

**LEVEL OF KNOWLEDGE OF STREET AND HIGHWAY FOOD VENDORS
AND CONSUMERS ON BASIC FOOD HANDLING PRINCIPLES IN
KAMPALA AND KISUMU CITIES, EAST AFRICA**

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ABSTRACT

Although street food vending provides a source of nutrition, satisfaction, and economic livelihood, the unconsciousness of the community to the hidden dangers are high. Street food vendors are often poor, uneducated, and lack knowledge in safe food handling, environmental safety, sanitation, and personal hygiene, mode of food display and hand washing, sources of raw materials, and use of potable water. The study, therefore, sought to determine the level of knowledge of vendors and consumers on basic food handling principles in Kampala and Kisumu cities, East Africa. The study adopted cross-sectional and evaluation research designs. The sample size comprised four hundred and twenty-two (422) respondents sampled using stratified random, quota, and purposive sampling to ensure proportional representation. The survey was self-administered through questionnaires, focus group discussions, interviews, and observation. Descriptive and inferential statistics through the Statistical Package for Social sciences (SPSS) were used to analyze the collected data. Study findings revealed that the key variables were significantly ($p < 0.05$) influenced by gender, marital status, age, level of education, and work experience. The results show a highly significant level of knowledge of consumers on basic food handling principles in Kampala at a mean of 2.17 and ($\chi^2 = 312.494$, $p < 0.01$), and in Kisumu 1.91 and ($\chi^2 = 144.950$, $p < 0.01$). On vendors in Kampala city, there was an adequate level of knowledge of consumers on basic food handling principles at a mean of 2.57 and ($\chi^2 = 34.529$, $p < 0.01$) and in Kisumu city a mean of 1.79 and ($\chi^2 = 16.667$, $p < 0.01$). Most of the respondents sampled showed that food handling, personal hygiene, sanitation, environmental safety significantly related to the livelihood of consumers and vendors in Kampala and Kisumu cities, East Africa. The study recommends more attention to be devoted to consumers and their eating habits, behaviours and awareness.

Keywords: Vendors, Consumers, Food Handling, Personal Hygiene, Sanitation, Environmental Safety, Street, and Highway Foods.

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INTRODUCTION

Street foods guarantee food security for low-income urban population and livelihood for a significant proportion of the people in many developing countries (Ackah *et al.*, 2011). Vendors and hawkers usually sell these food items in the streets or other similar public places. While street foods are appreciated for their unique flavours as well as their convenience, they are also important in contributing to the nutritional status of the population. In contrast to these possible benefits, it is also known that street food vendors are often poor, uneducated, and lack knowledge in safe food handling. Consequently, street foods are perceived to be a significant public health risk (Muzaffar *et al.*, 2009).

According to WHO (2015), food safety has been identified at national, regional, and international levels as a public health priority, since unsafe food cause illness and deaths in millions of people every year. Since street food enterprises are generally small in size and require only basic facilities and skills for the preparation of food, anybody with a small amount of capital can set up a food-stall (Winarno, 2017). Street and Highway food vendors operate from places such as bus terminals, industrial sites, market places, school compounds or gates, roadsides, highways and other street corners where there are ready and numerous customers (Muinde and Kuria, 2005). Food sold at these sites can be hazardous to the health of consumers as they are especially exposed to environmental conditions and may be stored improperly. Other risk factors are poor knowledge of adequate hygiene and sanitary conditions and practices by food handlers (Samapundo *et al.*, 2016). Unfortunately, these locations usually do not meet all food safety requirements. Therefore, the study sought to determine the level of knowledge of vendors and consumers on basic food handling principles in Kampala and Kisumu cities, East Africa.

