

Hand Hygiene Knowledge, Practice and Associated Factors among Food Vendors in Nnewi, Anambra State, Nigeria: A Cross-Sectional Study

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Abstract

This study examined the level of knowledge and actual hand hygiene practices among food vendors in Nnewi, Anambra State, and explored factors contributing to foodborne disease risk. A cross-sectional descriptive survey conducted among 167 food vendors using a structured questionnaire and checklist. Data were analyzed using Chi-square tests to assess associations between socio-demographic factors and hygiene practices. The results highlighted a significant disparity between knowledge and practice. Most vendors had good knowledge of hygiene but this did not translate into practice. Only one-third used soap and water, while others used water alone or cloth. Unsafe behaviours after handling money were common. Inferential analysis using Chi-Square Tests of Independence showed no significant associations were found between education, training, or water source and hygiene behaviour. Many relied on stagnant water instead of running water. There is a clear gap between what vendors know and what they do. Improving access to clean running water and promoting practical hygiene habits are crucial for reducing foodborne disease risks in this setting.

Keywords: hand hygiene, food vendors, foodborne diseases, hygiene practices, knowledge-practice gap

INTRODUCTION

Foodborne diseases represent a significant and persistent threat to global public health. The World Health Organization (WHO) estimates that unsafe food causes approximately 600 million illnesses and 420,000 deaths annually, affecting nearly one in ten people worldwide (WHO, 2022). This burden is not distributed equally; vulnerable populations, particularly children under the age of five, are disproportionately affected. Despite comprising only 9% of the global population, young children account for a staggering 30% of all deaths from foodborne diseases, with 125,000 children dying each year from preventable food-related illnesses. The overall impact, measured in the loss of healthy life years, is estimated at 33 million Disability-Adjusted Life Years (DALYs) annually, a figure comparable to major infectious diseases. The WHO African and South-East Asia Regions report the highest incidence and death rates, underscoring the critical need for food safety research and intervention in these areas (Afsana et al., 2022).

Among the array of preventative measures, hand hygiene stands out as one of the most effective, simple, and cost-effective strategies for interrupting the transmission of foodborne pathogens (Akinsulie et al., 2024). A significant portion of foodborne pathogens, including *Salmonella*, pathogenic *E. coli*, and norovirus, are transmitted via the fecal-oral route, where contaminated hands serve as a primary vehicle for transferring microbes from a source to food. The Centers for Disease Control and Prevention (CDC) reports that educational interventions promoting handwashing can reduce the incidence of diarrheal diseases by 23-40% (Hayman,

2021). The critical role of food handlers in this transmission chain is undeniable; evidence indicates that the spread of germs from the hands of food workers accounts for 89% of foodborne outbreaks in which food was contaminated by an employee (Iwu, 2020). This highlights that the hygiene practices of individuals who prepare and sell food are a critical control point for safeguarding public health.

In urban and semi-urban areas across Nigeria, food vendors are integral to the food supply chain and daily life. These vendors, often operating in the informal sector, provide an essential service by offering convenient and affordable ready-to-eat meals to a large segment of the population. Research indicates that for a substantial number of urban dwellers in Nigeria, street food is not merely a convenience but the primary source of daily nutrition, with some studies suggesting that over half of urban out-of-home consumers derive their entire daily food intake from these vendors (Wolf et al., 2022). A vendor's knowledge of hygiene principles and their personal attitude toward food safety are fundamental precursors to their actions. However, these vendors often operate in challenging environments characterized by a lack of formal training and inadequate infrastructure, such as limited access to potable water and proper sanitation facilities, which directly impacts their ability to practice safe hygiene ((Solomon et al., 2021).

