



American Journal of Medicine and Health Care (AJMHC)

VOLUME 1 ISSUE 2 (2026)



PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

Assessment of Knowledge and Practice of Food Safety and Hygiene Among Food Vendors in Selected Primary Schools Within Sokoto Metropolis

Usman Babadoko¹, Muhammad Salim Isah¹, Zulkiflu Musa Argungu^{2*}, Nuraddeen Abubakar Argungu³, Nasir Muhammad¹

Article Information

Received: April 10, 2026

Accepted: June 22, 2026

Published: August 22, 2026

Keywords

Food Contamination, Food Hygiene, Food Safety, Food Vendor, Foodborne Disease, Pathogenic Microorganisms, Primary Schools

ABSTRACT

Foodborne diseases represent a significant public health challenge in developing countries, with contaminated food from unhygienic food vendors being a major source of morbidity and mortality, particularly among vulnerable populations, including schoolchildren. Food hygiene practices among vendors serving primary school children require a comprehensive assessment to guide health promotion and policy interventions. This study assessed the knowledge, practices, and improvement strategies for food safety and hygiene among food vendors operating in selected primary schools within Sokoto Metropolis. A descriptive cross-sectional study was conducted with 100 food vendors selected through multi-staged sampling from 20 primary schools across three local government areas in Sokoto Metropolis. Data were collected using a structured questionnaire comprising demographic information, knowledge assessment, practice evaluation, and improvement strategies. Descriptive statistics, including frequency distributions and percentages, were used for data analysis. Seventy-two per cent of food vendors demonstrated knowledge of food safety and hygiene principles. The majority engaged in good food safety practices, with 88% using clean utensils when serving food, 82% washing vegetables thoroughly before preparation, and 80% maintaining clean school premises. Key improvement strategies identified included attending food safety training programs (14%), avoiding cross-contamination (12%), and maintaining appropriate food storage temperatures (12%). Food vendors in primary schools demonstrated adequate knowledge and reasonably good food safety practices. However, systematic food safety training programs, regular environmental health inspections, and the provision of adequate facilities for handwashing and waste disposal are essential for sustaining and improving food hygiene standards. School health programs should be strengthened through collaboration between educational and health authorities.

INTRODUCTION

Food serves as an essential component of human survival, providing necessary nutrients, energy, and materials for building and maintaining body tissues and organs (Alhaji, 2023). However, when food is contaminated by pathogenic microorganisms, it becomes a vehicle for disease transmission. Street and school-vended foods are extensively patronized in educational institutions, including primary schools, particularly in developing countries, because they are affordable and readily accessible to students and teachers. Yet, most of these vended foods do not meet proper hygienic standards and can lead to increased morbidity and mortality from foodborne illnesses.

According to the World Health Organization (WHO, 2024), food safety entails limiting the presence of acute or chronic hazards that can render food injurious to consumer health. Food hygiene refers to the sum of all conditions and measures necessary to ensure food safety and suitability throughout the food chain, including production, collection, transportation, storage, preparation, sale, and consumption. The WHO recommends “Five Keys to Safer Food” keeping food surfaces clean; separating raw from cooked food; cooking food thoroughly; keeping food at safe temperatures; and using safe water and raw materials as the foundation for designing training programs for food handlers and

educating consumers.

Foodborne diseases represent a growing public health concern in both low- and middle-income countries, causing significant morbidity and mortality, particularly in vulnerable groups such as infants, young children, elderly persons, and immunocompromised individuals (WHO, 2020). The global burden of foodborne illnesses is substantial: an estimated 2.1 million adults and 3 million children die annually from consuming contaminated food and water in developing countries (WHO, 2016). In Africa, foodborne and waterborne diarrheal diseases cause between 450,000 to 700,000 deaths annually. In Sokoto State specifically, reports indicate that approximately 48% of children presenting to health facilities suffer from food poisoning, with 32% experiencing symptoms directly attributable to contaminated food (Aliyu, 2021). Food handlers are identified as the most common source of food contamination due to poor personal and environmental hygiene. In developing countries like Nigeria, traditional food processing methods combined with inadequate personal hygiene among vendors create substantial risks for pathogenic contamination. Most vendors operate with minimal regulatory oversight, preparing and vending foods without systematic monitoring or adherence to food safety standards. The gap between vendor knowledge of proper food safety practices and actual implementation of these practices

¹ Department of Nursing Sciences, Faculty of Allied Health Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria

² Department of Nursing, College of Applied Sciences, AlMaarefa University, Diriyah, 13713, Riyadh, Saudi Arabia

³ College of Nursing Sciences, Usman Danfodio University Teaching Hospital Sokoto, Sokoto State, Nigeria

* Corresponding author's e-mail: zmusa@um.edu.sa

remains a significant challenge.

