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FOOD SAFETY AND HYGIENE PRACTICE OF STREET FOOD VENDORS IN FEDERAL UNIVERSITY OF AGRICULTURE, ABEOKUTA

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ABSTRACT

Street food has been implicated in adverse health outcomes among consumers. The safety of food and hygiene practice of street food vendors are major contributing factor to these health outcomes. This study was carried out to assess food safety and hygiene practice of street food vendors in Federal University of Agriculture, Abeokuta. A descriptive cross-sectional study design was adopted. A validated interviewer-administered structured questionnaire adapted from Nutrition related knowledge, attitude and practice questionnaire was used to obtain information from 50 respondents. Information obtained are: personal and socio-economic characteristics, food safety, personal hygiene, food hygiene and sanitary, water sanitation and environmental sanitation practices. Chi-square test was used to determine association among variables at $p<0.05$ using statistical package for social sciences. All the respondents were females, 68% were within 30-49 years, about half 52% were literate and earned between N10,001– N20,000 daily. Majority (62%) of the respondents used brick as vending site while 92% were stationary vendors. Majority of the respondents had adequate food safety, personal hygiene, food hygiene and sanitary practices but moderate water and environmental sanitation practices. Daily income of respondents had significant association ($p<0.05$) with environmental and water sanitation practices. Type of vending site had significant ($p<0.05$) association with food safety and environmental sanitation practices. Respondents had adequate food safety and hygiene practices in this study and this may have positive impact on the safety of the food they are vending.

Keywords: Street food, Hygiene practice, Food safety.

INTRODUCTION

Street foods contribute significantly to the diet and nutrient intake of the general populace. This is because they are relatively cheap, easily accessible, convenient and ready-to-eat foods (Nurudeen et al, 2014; Muinde and Kuria, 2005). In a University environment where students have early morning lectures and spend most of their time at school – attending lectures and practicals – they have limited time to cook foods and hence depend largely on street foods to satisfy their hunger and meet their nutritional needs. In the same vein, most University staff resume work as early as 8.00 – 8.30a.m and spend long hours at work. Many of them patronize street food vendors for at least one meal daily. As a result, consumers

of vended foods do not only benefit from the advantages offered by street foods but are also predisposed to several health hazards that may be associated with street food consumption.

Food borne disease remains a major public health problem in many developed and developing countries. About 2.1 million adults and three million children in developed countries, including two million people in developing countries die from water consumption and contaminated food each year (Sabir et al, 2013). The common agents responsible for outbreaks of foodborne diseases are: *Bacillus cereus, Campylobacter* spp., *Clostridium* spp., *Escherichia coli, Listeria monocytogenes* (El-Shenawy et al, 2011), *Salmonella* spp., *Shigella* spp., and *Staphylococcus* spp. (Samapundo et al, 2015; Choi et al, 2011; WHO, 2010). Among these agents, staphylococcus spp. Stands out as the most common one (Nonato et al, 2016). Studies have revealed that street foods are associated with several health hazards such as foodborne disease (Gizaw et al., 2014; Mensah et al, 2012; Zain and Naing, 2002), diarrhea and vomiting (WHO, 2008) which has claimed the lives of many, especially the vulnerable groups (Nyenje and Ndip, 2013; Fleury et al., 2008).

The safety of street vended foods, throughout the food chain of production, is largely dependent on level of training acquired by street food vendors (Oladoyinbo et al, 2015; Adewunmi et al, 2014). Most food vendors in Nigeria are not trained (FAO, 2003; Omemu and Aderoju, 2007; Chukuezi, 2010; Nurudeen et al, 2014). Many of them resolve to food vending business because it is highly lucrative and requires low capital to initiate. In addition, most street food vendors lack basic education and disregard proper food handling techniques and hygiene measures (Oladoyinbo et al, 2015; Nurudeen et al, 2014).

