

# Food Safety Knowledge and Handling Practices of Adult Rural Women: A Cross-sectional Survey

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## Abstract

### Background:

Food contamination can occur in any step of handling of food from “farm to table” and lead to a variety of food borne diseases which can cause increased morbidity and mortality. Food handlers play a vital role in transmitting these diseases and pose a significant threat to public health.

### Objective:

This study was aimed to assess knowledge about food safety and handling practices of adult rural women who were actively involved with food preparation.

### Methods:

A cross-sectional descriptive study was conducted among 664 adult rural women involved with food preparation of households in six villages of Taraganj Upazila, Rangpur district from 20th September 2023 to 19th October 2023. Pre-tested semi-structured questionnaire was used to collect data and face-to-face interview with the respondents were performed.

### Results:

About 46.1% participants were between the age group of 18-34 years (Mean±SD=36.07±11.6 years). 58.9% educational status was below SSC.43.2% respondents had monthly family income between (10,001-20,000) taka. 95.2%of the respondents did not attend any type of food safety training or session. Among all 47.0% had good knowledge and only 13.4% had good handling practice. 98.8% respondents knew about hand washing before food preparation but only 78.3% practiced it. About 81.5% of respondents knew that keeping raw fish/meat/vegetable in same bag/vessels is harmful to health, but during practice 70.6% participants reported that they always used separate utensils for raw and cooked food during food preparation. 93.8% knew that raw fish, meat, and eggs should be completely cooked, and food should be served piping-hot, although 41% of them always practiced thorough cooking and re-heating cooked foods until it is piping-hot. 89.5% of respondents knew that expiry date of packed/canned food should be checked before eating/cooking but 66.6% always threw away expired foods. 98.9% of the respondents said that it is mandatory to wash raw fruits and vegetables with safe water before cooking/eating but 84.6% of them practice this. 81.2% knew that diarrhea/skin disease of cook can contaminate food, 70.9% of them avoid serving food while they are infected with these diseases. The association between food handling practice and food safety knowledge was strongly significant ( $p<.001$ )

### Conclusion:

The findings of this study portray the importance of education and awareness and training or courtyard session about safe food handling knowledge for prevention of food borne illness to decrease mortality and morbidity from these diseases.

**Keywords:** Food safety knowledge, Handling practice, Food contamination, Food borne diseases

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### **Introduction:**

Food borne illness, a major problem of the modern world, is a cause of increased morbidity and mortality and a significant public health problem. Food safety, according to the World Health Organization (WHO), is described as the circumstances and actions required during the preparation, production, processing, storage, and distribution of food to ensure that it is wholesome, safe, and fit for human consumption.<sup>1</sup> World Food Safety Day is observed on June 7th each year with an aim to raise awareness of food safety issue,<sup>2</sup> it includes environmental cleanliness; chemical safety, microbiological safety, and personal hygiene.<sup>3</sup> One in ten people throughout the world get sick because of eating contaminated food. 33 million healthy life years (DALYs) are lost as a result each year. And it costs low- and middle-income countries' economies USD 110 billion annually in lost productivity and medical expenses.<sup>4</sup> Food handlers can be the greatest source of infection since they handle food products directly. Several studies have shown that while food handlers of all ages believe that they understand how to handle food safely, their self-reported food handling practices contradict this belief.<sup>5</sup> Food safety is an issue for any country, but it is particularly difficult in low- and middle-income nations. An outbreak of a food-borne disease can have disastrous effects, as the listeriosis outbreak in South Africa in 2017-2018 served as a reminder, highlighting the need for improved food safety regulations and interventions.<sup>6</sup> In the European Union, household accounts for one-third (36.4%) of the reported food-borne outbreaks, followed by restaurants, cafes, bars, hotels (20.6%), and schools and kindergartens (5.5%). A weak link can result in significant morbidity and mortality from foodborne illness, even in cultures with highly developed food safety systems, such as "farm-to-fork" in Europe and "farm-to-table" in the United States.<sup>7</sup> Nearly 150 million people in Southeast Asia experienced food-borne illnesses in 2010, which resulted in 175,000 fatalities. A rough 50% of malnutrition is not caused by a lack of food or a poor diet, but rather by inadequate water and sanitation facilities, as well as unhygienic practices that result in life-threatening illnesses and infections like diarrhea.<sup>8</sup> According to survey done across the country, 13.2% of food poisoning cases in India occur in households and 40% are caused

by food that was cooked at home.<sup>9</sup> The reality that domestic food handlers constitute a crucial link in the food chain is shown by the fact that more than 95% of food poisoning episodes are sporadic, rare, and start at home. Without their knowledge, all regulatory efforts may be challenged.<sup>10</sup> Bangladesh's population density, poor infrastructure, lack of clean water, and inadequate sanitation and hygiene (WASH) facilities contribute to high foodborne diseases and safety hazards. Over 30 million people develop foodborne illnesses annually, with acute gastroenteritis being the most common, accounting for over 0.28 million cases in 2015. Enteric fever and hepatitis affect around 30,000 and 500 people, respectively, each year.<sup>3</sup> The Bangladesh Food Safety Authority (BFSA) was established in 2013 to improve food safety in Bangladesh. Recent academic studies have focused on the knowledge and practices of food handlers in the country.<sup>11</sup> The study aims to assess food safety knowledge and practices among rural women in selected villages of Taragonj Upazila, Rangpur district, as monitoring healthy food handling practices among these women, who are the primary food handlers in rural households, is challenging due to high population density.

