

Knowledge, Attitude and Practices of Food Hygiene among Food Vendors in Owerri, Imo State, Nigeria

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Abstract

Background: Food vendors play a critical food safety role in the “farm to plate” continuum that is necessary for the prevention and control of food borne diseases and therefore, any lack of its understanding by the food vendors poses a serious challenge to food safety. **Objective:** To assess the knowledge, attitude and hygienic practices of food vendors in Owerri town of Imo State, Nigeria. **Methods:** The study was a Cross-Sectional descriptive design that used a proportionate convenience sampling technique to select 200 food vendors from the three Local Government Areas (LGAs) in Owerri town. Data were collected using a pretested semi-structured interviewer administered questionnaire. Descriptive analyses were done with frequencies and summary statistics. Chi square statistics were computed to determine significant relationships and p value was set at 0.05 significant level. **Results:** While a majority of the respondents had a good level of knowledge (81%) and positive attitude (71%) about food hygiene, only 37% of the respondents had a good level of hygienic practice. It was revealed that 32% and 46% of the respondents received training on food hygiene and environmental health worker inspection respectively. It was also revealed that, there were statistically significant relationships between knowledge ($p = 0.001$), attitude ($p = 0.000$), formal training on food hygiene ($p = 0.000$) and the level of food hygienic practices. **Conclusion:** The public health management of food vending services should involve the development of strategies that will equip them with the necessary knowledge and skills to provide vending services in a hygienic and safe manner.

Keywords

Knowledge, Attitude, Practice, Food Hygiene, Food Vendors, Owerri, Nigeria

1. Introduction

The World health theme for 2015 was “Food Safety” and the slogan was “Farm to Plate, make Food Safe” [1]. This highlights the importance that the World Health Organization places on the need to globally address in a coordinated manner, the potential threats posed by unsafe food which is a consequence of the breakdown of food hygiene with the subsequent risk of the emergence of food borne illnesses along the pathway of the entire food supply chain, of which the food vendor is a critical component.

Food borne diseases are an important cause of morbidity and mortality worldwide with significant public health impact. The global burden of food borne diseases in 2010 was 33 million Healthy life years lost (DALY) with about 600 million food borne illnesses and 420,000 deaths, of which food borne diarrhoeal diseases, the most frequent cause of food borne illnesses contributed about 230,000 deaths [2] [3]. The burden of foodborne diseases is borne by individuals of all ages, particularly children under the age of 5 years who constitute about 40% of the global burden and also by individuals living in low-income regions. With considerable regional differences in the global burden of food borne diseases, Africa stands out, as having the highest burden per population of food borne diseases [2] [3].

In Sub-Saharan Africa especially Nigeria, despite the efforts of Government through its National Agency for Food and Drug Administration and Control (NAFDAC), to improve the safety of food supply, food safety still remains a major issue that has been exacerbated by the peoples’ ignorance of food hygiene, Government’s uncoordinated approach to food safety control and the poor enforcement of food safety legislation and regulations [4]. In addition, climate change resulting in temperature changes has been predicted to influence the risks associated with food production, storage and distribution and therefore has placed greater responsibility on food vendors to ensure the safety of food that they prepare for public consumption [3].

Unsafe food creates a vicious cycle of disease, diarrhoea and malnutrition which significantly impedes public health and socioeconomic development. The number of people buying and consuming food prepared in public places has increased as a result of population migration, changes in consumer demand and behaviour with urban dwellers needing cheaper foods in the face of harsh economic realities and as a consequence, the risk of food borne illnesses is more prevalent due to challenges in food safety especially in regions where adequate resources have not been allocated for food safety control and intervention efforts [3].

Food can become contaminated at any point of production and distribution along the farm to plate continuum and as a result, food safety control is a responsibility shared by all components in the food supply chain; so with each component operating responsibly, the supply of safe food to the consumer is supposed to be guaranteed. But unfortunately, a large proportion of food borne diseases are caused by improperly prepared and mishandled food by food vendors and also food handlers at home. The challenge in food safety is that these food handlers lack understanding of their roles in ensuring proper personal and environmental hygiene accompanied with the basic food hygienic practices when they buy, prepare and sell food [3].

The role of the food handlers especially the food vendors in effectively reducing the risk of food borne diseases is critically important as they are in direct contact with the consumers and also, they are the least challenging in terms of implementing food safety control measures. So assessing the knowledge, attitude and practices of food vendors will enable the development of coordinated, effective, integrated and preventive strategies in line with the WHO “Five Keys to Safer Food” with the aim of reducing the risk of contamination as they buy, prepare, store and serve food to the consumers [5].