Furthermore, street food vendors are faced with challenges of infrastructure and lack of toilet facilities at vending sites (Rane 2011, Ghosh *et al*, 2007). Even the available food vending sites built with basic infrastructures and services are very expensive, leaving low-income street food vendors, especially in many developing countries as Nigeria, with the option of using metal containers, shops built with wooden materials or shed made with palm fronds by the roadside. Many of them pass their feces and urine in nearby bushes and uncompleted buildings, cleaning up with sheets of paper (Idowu and Rowland, 2006). Also, washing of hands, utensils, and dishes is often done in buckets or bowls (Dexter *et al*, 2014). Vending surroundings are not often disinfected, insects and rodents are often attracted to sites due to unorganized sewage disposal, and food is not adequately protected from flies where refrigeration is usually unavailable (Patience *et al*, 2002). As a result, street foods constitute a potential vehicle for the emergence of the foodborne diseases.

All these predispose consumers of street foods at the risk of consuming contaminated foods and hence predispose them to health challenges of public health significance. As a result, those who patronize them purchase and consume foods in an unwholesome condition which predisposes them to food borne disease (Akintaro, 2012) and other health hazards which may decrease their participation in school activities and as well contribute to poor academic performance. There is therefore need to minimize the risk of food borne diseases among consumers of vended foods especially among students who

consume street foods, and as well provide information that can be translated into policy to ensure adequate food safety and hygiene compliance among food vendors in educational institutions. This is necessary to promote the health of these undergraduates, as well as school attendance and hence, their academic performance. This study was therefore carried out to assess the food safety and hygiene practices of University food vendors.

METHODOLOGY

This study was descriptive cross-sectional in design. All the street food vendors (50) in Federal University of Agriculture Abeokuta participated in the study. A validated, structured, interviewer-administered questionnaire adapted from Nutrition related knowledge, attitude and practice questionnaire was used to obtain information on the socio-demographic, socio-economic characteristics, food safety practice, personal hygiene, food hygiene and sanitary practice, water and environmental sanitation practice of the respondents. Food safety practice, personal hygiene, food hygiene and sanitary practice, water and environmental sanitation practice of the respondents were assessed on a scale of 8, 13, 11, 12 questions respectively. For each factor scale were converted to percentage. The score of 0 – 39% was categorized as poor, 40 – 69% was categorize ad moderate while 70% and above was categorized as adequate practice. Chi-square test was used to determine association among variables at $p<0.05$ using statistical package for social sciences, version 20.

RESULTS AND DISCUSSION

Socio-demographic and Socio-economic characteristics of street food vendors

All (100%) the street food vendors were females and 40% were within the age range of 30-39 years. This implies that street food vending is common among females than males and who were young adults. The findings from this study is similar with the findings of Adewunmi (2014) and Mensa *et al* (2002) conducted in Nigeria and Ghanna respectively, who reported that all the street food vendors assessed were female and young adults. Other studies in Ghana and Nigeria also reported similar findings (Afolaranmi et al., 2015; Apanga et al, 2014; Nurudeen et al, 2014; Isara and Isah, 2009; Chukuezi, 2010; Musa and Akande, 2003). Most (80%) were married.

Most (92%) of the street food vendors were stationary vendors. This is in consonance with previous studies conducted in Nigeria and Ghana (Chukuezi, 2010; Janie and Marie, 2010; Nurudeen et al, 2014; Mensah et al, 2002), where most street food vendors were stationary vendors. Also, majority (62%) of them used vending site made of brick, 34% of them used wooden vending site while very few (4%) of them used container as vending site. This imply that most street food vendors under study used appropriate structures as their vending sites which would protect the street foods from possible environmental contaminants. Inappropriate vending sites may promote contamination of street foods through dust and exhaust from vehicles or motorcycles. This is because dust inhabit microorganisms, particularly pathogenic microorganisms while vehicle exhausts have been reported to contain carbon monoxide which is poisonous and contribute to the development of most cancers, thereby rendering the food unsafe for consumption. The use of appropriate structures as vending sites by respondents may be influenced by the institution management, as most street food vendors have been reported to use

poorly constructed vending site, which contributes immensely to contamination of their foods (Muinde and Kuria, 2005; Mensah et al, 2002). Most (94%) had sales attendance below five (5) and 76% of them were females.

