World Journal of Public Health
2025, Vol. 10, No. 2, pp. 77-87
https://doi.org/10.11648/j.wjph.20251002.11

Research Article

Investigating the Role of Socio-Demographic Factors in Shaping Consumer Attitudes Towards Food Safety in Bangladesh: A Cross-Sectional Study

Md. Abdullah Al Mamun Hridoy[1, *], Md. Hafijul Islam[2], Andleeb Masood[3], Zulfaqar Sa'adi[4], Niraj Bohora[5], Md. Saiful Islam[6], Monoara Akter Lima[7], Md. Khalid Hasan[8], Dewan Hasan Al Mostakim[5], Asif Al Jami Rajin[9], Mominul Haque[9], Md. Mahdi Hasan Munna[5], Md. Musfikur Rahman[7], Nusrat Bahar[10], Anik Sarker[1], Pritam Kummer Barmon[9], Md. Mehedi Hasan[11], Kazi Rafsan Zaman[9], Munni Begum[1]

[1]Faculty of Fisheries, Sylhet Agricultural University, Sylhet, Bangladesh

[2]Department of Marine Fisheries and Oceanography, Patuakhali Science and Technology University, Patuakhali, Bangladesh

[3]School of Physical Science and Technology, Southwest Jiaotong University, Chengdu, China

[4]Centre for Environmental Sustainability and Water Security, Research Institute for Sustainable Environment, Universiti Teknologi Malaysia, Johor Bahru, Malaysia

[5]Faculty of Agriculture, Sylhet Agricultural University, Sylhet, Bangladesh

[6]Department of Marine Fisheries Science, Bangladesh Agricultural University, Mymensingh, Bangladesh

[7]Department of Marine Bioresource Science, Faculty of Fisheries, Chattogram Veterinary and Animal Sciences University, Chattogram, Bangladesh

[8]Faculty of Fisheries, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh

[9]Faculty of Agricultural Economics & Business Studies, Sylhet Agricultural University, Sylhet, Bangladesh

[10]Department of Marketing, Faculty of Business Studies, Bangladesh University of Professionals, Dhaka, Bangladesh

[11]Department of Aquatic Resource Management, Faculty of Fisheries, Sylhet Agricultural University, Sylhet, Bangladesh

Abstract

Background: Food safety remains a major public health concern globally, with foodborne illnesses resulting in significant morbidity and mortality. In Bangladesh, food safety is compounded by challenges such as poor infrastructure, weak regulatory systems, and low public awareness. The increase in foodborne diseases, especially in urban areas, calls for an investigation into consumer attitudes and practices regarding food safety. *Objectives:* This study aims to examine the influence of socio-demographic factors (age, gender, education, income, occupation, household size) on consumer attitudes toward food safety and to assess the level of knowledge and awareness about food safety practices among consumers in Bangladesh. *Methods:* A cross-sectional survey was conducted from October to December 2024 across 19 districts in Bangladesh, involving 511 food

[*]Corresponding author: Aamhridoy.fisheries@student.sau.ac.bd (Md. Abdullah Al Mamun Hridoy)

Received: 17 February 2025; **Accepted:** 3 March 2025; **Published:** 21 March 2025

consumers. Data were collected through face-to-face interviews using semi-structured questionnaires. Analysis in RStudio 4.3.2 included descriptive statistics, and multivariate, and multinomial logistic regression to assess predictors of food safety attitudes and knowledge. *Results:* The study found that education level significantly influenced food safety attitudes ($p = 0.002$). However, factors like age, gender, and income had no significant impact. Respondents also lacked knowledge about foodborne pathogens, such as Hepatitis A, highlighting gaps in food safety awareness. *Conclusion:* Consumer education is crucial for improving food safety practices. Policy interventions should focus on enhancing public knowledge, particularly among vulnerable populations, to reduce foodborne diseases in Bangladesh.