2. Methodology

2.1. Study Area

The survey was conducted in Owerri town of Imo State, Nigeria. Owerri town is bordered to the east by Otamiri River and to the south by Nworie River and it comprises of three Local Government Areas; Owerri Municipal, Owerri North and Owerri West which are part of the 27 Local Governments that make up Imo State. Imo State is in the South Eastern part of Nigeria, within longitude 5°29'06"N and latitude 7°02'06"E occupying an area between the lower river Niger and the upper and middle Imo River [6]. It had a total population of 3.93 million (2.03 million males and 1.9 million females) by 2006 census with an expected population in 2013 of 4.95 million based on an annual growth rate of 3.2% between 2006 and 2013 [7]. The State occupies an area of 5289.49 square kilometres with a population density of about 707.9 per square kilometre [6].

2.2. Study Population

The study population comprise of food vendors *i.e.* major hotels, school and hospital cafeterias, fast food restaurants, food kiosks, roadside food sellers and food hawkers.

2.3. Sample Size Estimation

The minimum sample size required was estimated using Cochran formula [8].

$$n = Z^2 pq / d^2$$

when n = minimum sample size required; Z = Standard normal deviate corresponding to the probability of type I error; p = proportion of food vendors esti-

mated to have a certain knowledge, attitude and practice, which is set at 50%; $q = 1 - p$; $d =$ tolerable error of margin set at 0.05. The minimum required sample size (n) calculated was 384. The population (N) of the food vendors in Owerri was established to be 300, using the finite population correction factor [9];

The adjusted sample size (n_0) = $n \times N/n + (N - 1)$.

The adjusted sample size (n_0) for this study was 169 but the researchers increased the sample size to 200 participants to accommodate non-response.

2.4. Study Design and Sampling Technique

The study was a cross sectional descriptive design that used a proportionate convenience sampling technique to select 200 food vendors from the three Local Government Areas (LGAs). The established population (N) of 300 food vendors were located in the three LGAs as follows; Owerri Municipal—156 (52%), Owerri North—69 (23%) and Owerri West—75 (25%). These proportions were applied to the study sample size of 200 and the proportionate number of food vendors selected from each LGA were identified as follows; Owerri Municipal—104, Owerri North—46 and Owerri West—50. Subsequently, the food vendors were enrolled as participants based on convenience, accessibility, proximity and consent until the proportionate numbers for the respective LGAs were attained.

2.5. Inclusion/Exclusion Criteria

For each food vendor, the principal individual directly involved in the preparation of food was selected and there was no exclusion criteria applied.

2.6. Data Collection and Analysis

Data was collected from two hundred pretested semi structured interviewer-administered questionnaires with an observational checklist. The questionnaire comprise of 4 sections; section one, Sociodemographic Characteristics, section two, Knowledge of food hygiene, section three, Attitude towards food hygiene and section four, Practice and Training on food hygiene. The observational checklist comprise of 2 sections; Personal hygiene and Environmental hygiene. Medical students were recruited for the distribution and collection of the questionnaires.

The level of knowledge of food hygiene was determined by scoring the questions that assessed knowledge. For a single response question, a correct answer was scored 5; a false answer was scored 0. For a multiple response question, each correct answer was scored 5 and up to a maximum of 4 correct answers, a sub-total score of 20 was allocated and for a false answer, 0 was allocated. The total maximum score for all the correct answers for assessing the level knowledge was 35. The level of attitude towards food hygiene was determined by scoring questions that connote an appropriate attitude. For an appropriate attitude, a score of 5 was allocated and for an inappropriate attitude a score of 0 was allocated. The total maximum score for all the appropriate attitudinal response for assessing the level of attitude was 25. The level of practice of food hygiene was determined

by scoring questions that assessed practice. For an appropriate practice a score of 5 was allocated and for an inappropriate practice, a score of 0 was allocated. The total maximum score for all the appropriate practices was 25. The aggregate score for each respondent according to the level of knowledge, attitude and practice was translated to a percentage and assessed against a scale of 0% - 49% for poor, 50% - 69% for fair and 70% or more as good. Data was cleaned, validated manually and analysed using Software Package for Social Sciences (SPSS-IBM) version 22. Descriptive statistics (frequency tables and summary indices) were generated. Chi Square was used to test association between categorical variables with the p value set at 0.05 significant level.