In this study, majority (64%) respondents were literate. More than half (52%) of them had more than secondary education. About 6% completed their primary education, 12% completed their secondary school education. Infact, about one-quarter of them had University education. Only few (6%) respondents lacked basic education. This high level of literacy may influence proper food handling techniques and hygiene measures among food venders, hence, may contribute immensely to the safety of the food sold by these vendors. However, this findings contradict the report of previous studies where most street food venders were illiterate (Mensah et al, 2013; Oladoyinbo et al, 2015; Mensah et al, 2002; Muinde and Kuria, 2005).

More than half (56%) of the street food vendors earned between N10,001- N20,000 daily. Only 6% earned less than or equal to N5,000 while 30% of them earned more (above N 20,000). This confirms the report of Mwangi (2002) that street foods provide substantial income for food vendors. This suggests that street food vending is a lucrative business, as most respondents earned up to, or more than the minimum wages of Nigeria in a day. Also, about 38.6% of their spouses were civil servants, 20.5% were self-employed, 34.1% were traders, and 6.8% were highly trained professionals.

About half (52%) of the food venders acquired training on food preparation from catering school, 24% acquired training from parents, 10% acquired training by trial and error while 14% acquired training by observation, as apprentice (Table 1). Also, about half (48%) of them were trained on personal hygiene, 42% were trained on food safety while only 28% were trained on water and environmental sanitation. This suggests that most respondents may not necessarily resolve to food vending business because it is highly lucrative but rather because they had passion for it and acquired adequate training on food preparation, food safety and hygiene practice. The findings from this study contradicts previous findings where street food vendors were reported to lack basic training on hygiene and formal training on food preparation (Muine and Kuria 2005; Omemu and Aderoju, 2008; Nurudeen et al, 2014) that reported that most street food vendors acquired training on cooking by observation.

Food safety practices of FUNAAB street food vendors

Most (84%) of the respondents had adequate food safety practice, 16% had moderate food safety practice while none had poor food safety practice (Table 2).

More than two-third of the respondents wash their cleaning surfaces with detergent, store perishable goods in the refrigerator and separate raw foods from cooked foods during storage. All (100%) the respondents wash fruits and vegetables with clean water and 94% reheated leftover foods before serving them to customers. This suggests that the foods prepared by these street food vendors are safe for consumption and may pose little or no health risk to consumers. The findings from this study negates the report of some studies conducted in Abeokuta and Ijebu-Ode, Nigeria, which reported poor to moderate food safety practices among street food

vendors (Omemu and Aderoju, 2008; Oladoyinbo et al, 2015). Also, most street food vendors in Sudan and Kenya were reported not to thoroughly wash their food items before cooking due to insufficient water supply (Nurudeen et al, 2014; Abdalla et al, 2009; Muinde and Kuria, 2005) while most of them do not reheat foods before serving to consumers (Mensah et al, 2002). On the other hand, other studies conducted in Owerri, Nigeria and Ghana revealed that street food vendors washed their food thoroughly before cooking and reheated food before serving (Apanga et al, 2014; Chukuezi, 2010). Also, the practise of re-using oil severally for frying by street food vendors was predominant in this study. All (100%) the respondents re-used oil for frying. Other studies reported the same (Muinde and Kuria, 2005; Nurudeen et al, 2014). This practice could predispose consumers of street foods to consumption of trans fats which, if consumed in excess could lead to development of coronary artery diseases and other non-communicable chronic diseases.

