

# Food Handler's Understanding Regarding Food Handling Knowledge and Practices and Contributing Factors to Those Practices of Selected Hospital Cafeterias in Dhaka, Bangladesh

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## ABSTRACT

**Background:** Food safety issues are a major concern for the globe and food related diseases impose a great burden on public health in both developed and developing countries.

**Objectives:** This research work is aimed at evaluation of the understanding of the food handler's regarding their food handling knowledge and practices and contributing factors behind those practices of the selected hospital cafeterias in Dhaka city, Bangladesh.

**Study Design:** The study was cross-sectional in nature.

**Methods:** Purposive sampling method was used for selection of both hospital cafeterias and food handlers. A total of 8 hospital cafeterias were selected and 120 food handlers were assessed for knowledge and practice status. Data were collected through face-to-face interview of the food handlers by using a pretested questionnaire and observation checklist. SPSS version 25 statistical packages was used for data management and analysis. Percentage, chi-square test and logistics regressions were used to analyze the data.

**Results:** Among the 120 food handlers, 58 (48.4%) of them aged below 20 years and all (100%) were male. About two-third of the food handlers (70%) had educational level below secondary level. Only 46 (38.3%) of them had training regarding food preparation and handling. 76 (63.3%) of them had heard about food borne diseases. Majority (62.50%) of the food handlers had poor knowledge score. Practice score revealed that majority, 71.67% (86) of food handlers observed were poor in maintaining food handling practices. Univariate analysis showed that training status ( $P=0.000$ ), educational level ( $P=0.000$ ) and monthly income ( $P=0.031$ ) had significant impact on food handling practices. Multivariate logistic regression showed that training status ( $P=0.000$ , AOR=0.049, 95% CI =0.011, 0.225) and educational level ( $P=0.006$ ) had significant impact on food handling practice. There was significant ( $P=0.002$ ) relationship between knowledge score and food handling score of the food handlers of selected hospitals cafeterias of Dhaka city, Bangladesh.

**Conclusion:** Majority of food handlers had poor food safety knowledge and poor food handling practices. The influential factors behind poor food handling practices of the food handlers were poor knowledge, poor educational status and poor training status. Provision of training and food safety and health education programs can improve the situation.

**Keywords:** Food safety knowledge; food handling practices; hospital cafeterias; Dhaka city; Bangladesh

## INTRODUCTION

Food related diseases is one of the most important public health problems both in developed and developing countries. Every year approximately 600 million individuals become ill because of consumption of contaminated food and an approximately 420,000 of these infected loss their lives per year [1]. According to World Health Organization (WHO), each year in developed countries up to 30% of the population suffers from food borne diseases, whereas in developing countries up to 2 million deaths are estimated per annum [2]. The frequency of foodborne illnesses is more prevalent in developing countries because of poor hygiene, absence of drinking water, contaminated and inappropriate food storage facilities and absence of food safety knowledge and lack of practice [3]. There is increasing evidence that food safety has been neglected in developing nations [4]. In developing countries, foodborne diseases may be an important contributor to gastrointestinal disease, and poor hygienic practices during food preparation, handling, and storage are one of the commonest causes of morbidity [5, 4]. Food establishment such as hospital, school, university canteens serving a large number of heterogeneous individuals are responsible to provide safe and wholesome food for their consumers [6]. Outbreaks of foodborne disease can cause morbidity and mortality of patients, attendants and service providers in hospital and in the public leading to increased hospitalization cost for the public health department [7]. An outbreak of foodborne disease outbreaks in hospitals can lead to service disruption, life threatening diseases and even death for anyone who is infected, especially the already vulnerable patients [8]. Foods from hospital cafeterias are served parallelly to the outpatients and also to visitors, employees, the broader community and society [9]. Besides these, high amounts of antibiotics is used in hospitals; so bacteria from patients under treatment may serve as a source of bacterial contamination, with the

antibiotic resistant strains, in the cafeteria ambience. Food contamination by the food handlers is also a major concern in food safety [10]. Empirical data indicates that poor food handling practices by food handlers were responsible for 10–20% of foodborne diseases [11, 12, 13]. Therefore, assessing food handlers' level of food safety knowledge, handling practices is very crucial. There are some studies related to this research in abroad [14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24]. But there is no available evidence on the food safety knowledge and practices of food handlers in hospital cafeterias in Dhaka city, Bangladesh. Hence, this study aimed at assessing food safety knowledge and practices of food handlers in selected hospital cafeterias in Dhaka city, Bangladesh.

