

HANDLING AND HYGIENE PRACTICES OF FOOD VENDORS IN RIVERS STATE UNIVERSITY AND ITS ENVIRONMENT

ABSTRACT

The study assessed handling hygiene practices of food vendors in Rivers State University and its environment. A survey research design was adopted for the study while the population consisted of food vendors who prepare and sell ready-to-eat foods in the study area. Snowball sampling technique was used for the study and a total of thirty food vendors constituted the sample size for the study. A self-assessment form was used for data collection and data analyzed with frequency, percentages and Pearson's correlation. The result showed that majority of the food vendors had no access to portable water and the operating environment untidy. Most (60%) of the food vendors appear clean and 70% of them use personal protective clothing while 70% and 97% of them handled foods and money with bare hands while serving food. Storage of cooked food was properly kept in covered containers by 70% of the vendors while 60% of the vendors do not separate raw and cooked food. Seventy seven (77) percent of vendors do not keep cold foods in refrigerators or ice boxes as to maintain the temperature. Only 40% of the food vendors cover unused utensils while 57% of them do not clean utensils properly after use. The study found out that all the food vendors wash utensils with cold soapy water and 90% of the vendors re-use water for washing utensils. There was a positive association between the personal and environmental hygiene of the food vendors at the University main gate and hostel blocks while those at the University back gate was negative.

Keywords: Handling, hygiene, practice, food vendor, street food.

INTRODUCTION

Street foods are ready-to-eat foods and beverages prepared and sold by vendors in streets and similar public places. Consumption of street foods has increased in most urban areas due to the demands of urban life and limited time. Street foods now constitute a significant part of the urban food supply in most countries (WHO, 1996). It is believed that street foods have nutritional components of an unhealthy diet and a higher risk of contamination by physical, chemical and biological agents which have become a serious concern in terms of food safety (Nonato, 2016). However, due to the increased demand for street foods, more persons are engaging in the business most of whom are not knowledgeable in the basic principles of handling such foods.

Food vendors ease access to ready-to-eat foods for the busy individuals who may not be able to prepare their meals at home (Beleya *et al.*, 2017). They usually congregate in crowded areas where there are large numbers of potential customers (Gadi *et al.*, 2013).

Comment [FN1]: And?

Comment [FN2]: A cross-sectional research design

Comment [FN3]: A cross-sectional research design

Comment [FN4]: State the software used for analysis

Comment [FN5]: Please rephrase this. Does it mean the environment was unhygiene?

Comment [FN6]: Not cleaning properly is a general term. What do you use to clean the utensils? Is it water only? Without soap? How is the cleaning done? This will then determine if it is done properly or not.

Comment [FN7]: All of them? So how about the 57% mentioned above?

Comment [FN8]: What are your p values?

Comment [FN9]: How about the growing population and the cost of these foods? Are they affordable?

Comment [FN10]: Limited time to prepare their own food? Or limited time to travel for example home for their meals and back to work?

Comment [FN11]: What are these components? I prefer you just state that they are mostly unhealthy? They contain a lot of or less of some nutrients

These areas usually have little or no basic sanitary facilities. Thus it is common to find food vendors within educational institutions due to the large population of students and staff. These students depend greatly on these food vendors for their meals as there are restrictions on cooking in the hostel for safety reasons in addition to little or no time for meal preparation.

Comment [FN12]: Such as?

The quality and safety of ready-to-eat foods available in educational institutions is important because it could negatively affect the health of the students which make up a large proportion of the consumers. The safety of these foods depends greatly on the handling and hygiene practices of the vendors. The World Health Organization (1989) reported that food handling personnel play important role in ensuring food safety throughout the food chain from production and storage to consumption. Foods can become contaminated during preparation, post preparation and storage as well as during service prior to consumption.

Comment [FN13]: Most of your statements in this section are not cited. Look at other studies carried out under the same topic and make references and compare findings with you current study

The consumption of street foods is inevitable thus it is necessary to ensure the safety of these foods and reduce contamination. To achieve this, the World Health Organization developed preventive measures tagged "Golden rules for safe food preparation" as to enhance food safety (WHO, 1984). These rules include amongst others thorough cooking of food, maintaining appropriate temperature of cooked food, re-heating stored food, avoiding contact between raw and cooked food and protection of food from insects, rodents and other animals.