### **Methods:**

This study was conducted from 20th September 2023 to 19th October 2023 in selected villages of Taraganj Upazila, Rangpur to assess food safety knowledge and handling practices among rural women. This cross-sectional descriptive study was carried out among 664 willing rural women of 18 years or above and who were directly involved in household food preparation. Data were collected conveniently in selected six villages namely Bangalipara, Ghanirampur, Majhapara, Dokkhinhajipur Majhapara, Ikorchali, Soyar, Doalipara through face-to-face interview with the respondents with a pretested semi structured questionnaire. Permission from proper authorities were taken with verbal consent of the respondents and no harm to any man or animal was done. Knowledge and practice related questions were based on WHO five keys for food safety namely Keep clean, separate raw and cooked food, keep food at safe temperature, use safe water and raw material, cook thoroughly and also on cross contamination and checking expired food.<sup>12</sup> There were 19 statements to assess food safety knowledge

where the responses were true/false, 1 for each correct answer and 0 for wrong one. Using Bloom's cut-off point knowledge score was categorized as score above 80% as good knowledge, score of 60%-79% as average knowledge and score below 60% were considered as poor knowledge. For assessment of practice (self-reported) a 19-item questionnaire was selected, and each item was assessed using a 4 point "Likert Scale"-always, most of the time, occasionally, never where corresponding marks were 3,2,1,0 respectively with a maximum score of 45. Practice score was also categorized using Bloom's cut-off point as stated above in case of knowledge. Collected data were checked, verified, edited and analyzed using software SPSS version-23.

#### Results:

Out of 664 participants, 46.1% were aged 18-34, 43.2% had monthly family income between 10001-20000 taka, and 58.9% had an educational status below SSC (Table-I)

**Table-I: Distribution of the respondents by socio-demographic characteristics (N=664)**

Attributes	no. (%)
<b>Age group (Years)</b>	
18-34	306(46.1)
35-50	289(43.5)
≥51	69(10.4)
Mean ± SD	36.07±11.6
<b>Educational Status</b>	
Illiterate	142(21.4)
Below SSC	391(58.9)
SSC and above	131(19.7)
<b>Monthly income (Taka)</b>	
10000	269(40.5)
10001-20000	287(43.2)
≥ 20001	108(16.3)
Mean ± SD	16231.48±13617.52

Majority (95.2%) of the respondents did not attend any type of training or session/courtyard meeting/nutrition education about food safety (Figure-1).



**Figure-1: Distribution of respondents by their food safety related training session/ courtyard meeting/ nutrition education experience of the respondents (N=664)**

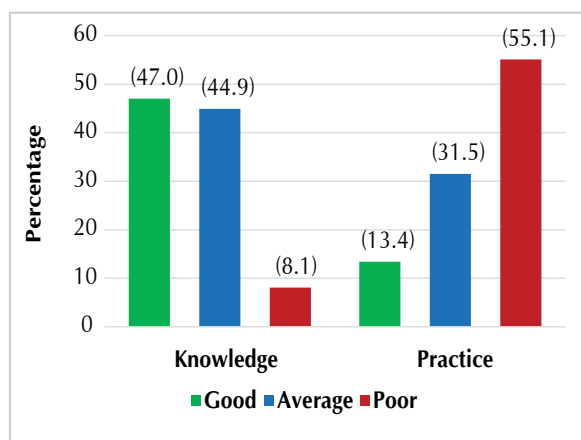
Table-II showed that 98.8% of participants agreed that hand washing is essential before preparing and serving food, but only 78.3% practiced it. 81.5% of respondents mentioned that raw fish, meat, and vegetables should not be kept in the same bag or vessel, but 70.6% participants always and 17% participants most of the time used separate utensils. Most respondents (93.8%) agreed that raw fish, meat, and eggs should be completely cooked and cooked food should be re-heated until piping hot. But only 41% respondents always practiced it, whereas only 19.3% practiced it most of the time. Most respondents (89.5%) agreed that checking expiry dates of packed or canned food before cooking or eating is necessary, but less than half (45.8%) did. Most participants (98.9%) correctly answered that washing raw fruits and vegetables with safe water is mandatory, and 84.6% always practiced it. About 81.2% accepted the possibility of food contamination due to diarrhea or skin diseases, but only 29.1% avoided preparing or serving foods when contaminated.

