

# Food Safety and Hygiene Practices among Food Handlers in Selected Markets in Benin-City, Edo State, Nigeria

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**Abstract:** ***Background:** Food borne illnesses are common, costly, yet preventable public health challenges. Poorly handled food is linked to the global deaths of an estimated two million people annually, including many children. **Aim:** To examine the safety practices among food handlers regarding food hygiene in selected markets in Edo State, Nigeria and examine relationships among variables within study. **Methods:** A descriptive cross-sectional, study design with final sample size of 265 was adopted in conducting this study. **Results:** Study found that majority of market food handlers reported good practice of food hygiene. Evidence of relationship between the level of education ( $p = 0.006$  CI 95%), sex ( $p = 0.033$  CI 95%) and practice of food hygiene was statistically significant in this study. Also, years of handling food and food hygiene and safety practices ( $p = 0.623$  CI 95%) were not correlated. The relationship between the practice of food hygiene and knowledge of food hygiene was also statistically significant ( $p = 0.0001$  CI 95%) in our study. **Conclusion:** This current study concludes that reported practice of food hygiene and safety differ from observed practices among food handlers in Markets.*

**Keywords:** Food hygiene, Food safety, Food handlers, Practice

## 1. Introduction

Unsafe food is linked to the global deaths of an estimated two million people annually, including many children. New threats to food safety have also been reported to also be constantly emerging. These food borne illnesses are common, costly, yet preventable public health challenge [1, 2]. Environmental factors have been particularly implicated to account for 12.6 million deaths globally in 2012, representing 23% of all deaths according to the World Health Organization (WHO). The mortality is also higher when accounting for impact on vulnerable groups, children and the frail [3]. Among the environmental factors implicated is food and water contaminations which are relevant in disease transmission chain. In both rural and urban towns, food handlers play a major role in these chains of environmental transmission of diseases. Hence, it is significant for public health actions when developing policies and interventions to mitigate disease transmissions.

Many diseases can be transmitted through ingested food. These so-called food borne diseases (FBD) are caused by a variety of agents, including bacteria, viruses, parasites, chemicals and toxins, and give rise to a variety of clinical presentations [4,5]. The World Health Organization and the Centre for Disease Control reported that, in the USA alone, there are 76 million cases of food-borne illness leading to 325,000 hospitalizations and 5,000 deaths annually [6,7]

Global incidence of food-borne diseases is quite alarming. The Center for Disease Control and Prevention (CDCP) estimates show an annual occurrence of 47.8 million, 2 million and 750,000 food-borne illnesses in the United

States, United Kingdom and France, respectively. It is also estimated that in Australia, there are 5.4 million cases of food-borne illnesses every year, causing 18,000 hospitalizations, 120 deaths, 21 million lost days off work, 1.2 million doctor consultations and 300,000 prescriptions for antibiotics [6, 7]. The same cannot be said for Africa and its underdeveloped states as reported cases are clumsy and too many unrecorded deaths associated with food-borne illnesses.

## 2. Literature

In Port-au-Prince, Haiti in 2012 [8] researchers conducted a study and reported that flies and animals were evident around the majority of the food stalls and 65% did not have access to potable water. Majority of food handlers also served food with bare hands and did not wash their hands after handling money. Additionally, the majority of the vendors did not appropriately store pre-cooked food. The authors concluded that the conditions in which street food vendors operate in Port-au-Prince are largely unacceptable from a food safety point of view and effort should be made to provide them with adequate infrastructure including potable water, toilets and waste disposal facilities. While a descriptive cross-sectional study reported overall adherence to food hygiene practices by food vendors in educational institutions in Konongo, Ghana. The study suggests that food vendors in educational institutions generally adhered to good food hygiene practices, namely, regular medical examination (93%), protection of food from flies and dust (55%); proper serving of food (100%), good hand hygiene (63%) and the use of personal protective clothing (52%). The study proposes that efforts should be geared towards

