

**Original Article**

## **Food Safety Knowledge, Attitudes and Practices of Chotpoti Vendors in Dhaka, Bangladesh**

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### **Abstract**

**Background:** Chotpoti is a popular street food among all groups of people from low to high income in most cities of Bangladesh. **Objective:** This study was conducted to describe the vending sites, the stalls and equipments used for food preparation, current level of food safety knowledge of vendors and the way to prepare foods to understand the risks of food contamination and opportunities for prevention. **Materials and Methods:** This cross-sectional study was conducted between July and October, 2012. We selected 18 popular chotpoti vending sites including market places, bus stops, road sides and amusement parks located under Dhaka city corporation areas by judgment sampling. From each study site we randomly selected six vendors for interview. A structured pretested questionnaire was used for data collection. Data were collected on (i) socio-economic and demographic characteristics of the respondents; (ii) health and personal hygiene knowledge of vendors; (iii) vendors' food handling practices and (iv) source of ingredients and process of chotpoti making. Location of the chotpoti vendors, utensils used, handling of food, place of preparation of chotpoti, environment surroundings of the stall, general processing of chotpoti and hygienic practices were observed and recorded through an observation checklist. **Results:** We interviewed a total of 110 vendors. All vendors were male, the majority was between 21 and 30 years of age. Majority (58.2%) of the vendors acquired the knowledge of chotpoti preparation through observation. Nearly all vendors (99%) handled food with bare hands, 95% did not use aprons and hair covering and 94% handled money while serving chotpoti. Most vendors had leftovers; out of those 30% reported discarding them and the rest stored them for following day's sale with inappropriate storage. Nearly one-third (32.7%) of the vendors washed their utensils with dirty water which is recycled. Majority reported that they changed the bucket water only once per 12 hours. Presence of flies was observed on food and surroundings of 33% of the stalls. Of the vendors interviewed, most of them did not have garbage receptacles and 23% disposed wastes nearby their stalls and 76% disposed in nearby dustbin. **Conclusion:** This study demonstrates that chotpoti vendors do not have formal education and formal training on food preparation. Moreover, lack of hand hygiene knowledge, infrequent cleaning of utensils with soap, inappropriate management of leftover foods, and lack of proper waste management create numerous possibilities for food contamination. Consumption of street vended chotpoti may pose a risk of food borne diseases and steps should be taken to educate and train the vendors on personal hygiene and food handling practices.

**Key words:** Street food; Chotpoti; Microbial contamination; Food safety; Knowledge; Practices

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## Introduction

Street food refers to a wide variety of ready-to-eat foods that are prepared and sold on the street and public places.<sup>1,2</sup> In many developing countries the street food industry is expanding rapidly with rapid population growth and urbanization.<sup>3-5</sup> It offers employment opportunities for the uneducated, unemployed urban population in many low-income countries.<sup>6,7</sup> Street foods are widely consumed because they are easily accessible and cheap.<sup>8</sup> Most vendors are poor, uneducated, untrained and unlicensed for their business.<sup>9,10</sup> The unhygienic environment in which foods are prepared and stored, and improper handling and preparation are some of the potential causes of bacterial contamination of street food.<sup>11,12</sup> Foodborne bacterial pathogens commonly detected in street foods are *E. Coli*, *Bacillus cereus*, *Clostridium perfringens*, *Staphylococcus aureus* and *Salmonella spp.*<sup>13-15</sup> Consumers of street food often suffer from foodborne diseases like diarrhea, cholera, typhoid fever and food poisoning.<sup>16,17</sup> Contaminated street food has also caused foodborne epidemics.<sup>18-21</sup>

