

Original Article

Food safety and hygiene practices of vendors during chain of street food production in Barisal city

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ABSTRACT

This study was designed to know the hygiene practices of street food vendors in the different areas of Barisal city, Bangladesh. Cross-sectional descriptive data were collected from 91 vendors pre-structured through questionnaire. Among street food vendors, 96.7% were male, 69.2% up to primary level educated, and 50.5% were 25 -40 years aged. Maximum 40.7% had monthly 10,000-15,000 BDT income. Highest 38.5% settings located in commercial places, 65.9% considered price as main attribute of raw material and only 5.5% concerned about expire date. Manually driven Rickshaw used by maximum 47.3% to transport raw material and 30.8% used onetime polythene bag to carry. Uncovered food settings were 51.6%, only 49.5 % washed hand before preparation of food, 70.3% used only water to wash their hands, and 60.4% did not wash plate before serving food. For food preparation, 9.9% used pond water, 78% provide tube well water for drinking. Smoking and chewing were observed in respectively 12.1% and 45.1% vendors during food preparation. When feel sickness, 38.5% vendors continue business and, 59.3% reformed left over items to sell next day. Regular training of vendors and awareness and monitoring program can ensure more safe practices in street food business in the study area.

Keywords: Barisal, Hygiene, practices, street food, vendors.

INTRODUCTION

The term "street food" refers to a wide variety of ready-to-eat foods and beverages sold and sometimes prepared, in public places and consumed where it is purchased or taken to eat elsewhere (WHO, 1996). The street foods play an important socioeconomic role in meeting food and nutritional requirements of a significant numbers of city consumers at affordable prices to the lower and middle income groups (Cross and Morales, 2007; Muzaffar et al., 2009). About 2.5 million people eat street food every day in Bangladesh and it is increasing among young adults for its lower price than other restaurants (FAO, 2010). Food handlers have been found to play prominent roles in the transmission of foodborne diseases and can pose a significant public health problem because of their poor knowledge of safe food handling. Vendors are often poor, uneducated, and lack knowledge in safe food handling, environment, sanitation and hygiene, mode of food display, food service and hand washing, sources of raw materials, and use of potable water. Consequently, street foods are perceived to be a major public health risk (Bhowmik, 2010). However, several factors could lead to contamination of foods and consequently increase public health risks: lack of water supply at the point of sale; improper storage of perishable foods during transportation and at point of sale; handling of money and food by the same person; low hand hygiene; lack of vendors' compliance with food safety training; and scarcity of sanitary and proper waste disposal facilities (Campos et al., 2015; Muyanja et al., 2011; Omemu and Aderoju, 2008; Proietti et al., 2014; Rane, 2011).

Ultimately, assuring public food safety at the street level may be more cost-effective than providing medical care for those afflicted with foodborne, pathogenic diseases (Barro et al., 2007; Muyanja et al., 2011; Omemu and Aderoju, 2008). Street food is unsafe and dangers that can cause health problems (Tacio, 2012). Street vendors often do not comply with safe and hygienic food handling practices, leading to a greater risk of a range of food-borne illnesses. The purpose of this study is to know the street food production chain and evaluate vendors' perception on food safety and hygienic practice during different stages of production in the study area.

MATERIALS AND METHODS

Study setting

Cross sectional descriptive study in Barisal city area from January to August 2017. It is located in southern region of Bangladesh, 196 km away from capital and lies on the bank of the Kirtankhola river.

Sampling procedure

Cross sectional descriptive study was used to collect information on respondents regarding their knowledge and practice of appropriate hygiene during handling of food. The investigators discussed with the respective wing of Barisal City Corporation office to collect the information about temporary street shops. There was no available data in corporation authority but they provide us city map. According to map investigators visited every roads, parks, terminals and institutions and identified 91 street shops for data collection. Few street food vendors who were not interested to provide data were excluded from this study. Only those shops where owner sell food and bring all ingredients back to home at the end of day were included in this study. All purpose of the study was explained to the vendors and verbal consent was taken before collection of data. It was assured that their name will not be expressed during report writing.

Data collection and analysis

The questionnaire was divided into various sections where profile of street vender, nature of product, purchasing, transportation, storage, cooking and serving information were assessed. In person interview taken for more accuracy and completeness by a pre tested questionnaire developed according to previous documents (FAO, 2009b). The data was entered in computer, cleaned and statistically analyzed using SPSS 19.0.