Keywords

Food Safety, Awareness, Practice, Bangladesh

1. Introduction

Food safety is a major concern of global public health as well as economic development and social stability. Foodborne illnesses are caused by unsafe food contaminated with harmful bacteria, viruses, chemicals, or physical agents that can lead to significant morbidity and mortality worldwide. An estimated 600 million people – or 1 in 10 – get sick because of contaminated food each year according to the World Health Organization (WHO) [57]. Foodborne illnesses go beyond being a health issue — they are a serious economic burden costing billions in healthcare costs and lost productivity yearly [23, 42, 44]. Foodborne diseases are a major health concern in low and middle-income countries, with poor infrastructure, weak regulatory systems, lack of public knowledge about food safety practices [34, 45]. In addition, climate change, as well as globalization, brings about new challenges: the spread of foodborne pathogens, and the complexities of international food supply chains [8, 37, 61]. Food safety has uniquely become a global priority due to the COVID-19 pandemic. The pandemic also brought changes in consumer priorities, as they switched the demand for safe and hygienically packaged food, which adds new opportunities and challenges to the field of food safety regulations and practices around the world [12, 62].

Bangladesh, a lower-middle-income country with a GDP per capita of $2,529 and a literacy rate of 74.66%, grapples with critical development challenges like malnutrition and poverty, which hinder progress in enhancing food safety [54, 58]. These challenges are intensified by factors such as rapid urbanization, a growing population, and changing dietary habits. Additionally, the country faces various food safety threats, including chemical contamination, microbial infections, and physical hazards in its food supply. Despite advancements in agriculture and food production, food safety remains compromised by widespread food adulteration, improper handling, and lack of adherence to hygienic practices [18, 25, 33]. Food adulteration, such as the use of chemical contamination in fruits, vegetables, fish, and dairy products, has been widely reported, creating significant health concerns [33, 48, 51]. Moreover, street food, a major component of urban diets, often lacks proper hygiene, exposing consumers to foodborne illnesses [2, 9, 36, 46]. The absence of stringent enforcement of food safety regulations and limited public awareness further exacerbate the situation. As a result, food safety concerns threaten public health, undermine consumer confidence in the food supply chain, and impede the country's economic progress [63, 47].

Bangladeshi consumers' food habits are almost cereal-dominated. Rice and wheat account for 62% and 54%, respectively, of the total consumption of all foods per capita per day in rural and urban areas [11]. Since Bangladesh is a riverine country, fish contribute more or less 60% of the total animal protein demand of Bangladesh [10, 49]. Food safety in Bangladesh is a critical public health issue that has acquired surging attention due to the high prevalence of foodborne diseases and the associated socio-economic implications. The country faces significant challenges in ensuring food safety, particularly in urban areas where food vending is prevalent. Studies have indicated that a substantial portion of street-vendor food is contaminated, with microbiological analyses revealing alarming levels of pathogenic bacteria, including various strains of *Escherichia coli* and *Salmonella* [40, 32]. The lack of proper sanitation and hygiene practices among food vendors escalates this issue, leading to an intensified risk of foodborne illnesses among consumers [20, 29, 27]. A survey of food practices among various allies, including street food vendors, food handlers, and consumers, is essential for understanding the current scenario and pinpointing the areas for improvement. This survey was executed with the core objective of assessing the level of awareness among stakeholders (vendors and consumers) about food safety standards and regulations and analysing the risk associated with inadequate food safety practices Previous studies have revealed that improper food handling and hygiene practices are prevalent among food vendors and handlers in Bangladesh, contributing to the high incidence of foodborne illnesses [3, 63]. Moreover, the lack of awareness regarding food safety regulations and standards further complicates the situation, necessitating a comprehensive assessment of current practices and knowledge gaps [3].

Thus, the purpose of the study was to explore the influ-

ence of socio-demographic characteristics, such as age, sex, education level, income level, occupation, and household size of consumers to formulate their attitude towards food safety in Bangladesh. Furthermore, it aims to evaluate the existing knowledge and awareness of food safety practices among Bangladeshi consumers. The study also provides valuable insights into the relationships and gaps in the perception and understanding of food safety issues, which could assist in establishing effective interventions and policies to promote food safety in the region.

