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Food Safety and Sanitary Conditions among Food Vendors in Higher Learning Institutions: A Case of the Institute of Rural Development Planning (IRDP) Dodoma

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Abstract: ***The food vending industry plays an important role in developing countries in meeting the food demands of the urban dwellers. Operators in street food vending normally depend on low capital with no business license, targeting low income individuals while neglecting issues related to hygiene and safety of the service. Unsanitary handling of street foods by some of the vendors has been commonly found to be the source of contamination. Vendors become carriers of pathogens like Escherichia coli, Salmonella, Campylobacter and Staphylococcus aureus and eventually transfer these foods borne hazards to the consumers. By employing descriptive survey using structured questionnaires and extensive observation of vendors, the study assesses the food safety and sanitary practices among food vendors in higher learning institution and the sanitary conditions at the food vending points. 86.7% of the food vendors had improper storage facilities, 72.4% of them reused oil for frying, 35.9% warmed the food before serving it to the customers. It was also observed only 20% had hair restraints by a head scarf and 36.7% wore aprons. Awareness creation on better hygienic practice to food vendors is recommended.***

Keywords: Food Safety, Sanitary Conditions among Food Vendors, Higher Learning Institutions

1. Introduction

The food vending industry plays an important role in developing countries in meeting the food demands of the urban dwellers. It is an industry that serves large number of population daily with relative cheap and easy accessible food varieties [1], [2]. In spite of advantages of easy access and affordability, together with self-employment, there are significant reports of health problems that have been associated with these street food [1], [3]. Since most of operators in street food vending normally depend on low capital with no business license, and their activities targets low income individuals, issue of hygiene and safety are routinely neglected, resulting to easy outbreak of cholera and diarrhea around the area of operations [4], [5].

Generally, informal sector in Tanzania has become a safe haven for large number of unemployed population especially youth, this is because the sector contributesmore than 40 percent to country's GDP (gross domestic product) while accounting for more than 20 percent of total employed population [6]. Therefore, it is not surprising to see a noticeable increase of food vending business mostly in urban settings, involving both men and women, struggling to earn for their daily urban survival under environment that exclusionary and harshly [3], [7].As observed in other developing countries, food vendors in Tanzania are often unlicensed making them to be in constant confrontation with local authority, untrained in relation to food safety, food hygiene and sanitation, and work under crude unsanitary conditions [8].

Multiple lines of evidences[2], [9]reveals that food vending is mostly done in busy public areas such as streets, near school premises where there is crowd of students, along the railway stations, and bus stations, making more likely for contamination either by spoilage or pathogenic micro-organisms, hence high risk of food borne illnesses due to microbial contamination as well as environmental contamination[2], [9]. Eruption of disease around these public places in danger large number of population due to unhygienic practices, and poor basic facilities such as public loo[9], [10].

Unsanitary handling of street foods by some of the vendors has been commonly found to be the source of contamination.The vendors can be carriers of pathogens like *Escherichia coli*, *Salmonella*, *Campylobacter* and *Staphylococcus aureus*and eventually transfer these foods borne hazards to the consumers[2], [11]. Pathogens like *Salmonella*, *Campylobacter* and *Escherichia coli* can survive on finger tips and other surfaces for varying periods of time, thus making both water and hands to among major means of bacterial pathogen transmission[11], [12].

There have been monthly reports on incidences of food-borne diseases in major urban area of Tanzania, including diarrhea and cholera, in all incidencespo or hygiene and unclean environment related to food vending has associated[13]. The blame has been on how street vendors operates, in terms of food preparation, food serving, and food storage.

From sanitation review report, it is indicated that, food preparation highest sources of faecal indicator bacteria (enterrococci) on women's hands[14]. To most food venders, preparation of food is done in places which is not always clean, well-lit and not far from source of contamination, and most of this food is not covered and is exposed to flies and dust, which may harbor food-borne pathogens [10], [15].

