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Factors hindering compliance with food safety among food handlers in Benin city markets, Edo state, Nigeria

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ABSTRACT

Outbreaks of food-borne diseases globally still exist and continue to generate public health concerns. This raises possible concerns that the extent of food safety regulation is not taken seriously among the regulation authorities, food handlers and even the consumers of food in markets and streets. Evidence of the impact of these food-borne illnesses exists and they pose not only health but also economic challenges on global health and national growth. This study aimed to examine the compliance with safe food hygiene practices and factors hindering compliance with food safety practices among food handlers in Benin-City, Nigeria. A descriptive cross-sectional study design was adopted in conducting this study. Total of 269 participants were recruited after ethical clearance from health authority in Benin-city. Data collection was with use of structured questionnaire and observational checklist. Retrieved data were coded and recorded in secured system, analysed using SPSS Ver.21. More than half (57.7%) of the respondents had poor compliance with (21.9%) having good compliance, while the rest (20.4%) had fair compliance. Also, majority of the respondents identified lack of potable water in cooking areas, lack of financial support and training as factors hindering their food safety compliance. Lack of compliance with food safety exist among food vendors in the markets. The relationship between the years of handling food, level of education of food handlers and compliance with food hygiene practices was statistically significant. Non-compliance with food safety exist among food vendors in the markets despite self-reported positive practices.

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1. Introduction

Several overwhelming epidemics of cholera, enterohaemorrhagic *Escherichia coli* infections, hepatitis A, salmonellosis and other diseases have been reported globally. These are challenging public health diseases that are further compounded with their identified mechanism of transmission, which includes food and water borne cases (1). Due to this, there are possible concerns that the extent of food safety regulation is not taken seriously among the regulation authorities, food handlers and even the consumers (2).

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Economic burden of food-borne disease outbreaks on consumer businesses and the impact of food-borne diseases on national and global economy has been reported, therefore necessitating the need for authorities to take the issue seriously (3,4). About 600 million illnesses and over 400,000 estimated deaths were attributed to foodborne disease in 2010 globally. Of these illnesses reported, 40% are burdensome to the under 5 years old. Diarrhoeal-causing microbes including *Compylobacre spp* and norovirus, have been reported to cause most of these illnesses. Experts have advocated that these estimations should enlighten public health strategy development globally to increase food safety through the food chain.

As challenges to food safety continue to rise, food handlers' questionable compliance with need for measures for reducing these challenges to food safety get more important (5).

One factor which have been reported to hinder food safety practices is lack of medical examination of food handlers. In a study conducted in Konongo, Ghana, it was reported that majority of the vendors had medical assessment and higher percentage showed their certificates as indication. Among the food handlers who had been medically observed, some of them went further to complain of difficulties regarding the medical fitness of test. They reported that delays in the laboratory result and high financial implications hindered their compliance regarding medical assessment (5). In another study, compliance with elements of food hygiene and safety fundamentals was assessed among accidentally recruited respondents (food vendors) in two research sites in Republic of Ghana. Food vendors were observed and supplemented by interviews using survey and interviews. It was reported that compliance with food safety was marginally good (Overall Compliance (OC) score = 0.67, on a 0 to 1 scale). Even though, the food vendors demonstrated compliance level with health screening, poor compliance was shown with use of protective clothing (Compliance score=0.38, considering 0 to 1 scale).

Ensuring food safety globally, demands applicable legal tenets and sufficiently funded establishments to implement these legislations. However, it appears that these legal instruments as well as institutional charters aimed at ensuring food hygiene and safety practices lack to achieve the desired effects (6). Another major factor affecting compliance among food handlers is unsanitary condition on food vending sites. A descriptive study was conducted in Benin City, Nigeria on the sanitary conditions of food vending locations.

Results showed that even though a greater proportion of the observed vending sites were clean, some sanitary abnormalities were noted in others. Flies, cockroaches and rats were reported to be the primary breaches of the environment where public foods were prepared and served to consumers. Additionally, food vendors with third level education vended foods in sites observed with good hygiene status in comparison to others with no similar educational standings. The study concluded that though open food vending sites in Benin-city appeared sanitary, and food handlers demonstrated good food handling practices, some of them still lacked appropriate sanitary surroundings (7).