## MATERIALS AND METHODS

**Study Area and Period:** The study area was eight hospital cafeterias of Dhaka city, Bangladesh. Among the eight hospital cafeterias, four were from governmental and four were non-governmental hospitals. The study was conducted from August 2019 to February 2021.

**Study Design:** The study design was cross-sectional study.

**Study Population:** All willing and available food handlers during data collection of the selected governmental and non-governmental hospital cafeterias of Dhaka city, were enlisted for knowledge and practice assessment.

**Sampling Method:** Purposive sampling method was used in the study.

**Data Collection Techniques:** After literature survey, structured questionnaire and checklist were developed for data collection. The structured questionnaire was used to collect the response of respondents and the physical observation checklist was designed to obtain information on knowledge and practice of food handlers. The questionnaire was adapted and

modified from previously published studies [18, 20, 24, 25, 26, 27, 28, 29]. The questionnaire was divided into three distinctive parts; socio-demographic, knowledge (8 statements) and practices (8 questions). It was prepared originally in English and then translated into Bengali and back to English. Finally the questionnaire was administered in Bengali. Some minor modifications were carried out after the pilot study.

**Data Analysis:** SPSS version 25 statistical package was used for data management and analysis. Data was entered first and cleaned before analysis. To determine the influence of different socio-demographic variables of food handlers on their practice score, Cross tabulations and chi-squared tests (5% significance level) were used. Based on the summation of individual scores of the variables, the score of knowledge and practice was categorized as: good or poor. The score range for knowledge of food handlers and food handling practices was between 0-8 and the scores were converted to 100 points and food handlers who had a score of above 75% were categorized as good and below it as poor. Eight statements were used to score the food safety knowledge and eight variables were used for scoring overall practice score of the food handlers. Univariate and multivariate analyses were used to identify the Potential influencing factors towards practice. Variables that were found statistically significant in univariate analysis and those under main interests of the study were included in multivariate analysis. The results were presented by appropriate tabulations based on the determined variables, crude or adjusted odds ratio with 95% confidence interval and its corresponding p-values.

## RESULTS

### Socio-demographic characteristics of the food handlers

In this study a total number of 120 food handlers had been participated. Almost half of the food handlers (48.4%) were aged

below twenty years, all (100%) were male, most (70.0) % had educational level below secondary level, nearly half (48.3%) had monthly income between Tk. 6000-10000, 66.7% were unmarried and most (70.0%) had work experience less than six years.

**Table-1: Socio-demographic profile of food handlers of selected hospitals cafeterias of Dhaka city**

Variable	Frequency	Percentage
<b>Age (Years)</b>		
<20	58	48.4
21-30	36	30.0
31-40	12	10.0
41-50	10	8.3
>51	4	3.3
<b>Sex</b>		
Male	120	100
<b>Educational Level</b>		
Illiterate	2	1.7
Class1-8	84	70.0
S.S.C	22	18.3
H.S.C	10	8.3
>H.S.C	2	1.7
<b>Monthly Income (Tk.)</b>		
5,000 and less	40	33.3
6,000-10,000	58	48.3
11,000-15,000	8	6.7
16,000-20,000	8	6.7
21,000 and above	6	5.0
<b>Marital Status</b>		
Unmarried	80	66.7
Married	40	33.3
<b>Work Experience (Years)</b>		
<6	84	70.0
6-10	18	15.0
11-15	10	8.3
>15	8	6.7
<b>Overall</b>	<b>120</b>	<b>100</b>

### Knowledge of the food handlers

To assess the knowledge of the food handlers firstly some general questions regarding food borne diseases, causes of food contamination, route of disease transmission, source of information had been asked. Then eight statements were used to assess the knowledge score.