School health services, encompassing health medical examinations, school clinics, school meals, and communicable disease control, must include comprehensive food hygiene monitoring. This involves inspection of foods sold in school premises, vendor kitchen facilities, and health screening of vendors for communicable diseases. Improving food handlers' knowledge and hygiene practices is crucial for controlling foodborne diseases and protecting school children from preventable illness.

The study objectives are to: (1) assess the knowledge of food safety and hygiene among food vendors in selected primary schools within Sokoto Metropolis; (2) evaluate the practices of food safety and hygiene among these vendors; and (3) identify strategies for improving food hygiene practices. Understanding vendor knowledge, current practices, and perceived improvement pathways provides essential data for developing effective health promotion and regulatory interventions.

MATERIALS AND METHODS

Research Design and Setting

A descriptive cross-sectional research design was employed to assess knowledge and practices regarding food safety and hygiene among food vendors. This design facilitated the collection of data from food vendors at a single point in time, allowing for a comprehensive snapshot assessment of current knowledge, practices, and improvement strategies. The study was conducted in selected primary schools within Sokoto Metropolis, located between latitudes 12°46'N to 13°08'N and longitudes 5°14'E to 5°30'E, with an average population density of 500 persons/km². Twenty primary schools were purposively selected from three local government areas: Sokoto South, Sokoto North, and Wamako Local Government.

Population and Sampling

The target population comprised all food vendors operating in selected primary schools within Sokoto Metropolis. A multi-staged sampling technique was employed: Stage 1 involved random selection of 20 primary schools from 106 total schools across the three local governments; Stage 2 involved random selection

of 5 food vendors from each of the 20 selected schools, yielding a total sample of 100 food vendors (20 schools × 5 vendors/school). This sampling strategy ensured proportionate representation across all three local government areas.

Data Collection and Instrument

Data were collected using a structured questionnaire adapted from Buccheri *et al.* (2010), comprising four sections: Section A assessed demographic characteristics; Section B evaluated knowledge of food safety and hygiene; Section C assessed food safety and hygiene practices; Section D identified strategies for improving food hygiene. The questionnaire contained both closed-ended and open-ended items using dichotomous (yes/no) and Likert-scale response formats. Data collection was conducted over five days, with the researcher and three trained research assistants administering questionnaires to vendors. For vendors unfamiliar with English, interviews were conducted in local languages with responses recorded directly in the questionnaire. Validity was ensured through expert review by the research supervisor. Reliability was tested through a pilot study conducted on 10% of the sample (n=10 vendors), with results demonstrating strong consistency with final study findings.

Data Analysis and Ethical Considerations

Data were analyzed using SPSS version 23, employing descriptive statistics including frequency distributions and percentages to describe the data. Ethical approval was obtained from the Ministry of Education and primary school principals. The study purpose was explained to all respondents, and participation was voluntary. Confidentiality and anonymity were maintained throughout, with assurance that information would be used solely for research purposes and treated confidentially.

RESULTS AND DISCUSSION

Sociodemographic Characteristics

The majority of food vendors (42%) were aged 26-35 years, with 24% aged 20-25 years, 16% aged 15-19 years, and 11% aged 36-40 years. Female vendors constituted 78% of the sample compared to 22% males. The sample

Table 1: Sociodemographic Characteristics of Food Vendors (N=100)

Characteristic	Frequency (n)	Percentage (%)
Age 26-35 years	42	42.0
Female gender	78	78.0
Hausa ethnicity	68	68.0
Muslim religion	82	82.0
Married status	56	56.0
Secondary education	52	52.0
6-10 children	62	62.0
Total Sample	100	100.0

was ethnically diverse, with 68% Hausa, 14% Yoruba, 15% Igbo, and 12% other ethnic groups. Religiously, 82% were Muslim and 18% Christian. Regarding marital status, 56% were married, 28% single, and 16% divorced. Educational attainment varied: 52% completed secondary school, 24% primary school, 16% had no formal education, and 8% completed tertiary education. Regarding household composition, 12% had 11-15 children, 62% had 6-10 children, and 17% had 1-5 children.

