

Original Article

Food Safety Knowledge, Attitudes and Behavior of Street Food Vendors and Consumers in Dhaka City

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Food safety knowledge, attitudes, and street food suppliers and consumer behaviors of the capital city Dhaka were investigated. A cross-sectional study was conducted using questionnaires based on previous studies. Three main areas addressed in the surveys and statistical analysis are; 1) statistical data including gender, age, education, income, food safety training, and specific elements related to the work experience of suppliers, 2) knowledge of food safety such as the awareness of consumers and suppliers concerning pathogenic microbes that cause food poisoning, food and personal hygiene, proper cleaning procedures and high-risk groups, and 3) list of food handling attitude and behavior of subjects. Results showed food safety knowledge of street vendors in the High-tech Industries Development Zone was the lowest, where education levels are generally relatively low. Food safety attitudes of the youngest consumers were significantly better than those of older age groups. Street vendors were relatively poor in carrying out safe food handling, with only 27.6% using or being fully equipped with hand-washing facilities, although more than 50% of vendors were not wearing clean and tidy clothes and masks. Steps should be taken to improve street food stall operating conditions and facilities, including access of potable water, providing clean protected structures, and efficient waste collection and disposal systems that can promote the plans and strategies to improve street food safety of Dhaka city and Bangladesh as a whole.

Keywords: Street food, Food safety knowledge, attitude, behavior, Vendors, Consumers

Introduction

Street food refers to a wide variety of ready-to-eat (RTE) foods which are sold beside the busy streets and public places^{1,2}. In many developing countries the street food industry is booming along with the expeditious population growth and urbanization³⁻⁵. In many low-income countries, the uneducated, unemployed urban population are having an employment opportunities based on this street food business^{6,7}. Street foods are widely consumed by low earning people because these are easily accessible and cheap⁸. Most vendors are poor, uneducated, untrained and unlicensed for their business^{9,10}. The potential causes of microbial contamination includes the unhygienic environment of foods preparation and storage and manhandling of food^{11,12}. Commonly detected foodborne pathogens in street foods are *E. coli*, *Bacillus cereus*, *Clostridium perfringens*, *Staphylococcus aureus* and *Salmonella* spp¹³⁻¹⁵. Consumers of street food often suffer from foodborne diseases like diarrhea, cholera, typhoid fever and food poisoning^{16,17}. Contaminated street food has also caused foodborne epidemics¹⁸⁻²¹.

In developing countries millions of low earning people consider street food as a convenient diet for them^{22, 23}. Approximately 2.5 billion people eat street food everyday, which supports the livelihood of those low earning people. Not only that, it has an enormous contribution to the economy²⁴.

Street food safety remains a major concern in developing countries²⁵. Bangladeshi food culture has a long history of street

food. It has become somewhat of an identity of Bangladeshi culture. Many big cities as well as small towns and villages provide street food to the locals and tourists. Therefore, street food safety has become a major food safety concern due to poor food hygiene and handling conditions²⁶. Most street food vendors are comparatively uneducated and often lack proper knowledge and have poor regulatory behaviour towards correcting oversight²⁷.

This study has undertaken to find the food safety status of street food in Capital City of Bangladesh (Dhaka), for which a suitable questionnaire was constructed to assess food safety knowledge, attitudes, and behaviors of street food vendors and consumers.

Materials and Methods

This is a cross-sectional study conducted on 247 consumers and 90 street vending stalls. Structured written questionnaires were used to assess food safety knowledge and attitudes of vendors. A structured questionnaire was used to record demographic information. This section gathered details regarding sex, age, educational level, income, and training in food safety, with a specific element relating to work experience for vendors.

Food safety knowledge

This section assessed consumer and vendor awareness of food poisoning pathogens, food and personal hygiene, high risk groups, proper cleaning, etc. There were 18 questions with three possible answers: “yes”, “no” and “do not know”. Each “yes” answer

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assigned one point, rest assigned 0 points. Hence, a maximum of 18 questions were included in this section. The top score for each question was of 100 points, where a score < 50 was regarded for a low level of knowledge in food safety, 50–75 regarded as a satisfactory level, and more than 75 was regarded as good. These questions evaluated food safety attitudes, including food preference, handling, and personal hygiene. There were 16 questions with three possible answers: ‘yes’, ‘no’, or ‘do not know’, with one point for each ‘yes’ and 0 points for the rest.

