UNIOFFA JOURNAL OF INTERDISCIPLINARY STUDIES (U-OJIS)
A Multidisciplinary Journal of Science, Management and Social Sciences
Website: www.unioffajis.com
ISSN:3141-5571
E-ISSN:3141-558X

Assessment of Food Hygiene Practices and Microbiological Quality of Ready-to-Eat Foods in Food Outlets in Malete, Kwara State, Nigeria

BY

AMBALI, Khadijat Olamide
Department of Environmental Health Sciences,
Faculty of Allied Health Sciences,
Kwara State University, Malete
+2349135383970

ADIAMA, B.Y PhD
Department of Environmental Health Sciences,
Faculty of Allied Health Sciences,
Kwara State University, Malete
+2348035223698

Volume 1:2

ABSTRACT

Food-borne illnesses present significant public health and economic challenges, particularly in developing countries with expanding institutional environments. This study evaluated food safety knowledge, hygiene practices, and the microbiological quality of ready-to-eat (RTE) foods across 30 selected food outlets in Malete, Moro Local Government Area, Kwara State, Nigeria. A mixed-method approach was employed, integrating a descriptive cross-sectional survey (n = 30) with laboratory-based microbial analysis of 15 RTE food samples. Survey data revealed that while most respondents possessed basic formal education (43.3% SSCE) and moderate work experience (50.0% with 4–6 years), formal food safety training was critically lacking: 73.3% had never attended a safe food handling course, and 66.7% had never attended food safety seminars. Key observational hygiene gaps included non-compliance with handwashing prior to handling unwrapped food (73.3%), low usage of gloves (86.7%), face masks (80.0%), and head caps (56.7%), along with widespread practices fostering cross-contamination (83.3% did not separate chopping boards; 66.7% failed to sanitize knives post-raw meat preparation). Furthermore, 60.0% reported working while experiencing symptoms of illness. Microbiological analysis supported these behavioral findings, detecting total bacterial counts ranging from 1.9 × 10^4 to 4.5 × 10^4 cfu/g in local outlets and 6.0 × 10^3 to 3.2 × 10^4 cfu/g in restaurant samples. Coliforms were isolated from several samples (including moin-moin, beans, rice, noodles, and fried rice), and Escherichia coli was isolated from beans. A clear gap between theoretical awareness and actual compliance was identified. Interventions such as mandatory food safety certification, regular municipal inspections, provision of handwashing infrastructure, and targeted behavioral training are strongly recommended to mitigate food-borne health risks.

Keywords: *Food Safety, Hygiene Practices, Ready-to-Eat Foods, Escherichia coli, Food Handlers, Microbial Quality, Malete.*

ISSN:3141-5571
E-ISSN:3141-558X

Introduction

Background

Food safety and environmental hygiene are critical pillars of public health, directly impacting economic productivity and population well-being. Globally, food-borne diseases account for an estimated 600 million illnesses and 420,000 deaths annually, translating to a loss of 33 million disability-adjusted life years (DALYs). Developing nations bear a disproportionate burden due to infrastructural deficits, rapid urbanization, and inadequate institutional regulatory frameworks.

In Sub-Saharan Africa, food safety risks are accentuated by a reliance on informal commercial food outlets, street vendors, and decentralized eateries. In university host communities like Malete, Kwara State—home to Kwara State University (KWASU)—rapid population growth often outpaces municipal support infrastructure such as continuous potable water supply and organized waste disposal systems. Consequently, ready-to-eat (RTE) foods served to large student and resident populations may act as vehicles for enteric pathogens through cross-contamination, poor personal hygiene, and improper ambient handling.

Statement of the Problem

Despite international and national surveillance initiatives, food safety programs across many African regions remain fragmented, resulting in a scarcity of empirical data regarding localized transmission vectors. In Nigeria, food-borne diarrheal outbreaks cause substantial morbidity and avoidable mortality. Previous outbreaks across the country have been traced to toxic chemical preservatives, improper storage temperatures, and pathogen cross-contamination during handling. Evaluating hygiene standards at decentralized points of consumption is vital for protecting public health in expanding academic communities.

