

Food hygiene and safety practices of mobile food vendors in Benin City, Nigeria

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Abstract

Background: There is growing evidence that the consumption of street foods is increasingly cutting across people of all socioeconomic groups in many countries of the world. This study was conducted to assess the food hygiene and safety practices of mobile food vendors in Benin City, Nigeria. **Materials and Methods:** This descriptive cross-sectional study was carried out among mobile food vendors in Benin City, Nigeria. A structured, pretested, interviewer-administered questionnaire and an observational checklist were the data collection tools. Data analysis was carried out using SPSS version 20.0 software. **Results:** Two hundred and fifty respondents with a mean age of 31.7 ± 8.7 years were studied. There were 24 (9.6%) males and 226 (90.4%) females. Most of them knew regular handwashing practices with soap and water (95.5%), proper covering of stored food (92.8%), proper cleaning of cutting/sale surfaces (89.6%), and storage of food at appropriate temperature (79.6%). Forty-seven (18.8%) respondents kept long finger nails and 58 (23.2%) blew air into the cellophane. Handwashing before and after serving food was practiced by 115 (46.0%) respondents, 14 (5.6%) used hand gloves while serving food, 143 (57.3%) properly covered their hair, and 205 (82.0%) concurrently served food and collected money from consumers. The utensils used in serving food were considered clean in majority (217 [86.8%]) of the food vendors. **Conclusion:** There was a high level of knowledge of food hygiene among the mobile food vendors but their food safety practices were poor. This finding suggests that the street foods sold in Benin City may be heavily contaminated with pathogenic microorganisms.

Key words: Food hygiene, food safety practices, mobile food vendors, Nigeria, street foods

INTRODUCTION

The World Health Organization defined “street-vended foods” or their equivalent “street foods” as foods and beverages prepared and/or sold by vendors in streets

and other public places for immediate consumption or consumption at a later time without further processing or preparation.^[1] Food vending is an age-long tradition in many developing countries such as Nigeria. The trade has evolved over time from a single food item being carried on the head by the vendors, to the rolling of multiple food items in wheelbarrows and trolleys along the streets and markets. The diversity that exists among street food vendors is reflected in the type of food they prepare and sell, the scale of their business, the mode in which they are operating, the location in which they prepare and

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Access this article online

Quick Response Code:



Website:

www.sudanmedicalmonitor.org

DOI:

10.4103/summ.summ_36_17

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How to cite this article: Isara AR, Osagie JO, Omodamwen N, Omorodion IS. Food hygiene and safety practices of mobile food vendors in Benin City, Nigeria. Sudan Med Monit 2017;12:51-5.

sell the food, and the type of consumers to which they sell the food.^[2] According to the Food and Agricultural Organization, the consumers of street foods in most countries are members of the informal sectors such as fellow hawkers, hustlers, and casual wage workers. Others are children, students, office workers, homemakers, and other income groups.^[3] However, there is growing evidence that the consumption of street foods is increasingly cutting across people of all socioeconomic groups in many countries of the world.

The risk of serious food-borne disease outbreaks linked to street foods remains a threat in many parts of the world. A lack of knowledge among street food vendors about the causes of food-borne disease is a major risk factor.^[4] Although many consumers attach importance to hygiene in selecting a street food vendor, consumers are often unaware of the health hazards associated with street-vended foods.^[4] Many studies have demonstrated that food handlers lack basic knowledge and formal training in food hygiene and safety in most parts of Africa.^[5-8] However, Apanga *et al.* reported that the knowledge level among street food vendors concerning food safety practices was 100% in rural Ghana, but this knowledge did not entirely translate into practice.^[9] This situation is usually compounded with poor personal hygiene on the part of the food vendors and poor waste disposal methods leading to danger of increased risk of food contamination with pathogenic microorganisms, resulting in potential food-borne disease outbreaks.

Studies on microbiological quality of street food in Africa and other parts of the world revealed that street foods are heavily contaminated with different microorganisms.^[7,10-16] The organisms most commonly isolated from street food in these studies included but not limited to *Staphylococcus aureus*, *Salmonella* spp., *Escherichia coli*, *Bacillus* spp., *Listeria monocytogenes*, and *Campylobacter jejuni*. Globally, *Salmonella* spp., have been implicated in many food-borne disease outbreaks. The lack of regulation of the activities of street food vendors by government authorities is a major challenge to food hygiene and safety. A previous study in Benin City, Nigeria, showed that the inspection of registered fast-food restaurants is either rudimentary or nonexistent.^[17] It is therefore not surprising that mobile food vendors are not regulated by local authorities.

Many studies on food safety practices of food handlers in Benin City, Nigeria, focused on food handlers stationed in food restaurants, eateries or fast-food outfits, and institutions such as hospitals and schools. However, there is an apparent lack of studies evaluating the activities of mobile food vendors who hawk their foods along the

streets and major markets. There is currently scarcity of data on knowledge level and food safety practices on mobile food vendors in Nigeria, especially in Benin City. It is therefore with this view that we conducted this study to assess the food hygiene and safety practices of mobile food vendors in Benin City, Nigeria.