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developing training programs for food vendors on food hygiene as well as capacity building of the stakeholders [9]. A contradicting evidence exists in another study by another author in Ethiopia reported the majority of the food vendors (88.6%) did not wear an apron and almost all food vendors (95%) did not cover their hair during the cooking process. In the two sub-cities of Ethiopia, vendors had access to tap water at less than a five-minute walk. Jerry cans were commonly used for water storage. Thirty five percent of street food vendors reported they changed to clean water only when it is dirty. Large number of street vendors within this study (90.7%) used recycled paper to serve the consumers. All the vendors (100%) handled money with bare hands while serving food. All the food vendors had no health certificate from authorized dignitary and seventy-eight-point six percent of the vendors prepared their food along the roadside.

Another evidence regarding safety food handling practice was reported in Gizan city, Saudi Arabia in 2012 where practices of street vendors concerning health and personal hygiene, practice of hand washing, general body hygiene and washing of their cooking utensils with soap were all reported to be good. Further studies within Nigeria and West-Africa have conducted and reported studies on poor practices of food handling among food handlers [11], [12], [13], [14].

A cross sectional study [15] was carried out to assess the knowledge of foodborne infections and food safety practices of local food handlers in Ijebu-Ode Local Government Area of Ogun State Nigeria. About 31.5% of the respondents had poor food safety practices, 43.8% of the food handlers interviewed had moderate food safety practice, although the specific practices observed by these food handlers were not assessed. This further confirms the need to examine the current safety issues in food handling among these vendors, especially in marketplaces. In Nigeria, a study was carried out to determine the knowledge and practice of food safety and hygiene in 2015 in Jos, Plateau showed very poor practice of hand hygiene before handling food however, more food handlers in the study (67.1%) had reported periodic medical examination which appears to be best practice for food handlers. Furthermore in a descriptive cross-sectional study [16] in Benin City that majority of food handlers were generally clean, though skin lesions were seen in four (7.3%) of the respondents and very low number of respondents, in that study maintained a good level of hygiene in their practice. However, another contradictory evidence [17] has been reported regarding good handling, environmental and vending practices among food handlers in Nigeria.

A cross-sectional study was conducted to evaluate the food safety knowledge and practice of food handlers and assess the sanitary conditions of food and drink establishments in Bahir Dar town in 2011. The result of the study showed that majority of the food handlers have direct contact with food during food preparation, 53.2% of the food handlers touch their body and wear hand jewelries during food preparation and the food handling practice scores of the food handlers were low [18]. Another study conducted in Ghana [19] among 200 street food vendors revealed that over 96%

washed their hands after some major activities in food handling while 13% of them did not use soap, 13% reheated their food before serving, 11.5% refrigerated their food. Water storage containers were also found to be used for other activities. Street food vendors in this rural northern setting generally did not practice good food hygiene. While most studies on the literature showed some level of improved knowledge with varying lack in compliance, it is still essential for establishments, government agencies involved in public health education should train staff and rural food handlers regularly on basic personal hygienic techniques, self care and food hygiene practices.

### Study design

A descriptive cross-sectional, study design was adopted in conducting this study.

### Study population

The study population comprised of 650 food vendors in their respective food vending units within markets in Oredo LGA in Benin City.

### Inclusion Criteria

Food handlers within markets were selected.

### Exclusion criteria

All mobile food vendors around the market were excluded in this survey.

### Sample Size determination

The sample size of was calculated 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  $>10,000$

$$n = z^2 pq/d^2 \quad (i)$$

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%) [20] 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 formula used to calculate the minimum sample size is:-

$$N = Z^2 pq/d^2 \quad (ii)$$

Where n = Minimum sample size

Z=z score at 95% confidence level at  $\alpha=0.05$ . This is 1.96

P=prevalence rate= 48.4%= 0.0484

$$Q = (1-p) = 1-0.484$$

In a study carried out in Benin City, 48.4% had poor knowledge of food sanitation (Chukwuocha, Dozie, Amadi et al., 2009) thus n calculation is-

$$n = \frac{(1.96)^2 \times (0.484) \times (0.516)}{(0.05)^2} = 383.76 \approx 384$$

n = 384

$$n_2 = \frac{n}{1 + \frac{n_1}{N}} = \frac{n}{1 + \frac{n_1}{N}} \quad (iii)$$

Where;