REVIEW OF LITERATURE

Food safety

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent foodborne illness. In developed countries, there are complex standards for food preparation, whereas, in less developed countries, the main concern is simply the availability of sufficient, safe water, which is usually a critical item. In theory, food poisoning is 100 percent avoidable (FSN, 2012). The street food industry offers a significant amount of employment, often to persons with little education and training (Taylor *et al.*, 2000). Due to difficulties in tracking cases and the lack of disease-reporting systems, follow-up studies proving actual connections between street food consumption and foodborne diseases are still very few. Little attention has been devoted to consumers and their eating habits, behaviours, and awareness (Marras, 2014). With the increasing pace of globalization and tourism, the safety of street and highway food has become one of the major concerns of public health, and a focus for governments and scientists to raise public awareness. However, despite fears of contamination at street food vendors, the

incidence of such is low, with studies showing rates comparable to restaurants only (Nina, 2009). Many African cities experience a deficit of 'policy best practices' about street vending (Skinner, 2010). Most of the street seller foods are usually prepared in bulk at different times before selling. The problems of food safety in developed countries differ considerably from those of developing countries. Whereas, in developing countries, traditional methods of processing and packaging, improper holding temperature, poor personal hygiene of food handlers is still observed during food marketing and technology (Mensah *et al.*, 2002).

Food handling

Food safety experts identified the most common food handling problems by consumers: obtaining food from unsafe sources, inadequate cooking or heat processing, improper cooling. Intervals of twelve (12) hours or more between preparation and eating, poor hygiene, or colonized person handling implicated food (Bryan, 1988). Thanh *et al.*, (2016) found out that food handlers should practice good personal hygiene which contradicts their expectation of poor personal hygiene practice among the food handlers. Not all food handlers and consumers understand the role they must play, such as adopting basic hygienic practices when buying, selling and preparing food to protect their health and that of the wider community, (FAO, 2011). Redmond and Griffith, (2003), emphasized that unsafe food-handling practices are still commonly found during the preparation of food in homes, thus increasing the potential risk of illness from food poisoning. Street food vendors selling main meals and snacks at night constituted the more significant part of those using polythene bags to serve the consumers (Mensah *et al.*, 1999).

The food handlers usually contaminate the polythene bags. Pathogens may enter the interior surfaces of the polyethylene bags during packaging due to poor handling practices of the vendors (Barro *et al.*, 2007). The reduced storage of the polythene bags contributes to their contamination with pathogens from the environment. Street vendors use inadequate simple vending facilities which encourage the invasion of cockroaches, rodents, and dust, thus increasing the risk of contamination (Nwachukwu *et al.*, 2008). Other risk factors identified in the preparation and handling of street foods include the common use of charcoal stoves for keeping and warming of food over a long period of time which may not provide sufficient temperature to prevent the spread of pathogenic microorganisms (Lues *et al.*, 2006). Mosupye and von Holy (2000) observed that ready to eat foods could be left uncovered for up to 10 minutes at times when vendors were serving customers. Raw vegetable salads (*kachumbari*) include tomatoes, coriander, and red bulb onions, which are microbiologically risky foods since they are eaten uncooked (Beuchat *et al.*, 2003). The majority of street vendors used non-disposable plates, cups, and cutleries for serving foods (Muyanja *et al.*, 2011). These utensils were usually washed with the soap solution and rinsed in cold water. While some vendors changed the washing and rinsing liquids twice in a day, others used the same juices unchanged for the whole day due to lack of adequate water along the streets (Canini *et al.*, 2013).

Personal hygiene

Food can become contaminated at any point during harvesting, processing, storage, distribution, transportation, and preparation. Lack of adequate food hygiene practice can lead to foodborne diseases and the death of the consumer (Byrd-Brendbenner *et al.*, 2010). Food handlers should maintain a high degree of personal cleanliness and, where appropriate, wear suitable protective clothing, head covering, and footwear. Consumers pay attention to convenience and low prices, and usually neglect aspects of hygiene or sanitation; most of the consumers lack an understanding of proper food-handling practices and the potential for foodborne diseases (Winarno and Allain, 1991). Foods and ingredients are also subjected to repeated contamination from unwashed hands and the materials used for wrappings, such as leaves, old newspapers, and reusable polyethylene bags (Roberts *et al.*, 2008). Lack of toilet and lavatory facilities at the vending sites especially along the highways force most street food vendors to seek isolated areas within the vicinity like bushes and incomplete buildings for excretion (Idowu, and Rowland, 2006).

