



Infrastructural Conditions at Food Vending Sites in Imo State, Nigeria: A Cross-Sectional Assessment

Njoku Charity Ijeoma^{1*}, Eberendu Izuchukwu Francis¹, and Obasi Kalu Obasi¹

¹Department of Public Health Science, Faculty of Health Sciences, Imo State University, Owerri, Nigeria

Corresponding Author: Njoku Charity Ijeoma

DOI: 10.67224/ioasdjmps.2026.v03i03.021

Department of Public Health Science, Faculty of Health Sciences, Imo State University, Owerri, Nigeria

ABSTRACT	Original Research Article
Infrastructure supporting safe food selling includes the use of potable water, sanitation, hand hygiene, waste management, drainage, and protection from dust and garbage. This study described the infrastructural problems at food selling sites in chosen locations in Imo State, Nigeria. A descriptive cross-sectional study was undertaken among 705 food vendors/sites in five selected local government areas. Trained research assistants administered structured questionnaires and completed observation checklists. Infrastructure indicators were the principal source of water, solid waste disposal technique, sewage disposal facility, distance to drainage channels, type of surrounding road, handwashing facilities and presence of visible trash dumps within 10 m. Frequencies and percentages were computed using SPSS version 23. 44.0% of sites had piped or borehole water and 31.2% relied on vendor/cart-supplied or surface water. Only 34.2% used government rubbish bins but 65.8% used open dumping, burning or roadside heaps. Pit latrines served 45.4% of sites and 14.6% had no sewage facility or reported open defecation. Four out of five sites (80.1%) were located within 50 m of a drainage canal. But 47.7% were along roadside market corridors or dirt roads, and 52.3% were next to paved roads. Handwashing facilities with soap were available at 48.1% of sites, 27.2% had a facility without soap, and 24.7% had none. 56.0% of sites have visible garbage dumps within 10 m. There were serious deficiencies in trash disposal, sanitation, handwashing, separation of drainage and cleanliness of the site. Investment is needed in defined vending zones, safe water, working handwashing stations, restrooms, drainage and reliable rubbish collection. Keywords: food-vending infrastructure; street food; WASH; handwashing; sanitation; food safety; Imo State.	Article History Received: 09-07-2026 Accepted: 28-08-2026 Published: 07-09-2026
	Copyright © 2026 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.
	

INTRODUCTION

Street food is an essential feature of urban food systems, particularly in poor and middle-income nations because it offers affordable and easily available food to significant sectors of the population. Besides enhancing food availability and eating convenience, street food selling offers job and cash earning chances for millions of people notably those in the informal economy. Street-vended foods are a major source of breakfast, lunch, snacks and evening meals for students, workers, traders, transit operators and other members of the public in many metropolitan and semi-urban regions. The continuous spread of street food selling therefore has serious consequences for food security, urban livelihoods and public health. However, the potential public-health benefits of accessible food may be compromised when the physical environment in which

food is cooked, kept, presented and served does not promote sufficient hygiene and sanitation practices [1].

The safety of street-vended food depends on the knowledge, attitudes and practices of individual vendors and the infrastructure present at the point of sale. Clean food preparation and serving are almost impossible without access to safe drinking water, working handwashing stations, sanitary toilets, adequate drainage, regular waste removal, clean food-contact surfaces, suitable food storage and protection from dirt, flies, refuse and other environmental contaminants [2]. The absence or inadequacy of such basic facilities can make it difficult for vendors to follow recommended foodsafety standards regularly. For instance, inadequate access to water can restrict hand washing, washing of utensils and washing of surfaces that come into contact with food, and inadequate waste disposal systems can

lead to the accumulation of refuse around vending sites and attract flies and other potential vectors of food contamination.

Street food sellers in many low- and middle-income countries operate in informal locations that were not originally built or developed for food preparation and commercial food serving. It might be held on the side of roads, outside marketplaces, near schools and motor parks, at transit terminals or in temporary structures with poor access to water and sanitation services. Such conditions may expose food to dust, car fumes, wastewater, garbage, insects, rodents and other environmental pollutants. Vendors may also have restricted access to electricity, refrigeration, food storage facilities, drainage and properly built work surfaces. Thus, even vendors who have adequate knowledge of food safety principles may not be able to transfer that knowledge into safe operations when the physical environment does not provide the essential facilities [3].