Despite these rules food borne diseases continue to be a serious public health problem in developing countries (Musa and Akande, 2003). Poorly prepared and packaged street vended foods have been identified in many countries as the cause of food borne diseases (FAO, 1997). Most street food vendors are ignorant and untrained in food hygiene and basic food safety rules (Abdalla *et al.*, 2008). Although some are knowledgeable on these safety measures, they do not adhere to the rules thereby predisposing the consumers to several health risks. Improper handling and disregard for hygienic measures on the part of the food vendors could lead to contamination of the food by pathogenic bacteria which are capable of causing illness in the consumers (Abdalla, *et al.*, 2009).

The adherence to basic hygiene and food safety measures by food vendors is therefore of utmost importance particularly in educational institutions. failure to do so could result in Food poisoning and other food borne diseases. Thus the need to assess the food handling and hygiene practices of food vendors in Rivers State University.

Comment [FN14]: Your study does not look into adherence to rules. It seeks to find out handling practices. Did the vendors in your study have access to the WHO rules/guidelines?

MATERIALS AND METHODS

The study adopted a survey research design and was conducted in Rivers State University and its environs. The population for the study consisted of food vendors who prepare and sell ready-to-eat foods within the premises of the University and its environs – the University main gate, hostel blocks and the Azikiwe (back gate). Vendors who sell pre-packaged and packaged foods were not included in the population of the

Comment [FN15]: A cross-sectional research design

study. These areas were included in the population of the study because large numbers of students patronize the food vendors in these areas. There was no official data on the population of food vendors in the study area. Thus Snow-ball sampling technique was used for the study. Using this sampling technique, a total of thirty food vendors were contacted and constituted the sample size for the study. Data was collected using a self-assessment/observation form. This was based on the findings of Beleya *et al.*, (2017) who reported remarkable variations in reported and observed hygiene practices of food vendors. Data collected were analyzed using descriptive statistics such as frequency and percentages and Pearson's correlation.

RESULTS

Table 1 shows the facilities used by the various food vendors. About 60% of the vendors constructed their stalls with canopies, 30% of the vendors use wooden tables and 10% use wheel barrows as food stall.

Table 1: Facilities used for vending food

Facilities	Frequency	Percentage (%)
Canopies	18	60
Wooden tables	9	30
Wheel barrows	3	10

Table 2 presents the hygiene situation around food vending stalls. Majority (83%) of the stalls are not protected from the sun, wind and dust, 50% are free from pests, flies and animals. Only 20% of the food vendors have access to portable and none of the vendors have adequate hand washing facilities. Thirty three (33) percent of the food vendors have waste disposal facilities and only 7% of them have their waste bins properly closed, while 17% of the food vendors have access to waste water disposal sites as well as situated far from refuse/waste disposal sites and 57% of the vendors are situated far from open drains.

Table 2: Environment around food vending stalls

Environment	Yes frequency	%	No frequency	%
Stall are properly protected from sun, wind and dust	5	17	25	83
Free from pests, flies and animals	15	50	15	50
Access to portable water	6	20	24	80
Adequate hand washing facilities available	0	0	30	100
Availability of food waste disposal facilities	10	33	20	67
Food vendors bins are properly closed	2	7	28	93
Access to waste water disposal sites	5	17	25	83
Stalls are situated far from refuse/waste disposal sites	5	17	25	83

Comment [FN16]: A researcher administered questionnaire is the best for this case. Can you briefly describe the self-assessment form? Isn't the form a great source of bias

Comment [FN17]: Are you replicating this study? What was the justification of carrying out the current study? How different is the current study from Beleya's study?

Comment [FN18]: Which software was used?

Comment [FN19]: Why was it important to assess the structures? How are they related to hygiene? The ease to clean up a structure or what exactly?

Comment [FN20]: Portable cleaning facilities? Please clarify

Comment [FN21]: Had. Report in past tense, because that was the case during the study period.

Comment [FN22]: Rephrase this. They have access and yet they are again far from the disposal sites?

The personal hygiene practices of the food vendors are presented in Table 3. Results showed that 37% of the vendors wash hands properly before handling foods, while 60% of the vendors wear clean and presentable clothes with 70% of them using personal protective clothing. Seventy (70%) percent of the food vendors handle foods with bare hands, 83% of them have short and clean nails and only 17% of the food vendors cover their hair while serving food. Almost all (97%) of the food vendors handle money with bare hands while serving food, 30% serve food with their jewelries on and 80% of the vendors blow nose into hands and proceed to work. Majority (70%) of the food vendors do not wash hands after coughing.