Street foods commonly sold in Bangladesh include chola boot (chickpeas), bhelpuri (puffed rice with potatoes), samucha (deep-fried dough stuffed with vegetables and/or meat), sugar-cane juice, lassi (yoghurt and water), ghugni (boiled and mashed white peas with spices), singara (pastry stuffed with vegetables, spices and occasionally liver) and different types of cakes.<sup>22</sup> Al Mamun et al found 44% of samples with a total coliform count  $\geq 100/\text{gm}$  in selected street food items including chotpoti sold by street food vendors around 80 schools of Dhaka, the capital city of Bangladesh.<sup>12</sup> Another study done in three wards of Dhaka City (Motijheel, Lalbagh, Dhanmondi) found a total coliform count that represent medium to high risk in WHO standard ( $\leq 3 \log_{10} \text{cfu/g}$ ) on some selected items (Chola boot, ghugni, samucha, singara, bhelpuri, cake).<sup>22</sup> Chotpoti is a popular street food consumed by all ages and all groups of people in urban Bangladesh. It is a mixture of boiled diced potatoes, boiled chickpeas and sliced onions and chillies with grated eggs on top. A study on street vended chotpoti in different parts identified pathogenic micro-organisms including *E. coli*, *Klebsiella*, *Acinetobacter*. Despite the fact that chotpoti is often contaminated and poses risk of food-borne illness to consumer, we do not know much about its preparation practices that might lead

to its contamination. Lack of food hygiene knowledge and practices may enable pathogen to come into contact with foods and contaminate. Data on chotpoti vendors' knowledge about food safety and food preparation practices would help design intervention to reduce food contamination and minimize health risk associated with street food consumption. This study was conducted to describe the vending site, the stalls and equipments used for food preparation, current level of food safety knowledge of vendors and how they prepare foods to understand the risks of food contamination and opportunities for prevention.

## Materials and Methods

This cross-sectional study was conducted in 18 selected sites including market places, bus stops, road sides and amusement parks located under Dhaka city corporation areas during the period between July and October 2012. These places are Shahbag in front of national museum, Dhaka Zoo, Rayer Bazar, Mitford Babubazar, Donia College, Shishu Park, Zigatola bus stop, Mirpur-10 bus stop, Mirpur stadium, Suhrawardiy Uddyan, Danmondi-15 bus stop, Parliament area, Jatrabari bus stop, Jurain rail gate, New market, IDB Bhaban and Benaroshi polli, Mirpur. In the absence of sampling frame of chotpoti vendors we selected these study sites by judgmental sampling. These are popular places for chotpoti vending and chotpoti consumption. In most of the sites people gather in the evening and take chotpoti as evening snacks. Vendors use mobile stalls for preparation and selling chotpoti. Most vendors sell chotpoti at a particular site rather than moving from one place to another.

Data were collected from chotpoti vendors using a structured questionnaire. Informed consent was taken before interviewing them.

**Sample size calculation:** It was an exploratory study. In sample size calculation our consideration was to collect data from a minimum number of vendors that will allow us to draw a conclusion. Data were not available on the total number of chotpoti vending sites and exact number of chotpoti vendors in Dhaka City Corporation areas. Considering these along with our time and resource constraint we selected 18 study sites and collected data from 110 vendors. From each of the 18 study sites we selected six chotpoti stalls. Usually in each site there were 15 to 20 chotpoti stalls. First we numbered every stall. Then we randomly selected six stalls using random number table.

**Data collection:** We trained two field assistants (FA) on data collection. Based on previously published data, a structured questionnaire was developed and pretested for clarity and validity. The field workers used the pretested structured questionnaire for data collection. The four-page questionnaire contained 44 variables which were divided into four sections: (i) demographic characteristics of the respondents; (ii) health and personal hygiene (knowledge of appropriate hand hygiene, food handling, food preservation); (iii) food handling practices (use of gloves, aprons during food preparation, use of garnish, touching money during chotpoti preparation, covering hair) and (iv) source of ingredients and process of chotpoti making (source of sauce, source of water, condition of the preparation surfaces). Location of the chotpoti vendor, utensils used, handling of food, place of food preparation, environment surrounding the stall, general processing of the chotpoti and hygienic practices were observed and recorded through an observation checklist.