A well-documented phenomenon in public health is the gap that often exists between an individual's knowledge, attitude, and their actual practice (KAP). This disconnect is particularly evident in studies of food hygiene among vendors in Nigeria. For instance, a study conducted by Iwu et al. in Owerri revealed that while a majority of food vendors possessed good knowledge (81%) and a positive attitude (71%) regarding food hygiene, only 37% demonstrated good hygienic practices (Okojie and Isah, 2019). Another Nigerian study echoed this finding, reporting that over 90% of vendors had good knowledge and attitude, yet only 34.6% adhered to good hygiene practices (Oseyemi, 2023). This gap is often exacerbated by practical barriers, such as the absence of dedicated handwashing stations with soap and clean water at vending sites, which makes it exceedingly difficult for vendors to translate their knowledge into consistent, safe behaviors. Hence, the main objectives of this study are to: (1) determine the socio-demographic characteristics of food vendors in Nnewi, Anambra State, (2) assess the level of hand hygiene knowledge among food vendors in Nnewi, Anambra State, (3) examine the hand hygiene practices of food vendors in Nnewi, Anambra State, and (4) identify the factors influencing the knowledge and practice of hand hygiene among food vendors in Nnewi, Anambra State.

METHODOLOGY

A descriptive cross-sectional design was conducted in Nnewi, Anambra State, southeastern Nigeria. The study was carried out in Nnewi, Anambra State, southeastern Nigeria. Nnewi is a major commercial and industrial city located east of the River Niger, about 22 km southeast of Onitsha, and comprises Nnewi North and Nnewi South local government areas. The city is known for its dense trading activity, transport movement, busy markets, and large concentration of small-scale food businesses. These features make it a relevant setting for a study on hand hygiene among food vendors, because ready-to-eat foods are prepared and sold daily in crowded public environments where hygiene practices have direct implications for food safety and disease prevention.

The target population comprised individuals involved in the preparation and sale of ready-to-eat food in the informal sector within Nnewi North Local Government Area. A census approach was adopted for the study. Rather than selecting a fraction of the accessible population, all eligible and available informal ready-to-eat food vendors identified within the study area were included.

On this basis, a separate statistical sample size calculation was not required. Purposive sampling method was used to identify the locations where food vendors were concentrated and to support the census of the accessible population. Eligible participants were food vendors aged 18 years and above who were actively engaged in daily food preparation or sale and who consented to participate. Vendors working in formal establishments such as registered hotels, restaurants, or institutional canteens, as well as those selling only raw or pre-packaged foods, were excluded.

Quantitative data employed a validated questionnaire with four sections: sociodemographics, knowledge of hand hygiene, self-reported hand hygiene practices, and factors influencing knowledge and practice. Data were collected through face-to-face visits to vendors at their places of business. After explaining the purpose of the study and obtaining consent, the questionnaire was administered in interview format where necessary to accommodate differences in literacy level. At the same time, the observational checklist was completed discreetly in order to capture natural hygiene conditions and practices.

Reliability was assessed using the test-retest method. The instrument was pretested among 20 residents in Onitsha who shared similar characteristics with the study population but were not included in the main study. The questionnaire was re-administered to the same group after an interval of two weeks, and the responses from both administrations were correlated to determine the stability and internal consistency of the instrument.

Data were analyzed using IBM SPSS Statistics version 27.0. Descriptive statistics, including frequencies and percentages, were used to summarize respondents' socio-demographic characteristics, knowledge of hand hygiene, observed practices, and perceived operational barriers. Associations between demographic characteristics, facility-related factors, and hand hygiene practice were assessed using the Chi-square test of independence. Statistical significance was set at $p < 0.05$.

Ethical approval was obtained from Abia State University ethics committee, before data collection commenced. Participation was voluntary and based on informed consent. Participants were informed of the purpose of the study, assured of confidentiality and anonymity, and told that they could withdraw from the study at any time without penalty. The benefits of the research were clearly explained to the participants.

Conflict of Interest

The authors have declared that no competing interests exist.

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RESULTS

Table 1 presents the socio-demographic characteristics of the 167 respondents. The largest age group was 26–35 years (36.5%), followed by 36–45 years (25.7%) and 18–25 years (24.6%). Most respondents were female (76.6%), while males accounted for 23.4%. Regarding educational attainment, nearly half of the respondents had secondary education (47.3%), followed by primary education (24.6%), tertiary education (16.8%), and no formal education (11.4%). In terms of work experience, the majority had 1–3 years of experience (34.1%), followed by 4–6 years (29.3%), while only 6.6% had more than 10 years of experience. Overall, the study population was predominantly female, relatively young, and characterized by secondary-level education and short-to-moderate work experience.

