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Major Risks Related to Street Food Production in Residential Areas in Juja Sub-County, Kiambu County, Kenya

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Abstract:

There is heavy presence of street food production in Kenya, demanding for proper supervision and taking food safety precautions. The current trend of street food production is spreading beyond major cities to residential areas at an alarming rate. There are various types of risks in all critical control points that require public health intervention because they can be a threat to street food consumers. The aim of this study was to determine the major risks related to street food production practices in Juja Sub-County, Kiambu County Kenya. The study adopted descriptive cross-sectional design where observation method was used to collect data from a convenience sample of 248 food handlers operating their food businesses within the Sub County. Descriptive results revealed several major risks key among them being use of recycled deep frying oil and lack of appropriate waste management methods. Moreover, correlation results indicated that major risks related to street food production have an inverse correlation with food hygiene and safety. The study concluded that an increase in major risks related to food production would entirely result to decreased food hygiene and safety. The study recommends the County government of Kiambu through Juja sub-county to provide street food designated areas with permanent structures suitable for food handling and proper training on critical control points to all food handlers.

Key words: Food borne diseases, food contamination, food hygiene, food poisoning, food safety

1. Introduction

Street food may be referred to as type of food prepared and sold by food handlers in the streets for immediate consumption. According to Campbell (2011), millions of people depend on street food and many of them are not aware of the types of risks associated with it. Street food production is common globally and it is normally found in places like railway stations, bus terminals and residential estates in urban areas (Steyn, Labbadorios&Nel, 2011). In Kenya, street food handling is characterized by temporary structures or open places where food handlers produce and sell their food in dusty environment (Ndirangu, 2013). With this kind of environment, street food handlers in Kenya may not be able to reduce the major risks related to food production due to lack of all aspects of hygiene awareness. The Public Health Act emphasizes on three dimensions of hygiene including food hygiene, personal hygiene and premises hygiene in all food production critical control points (GoK, 1990). Food hygiene and safety observation is crucial to street food production which can be a potential source of contamination and food borne diseases (Jannie&Marrie, 2010).

2. Literature Review

There are various types of risks associated with food safety in all stages of food production. These types of risks may be traced back from the sources of food raw materials through preparation area, to the point of selling food to the consumers. The critical areas should be monitored well in order to prevent food contamination and food poisoning that may be caused by poor food hygiene, personal hygiene due to dirty food handlers and unclean preparation premises (Lucas & Peterson, 2015).

2.1. Risks Related to Food Hygiene

Food hygiene is crucial at all food production stages and therefore it is vital for all food handlers to observe hygiene rules in order to prevent food contamination. According to WHO (2010), Food contamination is the introduction or occurrence of a contaminant in food during the time of food production, storage and serving of that food. According to Jill (2008) there are four main sources of contamination including, raw meat and poultry; animals, rodents, birds and insects; food handlers; as well as dust and soil. Poultry may carry *salmonella* bacteria; red meat may have *clostridium* bacteria; while soil and dust may contain spores of *clostridium perfringens*, all of which are risks towards food production. Unhygienic food preparation can lead to transfer of harmful bacteria to food which is one of the leading causes of food contamination (Gordon, 2011). While street food may look appetizing, clean, have a good taste and smell, it may be full of micro-organisms that may cause food poisoning especially food hygiene is not observed (Jill, 2008).

2.2. Risks Related to Personal Hygiene

Lack of proper personal hygiene is one of the major cause food poisoning in food preparation areas. According to Michael (2008), food poisoning is an illness that is characterized by stomach pains, diarrhoea and sometimes vomiting, generally developing within one to thirty-six hours after eating contaminated food. This may be as a result of pathogenic organisms like *Salmonella*, *Staphylococcus aureus*, *Bacillus cereus* and *Escherichia coli* from food handlers and are major causes of un safe food (Mekonnein, Habatamu & Kelali, 2011). Other causes of food poisoning are chemicals and poisonous plants (Daniel, Sarah, Elizabeth and Hannah 2013) which may be introduced to food by dirty hands when handling food and by use of corrosive containers. Food poisoning causes about 48 million illnesses every year (Lucas & Peterson, 2015), many of which may be associated with dirty food handlers who do not observe personal hygiene at all critical control points. Poor personal hygiene may also lead to frequent illness (WHO, 2010) which may contribute to loss of business reputation and customers. Food vendors play a big role towards the development of food borne diseases in developing countries (Zawide, 2011) which may cause death to consumers.