The importance of environmental infrastructure is represented in the Five Keys to Safer Food by the World Health Organization which stress keeping clean, separating raw and prepared foods, preparing food properly, keeping food at safe temperatures and utilising safe water and raw materials [4]. Although these principles are generally presented as individual food handling habits, the successful execution of these principles is highly dependent on the availability of enabling infrastructure. Keep hands and surfaces clean, separate raw and cooked foods, cook foods thoroughly, keep food at safe temperatures and use safe water and raw materials. Access to clean water and appropriate washing facilities, adequate space for work and storage, appropriate cooking, re-heating and storage facilities and reliable access to potable water and suitable food-storage conditions. Thus, food-safety behaviour should be examined in the broader physical and environmental context in which vending takes place [5].

Reviews of street-vended food safety have identified water supply, sanitation, drainage, waste disposal, food storage, vending structures, and environmental cleanliness as major factors of food contamination and foodborne-disease risk [2]. Poor infrastructure can provide many routes via which micro-organisms and other risks might find their way into food. Contaminated water can be used for washing hands, utensils or ingredients; poorly managed refuse can attract flies and rodents; stagnant wastewater can be a breeding ground for insects and can contribute to environmental contamination; and unprotected vending spaces can allow dust and airborne contaminants to settle on exposed food. Moreover, the lack of appropriate storage structures might expose prepared foods to frequent handling and environmental contamination, especially in areas where food is exposed for lengthy periods [6].

The association between infrastructure and food safety is especially relevant because street food is frequently prepared in conditions where environmental controls are far less stringent than those in official restaurants or institutional food outlets. Formal food service venues are normally expected to provide: defined food preparation areas; water supply; sanitary facilities; waste disposal procedures; and surfaces that can be cleaned properly. Street sellers however may be found in moveable stalls, tables, kiosks, umbrellas, improvised shelters or just in open roadside places. Poorly delineated spaces for food preparation and trash disposal may result in food handling, garbage accumulation, traffic exposure and other activities taking place simultaneously in a narrow space [7].

Evidence from cities in Africa shows that many street food sellers work without proper washing points, sanitary restrooms, organised waste-collection services, drainage, and protected vending structures [8]. Such architectural flaws may raise the probability of poor hygiene and environmental contamination, and may also put vendors in a position where compliance with food-safety regulations becomes impossible. It is important, therefore, that infrastructure is not considered as a purely background element of vending sites, but rather as an enabling aspect that can either facilitate or hinder vendors' abilities to keep food safe [9].

The increasing rise of urban populations and informal food vending in Nigeria has enhanced the significance of comprehending the environmental circumstances of food vending activities. Street-vended foods are commonly consumed due to their comparatively cheap, convenient and ready availability. However, other studies in diverse Nigerian settings have documented food-hygiene concerns among food sellers and food-service establishments, including water availability, hand hygiene, food handling, environmental sanitation, waste disposal and food protection problems [10]. Food-safety and hygiene issues have also been documented in studies in Owerri; hence, the environment in which food vendors operate needs to be taken into consideration [11].

Imo State is a suitable place to investigate these concerns since street food selling is popular in urban and semi-urban communities and caters to varied demographics. Vendors operate in a range of physical venues, including marketplaces, roadside, commercial, educational, transport corridors and residential neighborhoods. These areas may range greatly in their access to safe water, sanitation, drainage, waste management and structures that can protect food from environmental contamination. This difference provides the chance to assess the extent of diversity in infrastructure conditions between vending locations, and to identify specific weaknesses that may require public health action [12].

Assessment of the status of the infrastructure is particularly crucial as initiatives focusing on vendor education alone may not have much impact if basic facilities are not provided. If water is not available, a seller may comprehend the significance of handwashing but not be able to continuously practise it. A merchant might know how to handle garbage properly but may not have a waste pickup point close to where they sell. Thus, enhancing street-food safety needs a cocktail of individual-level interventions, regulatory control, environmental sanitation and investment in basic infrastructure [13].

From a public health standpoint, recording the infrastructure conditions at food-vending sites can give evidence for specific measures taken by local government authorities, environmental health officers, public health practitioners, market authorities and other relevant stakeholders. Such evidence may help identify priority areas for the supply of potable water, handwashing stations, hygienic toilets, drainage, waste receptacles, regular trash collection and suitably built vending spaces. It can also help establish and implement practical food safety standards that are sensitive to the situations in which informal food vendors are really working [14].

While the presence of environmental infrastructure is important for food safety, the available studies in Nigeria have tended to focus more on vendors' knowledge, attitudes and food-handling practices than on systematic descriptions of the physical infrastructure at individual vending sites. Thus, a state-level survey recording the practical conditions of food vending outlets may give complementary evidence to comprehend food-safety risks. This type of assessment is especially helpful when infrastructure inadequacies are assessed with vendors' hygiene standards and other components of the broader food-safety environment [15].