RESULTS

This study was approached to find the food safety and hygienic practices of vendors in different stages of street food production in the study area. It was noticed that food production chain of vendors started from collecting raw materials or processed food. Selection of food or raw materials depends on product price, appearance and expiration date. Then ingredients or food transported mainly via Rickshaw (local manual vehicle) to selling point. During transportation it was collected in plastic bag or onetime polythene bag. Vendors prepared the food mainly at the point of sale. Consumer can eat those street foods instantly or can take home away.

Socio-demographic status of street food vendors

The complete socio-demographic status of vendors is shown in **Table 1**. Of the 91 street food vendors interviewed, 96.7% were male and 3.3% female, 50.5% were aged between 25 and 40 years, 37.4% can only write name and 20.9% had completed only elementary school. Among the vendors 86.8% were Muslim and 13.2% were Hindus. More than 60% vendors had been running their business since 6 years. Street food business was the main occupation of 89% vendor. The monthly income of 40.7% vendors was 10000-15000 BDT.

Stall and production details

The complete list of stall and production details is shown in **Table 2**. Of the 91 vending location observed, 38.5% of the stalls in commercial areas, 26.3% in park and 23.1% near to bus terminals. Personally owned stalls were 87.9% and 12.1% were adopt stalls on rent. Homemade food was 18.7%, 39.6% instant processed, 33% semi processed and 8.8% whole natural products (e.g. coconut water). 65.9% stalls were running by the owner and 33% stalls have one employee.

Table 1: Demographic characteristics of the street food vendors in Barisal city.

Parameters	Number	Percentage(%)
Gender		
Male	88	96.7
Female	3	3.3
Religion		
Islam	79	86.8
Hindu	12	13.2
Educational Status		
Illiterate	10	11
Only write name	34	37.4
Primary	19	20.9
Secondary and above	27	30.8
Duration of business		
2 years	18	19.8
4 year	11	12.1
6 year	7	7.7
More	55	60.4
Main occupation		
Yes	81	89
No	10	11
Monthly income of vendors		
<5000	5	5.5
5000-10000	18	19.8
10000-15000	37	40.7
>15000	31	34.1

Table 2: Stall and production details.

Parameters	Number	Percentage (%)
Location of the stall		
Commercial place	35	38.5
Park	24	26.4
Bus-Terminal	21	23.1
Others	11	12.1
Owner of the stall		
Personal	80	87.9
Adopted	11	12.1
Nature of food		
Home made	17	18.7
Instant process	36	39.6
Semi Processed	30	33
Natural	8	8.8
Number of employee in the stall		
None	60	65.9
One	30	33
More than one	1	1.1

Table 3: Distribution of purchase, transport and storage.

Parameters	Number	Percentage(%)
Purchase		
Sources of raw materials		
wholesale outlet	42	46.2
Local Market	49	53.8
Verifying expiration date		
Yes	42	46.2
No	7	7.7
Not applicable	42	46.2
Attribute of purchase raw materials		
Expiration Date	5	5.5
Price	60	65.9
Appearance	26	28.6
Transport		
Way of transportation		
Walking	15	16.5
Cart of sale	11	12.1
Rickshaw	43	47.3
Easy-bike	20	22
Bag use during transport bakery product		
Plastic bag	38	41.8
Cartoon	13	14.3
Jute bag	10	11
Polythene	28	30.8
Storage		
Using preservation system at different stages		
Yes	55	60.4
No	36	39.6
Using preservation system for raw food		
Yes	22	24.2
No	69	75.8
Using preservation system for Semi processed food		
Yes	32	35.2
No	59	64.8
Using preservation system for Home made food		
Yes	34	37.4
No	57	62.6
Covered food		
Yes	44	48.4
No	47	51.6
process used to store leftover food		
Freezing	7	7.7
Heating	37	40.7
Other	10	11
No need	37	40.7