Research Objectives

This study aimed to:

1. Evaluate food safety practices in food premises in Malete.
2. Assess personal hygiene measures practiced by food handlers.
3. Determine food safety knowledge levels among food handlers.
4. Enumerate microbial loads and isolate key pathogens from RTE foods.
5. Examine the relationship between food handlers' socio-demographic factors (e.g., education, training) and hygiene compliance.

Materials and Methods

Research Design & Study Area

A mixed-method design combining a cross-sectional descriptive survey with experimental laboratory analysis was utilized. The study was conducted in Malete, Moro Local Government Area, Kwara State, Nigeria.

Sampling Strategy & Data Collection

A multi-stage sampling technique was implemented:

- **Survey Sample:** 30 food outlets (both on-campus and off-campus) were selected. Structured questionnaires were administered to 30 food handlers to gather socio-demographic details, hygiene knowledge, and reported practices. Out of 30 questionnaires, 28 were returned and complete items were analyzed across parameters.
- **Microbial Food Sampling:** 15 RTE food samples (spanning local and standard outlets) were collected anonymously in sterile containers, stored under ice (<4°C), and transferred to the laboratory within 2 hours.

ISSN:3141-5571
E-ISSN:3141-558X

Laboratory & Statistical Analysis

Standard microbiological assays were performed to determine Total Bacterial Count (TBC) and Total Coliform Count (TCC), and to identify specific isolates (E. coli, Salmonella spp., Staphylococcus aureus, etc.). Descriptive statistics (frequencies and percentages) were processed using SPSS.

Results

Socio-Demographic Profile of Respondents

The demographic profile indicates a female-dominated workforce (82.1% valid response) with basic formal education but minimal formal food safety instruction.

Parameter	Category	Frequency (n = 28)	Valid Percentage (%)
Gender	Female	23	82.1
	Male	5	17.9
Age Range (Years)	18–20	10	35.7
	20–29	12	42.9
	30–39	5	17.9
	40–49	1	3.6
Work Experience	1–3 years	10	35.7
	4–6 years	15	53.6
	7–10 years	3	10.7
Education Level	Primary School	9	32.1
	SSCE	13	46.4
	NCE	6	21.5

Observed Hygiene Practices & Training Compliance

Key observations regarding personal hygiene and operational practices included:

- **Formal Training:** 78.6% had never attended a safe food handling course, and 71.4% had never attended a food safety seminar.

ISSN:3141-5571
E-ISSN:3141-558X

• **Personal Protective Equipment (PPE):** While 60.7% wore aprons, compliance was extremely low for face masks (14.3%), head caps (39.3%), and gloves (7.1%).

• **Cross-Contamination Controls:** 89.3% did not use separate chopping boards for raw meat and vegetables; 71.4% did not sanitize knives after chopping raw meat; 85.7% used the same cloth/towel across multiple surfaces.

• **Morbidity Management:** 64.3% reported continuing to handle food while suffering from active illnesses (cough, catarrh, diarrhea).

Food Safety Knowledge vs. Belief Systems

Knowledge / Attitude Statement	Agreed / Strongly Agreed (%)	Disagreed / Strongly Disagreed (%)
Cleaning and sanitizing utensils reduces contamination risk.	82.2%	17.8%
Contact between raw and cooked foods causes cross-contamination.	57.2%	42.8%
Using gloves reduces contamination risks.	64.2%	35.8%
Refrigeration/Freezing destroys most bacteria.	25.0%	75.0% (Correct concept)
Dish towels used for hand-wiping can transfer pathogens.	39.3%	60.7% (Knowledge gap)
Handwashing in cutlery sinks increases risk.	35.8%	64.2% (Knowledge gap)
Separate cutlery for raw/cooked food prevents cross-contamination.	32.1%	67.9% (Knowledge gap)

