authorities to monitor their activities, enforce compliance, and give timely support. Mobile street vending poses logistical issues in terms of resource allocation, coordination, and accessibility for inspection and surveillance operations.
- iii. Cultural and Socioeconomic Factors: Cultural customs, socioeconomic inequities, and linguistic obstacles impact food safety behaviours and perceptions among street food sellers and consumers. (Patel et al., 2014). Traditional culinary customs, informal social networks, and economic pressures may all influence vendors' willingness to adopt sanitary procedures, participate in training programmes, or meet statutory criteria. Cultural competency and specialised communication methods are critical for overcoming cultural and socioeconomic hurdles to food safety in street food environments.
- iv. Resource Constraints: Regulatory agencies may struggle to conduct complete assessments and support street food sellers due to limited funds, staffing, and infrastructure. (Odom-Young et al., 2009). Insufficient funding for training, equipment, and data management stymies efforts to monitor compliance, investigate complaints, and implement preventive measures. Resource mobilization, capacity-building efforts, and public-private partnerships are critical for overcoming resource restrictions and improving regulatory efficacy in street food environments.
- v. Resistance to Change: Implementing food safety interventions and adopting new practices can be challenging due to resistance from street food sellers, consumers, and stakeholders.(Unnevehr, 2022). Vendors may regard regulatory requirements as difficult, costly, or incompatible with their operating realities, resulting in non-compliance, evasion, or informal adaption tactics. To overcome change resistance, specific communication, education, and capacity-building initiatives must be made to address vendors' concerns, establish trust, and create collaboration between regulatory agencies and street food groups.(Brike and Zawide, 2019).

#### **3.1.1 Importance of Regular Monitoring and Evaluation**

Regular monitoring and evaluation play a pivotal role in ensuring the effectiveness and sustainability of various initiatives across sectors, including public health, education, and environmental conservation.(Frieden, 2014).

In the realm of public health and food safety, consistent monitoring and evaluation are essential for identifying emerging risks, assessing the impact of interventions, and guiding evidence-based decision-making. Specifically, in the context of food safety, regular monitoring allows for the detection of potential hazards, such as microbial contamination or unsafe handling practices, in food production, processing, and distribution. By systematically collecting and analyzing data on food safety indicators, such as hygiene practices, sanitation standards, and microbiological testing results, stakeholders can proactively identify areas for improvement and implement targeted interventions to mitigate risks. (Krezieva et al., 2013). Thus, the importance of regular monitoring and evaluation are summarized below:

- i. **Prevention of Foodborne Illnesses:** Foodborne illness prevention requires regular monitoring and evaluation of street-vended items. (Frankish et al., 2022). By proactively identifying dangers and adopting control measures, regulatory agencies can reduce the risk of microbiological contamination, chemical hazards, and physical hazards, lowering the incidence of foodborne diseases and protecting public health.
- ii. **Quality Assurance:** Constant monitoring and evaluation assure compliance with food safety standards and regulations (Trienekens and Zuurbier, 2008). Regular audits of vendors' procedures, infrastructure, and hygiene protocols boost consumer confidence in the safety of street food. (Fayaz et al., 2020).
- iii. **Continuous Improvement:** Evaluation acts as a driver for ongoing improvements in food safety management systems. Stakeholders may develop their food safety practices, reduce risks, and improve overall operations by analyzing assessment results, identifying areas for improvement, and adopting corrective actions. (Sikora, 2005).
- iv. **Public Health Protection:** Regular monitoring and evaluation are critical for protecting public health and developing a food safety culture among street food vendors. Authorities can reduce risks, prevent foodborne diseases, and protect consumer health by enforcing regulatory requirements, promoting knowledge about food safety principles, and offering assistance to vendors. ( Jose and Villanueva, 2023).

### **3.1.2 Challenges Faced in Conducting Assessments in Street Food Settings**

Conducting assessments in street food establishments involves a slew of obstacles due to the particular characteristics of this informal sector. One of the most significant challenges is the dynamic and decentralized nature of street food vending, which frequently operates outside of conventional legal systems. This makes it difficult to develop standardized evaluation processes and enforce compliance with food safety regulations. Furthermore, the absence of infrastructure and resources in many street food situations creates substantial barriers to completing full studies. Inadequate access to clean water, proper sanitation facilities, and reliable energy impedes efforts to maintain hygiene and monitor food handling standards properly. Furthermore, the variety of street food choices, ranging from traditional specialties to current fusion cuisine, complicates the evaluation process, necessitating a thorough awareness of local culinary techniques and ingredients. Street sellers frequently suffer budgetary constraints and have limited access to food safety education and training. Furthermore, cultural practices, socioeconomic disparities, and linguistic barriers all influence food handling behaviours and food safety perceptions among street food vendors and consumers. Traditional culinary habits, informal social networks, and economic constraints can all influence vendors' willingness to follow hygienic procedures, participate in training programs, or meet legislative requirements.

In addition, regulatory bodies may have resource constraints such as a lack of funds, a scarcity of workers, and inadequate infrastructure. Inadequate money for training, equipment, and data management hinders efforts to monitor compliance, investigate complaints, and implement preventive actions. Similarly, the movement of street food sellers impedes frequent inspection and monitoring efforts. Vendor locations may change frequently, making it difficult for regulatory authorities to monitor their activities, enforce compliance, and provide timely assistance. (Trautman, 2015). Similarly, street food vendors, customers, and other stakeholders are reluctant to change, making it difficult to implement food safety standards and adopt new practices. (Pothukuchi and Kaufman, 1999). Vendors may view regulatory requirements as burdensome, costly, or incompatible with their operational realities, leading to non-compliance, evasion, or informal adaptation strategies. (WHO, 2021). Despite these limitations, conducting assessments in street food establishments is critical for preserving public health, raising food safety awareness, and encouraging sustainable development in urban food systems. (Krishnasree et al., 2018).