In Dodoma municipality around the Institute of Rural Development Planning, there is significant number of food vendors, providing service to a considerable number of students and staff daily.As common feature of this business, women and young girls are more observed to be involved in providing food service to surrounding community, thus most of them are referred as '*Mama ntilie'*a common Swahili name.

Observations show that, most of these food vendors do not adhere to basic food safety and hygienic practices such as handling payments while serving food to another customer, nonuse of aprons and chef hats, and serving of poor covered and cold food. They are also unaware of food regulations as well as lacking supportive services such as water supply of good and adequate quality, waste disposal systems, which enhance their ability to provide safe food.

The food prepared by the food vendors at the institute isat risk of contamination often at all stages of food handling, the food is prepared at very dirty surroundings and sometimes waste water and garbage disposed nearby. In most cases running water is not available at vending sites; washing hands and crockery are done in bowls or buckets sometimes without soap, and lack of proper storage facilities.

2. Materials and Methods

The study was conducted at the Institute of Rural Development Planning (IRDP) found in Dodoma Municipality. Officially Dodoma Urban District is the sixth city of Tanzania and seating of national headquarters with a population of 410,956. It covers an area of 2,669 Sq.Km of which 625 Sq.Km is urbanized. Dodoma Urban District is selected because six Higher Learning Institutions are found within it and more are expected to come.

Both primary and secondary data were used in this study. Primary data were collected through structured questionnaires. Secondary data were collected through documentary review.The study drew predominantly on descriptive survey using structured questionnaires and extensive observation of vendors to assess the food safety and sanitary practices among food vendors in higher learning institutions and the sanitary conditions at the food vending points. The questionnaire was organized to obtain information pertaining to respondent's socio characteristics and observation checklist to determine sanitary environment, personal hygiene and food handling practices of the food vendors. The data for this paper were analyzed using IBM SPSS version 20, mainly for descriptive statistics such as frequencies and percentages. The study parameters assessed included the level of education, period of selling food, the personal hygiene of food vendors (hands, nails and hair), the use of protective garments, the means of food preparation and protection and sanitary environment at food vending points.

3. Results and Discussion

3.1. Characteristics of Respondents

Table 1: Characteristics of Respondents

Characteristic	Frequency	Percentage
Sex of respondents		
Male	0	0
Female	30	100
Age groups		
18-25	3	10
25-35	15	50
35-45	10	33.3
45-55	2	6.7
Education level		
Primary	4	13.3
Secondary	13	43.3
College and above	7	23.3
Vocational school	6	20
Period of selling food		
Less than 5 years	16	53.3
5-10 years	10	33.3
10-15 years	3	10
More than 15 years	1	3.3

Source: Field survey, 2016

All food vendors surveyed were females and this agrees with [5], [7]who indicated that street food vending is a common income-generating venture particularly for women in developing countries. Half of the food vendors 30 (50.0%) were 25–35 years of age while 2 (6.7%) were in the age group of 45–55 years as shown in Table 1. Respondents had at least primary school education (13.3%), with almost half of them (43.3%) attaining secondary school education and while 23.3% had attained college education. A good proportion of respondents 16(53.3%) had been selling food for less than five years and the proportion of respondents reduces with increasing number of years (Table 1); meaning, at the Institute of Rural Development Planning, the street food business has boomed only recently. This trend confirms the assertions in available literature that the food vending business in developing countries is rapidly expanding and serves as a form of employment for urban residents.

3.2. Elements of food safety

a) Storage of food

This was assessed using various criteria such as the presence of hotpots, refrigerators and the cupboards whereby the food ready for use and the food leftovers were to be stored. It was found that 86.7% of the food vendors had poor storage facilities, whereby food was stored in cooking pots. Only 13.3% of the food vendors were found to use the proper storage facilities such as hotpots for the food and having appropriate container to handle leftovers. This contrary to study made in Eastern Ethiopia, whereby 86 percent of food vendors covered their food in warmer or utensils [16].

