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Original Research Article

An Assessment of Food Safety Practices among Street Vendors in Mombasa, Kenya

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ABSTRACT

Street vended foods have gained popularity due to economic benefits. However, they have been recognized as a potential hazard to public health. Minimal information exists on the safety and hygiene of street foods. This study aimed to assess the hygienic practices of the street food vendors in respect to their training in basic food hygiene. The study adopted a descriptive survey in Mombasa Island on a sample of 100 randomly selected vendors. The focus was on vendors selling *mahamri, mbaazi and samosa.* Chi-square (χ^2) was used to test the relationship between training and various aspects of hygiene. T- Test and analysis of variance was used to assess for any significant differences between study variables. Results notes poor hygiene practices like wearing of jewellery (37%), having long and unclean nails (43%) and lack of protective clothing (36%). Men had better hygienic practices than women ($P<0.05$). Hygiene practices significantly ($P<0.05$) related to the training where those trained were found to observe hygiene. The study concluded that the street-vended foods are not safe as they are exposed to food safety risks. It is recommended that street food vendors be trained, recognized and licensed to enable them produce safe food.

Key Words: Street food vendors, Food safety, Hygiene practices, Training

INTRODUCTION

Street foods are ready to eat foods and beverages prepared or sold by vendors or hawkers especially in streets and other public places (WHO, 1996). The characteristic of street foods is their retail location, from pushcarts, baskets, trays or basins with few having permanent structures.

According to Garin et al. (2002) street vended foods are an ancient, almost universal phenomenon in both developing and industrialised countries. Their popularity has also grown significantly world over and Kenya's coastal region is no exception. With its large variety of authentic street vended foods that reflect the traditional culture, most of the local and international tourists find pleasure in eating these foods. Street food vendors in Mombasa Island prepare and serve a large variety of these authentic foods with *mahamri, mbaazi* and *samosas* being among the most common. Street foods also significantly contribute to the diets of many people in the developing world (FAO, 2007).

With the growth of urbanization, there has been a corresponding development of the informal sectors of the economy and more specifically, of street vended foods (Garin et al., 2002) These foods contribute significantly to the economy of many countries and, an estimated two and half billion people worldwide consume them (FAO, 2001). It also provides a competitive

source of employment and income to millions of people. For instance, FAO estimated that approximately 100,000 vendors in Malaysia had a collective total annual sales amounting to $2 billion.

A study by Mwangi (2002) revealed that most of vendors in Nairobi, Kenya earned an income above or twice the official minimum wage. The majority of vendors were women who balanced the income generating opportunities of street vending, with traditional household and child-care duties. Another important aspect of street vended foods is the crucial role it plays in the preservation of traditional and local culture (Escalante, 2001). Some traditional snacks or foods only appeal to consumers by the way the vendors prepare them on the streets. Consumers find them to be easily accessible, relatively safe, affordable, nutritious and delicious (FAO, 2001). Preparation of some traditional foods like *mbaazi*, *mahamri* and *githeri* are usually time and fuel consuming for the urbanite. Hence, people tend to buy traditional ready to eat foods from sources such as street food vendors. Street foods are sometimes considered "fast foods" with a traditional twist, given the great variety that could be procured easily and cheaply.

Despite the popularity and economic benefits of street vended foods, it has been recognized as a potential hazard to public health when not prepared and handled hygienically. The hygienic aspect of vending operations is a major concern. Stands are often located in areas where running potable water is not readily available and sanitation is poor. A study by Muinde and Kuria (2005) in Nairobi Kenya revealed that street food vendors practiced minimal hygiene and sanitary practices due to lack of proper knowledge and guidance on street food vending

Street vended foods have in many studies been associated with microbiological contamination and low hygienic standards (WHO, 2006). Food-borne illnesses are a major international health problem and an important cause of reduced economic growth (Mensah et al., 2002). Outbreaks of food- borne illness can damage trade and tourism (FAO/WHO, 2001). The exact number of food poisoning and food borne diseases is not known since most incidences are not reported. It has been estimated that food and waterborne diarrhoeal diseases are leading causes of illness and death in less developed countries killing 1.8 million people annually (WHO, 2002) most of whom are children.