Sanitation

Sanitation has a positive impact on the livelihoods of the poor. Safe sanitation makes it more possible for poor women and men to undertake initiatives and mobilize their assets. It is the hygienic disposal or recycling of black water (human excreta) and greywater (wastewater from washing, laundry, and kitchens) produced by households (IRC, 2007). The collective aim for improved sanitation is either low or non-existent in many low-income rural communities and low-income high-density peri-urban areas. This shows the discrepancy between the real need for hygiene to enhance the quality of life and the actual demand for it along the highways and streets (Scott and Govindan, 2003). Street food vendors ferried water from their homes to their business premises in containers of 5 to 20-liter capacities since no potable water was available in their areas of operation. However, this water may not be enough for dishwashing and food preparation (Muinde, 2005). The sanitary and environmental conditions in some urban and peripheral urban areas in developing countries have become a severe threat to public health and the preservation of natural assets” (Crenan and Berry, 2003). The most important problem that comes along with a lack of access to sanitation facilities is the bigger chance of illness. At all times, more than half of the poor people in the developing world are ill from causes that are related to the lack of hygiene, sanitation, and water supply (WSSCC, 2003).

Environmental Safety

The food environment includes physical, socio-cultural, economic, and policy factors at both micro- and macro-levels (Glanz *et al.*, 2005). Many food vendors work near roads or paths in informal settlements to cater to passers-by. However, these locations may expose foods to dust, mud, or solid waste due to the poor roads and insufficient solid waste management (Ahmed *et al.*, 2015). According to Mensah, *et al.*, (2002), the hygienic characteristics of vending operations,

are a major source of concern for food control officers, stalls are often unfinished structures, and running water are not readily available. Also, toilets and adequate washing facilities are rarely accessible. Finally, food is not adequately protected from flies and refrigeration. Environmental factors, such as risks of contamination from pollen, dust, and insects, are ever-present in the street. Moreover, when vendors prepare food in their houses, often located in undeveloped settlements, slums, or corridors, risks may arise from unsanitary housing and environmental conditions, and lack of drinking water (Cardoso *et al.*, 2014). Poor sanitary conditions in the area where foods are vended also contribute to poor food storage and transport conditions. However, most vendors have no fixed stalls where they can store their raw materials on-site (Mehta, 2005). They usually store their goods at home overnight and transport them the following day, often improperly covered, to their operating sites. Thus, food becomes prone to contamination during transportation (Benjamin, 2011). Vendors worked in a variety of vending structures and hygiene of premises was poor (Muinde and Kuria, 2005).

RESEARCH METHODOLOGY

Through the quantitative method, a cross-sectional survey design was used for accurate estimate and generation of data which was subjected to rigorous quantitative analysis. The quantitative method involved the calculation of frequencies and percentages, and mean differences while qualitative method involved interviews, focus group discussion, secondary data and documentary analysis as well as observations. The target population of 422 covered the street vendors and the consumers who frequently travel to and from the cities and key informants. The units of view were based on the plates (photos). Under probability sampling, the researcher employed simple random sampling and stratified random sampling strategy while under non-probability sampling, the purposive sampling strategy was applied. Interviews and focus group discussion was based on quota sampling. The researcher used mixed-method design considering both quantitative and qualitative approaches of research. Secondary data was obtained through the study of available literature and reports from the Ministry of Health and other stakeholders. Primary data was collected by the researcher and a team of research assistants for the specific purpose and analysis under consideration.

Data Analyses and presentation

Data were coded, categorized, and analyzed through descriptive frequency and percentages, and mean and standard deviation. Microsoft Excel and Statistical Package for Social Sciences (SPSS V.20) was the primary software used and results presented through tabulations.

RESULTS AND DISCUSSION

This section determined the level of knowledge of consumers on basic food handling principles in Kampala, city, Uganda.

Level of Knowledge on Food Handling in Kampala City, Uganda.

