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Food hygiene knowledge, attitude and practices among food handlers in Calabar Municipal, Cross River State, Nigeria

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Abstract

Background: The risk of foodborne diseases increase with poor food handling practices. Unsafe food leads to the spread of diseases which increases morbidity and occasionally mortality, significantly impeding public health. This study was aimed to determine food hygiene knowledge, attitude, and practices among food handlers in Calabar Municipal, Cross River State, Nigeria.

Methods: A total of 156 food handlers were randomly selected and interviewed using a structured pretested questionnaire. Direct observation of environment and hygiene practices while handling or serving the food was also done. SPSS version 25 was used for data analysis and testing associations using Chi square test.

Results: The finding of the study revealed that majority 135(86.6%) of the food handlers had good knowledge of food safety and hygiene. Most 134(86%) of the respondents also had good level of practice of food hygiene. Majority 118(75.6%) were also found to have good attitude towards food hygiene. but few still had poor practice. The proportion who had good food hygiene practice was higher among handlers with good food hygiene knowledge levels compared to those with poor knowledge levels, (87.3% versus 66.6%) and the difference was statically significant ($P = 0.002$). Moderately sanitary food vending environments were also observed in the study.

Conclusion: Good food hygiene practices is associated with good knowledge levels. We recommend health education courses/ workshops for food handlers as a requirement for commencement of food vending business. Continuous monitoring and periodic training is also essential in order to improve knowledge, attitude and practice towards food safety.

Keywords: Food hygiene; Knowledge; Practice; Attitude; Food handlers

1. Introduction

Food, being the most important and only substance that is consumed universally by every human and animal to stay alive, needs to be handled properly to safeguard human health. Contamination anywhere along the food chain can have far reaching effects and sometimes fatal consequences. Food hygiene is a set of food manufacturing practices that aim to minimize biological food hazards through safe and clean operations to protect public health from foodborne diseases (Fooddocs, 2022). It refers to all the conditions and measures taken from production to consumption of food to ensure that food is safe, wholesome and fit for human consumption. According to World Health Organization (2022), an estimated 600 million, almost 1 in 10 people in the world fall ill after eating contaminated food and 420,000 die every

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year, resulting in the loss of 33 million healthy life years (DALYs). Also, 1.8 million people die from diarrheal disease and a great proportion of these cases can be attributed to contamination of food and drinking water (WHO, 2022). The total productivity loss associated with food borne disease in low and middle income countries is estimated to cost U.S \$95.2 billion per year and annual cost of treating food borne illness is estimated at U.S \$15 billion (World Bank, 2018). Many food poisoning outbreaks in the developed countries are attributed to restaurants which have received special interest among other possible sources of pathogens widely found to be associated with many poisoning outbreaks (Al-Ghazali et al., 2020; FAO, 2020; Firestone et al., 2020).

Annor and Baiden (2011), in their study of food hygiene knowledge, attitudes and practices of some food handlers in food businesses in Accra, Ghana reported that microbial counts of all food samples assessed were generally high. This they attributed to poor hygiene practices of food the handlers. Food handlers play a major role throughout the chain of production, processing, packaging, storing and preparation of food. Hence any knowledge deficiency in food hygiene by the food handlers causes a serious challenge to food safety. Globally, poor food hygiene knowledge and practice have been observed among some commercial and domestic food handlers (Al-Ghazali et al., 2020).

The knowledge and practice of food hygiene among food handlers is of great importance to public health due to increased report of health problems. In Nigeria, a case of food poisoning at a restaurant was reported in Calabar in the Tide newspaper on the 27th of March, 2017 (Elechi, & Allison, 2018). Similarly, National Agency for Food and Drug Administration Control (NAFDAC) 2018, reported from a nationwide investigation in Port Harcourt, Abuja and Lagos that a total of 3,300kg of vegetables were contaminated. The mishandling of food and disregard of hygienic practices facilitates pathogens coming into contact with food which may lead to illness among consumers.