2. Materials and Methods

2.1. Study Design

This cross-sectional study was conducted between October to December 2024, using semi-structured questionnaires and face-to-face data collection through KoboToolbox. The study gathered data from food consumers above 18 years old who are residents of Bangladesh. The study focused on fish markets in both the northern and southern regions of the country, covering a total of 19 districts (Figure 1).

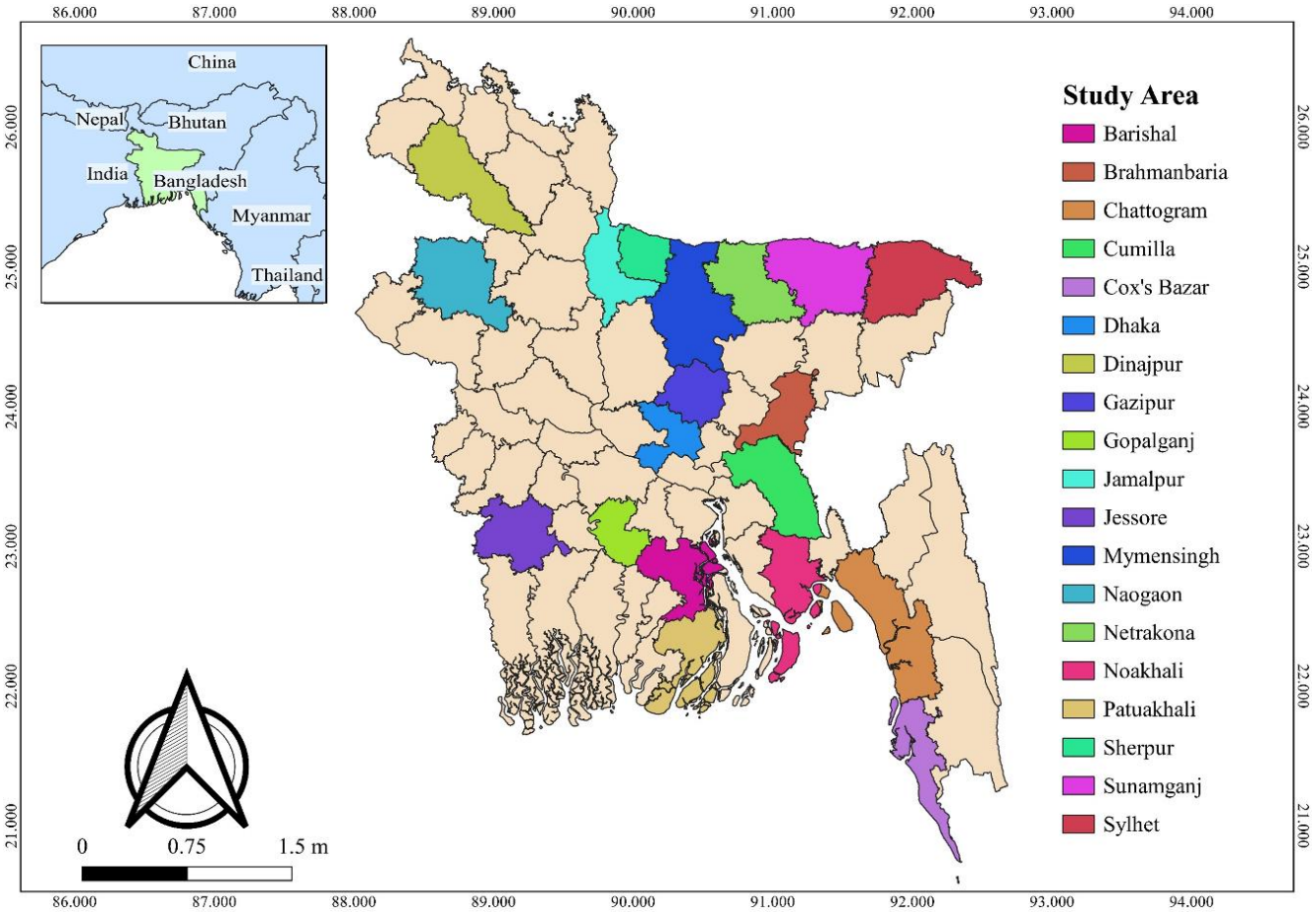

Figure 1. *The map in the top left (light sky blue) represents the World Map, with Bangladesh highlighted in a light green to indicate its location. In the middle right, the map displays the entire country of Bangladesh with district boundaries marked using different colors with legend shown.*

The sample size for the proportion was determined using Open-Source Epidemiologic Statistics for Public Health (OpenEpi v3.01), with an anticipated prevalence (p) of 68.3% of respondents possessing knowledge of food safety [41]. Therefore, all-time data monitoring ensures all data are appropriate in this study, and these questionnaires are reviewed by professional persons (two university professors, one Upazila Fisheries Officer, and one food Nutritional specialist).

2.2. Determination of the Number of Food Consumers

To determine the necessary sample size, the Yamane equation was applied to find the number of food consumers (n) needed for the study [59].

$$n = N/(1 + Ne^2)$$

In this equation, 'n' represents the sample size, 'N' denotes the population size, and 'e' signifies the level of precision, set at 5% with a corresponding 95% confidence interval. The overall population of consumers in the North-South region was 2,040,000 [54]. Using Yamane's equation, the calculated sample size (n) was 399. However, the final total sample consisted of 511 participants.

2.3. Data Collection