$n_2$  = desired sample size in population  $< 10,000$

$n_1$  = initial sample size in population

N = Total sample

$$N = \frac{384}{1 + \frac{384}{650}} = \frac{384}{1 + 0.591} = 241.39 \approx 241$$

By correcting for non-response rate of 10%, the total sample size required for this study was calculated to be 241+24. = 265. This is the minimum sample size required for this study.

#### Method of Sampling

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.

#### Method of Data Collection

The tools for data collection was a combination of quantitative and qualitative methods

#### Quantitative Method:

The instrument for this study was an interviewer administered questionnaire which consisted of both open and closed ended questions. The questionnaire was pretested among 10% of the sample size of (265) in Uselu market in Egor LGA.

#### Qualitative Method:

- Direct observation of a 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.
- 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 aprons while cooking, handling of money while serving food and other practical activities.

#### Training of the Research Assistants:

Ten Environmental Health Workers were trained as research assistants. Training was for ten days on how to administer questionnaires properly and uniformly and to ensure confidentiality of the respondents, respecting their dignity.

#### Method of Data Analysis

The questionnaire was retrieved, coded and analyzed. The data obtained from the questionnaires administered were subjected to statistical analysis with the use of 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 Fisher's Exact statistical test were carried out to test association between the socio-demographic characteristics of the respondents and their knowledge,

practice and compliance of food hygiene practices. The level of significance was set at  $p \leq 0.05$ .

#### Scoring for practice of Food Hygiene

The 2 point score for the variables were ranged from 0 to 1 with each question having a score of 0 or 1. The mean score for the section was transformed into a percentage score from 16 questions in this section. From this, respondents with scores of less than 50% had poor practice, scores between 50%-75% had fair practice and those with scores greater than 75% had good practice.

#### 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

#### Study Duration

This study was carried out over a period of seven months from January 2017 to July 2017. The study was part of the postgraduate award of Masters in Public Health project dissertation and has never been published before.

#### Ethical Consideration

Ethical approval (approval number ref: HM 1208/139) was obtained from the Ethical and research Committee Ministry of Health before the commencement of this study. Permission was also obtained from the market authorities. Written informed consent was obtained from the respondents before the interviews after adequate information has been provided by the interviewers. Confidentiality was respected during study; serial number rather than names was used to identify each respondent.

### 3. Results

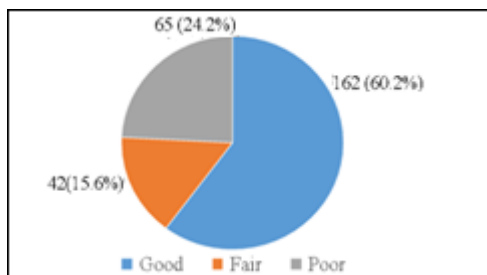
**Table I:** Demographic characteristics of Respondents

Variable	Frequency (n = 269)	Percent
<b>Age Group (Years)</b>		
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)		
<b>Sex</b>		
Male	33	12.3
Female	236	87.7
<b>Level of Education</b>		
None	40	14.9
Primary	88	32.7
Secondary	116	43.1
Tertiary	25	9.3
<b>Marital Status</b>		
Single	56	20.8
Married	193	71.1
Widowed	18	6.7
Separated	2	0.7

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
Iri	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 II:** Respondents' Practice of Food Hygiene