About 63.3% food handlers were heard about at least one food borne disease. Among the food handlers who were aware about food borne disease, 30.0% knew it from media. According to the food handlers contaminated food (35.0%), contaminated water (36.7%), vector (28.3%) all are important route to transmit food borne diseases. Majority (66.7%) food handlers had opinion that dirty work environment is the main cause of food contamination.

**Table-2: Knowledge of food handlers regarding food borne disease, mode of transmission and way of food contamination**

Variables	Frequency	Percentage
<b>Knowledge of food handlers about food borne disease</b>		
Yes	76	63.3
No	44	36.7
<b>Source of information about FBD</b>		
Health Center	2	1.7
Training	14	11.7
Media	36	30.0
School education	24	20.0
Do not know	44	36.6
<b>Knowledge about route of transmission</b>		
Contaminated food	42	35.0
Contaminated water	44	36.7
Vector	34	28.3
<b>Knowledge about cause of food contamination</b>		
Dirty utensils	6	5.0
Dirty work environment	80	66.7
Dirty hands	20	16.7
Diseased food handler	6	5.0
Do not know	8	6.6
<b>Overall</b>	<b>120</b>	<b>100</b>

**Table-3: Knowledge statements regarding the knowledge of the food handlers**

Variables	Frequency	percentage
<b>Heard about food borne disease before</b>		
Yes	76	63.3%
No	44	36.7%
<b>Healthy people can cause illness by carrying germs to food</b>		
Yes	58	48.3%
No	62	51.7%
<b>Reheating foods contributes to bacterial food contamination</b>		
Yes	54	45.0%
No	66	55.0%
<b>Contact between raw and cooked foods contributes to food contamination</b>		
Yes	50	41.7%
No	70	58.3%
<b>Cleaning and sanitizing utensils reduces the risk of food contamination</b>		
Yes	42	35.0%
No	78	65.0%
<b>Refrigeration and freezing do not destroy most bacteria</b>		
Yes	56	46.7%
No	64	53.3%
<b>Using gloves to handle raw foods reduces the risk of food contamination</b>		
Yes	68	56.7%
No	52	43.3%
<b>Use of jewels such as rings, watches, wearing in food handling cause food contamination</b>		
Yes	48	40%
No	72	60%
<b>Overall</b>	<b>120</b>	<b>100</b>

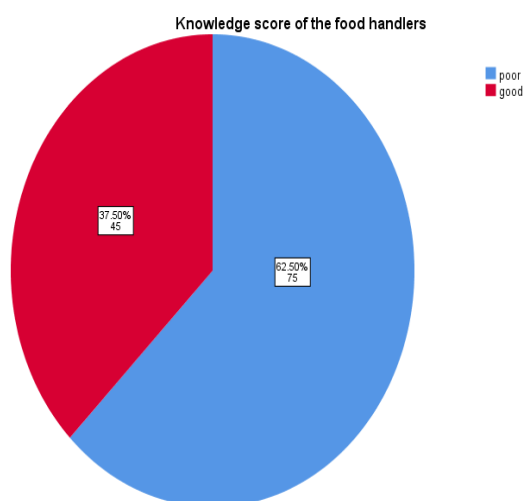
Almost half (48.3%) of the food handlers agreed that healthy people can carry germs to food, 53.3% had opinion that refrigeration and freezing destroy most bacteria, 56.7% agreed that using gloves to handle raw foods reduces the risk of food contamination. More than half (55.0%) of the food handlers did not agree that reheating of the foods contributes to bacterial food contamination, 58.3% did not agree that contact between raw and cooked foods contributes to food contamination,

65.0% did not know that cleaning and sanitizing utensils reduces the risk of food contamination.

### **Knowledge score of the food handlers**

Based on the summation of individual scores of the knowledge statements majority (62.50%) of the food handlers had poor knowledge score. Individuals who scored 6 and above out of 8 knowledge statements were categorized as good knowledge score.