Distribution of purchase, transport and storage

The information on purchasing, transport and storage was collected from the interviews and detailed in table 3. This data showed that the vendors bought their products from wholesale outlets (46.2%) and

local market(53.8%). According to the vendors, if a food product has a good appearance when purchased, this ensures a greater quality of the final products sold. However, in the decision to choose a supplier, 65.9% (n = 60) of the vendors prioritized overall pricing, 28.6% (n = 26) of the vendors prioritized appearance to purchase ingredients and, 5.5% (n = 5) of the vendors reported that they checked the expiration date of the raw materials at the point of purchase. Data generated through interviews on the transportation of ingredients indicated that the main method for bringing ingredients to the point of sale was a rickshaw, as reported by 47.3% (n = 43) of the street vendors, 16.5% walking, 22% easy bike, 12.1% cart of sale. 41.8% vendors using plastic bag and 30.8% using onetime polythene during transportation. 60.4% (n=55) of street vendors reported they use preservation system (e.g. meat for barbecue, hot dogs and home-made tomato sauce), whereas 39.6% of the vendors (n = 36) reported not using preservation system. 7.7% vendors used freezing as preservation system, where 40.7% vendors used heating.

Table 4: Cooking and serving practices.

Parameters	Number	Percentage (%)
Hand washing before serving		
Yes	29	31.9
No	62	68.1
Hand washing after serving		
Yes	15	16.5
No	76	83.5
Hand washing before preparation		
Yes	45	49.5
No	46	50.5
Hand washing after preparation		
Yes	22	24.2
No	69	75.8
Product used for hand washing		
Just water	64	70.3
Soap	15	16.5
Detergent	5	5.5
Type of serving utensils used during food serving		
one time plate	7	7.7
paper	20	22.0
normal plate	48	52.7
Polithin	4	4.4
Other	12	13.2
Washing of plate		
Yes	63	69.2
No	22	24.2
Not Applicable	6	6.6
Washing plate before serving		
Yes	36	39.6
No	55	60.4
Washing plate after serving		
Yes	52	57.1
No	39	42.9
Sources of water to prepare food		
Not applicable	12	13.2
Pond water	9	9.9
Boiled water	5	5.5
Tap water	20	22
Tube well water	45	49.5
Place to store the drinking water		

Not applicable	8	8.8
Container (closed)	50	54.9
Container (opened)	27	29.7
Others (pan with lid)	6	6.6
Frequency of 'sanitizing'		
Opening	17	18.7
Closing	9	9.9
Opening and closing	59	64.8
Other	6	6.6
Source of drinking water		
Not applicable	4	4.4
Tube well water	71	78
Filtered water	5	5.5
Tap water	10	11
Others	1	1.1
Hand drying material used		
Paper towel	7	7.7
Towel	58	63.7
Don't drying	26	28.6
Cooking and selling during sickness		
Not applicable	2	2.2
Yes	35	38.5
No	54	59.3
Seating capacity in the stall		
Nil	50	54.9
Up to 3	8	8.8
Up to 5	20	22
More	13	14.3
personal behavior during preparation and serving food		
Smoking	11	12.1
Chewing	41	45.1
Sneezing	37	40.7
Nose hole touching	2	2.2
Done with left food		
Wastage	23	25.3
Reform to sell	54	59.3
Eaten by family	10	11
Other	4	4.4

Cooking and serving points

Data on cooking and serving area describes in **table 4**. During working time 30.5% vendors washing their hands for a single time a day, whereas 69.5% did not wash hands at all. From those who washed their hands, 70.3% using water only, 16.5% using soap and water. Only 7.7% vendors used one time plate to serve food where 52.7% used normal melamine plate and 22% used paper. Maximum 49.5% vendors used tube well water to prepare food and, it was 22% for tape water, 9.9% for pond water. 49.5% used boiled water to prepare food, 12.1% vendors used to smoke while selling their food and 45.1% vendors having chewing habits.

DISCUSSION

The majority of the vendors were male, which is consistent with the previous literature (Adjrah et al., 2013; Alves da Silva et al., 2014; Choudhury et al., 2011; Hanashiro et al., 2005; Muyanja et al.,