MATERIALS AND METHODS

This descriptive cross-sectional study was carried out in Benin City, the metropolitan capital of Edo state in South Nigeria. Benin City has a projected population of 1,147,188 from the 2006 population and housing census.^[18] The city has many major and minor markets spread across the three metropolitan local government areas (LGAs) that make up the city. In majority of the markets, a variety of goods are sold but a few are specialized in the sale of only a category of items.

The study population comprised of mobile food vendors hawking their food around selected markets in Benin City. Ready-to-eat foods commonly sold by the mobile food vendors around the markets include jollof rice, fried rice, plantain (roasted, boiled, and fried), beans, bean cake (moi moi), and fried meat. A minimum sample size of 240 was calculated using the Cochran formula used for descriptive studies.^[19]

A simple random sampling technique using the table of random numbers was the method used in selecting six markets (two markets were selected from each of the three LGAs) from the total of 23 major markets in Benin City as at the time of the study. The selected markets were Edaiken and Ogida markets in Egor LGA, Oba and New Benin markets in Oredo LGA, and Eki-Osa and Santana markets in Ikpoba-Okha LGA. In each of the selected markets, mobile food vendors who gave consent were recruited consecutively to participate in the study.

A structured, pretested, interviewer-administered questionnaire and an observational checklist were the data collection tools used for this study. The questionnaire was used to collect qualitative information such as the sociodemographic characteristics of the food vendors and their knowledge and practices concerning food hygiene and safety. The observational checklist was used to assess the general conditions and environments in which the mobile food vendors ply their trade and to corroborate the information given by them on food safety practices. Trained research assistants who were final year medical students of the University of Benin assisted with data collection in this study. Data analysis was carried out using SPSS version 20.0 software (IBM Corp, Armonk, NY, USA).

RESULTS

Two hundred and fifty mobile food vendors with a mean age of 31.7 ± 8.7 years were involved in this study. Table 1 shows the sociodemographic characteristics of the respondents. Majority (72.4%) of the participants were aged between 21 and 40 years, while 32 (12.8%) were ≤ 20 years of age. There were 24 (9.6%) males and 226 (90.4%) females in this study. This gives a male-to-female ratio of 1:9.4. The respondents were predominantly Christians (98.0%) and a higher proportion (155 [62.0%]) were married. More than half (55.6%) had secondary level of education, while 11 (4.4%) had no formal education. Almost half (48.8%) of them have been in the food-vending business between 1 and 5 years compared to a quarter (25.6%) who have plied the trade for <1 year. Only 20 (8.0%) have >10 years' experience in food vending.

The knowledge of food hygiene and safety among the food vendors is shown in Table 2. All the respondents knew that food should be thoroughly washed before preparation. Most of the respondents knew that food handlers should regularly wash their hands with soap and water (95.5%), stored food should be properly covered (92.8%), cutting/sale surfaces should be properly cleaned (89.6%), should wear apron and hair restrain while serving food (91.6%), and food should be stored at appropriate

temperature (79.6%). Higher proportion (216 [86.4%]) of the respondents knew that human feces can contaminate food, but only 134 (53.6%) knew that microorganisms can contaminate food. On symptoms of food-borne illnesses, vomiting (83.2%), abdominal pain (73.6%), passage of watery stool (75.2%), and fever (72.8%) were mentioned by the food vendors. Similarly, gastroenteritis (89.6%) and cholera (66.4%) were mentioned as types of food-borne illnesses.

Personal hygiene, food handling, and sanitary practices of the food vendors showed that 47 (18.8%) kept long finger nails, 143 (57.3%) properly covered their hair, 58 (23.2%) blew air into the cellophane, and 7 (2.8%) picked their nose while serving food [Table 3]. Handwashing before and after serving food was practiced by 115 (46.0%) respondents while only 14 (5.6%) used hand gloves while serving food. The utensils used in serving food were considered clean in majority (217 [86.8%]) of the food vendors. It was observed that 205 (82.0%) respondents concurrently served food and collected money from consumers. The environment in which food was sold was considered satisfactory in 136 (54.4%) food vendors.

DISCUSSION

This study showed a considerable high level of knowledge of food hygiene and safety among the mobile food vendors studied, but safety practices were poor. This worrisome finding is comparable to many other studies in Nigeria and other parts of the world, especially sub-Saharan Africa where knowledge of food hygiene did not translate to better food safety practices. Safe handling and preparation of food and good hygienic practices are an essential part of any strategy to improve the safety and quality of street-vended food.^[1]

The food safety practices and personal hygiene status of the mobile food vendors in this study revealed that the food sold may be prone to contamination. Almost all the food vendors served food with bare hands. This was far higher than the 73.6%, 62.8%, and 60.0% reported by Canini *et al.* in the Philippines,^[16] Nurudeen *et al.*^[6] in Kaduna, Northern Nigeria, and Abdalla *et al.*^[20] in Sudan, respectively. Chukuezi also reported that 47.62% of the food vendors handled food with bare hands in Owerri, Nigeria.^[21] Serving food with bare hands in combination with poor handwashing practices by food vendors and keeping of long finger nails are conditions identified in this study that could adversely affect the suitability of the food. This study also revealed that some food vendors blew air into cellophane bags and picked their nose while serving food. This is an indication that microorganisms which can