Comment [FN23]: Did you observe all the 80% of them actually blowing their noses? I find it impossible

Comment [FN24]: Same case here. Did you observe them or they reported to you that it is what they do?

Table 3: Personal hygiene practices of the food vendors

Parameter	Yes frequency	%	No frequency	%
Proper hand washing before handling foods	11	37	19	63
Clean and presentable clothes	18	60	12	40
Use of personal protective clothing	21	70	9	30
Handle foods with bare hands	21	70	9	30
Short and clean nails	25	83	5	17
Hair covered while serving food	5	17	25	83
Handle money with bare hands while serving food	29	97	1	3
Serve food with jewelries on	9	30	21	70
Blow nose into hands and proceeds to work	24	80	16	20
Do not wash hands after coughing	21	70	9	30

The Food storage practices of the food vendors are presented in Table 4. Result of the present study showed that 30% of the vendors keep their foods open in stalls while 70% keep their foods in covered containers. About 40% of the food vendors separate raw foods from partially cooked and cooked foods. Few (23%) vendors maintain the temperature of cold foods by refrigerating or keeping in ice boxes and most (70%) of them store hot foods in coolers to maintain the temperature of hot foods.

Table 4: Food storage practices of the food vendors

Parameter	Yes frequency	%	No frequency	%
Foods are kept open in stalls	9	30	21	70
Foods are kept in covered containers	21	70	9	30
Raw, partially cooked and cooked food are kept separate	12	40	18	60

Cold foods are refrigerated or kept in ice boxes to maintain temperature	7	23	23	77
Hot foods are stored in coolers to maintain temperature	21	70	9	30

Table 5 shows the various ways food vendors handling and care for utensils. Data analysis showed that 40% of the food vendors cover unused utensils properly, 43% of the vendors clean their utensils properly after use. All the food vendors wash their utensils with cold water and soap and only 17% wash utensils with cold water without soap.

Comment [FN25]: Define what properly means in this case. How is the washing done? What do they use in cleaning?

Table 5: Handling and care of utensils by food vendors

Parameter	Yes		No	
	frequency	%	frequency	%
Unused utensils are well covered	12	40	18	60
Utensils are cleaned properly after use	13	43	17	57
Utensils are washed with warm soapy water	0	0	30	100
Utensils are washed with cold soapy water	30	100	0	0
Utensils are washed with dirty cold soapy water	27	90	3	10
Utensils are washed with clean water with no soap	5	17	25	83

The relationship between food vendors' personal and environmental hygiene is shown in Table 6. There is a positive association between the personal and environmental hygiene of the food vendors at Rivers state University main gate and those at the hostel blocks, while for those at the University back the association was negative.

Comment [FN26]: Is this the only relationship you analyzed? Were these two the only variables you related?

Table 6: Relationship between food vendors' personal and environmental hygiene

	Environmental hygiene		
	Main gate	Hostel block	Back gate
Personal hygiene	0.515 (0.087)	0.064 (0.843)	-0.056 (0.863)

DISCUSSION

The type of facility or equipment used for vending food is important as it could affect the wholesomeness of the ready-to eat food. The use of canopies by majority (60%) and

Comment [FN27]: The material used on the facility surfaces?

wooden tables by some (30%) of the food vendors could be a source of contamination to the food. Dust and other particles that settle on the canopies can easily come in contact with the food. The wooden tables used if not properly cleaned and disinfected could become breeding ground for microorganism which could later find themselves into the food. Wood is not suitable material for food contact surface as cleaning is not easy. Food contact surfaces should be smooth, free of cracks and crevices, non-porous, non-absorbent, non-contaminating, non-reactive, corrosion resistant, durable and cleanable Schmidt *et al.*, (2012). The use of these types of facilities by the food vendors could be for easy accessibility by the consumers. Buted and Ylagan (2014) also noted that street food vendors are usually located outdoors or under a roof which is easily accessible from the street.

Comment [FN28]: Find their way into the food. Please do not personify microorganisms.

Comment [FN29]: How about the cost implications?