This is a great public health challenge for citizens who are dependent on, and eat in such places. This study agrees with another study conducted in Northern Nigeria among one hundred and ten food vendors where it was observed that higher percentage of food vendors cooked foods on unclean equipment and surfaces many times, without surface-sanitation. There were presence of flies, close location of dump sites and poor pest controls (8).

In the same study, inappropriate waste disposals were observed, contributing to environmental degradation and potential damage to government amenities such as roads and blockage of drainage systems. Similarly, it was reported that food handlers lacked fundamental training on hygiene practices in Northern Nigeria. Majority of food handlers inherited the skills informally, especially from parents while others self-attained the skill of food vending. Further indications of poor training or lack of such was demonstrated by food vendors as majority were noted to blow oral air into polythene bags before handing same over to consumers (8).

Furthermore, adequate compliance with food safety is also affected by poor water supply to food handlers according to the study where most food vendors failed to rinse raw foodstuffs properly before preparing. Other similar studies have been conducted regarding compliance with food safety in other parts of West Africa and Nigeria, and some part of Edo State, however because of the fact that food handlers are essential to day-to-day local economies of where they are domiciled, this current study aims to examine further, and contribute to existing literature regarding food safety compliance practices and factors that hinder compliance with food safety among food handlers in Benin- City, Nigeria.

2. Materials and Methods

This study was carried out in markets in Oredo Local Government Area in Benin City, Nigeria. Benin City is the capital of Edo state and is made up of three main Local Government Area namely, Oredo, Egor, and Ikpoba-Okha. The population and housing census of 2006 puts the population of Edo State, 1,086,882 which is projected to be 1,440,992 in 2015. The residents of Benin City are chiefly small to medium-scale business owners, petty and large-scale traders, farmers, artisans, civil servants, bankers, and students. The people are a combination of Christians, Muslims, and traditionalists. Most of the inhabitants are Benin-speaking people. A descriptive cross-sectional, study design was used in conducting this study.

2.1. Study area

This study was carried out in markets in Oredo Local Government Area in Benin City, Nigeria. Benin City is the capital of Edo state and is made up of three main Local Government Area namely, Oredo, Egor, and Ikpoba-Okha. The population and housing census of 2006 puts the population of Edo State, 1,086,882 which is projected to be 1,440,992 in 2015. The residents of Benin City are chiefly small to medium-scale business owners, petty and large-scale traders, farmers, artisans, civil servants, bankers, and students. The people are a combination of Christians, Muslims, and traditionalists. Most of the inhabitants are Benin-speaking people. A descriptive cross-sectional, study design was used in conducting this study.

2.2. Sampling method

Food handlers in stationary food vending units used for preparation/sales of street food within the market were included in the study. All mobile food vendors around the market were excluded in this survey. The sample size was determined based on the assumption of 5% expected margins of error and 95% confidence interval using the formulae for calculating sample size for descriptive studies

in population >10,000. Formula; $n = z^2pq/d^2$ was applied and final total of 269 (after providing for attrition rate) participants were recruited for study. Where, n = calculated sample size, z = standard normal deviate at 95%, Confidence Interval = 1.96, P = proportion of food handlers with acceptable food hygiene practice in 2009 in Owerri (48.4%) (9), q = the complementary probability of P which is (1 − p) that is, percentage of food handlers without acceptable food hygiene practice (48.4%), d = precision level 5% = 0.05. The cluster sampling method was used to select eligible participants. Seven out of the fifteen markets in Oredo Local Government Area were selected by simple random sampling. Then all the food handlers who met the inclusion criteria were recruited for the study. The tools for data collection was a combination of quantitative and qualitative methods.

2.3. Data collection

The instrument for this study was interviewer administered questionnaire.The questionnaire was pretested among 10% of the sample size of (269) in Uselu market in Egor LGA. Reliability statistics after the instrument testing result was at 0.899.

2.4. Qualitative method

(a) Direct observation of sub sample of food vendors was done to ascertain their compliance with hygiene practices such as hand hygiene, wearing of aprons, gloves and waste management etc.

(b) An observational checklist to record the availability of facilities for proper hygiene practice such as hand washing facilities e.g. water, soap, towels, etc. and food hygiene practices of the handlers such as wearing of apron while cooking, handling of money while serving food and other practical activities. Ten Environmental Health Workers were trained as research assistants. Training was for ten days on how to administer questionnaire properly and uniformly and to ensure confidentiality of the respondents, respecting their dignity.