WHO (2002), states that, food safety is a basic human right and safe food contributes to economic growth and poverty alleviation. Losses in public confidence in the street foods do not only jeopardize incomes of vendors, but also their employees, customers, producers and traders. Kenya recorded one of the highest ever numbers of food poisoning cases in 1990 (Kimani, 2001). A total number of more than 200,000 outpatients were treated at government hospitals although official data is lacking as to the cause.

The street food trade has therefore been seen as a problem, a challenge, and an opportunity for development. The problem is control of quality and safety of foods offered for sale while the opportunity is the strengthening of traditional and local food culture, and development of small industries and cooperative marketing structure. The challenge is to provide government and counties with the means to ensure the safety and quality of street food, while at the same time encouraging the formal development of the sector.

Against the above background, if street vended foods are going to play an increasingly important role in national economy, current information on such aspects as food-borne health risks and constraints to compliance with the Codex Alimentarius standards is required. There exists minimal information on food practises among street food vendors especially in the coastal region of Mombasa that hosts many tourists

METHODS

The study was carried out in three locations namely Old town, Majengo and Mwembe Tayari in Mombasa Island. Mombasa is the second largest city in Kenya, and a major tourist centre with a population of approximately 939,000(Kenya Census, 2009). These three locations have characteristics such as major bus stops, markets, shopping areas, construction sites and commercial areas, which favour street food vending. The study adopted a descriptive survey design. The focus was on vendors who were selling the most popular street vended foods, namely, *mahamri, mbaazi and samosa* in Mombasa Island, Kenya

One hundred vendors were selected using simple random sampling method. From the census in the area, there were 130 vendors selling these three food items. Sample size calculation using Fisher et al. (1983) formula, gave a sample of 97 vendors. To cater for non-responses, 10% was added to get a number of 107 (Table 1). Finally the sample size of 100 was adopted as the seven were considered inconsistent.

Sampling from the three study areas was as follows:

Table 1: Sampling of study respondents

	Total sample (census)	Distribution of sample	Actual response	No response
Area A	39	32	29	3
Area B	43	35	34	1
Area C	48	40	37	3
Total	130	107	100	7

Questionnaires were administered to vendors with the help of two assistants. They were filled together openly as most of the vendors did not have permanent structures and locating them would have been difficult. Focus group discussions were held with a group of four vendors at any given time. Observation checklist was used to gather information on the current situation of the vendors and the vending sites. Observation was carried out at the same time as the questionnaire was being administered.

Data analysis was done using Statistical Package for Social Sciences (SPSS) computer software version 22.0. Chi-square (χ^2) was used to test the relationship between training and various aspects of hygiene. T- Test and Analysis of Variance was used to assess any significant differences between the three areas and between male and female, respectively. Consent to carry out the research was obtained from the office of the Governor, Mombasa. The vendors were briefed on the purpose and importance of the study and a verbal consent was obtained from each of them before data collection.

RESULTS AND DISCUSSION

Demographic Characteristics

According to this study, female vendors were the majority in this study (Table 2), as they comprised of 60% of the total population of 100 vendors. This could have been due to the responsibility charged on them for the preparation of food for their households. Some married women said that they engaged in the business in order to assist in the maintenance of the families, as most of their husbands did not have well-paying jobs (FGD. Majengo). Single and some married women were the sole breadwinners of their households. This was consistent with other findings of Mensah et al. and Donkor et al. (2002), in Ghana. According to Mensah et al. (2002) the street food traders in Accra were mainly women as they played major roles in food control programmes and were involved in a wide variety of food processing activities. This trend was similar to that reported by Chukezi (2010) where the majority of street food vendors in Owerri, Nigeria were women. However, this was in contrast with a study by Muinde and Kuria, (2005), in Nairobi where the majority of vendors were males.