Variable	Frequency (n = 269)	Percent
Wash hands before handling food		
Yes	197	73.2
No	72	26.8
Wash hands after visit to toilet		
Yes	204	75.8
No	65	24.2
Wear clean hair cover (cap) when cooking		
Yes	176	65.4
No	93	34.6
Cover my hair when serving		
Yes	164	61.0
No	105	39.0
Store cooked food overnight		
Yes	158	58.7
No	111	41.3
Wash my food properly before cooking		
Yes	219	81.4
No	50	18.6
Clean my cooking environment at least twice daily		
Yes	198	73.6
No	71	26.4
Cover food to prevent flies and rodents		
Yes	188	69.9
No	81	30.1
Do regular medical checkup		
Yes	141	52.4
No	128	47.6



**Figure I:** Reported total practice score of respondents of food safety

**Table III:** Socio-demographic characteristics by Practice of respondents

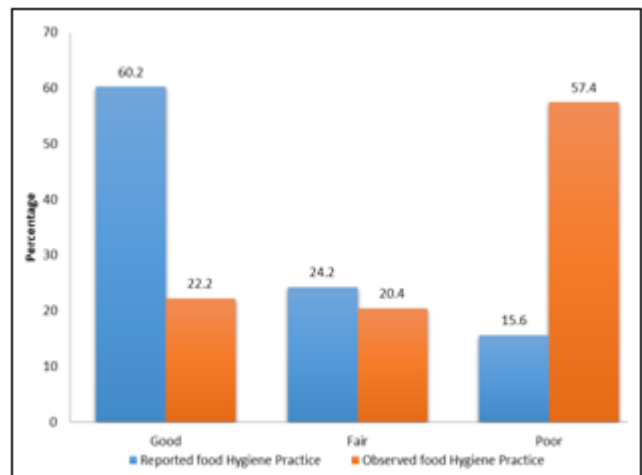
Variable	Practice			Test statistics	p-value
	Good (n=162) n (%)	Fair (n=42) n (%)	Poor (n=65) n (%)		
Age Group					
Less than 20	0 (0.0)	1 (50.0)	1 (50.0)	Fischer's	0.004*
20-29	45 (58.4)	9 (11.7)	23 (29.9)	Exact=	24.200
30-39	68 (59.6)	12 (10.5)	34 (29.8)		
40-49	43 (65.2)	18(27.3)	5 (7.6)		
50 and above	6 (60.0)	2 (20.0)	2 (20.0)		
Years of food Handling					
1-3	42 (63.6)	11 (18.2)	12 (18.2)	$\chi^2 = 2.612$	0.623
4-6	55 (61.8)	11 (12.4)	23 (25.8)		
7 and above	65 (57.0)	19 (16.7)	30 (26.3)		
Sex					
Male	24 (72.7)	7 (21.2)	2 (6.1)	$\chi^2 = 6.833$	0.033*
Female	138 (58.5)	35 (14.8)	63 (26.7)		
Level of Education					
None	30 (75.0)	5 (12.5)	5 (12.5)	$\chi^2 = 17.914$	0.006*
Primary	53 (60.2)	14 (15.9)	21 (23.9)		
Secondary	59 (50.9)	18 (15.5)	39 (33.6)		
Tertiary	20 (80.0)	5 (20.0)	0 (0.0)		

\*Statistically significant, ( $p \leq 0.05$  CI= 95%)

**Table IV:** Practice of food hygiene and knowledge of respondents

Knowledge	Practice			Total	%
	Good n (%)	Fair n (%)	Poor n (%)		
Good	104 (58.1)	17 (9.5)	58 (32.4)	179	100
Fair	50 (64.9)	20 (26.0)	7(9.1)	77	100
Poor	8 (61.5)	5(38.5)	0 (0.0)	13	100
Total	162 (60.2)	42(15.6)	65(24.2)	269	100

$\chi^2 = 29.762$ ,  $df = 4$ ,  $p < 0.0001$ , ( $p \leq 0.05$  CI= 95%)