Iwu et al. (2017), in their study on “knowledge, attitude and practices of food hygiene among food vendors in Owerri, Imo State” observed that more than half of the respondents knew that diarrhoeal diseases were food borne and among those aware of food hygiene, majority knew that lack of good food hygiene practice could cause disease. Their overall findings revealed that knowledge, attitude and training were significantly associated with the level of food hygienic practice of food vendors. The study of Okojie and Isah (2019), revealed that street vendors in Benin City have poor knowledge of food hygiene and safety, their practice of food hygiene and safety fell short of standard. The study of Etim et al. (2022), showed a high level of awareness of food borne diseases among artisanal drink producers in Cross River State.

Faremi et al. (2018) in their study titled “Food safety and hygiene practices among food vendors in a tertiary educational institution in South Western Nigeria” reported that majority of the participants had satisfactory safety/ hygiene practices with a greater number agreeing that fresh meat always have microbes on the surface and healthy people can cause illness by carrying germs to food. Majority of the food vendors always practiced hand washing with soap and water before touching or preparing food. They reported that level of education and previous training on food safety affected their food hygiene and safety practices. The study of Faremi et al. (2018) confirmed educational level of food vendors to be significantly related to food safety and hygiene practices of food vendors ($p= 0.001$). Elmadbouly (2018), also found an association between socio-demographic factors and knowledge level of food safety and hygiene among hospital food services staff. Academic level influences food safety knowledge positively. They conclude that food handlers who receive training would have a better understanding of safe food handling practices as they get professional advice during training. (Azanaw et al., 2019). Training of food vendors is important in ensuring good personal and environmental hygiene and has been reported by Gaungoo & Jeewon (2013). Monney et al. (2013), posit that food vendors trained in food hygiene and safety are more likely to keep their finger nails clean and adequately protect their food from flies and dust. This study sought to determine food hygiene knowledge, attitude, and practices among food handlers in Calabar municipal, Cross River State, Nigeria.

2. Material and methods

2.1. Study Area

Calabar Municipality is a local government area in Cross River State, Nigeria with headquarters is in the city of Calabar. It lies between latitude $04^{\circ} 15'$ and $5^{\circ} N$ and longitude $8^{\circ} 25'$ E in the North. The Municipality is bounded by Odukpani Local Government Area in the North East by the great Kwa River. Its Southern shores are bounded by the Calabar River and Calabar South Local Government Area. It has an area of 142km^2 and a population of 179,392 at the 2006 census. Calabar Municipal Government Area plays a dual role. Apart from being the capital city of cross River State, it also plays its role as headquarters of the Southern Senatorial District. There are ten wards in the local government and two ethnic groups form the indigenous population. These are the Quas and the Efiks (Cross River Hub, 2022).

2.2. Study Design

A cross-sectional descriptive study design using a quantitative method of data collection was used to determine food hygiene Knowledge and practices among food handlers working in selected restaurants.

2.3. Study Population

The study population comprised of all food handlers who operate restaurants in Calabar Municipality during the study period.

2.4. Inclusion Criteria

Food handlers who operate in the selected food establishments in Calabar Municipality. Also those who were willing and consented to participate in this study,

2.5. Exclusion Criteria

Food handlers who were not willing to participate in the study were excluded from the study and all Cleaners and others who do not handle food in the restaurant.

2.6. Sample Size Determination

The minimum sample size required was estimated using Cochran's formula (1963).

$$n = \frac{Z^2 pq}{d^2}$$

Where;

n = minimum sample size required;

Z = Standard normal deviate corresponding to the probability of type I error set at 1.96 (95% confidence level);

p = proportion of food handlers estimated to practice poor food hygiene, which is set at (37%) Iwu et al (2017);

q = 1-p (1-0.37 = 0.63);

d = tolerable error of margin set at 0.05.

The minimum required sample size (n) calculated was 140. To account for bias and non-response, the sample size was increased by 10% n= 156.

2.7. Sampling Procedure

The restaurants were grouped into licensed and unlicensed. A list of licensed restaurant was obtained from the Cross River State Tourism Bureau Calabar. Simple random sampling technique was used to select 26 restaurants from the list of licensed restaurants while convenience sampling was used to select 40 unlicensed restaurants. This gave a total of 66 restaurants. Three respondents were selected from each of the selected food establishment.

2.8. Instrument for Data Collection

A structured questionnaire and an observational checklist were used for collection of data. The instrument consisted of five Sections A – E

2.9. Data Collection Method

Data was collected by self-administration of questionnaire to respondents and an observational checklist was used to document sanitary conditions of food service establishments and hygiene practices of food handlers.