Third-quarter of the consumers (75.0%) agreed that street foods make an essential contribution to employment, household revenue, and food security with a mean of $\mu=2.08$ and $SD=1.218$. Chi-square test conducted on the level of knowledge of consumers on the contribution of street foods ($\chi^2=92.092$, $df=4$, $p=0.01$) showed that it was highly significant ($p<0.01$) variation.

Level of Knowledge of Consumers on Personal Hygiene in Kampala City, Uganda.

More than half of the consumers (57.0%) stated that wet hands transfer bacteria much more readily than dry hands while (57.0%) disagreed that street foods are sources of nutrition for many low-income groups at affordable prices in the city. More than half (68.0%) of the consumers stated that street food vendors are often unlicensed, untrained in food safety, food hygiene, and sanitation, and work under unsanitary makeshift conditions.

Level of Knowledge of Consumers on Sanitation in Kampala City, Uganda.

Most of the consumers (70.0%) said that many vendors are aware of the need to wear clean and appropriate clothes with a mean of $\mu=2.21$. Third-quarter (75.0%) of consumers stated that the absence of water points near workplaces and inadequate drainage facilities make vendors incapable of practicing good hygiene. It was also found that (89.0%) of the food vendors operate their business without health certificates/licenses. 115(66%) said that street food vendors do not have access to improved sanitation facilities. More than a third-quarter (78.0%) stated that with lack of access to sanitation facilities, there is bigger chance of illness, while (64.0%) disagreed that the main consumers of street foods are other members of the informal sector and low-income groups.

Level of Knowledge of Consumers on Environmental Safety in Kampala City, Uganda

More than half (55.0%) of consumers agreed that investment in water supply has a higher return than investments in sanitation, even where demands exist. The majority of consumers (69.0%) stated that stalls are often temporary structures, and running water is not readily available. The majority (84.0%) of consumers said that toilets and washing facilities are hardly available along the highways. The researcher observed (Plate 1) that cooked food utensils were washed in an unsanitary environment where running water was lacking; instead water was stored in buckets and reused in Kampala city.



Plate 1

The finding on the level of knowledge of consumers in Kampala (Table 1) revealed that sanitation had mean at $\mu=2.39$ and $SD=.824$, followed by personal hygiene mean $\mu=2.36$ and $SD=.973$, food handling mean at $\mu=2.24$ and $SD=.893$ and environmental safety had a mean $\mu=1.69$, $SD=.858$. This means that there is an adequate level of knowledge of consumers on basic food handling principles in Kampala city, East Africa with a mean $\mu=2.17$. Chi-square test results on level of knowledge of consumers on basic food handling principles ($\chi^2 =312.494$, $p=0.01$) showed that it was a highly significant variation ($p<0.01$).

Table 1: Knowledge of Street and Highway food consumers in Kampala City, Uganda

Items	Mean	Std. Deviation	χ^2	N
Environmental safety	1.69	.858	366.414	174
Food handling	2.24	.893	259.276	174
Personal hygiene	2.36	.973	200.195	174
Sanitation	2.39	.824	207.839	174

Level of Knowledge of Consumers on Food Handling in Kisumu City, Kenya

The findings were ranked on (Table 2) where environmental safety had a mean at $\mu=1.97$ and $SD=.517$, followed by personal hygiene had a mean at $\mu=1.92$ and $SD=.559$, sanitation had a mean at $\mu=1.89$ and $SD=.577$, and food handling had a mean at $\mu=1.86$ and $SD=.455$. This means that there was an adequate level of knowledge of consumers on basic food handling principles in Kisumu city, East Africa with a mean at $\mu=1.91$ and $SD=0.52$. Chi-square test on the level of

knowledge of consumers on basic food handling principles in Kisumu city ($\chi^2 = 144.950$, $df=4$, $\rho=0.01$) showed that there was a highly significant variation ($p<0.01$).

Table 2. Consumers' Level of Knowledge on Basic Food Handling Principles in Kisumu City, Kenya

Items	Mean	Std. Dev'n	χ^2	N
Food handling	1.86	.455	298.333	120
Personal hygiene	1.92	.559	37.900	120
Sanitation	1.89	.577	75.800	120
Environmental safety	1.97	.517	169.733	120

Vendors Level of Knowledge on basic food handling principles in Kampala City, Uganda.