**Figure II:** Comparison between reported food hygiene practices and observed food hygiene practices

#### 4. Discussion

In respect of food hygiene practices, findings from our study revealed that more than half of the respondents had good practice which was a sharp contrast from a study done in Bahir Dar town, Ghana where more than half had poor hygiene practices [17], [18]. It was surprising that despite the good hygiene knowledge and practices recorded by the

respondents, it was observed that more than half failed to comply with ideal food hygiene and safety of food handling procedures. This showed that there was a gap between the reported practices and observed practices of food safety. This could be due to firstly, the market scenario which is in keeping with the traditional market system in contrast to the modern market system. Secondly, it could also be due to the poor sanitary condition of the market and poor availability of running water which could make practicing food hygiene difficult. Thirdly, it could also be due to the cumbersome nature of food hygiene practices like changing of gloves in between selling of meals. Fourthly, it could be due to the financial implication of ensuring ideal food hygiene practices such as buying items like gloves, apron and caps. Previous evidence [20] showed that earlier reported that about 63% of food-handlers that demonstrated good knowledge in food safety did not show a corresponding positive behavior towards food safety/hygienic practices. This further shine light on the fact that food-handlers might not necessarily be practicing strict food safety procedures during food handling, even when they provide answers to show that they are knowledgeable in a survey.

Also, it was noted that the majority of respondents engaged in hand washing before cooking and after using the toilet. This finding is similar to the study in Saudi Arabia where more than half had practiced hand washing [21]. This could be attributed to the global hand washing campaign taking its toll. However, it was noted that even though the majority engaged in hand washing, it was noted that almost three-quarter of the respondents did not engage in washing their hands with soap. This shows that the majority did not engage in proper hand washing technique. This shows further that the need for more hand washing with soap cannot be overemphasized to reduce food contamination with pathogens. It was noted that almost all the food vendors never went for medical examination which is a sharp contrast to a study done in Ghana where almost all the respondents had done medical examination [9]. Also, it was noted that almost all of the respondents who had a tertiary level of education did not only just had good practices but had good compliance with food safety practices. This shows the importance of education in not just understanding but in practicing laid down protocols implemented in food safety.

A higher proportion of respondents who were in age group 40 and 49 had good practice of food hygiene. The relationship between the age group of respondents and practice of food hygiene was statistically significant ( $p=0.004$ , CI 95%). Most of respondents who had a tertiary level of education had good food hygiene practices. The relationship between the level of education and practice of food hygiene was statistically significant ( $p=0.006$  CI 95%). Also, sex was found to be significant ( $p\leq 0.033$  CI 95%) while no relationship between years of handling food and food hygiene practices ( $p\leq 0.623$  CI 95%). The relationship between the practice of food hygiene and knowledge of food hygiene was statistically significant ( $p<0.0001$ ). This empirical finding supports the evidence of existing correlation that has been reported earlier in a South-southern Nigeria [19] among food vendors.

## 5. Limitations of the Study

The research study was largely based on responses gathered from the field so one major limitation of this study was the self-reporting method of assessment of food hygiene practice of food handlers.

## 6. Conclusion

This study concludes that relationship between the age, level of education and sex and practice of food hygiene. While no relationship between years of handling food and food hygiene practices. Even though the relationship between the practice of food hygiene and knowledge of food hygiene was statistically significant this study concludes that practice of food hygiene and safety differ from observed practices among food handlers in the marketplaces.

## 7. Declaration

Authors declare nil conflict of interest and no funding was received from any source for the conduct of this study.