2.7. Ethical Considerations

Ethical approval was obtained from the Ethics Committee of Imo State University Teaching Hospital Orlu and verbal consents were given by the respondents. All authors hereby declare that the study has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

3. Results

Two hundred questionnaires were distributed with one questionnaire per food vendor and all were completely and correctly filled with a response rate of 100%.

3.1. Sociodemographic Characteristics

More than half of the respondents (59.5%) were between the ages of 21 and 40 years old with the majority of them, female (71.5%), having either a secondary or tertiary school education (74.5%), providing an informal food vending service (78%) and were operating within Owerri Municipal Local Government Area of Imo State (52%) (**Table 1**).

Table 1. Sociodemographic characteristics.

Variable	Category	Frequency (%) n = 200
Age (years)	10 - 20	25(12.5)
	21 - 30	66(33.0)
	31 - 40	53(26.5)
	>40	56(28.0)
Gender	Female	143(71.5)
	Male	57(28.5)
Educational level	Tertiary	60(30.0)
	Secondary	89(44.5)
	Primary	34(17.0)
LGA Residence	None	17(8.5)
	Owerri North	46(23.0)
	Owerri West	50(25.0)
Type of food vendor	Owerri Municipal	104(52.0)
	Formal	44(22.0)
	Informal	156(78.0)

3.2. Respondents Knowledge of Food Hygiene

Most of the participants had heard of food hygiene (87%) with more than one third of the respondents who were aware of food hygiene, indicating that their main sources of information were from television (38.5%), health workers (36.2%) and radio (35.1%). More than half of the respondents (55.5%) knew that diarrhoeal diseases were food borne and among those aware of food hygiene, majority (85.6%) knew that lack of good food hygiene practice could cause disease (Table 2).

The aggregate score of the level of knowledge showed that 81% of the respondents had a good level of food hygiene knowledge (Figure 1).

Table 2. Knowledge of respondents on food hygiene.

Variable	Category	Frequency (%)
Have you heard of Food Hygiene (n = 200)	Yes	174(87.0)
	No	26(13.0)
*Source of information about Food Hygiene (n = 174)	Television	67(38.5)
	Health workers	63(36.2)
	Radio	61(35.1)
	Others	33(19.0)
Lack of good food hygiene as a cause of disease (n = 174)	Yes	149(85.6)
	No	7(4.0)
	Don't know	18(10.4)
	Diarrhoea	111(55.5)
*Food borne diseases (n = 200)	Typhoid	76(38.0)
	Malaria	27(13.5)
	Others	6(3.0)
	HIV	1(0.5)
Need for regular Medical check-up (n = 200)	Yes	137(68.5)
	No	63(31.5)

*Multiple response.

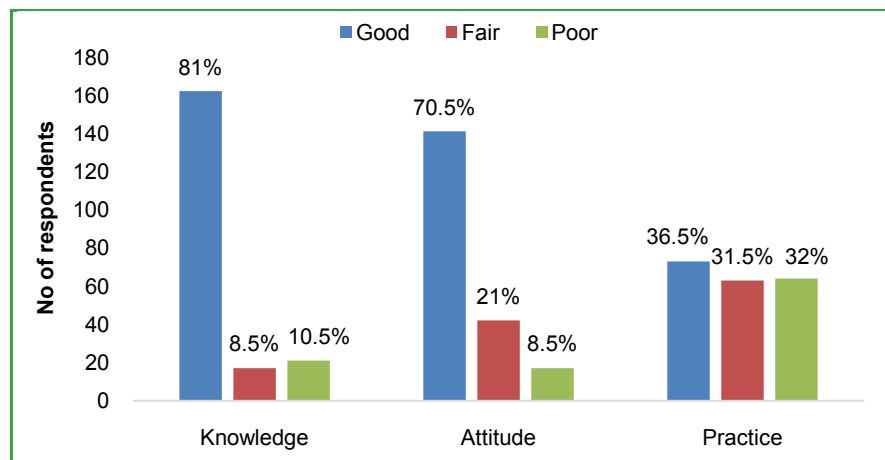


Figure 1. Levels of knowledge, attitude and practice of food hygiene.

3.3. Attitude of Respondents towards Food Hygiene

Most of the participants (86.5%) believed that food hygiene is important but only about half of the participants (52%) were satisfied with their surrounding environmental conditions from where they provide food to the public. When buying food, a majority of the respondents (60.5%) believed that freshness of the food being bought should be their most important consideration. Even though, most of the respondents believed in hand washing (93%), a higher proportion, close to half of the respondents (46.5%) believed that the water used in washing utensils should only be discarded when the water changes colour (Table 3).