The environment where food is prepared and sold is important and contributes to the safety of the food. The findings of the study revealed that majority of the food vendors operate in places that are not properly protected from sun, wind and dust, do have access to portable water, no adequate hand washing and waste disposal facilities and are situated close to waste disposal sites. This contributed to the infestation of most food vending stalls with insects, pests and animals as revealed in the study. The unhygienic environment where these food vendors operate coupled with lack of portable water and hand washing facilities poses a great risk to the health of the consumers. The findings of the study are in agreement with that of Dajaan *et al.* (2018) who reported that 91% of the food vendors had no running water in their place of selling. Muinde and Kuria (2005) also reported that 92.5% of the food vendors had no garbage receptacles for waste collection and disposed garbage near their stalls.

Comment [FN30]: As observed during data collection

Observing personal hygiene is vital for any food establishment as human beings are a major source of food contamination (Monny *et al.*, 2014). Although most of the food vendors appear clean, use personal protective clothing and maintain short clean nails, other hygiene practices assessed were generally poor. Most of the food vendors do not wash their hands properly and between tasks, handle foods with bare hands and handle money while serving food. Hands of food vendors are usually a means of transmitting pathogens from contaminated places and items and could result in cross contamination when in contact with food. Thus hand washing is one of the precautionary measures to protect against the spread of diseases and to reduce cross contamination. The unhygienic practices of the food vendors make them potent source of cross-contamination. Improper hand washing and handling of money with food have been implicated in food borne illnesses (Tood *et al.*, 2009). Poor personal hygiene of food vendors have been reported by Ntow *et al.*, (2016) and Umar *et al.*, (2018).

Cooked food can become contaminated due to improper handling and inappropriate temperature control. Most of the vendors keep cooked food in covered containers and in coolers to retain the temperature of hot foods whereas cold foods are kept at ambient temperatures. Most (60%) vendors do not separate raw foods from partially cooked and cooked foods. Cold foods such as fruits and salads should be refrigerated. WHO (1996)

reported that storing cold foods at ambient temperatures favor the growth and proliferation of microorganisms.

Most (60%) food vendors do not cover unused utensils and used ones are not cleaned properly after use. Majority (90%) of the vendors use dirty water for washing their utensils. This is expected as 80% of the food vendors do not have access to portable water. This is consistent with the findings of Hilario (2015) and Dajaan *et al.* (2018) who reported that most food vendors carried water from their homes due to unavailability of portable water at their place of operation. The use of dirty soapy water could result in a public health risk as dirt from the water and chemicals from the soap which were not thoroughly rinsed off can come in contact with the food. Miettinen *et al.* (2001) and Bhaskar, *et al.* (2004) observed that bacteria from dirty dish washing waters can adhere to utensil surface and constitute a risk of contamination when vending food.

A positive association exists between personal and environmental hygiene of the food vendors at the university main gate and hostel blocks. This implies that food vendors at these two locations who practice good personal hygiene also maintain good environmental hygiene. For food vendors at the University back gate, their personal hygiene is not a reflection of their environment as observed by the negative association between their personal and environmental hygiene.

CONCLUSION

The study revealed that the handling and hygiene practices of the food vendors in the study area is unhygienic and below international standards. The hygiene practices of the food vendors could result in contamination of the food and consequently disease outbreaks. There is need for continuous education and training for the food vendors on food safety and basic hygiene practices. Also, there should be proper monitoring and supervision by the relevant authorities to ensure compliance by the food vendors.

REFERENCES

- Abdalla, M.A., Sullman, E.E. and Bakhlet, O.A. (2009). Food safety knowledge and practices of street food vendors in Atbara city (NaherElneel State Sudan). *African Journal of Biotechnology*, 8(24): 6967- 6971.
- Abdalla, M.A., Sullman, E.E., Alian, Y.Y.H.A. and Amel. O.B., (2008). Food safety knowledge and practices of street food-vendors in Khartoun City. *Sudanese Journal of Veterinary Science and Animal Husbandry*, 47(1&2): 126-136.
- Beleya, E.A., Eke-Ejiofor, J. and Wariso, B. (2017). Assessment of hygiene practices of food vendors in Rivers State University. 3rd Nigerian Institute of Food Science and Technology, South-East Chapter Food Summit. Promoting Nigerian

Comment [FN31]: All your statistics are 90,80, 60. None has a decimal point or an odd number. Were the results of your data analysis so accurate like that. Please clarify. Most of the times frequencies would not be accurate like 90, 80, 70.