Primary data were collected using a face-to-face interview and a Focus group discussion (FGDs) method applied for this survey. Non-Bangladeshi individuals were excluded from the study. Initially 73 consumers pre-tested for the final survey but were not included in this study. The necessary modifications were made to ensure the questions were clear for the final survey. The questionnaires aim to assess food safety, hygiene practices, foodborne illnesses, and the level of knowledge, attitudes, and practices regarding challenges in ensuring food safety. The questionnaires consisted of four sections (I-IV): Section I. *Demographic Information*; Section II. *Consumer Attitudes Towards Food Safety*; Section III. *Knowledge and Awareness of Food Safety*; Section IV. *Challenges and needs* (Additional file).

2.4. Ethical Standard

The research complied with institutional protocols and received approval from the Ethics Board of the Institutional Review Board at Sylhet Agricultural University, Bangladesh [Memo no: SAU/Ethical committee/APR/24/05]. It adhered to the medical ethical principles established in the Helsinki Declaration of 1975. Before participation, written consent was secured from the consumers involved in the study.

2.5. Data Analysis

A descriptive analysis was conducted for all continuous and categorical data, including the mean, standard deviation, frequency, and percentage calculations as well as Multivariate logistic regression analysis. The data were analyzed using R programming within RStudio (version 4.3.2), with statistical significance defined as $p < 0.05$.

3. Result

Table 1 presents the demographic distribution of respondents and highlights the influence of these factors on consumer attitudes towards food safety in Bangladesh. The majority of respondents were aged 18-30 years (38.16%), followed by 31-40 years (23.09%). Gender distribution revealed that males comprised 72.99% of the sample, while females accounted for 27.01%. Most respondents were married (56.75%), and education levels varied, with 30.14% having a graduate degree or higher and 6.26% being illiterate. Monthly household income was distributed across four categories, with the highest proportion (27.01%) earning BDT 20,001-40,000. Household size was predominantly 3-4 members (45.79%), followed by 5-6 members (36.99%).