Vendors varied in ages with the predominant age group being 19 to 28 years. Similar findings were reported by Odonkor et al. (2011) and Muinde and Kuria (2005). This was a clear indication that street food trade provided employment for the young who have no formal employment. Similar findings were reported by Mensah et al. (2002) that found street food vending common due to high rate of unemployment. During the FGD, some vendors in Old Town expressed that street food vending was a relatively easy sector to venture into, given the low capital and skills needed for its establishment (FGD. Old Town).

In this study only 16% of the vendors did not have formal education. Thirty nine percent of the vendors had either primary or secondary school education. Those who had attended a tertiary college were 16%. This was consistent with findings by Nurudeen et al. (2014) and Thanh (2014) whereby a minority did not have any formal education. Chi-square test was carried out to establish any statistical association between certain characteristics such as food preparation training, level of education and age as regards to gender (Table 2). In this study, the majority (81%) of the vendors had no formal training in food preparation. They either learnt it through observation or from their parents. This was consistent with findings of Nurudeen et al. (2014) and Buted et al. (2014) where only 2.7% and 12% had formal training on food preparation.

From the results above, there was no statistical significant association between food preparation training, level of education and age as regards to gender (P>0.05). The population studied was uniform with regard to the baseline variable even though the females were the majority.

Table 2: The characteristics of the street food vendors

Characteristic	Gender		Total	χ^2	P-value
Trained in Food Preparation	**Male**	**Female**			
Yes	6(6%)	13(13%)	19(19%)	0.69	0.405
No	34(34%)	47(47%)	81(81%)		
Level of Education					
No formal education	7(7%)	9(9%)	16(16%)	0.816	0.94
Primary education	15(15%)	24(24%)	39(39%)		
Secondary education	16(16%)	23(23%)	39(39%)		
Certificate & above	2(2%)	4(4%)	6(6%)		
Age Distribution					
≤ 18	3(3%)	3(3%)	6(6%)		
19 – 28	21(21%)	28(28%)	49(49%)	0.79	0.68
29 and above	16(16%)	29(29%)	45(45%)		

Hygienic Practices of the Street Food Vendors

Food hygiene is all conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain (FAO, 2003). Poor hygienic practices were observed among the vendors examined (Figure 1). Vendors who were smoking when selling food were 11%. This practice was observed among the male vendors in all the three study sites. Those coughing over food were 25% and 26 % had a skin rash. According to WHO (2002) food handlers with a skin rash should not be allowed to handle food. The presence of a skin rash is therefore an important risk factor in food contamination.

Handling of food and money without washing hands in between and not having short and clean fingernails, were both relatively commonly seen in 91% and 54% of the vendors respectively. Hands can be an avenue of promoting contamination and introducing pathogens to the foods (Ferron et al., 2000). This can be more critical especially when the same hands are used to handle money. Similar findings were observed by Muinde and Kuria (2005), where all vendors handled money while serving food. This could have been due to lack of hand washing facilities

A study by Nurudeen et al. (2014), observed that half of the vendors kept their finger nails clean although the majority

handled money while serving food. In addition to these findings, 68.2% served their foods with bare hands. This was in contrast with findings of Monney et al. (2013), where none of the vendors involved in the study were seen to dish out food with bare hands but rather used either a spoon or ladle. Vendors who had no protective clothing and those wearing jewellery (finger rings, bangles and bracelets) accounted for 48% and 51% respectively. This was inconsistent with findings of Muinde and Kuria (2005), where only 10% of the vendors were observed as having jewelry

In addition to the hygienic practices, 70% had not gone for routine medical examination during the study period. Some were not aware of the requirement while some did not have the funds to acquire the certificate. This trend was similar to that reported by Buted and Ylagan (2014) where only 31% of the respondents had the annual medical health certificate to indicate that they had carried out the recommended physical and medical examination. However this differed with the findings of Apanga et al. (2014) whereby the majority, 71% of vendors had gone for medical screening.