b) Preparation of food

Food preparation was assessed by the use of various parameters including cleanliness of the preparation surface,

hygienic condition of the food vendors, washing food before cooking and re-use of oil for frying and re-heating of the food before serving. Only 56.7% of the food vendors had good preparation for the food while 43.3% had poor preparation as shown in Table 2. It was found that only 35.90% of food vendors warmedtheir food before serving it to the customers. It was also noted that preparation surfaces were dirty in 33.33% of those surveyed. 80.95% claimed that they washed the preparation surface before reuse while 72.42% of them reused oil for frying. These findings differ from findings by [17]who reported that 80% of street food vendors (n = 80) in Nairobi prepared food in hygienic ways.

c) Hygienic practices

In the issue of hygienic practices of the food vendors, various parameters were assessed including the use of aprons, adequate protection of food from flies and dust, means of dishing out food, presence of food debris on vendors' hand, finger nails and hair protection. About 57% of vendors were observed to adequately protect their food from flies and dust whilst 43% had no protection, thus exposing their food to flies and dust (Table 2). Any exposure of food material to flies and dust increases the risks of contamination has it has been argued by [5], [11], [18].

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, substantiating results by [5]. Conversely, it was observed that 70% of the vendors had food remains on their hands, indicating possible hand contact with food during dishing out with spoon or ladle. The hands of food vendors are usually the most critical means of transmitting pathogens from contaminated places and items and hence could result in cross contamination upon contact with food. Particularly, in the case where vendors use the same hands to handle money from consumers, as this can further aggravate the situation due to possible accumulation of dirt on the money[5], [19].In addition, 76.6% had clean, short and well-trimmed fingernails, 20% had hair restraints in the form of a head scarf and 36.7% wore aprons (Table 2). Clean and well-trimmed fingernails are important practices since it has been noted that *Salmonella*, non-typhi salmonellae, *Campylobacter* and *E. coli* can survive on finger tips that are not well cleaned[5], [9].

The low proportion of food vendors with hair restraints, as found in this study, is in contrast with the findings of [20]but in agreement with those reported by [21]and [11]who reported a relatively low level of hair protection by food vendors. This could be associated with the fact that many young ladies consider good-looking hair as part of beauty.

The practice of using aprons and hair restraints by food vendors has been observed by many studies as a means that ensure customers on safety of food provided, thus the existing non-uses of apron and hair restraints indicates risks of food contamination[22], [23].

Table 2: Hygienic practices observed by food vendors

Observation Condition	Response	Frequency	Percent
Adequate protection of food from flies and dust	Yes	17	57
	No	13	43
Dishing out food	Spoon/Ladle	30	100
	Bare hands	0	0
Presence of food debris on vendor's hands	Yes	21	70
	No	9	30
Finger nails	Clean	23	76.6
	Unclean	7	23.4
Hair protection	Present	6	20
	Absent	24	80
Use of apron	Yes	11	36.7
	No	19	63.3

Source: Field Survey, 2016

All food hygiene variables were not associated with the level of education as shown in Table 3. This findings affirms results by [5], [24] who reported statistical insignificance of education level on the hygienic practices of food vendors. Thus, the level of education of food vendors does not necessarily affect their inclination to observe food hygiene practices such as protection of food from flies and dust, hair protection, cleanliness of fingernails and use of aprons.

Table 3: Relationship between vendor's educational level and food hygiene variables (n=30)

Food hygiene variables	Response	Highest level of Education level (%)			
		Primary	Secondary	College	Vocational school
Protection of food from flies and dust	Yes	33.3	50.0	55.2	83.3
	No	66.7	50.0	44.8	16.7
Presence of food debris on vendors' hands	Yes	66.7	63.6	58.6	100.0
	No	33.3	36.4	41.4	0.0
Finger nails	Clean	33.3	63.6	65.5	66.7
	Unclean	66.7	36.4	34.5	33.3
Hair protection	Present	0.0	9.1	17.2	33.3
	Absent	100.0	90.9	82.8	66.7
Use of apron	Yes	33.3	50.0	51.7	66.7
	No	66.7	50.0	48.3	33.3