Table 1. *Demographic Factors in Shaping Consumer Attitudes Towards Food Safety in Bangladesh.*

Variable	Percentage	Frequency
Age		
18-30	195	38.16
31-40	118	23.09
41-50	81	15.85
51-60	72	14.09
Above 60	27	5.28
Below 18	18	3.52
Gender		
Male	373	72.99
Female	138	27.01
Marital Status		
Married	290	56.75
Single	194	37.96
Divorced/ Widow	27	5.28
Highest Level of Education Completed		
Graduate and above	154	30.14
Undergraduate	147	28.77
Higher Secondary	89	17.42
Secondary school	56	19.96
Primary school	33	6.46
Illiterate	32	6.26
Monthly Household Income		
BDT 20,001 - 40,000	138	27.01
Below BDT 10,000	136	26.61
Above BDT 40,000	120	23.48
BDT 10,000 - 20,000	117	22.9
Household Size		
3-4 members	234	45.79
5-6 members	189	36.99
7 or more members	44	8.61
1-2 members	44	8.61

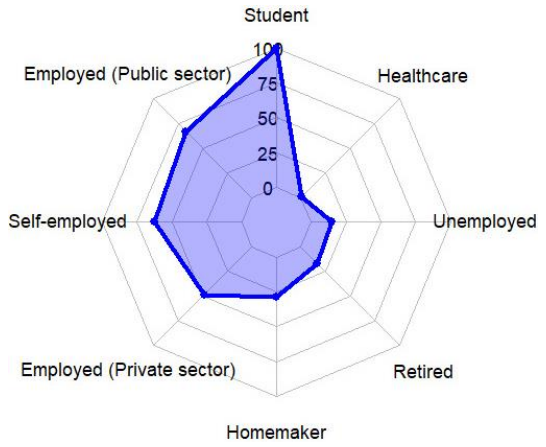

Figure 2. *The radar plot displays the distribution of various occupations among the respondents, highlighting the frequency of each occupation category as a percentage of the total (N- 511).*

The radar plot (Figure 2) demonstrated the occupational distribution among respondents, emphasizing that occupation influenced knowledge and practices significantly. Occupations such as healthcare and food-related industries showed greater food safety awareness. In the bar plots, most respondents checked expiry dates before purchasing or consuming food, with noticeable differences in practices based on occupational categories.

As shown in Table 2, regression analysis indicated that most demographic and socio-economic factors, such as age, gender, and monthly household income, did not significantly predict consumer attitudes toward food safety (p-values > 0.05). However, education level was a statistically significant predictor ($p = 0.002$), highlighting its critical role in shaping food safety attitudes.

Table 2. *Regression Analysis of Demographic and Socio-Economic Factors Influencing Food Safety Consumers.*

Factors	B	SE	t	*p*-Value
Age in Years	-0.7143	2.4744	-0.2887	0.7872
Gender	-1.0875	1.0245	-1.0615	0.2889
Education level	−13.33	3.99	7.05	0.002
Monthly Household Income	-2.70	5.588	-0.483	0.677

Note: B- Regression Coefficient; SE- Standard Errors (SE).

Table 3 presents the results of a multinomial logistic regression analysis examining the relationship between food safety confidence and two predictors: food safety practices (food safety in shopping) and knowledge confidence. The analysis shows that knowledge confidence (disagree) has a highly significant negative effect on food safety confidence, with a p-value of less than 0.001. Furthermore, belief: Strongly Agree and Food Safety While Shopping (Disagree) are statistically significant predictors of food safety belief, with p-values of 0.011 and 0.004, respectively. Other predictors, such as Belief: Agree, Food Safety Shopping (Agree), and Confidence in Knowledge (Agree), show non-significant results with p-values greater than 0.05.