Personal hygiene of FUNAAB street food vendors

This study revealed that most (88%) of the street food vendors had adequate personal hygiene practice, 12% had moderate personal hygiene while none of them had poor hygiene practice. During cooking, majority (62%) of the vendors used apron, 80% covered their hair, 56% of the respondents washed their hands under running water, most (96%) washed their hands after preparing or handling meal and after handling garbage while all (100%) the vendors washed their hands after visiting the toilet (Table 2). This reflects adequate hygiene practice among respondents. Previous studies revealed similar findings (Chukuezi, 2010; Mensah et al, 2002), however, some studies revealed contrary findings that street food vendors have poor personal hygiene practice with majjority of them not complying to the use of apron, covering of hair among others (Muinde and Kuria, 2005; Nurudeen et al, 2014).

Food hygiene and sanitary practices of FUNAAB street food vendors

Food hygiene is one of the basic training that street food vendors require for obtaining license (FAO, 2003). In previous studies, majority of the street food vendors were reported to lack basic training on food hygiene and sanitation, food safety, as well as water and environmental sanitation (Omemu and Aderoju, 2008; Chukuezi, 2010; Nurudeen et al, 2014). However, this study provides a contrary finding, as most (92%) vendors had adequate food hygiene and sanitary practice, 8% had moderate practice while none had poor practice (Table 2). All (100%) the vendors washed food before cooking, 92% prepared food on the same surface. However, they all (100%) washed the surface before reuse. Also, all (100%) the food vendors served food while it is hot, prepared their food at the vending site, used warmers to hold food hot before serving, and washed utensils with cold soapy water before giving them to customers to eat. More than half (54%) of the food vendors used basin for washing plates, cutleries and cook wares, most (82%) used liquid soap for washing and did not practice blowing air into polythene bag before use for packaging food (Table 2). This may account for the adequate food safety and hygiene practice observed in respondents.

Water sanitation practices among street food vendors

Most (90%) of the food vendors had moder-

ate water sanitation practice, 10% had poor water sanitation practice and none had adequate water sanitation practice (Table 2). Most (94%) used sachet water as the major source of drinking water, and have access to portable water for cooking. This may explain why food hygiene and sanitary practices of most of the respondents were adequate, as water is essential in ensuring food safety and hygiene (Muinde and Kuria, 2005; Latham, 1997). This is contrary to previous findings where pipe borne water is the major source of water for cooking (Donkor et al, 2009; Abdalla et al, 2009; Reang and Bhattacharjya, 2013).

Also, about 94% did not treat water to be safe for drinking and majority (60%) used water once before replacement. The major source of drinking water was sachet water (commonly called pure water) which is commonly consumed in Nigeria. This water is assumed to have undergone treatment by the manufacturer. However, most sachet water are not actually pure, they are found to contain contaminants which claims the lives of many and leaves others with ailments such as diarrhea (Sabir et al, 2013), among others. In addition, the major source of water used for cooking among respondents is borehole. Furthermore, all the respondents stored water in clean and covered containers which will prevent contamination by external contaminant. This findings contradicts the report of Nurudeen et al (2014) who reported that food vendors stored water in buckets, bowls, gallons and drums which were used for other domestic work, thereby increasing the chance of contamination of water stored in them.

Environmental sanitation practices among street food vendors

The study revealed that majority (72%) of the respondents had adequate environmental sanitation practice, 22% had moderate practice and 6% had poor practice (Table 2). The entire food vendors cleaned their vending environment daily and most (84%) of them were not close to a dumping site. Also, 72% street food vendors did not dispose dirt around their vending environment with most (60%) disposing their dirt through a dirt collector, to the dumping site which was away from their vending environment. The maintenance of clean environment by these food vendors may be influenced by the management of the institution as previous studies revealed contrary findings (Nurudeen et al, 2014; Muinde and Kuria, 2005). However, Chukuezi (2010) observed a substantial compliance to clean environment and appropriate waste disposal among street food vendors in Owerri, Nigeria.