Knowledge of Food Safety and Hygiene

Assessment of vendor knowledge regarding food safety and hygiene revealed that 72% of food vendors possessed demonstrated knowledge of food safety and hygiene principles, while 28% did not. Among those with knowledge, vendors defined food safety and hygiene variously: 42% described it as scientific preparation and storage methods, 28% as practices preventing food contamination, 18% as measures to control hazards,

and 12% offered other definitions. Regarding the advantages of food safety and hygiene, 52% identified maintaining food cleanliness, 22% cited safe food storage temperatures, 14% emphasized prevention of bacterial spread, and 12% mentioned reducing food spoilage. Knowledge sources included: 46% of health workers, 30% from family members, 16% from mass media, and 8% from television. A substantial 80% of vendors recognized the direct relationship between good personal hygiene and reduced illness with better health. Notably, 60% reported never experiencing food contamination, while 40% had experienced contamination incidents. Regarding food preparation practices: 90% cook food to maximum temperature before serving; 96% understand the necessity of separating cooked from raw foods; 98% recognize that immediately washing plates after use promotes food hygiene; and 99% understand that cooking pots should be covered after cooking.

Table 2: Knowledge Assessment of Food Safety and Hygiene (N=100)

Knowledge Items	Yes n (%)	No n (%)
Possess food safety/hygiene knowledge	72 (72.0)	28 (28.0)
Relate good hygiene to less illness	80 (80.0)	20 (20.0)
Ever experienced food contamination	40 (40.0)	60 (60.0)
Cook food to maximum temperature	90 (90.0)	10 (10.0)
Separate cooked from raw food	96 (96.0)	4 (4.0)
Wash plates immediately after use	98 (98.0)	2 (2.0)
Cover cooking pots after cooking	99 (99.0)	1 (1.0)

Food Safety and Hygiene Practices

Assessment of actual food safety and hygiene practices revealed that the majority of food vendors reported engaging in appropriate food safety behaviors. Specifically, 36% boil water to the required temperature for drinking and food preparation as prevention against waterborne infections and worms. Regarding utensil hygiene, 88% use clean utensils when serving food, with strong agreement (88% strongly agreed) about maintaining clean utensils. Food preparation practices demonstrated high standards: 82% wash vegetables and soups thoroughly before preparation (82% strongly agreed), 80% maintain clean school premises (80%

strongly agreed), and 78% properly refrigerate food to prevent bacterial growth (78% strongly agreed). Personal hygiene practices showed strong endorsement: 53% strongly agreed that long hair should be tied back when handling unpackaged food, 80% strongly agreed about maintaining environmental cleanliness, and 41% agreed about wearing aprons while working. Water temperature practices were important: 36% strongly agreed that boiling water at the required temperature prevents infections, 47% agreed. Additionally, 72% of vendors strongly agreed that children are most susceptible to foodborne contamination, and 35-40% recognized food hazards and diseases as serious community problems.

Table 3: Food Safety and Hygiene Practices (N=100)

Practice Items	Strongly Agree (%)	Agree (%)	Disagree/Undecided (%)
Children susceptible to food contamination	72	12	16
Food hazards are serious problems	40	35	25
Safe water temperature prevents infections	36	47	17
Long hair should be tied back	53	41	6
Wear aprons for disease prevention	28	42	30

Use clean utensils when serving	88	10	2
Refrigeration prevents bacterial growth	78	14	8
Keep environment clean and tidy	80	19	1
Wash vegetables thoroughly	82	16	2

Ways of Improving Food Hygiene

Vendors identified multiple strategies for improving food hygiene practices. The most frequently cited improvement strategy was attending food safety and hygiene training programs (14%), followed by avoiding contact between raw and cooked foods (12%) and maintaining appropriate food storage temperatures