Findings (Table 3) showed that food handling ranked high with a mean at $\mu=2.79$ and $SD=1.274$, followed by sanitation with $\mu=2.74$ and $SD=.864$), personal hygiene with $\mu=2.41$ and $SD=0.957$) and environmental safety with $\mu=2.35$ and $SD=.981$. Therefore, there was a fairly adequate level of knowledge of vendors on basic food handling principles in Kampala city, East Africa with a mean at $\mu=2.57$, $SD=1.019$ and Chi-square test ($\chi^2 = 34.529$, $df=4$, $\rho=0.01$) showed a highly significant ($p<0.01$) variation.

Table 3. Vendors' level of knowledge on Basic Food Handling Principles in Kampala city, Uganda.

	Mean	Std. Deviation	χ^2	N
Food handling	2.79	1.274	28.353	34
Personal hygiene	2.41	.957	8.941	34
Sanitation	2.74	.864	15.235	34
Environmental safety	2.35	.981	15.765	34

Vendors Level of Knowledge on Basic Food Handling Principles in Kisumu City, Kenya.

Results in Table 4 show the ranked highest environmental safety at a mean $\mu=2.12$, and $SD=.338$) and Chi-square ($\chi^2 = 13.500$, $df=1$, $\rho=0.01$) followed by the Food handling at a mean $\mu=1.88$ and $SD=0.338$ with Chi-square ($\chi^2 = 16.167$, $df=1$, $\rho=0.01$); Sanitation at a mean $\mu=1.67$ and $SD=.637$, and Chi-square ($\chi^2 = 9.750$, $df=2$, $\rho=0.01$), and the Personal hygiene at a mean $\mu=1.50$ and $SD=.590$ with chi-square ($\chi^2 = 8.167$, $df=1$, $\rho=0.01$). Therefore, there is adequate the level of knowledge of vendors on basic food handling principles in Kisumu city, Kenya with a mean $\mu=1.79$ and Chi-square test ($\chi^2 = 16.667$, $\rho=0.01$) showed that there was a highly significant ($p<0.01$) variation.

Table 4. Vendors’ Level of Knowledge on Basic Food Handling Principles in Kisumu city, Kenya

Items	Mean	Std. Deviation	χ^2	N
Food handling	1.88	.338	16.667	24
Personal hygiene	1.50	.590	8.167	24
Sanitation	1.67	.637	9.750	24
Environmental safety	2.12	.338	13.500	24

Table 5. Comparative summary on knowledge of consumers on food safety in Kampala and Kisumu cities East Africa

Consumers	Kampala city	Kisumu city
Food Handling	<ul style="list-style-type: none"> • Unsafe food and water mean it has been exposed to dirt and germs • It is the conditions and practices that preserve the quality of food to prevent contamination • There is a lack of disease-reporting systems 	<ul style="list-style-type: none"> • Unsafe food and water mean that it has been exposed to dirt and germs • It is the conditions and practices that preserve the quality of food to prevent contamination • There are disease-reporting systems
Personal Hygiene	<ul style="list-style-type: none"> • Wet hands transfer bacteria much more readily than dry hands • Contaminated hands could contaminate a clean paper or towel • Street foods are not the source of nutrition for many low-income groups at affordable prices. • Street food vendors are often unlicensed, untrained in food safety, food hygiene, and sanitation. 	<ul style="list-style-type: none"> • Wet hands transfer bacteria much more readily than dry hands • Contaminated hands could contaminate a clean paper or towel • Street foods are sources of nutrition for many low-income groups at affordable prices. • Street food vendors are often unlicensed, untrained in food safety, food hygiene, and sanitation.
Sanitation	<ul style="list-style-type: none"> • Many vendors are aware of the need to wear clean and appropriate clothes. • There is an absence of water points near workplaces and inadequate drainage facilities • Most food vendors operate their businesses without health certificates/licenses. • Street food vendors do not have access to improved sanitation facilities • Public facilities like pit latrines have to be private or shared • Lack of access to sanitation facilities trigger chance of illness • Consumers of street foods are not other members of the informal sector and low-income groups 	<ul style="list-style-type: none"> • Many vendors are aware of the need to wear clean and appropriate clothes. • There is an absence of water points near workplaces and inadequate drainage facilities • Most food vendors operate their businesses without health certificates/licenses. • Street food vendors do not have access to improved sanitation facilities • Public facilities like pit latrines have to be private or shared • With a lack of access to sanitation facilities, there is a bigger chance of illness. • The primary consumers of street foods are other members of the informal sector and low-income groups.