Table 1: Socio-demographic characteristics of respondents

Variables	Frequency	Percentage (%)
Age Range		
18 – 25 years	41	24.6
26 – 35 years	61	36.5
36 – 45 years	43	25.7
46 – 55 years	13	7.8
56 years and above	9	5.4
Gender		
Male	39	23.4
Female	128	76.6
Level of Education		
No formal education	19	11.4
Primary education	41	24.6
Secondary education	79	47.3
Tertiary education	28	16.8
Years of Experience		
Less than 1 year	27	16.2
1 – 3 years	57	34.1
4 – 6 years	49	29.3
7 – 10 years	23	13.8
More than 10 years	11	6.6
Total	167	100.0

Source: Field Survey, 2026

Table 2: Respondents' Knowledge regarding hand hygiene

Variables	Frequency	Percentage (%)
Important Times to Wash Hands		
After using the toilet	51	30.5
After handling money	9	5.4
Before handling cooked/RTE food	69	41.3
After handling raw food	21	12.6
Before starting work	7	4.2
Only when hands look dirty	7	4.2
After coughing/sneezing	3	1.8
Most Important Step for Killing Germs		
Rinsing with water only	13	7.8
Using very hot water	9	5.4
Wiping on cloth/apron	7	4.2
Using soap and rubbing (20 secs)	137	82.0
Using hand sanitizer	1	0.6
Main Reason for Handwashing		
To prevent smelling		
To avoid fines	9	5.4
To prevent spread of germs/disease	147	88.0
To make food taste better	4	2.4

Total	167	100.0
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Source: Field Survey, 2026

In table 2, the respondents generally had good knowledge of hand hygiene. Most participants recognized that hands should be washed before handling cooked/ready-to-eat food (41.3%) and after using the toilet (30.5%). A large majority (82.0%) correctly identified washing with soap and rubbing for at least 20 seconds as the most effective way to remove germs, while 88.0% understood that the primary purpose of handwashing is to prevent the spread of germs and disease.

Table 3: Respondents' hand hygiene practices

Variables	Frequency	Percentage (%)
Material Used to Clean Hands		
Water only	49	29.3
Water and soap	53	31.7
Water and detergent	21	12.6
Hand sanitizer	9	5.4
Wipe on cloth/apron	23	13.8
No way to clean hands	12	7.2
Action After Handling Money		
Wash with soap and water	27	16.2
Rinse with water only	41	24.6
Use hand sanitizer	13	7.8
Wipe on cloth/apron	47	28.1
Continue working without action	39	23.4
Water Source Setup		
Dedicated station with running water	31	18.6
Bowl or basin of water	73	43.7
Public tap/well (walk to get)	41	24.6
Sachet/bottled water	11	6.6
No reliable source	11	6.6
Total	167	100.0

Source: Field Survey, 2026

Table 3 indicates that hand hygiene practices were generally inadequate despite respondents' knowledge of proper handwashing. Only 31.7% reported washing their hands with soap and water, while 29.3% used water only. After handling money, few respondents (16.2%) washed with soap and water; many either wiped their hands on a cloth/apron (28.1%) or continued working without cleaning their hands (23.4%). In addition, most respondents relied on a bowl or basin of water (43.7%), whereas only 18.6% had access to a dedicated handwashing station with running water.

Table 4: Factors influencing respondents' knowledge and practice

Variables	Frequency	Percentage (%)
Water Availability		
Always available	21	12.6
Mostly available	37	22.2
Rarely available	63	37.7
Not available	46	27.5
Soap Availability		
Yes, always	29	17.4
Yes, sometimes	79	47.3
No, rarely	37	22.2
No, never	22	13.2
Training Attendance		
Yes	31	18.6
No	136	81.4
Inspection Frequency		
Weekly	9	5.4
Monthly	21	12.6
Once in a few months	51	30.5
Once a year	33	19.8
Never	53	31.7
Main Operational Challenge		
High volume of customers	61	36.5
Lack of assistance	33	19.8
Station too far	27	16.2
Skin irritation	13	7.8
Forgetfulness	33	19.8
Total	167	100.0

Source: Field Survey, 2026

Table 4 shows several constraints that may affect respondents' knowledge and practice. Access to water was generally poor, with most respondents reporting that it was rarely available (37.7%) or not available (27.5%), while only a small proportion (12.6%) had constant access. Soap availability followed a similar pattern, as it was only sometimes available for nearly half of respondents (47.3%), and consistently available for just 17.4%.