2.3. Risks Related to Premises Hygiene

Food related diseases are likely to occur in food preparation areas where premises hygiene is not observed. Food borne diseases refers to the kind of diseases that are likely to occur as a result of consuming contaminated food which is prepared in dirty premises. Food borne diseases like diarrhoea and cholera are associated with contaminated water (Daniel *et al.*, 2013; Mekonnein *et al.*, 2011) which is not safe for consumption. This may in turn lead to amoeba infection and diseases like typhoid. Food borne diseases may also occur due to lack of hand washing facilities, dirty cleaning clothes, handling food with bare hands due to lack of proper food equipment, insufficient hot water for cleaning utensils and poor waste management (Kimani & Gitau, 2014). Cross contamination is also possible, due to dirty preparation surfaces, locating toilets near food preparation areas and drainage water flowing near food preparation areas (Mekonnein *et al.*, 2011) which are major risks associated to food production.

3. Problem Statement and Justification

There is a high growth of street food production with an increasing demand of cheap and readily available food. There are different critical control points that should be observed in all food production practices in order to reduce the major risk that may be associated with food production practices. (David, Victor & Ronald, 2003). All food handlers are expected to observe all aspects of food hygiene and safety when preparing food (WHO, 2010). Street food is characterized by lack of food, personal and premises hygiene and this is likely to lead to food contamination and poisoning. Various people have been reported to have suffered from food borne diseases involving severe diarrhea, vomiting and stomach pains in the study area. (GoK, 2015). These kinds of diseases are a clear reflection of lack proper precautions in food production practice. With adequate training on critical control points and proper supervision of street food production major risks can easily be controlled.

4. Objective of the Study

The current trend of street food production from major cities to residential areas requires public health intervention. The aim of this study was therefore to determine the major risks associated with street food production practices and preventive measures taken by food handlers in Juja sub county, Kiambu County, Kenya.

5. Research Methodology

This section consists of design of the study, target population, sampling procedure and size, data collection procedures, validity and reliability of measures and data analysis.

5.1. Design of the Study

The study adopted exploratory descriptive cross sectional study design that sought to determine the major risks associated with street food production practices in Juja sub county, Kiambu County.

5.2. Target Population

The study participants were street food handlers who are clustered along residential estates' streets in five different wards in Juja Sub-County which are *Witeithie*, *Kalimoni*, *Theta*, *Murera*, and *Juja*. The survey was conducted on 248 street food handlers who were preparing different types of food.

5.3. Sampling Procedure and Size

A convenience random sample of 248 street food handlers was drawn from the five wards of Juja Sub County. The 248 participants were determined by use of two formulas by Fisher *et al.* (1983) as cited by Mugenda & Mugenda (2003), $N = \frac{z^2 pq}{d^2}$ and $N = \frac{n}{1 + \frac{n}{N}}$.

5.4 Data Collection Procedures

A structured questionnaire that consisted of 5-point Likert scale was used to collect data, in which respondents rated the measures they were taking to observe food hygiene and safety. A pre-compiled observation list that was adapted from Kenya Food Drugs and Chemical substance Act (GoK, 1992) was also used and was modified to suit the context of the

current study. This method was used as guide on critical control points with regards to hygiene and safety standards among the street food handlers.

5.5 Validity and Reliability of Measures

An extensive review of literature on major risks likely to occur in street food production produced the measures adopted for the study thus providing content validity. A pre- test of the research instrument was also conducted with the set of food handlers, in a separate ward but in the same sub county for the purpose of refining them. The reliability of the study measures was ensured through a test-retest reliability whereby the research instrument was administered twice to the respondents an interval of one month.

5.6 Data Analysis

The study mainly used frequencies and percentages as descriptive statistics to address the study objective. Inferential statistics were also used to test the relationship between major risks associated with street food production practices and food hygiene and safety standards.

6. Results and Discussion.

6.1 Introduction

The following is the descriptive analysis of the findings on major risks associated with street food production in Juja sub county, Kiambu County. It includes the analysis of the respondents' responses and observed data findings.

6.2 Major Risks Related to Street Food Production Analysis from Respondent's Responses

The respondents indicated their level of agreement on several statements regarding major risks related to street food production practices as shown in table below, a combined percentage of 91.9% strongly agrees and agrees that they serve hot food. In addition, 51.9% and 44.3% strongly disagree and disagree respectively on the statement "Storage of food does not matter" while 59.1% and 34.5% strongly agree and agree that they use clean cooking oil when deep frying food items. A total of 94.5% of the food handlers always wash their hands when preparing food while 95.3% ensure that the food preparation area is clean. Moreover, 42.1% and 42.6% of the respondents strongly disagree and disagree that they clean food equipment with hot water; 13.6% and 79.1% strongly disagree and disagree that "Storage of food equipment does not matter". Majority (94.5%) of the respondents agree that they use clean water when preparing food. Lastly, 92.4% of the total respondents strongly agree and agree that they have waste bins to dispose waste