Less than half (47%) of the respondents had good knowledge about food safety but only 13.4% had good practice level in food handling. 44.9% respondents had moderate knowledge, whereas 8.1% respondents had poor knowledge on food safety. Regarding food handling practice 31.5%

**Table-II: Distribution of respondents by correct responses on knowledge statements and self-reported practices (N=664)**

Key statements	Knowledge domain no. (%)	Practice domain			
		Always no. (%)	Most of the time no. (%)	Occasionally no. (%)	Never no. (%)
Washing hands before food preparation and serving	656(98.8)	520(78.3)	98(14.8)	40(6.0)	6(0.9)
Separating raw and cooked food	541(81.5)	469(70.6)	113(17.0)	59(8.9)	23(3.5)
Thorough cooking and proper re-heating for maintaining safe temperature	623(93.8)	272(41.0)	128(19.3)	171(25.8)	93(14.0)
Checking and throwing away expired foods	594(89.5)	442(66.6)	75(11.3)	44(6.6)	103(15.5)
Use safe water and raw materials	657(98.9)	562(84.6)	70(10.5)	24(3.6)	8(1.2)
Cross contamination	539(81.2)	193(29.1)	132(19.9)	153(23.0)	186(28.0)

had moderate practice level and more than half (55.1%) respondents had poor practice (Figure-2).



**Figure-2: Distribution of respondents by their food safety knowledge and practices (self-reported) (N=664)**

Table-III showed the association between food handling practice with food safety knowledge. Participants who did good food handling practice had also good knowledge on food safety. Food handling practice was significantly associated (pearson’s chi square test, p value<0.001) food safety knowledge.

**Table-III: Association of food handling practice with food safety knowledge (N=664)**

Attributes	Food handling practice			p-value
	Good (n=89)	Average (n=209)	Poor (n=366)	
<b>Food safety knowledge</b>				
Good	312	59(66.3)	112(53.6)	141(38.5)
Average	298	28(31.5)	85(40.7)	185(50.5)
Poor	54	2(2.2)	12(5.7)	40(10.9)

Pearson’s Chi-Square test

**Discussion:**

The study surveyed 664 rural women in Taragonj Upazila, Rangpur, focusing on food safety knowledge and handling practices. The majority were aged 18-34 (46.1%), with 58.9% having education qualifications below SSC and 43.2% having monthly family incomes 10,001-20,000 taka. Most participants did not attend any food safety training or nutrition education. The study found that 98.8% of respondents knew that hands should be washed before preparing or serving food, similar to a KAP study in Bangladesh where 99% of respondents knew this. Proper hand washing is essential to prevent foodborne illnesses,

and the study highlights the importance of proper food handling practices.<sup>13</sup>

A study in Hyderabad, India<sup>14</sup> found that 90% of respondents always properly wash their hands before cooking or serving food, contrasting with us only 78.3% who did both before and after cooking, possibly due to inadequate health education. About 81.5% of our respondents knew that keeping raw fish/meat/vegetable in same bag/vessels is harmful to health. Whereas only 69.2% of the respondents in the KAP study of Bangladeshi household agreed that keeping raw and cooked food separately helps to prevent illness which appears very low in comparison to our study. But during practice 70.6% participants reported that they always used separate utensils for raw and cooked food during food preparation. According to WHO 5 keys for food safety thorough cooking has a prominent role in preventing food borne illness. Majority of our respondents (93.8%) knew that raw fish, meat, and eggs should be completely cooked, and food should be served piping hot. This finding is different from a KAP study conducted on food handlers of eThekweni districts, South Africa, where most (92.5%) food handlers didn't appreciate the importance of thorough cooking or temperature control.<sup>15</sup> Although 41% of our respondents always practiced thorough cooking and re-heating cooked foods until it is piping hot. About 89.5% of our respondents knew that expiry date of packed/canned food should be checked before eating/cooking. Regarding practice, more than half of our respondents (66.6%) always throw away expired foods which differs from the study conducted in eThekweni district where all (100%) food handlers inspect or discard food that has passed its expiry date.<sup>15</sup> It clearly showed the importance of conveying messages and health education about checking expiry dates and throwing away expired foods. Almost all (98.9%) of our respondents said that it is mandatory to wash raw fruits and vegetables with safe water before cooking/eating. About 84.6% of our respondents properly washed fruits and vegetables with safe water before cooking or eating which was clearly more than a study conducted on Lebanese University students where only 26.8% students properly practiced it.<sup>7</sup> The study found that 81.2% of respondents knew that communicable diseases like diarrhea/skin disease can contaminate food, leading to foodborne

illnesses. However, 28% never avoided serving food when infected. Of the 664 participants, 47% had good knowledge about food safety, while 13.4% had good practice in food handling. About 44.9% had moderate knowledge, while 8.1% had poor knowledge. About 31.5% of participants had moderate practice level and more than half (55.1%) had poor food handling practice. The study found that respondents' food handling practice was significantly associated with food safety knowledge ( $p < 0.001$ ).

#### **Conclusion:**

The current study found that 47% had good knowledge about food safety, 44.9% had moderate knowledge, while 8.1% had poor knowledge. This lack of knowledge is insufficient to prevent cross-contamination and foodborne diseases. The study also found that only 13.4% had good food handling practice, while 31.5% had moderate level of food handling practice and over half (55.1%) had poor food handling practice. The findings highlight the need for continuous food safety education and awareness training in rural households to ensure safe food handling practices.

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