2011). However, most vendors were between 25 and 40 years old. It is similar in the study done by (Eliku, 2016). It was maximum (41.9%) for 40-59 years in Brazil (Cortese, 2016). 63 % between 25-44 years in Delhi, India (Thakur, 2013). Maximum 37.4% can only write name and 69.3% had no or primary education. It was maximum 48.8 % for primary education in Brazil (Cortese, 2016). 68.5% of the street food vendors had either primary or no education Addis Ababa, Nigeria and 82% in had no education and 15(30%) had primary education in Aboabo, Ghana (Eliku, 2016). The low education levels linked with poor hygiene practices during handling and storage of foods which leads to threat of street food contamination (Kitagwa et al., 2006). When buy raw material, 65.9% observed price and 28.8% and 5.5% saw appearance and expiration date respectively. It was lower 23 %, almost similar 35% and 7% percent in Brazil (Cortese, 2016). Price is main attribute of collecting raw material for 65.9 % vendors which was only 9% in Brazil but 56 % of them considered cleanliness as first attribute. In this study 60.4 % vendors doing business for more than 6 years. It is similar 56 % for more than 5 years in Ghana (Monney et al., 2014). In this study, for transportation vendor used rickshaw, as reported by 47.3% (n = 43) of the street vendors, 16.5% walking and, 41.8% used plastic bags and 30.8% used polythene. It was 21% by walking in Brazil and only 12% used polythene bag. Only 7.7 % used freezing as preservation system which is 12% in Brazil (Cortese, 2016). This situation is potentially hazardous due to prolonged exposure to the generally high ambient temperatures typical of the local climate (Alves da Silva et al., 2014). We found 59.3 % vendors reform leftover food for the next day. It was 56% of the respondents for Accra metropolis, Ghana (Odonkor, 2011). It was observed that 69.5% of vendors didn't wash hands properly before preparation and cooking of foods whereas 30.5% vendors wash their hands. A reverse situation observed in another study, where 67% vendors washing their hand before preparation and cooking of foods and 33% didn't wash their hands (Rayza et al, 2016). We found 16.5% wash hand with soap. It was only 4% in Free State, South Africa (Lues et al, 2006). We observed 70.3% washed hand with water only and 63.7% used only towel for hand drying which was 24% and 3 % respectively in Brazil but maximum (59%) don't dry hand there (Cortese, 2016). In this study 22% used tap water for food preparation and 49.5 % used deep tube well water. Although 75% vendors used the tap water for their food preparation in Rawalpindi, Pakistan (Ahmed et al., 2017) and 81 % tap water in Brazil. Both opening and closing time sanitizing done by 64.8% which was a bit lower 51 % in Brazil (Cortese, 2016). In our study area 50% vendors store water in closed container where 27% vendors store water in open container to prepare food on the other hand, another study revealed that 75% vendors store water in closed container and 25% vendors store in open container (Rayza et al, 2016).

However, it is not completely clear whether the vendors reused leftovers in subsequent days for production within or outside of statutory regulations. Earlier studies have identified the point of service as the most critical step for potential contamination of street food (Liu et al., 2014; Proietti et al., 2014). The lack of running water or potable water storage makes food safety conditions at these locations untenable, as water is needed for washing food, hands, utensils and equipment and for proper food preparation procedures (Omemu and Aderoju, 2008; Proietti et al., 2014; Rane, 2011).

Several positive food safety efforts made by many of the street vendors along the production chain were identified. This includes buying foods with regulated packaging and labels, checking expiration dates, using utensils to handle the food, not adding eggs in the preparation of homemade mayonnaise sauce and proper storage of most foods during transportation and at point of sale (Brasil, 2004; WHO, 1996). However, several factors could lead to contamination of foods and consequently increase public health risks: lack of water supply at the point of sale; improper storage of perishable foods during transportation and at point of sale; handling of money and food by the same person; low Hand hygiene; lack of vendors' compliance with food safety training; and scarcity of sanitary and proper waste disposal facilities (Campos et al., 2015; Cardoso et al., 2009; Muyanja et al., 2011; Omemu and Aderoju, 2008; Proietti et al., 2014; Rane, 2011). Ultimately, assuring public food safety at the street level may be more cost-effective than providing medical care for those afflicted with foodborne, pathogenic diseases (Barro et al., 2007; Muyanja et al., 2011; Omemu and Aderoju, 2008).

CONCLUSION

The study provides a clear picture of socio-demographic status and safety practices of street food vendors in Barisal city area. It can be stated that vendors are not completely ignorant of the basic food hygiene practices. But there are areas like source of drinking water, food preparation water, hand washing, reused leftover food, selling during sickness need to be drawn attention. Food-handling training and education, awareness program, enforcement of government regulations and infrastructure may improve the safety for street foods.

CONFLICT OF INTERESTS

The author should declare any conflict of interests.

AUTHORS' CONTRIBUTION

All authors contribute to the research planning, data collection, data analysis and, manuscript writing and editing of manuscript.

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