Therefore, assessing infrastructure must go beyond simply determining the existence of a facility. It should also be practical, accessible, clean, adequate and appropriate for food-service activities. For example, the mere existence of a water supply does not necessarily mean that the water is potable, if the source is polluted or unreliable. There may also be minimal public health value in the presence of a rubbish container if waste is not removed frequently. A blocked or filled drainage channel with stagnant wastewater can be a greater environmental danger than no drainage at all. Therefore, measuring availability and functioning state of infrastructure together gives a more comprehensive assessment of the environmental context of street food vending.

These variables are also significant in understanding the food safety practices of vendors. Poor hygiene seen at a vending site can be a reflection of person behaviour but can as well be a consequence of

poor infrastructure. It is important to distinguish these elements so that we can develop effective interventions. Where the primary problem is weak infrastructure, public health authorities may need to focus on environmental and municipal reforms rather than vendor education alone. Where suitable infrastructure exists, but is under-utilised, behavioural interventions, monitoring, training and enforcement may be more appropriate.

Against this background, this paper focuses on infrastructure conditions under which street food vending operations take place in several selected areas of Imo State, Nigeria. The assessment includes availability and adequacy of the essential facilities and environmental conditions that may affect hygienic preparation and service of food including potable water, hand washing facilities, sanitation, drainage, waste disposal, vending structures, food contact surfaces and protection from environmental contaminants. The findings are intended to provide evidence that can assist targeted food-safety initiatives, environmental-health planning, and municipal actions to reduce possible dangers associated with street-vended foods.

This paper describes the infrastructural conditions around food-vending sites in selected areas of Imo State, Nigeria. The study seeks to contribute to a more holistic understanding of the environmental determinants of street-food safety by documenting the practical infrastructure available to vendors and to provide evidence for interventions that combine vendor-level behavioral change with improvements to the physical and sanitary environment of food-vending locations.

METHODS

Study design and setting

A descriptive cross-sectional study was conducted at food vending sites in five selected local government areas of Imo State, South-East Nigeria: Owerri Municipal, Owerri West, Owerri North, Orlu, and Okigwe. Sites represented urban and peri-urban vending contexts, including markets, roadsides, transport corridors, and other clusters where ready-to-eat foods were prepared or sold.

Study population and sampling

The study population comprised active food vendors operating at selected vending points. A total of 705 vendors/sites were assessed. The parent study used a multistage sampling procedure to select local government areas, vending clusters, and eligible vendors. Participation required informed consent and satisfaction of the study's eligibility criteria.

Ethical considerations

Permission was obtained from department of Public Health Science of Imo State University and that informed consent was obtained before questionnaire administration and site observation. Participation was

voluntary, information was handled confidentially, and findings were reported in aggregate. The ethics committee of Imo State ministry of health approved the study.

Data collection and measures

Trained research assistants used a structured interviewer-administered questionnaire and an observation checklist. Objective-two measures included the primary water source; solid-waste disposal method; sewage disposal facility; distance from a drainage channel; road type around the site; availability and functionality of a handwashing point, including soap; and visible refuse dumps within a 10-m radius.

Questionnaire responses were interpreted alongside direct observations where applicable.

Data analysis

Data were coded, cleaned, and analysed using IBM SPSS Statistics version 23. Infrastructure indicators were treated as categorical variables and summarised using frequencies and percentages. The analysis was descriptive and did not estimate causal effects.

RESULTS

Distribution of study sites

The 705 sites were distributed across Owerri Municipal (27.0%), Owerri West (21.3%), Owerri North (18.9%), Orlu (17.0%), and Okigwe (15.9%).

Table 1: Distribution of food vending sites by study area (n = 705)

Study area	Frequency	Percent
Owerri Municipal	190	27.0
Owerri West	150	21.3
Owerri North	133	18.9
Orlu	120	17.0
Okigwe	112	15.9

Water, waste, and sewage infrastructure

Piped or borehole water was the most common primary source (44.0%), followed by protected wells (24.8%). Almost one-third of sites (31.2%) relied on vendor/cart-supplied water or surface water.

Government waste bins were used at 34.2% of sites; the remaining 65.8% disposed of waste through open dumping, burning, or roadside heaps. Pit latrines were the most common sewage facility (45.4%), while 14.6% had no facility or reported open defecation (Table 2).