2.10. Methods of Data Analysis

Data collected were analyzed using Microsoft Excel and Statistical Package for Social Science (SPSS) version 25. Questionnaire were checked for completeness by counting the number of those returned. Results are presented in percentages, frequencies, tables, charts and was summarized using descriptive statistic. Chi square was used to test associations between some socio-demographic variables, knowledge and food hygiene practice of food handlers.

3. Results

3.1. Demographic characteristics

Majority of the respondents 59(37.9) were between 20-29, followed by those between 30-39, 53(34%). Majority of the respondents representing 117(75%) were females, 89(57.1%) were married, 61(39.1%) were single. Respondents who had secondary level of education were majority representing 59(37.8%), 52(34%) had a primary level of education, 30(19.2%) attended a tertiary level of education, and 14(9%) had no formal education. Majority, 83(53.2%) of respondents had 1-3 years of experience in food handling.

Table 1 Demographic characteristics of respondents

| Variables | Frequency (n=156) | Percentage (100%) |
|---|-------------------|-------------------|
| Age | | |
| <20 | 6 | 3.8 |
| 20-29 | 59 | 37.9 |
| 30-39 | 53 | 34 |
| 40-49 | 25 | 16 |
| 50 & Above | 13 | 8.3 |
| Sex | | |
| Male | 5 | 3.9 |
| Female | 151 | 96.1 |
| Marital status | | |
| Single | 61 | 39.1 |
| Married | 89 | 57.1 |
| Divorced | 2 | 1.3 |
| Widowed | 4 | 2.6 |
| Educational Level | | |
| Primary | 52 | 34 |
| Secondary | 59 | 37.8 |
| Tertiary | 30 | 19.2 |
| No formal education | 14 | 9 |
| How long have you been working as a food handler | | |
| Below 1 year | 37 | 23.7 |
| 1-3 years | 83 | 53.2 |
| Above 3 years | 36 | 23.1 |

3.2. Knowledge of food hygiene

Out of 156 respondents, 121(79%) agreed there is a relationship between food and disease, 23(14.7%) disagreed, while 12(7.7%) didn't know. One hundred and seven (68.6%) knew how food becomes contaminated. Majority of the respondents 137 (87.8%) had heard of food borne diseases, while 19(12.2%) had not. Seventy-seven[77(49.3%)], 122(78.2%), 108(69.2%), 59(37.8%) identified typhoid, dysentery, food poisoning and cholera respectively as food borne diseases. Ninety-three [93(59.6%)] thought food borne diseases does not cause death, 63(40.4%) agreed that food borne diseases cause death.. Majority of the respondents 122(78.2%) agreed that washing hands always before preparing food can reduce the chances of food borne illness, 21(13.5%) disagreed, while 13(8.3%) didn't know. Most of the food handlers 151(96.8%) knew raw & cooked food should be separated and 67(42.9%) think that cutting fruit & vegetables with same board used to cut raw food can cause cross contamination, 48(30.8%) don't know, while

41(26.3%) think that cutting fruit & vegetables with same board used to cut raw food cannot cause cross contamination as shown in table 2 below. Majority of respondents representing 148(94.9%) had never attended any food safety & hygiene training, only 8(5.1%) had attended a food safety & hygiene training. Out of the 8 that had attended a training, 6(75%) and 2(25%) did that over a year in the past and less than a year in the past respectively.