Figure-1: Knowledge score of food handlers of selected hospitals cafeterias of Dhaka city



### Food handling practice of the food handlers

About 28.3% food handler's worn gloves, 35% covered their hair, 48.3% had clean dress, 73.3% check expiry date of ingredients, 80.0% wash their hands before starting any event and 73.3% had short and

clean nail during inspection. All (100%) of the food handlers did not worn apron, 61.7% did not worn any jewellery during inspection. Most of them (61.7%) had no training regarding food preparation and handling.

Table-4: Food handling practices of the food handlers

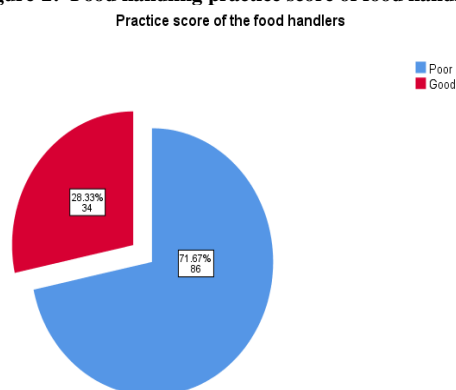
Variable	Frequency	Percent
<b>Food handlers worn gloves during inspection</b>		
Yes	34	28.3
No	86	71.7
<b>Food handlers worn apron during inspection</b>		
Yes	0	0
No	120	100
<b>Food handlers' hair covered</b>		
Yes	42	35.0
No	78	65.0
<b>Food handlers dress</b>		
Clean	58	48.3
Not Clean	62	51.7
<b>Food handlers checking of expiry date of ingredients</b>		
Yes	88	73.3
No	32	26.7
<b>Wash hands before any event</b>		
Yes	96	80.0
No	24	20.0
<b>Finger nail cut short and clean</b>		
Yes	88	73.3
No	32	26.7
<b>Wear jewelry during inspection</b>		
Yes	46	38.3
No	74	61.7
<b>Training acceptance regarding food preparation and handling</b>		
Yes	46	38.3
No	74	61.7
<b>Overall</b>	<b>120</b>	<b>100</b>

### Food handling practice score of the food handlers

Based on the summation of individual scores about 71.67% of them had poor food

handling practice score. Individuals who scored 6 and above out of 8 practiced questions were categorized as good food handling practice.

**Figure-2: Food handling practice score of food handlers**



**Relationship between socio-demographic profile of food handlers and food handling practice score**

On univariate analysis, there was significant difference between good and poor food

handling practice score regarding training status, educational level and monthly income. Age & work experience of the food handlers did not influence the practice score.

**Table-5: Univariate analysis between socio-demographic profile of food handlers and food handling practice score**

Socio-economic variables	Overall practice score		P-value
	Good	Poor	
<b>Age (Years)</b>			0.067
<20	16	42	
21-30	12	24	
31-40	6	6	
41-50	0	10	
>51	0	4	
<b>Training status</b>			0.000
Yes	8	66	
NO	26	20	
<b>Educational Level</b>			0.000
Illiterate	0	2	
Class1-8	14	70	
S.S.C	16	6	
H.S.C	4	6	
>H.S.C	0	2	
<b>Monthly Income (Tk.)</b>			0.031
5,000 and less	14	26	
6,000-10,000	10	48	
11,000-15,000	2	6	
16,000-20,000	4	4	
21,000 and above	4	2	
<b>Work Experience (Years)</b>			0.771
<6	22	62	
6-10	6	12	
11-15	4	6	
>15	2	6	
<b>Overall</b>	<b>34</b>	<b>86</b>	

**Multivariate analysis between socio-demographic profile of food handlers and food handling practice score**

On multivariate analysis, training acceptance was found to be the potential

influencing factor with AOR=0.049%, 95% CI= 0.011, 0.225, P=0.000. Also educational level (P=0.006) was found to have significant effect on food handling practice score of the food handlers.