(12%). Additional improvement strategies included using safe water sources for food preparation (10%), using gloves when handling food (12%), and safe handling practices when serving customers (10%). Other strategies mentioned included keeping utensils meticulously clean (8%), washing hands repeatedly with soap and water (8%), cleaning and sanitizing cooking surfaces (8%),

Table 4: Strategies for Improving Food Hygiene (N=100)

Improvement Strategy	Frequency (%)
Attend food safety training programs	14
Avoid contact between raw and cooked foods	12
Maintain appropriate food storage temperatures	12
Use gloves when handling food	12
Use safe water for food preparation	10
Safe handling practices when serving	10
Keep utensils meticulously clean	8
Wash hands with soap and water	8
Clean/sanitize cooking surfaces	8
Maintain designated garbage disposal	5
Use food hygiene checklist	3
Trim/cut fingernails regularly	4

maintaining designated garbage disposal areas (5%), using food hygiene checklists (3%), and trimming fingernails (4%). These findings indicate that vendors recognize the importance of systematic training, proper food handling techniques, environmental sanitation, and personal hygiene as mechanisms for improving food safety in their operations.

Discussion

Knowledge of Food Safety and Hygiene

The finding that 72% of food vendors demonstrated knowledge of food safety and hygiene aligns favourably with international research. Similar studies in Egypt by Margaret *et al.* (2019) reported 79.2% of food handlers possessed good food safety knowledge. In India, Lal (2019) found 90% awareness of hand hygiene with soap and water. In Nigeria specifically, Bello *et al.* (2020) reported 60.9% of vendors had good food safety knowledge in north central Nigeria, while Afolaranmi (2018) found 50% in Jos, Plateau State. These variations may reflect differences in urbanization, education levels, regulatory oversight, and community health promotion activities. The present study's 72% knowledge rate suggests reasonable awareness among Sokoto vendors, though the 28% knowledge gap indicates substantial opportunity for health education interventions.

The relationship between education level and food safety

knowledge is well established. In the present study, vendors with secondary education constituted 52% of the sample, which may explain the relatively high knowledge prevalence. This finding underscores the importance of prioritizing food safety training for vendors with lower educational attainment. Knowledge sources identified predominantly from health workers (46%) and family members (30%) suggest that formal health sector engagement and informal learning pathways both contribute to vendor education. The strong recognition that good personal hygiene relates to reduced illness (80%) demonstrates underlying receptiveness to health promotion messages.

Food Safety Practices

Actual food safety practices assessed in this study revealed encouraging compliance with key food safety principles. The 88% using clean utensils, 82% washing vegetables thoroughly, and 80% maintaining clean premises represent substantial adherence to fundamental hygiene practices. These findings parallel those of Musa & Akande (2020), who found 60.5% of Kaduna vendors had good knowledge, with 57.6% practicing good hygiene. The slightly higher practice rates in the present study may reflect the school setting, where principal and teacher oversight create accountability structures. However, the gap between knowledge (72%) and some practices

suggests opportunities for practice improvement. For instance, while 98% understand the importance of washing plates immediately after use, actual compliance may differ in daily operations, particularly under time pressure or resource constraints.

Strategies for Improving Food Hygiene

The identification of food safety training as the primary improvement strategy (14%) aligns with WHO recommendations and international evidence. Smith (2024) found that food handler training substantially increases food safety knowledge and practice. The study conducted by Kamaladdin *et al.* (2022) in Malaysia demonstrated that systematic training programs improved food safety practices by up to 46%. The emphasis on training suggests vendors recognize their knowledge and skill gaps and value structured education. The identification of cross-contamination prevention (12%), temperature control (12%), and glove use (12%) as improvement strategies reflects an understanding of critical control points in the food chain. However, the relatively low percentage endorsing these strategies suggests that many vendors may not yet recognize these as priority improvement areas. The importance of environmental and personal hygiene factors is evident in the diversity of the strategies mentioned: keeping utensils clean (8%), handwashing (8%), surface sanitation (8%), and waste disposal (5%). However, the fragmented identification of these strategies, with no single environmental factor exceeding 10%, suggests vendors may benefit from integrated training packages presenting food safety as a comprehensive system rather than isolated practices. WHO's Five Keys to Safer Food framework provides such integrated guidance and should be incorporated into local training programs.