Environmental Safety	<ul style="list-style-type: none"> • Investment in water supply has a higher return than in sanitation • Stalls are often makeshift structures without running water • Toilets and washing facilities are rarely available on the highways. • Vendors have no fixed stalls to store their raw materials on site. 	<ul style="list-style-type: none"> • Investment in water supply has a higher return than in sanitation. • Stalls are often makeshift structures without running water • Toilets and washing facilities are rarely available on the highways. • Vendors have no fixed stalls where they can store their raw materials on site.
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DISCUSSION AND CONCLUSION

The findings suggest that the stronger the food handling, personal hygiene, sanitation, and environmental safety, the stronger was the food safety of vendors and consumers; consequently, the stronger will be their livelihood. Marras, (2014) found out that, due to difficulties in tracking cases and the lack of disease-reporting systems, follow-up studies proving actual connections between street food consumption and food-borne diseases are still very few. Shojoei *et al.*, (2006) stated that food handlers with poor personal hygiene such as no handwashing, specifically after visiting the lavatories pose the risk of carriers of microbes such as *E. coli* and *S. aureus* on their hands. Despite knowledge, most of the vendors do not practice it due to various challenges they encounter during vending and especially when the business is considered illegal.

It was observed that the aprons and protective equipment were either somehow torn and faded in colour or an alternative apron created instead, which is an indication of a compromised hygienic condition. Most food vendors operate their businesses without health certificates or licenses. Mensah *et al.*, (2002), indicated that the sanitary characteristics of vending operations are a significant source of concern for food control officers. Among other challenges cited by the vendors was the mobility nature of trade. Vendors and consumers are always mobile and travelers at the same time are not still in the same place. Mensah, *et al.*, (2002) noted that the washing of hands, utensils, and dishes is often done in buckets or bowls. Disinfection is not usually carried out, and insects and rodents may be attracted to sites where there is no organized sewage disposal.

Finally, food is not adequately protected from flies, and refrigeration is usually unavailable. Research shows that during traveling, adequate means of hygienically washing and drying hands, including washbasins and a supply of hot and cold water; lavatories of appropriate hygienic design; and adequate changing facilities for personnel, such facilities are not suitably located and designated (Codex 2009). This study revealed that food handling safety is essential at the consumer level because many consumers have contaminated food through a lack of awareness. However, during travel periods, running water may not be readily available along the highways or streets. It was also noted that food insecurity, together with poverty worsens the food safety scenario. The study also noted that most of the street food vendors are unlicensed, untrained in food safety, food hygiene, and sanitation, and work under improvised unsanitary conditions. Redmond and Griffith (2003) emphasized that unsafe food-handling practices are still commonly found during the preparation of food in private homes, thus increasing the potential risk of illness from food poisoning. The researcher observed that the majority of the vendors were roadside food sellers

without a permanent vending kiosk. It was revealed that even if the food vendors are trained, the consumers have a lot of say in their choice of food.

Therefore, it was noted that food safety is a key health issue; it should be regarded more critically by all the stakeholders involved. During FGDs, it was revealed that most consumers' attitudes towards street foods vary from country to country and place to place. The study concluded that the degree of cleanliness might differ between your own and someone else's observations of the same object. Such judgment, however, is only applicable to visible dirt. "It is important to realize that a surface that looks clean is not necessarily free of microorganisms." Therefore, the study recommends more attention to be devoted to consumers and their eating habits, behaviours, and awareness when handling food.

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