	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
I serve hot food	57.0 (134)	34.9 (82)	3.8 (9)	3.4 (8)	0.9 (2)
Storage of food does not matter	0.9 (2)	1.3 (3)	1.7 (4)	44.3(104)	51.9(122)
I use clean cooking oil when deep frying food items	59.1 (139)	34.5 (81)	3.4 (8)	2.6 (6)	0.4 (1)
I always wash my hands when preparing food	31.1 (73)	63.4(149)	3.0 (7)	1.3 (3)	1.3 (3)
I ensure food preparation area is clean	43.4 (102)	51.9(122)	1.7 (4)	1.7 (4)	1.3 (3)
I clean food equipment with hot water	2.6 (6)	10.2 (24)	2.6 (6)	42.6(100)	42.1 (99)
Storage of food equipment does not matter	0.9 (2)	1.3 (3)	5.1 (12)	79.1(186)	13.6 (32)
I use clean water when preparing food	34.5 (81)	60.0(141)	5.5 (13)	0.0 (0)	0.0 (0)
I have waste bins to dispose waste	31.5 (74)	60.9(143)	12.8 (3)	4.3 (10)	2.1 (5)

Table 1: Level of Agreement on Major Risks Related to Street Food Production

6.3 Observation Checklist Summary on Major Risks in Street Food Production

The observation checklist under this category was divided into several sub-sections of various major risks as discussed below.

6.4 Major Risks Associated with Food Hygiene and Use of Safe Water

Descriptive results presented in the table below show that majority (66.1%) of the study respondents' re-used cooking oil while deep frying food items, there was presence of flies and insects in 65.1% of street food businesses observed in this study and about 70.6% were not maintaining the right temperature for holding cooked food. The food equipment was not well maintained and stored in 66.0% of all observed street food businesses. About 55.6% of all food handlers observed in this study had adequate clean water supply. However, all (100.0%) were not using hot water to clean the utensils. These risks are a good ground for food contamination which could result to food borne illnesses and even death. The findings were consistent with those of Kimani and Gitau (2014) that food may be contaminated due to lack of proper service equipment and poor food hygiene practices in preparation areas.

Food Hygiene	Availability	
	Yes N (%)	No N (%)
Washing and preparation	185 (78.7)	50 (21.3)
Storage equipment	80 (34.0)	155 (66.0)
Right holding temperature	69 (29.4)	166 (70.6)
Well maintained equipment	90 (38.3)	145 (61.7)
Presence of flies and insects	153 (65.1)	82 (34.9)
Re-used cooking oil	155 (66.0)	80 (34.0)
Food well covered	98 (41.7)	137 (58.3)
Service equipment	124 (52.8)	111 (47.3)
Adequate clean water supply	187 (55.6)	48 (44.4)
Hot water in cleaning utensils	-	235(100.0)

Table 2: Major Risks Related to Street Food Hygiene and Use of Safe Water

6.5 Major Risks Associated To Food Handlers' Personal Hygiene

According to results in the table below, it was observed that majority (74.0%) of all food handlers who participated in the study appeared healthy on the look and physique. However, about 82.5% did not have a clean uniform, 89.4% had not installed a hand washing facility in their business, and 92.8% did not have a towel for wiping hands. Therefore, the results demonstrated some worrying risks that need to be addressed.

Personal hygiene	Availability	
	Yes N (%)	No N (%)
Food handler in a clean uniform	41(17.5)	194(82.5)
Hand washing facility	25(10.6)	210(89.4)
Wiping hands towel	17(7.2)	218(92.8)
Healthy food handler	174(74.0)	61(26.0)

Table 3: Major Risks Related to Food Handlers' Personal Hygiene

6.6 Major Risks Associated to Food Preparation Area

Descriptive results in table below indicate three major risks related to street food production practices. Majority of food handlers (90.6%) were operating in a semi-structured food production facility, 78.3% were operating in open area working surfaces. and 82.1% were operating in dusty environments. It is clear from these risks that there are higher chances of food contamination in such environments that would be considered as critical to food safety and hygiene.

Food Preparation Area	Availability	
	Yes N(%)	No N(%)
Permanent structure	35(14.9)	200(85.1)
Semi-structure	213(90.6)	22(9.4)
Open area working surfaces	184(78.3)	51(21.7)
Dusty environment	193(82.1)	45(17.9)
Well maintained	33(14.0)	202(86.0)

Table 4: Major Risks Related to Street Food Preparation Area

6.7 Major Risks Related to Food Production Equipment

The table below present results of observed risks related to equipment used in food production and it is apparent that 63.8% of all food handlers in this study were using right equipment. Majority, (80.9%) were found to use non-corrosive equipment in the production and holding food for sale, with about 74.5% having clean equipment such as stainless steel and plastic. Conversely, about 62.1% of all respondents were found keeping their equipment inappropriately which could act as a good ground for harboring food poisoning bacteria.