Table 2: Water, solid-waste, and sewage infrastructure at food vending sites (n = 705)

Infrastructure domain	Category	Frequency	Percent
Primary water source	Piped/borehole	310	44.0
	Protected well	175	24.8
	Vendor/cart supplied	150	21.3
	Surface water	70	9.9
Solid-waste disposal	Government bin	241	34.2
	Open dumping	214	30.4
	Burning	151	21.4
	Roadside heap	99	14.0
Sewage disposal	Pit latrine	320	45.4
	Water-system toilet	282	40.0
	No facility/open defecation	103	14.6

Drainage, road access, handwashing, and nearby refuse

Two-fifths of sites (40.1%) were less than 10 m from a drainage channel, and another 40.0% were 10–50 m away. Just over half (52.3%) were situated beside paved roads, while 26.8% were along roadside market

corridors and 20.9% beside unpaved roads. A functional handwashing facility with soap was available at 48.1% of sites; 27.2% had a facility without soap and 24.7% had none. Visible refuse dumps occurred within 10 m of 56.0% of sites (Table 3).

Table 3: Physical access and hygiene-support infrastructure at vending sites (n = 705)

Infrastructure domain	Category	Frequency	Percent
Distance to drainage	<10 m	283	40.1
	10–50 m	282	40.0
	>50 m	140	19.9
Road type	Paved	369	52.3
	Roadside market corridor	189	26.8
	Unpaved	147	20.9
Handwashing facility	Functional with soap	339	48.1
	Functional without soap	192	27.2
	None	174	24.7
Visible refuse dump within 10 m	Yes	395	56.0
	No	310	44.0

DISCUSSION

This study found considerable infrastructure inadequacies at food selling sites in some selected areas of Imo State. Less than half the locations used piped or borehole water, two-thirds had no access to government waste bins, one in seven had no sewage-disposal facility, four out of five were within 50 m of drainage channels and less than half had a working handwashing facility with soap. Visible garbage dumps within 10 m of more than half of all sites further illustrate the intimate contact between vending infrastructure and the surrounding municipal environment [16].

Water infrastructure is necessary for food preparation, cleaning of utensils, cleanliness of surfaces and hand hygiene. Protected wells may yield useful supplies, but source categorisation does not ensure microbiological safety and vendor/cart-supplied water may be susceptible to contamination during collection, transit or storage. Therefore, the fraction that relies on vendor/cart supply or surface water needs attention to source quality and point-of-use management. Similar limits have been reported among street-food vendors elsewhere in Africa [17].

The infrastructure for waste handling was especially inadequate. Only around one-third of sites used government dumpsters. Most of the disposal procedures were open dumping, burning and roadside stacking. These practices can result in an increase of garbage, smoke, ash, attracting vectors and contamination of the nearby vending area. The fact that 56.0% of locations had a visible garbage dump within 10 m implies that bins alone may not be sufficient without reliable collection and site management. Waste storage, collection frequency, transport and final disposal should function as a whole service chain [18].

The sanitation findings are also worrying. The most popular option was pit latrines, with 14.6% of sites reporting no facility or open defecation. A toilet is not necessarily hygienically adequate: cleanliness,

accessibility, water, soap, maintenance and safe containment are all required. However, the lack of any such facility is a more substantial obstacle to good hygiene and may increase faecal-oral exposure pathways.

Handwashing infrastructure is a good example of the difference between having a facility and having a functioning service. Of places with some type of facility, 75.3% had available soap, but only 48.1% had soap available. So more than half the locations were unable to provide thorough handwashing with soap at the time of assessment. WHO advice acknowledges hand washing as a fundamental component of safer food preparation [19], but vendor compliance to this is unlikely to be sustained without conveniently supplied water and soap.

Physical siting also has an impact. Almost half of the sites were situated on unpaved roads and in roadside market corridors where food could be exposed to dust, dirt, vehicular pollutants, splash and congestion. The closeness of 80.1% to a drainage channel of ≤ 50 m shows that demarcated vending places have not been sufficiently distanced from the wastewater channels. Therefore, the enhancement of the infrastructure needs to include the services of the individual stalls in the development of the clusters, drainage management, road maintenance and zoning.

The infrastructure assessment was supported by a broad sample across five local government regions and the combination of questionnaire and observational data. However, the cross-sectional design captures conditions at one moment of time, and may not reflect seasonal changes in water supply, drainage, road conditions or garbage accumulation. Water and food samples were not examined with this purpose in mind and the report therefore emphasises risks associated with infrastructure rather than confirmed contamination. Some criteria were vendor-reported and broad categories may not fully describe the quality, performance, maintenance and accessibility of infrastructure. Hence extrapolation

outside the chosen vending clusters should be performed with caution.

CONCLUSION

Food vendors in the selected locations of Imo State operated with basic shortfalls in water, sanitation, waste, drainage and handwashing facilities. Particular worry was raised at poor utilisation of formal waste bins, absence of sewage facilities at certain sites, proximity to drainage channels and garbage dumps and lack of soap or any handwashing facility at over half of sites. Food-safety programs should address these structural constraints in addition to vendor education and inspection.