Table 2 Knowledge of food hygiene

| Variables | Frequency (n=156) | Percentage (100%) |
|---|-------------------|-------------------|
| Is there a association between food & disease | | |
| Yes | 121 | 79 |
| No | 23 | 14.7 |
| Don't know | 12 | 7.7 |
| Do you know how food becomes contaminated | | |
| Yes | 107 | 68.6 |
| No | 49 | 31.4 |
| Have you heard of food borne diseases | | |
| Yes | 137 | 87.8 |
| No | 19 | 12.2 |
| What food borne disease do you know | | |
| Cholera | 77 | 49.3 |
| Typhoid | 122 | 78.2 |
| Food poisoning | 108 | 69.2 |
| Dysentery | 59 | 37.8 |
| Does food borne diseases cause death | | |
| Yes | 63 | 40.4 |
| No | 93 | 59.6 |
| Do you know washing hands always before preparing food can reduce the chances of food borne illness? | | |
| Yes | 122 | 78.2 |
| No | 21 | 13.5 |
| Don't know | 13 | 8.3\ |
| Should raw & cooked foods be separated | | |
| Yes | 151 | 96.8 |
| No | 5 | 3.2 |
| Cutting fruit & vegetables with same board used to cut raw food can cause cross contamination | | |
| Yes | 67 | 42.9 |
| No | 41 | 26.3 |
| Don't know | 48 | 30.8 |
| Have attended any training on food safety & hygiene | | |
| Yes | 8 | 5.1 |
| No | 148 | 94.9 |
| If "yes", to question above, how long ago | | |
| >1year | 6 | 75 |
| <1year | 2 | 25 |

3.3. Knowledge level of food handlers on food hygiene

Figure 1 shows Most of the handlers 135(86.6%) had good knowledge of food hygiene while 21(13.5%) had poor knowledge of food hygiene. Knowledge of food hygiene was drawn from the relationship between food and diseases, knowledge on how food becomes contaminated, knowledge of food borne diseases, importance of hand washing. Knowledge score between 6-9 on a scale of 9 was rated as good knowledge and 0-5, poor knowledge.

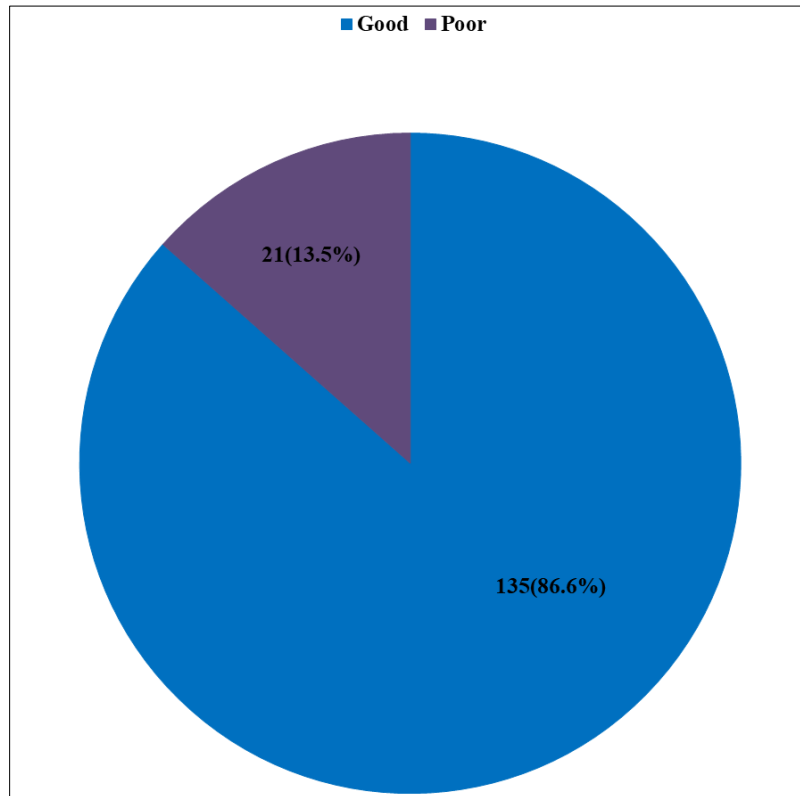


Figure 1 Level of knowledge of food hygiene amongst food handlers

3.4. Practice of food hygiene

Majority 87(55.8%) of the respondents cover their hair while preparing food, 69(44.2%) don't cover their hair while preparing food, 40(46%) cover with head tie, 39(34.8%) with hair net, while 8(9.1%) with cap. 71(45.5%) wash their hands after using the toilet, 51(32.7%) wash their hands after blowing their nose, 34(21.8%) wash their hands always before touching food & utensils. Majority of respondents 109(69.9%) don't wear apron while cooking, 47(30.1%). Thirty-two respondents (68.1%) wash their aprons weekly, 13(27.6%) wash it twice a week, 2(4.3%) wash it daily. Majority 151(96.8%) of the respondents separate raw and cooked food. Most of the respondents 101(64.7%) cut their nails once a month, least number of respondents 12(7.7%) cut their nails twice a week. Ninety-three respondents (59.6%) sweep and dust during food preparation; 147(94.2%) wash kitchen utensils before and after use as shown in table 3 below.