Factors affecting food safety and hygiene practices of street food vendors

Although, age and level of education of respondents had no significant association with respondents' personal hygiene ($p=0.90$ and 0.24 respectively), food safety ($p=0.29$, 0.25 respectively), food hygiene and sanitation ($p=0.72$, 0.21 respectively), water sanitation ($p=0.63$, 0.88 respectively) and environmental sanitation ($p=0.26$, 0.19 respectively), however, the food safety and hygiene practices of respondents increased with their level of education. Type of vendor had significant association with water sanitation practice of respondents while type of vending

site had significant association with food safety (p=0.00), environmental sanitation practices (p=0.01). This implies that the use of appropriate vending sites play a role in preventing contamination of foods from pathogenic organisms as well as environmental factors. In addition, estimated daily income had significant association with water sanitation (p=0.00) environmental sanitation practices (p=0.01). This suggests that income of street food vendors play a role in ensuring adequate water and environmental sanitation practices and hence rendering their food safe for consumers, promoting health of consumers.

CONCLUSION

Most street food vendors assessed in this study were literate and acquired food preparation skills as well as training on food safety and hygiene practices. Also, most respondents used appropriate vending sites which significantly impacted their food safety and hygiene practices. In addition, most respondents had adequate personal hygiene, food safety, food hygiene and sanitation, water sanitation and environmental hygiene practices.

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Table 1: Socio-demographic and Socio-economic characteristics of street food vendors

Variable	Frequency	Percent	Variable	Frequency	Percent
Age range (years)			**Type of vendor**		
<30	1	2	Stationary	46	92
30-39	20	40	Mobile	2	4
40-49	14	28	Both	2	4
50-59	9	18	**Total**	50	100
60 and above	6	12			
Total	50	100			
			Type of vending site		
Marital status					
Married	40	80	Wooden	17	34
Single	10	20	Container	2	4
Total	50	100	Brick	31	62
			Total	50	100
Level of Education			**Acquisition of training**		
No formal education	3	6	**On food preparation**		
Primary completed	3	6	Catering school	26	52
Primary uncompleted	3	6	Parents	12	24
Secondary completed	6	12	Trial and error	5	10
Secondary uncompleted	9	18	Observation	7	14
Post-secondary education	15	30	Total	50	100
University education	11	22			
Total	50	100			
Estimated monthly income					
N > 5000	3	6			
N 5,000-10,000	4	8			
N 10,001-20,000	28	56			
Above N 20,000	15	30			
Total	50	100			

Table 2: Food safety and hygiene Practices of the respondents

Variables	Frequency	Percent	Variables	Frequency	Percent
Food Safety Practice Score			**Water Sanitation score**		
Poor Practice	-	0	Poor Practice	5	10
Moderate Practice	8	16	Moderate Practice	45	90
Adequate Practice	42	84	Adequate Practice	-	-
Total	50	100	Total	50	100
Food Hygiene and Sanitary score			**Environmental Sanitation score**		
Poor Practice	-	0	Poor Practice	3	6
Moderate Practice	46	92	Moderate Practice	11	22
Adequate Practice	4	8	Adequate Practice	36	72
Total	50	100	Total	50	100
Personal hygiene					
Poor Practice	-	0			
Moderate Practice	6	12			
Adequate Practice	44	88			
Total	50	100			

Table 3: Factors affecting food safety and hygiene practices of street food vendors

Variables	Food safety		Personal hygiene		Food hygiene and sanitation		Water sanitation		Environmental sanitation	
	χ^2	P=value	χ^2	P=value	χ^2	P=value	χ^2	P=value	χ^2	P=value
Age	4.93	0.294	1.08	0.90	5.37	0.72	2.58	0.63	10.05	0.26
Level of education	10.22	0.25	10.32	0.24	20.16	0.21	3.74	0.88	20.75	0.19
Estimated income	2.027	0.57	1.64	0.65	2.51	0.87	38.89	0.00*	1.46	0.01*
Type of vendor	0.83	0.66			0.28	0.99	18.84	0.00*	8.04	0.90
Type of vending site	18.49	0.00*	4.04	0.13	3.18	0.53	1.76	0.42	0.52	0.01*

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