Table 3. *Multinomial Logistic Regression Results for Predicting Belief in Food Safety Based on Food Safety Practices and Knowledge Confidence.*

Factors	B	SE	Z - value	*p*-value
Belief: Disagree	1.79	1.08	1.66	0.097
Belief: Agree	-8.88	321.86	-0.10	
Belief: Strongly Agree	2.64	4.63	2.55	0.011
Purchase Food Safety (Disagree)	-4.50	1.35	-2.87	0.004
Purchase Food Safety (Agree)	0.34	97.02	0.16	0.871
Purchase Food Safety (Strongly Agree)	8.98	12.52	0.17	0.786
Knowledge Confidence (Disagree)	-3.52	0.00	-22.17	<0.001

Factors	B	SE	Z - value	*p*-value
Knowledge Confidence (Agree)	14.18	72.00	0.20	0.844
Knowledge Confidence (Strongly Agree)	10.64	72.04	0.15	0.883

Note: Coefficients (B), Standard Errors (SE), Belief- (Do you believe that food safety practices can reduce the risk of foodborne diseases?), Purchase- (How often do you consider food safety when purchasing food?), Knowledge Confidence- (How confident are you in your knowledge of food safety practices?), 5% level of significance.

This bar graph compares the percentage of correct, "don't know," and incorrect responses on three topics: food safety guidelines, hepatitis A virus, and food trucks from manufacturers. The majority of respondents answered the questions about food safety guidelines and food trucks from manufacturers correctly (Figure 4), while the majority indicated they didn't know the answer to the hepatitis A virus, shown in letters, indicating differences in response proportions within each topic (Figure 3).

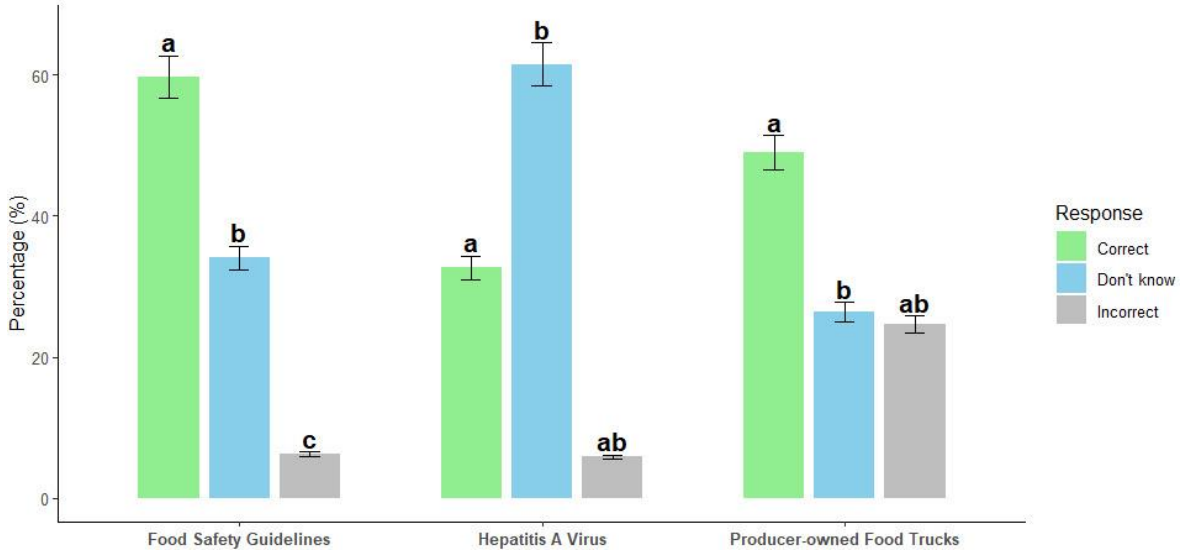

Figure 3. *Food Safety Knowledge and Responses: (Are you aware of food safety guidelines, such as proper food storage or cooking temperatures?); (Hepatitis A virus is a foodborne pathogen.); (Producer-owned food trucks increase the risk of food poisoning.).*