**Data analysis:** We used descriptive statistics such as means and frequencies to present the findings.

**Results**

**Demographic profile of vendors**

All the respondents in this study were male with 48.2% between 21 and 30 years of age and 38.2% between 31 and 40 years. Forty three point six percent of respondents had no formal education while 46.4% had at least a primary school education. Most (92%) of the vendors surveyed were stationary and only 8% were mobile. Only 2% of the vendors acquired their knowledge of chotpoti preparation by formal training while the majority (58.2%) acquired their knowledge through observation (Table I).

**Knowledge of hand hygiene, food handling, and food preservation**

About 94% of the vendors reported that hand should be washed after toilet use. Nearly half of them (54%) reported that it is necessary to clean hand before food preparation. Less than 28% of the respondents reported using soap after using the toilet, and more than 70% use neither soap nor ash after toilet use. When we asked about how to get water safe to drink, nearly all (96.4%) of the vendors mentioned that water should be boiled before use. Very few (18%) of the vendors were aware that it was necessary to refrigerate leftover food, and the majority (81%) believed that food can be preserved in a container with a cover.

Table I: Socio-economic and demographic profile of vendors (N=110)

Parameters	Number	Percentage
<b>Age</b>		
≤20	3	2.7
21–30	53	48.2
31–39	42	38.2
≥40	12	10.9
<b>Level of education</b>		
No formal education	48	43.6
Completed primary level (5 years formal education)	51	46.4
Completed secondary level (12 years of formal education)	10	9.1
Above secondary level (more than 12 years formal education)	1	0.9
<b>Monthly income (in taka)</b>		
10,000–20,000 (125–250 USD)	58	52.7
20,001–30,000 (251–375 USD)	45	40.9
30,001–40,000 (376–500 USD)	7	6.4
<b>Marital status</b>		
Married	94	86.5
Unmarried	16	14.5
<b>Type of housing</b>		
Slum	17	15.5
Rented house	89	80.9
Owned house	4	3.6
<b>Type of vendor</b>		
Stationary (selling chotpoti at a particular place for long time)	101	92
Mobile	9	8
<b>Acquisition of knowledge about chotpoti preparation</b>		
Self-taught	30	27.3
Observation of others	64	58.2
Taught by parents	14	12.7
Formal training	2	1.8

**Source of ingredients, preparation of food and preservation of leftover food**

Survey showed that vendors prepared foods either at home or at the stalls located roadside. Almost all of the vendors (99%) said they boil potatoes, eggs and lentils at home. Ninety three percent of vendors used municipal tap water for chotpoti preparation and washing of utensils. They brought water either from home or from an available nearby place to their vending sites in containers of 5 to 10 liter capacity and reused this water again and again. Moreover, this water was not enough for dish washing and chotpoti preparation. Eighty four percent of vendors bought raw food materials (potato, chili, egg) from market while most of them (97%) prepared sauces at home. Food ingredients were kept in open plastic bowls. Majority of the vendors (97%) interviewed said that they usually had leftover food. Out of those, 30%

Table II: *Chotpoti* vendors’ knowledge of hand hygiene, food handling, and food preservation (N=110)

Parameters	Number	Percentage
<b><i>Hand should be washed after toilet use</i></b>		
Yes	104	94.5
No	6	5.5
<b><i>Hand wash is necessary before food preparation</i></b>		
Yes	59	54
No	51	46
<b><i>Hand wash after using toilet</i></b>		
With soap or ash	31	28.2
Without soap or ash	79	70.9
<b><i>How to make water safe to drink</i></b>		
Boiling	106	96.4
Others	4	3.6
<b><i>How to preserve food</i></b>		
In open container	1	0.9
In container with cover	89	80.9
In refrigerator	20	18.2

reported discarding the leftovers and the rest stored leftovers for the following day’s sale. Of those who kept leftover foods, majority used plastic containers to keep them for sale next day. They used boiled potato, and dal for up to two days after cooking in some way.