Table 3 Practice of food hygiene among food handlers

| Variables | Frequency (n=156) | Percentage (%) |
|--|-------------------|----------------|
| Do you cover your hair while preparing food? | | |
| Yes | 87 | 55.8 |
| No | 69 | 44.2 |
| If “Yes”, what do you cover your hair with | | |
| Cap | 8 | 9.1 |
| Head tie | 40 | 46 |
| Hair net | 39 | 44.8 |
| Under which of these conditions do you wash your hands | | |
| After using the toilet | 107 | 68.6 |
| Before touching food & utensils | 84 | 53.8 |
| After blowing my nose | 105 | 67.3 |
| Do you wipe raw food surfaces & dry dishes with same rag? | | |
| Always | 11 | 7.1 |
| Sometimes | 56 | 35.9 |
| Never | 27 | 17.3 |
| Don't use | 62 | 39.7 |
| Do you wear an apron when handling or preparing food? | | |
| Yes | 47 | 30.1 |
| No | 109 | 69.9 |
| If 'yes' how often do you wash it | | |
| Everyday | 2 | 4.3 |
| Twice a week | 13 | 27.6 |
| Every week | 32 | 68.1 |
| Do you separate raw and cooked food? | | |
| Yes | 151 | 96.8 |
| No | 5 | 3.2 |
| How often do you cut your finger nails? | | |
| Twice a week | 12 | 7.7 |
| Every week | 23 | 14.7 |
| Once a month | 101 | 64.7 |
| Others | 20 | 12.8 |
| Do you sweep and dust during food preparation? | | |
| Yes | 93 | 59.6 |
| No | 63 | 40.4 |
| Do you wash kitchen utensils before and after use? | | |
| Yes | 147 | 94.8 |
| No | 9 | 5.8 |
| When do you dispose water used in washing utensils? | | |
| Water colour change | 83 | 53.2 |
| After each use | 41 | 26.3 |
| Water finishes | 32 | 20.5 |

3.5. Level of practice of food hygiene

Figure 2 shows that 134(86%) of the food handlers had good level of practice of food hygiene, while 22(14%) were found to have poor level of practice of food hygiene. Practice of food hygiene was drawn from response regarding frequent hand washing, use of hair covering, work environment kept clean, use of apron when handling food, washing of utensils before and after use. A score between 6-9 on a scale of 9 was used to rate good practice and poor practice was rated by a score between 0-5.

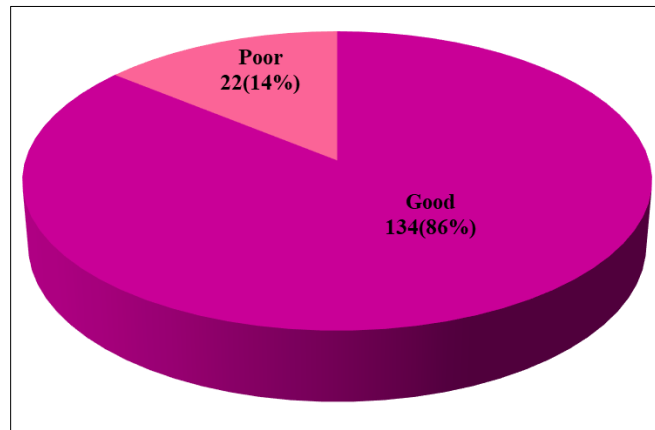


Figure 2 Level of practice of food hygiene

3.6. Attitude of food handlers towards food hygiene

Majority 92(59%) of the respondents agreed that it is important to wash hands before and after handling food, 61(39.1%) strongly agreed, 2(1.3%) disagreed and 1(0.6%) strongly disagreed. Majority of the respondents 61(39.1%) strongly disagreed that training and learning about food safety & hygiene is important, 56(35.9%) disagreed, 27(17.3%) strongly agreed and 12(17.3%) agreed. Majority 87(55.8%) agreed that water used for washing utensils must be changed frequently, 53(34%) strongly agreed, 9(5.8%) disagree, 7(4.5%) strongly disagreed. Majority of the respondents 98(62.8%) strongly agreed that raw food should be kept separately from cooked food, 40(25.6%) agreed, 11(7.1%) disagreed, 7(4.5%) strongly disagreed. Also, 58(37.2%) strongly agreed that food handlers should cover their hair while cooking and serving food, , 50(32.1%) agreed, 26(16.7%) disagreed, 22(14.1%) strongly disagreed as shown in table 4 below.