REFERENCES

- Muinde, O. K., & Kuria, E. (2005). Hygienic and sanitary practices of vendors of street foods in Nairobi, Kenya. *African Journal of Food, Agriculture, Nutrition and Development*, 5(1), 1–14. <https://doi.org/10.18697/ajfand.8.1060>
- Onyeneho, S. N., & Hedberg, C. W. (2013). An assessment of food safety needs of restaurants in Owerri, Imo State, Nigeria. *International Journal of Environmental Research and Public Health*, 10(8), 3296–3309. <https://doi.org/10.3390/ijerph10083296>
- Alimi, B. A. (2016). Risk factors in street food practices in developing countries: A review. *Food Science and Human Wellness*, 5(3), 141–148.
- Rane, S. (2011). Street vended food in developing world: Hazard analyses. *Indian Journal of Microbiology*, 51(1), 100–106. <https://doi.org/10.1007/s12088-011-0154-x>
- Okojie, P. W., & Isah, E. C. (2014). Sanitary conditions of food vending sites and food handling practices of street food vendors in Benin City, Nigeria: Implication for food hygiene and safety. *Journal of Environmental and Public Health*, 2014, Article 701316.
- Ibrahim, U. M., Garba, R. M., Jalo, R. I., Tsiga-Ahmed, F. I., Musa, A., Karkarna, M. Z., Yusuf, M. A., Jibo, A. M., & Umar, M. L. (2023). Knowledge of personal hygiene among street food vendors and canteen food handlers in Kano: A mixed methods study. *Nigerian Medical Journal*, 64(3), 337–351.
- Mazi, I. M., Onyeaka, H., Akegbe, H., Njoagwuani, E. I., Ochulor, C. E., Oladunjoye, I. O., Omotosho, A. D., Nwaiwu, O., Tamasiga, P., & Odeyemi, O. A. (2023). Street vended foods in Nigeria: An analysis of the current state of affairs and the way forward. *Cogent Food & Agriculture*, 9(2), Article 2266194. <https://doi.org/10.1080/23311932.2023.2266194>
- Asogwa, F. C., Ugwu, P. C. O., Alum, U. E., Egwu, O., & Nzubechukwu, E. (2015). Hygienic and sanitary assessment of street food vendors in selected towns of Enugu North District of Nigeria. *American-Eurasian Journal of Scientific Research*, 10(1), 22–26.
- Muyanja, C., Nayiga, L., Brenda, N., & Nasinyama, G. (2011). Practices, knowledge and risk factors of street food vendors in Uganda. *Food Control*, 22(10), 1551–1558.
- Girmay, A. M. (2024). Sanitary condition and hygienic practice of street food vendors in selected towns of Ethiopia: A cross-sectional study addressing public health concern. *Journal of Agriculture and Food Research*, 15, Article 100857.
- Samapundo, S., Climat, R., Xhaferi, R., & Devlieghere, F. (2015). Food safety knowledge, attitudes and practices of street food vendors and consumers in Port-au-Prince, Haiti. *Food Control*, 50, 457–466. <https://doi.org/10.1016/j.foodcont.2014.09.010>
- Monney, I., Agyei, D., Ewoenam, B. S., Priscilla, C., & Nyaw, S. (2014). Food hygiene and safety practices among street food vendors: An assessment of compliance, institutional and legislative framework in Ghana. *Food and Public Health*, 4(6), 306–315.
- Akanbi, B. O., & Usuh, E. A. (2016). Safety of street-vended Soy Wara in Nigeria. *Journal of Food Protection*, 79(1), 169–173.
- World Health Organization. (2006). *Five keys to safer food manual*. WHO Press.
- Chukuezi, C. O. (2010). Food safety and hygienic practices of street food vendors in Owerri, Nigeria. *Studies in Sociology of Science*, 1(1), 50–57.
- Food and Agriculture Organization of the United Nations, & World Health Organization. (2003). *Assuring food safety and quality: Guidelines for strengthening national food control systems*. Food and Agriculture Organization of the United Nations.
- 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.
- WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene. (2021). *Progress on household drinking water, sanitation and hygiene 2000–2020: Five years into the SDGs*. World Health Organization & United Nations Children's Fund.
- World Health Organization. (2010). *Basic steps to improve safety of street-vended food*. World Health Organization.
- World Health Organization. (2015). *WHO estimates of the global burden of foodborne diseases: Foodborne Disease Burden Epidemiology Reference Group 2007–2015*. WHO Press.