2.5. Data analysis

The questionnaire was retrieved coded and analysed. The data obtained from the questionnaires administered and observational checklist were exposed to mathematical analysis, using Statistical Package for Social Science (SPSS) version 21 and the data were coded on Microsoft Excel to evaluate the frequency distribution table and charts, showing system for knowledge and practice.

Categorical (discrete) variables like sex were presented as frequencies and percentages. While continuous variables like age were expressed as means± standard deviation. Chi-square and Fischer's exact statistical test were carried out to test association between the socio-demographic features of the respondents and their knowledge, practice and compliance of food hygiene practices. The level of significance was set at $p<0.05$.

2.6. Scoring system for compliance of food hygiene

The Section on observational checklist was used to score compliance with safe food hygiene practices. With a score of 0 and 1 given for correct practice observed. The 25 practices observed, were converted to a mean percentage score. Hence compliance of respondents was classified thus; those with scores less than 50% had poor compliance, those with scores between 50-75% had fair compliance and those with scores greater than 75% had good compliance. This study was carried out over a period of seven months from January 2017 to July 2017.

2.7. Ethical consideration

Ethical approval (HM 1208/139) was obtained from Ethical and research Committee Ministry of Health before the commencement of this study. Permission was also obtained from the market authorities. Confidentiality was respected during study.

3. Results

Majority (42.4%) of the respondents were between the age of 30-39 while only 0.7% were found to be less than 20 years old. Mean age was 34.3 while SD 8.0 Females were more (87.7%) than males (12.3%) in this study sample. While only 9.3% of the respondents has had tertiary education, 14.9% had no formal education, 32.7% with primary and 43.1% were with secondary education respectively. More than 70% of the respondents were married, 20.8% single while 6.7% and 0.7% were widowed and separated respectively. Also, majority of the respondents in this study were Bini tribe (46.1%), 17.1% of Igbo origin and only 4.5% were Urhobos. Christians formed the larger part of the sample size (92.9%) while only 6.3% and 0.7% were Islam and Traditionalists respectively. According to table 2, 42.4% of the respondents had above 7years of experience in selling foods, 33.1% and 24.5% formed the proportion of respondents with 4 -6 years and 1- 3 years experiences respectively in food handling. Cook and vendors were 51.3% and 47.2% respectively while only 1.1% and 0.4% were waiters and cleaners respectively. Regarding table 3, factors hindering food safety practices were presented and it was found that majority of respondents (59.6%) reported that there is lack of portable water in cooking areas while others have access to potable water. While 75.1% lack waste management system, only 24.9% had access to waste management. Also, 80.3% reported difficulty in wearing gloves to serve food properly only 19.7% disagreed. According to the table, 81.0% reported lack of money for control of rodents and flies, 84.0% also reported financial barrier to purchase food safety equipment. Majority (87.7%) of these respondents reported that food safety practices are time consuming, only 12.3% reported otherwise. Regarding support from government, 59.5% agreed that government is doing enough to support regarding food safety while 40.5% disagreed. In overall subjective response regarding financial burden of food safety, almost all the respondents (92.6%) believed that food safety is expensive.

While most of the respondents (77.3%) reported no training on how to control food environments without contamination, majority (74.3%) of the respondents however reported that cooking close to dump sites is a major factor hindering food safety practices and general high cost of food storage facilities were reported to be a major factor hindering safety practices among the respondents.

Table 1: Demographic characteristics of Respondents

Variable	Frequency (n = 269)	Percent
Age Group (Years)		
Less than 20	2	0.7
20-29	77	28.6
30-39	114	42.4
40-49	66	24.5
50 and above	10	3.7
Mean age in years (SD)= 34.3 (8.0)		
Sex		
Male	33	12.3
Female	236	87.7
Level of Education		
None	40	14.9
Primary	88	32.7
Secondary	116	43.1
Tertiary	25	9.3
Marital Status		
Single	56	20.8
Married	193	71.1
Widowed	18	6.7
Separated	2	0.7
Tribe		
Bini	124	46.1
Igbo	46	17.1
Esan	37	13.8
Estako	15	5.6
Yoruba	23	8.6
Urhobo	12	4.5
Religion		
Christian	250	92.9
Islam	17	6.3
African Traditional Religion	2	0.7