Training exposure was very low, with 81.4% of respondents reporting no prior training. Likewise, oversight was weak, as about one-third (31.7%) had never been inspected and another 30.5% were inspected only occasionally. Regular inspections were rare. The main challenge reported was high customer volume (36.5%), followed by lack of assistance and forgetfulness (both 19.8%). Fewer respondents cited distance to the station (16.2%) or skin irritation (7.8%). Overall, the findings point to limited resources, low training and weak supervision, alongside workload pressures—all of which likely contribute to suboptimal practice.

Table 5. Inferential Associations with Hand Hygiene Knowledge and Practice

Variables Tested	Chi-Square (χ^2)	Degrees of Freedom (df)	p-value	Significance
Educational Attainment vs. Knowledge of Germ Elimination	7.07	3	0.070	Not Significant
Formal Training Attendance vs. Money Handling Practices	0.00	1	1.000	Not Significant
Water Source Setup vs. Material Used to Clean Hands	2.54	1	0.111	Not Significant

Source: Field survey, 2026

As shown in Table 5, no statistically significant associations were observed at the 0.05 level. Educational attainment was not significantly associated with knowledge of germ elimination ($\chi^2 = 7.07$, $df = 3$, $p = 0.070$). Similarly, attendance at formal training showed no significant relationship with appropriate hand hygiene practice after handling money ($\chi^2 = 0.00$, $df = 1$, $p = 1.000$). Water source arrangement was also not significantly associated with the type of material used for hand cleaning ($\chi^2 = 2.54$, $df = 1$, $p = 0.111$).

Overall, the results indicate that variations in education, training, and water access did not translate into meaningful differences in hygiene-related knowledge or practice. This suggests that suboptimal hand hygiene behaviours were widespread across all groups, pointing to broader structural and contextual barriers rather than differences in individual characteristics alone.

DISCUSSION

What is the socio-demographic characteristics of food vendors in Nnewi, Anambra State?

The socio-demographic profile of food vendors in Nnewi shows a workforce largely made up of women within the active working age of 26–45 years. This reflects how food vending is closely tied to traditional gender roles, where domestic cooking responsibilities are extended into income-generating activities. Similar patterns have been reported in Nasarawa State, where the sector is also predominantly female (Yusuf & Chege, 2019). Most vendors had at least secondary education, suggesting that basic literacy is unlikely to be a major constraint to understanding food hygiene. Instead, gaps in safe food practices may stem from other factors. Studies in Nnewi metropolis and Zanzibar similarly highlight the influence of gender and education on hygiene behaviour (Okwuanaso et al., 2025; Hassan & Fweja, 2020). In addition, many vendors had only a short period of business experience, indicating high turnover in the sector. This may limit the development of consistent food safety practices over time. Evidence from Ondo State also shows that higher education and experience are linked to better food safety knowledge (Odipe et al., 2019).

What is the level of hand hygiene knowledge among food vendors in Nnewi, Anambra State?

Vendors demonstrated a commendably high level of theoretical knowledge regarding hand hygiene, particularly concerning the use of soap and the role of handwashing in disease prevention. An overwhelming majority correctly identified the necessity of soap for killing germs and recognized that hygiene prevents foodborne illnesses like cholera and typhoid. The dissonance between the lack of formal training and high knowledge scores suggests that vendors likely acquire information through informal channels, mass media, or general societal awareness rather than structured occupational health education. Such high levels of cognitive awareness are consistent with the broader Nigerian context. Iwu et al. (2017) reported a similar trend in Owerri, where 81% of vendors possessed good food hygiene knowledge. Knowledge rate of 86.6% was observed among food handlers in Calabar (Okon et al., 2022), mirroring the high awareness found in the current study. Furthermore, Osuchukwu & Udom (2022) found that 85.1% of university food vendors had adequate knowledge, and Oseyemi (2023) confirmed that vendors in Akure generally understood safety procedures, indicating that ignorance of hygiene principles is not the primary challenge in these settings.