Contextual Factors and School Setting Implications

The school setting presents unique food safety challenges and opportunities. The high representation of female vendors (78%) may reflect both cultural factors in Sokoto and the reality that school food vending represents an accessible livelihood for women. The predominance of vendors aged 26-35 years suggests experienced practitioners, though age did not correlate with knowledge or practice in this cross-sectional analysis. The finding that 42% of vendors were aged 26-35 and 42% married with primarily secondary education suggests a relatively stable, potentially receptive vendor population for training programs.

The concentrated food vendor environment within school premises creates epidemiological significance: infections transmitted through contaminated school meals can affect multiple children simultaneously. Notably, 72% of vendors recognized children's increased susceptibility to foodborne illness, suggesting potential receptiveness to child health protection messaging. The school setting also enables systematic oversight through principals and teachers, creating an opportunity for regular

environmental monitoring and vendor accountability factors largely absent in street food vending contexts.

The challenges identified in this study, gaps between knowledge and practice, insufficient facility provision (implied by the recommendation for hand washing facilities and garbage disposal infrastructure), and a fragmented understanding of food safety as a comprehensive system are consistent with findings from other Nigerian and African studies. Abdalla *et al.* (2018) identified that inadequate facilities represent a primary barrier to good hygiene practice, suggesting that infrastructure improvements are as critical as education. Implications for Public Health and School Health Programs

The findings carry important implications for strengthening school health programs and protecting child health. First, the identification of training as the primary improvement strategy confirms the value of systematic food safety education; however, training programs must be structured, competency-based, and include practical skill development beyond knowledge transmission. Second, the gaps between vendor knowledge and actual practice point to the necessity of environmental supports, adequate hand-washing facilities, proper food storage capacity, and waste disposal infrastructure. Third, the school-based oversight structure provides an opportunity for regular monitoring through school principals and health personnel, creating accountability mechanisms often absent in other food vending contexts.

The role of nursing in promoting food safety is multifaceted. Nurses as community health educators can develop and deliver food safety training programs. As school health practitioners, nurses can conduct regular food vendor inspections using standardized checklists, provide feedback to vendors, and coordinate with educational authorities. As advocates, nurses can work with policymakers to establish food safety regulations, facility standards, and vendor registration systems. As researchers, nurses can conduct longitudinal studies examining the impact of training programs on vendor behavior and child health outcomes.

CONCLUSION

Food vendors in Sokoto primary schools show solid baseline knowledge of food safety, with 72% demonstrating adequate awareness of critical practices. Most already act on that knowledge: 88% use clean utensils, 82% wash vegetables thoroughly, and 80% keep premises clean. So the fundamentals are there, at least in principle.

The results line up with global evidence but carry local texture too. A mostly female vendor workforce, a concentrated school setting, and existing principal oversight all shape what interventions could look like. Vendor stability and existing knowledge suggest this group is ready for structured training, but gaps in hand washing stations, covered bins, and refrigeration mean knowledge alone won't hold. Environment has to catch

up.

Real progress needs everyone pulling in the same direction. Schools need to fund and oversee vendor facilities. Health authorities need to set and enforce standards. Training bodies need competency-based programs. Vendors need to commit despite daily operational strain. Nursing sits at the center of this as educator, inspector, advocate, and researcher.

Bottom line: targeted training on cross-contamination, temperature control, and hygiene, paired with real infrastructure investment and consistent oversight, can meaningfully cut foodborne illness risk for these kids.