Afolaranmi et al., (2015), in their study in Nigeria, argued that medical examination of food vendors prior to licensing, or at intervals afterwards, did little towards ensuring food safety and should not be mandatory. Medical examination is a requirement, as it enables early detection and treatment of diseases that can be spread to others through food, especially by food handlers (FAO/WHO, 2001). Food handlers are likely to introduce biological hazards especially when suffering from, or are carriers of, a disease or illness likely to be transmitted through food.

All the hygienic practices seen in this study, were in contrast to the standard by WHO (1996), Codex Alimentarius General Requirements for Food Hygiene (FAO/WHO, 2001) and the guidelines in The Foods, Drugs and Chemical Substance Act, Kenya (Revised 2012).

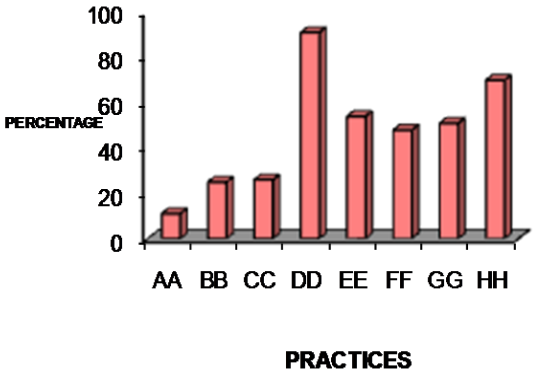

Figure 1: Hygienic Practices of the Street Food Vendors
Key: Practices

AA	-Smoking
BB	-Coughing over food
CC	-Having skin rash
DD	-Handling food and money without washing hands
EE	-Not having short and clean finger nails
FF	-No protective clothing
GG	-Wearing jewellery
	-Not gone for medical examination (No certificates)

Relationship between training and food hygiene practises

Training of the vendors in food safety issues was linked together with the hygienic practices, as these practises may have been acquired through factors related to training. Chi square (χ^2) tests were carried out to establish the association between the trained and untrained groups in relation to protective clothing. The results revealed that 36% of vendors, who did not have any protective clothing were untrained (Table 3) The probability of using protective clothing, if not trained was very minimal. Untrained vendors who had no medical certificates were 53% There was a highly statistical significant association between these variables and basic food hygiene training ($P<0.05$).

Similar findings were observed in a study by Monney et al. (2013) where a good proportion (97.4%) of food vendors who had been trained on food hygiene, had been medically screened, whereas only 2.6% of untrained vendors had been medically examined. The study found that previous training on food hygiene influenced the likelihood of medical examination among food vendors.

Table 3: Relationship between training and food hygiene practises

	Basic food hygiene training		Total	χ^2	P- Value
	Trained	Untrained			
Protective Clothing					
Aprons	15(15%)	5(5%)	20(20%)		
Dustcoats	4(4%)	1(1%)	5(5%)	20.48	<0.001
Lessos	7(7%)	20(20%)	27(27%)		
None	12(12%)	36(36%)	48(48%)		
Medical Examination					
Yes	20(20%)	10(10%)	30(30%)	15.78	<0.001
No	17(17%)	53(53%)	70(70%)		

Statistical significant association was found between the trained and untrained vendors in relation to personal hygiene (P<0.05) Untrained vendors wearing jewellery were 37%. Vendors who did not have short clean finger nails and handled food and money without washing hands were 43% and 61% respectively (Table 4).

Table 4: Relationship between training and food hygiene practises

	Basic food hygiene training		Total	χ^2	P-value
	Trained	Untrained			
Jewellery on					
Yes	14(14%)	37(37%)	51(51%)	4.9	0.03
No	24(24%)	25(25%)	49(49%)		
Short clean nails					
Yes	25(25%)	19(19%)	44(44%)	11.8	0.001
No	13(13%)	43(43%)	56(56%)		
Handling Food and Money					
Yes	30(30%)	61(61%)	91(91%)		
No	8(8%)	1(1%)	9(9%)	10.87	0.001

These results indicated that vendors who were trained adhered to good hygiene practices such as having short and clean nails, not wearing jewellery and not handling food and money. There was a significant association between training and these variables. This was in collaboration with findings of Monney et al. (2013) that reported the same.