Equipment Used	Availability	
	Yes N(%)	No N(%)
Clean equipment	175(74.5)	60(25.5)
Non-corrosive	190(80.9)	45(19.1)
Good condition	85(36.2)	150(63.8)
Properly stored	89(37.9)	146(62.1)

Table 5: Major Risks Related to Food Production Equipment

6.8 Major Risks Related to Waste Management

The risks related to waste management in street food production and selling businesses presented in the table below indicated that, 10.6% of all food handlers in this study did not have waste bins in their businesses, of those who had waste bins, majority (95.2%) were not clean and about 81.7% were not keeping their environment free of waste. Moreover, 92.3% of all street food businesses did not have proper drainage system. From these results, it is clear that street food handlers have not use appropriate methods of waste management which could lead to food contamination and poisoning.

Waste management	Availability	
	Yes N(%)	No N(%)
Waste bins available	210(89.4)	25(10.6)
Waste bins covered	10(4.8)	200(95.2)
Clean waste bins	27(12.9)	183(87.1)
Cleanliness of the environment	43(18.3)	192(81.7)
Proper drainage	18(7.7)	217(92.3)

Table 6: Major Risks Related to Food Handlers' Waste Management

6.9. Correlation Results between Major Risks Related to Street Food Production and Food Hygiene and Safety Standards in Juja Sub-County in Kiambu

A Pearson correlation analysis was conducted between the indicators of major risks related to street food production and food hygiene and safety standards at a significance level of 5% and the results are as tabulated below. The indicators of major risks related to street food production practices had a strong negative correlation at, -0.692, -0.772, -0.717, -0.638 and -0.718 for major risks associated to food hygiene and use of safe water, Food handlers' hygiene, Street food preparation area, Food production equipment and Waste management respectively. It is concluded that an inverse relationship exists between major risks related to street food production practices and food hygiene and safety standards in Juja Sub-County.

Major risks associated to:		Food hygiene and use of unsafe water	Food handlers' hygiene	Street food preparation area	Food production equipment	Waste management	Food hygiene and safety standards
Food hygiene and use of unsafe water	Pearson Correlation	1	.472**	.082	.396**	.183	-.692**
	Sig. (2-tailed)		.000	.278	.000	.016	.000
	N	235	235	235	235	235	235
Food handlers' hygiene	Pearson Correlation	.472**	1	.146	.335**	.281**	-.772**
	Sig. (2-tailed)	.000		.052	.000	.000	.022
	N	235	235	235	235	235	235
Street food preparation area	Pearson Correlation	.082	.146	1	-.007	.342**	-.717**
	Sig. (2-tailed)	.278	.052		.930	.000	.021
	N	235	235	235	235	235	235
Food production equipment	Pearson Correlation	.396**	.335**	-.007	1	.215**	-.638**
	Sig. (2-tailed)	.000	.000	.930		.005	.000
	N	235	235	235	235	235	235
Waste management	Pearson Correlation	.183	.281**	.342**	.215**	1	-.718
	Sig. (2-tailed)	.016	.000	.000	.005		.028
	N	235	235	235	235	235	235
Food hygiene and safety standards	Pearson Correlation	-.692**	-.772*	-.717**	-.638**	-.718	1
	Sig. (2-tailed)	.000	.022	.021	.000	.028	
	N	235	235	235	235	235	235

Table 7: Correlation Results between Major Risks and Hygiene and Safety
 **. Correlation Is Significant at the 0.05 Level (2-Tailed)

7. Conclusions and Recommendations

7.1. Conclusion

Risks related to Food production practices are crucial in all food preparation areas and their presence would lead to reduction in food hygiene and safety. Lack of proper hygiene and safety practices may lead to food contamination and food poisoning which may results to serious food borne diseases and even death.

7.2. Recommendations for Practice

- There should be proper training on all critical control points and only those with adequate knowledge on food production hygiene and safety should be allowed to start up a food related business.
- The government through Juja municipality should provide street food production designated areas with permanent structures suitable for food production in order to enable proper control and supervision.

7.3. Recommendation for Future Research

- Assessment of street food handler's knowledge on food production in regard to food hygiene and safety in Juja Sub County
- Assessment on the attitude of street food handlers towards food hygiene and safety in Juja Sub County

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