REFERENCES

- Abdalla, M. A., Siham, E. S., Alian, Y. H., & Amel, O. B. (2018). Food safety knowledge and practice of street food-vendors in Khartoum City, Sudan. *Journal of Veterinary Science and Animal Husbandry*, 47(2), 126–136.
- Afolaranmi, I. O. (2018). Knowledge and practice of food safety and hygiene among food vendors in primary schools in Jos, Plateau State. *European African Journal of Food Safety and Food Hygiene Practice*. www.whobulletin.com
- Ajzen, I. (2019). *Attitudes, personality and behavior* (2nd ed.). Open University Press/McGraw-Hill.
- Alhaji, A. A. (2023). *Food and nutrition in health I* [Unpublished lecture notes]. Department of Physical and Health Education, Azare College of Education.
- Aliyu, M. M. (2021). *Report of food poison in Sokoto State metropolis*. Sokoto State Ministry of Health.
- Azanza, B., & Ortega, T. (2024). Food safety knowledge and practices of street food vendors. *International Journal of Food Science and Nutrition*, 51, 235–246.
- Bello, D. A., Hassan, Z. I., & Misari, Z. (2020). Knowledge and practice of food safety and hygiene among food vendors in primary schools. *European African Journal of Food Safety and Food Hygiene Practice*. www.whobulletin.com
- Buccheri, C., Casuccio, A., Giammanco, S., La Guardia, M., & Mammina, C. (2010). Knowledge, attitudes and behaviors of food handlers in Italy. *Journal of Food Protection*, 73(11), 2081–2086.
- Chukuezi, C. O. (2018). Food safety and hygienic practices of street food vendors in Owerri, Nigeria. *Studies in Sociology of Science*, 1(1), 12–15.
- Dewall, T., & Alderton, A. (2023). Food associated with foodborne illness outbreaks. *Food Safety Reviews*, 15(3), 45–52.
- Food and Agriculture Organization & World Health Organization. (2018). *Codex Alimentarius: Food hygiene basic text* (4th ed.). <http://www.fao.org/docrep/012/a1552e00.pdf>
- Isaac, M., Dominic, A., & Wellington, O. (2023). Hygienic practices among food vendors in educational institutions in Ghana. *Journal of Medical Research*, 4(2), 16–22.
- Kamaladdin, B., Arianar, R., & Afahammad, A. T. (2022). Food safety knowledge, attitude and practices among food vendors in northern Kuching City Sarawak, Malaysia. *Borneo Sciences*, 3(3), 95–103.
- Lal, H. (2019). *Food and nutrition for medical, nursing and allied science*. BS Publishers and Distributors.
- Leus, F. R., Mpeli, R. R., Venter, P., & Theron, M. M. (2019). Assessing food safety and associated food handling practices in street food vending. *International Journal of Environmental Health Research*, 16(5), 319–328.
- Margaret, G., Judith, K., & Paul, O. (2019). Knowledge in food hygiene and hygienic practices of food handlers at a hospital in Nairobi, Kenya. *African Journal of Food Science and Technology*, 4(1), 19–24.
- Muinde, O. K. (2018). Hygienic and sanitary practices of vendors of street foods in Nairobi, Kenya. *African Journal of Food, Agriculture and Nutritional Development*, 7(5), 1–15.
- Musa, O. I., & Akande, T. M. (2020). Food hygiene practices of food vendors in secondary schools in Ilorin. *Nigerian Postgraduate Medical Journal*, 10(3), 192–196.
- Nalugeta, K., & Bayeh, A. (2022). The sanitary conditions of food service establishments and food knowledge and practices of food handlers in Bahr Dar town, Ethiopia. *Ethiopian Journal of Health Science*, 22(1), 27–35.
- Omemu, A. M., Edema, M. O., & Bankole, M. O. (2018). Bacteriological assessment of street vended ready to eat vegetables and prepacked salad in Nigeria. *Nigerian Journal of Microbiology*, 19(2), 497–504.
- Omemu, A. M., & Aderoju, S. T. (2019). Food safety knowledge and practices of street food vendors in the city of Abeokuta, Nigeria. *Food Control*, 19(4), 396–402.
- Smith, J. (2024). Survey of food handling strategy in food industries. *Journal of Food Safety Management*, 18(2), 78–95.
- Suleiman, O. S. (2024). *Food hygiene practices among food handlers in tertiary institutions* [Unpublished report].
- Umar, P., & Akonor, M. A. (2023). Food safety knowledge among domestic food handlers in Accra, Ghana. *European Journal of Nutrition and Food Safety*, 2, 282–294.
- World Health Organization. (2016). *Initiative to estimate the global burden of foodborne diseases*. WHO.
- World Health Organization. (2024). *Overview on food safety and hygiene*. WHO.