**Table-6: Multivariate analysis between socio-demographic profile of food handlers and food handling practice score**

Socio-economic variables	Coefficient	95% CI	P-value
No training acceptance	RC		
Training acceptance	0.049	(0.011, 0.225)	<b>0.000</b>
Educational level	-	-	<b>0.006</b>
Age	-	-	1.000
Monthly Income	-	-	0.345
Work Experience	-	-	0.988

### Relationship between knowledge score and food handling score of the food handlers

There is significant relationship between knowledge score and food handling score of the food handlers ( $P < 0.05$ ) of selected hospitals cafeterias of Dhaka city

**Table-7: Relationship between knowledge score and food handling score of the food handlers**

Knowledge score	Food handling practice score		Total	P-value
	Poor	Good		
Poor	61	14	75	<b>0.002</b>
Good	25	20	45	
Total	86	34	120	

## DISCUSSION

There were a lot of studies regarding food handling practices and food safety knowledge of food handlers. But less concentration has been given in case of hospital cafeteria food handlers [30]. This study aimed at assessing food safety knowledge and food handling practices of food handlers of selected hospital cafeterias in Dhaka city, Bangladesh. Only 37.5% of the food handlers of this study had good knowledge about food borne diseases, food handling and food safety which is consistent with the studies conducted in northern Ethiopia [31], eastern Ethiopia [32] and India [33] and far below the study conducted by Zain [34]. Most (63.3%) of the food handlers were aware about food borne diseases that is they heard (at least one time) about food borne diseases before. Majority (66.7%) of the food handlers had opinion that dirty work environment is the main cause of food contamination. But their knowledge about other causes, mode of transmission and others associated factors was not satisfactory. More than half of the food handlers did not agree that reheating of the foods contributes to bacterial food contamination, contact between raw and cooked foods contributes to food contamination, cleaning and sanitizing utensils reduces the risk of food contamination, wearing of jewels in food handling can cause food contamination.

Almost half of the food handlers agreed that healthy people can carry germs to food, using gloves to handle raw foods reduces the risk of food contamination. More than half of the food handlers had opinion that refrigeration and freezing destroy most bacteria.

Only 28.33% of the food handlers had good food handling practices which is close to the studies conducted in Gondar, Ethiopia (30.3%) [35], Arba-Minch (32.6%) [36] And higher than the studies conducted in Somali (20.9%) [37]. But the finding is lower than the studies conducted in Jordan [39], Northwest Ethiopia [40] and Malaysia [38]. These differences may be due to the differences in institutional settings, study design, study instruments, socio-demographic and economic status, time and region of the study etc. Not a single food handler worn apron during inspection. The frequency of using gloves and hair cover was also very low. Nearly half of the food handlers had clean dress during inspection. Most of the food handlers used to check expiry date of ingredients, wash their hands frequently, cut their nail short and did not wear any jewellery during inspection. Most of the food handlers had no training regarding food preparation and handling. This study showed that there was a significant effect of educational level on food handling practice score of the food handlers which is consistent with some

other studies [41,42,43]. Also there was a positive effect of training status and monthly income on the practice score of the food handlers. On multivariate analysis, the training acceptance and educational level showed significant effect on the food handling practice score of the food handlers. Training acceptance have 4.9 times higher chance to improve the practice score of the food handlers. This study showed that work experience had no impact on knowledge and practice score of the food handlers similar to some studies [44]. This study also revealed that there is significant relationship ( $P < 0.05$ ) between knowledge score and food handling score of the food handlers.

## CONCLUSION

The study observed that majority of food handlers had poor food safety knowledge and poor food handling practices. But compared to the knowledge, practices seemed inferior to knowledge. Poor knowledge, poor educational status and poor training status were all contributing factors for poor food handling practices of the food handlers. Provision of food safety training emphasizing correction of undesirable food handling practices and health education programs can improve the situation.

**Ethical Approval:** Ethical permission has been taken from the cafeteria manager as well as from the food handlers of the study

## Declarations

### Author contributions statement:

Supriya Ghosh: Collected the data, analyzed and interpreted the data, wrote the paper  
Sharmin Rumi Alim: Conceived, designed and supervised the study.

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**Conflict of Interest:** The authors declare no conflict of interest.

**Data availability statement:** Data associated with this study has been deposited at the Department of Food Technology and Nutrition Science, Noakhali Science and Technology University, Noakhali-3814, Bangladesh.

**Additional information:** No additional information is available for this paper.

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