Microbiological Profile of RTE Foods

Local Cooked Food Outlets

ISSN:3141-5571
E-ISSN:3141-558X

Food Sample	Total Bacterial Count (cfu/g)	Total Coliform Count (cfu/g)	E. coli	Salmonella spp.
Moin-Moin	3.8×10^4	2.1×10^3	Absent	Absent
White Rice (1)	2.6×10^4	Absent	Absent	Absent
Beans	4.5×10^4	2.8×10^3	Present	Absent
Spaghetti	1.9×10^4	Absent	Absent	Absent
White Rice (2)	3.1×10^4	1.7×10^3	Absent	Absent

Modern Cooked Food Outlets

Food Sample	Total Bacterial Count (cfu/g)	Total Coliform Count (cfu/g)	E. coli	Salmonella spp.
Amala	1.9×10^4	2.8×10^3	Absent	Absent
White Rice (1)	2.6×10^4	Absent	Absent	Absent
Noodles	4.5×10^4	2.8×10^3	Present	Absent
Semo	1.9×10^4	Absent	Absent	Absent
Asun Rice (2)	3.1×10^4	1.7×10^3	Absent	Absent
Moin-Moin	3.8×10^4	2.1×10^3	Absent	Absent
Jollof Rice (3)	2.6×10^4	Absent	Absent	Absent
Beans	4.5×10^4	2.8×10^3	Present	Absent
Spaghetti	1.9×10^4	Absent	Absent	Absent
Fried Rice (4)	4.5×10^4	2.8×10^3	Present	Absent

Discussion

The study highlights a distinct discrepancy between general food safety awareness and practical compliance among food handlers in Malete. While basic education levels were fair (46.4% SSCE), formal food safety instruction was low, with 78.6% lacking certified training. This finding aligns with the

ISSN:3141-5571
E-ISSN:3141-558X

Knowledge-Attitude-Practice (KAP) model critique, which notes that general literacy or experience does not automatically translate to safe food handling behavior without targeted training.

Observed practices revealed frequent biosecurity breaches. Handwashing before handling raw food was low (21.4%), glove usage was minimal (7.1%), and cross-contamination risks were high, evidenced by the non-separation of chopping boards (89.3%) and re-use of dish towels (85.7%). Furthermore, the finding that 64.3% of handlers worked while experiencing symptomatic illness poses a risk for transmitting human-borne pathogens like Staphylococcus aureus.

The microbiological findings mirror these behavioral observations. High coliform counts across items like moin-moin, fried rice, and noodles indicate post-cooking contamination or water quality issues. The isolation of Escherichia coli in localized samples (e.g., cooked beans and fried rice) points to potential fecal-oral transmission vectors, likely introduced through unwashed hands or contaminated processing water. Overall, local informal outlets exhibited higher microbial loads compared to standard restaurants, demonstrating that structural environment and sanitation facilities play a key role in product safety.

Conclusion & Recommendations

Conclusion

Food handlers in Malete demonstrate poor hygiene compliance, low rates of formal food safety training, and critical gaps in cross-contamination control. Microbiological evaluation confirmed bacterial contamination in ready-to-eat foods, establishing a link between handler behavior, environmental factors, and food safety risks.

Policy & Operational Recommendations

1. Mandatory Certification: Local government authorities (Moro LGA) and Kwara State Ministry of Health should enforce mandatory, periodically renewed food safety certifications for all vendors.

2. Infrastructure Enhancements: Outlets must be mandated to provide dedicated handwashing stations with soap and clean running water.

3. Behavioral Interventions: Training programs should shift from passive lectures to practical, culturally tailored demonstrations emphasizing cross-contamination mechanisms.

4. Health Standards: Regulatory bodies should enforce strict stay-at-home policies for food handlers exhibiting infectious symptoms.

5. Routine Surveillance: Institutional health boards (e.g., KWASU Campus Health Services) should conduct periodic microbiological screening of vended foods to safeguard consumer health.

References

Adedoyin, O. T., Ojuawo, A., Adesiyun, O. O., Mark, F., & Anigilaje, E. A. (2008). Poisoning due to yam flour consumption in five families in Ilorin, central Nigeria. Nigerian Journal of Paediatrics, 35(3), 103–106.

Adeleke, S. I. (2009). Food poisoning due to yam flour consumption in Kano (Northwest) Nigeria. Online Journal of Health and Allied Sciences, 8(2).