## References

- [1] McCabe-Sellers BJ, Beattie SE. Food safety: emerging trends in foodborne illness surveillance and prevention. *Journal of the American Dietetic Association*. 2004; 104(11):1708-17.
- [2] Shrivastava SR, Shrivastava PS, Ramasamy J. Global food safety: Challenges and recommended public health strategies. *International journal of preventive medicine*. 2016;7(1):8.
- [3] Neira M, Prüss-Ustün A. Preventing disease through healthy environments: A global assessment of the environmental burden of disease. *Toxicology Letters*. 2016(259):S1.
- [4] Mridha Z. Food safety-A global concern. *Bangladesh Journal of Medical Biochemistry*. 2011;4(2):3-5.
- [5] Akonor P, Akonor M. Food Safety Knowledge: The case of domestic food handlers in Accra. *European Journal of Nutrition & Food Safety*. 2013:99-111.
- [6] WHO. Food safety. Geneva, 2015. Available at <http://www.who.int/foodsafety/en> accessed April 10<sup>th</sup>, 2020
- [7] Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Foodborne, Waterborne, and Environmental Diseases (DFWED), 2018. Available at <https://www.cdc.gov/foodsafety/cdc-and-food-safety.html> accessed April 10th, 2020.
- [8] Samapundo S, Climat R, Xhaferi R, Devlieghere F. Food safety knowledge, attitudes and practices of street food vendors and consumers in Port-au-Prince, Haiti. *Food Control*. 2015;50:457-66.
- [9] Monney I, Agyei D, Ewoenam BS, Priscilla C, Nyaw S. Food hygiene and safety practices among street food vendors: an assessment of compliance, institutional and legislative framework in Ghana. *Food and public health*. 2014;4(6):306-15.

- [10] Eliku T. Hygienic and sanitary practices of street food vendors in the city of Addis Ababa, Ethiopia. *Food Science and Quality Management*. 2016;6:32-8.
- [11] Onyeneho SN, Hedberg CW. An assessment of food safety needs of restaurants in Owerri, Imo State, Nigeria. *International journal of environmental research and public health*. 2013;10(8):3296-309.
- [12] Djéni TN, Kouamé AK, Traoré Y, Nevry RK, Marcellin KD. Assessment of knowledge, attitudes and practices of food handlers in Attieke production units in relation to food hygiene and safety in Côte d'Ivoire in 2012. *Food and Nutrition Sciences*. 2014;2014.
- [13] Addison IE. Hygienic Practices among Food Vendors in the University of Ghana: University of Ghana; 2015.
- [14] Dun-Dery EJ, Addo HO. Food hygiene awareness, processing and practice among street food vendors in Ghana. *Food and Public Health*. 2016;6(3):65-74.
- [15] Oladoyinbo C, Akinbule O. Awosika. Knowledge of food borne infection and food safety practices among local food handlers in Ijebu-Ode Local Government Area of Ogun State. *Journal of Public Health and Epidemiology*. 2015;7(9):268-73.
- [16] Isara A, Isah E. Knowledge and practice of food hygiene and safety among food handlers in fast food restaurants in Benin City, Edo State. *The Nigerian postgraduate medical journal*. 2009;16(3):207-12.
- [17] Okojie P, Isah E. Sanitary conditions of food vending sites and food handling practices of street food vendors in Benin City, Nigeria: implication for food hygiene and safety. *Journal of environmental and public health*. 2014;2014.
- [18] Nigusse D, Kumie A. Food hygiene practices and prevalence of intestinal parasites among food handlers working in Mekelle university student's cafeteria, Mekelle. *Global Advanced Research Journal of Social Science*. 2012;1(4):65-71.
- [19] Apanga S, Addah J, Sey DR. Food safety knowledge and practice of street food vendors in rural Northern Ghana. *Food and Public Health*. 2014;4(3):99-103.
- [20] Chukwuocha U, Dozie I, Amadi A, Nwankwo B, Ukaga C, Aguwa O, et al. The knowledge, attitude and practices of food handlers in food sanitation in a metropolis in south eastern Nigeria. *East African journal of public health*. 2009;6(3).
- [21] Clayton DA, Griffith CJ, Price P, Peters AC. Food handlers' beliefs and self-reported practices. *International journal of environmental health research*. 2002;12(1):25-39.
- [22] Moutz E, Suliman S, Abdalla M. Surveillance of food safety practices of street food-vendors in Gizan Saudi Arabia. *Agriculture & Forestry/Poljoprivreda i Sumarstvo*. 2012;58(4).