A majority of the respondents (71%) had a good level of positive attitude towards food hygiene (Figure 1).

3.4. Practice of Food Hygiene and Services Provided to Respondents

Majority of the respondents (70.5%) use cold water and soap when washing their hands, after which they dry with a towel. While preparing and serving food, just more than half of the respondents (59%) wear apron and cap and about half of the respondents (49.5%) rinse the plate with water once after use. A majority of the respondents (65.5%) did not go for an initial medical exam before commencing the food vending service and of those who went, only more than half of the respondents (59.4%) went for periodic medical examination (Table 4).

Table 3. Attitude of respondents towards food hygiene.

Variable	Category	Frequency (%) n = 200
Do you believe in the importance of Food Hygiene	Yes	173(86.5)
	No	1(0.5)
	Don't know	26(13.0)
Are you satisfied with surrounding environmental conditions	Yes	104(52.0)
	No	78(39.0)
	Don't know	18(9.0)
Most important belief when considering buying food	Freshness	121(60.5)
	Price	38(19.0)
	Quality	36(18.0)
	Others	5(2.5)
Do you believe in hand washing	Yes	186(93.0)
	No	6(3.0)
	Don't know	8(4.0)
When do you believe that water, used in washing utensils should be disposed	After each use	77(38.5)
	Water colour change	93(46.5)
	Water finishes	28(14.0)
	Others	2(1.0)

Table 4. Food hygienic practices and services provided.

Variable	Category	Frequency (%)
Practices		
Hand washing methods (n = 200)	Cold water/Soap/towel dry	45(22.5)
	Cold water/cloth dry	141(70.5)
	Hot water/Soap/towel dry	6(3.0)
	Cold water/Shake hands	5(2.5)
	Hot water/cloth dry	3(1.5)
	Hot water/Soap/Shake hands	0(0.0)
Wears apron and cap while preparing and serving food (n = 200)	Yes	118(59.0)
	No	82(41.0)
	Once	99(49.5)
Frequency of Rinsing plates (n = 200)	Twice	87(43.5)
	Others	13(6.5)
	Don't rinse	1(0.5)
Medical exam before Starting food vending (n = 200)	Yes	69(34.5)
	No	131(65.5)
Periodic medical exam (n = 69)	Yes	41(59.4)
	No	28(40.6)
Services provided		
Training on food hygiene (n = 200)	Yes	64(32.0)
	No	136(68.0)
Environmental Health worker Check (n = 200)	Yes	91(45.5)
	No	73(36.5)
	Don't know	36(18.0)

Furthermore, a majority of the respondents (68%) did not undergo any training on food hygiene though about 46% of the respondents were visited at one time or the other by an environmental health worker (Table 4).

While only 36.5% of the respondents had a good level of food hygienic practice, 32% of respondents also had a poor level of food hygienic practice (Figure 1).

3.5. Observational Check List of Personal/Environmental Hygiene of Respondents

On inspection of personal hygiene of the respondents, a majority of them were neatly dressed (74%) and did not use hair colouring (73%) but only about half of the respondents had well-kept nails (52%) or use an apron while preparing food (45%). On further inspection of the surrounding environment, it was observed that a majority of the respondents protected both prepared (62.5%) and stored (59.5%) food from flies and rodents and did not place uncooked food on the

floor unprotected (62.5%). It was also observed that a majority of respondents had clean wash hand basin with soap and towel (60%) with adequate supply of water (63.5%) and at the same time maintaining a clean service table and surrounding (67%) though, close to half of the respondents (49%) had inadequate sanitary conditions with most of the respondents (85%) having evidence of disease vectors in their premises (**Table 5**).

3.6. Association of Knowledge, Attitude and Training with the Level of Food Hygienic Practices

Knowledge of food hygiene ($p = 0.001$), attitude towards food hygiene ($p = 0.000$) and training of respondents on food hygiene ($p = 0.000$) were significantly associated with the level of food hygienic practices (**Table 6**).

Table 5. Observational check list of personal/environmental hygiene.