Table 4 Attitude of food handlers towards food hygiene

| Variable | Frequency (n=156) | Percentage (100%) |
|---|-------------------|-------------------|
| It is important to wash hands before and after handling food | | |
| SA | 61 | 39.1 |
| A | 92 | 59 |
| D | 2 | 1.3 |
| SD | 1 | 0.6 |
| Training and learning about food safety is important to me. | | |
| SA | 27 | 17.3 |
| A | 12 | 7.7 |
| D | 56 | 35.9 |
| SD | 61 | 39.1 |
| I will inform my supervisor if I suffer from diarrhea, cough, wounds, or cuts. | | |
| SA | 13 | 8.3 |

| | | |
|---|----|------|
| A | 39 | 25 |
| D | 81 | 51.9 |
| SD | 23 | 14.7 |
| Water used for washing utensils must be changed frequently | | |
| SA | 53 | 34 |
| A | 87 | 55.8 |
| D | 9 | 5.8 |
| SD | 7 | 4.5 |
| Raw food should be kept separately from cooked food | | |
| SA | 98 | 62.8 |
| A | 40 | 25.6 |
| D | 11 | 7.1 |
| SD | 7 | 4.5 |
| Food handlers should cover their hair while cooking and serving food | | |
| SA | 58 | 37.2 |
| A | 50 | 32.1 |
| D | 26 | 16.7 |
| SD | 22 | 14.1 |

3.7. Attitude categorization of food handlers towards food hygiene

Figure 3 shows that most of the handlers 118(75.6%) had good attitude towards food hygiene, a few 38(24.4%) had poor attitude towards food hygiene. Attitude towards food hygiene was drawn from importance attached to washing of hands before and after handling food; learning about food safety, changing water used to wash utensils frequently, keeping raw food separately from cooked food. Attitude of food handlers was rated on a scale of 9 points. Respondents having a score between 6-9 were rated as having good attitude while those with a score between 0-5 were rated as having a poor attitude towards food hygiene.

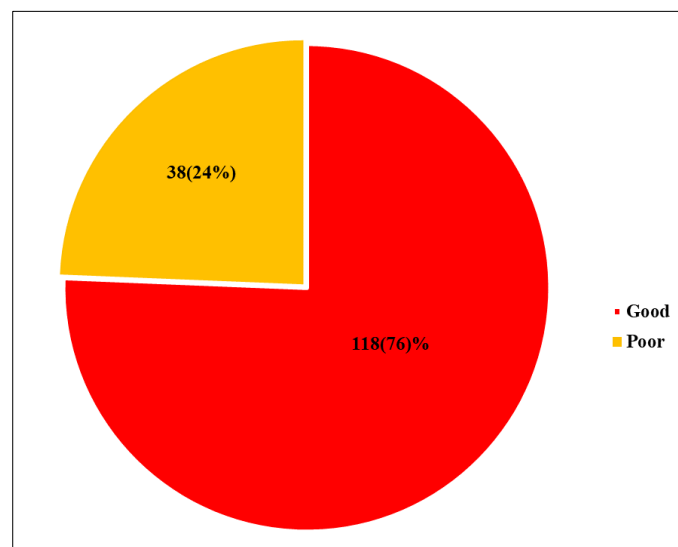


Figure 3 Attitude of food handlers towards food hygiene

Table 5 Observation of sanitary conditions of food service establishments and hygiene practices of food handlers