A study by Rane (2011) reported that *Salmonella*, non-typhi salmonellae, *Campylobacter* and *E. coli* can survive on finger tips and other surfaces for different periods of time and in some instances even after hand washing. Food vendors should always to keep their finger nails short and clean to prevent them from serving as a vehicle for transmission of pathogens (Lues et al., 2006)

There was no statistically significant relationship between smoking and covering of food in relation to training (P>0.05). Food vendors who had not covered their foodstuffs but were trained in basic hygiene were 17% out of 51% (Table 5). The ratio was 1:2. In a study by Monney et al. (2013), the majority of vendors had adequately protected their food from flies. However this was in contrast to recommendations of FAO and WHO that all foods must be protected to avoid contamination.

Out of the 11% of vendors who were smoking, 2% had received basic training in hygiene as opposed to 9% who had not trained (Table 5). This indicated that training of food vendors and these two variables were not necessarily correlated although there was a relatively higher tendency for trained vendors to avoid smoking when handling food

Table 5: Relationship between training and food hygiene practises

	Basic food Hygiene Training		Total	χ^2	P – value
	Trained	Untrained			
Smoking					
Yes	2 (2%)	9(9%)	11(11%)	2.1	0.51
No	36(36%)	53(53%)	89(89%)		
Covering of Food Items					
Yes	13(13%)	14(14%)	27(27%)		
No	17(17%)	34(34%)	51(51%)	1.64	0.44
Partly Covered	8(8%)	13(13%)	21(21%)		

Table 6: Proportion of vendors adopting the various food hygiene and safety practices by gender

	Male	Female	χ^2	P value
Washing hands in between when handling of food and money	7	3	4.167	0.046
Having short and clean fingernails	33	26	15.22	0.000
Had medical examination	19	11	4.96	0.023
Wearing jewellery	5	50	18.6	0.000
Having protective clothing	31	19	20.1	0.000
Having skin rash	22	8	19.8	0.02
Smoking	8	2	7.41	0.09

There was significant differences ($P<0.05$) in these practices by gender where more men were found to have better hygienic practices than women (Table 6). From the results the vendors who were trained were aware of the hygienic practices compared to the untrained. This trend was observed in all the three locations studied. Training here was seen as an important factor as it made the vendors aware of their responsibility in protecting food from contamination. According to FAO and WHO (2002), food vendors are required to undergo basic training in food hygiene before licensing. This is because inadequate hygiene could pose a potential threat to the safety of food and its suitability for consumption

Mahamri (Swahili coconut doughnut)
Mbaazi (Pigeon Peas cooked in coconut milk)

Samosas a triangular savory pastry fried in oil, containing spiced meat

CONCLUSION AND RECOMMENDATION

In this study, poor hygiene practices of the food vendors among them smoking, wearing of jewelry, handling of food together with money and lack of protective clothing were observed. These were in contrast to the standard by WHO (1996), Codex Alimentarius General Requirements for Food Hygiene (FAO/WHO, 2001) and the guidelines in The Foods, Drugs and Chemical Substance Act, Kenya (1992). Training was therefore seen as an important factor as it made vendors aware of their responsibility in protecting food from contamination.

Vigilant monitoring of the street food vendors by public health officers is recommended. However this can only be achieved if the street food vendors are licensed, as it would be easy to train, monitor and control them. In this study none of the vendors were licensed. Specific locations or sites with sanitary facilities such as running water, toilets, garbage disposal services and electricity at a set amount of fees can be identified and allocated to the vendors. Any vendor you contravenes the regulations can then be prosecuted. Training programmes can be facilitated based on basic food and personal

hygiene, proper food preparation and handling practices and small business management. Vendors, who will have gone through this training, can be given certificates or badges to display, as this would give them recognition and enhance a sense of pride in their work.

Data Availability

The readers may access the data underlying the findings of the study by contacting the corresponding author

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article

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