Table III: Source of ingredients, preparation and management of leftover food (N=110)

Parameters	Number	Percentage
<b><i>Source of water</i></b>		
Boiled water	6	5.5
Untreated tap water	103	93.6
Other	1	0.9
<b><i>Source of sauce</i></b>		
Made at home	107	97.3
Bought from market	3	2.7
<b><i>Source of food ingredients</i></b>		
Prepared at home	17	15.5
Bought from market	93	84.5
<b><i>Location of boiling potatoes, eggs, dal</i></b>		
At home	109	99.1
At stall on roadside	1	0.9
<b><i>Management of leftover food</i></b>		
Discarded	33	30
Kept and sold on the following day	65	59.1
Others	12	10.9
<b><i>Leftover potato and dal is used</i></b>		
Up to 2 days	106	96.4
More than 2 days	4	3.6

**Food-handling practices**

Ninety nine percent (99%) of the vendors reported that they washed the preparation surfaces. But we observed that the preparation surfaces were dirty in most cases. Only 4.5% used apron during making or serving chotpoti, 99% handled food with bare hands, 4% wore hair covering and 2% wore jewelry while handling food. It was observed that 94% were handling money while serving food

Table IV: Observed food-handling practices of *chotpoti* vendors (N=110)

Parameters	Number	Percentage
<b><i>Washed chotpoti preparation place</i></b>		
Yes	109	99.1
No	1	0.9
<b><i>Used gloves during handling chotpoti</i></b>		
Yes	1	9
No	109	99.1
<b><i>Used apron during making chotpoti</i></b>		
Yes	5	4.5
No	105	95.5
<b><i>Touched money while handling food</i></b>		
Yes	104	94.5
No	6	5.5
<b><i>Covered hair during making chotpoti</i></b>		
Yes	4	3.6
No	106	96.4

**Care of equipments**

We observed that 54.5% of vendors used soap for cleaning plates on which *chotpoti* was served. The utensils were washed using water in buckets, were rinsed only once and the water was used repeatedly before it was replaced. Among the vendors 41.8% reported that they changed the used water at 5 to 10-hour intervals and 37.3% reported the interval between 11 to 15 hours. They used a piece of cloth for washing plates after rinsing with bucket water. This piece of cloth was found very dirty. Sixty eight (61.8%) vendors said they cleaned it every hour and 37 (33.6%) said they did it at 2 to 3-hour intervals; 74 (67.3%) vendors reported using fresh water and 36 (32.7%) vendors used dirty bucket water for its cleaning (Table V).

**Environment of vending sites**

Based on observation, about 44% of the vendors prepared *chotpoti* in an environment where garbage

and dirty waste were conspicuously close to the stalls. Flies were observed on food and surrounding of 33% of the stalls. Most of the vendors did not have garbage receptacles — 76% disposed off waste in nearby dustbins and 23% disposed off waste nearby their stalls.

Table V: Care of equipments (observed and reported) (N=110)

Parameters	Number	Percentage
<b><i>Cleaned utensil with soap</i></b>		
Yes	60	54.5
No	50	45.5
<b><i>Interval of changing bucket water (hours)</i></b>		
≤ 4	2	1.8
5–10	46	41.8
11–15	41	37.3
≥ 16	21	19.1
<b><i>Frequency of cleaning the piece of cloth</i></b>		
Every hour	68	61.8
Every 2–3 hours	37	33.6
Every 4–5 hours	5	4.5
<b><i>Type of water used to clean the piece of cloth</i></b>		
With dirty water	36	32.7
With clean water	74	67.3

**Discussion**

This study demonstrates that *chotpoti* vendors do not have formal education and formal training on food preparation. Most of them do not know about hand hygiene and appropriate food handling practices. Moreover, infrequent cleaning of utensils with soap, inappropriate management of leftover foods, and lack of proper waste management create numerous possibilities for food contamination. Consumption of contaminated *chotpoti* increases the risk of food-borne illness and outbreaks.