| Food hygiene practice | No. of establishments who practice (n=66) | Remarks |
|--|--|--|
| Frequent hand washing | 8 (1.5%) | A few handlers washed their hands frequently, and they didn't observe the standard hand washing procedure. |
| Use of rings, bracelets, watches while handling food | 21 (31.8%) | Some of the handlers wore rings, bracelets and watches while preparing and handling food. |
| Use of hair covering | 24 (36.4%) | The hair covers used were mostly hair nets and some hand their hair dangling out of the covers |
| Work environment kept clean and disinfected | 47 (71.2%) | The environments were clean, though some hand flies hovering around in numbers. |
| Use of apron while on duty | 22(33.3%) | The aprons were worn right, though some were not clean |
| Restaurant well ventilated and spacious | 51 (77.3%) | The restaurants are well ventilated and spacious |
| Fingernails cut short | 53 (80.3%) | Most of the respondents hand their nails neatly cut short |
| Garment visibly dirty | 13 (19.7%) | Some hand aprons on and they were not clean, others hand their clothes soiled with food stuff, and others were simply not clean |
| Covered bins for waste or refuse | 19 (28.8%) | The bins were positioned at a distance but some didn't have covers, some covers were broken, some were not well covered, and some covers were not in use. |
| Eating & storing rooms free from pest | 51(77.3%) | Except for the flies in some, the rooms were all free from pest. |
| Facilities for hand washing | 32 (48.5%) | The facility for hand washing was available but most didn't have hot water running, just cold water, and some didn't have means for hand drying just a rag to be shared amongst multiple people. |
| Proper safe storage facilities for food stuff | 41 (62.1%) | Most stored their stuff in bags, containers and shelves. |
| Premises kept clean | 47 (71.2%) | The premises were kept clean, though some had the bins too close and others were located just by the road and close to the gutters |
| Handling of food with polished nails | 32 (48.5%) | Some of the handlers handled and prepared food with polished nails. |
| Nearest dumping site/gutter more than 30 meters away from restaurant | 41 (62.1%) | Some were at reasonable distance from the dump site and gutters. |
| Dumpster area clean and odor free | 57 86.4%) | Most dump sites are clean and others had a few sachets and cans littered about |
| Floors, walls and ceilings clean and in good repairs | 62 (93.9%) | Some hand cob webs on, some of the walls need retouch, but they were mostly in shape |
| Toilet facilities clean and well maintained | 29 (43.9%) | All of the licensed restaurants have a toilet facility and they are neat, but most of the unlicensed ones don't, the few that do are not well kept. |

3.8. Observation of sanitary conditions of food service establishments and hygiene practices of food handlers

Findings from researchers' physical observation and observational checklist as presented in table 5 showed that very few of the food handlers washed their hands frequently, and some didn't observe the standard hand washing procedure. Some of the handlers wore rings, bracelets and watches while preparing and handling food. Some used hair covers especially nets and had their hair dangling out of it. The few that had aprons, wore them right, though some were not clean. Most of the restaurants were well ventilated and spacious. Most of the participants had their nails neatly cut short, and some handled food with polished nails. A few of the food vending premises had bins for waste or refuse disposal, though some were not properly covered. Most didn't have right facilities for hand washing. Most of the premises were kept clean and distant from dump sites and gutters, waste bin areas were clean and odor free, though some had a few containers and sachets littered about. Most of the food vending premises did not have toilets, some that did, had no running water and facility for drying hands.

3.9. Association between socio-demographic variables and practice of food hygiene

Table 6 presents the statistical associations between educational level, age and years of experience with the practice of food hygiene.

3.10. Association between educational level and practice of food hygiene

Good food hygiene practice levels were found to be higher among respondents that attained a secondary level of education compared to other educational levels. The difference was significant ($P= 0.017$). A statistically significant association therefore existed between level of education and practice of food hygiene.

3.11. Association between years of experience and practice

The practice of good food hygiene was found to be higher among food handlers with 1 to 3 years of experience compared to those with less. The difference was significant when tested using Chi-square ($P = 0.001$).

3.12. Association between knowledge of food hygiene and practice food hygiene

The proportion who had good food hygiene practice was higher among handlers with good knowledge levels compared to those with poor knowledge levels, (87.3% versus 66.6%) and the difference was statically significant, ($P =0.002$).