Variable	Category	Frequency (%) n = 200
Personal Hygiene		
Neatly dressed	Yes	148(74.0)
	No	52(26.0)
Well-kept finger nails	Yes	105(52.5)
	No	95(47.5)
Use of hair colouring	Yes	54(27.0)
	No	146(73.0)
Use of apron	Yes	90(45.0)
	No	110(55.0)
Environmental Hygiene		
Prepared food protected from flies and rodents	Yes	125(62.5)
	No	75(37.5)
Stored food protected from flies and rodents	Yes	119(59.5)
	No	81(40.5)
Presence of clean wash hand basin/soap/towel	Yes	120(60.0)
	No	80(40.0)
Clean service table and surrounding	Yes	134(67.0)
	No	66(33.0)
Evidence of disease vectors in premises	Yes	170(85.0)
	No	30(15.0)
Uncooked food items placed on bare floor	Yes	75(37.5)
	No	125(62.5)
Adequate supply of water	Yes	127(63.5)
	No	73(36.5)
Adequate sanitary conditions	Yes	103(51.5)
	No	97(48.5)

Table 6. Association of Knowledge, Attitude and Training with the level of food hygienic practices.

Variable	Good-hygienic Practice (%)	Fair-hygienic Practice (%)	Poor-hygienic Practice (%)	Total (%)	χ^2	df	p-value
Knowledge					19.52	4	0.001*
Good	69(42.6)	50(30.9)	43(26.5)	162(100)			
Fair	3(17.6)	7(41.2)	7(41.2)	17(100)			
Poor	1(4.8)	6(28.6)	14(66.7)	21(100)			
Total	73(36.5)	63(31.5)	64(32.0)	200(100)			
Attitude					49.00	4	0.000*
Good	65(46.1)	49(34.8)	27(19.1)	141(100)			
Fair	7(16.7)	13(31.0)	22(52.4)	42(100)			
Poor	1(5.9)	1(5.9)	15(88.2)	17(100)			
Total	73(36.5)	63(31.5)	64(32.0)	200(100)			
Training					49.45	4	0.000*
Yes	45(70.3)	14(21.9)	5(7.8)	64(100)			
No	28(20.6)	49(36.0)	59(43.4)	136(100)			
Total	73(36.5)	63(31.5)	64(32.0)	200(100)			

*significant.

4. Discussion

This study assessed the knowledge, attitude and the level of practice of food hygiene among food vendors in Owerri town of Imo State, Nigeria; and overall, it revealed that knowledge, attitude and training were significantly associated with the level of food hygienic practice of food vendors.

In the present study, the respondents were mainly within the ages of 20 - 40 years old, female with either a secondary or tertiary level of education and operating in Owerri municipal LGA which is an urban area. This trend is similarly observed in previous studies where the food vendors are predominantly female [10]-[17] within the ages of 20 - 40 years old [10] [13] [18] and have either a secondary or tertiary level of education [10] [11] [14] [17] [18]. On the contrary, some studies have observed that food vendors were predominantly male [19] [20] with no education or primary education as the highest level of education attained [12] [13] [16] [19].

With the difficult, harsh economic environment especially in developing countries, food vending business is rapidly expanding in the urban areas and serving as a common, accessible and complementing source of family income and employment especially for women, which is probably due to the existing cultural orientation and gender bias. The higher level of education observed among these food vendors may be attributed to the increasing lack of employment opportunities for the skilled and educated, thereby increasing the number of educated people engaging in self-employment activities like the food vending

service as a source of livelihood.

It was observed that knowledge of the food vendors with regard to food hygiene was good for a majority of the respondents in the present study, and this observation was similar to some other studies done in Nigeria [14] [16] [21]. But on the contrary, studies from Ethiopia, Malaysia, Iran, Korea and Thailand observed that a majority of the food vendors had poor level of food hygiene knowledge [15] [18] [22] [23] [24] [25]. It is tempting to say that the level of good knowledge among the majority of food vendors in the present study could be related to the fact that a majority of the respondents had either a secondary or tertiary level of education which could have formed the basis for increased comprehension of food hygiene information and therefore improved knowledge. According to Kalua [26], knowledge, positively influences attitude formation and in other words, attitude can be said to be a reflection of knowledge which is linked to personal beliefs and previous personal experiences and this probably could explain the observation in the present study where a majority of the respondents had a good level of knowledge and also an accompanying good level of positive attitude towards food hygiene. This pattern was similarly observed in previous studies done in Nigeria [16] [21] where the majority of the respondents had a good level of both knowledge and attitude and in a study in Malaysia [18] where the majority of the respondents had a poor level of both knowledge and attitude.