Comment [FN32]: Which aspects of personal and environmental hygiene?

Comment [FN33]: Edit this sentence

Comment [FN34]: Which aspect of their personal hygiene?

Comment [FN35]: Check this statement. This implies that food vendors at these two locations who practice good personal hygiene also maintain good environmental hygiene.

Comment [FN36]: This authorities should be briefly discussed in your background

Economy through Development of Aquatic life value chain. Amphitheatre, Rivers State University, Port Harcourt. 5-7 June 2017. 26-27. (Ed) J. Eke-Ejiofor.

Bhaskar, J., Usman, M., Smith, S. and Bhat, G.K. (2004). Bacteriological profile of street foods in Mangalore. *Indian Journal of Medical Microbiology*, 22: 191-197.

Buted, D.R. and Ylagan, A.P. (2014). Street food preparation practices. *Asia Pacific Journal of Education, Arts and Sciences*, 1(2): 53 -60.

Dajaan, D.S., Addo, H.O., Luke, O., Afoakwa, E., Amshawu, A. and Kwasi, N. A. (2018). Food hygiene awareness and environmental practices among food vendors in basic schools in Kintampo Township, Ghana. *Food and Public Health*, 8(1): 13 -20.

Food and Agriculture Organization (1997). Street foods. Rome: Rome Publishers.

Gadi, C., Bala, K.L. and Kumar, A. (2013). Study of hygiene practices of street food vendors in Allahabad City, India and determination of critical control points for safe street food. *The Allahabad Farmer*, 68(2): 1-10.

Hilario, J.S. (2015). An evaluation of the hygiene and sanitation practices among street food vendors along Far Eastern University (FEU). *International Journal of Advanced Research*, 3(2): 604- 615.

Miettinen, H., Arnisalo, K., Salos, S. and Sjoberg, A.M. (2001). Evaluation of surface contamination and the presence of *Listria monocytogenes* in fish processing factories. *Journal of Food Protection*, 65: 635- 639.

Monny, I., Dominic, A., Badzi, S., Campaore, P. and Stephen, N. (2014). Food hygiene and safety practices among street food vendors: An assessment of compliance, institutional and legislative framework in Ghana. *Journal of Food and Public Health*, 4 (6): 306- 315.

Muide, K. and Kuria, E. (2005). Hygienic and sanitary practices of vendors of street foods in Nairobi, Kenya. *Journal of Food Agriculture, Nutrition and Development*, 5(1): 1-15.

Musa, O.I. and Akande, T.M. (2003). Food hygiene practices of food vendors in secondary schools in Ilorin. *The Nigerian Postgraduate Medical Journal*, 10(3):192-196.

Nonato, I.S. (2016). Nutritional issues concerning street foods. *Journal of Clinical Nutrition and Dietetics*, 12: 20-23.

Ntow, G.E., Kwabla, M.P. and Der, J. (2016). Hygiene practices among food vendors in Hohoe Township. *Central African Journal of Public Health*, 2 (2): 43 -50.

Schmidt, R.H., Erickson, D.J., Sims, S. and Wolff, P. (2012). Characteristics of food contact surface materials: Stainless steel. *Food Protection Trends*, 32(10): 574 -584.

- Tood, E.C., Grig, J.D., Bartleson, C.A. and Michaels, B.S. (2009). Outbreaks where food workers have been implicated in the spread of food borne diseases. Part 6. Transmission and survival of pathogens in the food processing and preparation environment. *Journal of Food Protection*, 72(1): 202- 219.
- Umar, A.A., Sambo, M.N., Sabitu, K., Iliyasu, Z., Sufiyan, M.B. and Hamza, K.L. (2018). Personal and food hygiene practices among street-food vendors in Sabon-Gari Local Government Area of Kaduna State, Nigeria. *Archives of Medicine and Surgery*, 3(2): 77-83.
- World Health Organization (1984). The role of food safety in health and development: Report of a joint FAO/WHO Expert Committee on food safety. Technical Report Series. 705:30-35.
- World Health Organization (1989). Health surveillance and management procedures for food handling personnel. WHO technical report series, 785. Geneva.
- World Health Organization (1996). Essential safety requirement for street vended foods. Food Safety Unit Division of Food and Nutrition, WHO/FNU/FOS/96.7.