Table 2. Demographic characteristics of Respondents

Variable	Frequency (n = 269)	Percent
Years of selling food		
1-3	66	24.5
4-6	89	33.1
7 and above	114	42.4
Mean duration of selling food (SD) years 6.8 (4.7)		
Name of Market		
Ekiosa	33	12.3
Ramat Park	11	4.1
New Benin	78	29.0
Oregbeni	10	3.7
Oba Market	38	14.1
Oliha Market	24	8.9
Santana	21	7.8
Ekiuwa	8	3.0
Iriri	14	5.2
New Market	32	11.9
Role in Food Handling		
Cook	138	51.3
Vendor	127	47.2
Waiter	3	1.1
Cleaning Duties	1	0.4

Table 3. Factors hindering food safety practices

Variable	Frequency (n = 269)	Percent
There is Lack of potable water in cooking areas.		
Yes	160	59.6
No	109	40.5
Poor waste management system.		
Yes	202	75.1
No	67	24.9
Difficulty in wearing gloves to serve food properly		
Yes	216	80.3
No	53	19.7
Do not have enough money for control of rodents and flies		
Yes	218	81.0
No	51	19.0
Lack of finance to purchase food safety equipment (cap, glove, apron, etc.).		
Yes	226	84.0
No	43	16.0
Food safety practices are time consuming.		
Yes	236	87.7
No	33	12.3
Government does not provide training on food safety practices.		
Yes	160	59.5
No	109	40.5
Food safety practice is expensive.		
Yes	249	92.6
No	20	7.4
No training for food handlers on how to control rodents and flies properly without contaminating the food with rodent poison or insecticides		
Yes	208	77.3
No	60	22.3
Cooking space close to dump sites.		
Yes	200	74.3
No	69	25.7
High cost of food storage equipment/facilities for proper food storage.		
Yes	259	96.3
No	10	3.7

Table 4. Relationship between age, years of experience, sex and level of education and compliance of food safety

Variable	Compliance				
	Good n (%)	Fair n (%)	Poor n (%)	Test statistics	P – value
Age Group					
Less than 20	0 (0.0)	0 (0.0)	2 (100.0)	Fischer's Exact χ^2=13.811	0.056
20-29	14 (18.2)	10 (13.0)	53 (68.8)		
30-39	20 (17.5)	28 (24.6)	66 (57.9)		
40-49	21 (31.8)	15 (22.7)	30 (45.5)		
50 and above	4 (40.0)	2 (20.0)	4 (40.0)		
Years of food Handling					
1-3	13 (19.7)	9 (13.6)	44 (66.7)	χ^2=4.661	0.324
4-6	21 (23.6)	17 (19.1)	51 (57.3)		
7 and above	25 (21.9)	29 (25.4)	60 (52.6)		
Sex					
Male	15 (45.5)	11 (33.3)	7 (21.2)	χ^2=21.197	<0.0001*
Female	44 (18.6)	44 (18.6)	148 (62.7)		
Level of Education					
None	5 (12.5)	11 (27.5)	24 (60.0)	χ^2=30.262	<0.0001*
Primary	11 (12.5)	18 (20.5)	59 (67.0)		
Secondary	29 (25.0)	19 (16.4)	68 (58.6)		
Tertiary	14 (56.0)	7 (28.0)	4 (16.0)		

*Statistically significant (p≤ 0.05, CI 95%)

According to Figure 1, overall food safety compliance among respondents was found to be poor (57.7%), only 21.90% and 20.4% with good and fair compliance respectively.

In Table 4, relationships examined between age, years of experience, sex and level of education and compliance of food safety was reported with Fischer's statistics. Relationships were found statistically significant at p≤ 0.05, CI 95% between the following; all the respondents less than 20 years old, majority of the age group 20-29, 30-39 and ages 40-49 were all found with poor compliance with p value 0.056 indicating the positive effect of higher age on compliance to food safety. This is further noted according to the table that 40% of the age group 50 and above had good compliance while 40% also had poor compliance. Years of handling food was also found according to the table not significantly related to the compliance level of respondents as the years of experience did not positively affect the compliance of respondents. Level of education was positively related to the compliance level of respondents to food safety practices as the highest level of education was correlated with compliance positively at p value 0.0001 even though, it cannot be determined if the higher education influenced the compliance. This is so because according to the table, the higher educationally trained respondents had majority of them with good compliance while secondary educationally-trained respondents however, had majority of them with poor compliance.