Table 1: Sociodemographic characteristics of respondents (n=250)

Variables	Frequency (%)
Age group (years)	
≤ 20	32 (12.8)
21-40	181 (72.4)
41-60	37 (14.8)
Sex	
Male	24 (9.6)
Female	226 (90.4)
Religion	
Christianity	245 (98.0)
Islam	5 (2.0)
Level of education	
No formal education	11 (4.4)
Primary	74 (29.6)
Secondary	139 (55.6)
Tertiary	26 (10.4)
Marital status	
Single	78 (31.2)
Married	155 (62.0)
Widowed	17 (6.8)
Years of food vending	
<1	64 (25.6)
1-5	122 (48.8)
6-10	44 (17.6)
>10	20 (8.0)

Table 2: Knowledge of food hygiene and safety by the respondents (n=250)

Correct knowledge	Frequency (%)
Thorough washing before preparation of food	250 (100)
Regular handwashing with soap and water	238 (95.2)
Proper cleaning of cutting/sale surfaces	224 (89.6)
Proper covering of stored food	232 (92.8)
Wearing apron and hair restrain while serving food	229 (91.6)
Storage of food at appropriate temperature	199 (79.6)
Common food contaminants	
Human feces	216 (86.4)
Animals	196 (78.4)
Chemicals	177 (70.8)
Microorganisms	134 (53.6)
Symptoms of food-borne illnesses	
Vomiting	208 (83.2)
Abdominal pain	191 (76.4)
Passage of watery stool	188 (75.2)
Fever	182 (72.8)
Types of food-borne illnesses	
Gastroenteritis	224 (89.6)
Typhoid	184 (73.6)
Cholera	166 (66.4)
Hepatitis	131 (52.4)

Table 3: Personal hygiene, food handling, and sanitary practices of the respondents (n=250)

Variables	Frequency (%)
Long finger nails	47 (18.8)
Proper hair covering	143 (57.2)
Use of apron	162 (64.8)
Handwashing before and after serving food	115 (46.0)
Picking nose while serving food	7 (2.8)
Blowing air into the cellophane	58 (23.2)
Use of clean utensils	217 (86.8)
Use of water to rinse utensils	176 (70.4)
Concurrent serving of food and collection of money	205 (82.0)
Proper coverage of food	207 (82.8)
Use of hand gloves while serving food	14 (5.6)
Satisfactory environmental hygiene	136 (54.4)

contaminate food can be directly transferred into the food by the vendors, considering the fact that many individuals are carriers of microorganisms in their nose.

The environment in which food is prepared and sold is very crucial to the safety of the food. In this study, the environment was satisfactory in only 54.4% of the food vendors. This finding was better than what was reported by Muinde and Kuria in Kenya in which 85.0% of the food vendors prepare food in unhygienic conditions (garbage and dirty waste).^[22] The preparation surfaces were

dirty in 83.3% of the food vendors surveyed by Bereda *et al.* in Jigjiga City, Eastern Ethiopia.^[7] In this environment, the beehive of activities in the market areas which can also be dusty sometimes and the hot climatic conditions which favor bacterial growth could aid the contamination of food. Mustafa and Abdalla opined that intense traffic in the sale environment increased dust formation which constitutes a major source of enterotoxigenic *Bacillus cereus*.^[14] This organism was one of the most commonly isolated microorganisms from fast foods in a previous study in this study locale.^[23]

We also observed in this study that 82.0% of the food vendors received and handled money from consumers. Most often, the apron worn by the food vendors contains the purse used in storing the money. Thus, there is regular movement of the food vendors' hands between the food sold, money from consumers, and the dresses/apron of the vendors. This is a critical hazard point of food contamination of the street-vended foods. Girma *et al.* in Southwest Ethiopia reported that all paper currencies of food vendors evaluated were contaminated with different microbes including pathogenic *Salmonella* spp., and *S. aureus*.^[24] This report underscores the need for food vendors to be educated not to handle money while serving food to consumers.

Training of food handlers and regulation of their activities are essential to the safety of street foods and ultimately reduction of food-borne illnesses. Unfortunately, mobile food vendors are not regulated by local authorities in Nigeria. The unsuspecting consumer is therefore at risk of eating contaminated foods, thus increasing the burden of food-borne illnesses in this environment. In Malaysia, apart from regulations for protecting street vendors, it is the only country where licensed street vendors are provided facilities for conducting their trade.^[25] The local authorities in Nigeria, particularly in Benin City, are encouraged to emulate the Malaysian model in order to improve the safety and suitability of the street foods sold in Nigeria.

CONCLUSION

There was a high level of knowledge of food hygiene among the mobile food vendors in Benin City, Nigeria. However, their food safety practices were abysmally poor. The critical hazard points identified were handling of food with bare hands, inadequate handwashing, poor personal hygiene, and handling of money while serving food. This finding suggests that the street foods sold in Benin City may be heavily contaminated with pathogenic microorganisms. We advocate the need for further study to evaluate the microbiological quality and safety of street foods sold in Benin City, Nigeria.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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