#### **4. OVERVIEW OF EXISTING REGULATIONS GOVERNING STREET FOOD VENDORS IN OYO STATE**

In Oyo State, street food vendors are subject to a variety of restrictions aimed at protecting public health and ensuring food safety. (Oseyemi, 2023). The regulatory framework includes laws, rules, and guidelines enacted by government bodies such as the Oyo State Ministry of Health and the Oyo State Environmental Protection Agency (OYEPA). To operate legally, street food sellers in Oyo State must get licenses or permits from the necessary authorities. These licenses often include an inspection of the vendor's premises, sanitary methods, and compliance with food safety requirements. (Rosales et al., 2023). Failure to get the required permits may result in penalties or the closure of the vending operation. Also, Oyo State has implemented food safety standards that are consistent with national rules, such as the National Agency for Food and Drug Administration and Control (NAFDAC) recommendations and the Nigerian Industrial Standards (NIS).

These regulations address different areas of food production, processing, storage, and distribution to avoid foodborne illnesses and ensure the quality of street-vending foods. (Mogles et al., 2024). Likewise, street food vendors must follow stringent hygiene and sanitation practices to reduce the danger of food contamination. This includes keeping food preparation surfaces clean, washing hands frequently, using clean tools and equipment, and storing food at the proper temperature. Inspections by regulatory agencies help to enforce compliance with these criteria. (Khadem Broojerdi et al., 2020).

Similarly, Street-vendor items must be clearly labelled and packaged to provide consumers with important information such as ingredients, allergens, and expiration dates. Proper labeling allows consumers to make educated decisions and ensures transparency in food transactions. (Lu et al., 2021). In addition, effective waste management is critical for preventing environmental contamination and maintaining hygienic standards in street food selling places. Vendors must dispose of waste responsibly, separate organic and non-organic waste, and avoid littering or dumping in public areas. However, Effective enforcement of food safety regulations is crucial to uphold public health and consumer welfare. (Liguori et al., 2022).

In Oyo State, several mechanisms are employed to monitor and enforce compliance among street food vendors. These include:

- i. **Inspections and Monitoring:** Regulatory organizations evaluate street food vending outlets regularly to ensure that they meet food safety regulations. Inspectors assess vendors' premises, food handling techniques, sanitary facilities, and compliance with licensing regulations. Non-compliance can result in warnings, fines, or the closure of non-compliant businesses.
- ii. **Training and Capacity Building:** Government agencies organize training programs and capacity-building activities to educate street food vendors on food safety principles, cleanliness practices, and regulatory requirements. Training programs provide suppliers with the knowledge and skills necessary to comply with legislation and maintain food safety standards in their operations.
- iii. **Public Awareness Campaigns:** Public awareness campaigns educate consumers on the necessity of purchasing food from licensed vendors that follow food safety guidelines. Posters, fliers, and social media ads highlight the dangers of eating uncontrolled street food while encouraging appropriate eating habits.
- iv. **Stakeholder Collaboration:** Government agencies, industry associations, community leaders, and other stakeholders work together to boost regulatory enforcement activities. Partnerships provide information exchange, joint activities, and coordinated responses to food safety concerns, promoting a collaborative approach to public health protection.
- v. **Enforcement agencies** have the authority to penalize and sanction non-compliant street food vendors. Fines, license suspension or revocation, confiscation of unsanitary food products, and legal action against repeat violators are all possible penalties. Strict penalty enforcement discourages noncompliance and emphasizes the significance of following food safety laws.

While existing legislation lays the groundwork for maintaining food safety in street selling, there are potentials to strengthen the regulatory framework, improve compliance with food safety standards, and protect public health and consumer welfare in Oyo State including:

- i. Collaboration among regulatory agencies, local authorities, and community organizations can enhance coordination, information sharing, and enforcement. Multi-stakeholder collaborations use a variety of expertise and resources to effectively solve food safety concerns.
- ii. Investing in training programs and capacity-building initiatives helps street food sellers improve their knowledge, skills, and awareness of food safety practices.
- iii. Using digital solutions, including mobile apps for licensing, inspection, and reporting, improves regulatory processes and transparency in enforcement.
- iv. Engaging with street food sellers, consumers, and community members promotes trust, cooperation, and shared responsibility for food safety.
- v. Investing in research and innovation leads to the creation of new technology, procedures, and tools to improve food safety for street vendors.

## 5. CONCLUSION

In conclusion, addressing risks and hazards in street-vended meals in Oyo State necessitates a diversified strategy. Integrating scientific approaches, legal frameworks, and sociocultural factors is critical.



By prioritizing regular monitoring, using a variety of assessment methodologies, and overcoming inherent hurdles, stakeholders can improve food safety and encourage sustainable street food vending. Collaboration, innovative solutions, and stakeholder participation are required for significant advances that benefit vendors, consumers, and communities. Identifying risk concerns, comprehending environmental implications, and recognizing vendors' duties are critical for protecting public health and ensuring the industry's sustainability. Implementing procedures, encouraging teamwork, and ensuring regulatory compliance are critical to improving street-vended food safety while maintaining its cultural and economic value.

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