Table 6 Association between some socio-demographic variables and practice of food hygiene

| Variables | Practice of food hygiene | | X ² | DF | P-Value |
|----------------------------|--------------------------|-----------|----------------|----|---------|
| | Good | Poor | | | |
| Level of education | | | | | |
| Primary | 35(66.2%) | 18(33.8%) | 10.185 | 3 | 0.017 |
| Secondary | 48(81.3%) | 11(18.7%) | | | |
| Tertiary | 26(86.6%) | 4(13.4%) | | | |
| No formal education | 9(63.9%) | 5(36.1%) | | | |
| Total | 118(73.9%) | 38(26.1%) | | | |
| Years of experience | | | | | |
| Below 1 year | 19(15.8%) | 18(50 %) | 10.828 | 2 | 0.001 |
| 1-3 years | 69(57.51%) | 14(39.8%) | | | |
| Above 3 years | 32(26.7%) | 4(11 %) | | | |
| Total | 120(76.9%) | 36(23.1%) | | | |
| Knowledge level | | | | | |
| Good knowledge | 113(87.3%) | 22(16.3%) | 12.492 | 1 | 0.002 |
| Poor knowledge | 14(66.6%) | 7(33.3%) | | | |
| Total | 127(81.4%) | 29(18.6%) | | | |

4. Discussion

This study revealed a relatively good level of knowledge of food hygiene among food handlers. A study conducted by Iwu et al. (2017), also showed a good level of knowledge among majority of food vendors. The study of Etim et al. (2022), equally reported a high level of awareness of food borne diseases among artisanal drink producers in Cross River State.

Faremi et al. (2018) in their study titled “Food safety and hygiene practices among food vendors in a tertiary educational institution in South Western Nigeria” also reported that majority of the participants had satisfactory food safety and hygiene practices. In contrast to this findings, the study of Okojie and Isah (2019), revealed that street vendors in Benin City had poor knowledge of food hygiene and safety, their practice of food hygiene and safety fell short of standard. The reason for this contrast could be the educational level of the respondents coupled with participation in food safety trainings.

This good level of food hygiene practice among majority of the food handlers can be related to the good level of knowledge of food hygiene observed in the study. Iwu et al. (2017), also observed, fairly good level of hygienic practice among majority of food handlers. Accessing knowledge of food safety and hygiene and its correct application amongst food handlers is very essential in preventing food borne diseases, as food handlers play a vital role in the etiology of food borne disease outbreaks. This study findings also reveal that educational level had significant association with food hygiene practice. The study of Faremi et al. (2018) confirmed educational level of food vendors to be significantly related to their food safety and hygiene practices. Monney et al. (2013) in their study also confirmed that educational level of food handlers influences their knowledge with regards to food hygiene.

The significant association between food hygiene practice and food hygiene knowledge corroborates the findings of Warnock (2007) who also reported a significant association between positive change in food hygiene behaviors and knowledge of food safety among rural households in Cambodia.

Majority of the food handlers expressed positive attitude toward food hygiene and safety. The studies of Ahmed et al. (2020) and Iwu et al. (2017) also reported positive attitude of food handlers towards food hygiene. Knowledge and attitudes are essential to ensure the practice of food hygiene and subsequent prevention of the occurrence of food borne diseases, which is a public health problem.

The observation of moderately sanitary food vending environments was similar to the findings of Okojie and Isah (2014) who reported good sanitary conditions in majority of the food vending sites where the food premises were observed to be tidy, with the use of waste bin and the presence of on-site water source for sanitary purposes. This is commendable as it is in line with the requirements of standard guidelines and recommendations for food vending practice (FAO/WHO, 1997). Emphasis should however be placed on continuous improvement of sanitary conditions of food vending environments besides food safety and hygiene practices of food handlers.

5. Conclusion

The finding of the study revealed that majority of the food handlers had good knowledge of food safety and hygiene. Most of the respondents also had good level of practice of food hygiene. Majority were also found to have good attitude towards food hygiene. The proportion who had good food hygiene practice was significantly higher among handlers with good food hygiene knowledge levels compared to those with poor knowledge levels indicating that good food hygiene practices is associated with good knowledge levels. Authors recommend health education courses/ workshops for food handlers as a requirement for commencement of food vending business. Continuous monitoring and periodic training is also essential in order to improve knowledge, attitude and practice towards food safety.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that they have no conflicts of interest.

Statement of informed consent

Informed consent was sought for and obtained from all respondents and food establishments. The respondents were also informed that participation was voluntary and that they had the right to opt out without any consequence.

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