Amoo, A., Ibrahim, M. M., Balogun, O., Adeleye, A., & Usman, A. (2025). Microbiological evaluation of ready to eat foods sold around Sa'adu Zungur University Gadau, Bauchi, Nigeria: Implications for food safety and public health. Journal of Public Health and Microbiology, 12(1), 45–52.

Ariel, A., Smret, T., Eric, O., Carrel, F., Haley, G., Genet, M., Bisaku, T., & Elisabetta, R. (2025). Food safety practices and behavior drivers in traditional food markets in Ethiopia: Assessing the potential for consumer-driven interventions. Food Control, 158, 110210.

Bas, M., Ersun, A. S., & Kivanc, G. (2006). Evaluation of food hygiene knowledge, attitudes and practices of food handlers in food businesses in Turkey. Food Control, 17(4), 317–322.

Bulus, Y., Miroslava, A., Mustapha, A., & Harald, K. (2022). Food safety knowledge, attitudes, and practices of food vendors participating in Nigeria's school feeding program. Food Protection Trends, 42(3), 210–222.

Centers for Disease Control and Prevention. (2006). Surveillance for foodborne-disease

ISSN:3141-5571
E-ISSN:3141-558X

outbreaks—United States, 1998–2002. MMWR Surveillance Summaries, 55(10), 1–42.

Demisu, A., Biniyam, K., Fikadu, T., Girma, M., Fikreab, D., & Daniel, W. (2022). Food hygiene practices and determinants among food handlers in Ethiopia: A systematic review and meta-analysis. PLoS ONE, 17(5), e0268107.

Ehiri, J. E., & Morris, G. P. (1996). Hygiene training and education of food handlers: Does it work? Ecology of Food and Nutrition, 35(2), 139–151.

Garba, M., & Mustapha, T. (2025). Assessment of food handlers' knowledge and hygiene practices at selected tertiary institutions in Kano State, Nigeria. African Journal of Environmental Health, 9(1), 88–96.

Havelaar, A. H., Kirk, M. D., Torgerson, P. R., Gibb, H. J., Hald, T., Lake, R. J., et al. (2015). World Health Organization global estimates and regional comparisons of the burden of foodborne disease in 2010. PLoS Medicine, 12(12), e1001923.

Mensah, P., Yeboah-Manu, D., Owusu-Darko, K., & Ablordey, A. (2002). Street foods in Accra, Ghana: How safe are they? Bulletin of the World Health Organization, 80(7), 546–554.

Ngozi, O., Deborah, A., Hamida, M., Nneoma, C., Chimzurum, E., & Ogemdinakachi, K. (2025). Knowledge and attitudes toward food safety among food handlers: A cross-sectional study in a Nigerian tertiary institution. International Journal of Environmental Research and Public Health, 22(2), 1140.

Nosa, O., & Olusegun, A. (2026). Evaluation of hygiene management practices in Nigerian retail beef outlets based on a survey of key principles. Journal of Food Protection, 89(1), 100312.

Pepple, D. (2017). Food safety knowledge and practice among food vendors in Garki, Abuja. Journal of Public Health and Epidemiology, 9(4), 71–80.

Shikwaya, S., & Abel, K. (2025). An assessment on knowledge, attitudes, and practices on food hygiene and safety among food handlers in restaurants and tuckshops in Sub-Saharan Africa: A scoping review. BMC Public Health, 25(1), 302.

Stella, O. (2022). Food safety perspectives and practices of consumers and vendors in Nigeria: A systematic review. Food Control, 133, 108620.

Umar, M. B., & Sanusi, M. T. (2014). Personal food hygiene practices of subsistence food vendors operating in Kano metropolis. Journal of Biology, Agriculture and Healthcare, 4(16), 112–118.

World Health Organization. (2024). Food safety and foodborne illness global burden report. WHO Guidelines Approved by the Guidelines Review Committee. Geneva.

Yibeltal, A., Natnael, T., & Kelemu, M. (2025). Food hygiene practice and associated factors among food handlers working in food establishments in sub-Saharan Africa: A systematic review and meta-analysis. Systematic Reviews, 14(1), 58.