What hand hygiene practices are observed among food vendors in Nnewi, Anambra State?

Despite high levels of knowledge, there is a clear gap between what vendors know and what they actually do. Many still rely on poor hand hygiene practices such as rinsing with water only or wiping hands on aprons. A major concern is that hands are often not washed after handling money before food preparation continues, which increases the risk of cross-contamination. The use of shared bowls of water instead of running water further reduces the effectiveness of handwashing. This gap between knowledge and practice is not unique to this setting and has been widely reported in other studies (Iwu et al., 2017; Okojie & Isah, 2019; Ibrahim & Adeola, 2024). Even where awareness is high, vendors often struggle to apply proper hygiene consistently due to practical constraints (Oseyemi, 2023). Overall, the findings suggest that improving food safety requires more than awareness, it needs workable conditions that make safe practices easier to follow in everyday work.

What are the factors that influence the knowledge and practice of hand hygiene practices among food vendors in Nnewi, Anambra State?

The results suggest that poor hygiene practices are driven more by everyday constraints than by lack of awareness alone. Many vendors struggle with limited access to running water and irregular availability of soap, making proper handwashing difficult in practice. On top of this, very few vendors have received formal training, and inspections are infrequent, pointing to weak regulatory support. Busy customer flow also pushes vendors to prioritise speed over proper hygiene.

These findings are in line with previous research showing that having basic facilities like water and soap strongly improves hygiene compliance (Hassan & Fweja, 2020; Okwuanaso et al., 2025), while lack of training is linked to poorer practices (Yusuf & Chege, 2019). Weak supervision and irregular inspections have also been reported as key gaps in maintaining sanitation standards (Odipe et al., 2019). Overall, the evidence points to the need for practical support systems—reliable facilities, regular training, and consistent monitoring—rather than awareness alone.

Statistical tests further explain the observed knowledge–practice gap among vendors. Educational level was not significantly associated with hygiene understanding ($X^2 = 7.07$, $df = 3$, $p = 0.070$), suggesting that misconceptions about germ elimination cut across all education groups.

Likewise, formal training showed no significant effect on post-money handling practices ($X^2 = 0.00$, $df = 1$, $p = 1.000$), indicating minimal behavioural impact of existing training exposure. Water source arrangement also had no significant association with hand-cleaning materials used ($X^2 = 2.54$, $df = 1$, $p = 0.111$). Overall, poor hand hygiene practices were widespread across all vendors rather than confined to specific subgroups. This implies that improving food safety will require more than education or infrastructure alone, and should instead combine practical training, routine supervision, and sustained behavioural reinforcement.

CONCLUSION

The assessment of hand hygiene among food vendors in Nnewi reveals a clear gap between knowledge and actual practice. Although most vendors demonstrated good awareness of hygiene principles and the risks of disease transmission, this knowledge was not consistently reflected in their daily behavior. This disconnect appears to be driven largely by structural constraints, particularly limited access to running water and soap, alongside high work demands and weak regulatory supervision. Overall, the findings indicate that improving knowledge alone is unlikely to produce meaningful behavioral change. Effective improvement in hand hygiene practices will likely require a combined approach that addresses infrastructural deficiencies and strengthens routine monitoring and enforcement mechanisms, in addition to educational efforts.

RECOMMENDATIONS

1. Local government authorities should prioritize the installation of accessible potable water points within high-density vending areas to address infrastructural deficits.
2. Environmental health officers need to increase the frequency of unannounced sanitary inspections to ensure strict adherence to hygiene protocols.
3. Public health agencies ought to implement mandatory, practical training programs that reinforce the behavioral application of safety knowledge.
4. Food vendors must ensure the constant availability of soap and water at their workstations to facilitate regular handwashing.
5. Policymakers should enact regulations that make the possession of functional handwashing facilities a prerequisite for obtaining a vending license.
6. Non-governmental organizations could assist by providing subsidies for essential hygiene materials to support vendors in resource-constrained settings.
7. Consumers should be encouraged through public awareness campaigns to patronize only those vendors who demonstrate visible adherence to hygiene standards.

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