In our study all the *chotpoti* vendors were male. Studies from other developing countries including Kenya, Nigeria, Ghana, Uganda and Botswana showed that the majority of street vendors are women

who in addition to household work take this income generating opportunity.<sup>9,23-25</sup> Though in Bangladesh women engagement in informal sector is increasing rapidly, they are still away from this particular occupation of *chotpoti* vending. In our study nearly half of the vendors interviewed did not have formal education, which is consistent with findings from other parts of the world.<sup>26,27</sup>

More than half of the vendors acquired *chotpoti* vending knowledge by observation and some acquired their knowledge by self-teaching by trial and error. Only a tiny fraction had formal training on food preparation. This is similar to reports from Nairobi, Kenya where 61% of the vendors acquired cooking skills from observation and from Abeokuta, Nigeria where only 12% acquired the knowledge of food preparation by formal training.<sup>28</sup>

Regarding personal hygiene we found that most the vendors do not use soap after toilet use. Only 5% used apron while making or serving *chotpoti* and nearly all handled food with bare hands without gloves. This is in contrast with findings at Owerri, Nigeria where 58% used aprons, and nearly 50% used gloves while preparing and serving food.<sup>27</sup> Muinde et al<sup>9</sup> reported that 81% of the vendors at Nairobi, Kenya did not use aprons and majority handled food with their bare hands.

In our study most vendors used untreated municipal tap water supplied by Water and Sewerage Authority (WASA) for *chotpoti* preparation and washing of utensils. They stored water in plastic drums without lids, thus making it more susceptible to contamination. Majority of the vendors kept leftover foods for up to two days without appropriate storage. In Owerri, Nigeria nearly half of the vendors had leftover foods for serving on the next day and only one-third had refrigerators for storage.<sup>27</sup> In Nairobi, only 21% vendors reported using refrigerator for storage of leftover items.<sup>9</sup>

We found that half of the vendors used soap for cleaning plates on which *chotpoti* is served. The utensils were washed using water in buckets, were rinsed only once and the water was used repeatedly before it was replaced. More than half of the vendors reported changing the bucket water only once per 12 hours. Also, majority infrequently washed the piece of cloth used for washing the plate following washing

with bucket water. Studies in Abeokuta city Nigeria, Nairobi in Kenya and Accra in Ghana also showed that vendors washed their utensils with dirty water which is recycled.<sup>3,9,23</sup>

The *chotpoti* vending sites were found unhygienic in this study. We observed garbage and dirty waste nearby the stalls. Presence of flies was observed on food and surroundings of many stalls. They also lack proper waste management practices. In Nairobi, nearly half of the vending sites was found unhygienic even though majority of the vendors had garbage receptacles.<sup>9</sup> The food vendors studied in Jakarta and Phnom Penh cities also showed overall low level of environmental and sanitary standard which is similar to our study findings.<sup>29,30</sup>

Our findings and findings from many other studies on street food clearly show that the street food vendors lack proper knowledge on safe food preparation and their current food handling practices increase the risk of food contamination. Von Holy & Makhoane<sup>31</sup> and Martins<sup>32</sup> demonstrated that vendors in South Africa produced relatively safe food and maintain high hygiene standard. Similarly in Philippines Azanza et al<sup>33</sup> found that over half of the vendors interviewed had fair knowledge on food contamination and personal hygiene. Despite these findings, in most countries street food remains a vehicle of food borne disease transmission.

This study demonstrates that popular street food item like *chotpoti* in Dhaka city is prepared and sold in unhygienic condition and poses a threat to health of the consumers. Most of the vendors lack food safety knowledge and do not have formal training on safe food preparation which further increases the risk of food contamination. The first step could be to educate consumers about health risks involved in street food consumption. Awareness among the consumers lead them either to choose vendors they believed to be preparing foods hygienically or avoid consuming street food. This could potentially change vendors' behavior as this could affect their income. The next step should be educating the vendors on food borne disease transmission, personal hygiene and food handling practices. Government should formulate legislation to recognize the street food industry by developing code of practice for street food vending and legal implication of unsafe food selling. Government

should also ensure basic infrastructure and services including availability of running water, waste disposal services, drainage system and available toilets. Further studies should include all sorts of street foods with large sample size to get a broader view of street food industry in Bangladesh.

As we conducted this study exclusively among hotpoti vendors because of its high consumption rate, it might not represent the other street food vendors. We adopted a non-probability judgment sampling for study site selection due to unavailability of sampling frame. Therefore, our study participants should not be considered as a representative sample for generalization of the study results.

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