To ensure appropriate consumers and street vendors were included in the survey, researchers focused on schools, markets, parks, residential communities, and people-intensive streets in the four districts. All respondents participated voluntarily, were over 15 years of age, and were selected randomly. After interviewing 100 respondents, the questionnaire was revised and the new edition used to interview a further 247 respondents for final analyses of consumers.

Statistical analysis

The data obtained from the questionnaires and observation checklists were analyzed using SPSS version 21.0, and then exported to Microsoft Excel to calculate the various scores. We used the following analysis categories:

- Age groups were 18–25, 26–35, 36–45 and >45
- Scores were aggregated into ranges of < 50, 50–75, and > 75 points;
- Consumer income cut-offs were grouped at 2000, 4000, and >6000Tk/month;

Descriptive analyses used mean, standard deviation, maxima, and minima for each age category. Scores were assessed according to age, education, location, income and sex. The two-sample t-test was used to compare data sets in terms of sex and training status. Comparisons of more than two groups were conducted by fixed effects analysis of variance. Data and residual normality were first tested using quantile–quantile plots or the Kolmogorov–Smirnov test, and variance equality was checked using the modified Levene test. Non-normally distributed data sets and those with sample size less than 30 were analyzed using the non-parametric Wilcoxon rank sum test for two category cases, i.e., sex (male or female), food safety training status (trained or untrained) etc., and the Kruskal-Wallis rank sum test was used when there were more than two categories, i.e., age groups, income level, work experience, location (district), and educational level. Statistically significant differences were based on 95% confidence limits, i.e., $\pm = 0.05$ or $p < 0.05$.

Results

In the present investigation, the capital city Dhaka was selected as the research object for the assessment of food safety knowledge, attitudes, and street food suppliers and consumer behaviors. A cross-sectional study was conducted using questionnaires based on previous studies. The food safety knowledge and attitude questionnaire conformed to the national conditions in Bangladesh. Three main areas were addressed in the surveys and statistical analysis that are: 1) statistical data

where gender, age, education, income, food safety training, and specific elements related to the work experience of suppliers included. (2) knowledge of food safety that included the awareness of consumers and suppliers concerning food poisoning by pathogenic microbes, personal hygiene, proper cleaning procedures and high-risk groups and (3) list of food handling attitude and behavior of subjects.

Table 1 summarizes socio-demographic characteristics of the 247 respondents (Consumers). Consumer age ranged from 18 to 72 years (mean, 30.95 ± 11.3 years), with 85.64% between 18 and 45 years of age, and >44.5% was 18–25 years of age; whereas vendor age was somewhat more restricted: 20–55 years of age. Consumers’ education level showed that 23.4% had attained high school, but more than half (53.8%) had university, or postgraduate level education. Consumers’ income showed that 70% of them earned less than 4000 Taka/month.

Table 1: Socio-demographic characteristics of respondents (consumers)

Characteristic	Count	
Gender	Female	123 (49.8%)
	Male	124 (50.2%)
Age (Years)	18–25	110 (44.5%)
	26–35	64 (25.9%)
	36–45	40 (16.1%)
	>45	33 (13.4%)
Education	Illiterate	10 (4.04%)
	Primary school	17 (6.8%)
	Middle school	28 (11.3%)
	High school	58 (23.4%)
	University	133 (53.8%)
Income (Tk./month)	< 2000	102 (41.2%)
	2001–4000	70 (28.3%)
	4001–6000	45 (18.2%)
	>6000	17(6.8%)

Table 2 shows food safety knowledge of street food consumers in Dhaka city. However, many consumers (48, 20%), had poor food safety knowledge (score < 50). There was no significant difference in food safety knowledge with regards to sex ($p = 0.322$), educational level ($p = 0.621$), or monthly income ($p = 0.540$). Mean consumer education = 66 points, and mean food training = 56 points. Thus, consumers need to continue to improve their food safety knowledge.

Generally, younger consumers with higher education had higher levels of food safety knowledge, whereas older consumers had less knowledge, where the consumers aged 26–35 years had the highest level of knowledge and those aged 56–60 years had the lowest. However, there were significant differences between those in the groups aged 18–25 and 46–55 years ($p = 0.04$), 26–35 and 46–55 years ($p < 0.05$), and 26–35 and 56–60 years ($p = 0.02$).