Source: Field Survey, 2016

3.3. Sanitary environment of vending points

The sanitary environment of the food vendors was assessed by various parameters like the availability of toilets, waste receiving receptacle, running water and how the grey water from the vending sites is being managed. These parameters were assessed through giving scores following the presence or absence of the given criteria whereby the ones who scored 3 and above were said to have a good sanitary environment while others who scored less than 2 were said to have a poor sanitary environment of the vending sites. About 36.7% of the food vendors had a very poor sanitary environment, since all the criteria assessed were absent to them meaning that they scored zero due to the failure to meet even one of the criterion assessed. Only 3.3% of the food vendors were found to have a good sanitary environment. Following the analysis almost 90% of the food vendors had poor sanitary environment, grey water was poorly managed and the wastes were disposed near the vending points.

Table 4: Sanitary environment of vending points

Score	Frequency	Percentage
0	11	36.7%
1	16	53.3%
2	2	6.7%
3 and above	1	3.3%

Source: Field Survey, 2016

3.4. Level of knowledge and awareness on food safety among vendors

The food vendors were required to list the practices that they think they are to be followed so as to ensure food safety. Few of the food vendors 24.3% seemed to be very much aware of serving hot meals as the issue of food safety and also the cleanliness of the vending points but the food vendors were less aware on the issues of clean and safe water which scored the least percentage of 1.4 and the cleanliness of vendors too.

Table 5: Level of knowledge and awareness on food safety among vendors

Parameters	Percentage
Washing food prior to cooking	4.1
Covering oneself	4.1
Storing in hotpot	6.8
Covering food	6.8
Cleanliness of environment	13.5
Treating water	5.4
Cleanliness of utensils	5.4
Hot meal	24.3
Personal hygiene	8.1
Well cooked food	6.8
Re-heating food	1.4
Washing utensils with clean water	5.4
Clean clothes	1.4
Availability of clean water	1.4
Protection of food from flies/dust	5.4
TOTAL	100

Source: Field Survey, 2016

4. Conclusion

The food vending industry plays an important role in developing countries in meeting the food demands of the urban dwellers. Operators in street food vending normally depend on low capital with no business license, targeting low income individuals while neglecting issues related to hygiene and safety of the service. Unsanitary handling of street foods by some of the vendors has been commonly found to be the source of contamination. Vendors become carriers of pathogens like Escherichia coli, Salmonella, Campylobacter and Staphylococcus aureus and eventually transfer these foods borne hazards to the consumers. By employing descriptive survey using structured questionnaires and extensive observation of vendors, the study assesses the food safety and sanitary practices among food vendors in higher learning institutions and the sanitary conditions at the food vending points. Significant number of food vendors had unsanitary environment for food preparations, with less reliable and hygienic food storage facilities such as hotpots, and refrigerators. It was observed, most of vendors reused oil for frying, while those who warmed the food before serving it to the customers were less in number. It was also observed only few vendors wore apron, head scarf to restrain hear during food preparation and serving

5. Recommendations

- Development of training programs for food vendors is therefore highly recommended. Ideally, this should be carried out at no monetary cost to food vendors and a certificate should be awarded at the end of each training programs. This is possible when the beneficiaries' institutions will consider it as a corporate social responsibility with win win situation for its community and the food vendors.
- Training manuals should be developed for trainers to serve as a guide and ensure uniformity of subject matter, this canbe done at ministerial level as the case for land regularization.
- The establishment of code of practice for the street food industry and provision of basic water and waste management utilities are recommended to diminish the gap between knowledge and practices of safe street food vending.
- Impact analysis of training programs in achieving and sustaining behavioral change among food vendors should also be carried out through regular monitoring. This can be done by adequately resourcing the Environmental Health and Sanitation Departments country-wide with funds, human resources and logistics to enhance their monitoring and evaluation activities.
- Authorities in higher learning institutions in Dodoma Urban District should be made aware of the vital role they play in ensuring adherence to food hygiene practices among food vendors on their premises.
- Formation of local food vendor groups would also ensure that food vendors adhere to appropriate codes of practice in street food vending.

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