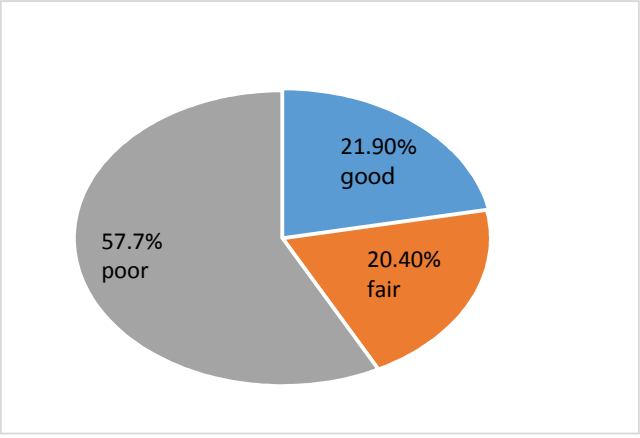

Figure 1. Total compliance score of respondents

4. Discussion

More than half (57.6%) of the respondents had poor compliance with food safety with only 21.9% having good compliance and remaining participants (20.4%) had fair compliance to food safety practices. This finding supports a Nigerian study (8).

that reported non-compliance with available guidelines for street food safety while it in contrast with results from similar study in Ghana (7) where researchers found a marginally good overall compliance among food vendors. It was also noted that almost all the food vendors never went for medical examination which is a sharp contrast to a study done in Ghana were almost all the respondents had done medical examination (7).

In this study, results show that almost all of respondents who had tertiary level of education did not only have good practices but had good compliance with food safety. This shows the importance of education in not just understanding but in practicing laid down protocols implemented in food safety. There were quite several factors that were reported which hindered food vendors from complying with food safety practices. Almost all the respondents (96.3%) said food safety practices is expensive and another major factor hindering food safety compliance was citing of food spaces, as majority (74.3%) of respondents were found with citing of food vending space close to dump sites. This financial hindrance could also be the reason why majority of the respondents did not have medical examination done and did not use soap in hand washing, these would have all been in a bid to cut cost of running the food vending business and subsequent citing of vending spaces near dumpsites.Also, based on this it was not surprising to note that majority of the respondents found lack of finance as a factor to purchase food safety equipment, this could have accounted for most respondents who did not possess gloves, caps and apron. It was also noted that majority had not gotten appropriate food safety training. This could have also accounted for the poor compliance of the respondents to proper and safe food hygiene practices. These findings are in agreement with a study done in Benin City, Nigeria where only

one-fourth of the respondents used waste bin to store wastes while the rest adopted use open dumping and gutters/drainages to dump food wastes (9). This may have been the reason why the food vendors acknowledged rats and flies were difficult to destroy as majority found it to be another major hindrance to safe food hygiene practices.Lack of potable water was recorded as a hindrance in food safety practices as more than half acknowledge this to be factor. This factor cannot be overemphasized as safe water is needed to curtail the prevalence of food borne illness. Due to poor availability of pipe borne water from government, food vendors may have to sought water from other sources like untreatedbore hole and well, which may not be safe for their business. This suggests a lack of government involvement in provision of basic amenities for food businesses and thus leading to mistrust. Reports from a study over a decade ago by authors in the UK (4) reported that barriers to compliance comprised scarcity of trust in safety legislation policies and its enforcement; lack of motivation in dealing with food safety policies; and a lack of information and understanding. Two hundred and eight (77.3%) of respondents had no training regarding control and prevention of rodents and flies properly within food handling chain. This finding agrees with a study done in Central Nigeria where almost all the respondents have not had formal training on food hygiene (8).

5. Conclusion

This study concludes that non-compliance with food safety practices exist among food handler in the markets in Benin-City, Nigeria. Also, statistically, the relationship between the years of handling food, level of education of food handlers and compliance with food hygiene practices was significant. Government and private enterprises can support small and medium- scale business owners like food vendors with loans to enable them to procure some equipment and materials to enable them to comply with food hygiene and safety practices. Local authorities can build vending sites in the market with adequate water supply to encourage good food hygiene behaviors. The research study was largely based on response gathered from the field, so one major limitation of this study was the self-reporting method of assessment of factors hindering food hygiene practice of food handlers.

Conflict of interest

Authors declare no conflict of interest.

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