Table 3 shows consumers’ attitudes toward food safety. Consumers also had an adequate understanding of food safety, where more than 70% had scores > 50 points and 18% had scores

Table 2. Food safety knowledge of street food consumers in Dhaka city

Characteristics		Score			
		< 50	50–75	> 75	Mean ± SD
Sex	Female	17 (6.8)	68 (27.5)	38(15.4)	62 ± 15
	Male	29 (11.7)	65 (26.3)	30 (12.1)	60 ± 17
Age (year)	18–25	16 (6.4)	74 (29.9)	16 (6.5)	61 ± 16
	26–35	10 (4.0)	40 (16.2)	14 (5.7)	65 ± 16
	36–45	6 (2.4)	32 (12.9)	2 (.81)	60 ± 16
	>45	9 (3.6)	16(6.5)	8 (3.2)	54 ± 13
	Education	Illiterate	2 (0.9)	6 (2.4)	2 (0.9)
	Primary school	4 (1.6)	12 (4.9)	1 (0.4)	59 ± 13
	Middle school	3 (1.2)	15 (6.1)	10 (4.0)	62 ± 13
	High school	10 (4.0)	32 (14.6)	16 (3.8)	59 ± 14
	Higher education	10 (4.0)	75 (30.4)	48 (19.4)	62 ± 16
Income (Tk./month)	< 2000	20(8.1)	68(27.5)	14 (5.7)	61 ± 16
	2001–4000	13 (5.3)	48 (19.4)	9(3.6)	61 ± 14
	4001–6000	10 (4.0)	22 (8.9)	13 (5.3)	63 ± 14
	6001–8000	9 (3.6)	17 (6.8)	4 (1.6)	63 ± 13

Table 3. Consumer attitudes toward food safety

	Characteristic	Score			
		< 50	50–75	> 75	Mean ± SD
Gender	Female	25 (10.1)	81 (32.8)	17 (6.9)	62 ± 15
	Male	30 (12.1)	78 (31.6)	16 (6.4)	61 ± 15
Age (year):(n=52)	18–25	26 (10.5)	64 (25.9)	20 (8.1)	61 ± 15
	26–35	10 (4.0)	32 (12.9)	22 (8.9)	63 ± 15
	36–45	9 (3.6)	25 (10.1)	6 (2.4)	61 ± 15
	>45	7 (2.8)	16 (6.4)	10 (4.0)	58 ± 15
	Education(n=35)	Illiterate	4 (1.6)	3 (1.2)	3 (1.2)
	Primary school	3 (1.2)	11 (4.4)	1 (0.8)	57 ± 15
	Middle school	4 (1.6)	15 (6.1)	9 (3.6)	63 ± 15
	High school	6 (2.4)	40 (16.2)	12 (4.8)	63 ± 15
	Higher education	18 (7.2)	87 (35.2)	28 (11.3)	61 ± 15
Income (Tk/monthly)(n=56)	< 2000	32 (12.9)	62 (25.1)	8 (3.2)	60 ± 15
	2001–4000	18 (7.2)	46 (18.6)	6 (2.42)	61 ± 15
	4001–6000	4 (1.6)	24 (9.7)	17 (6.8)	68 ± 15
	6001–8000	2 (1.7)	15 (6.1)	10 (4.0)	57 ± 15

> 75 points. Table 3 shows that increased education level significantly increased the proportion of consumers with score > 50 points. Regarding the financial status, we can see that an income of 4001 to 6000 Tk for the consumer showed the highest was (6.8%) on food safety and safety attitude.

Discussion

The main purpose of this study was to assess food safety knowledge and attitudes of street food consumers and vendors, and food handling behavior of food vendors in Dhaka city, Bangladesh. To our knowledge, there are very few studies to evaluate and report these important aspects of street food safety

in Dhaka city. The pure food ordinance of Bangladesh was introduced 1959, and the food safety law in 2013, with stricter food safety terms and further conditions adopted in 2017. Most of the aforementioned concerns, and others discussed in this paper, are addressed in these regulations. However, in the present study we have found that the knowledge, attitudes, and behavior of the food handler had no change. Poor educational level and negligence could be a major factor here. Recommendation from this study is given below:

- There should be extensive training for street food vendors and consumers to improve the safety of street food.
- More implications of policies and measures are important

to improve the food safety knowledge, attitudes, and behavior of the consumers and vendors.

- Possible measures should be taken to improve food handling conditions and facilities, e.g., access to clean water, providing clean & protected structures, and efficient waste collection and disposal systems.

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