According to Aiken *et al.* [27], practices refer to the ways in which people demonstrate their knowledge and attitude through their actions but in the present study, about one third of the respondents had a good level of food hygienic practice which appear not to be commensurate with the levels of knowledge and attitude observed in the majority of the respondents therefore appearing to have a disconnect between the levels of knowledge and attitude and the level of practice. The good level of hygienic practice observed in the present study in less than 50% of the respondents was also similarly observed in previous studies [16] [18] [25] with a range of only between 15% - 32% of the respondents having a good level of food hygienic practice. This was not the case in a number of other studies, were more than 50% of the respondents had a good level of food hygienic practice [14] [15] [17] [24] [28]. Despite the low level of food hygienic practice observed in the present study, the practice of wearing aprons and covering the hair was observed in more than 50% of the respondents and this supposedly, should give an indication of the willingness of the food vendors to provide service in a hygienic manner. Though according to the World Health Organization (WHO), the use of aprons and hair covers by food vendors has more to do with aesthetics and consumer assurances than food safety [29].

On the other hand, a majority of the respondents did not do the required initial medical examination before commencing the food vending business and also of those that did, just more than half of the respondents subsequently went for periodic medical examinations. Probably the lack of awareness, additional costs or associated inconveniences, especially when they feel healthy, may have contributed to why the majority of the respondents did not do medical examina-

tions. Though, Abdussalam *et al.* [30], is of the opinion that medical examination of food vendors prior to commencement or at periodic intervals thereafter, should not be mandatory, because it does not significantly ensure food safety. Notwithstanding, there is always a possibility of food vendors, being healthy carriers of disease and infecting consumers and as such, it is in the best interest of the consumer that all food vendors be examined.

On further analysis, it was revealed that the level of knowledge, attitude and formal training were significantly associated with food hygienic practices of the respondents. This was consistent with a number of studies; in Malaysia by Rahman *et al.* [18], where knowledge, attitude and training were significantly associated with practice, in Nigeria by Afolaranmi *et al.* [14], where knowledge and training were significantly associated with practice, in Ethiopia and Thailand by Tessema *et al.* [15] and Cuprasittrut *et al.* [25] respectively, where both studies reported that, knowledge was significantly associated with practice. On the contrary, a study in Nigeria by Otu S [21], reported that attitude was not significantly associated with practice and also a study in Ghana by Rheinländer *et al.* [31], reported that knowledge was not closely related to practice and this was attributed to the existing socio-cultural context which probably had a greater influence on safe food practices.

In the present study, formal training on food hygiene practices appear to be low with only 32% of the respondents having received training, and this appears to be a problem across developing countries as studies from Nigeria, Ethiopia, Malaysia and Thailand have reported a range of only between 12% - 39% of food vendors having received training on food hygiene practices [13] [14] [24] [25] [28] [32] [33]. Formal training of food vendors is important in ensuring good personal and environmental hygiene and has been reported by Monney *et al.* [11] who showed that, food vendors trained on food hygiene and safety are more likely to keep their finger nails clean and adequately protect their food from flies and dust. Despite the low level of formal training in the present study, the observational check list on hygiene standard, showed that while close to three quarters of respondents were neatly dressed, only about half of the respondents had well-kept finger nails. Also while about 60% of respondents protected their food from flies and rodents, only about half had adequate sanitary conditions.

So in the present study, the level of personal and environmental hygiene appears to be fairly good, and therefore similar with some other studies [34] [35] whose authors have argued that, due to the food vendor's necessity to depend on the customer's repeat patronage in order to maintain and sustain their livelihood, the vendors are more likely inclined to produce relatively safe food by maintaining the minimum required level of hygiene standards; even though a serious gap still exists for the improvement of proper hygienic conditions and access to basic sanitary facilities for the food vendors.

5. Conclusions

With rapidly increasing number of food vendors especially in the urban areas

and their access to a rapidly growing consumer base, there is a need for increased vigilance and control of the food vendor's practices through the enforcement of regulations, proper hygienic practices and food safety control measures by local authorities that are empowered to perform their functions without constraints, with the aim of preventing and controlling the potential risks and spread of disease.

In the interest of public health, the management of food vendors both mobile and stationary should involve the development of coordinated, effective, integrated and preventive strategies that emphasize vendor registration, formal training on hygienic practices, initial medical and periodic medical certification and regular personal and environmental hygiene checks.

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Authors' Contributions

All the authors participated in the study.

Conflict of Interest

The authors hereby declare that there is no conflict of interest.

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