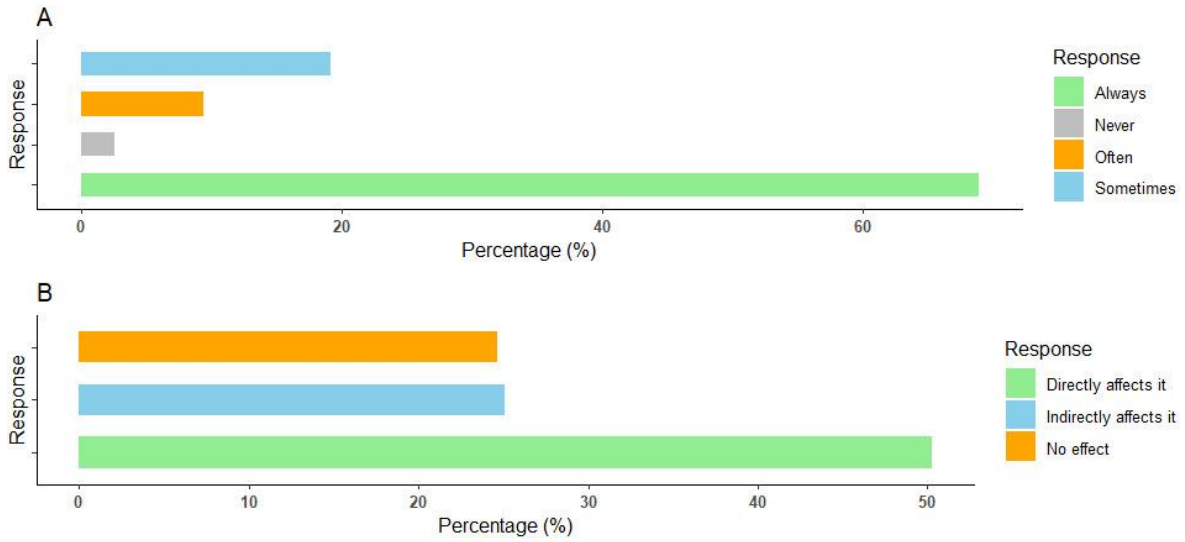

Figure 4. *The following plots display the responses to two key questions related to food safety practices: A. Expiry Date Checking Behavior Before Purchasing or Consuming Food, B. Occupation's Influence on Food Safety Knowledge and Practices.*

4. Discussion

This study builds on previous research highlighting consumers' concerns in Bangladesh regarding food safety, particularly the risks associated with toxic chemicals and adulterated food products in fruits and vegetables [38, 28]. While previous studies have explored socio-demographic factors shaping consumer attitudes towards food safety, this study diverges by focusing on food shopping practices and coping strategies among low-income households in Dhaka, emphasizing food safety concerns and the varying responses of different shopper groups [17, 50]. Earlier studies emphasize the crucial role of knowledge in ensuring food safety [1, 5, 16, 55, 56]. However, significant knowledge gaps remain, particularly regarding food safety laws and proper storage practices [15, 24, 35, 43]. This is particularly concerning given the expanding middle class in many countries, including Bangladesh, which is increasingly demanding higher-quality food [19]. The findings from food safety knowledge levels among food handlers also show mixed results. Studies by Hassan et al. and Jubayer et al. found very poor knowledge levels [21, 30], while others like Tarannum and Hossen et al. reported high levels of food safety knowledge [52, 63]. Al Mamun et al. pointed out that a significant proportion of food handlers (7.2%) were unaware of foodborne diseases [4], and many failed to identify their causes. In contrast, studies by Tarannum and Hossen et al. showed that the majority of food handlers possessed good food safety knowledge [52, 63]. Consumer behaviour in food purchasing often emphasizes the expiry date for packaged foods, and the quality or freshness for open food items, with only a small percentage (12%) considering regulatory approval for packaged goods [38]. This result found conformity with Yeasmin et al. [60], who noted that supermarkets typically offered packaged foods with nutritional and expiry information, along with a cleaner and more organized shopping environment. Conversely, in Faridpur City Bazar, freshness and appearance were found to be the most important factors in purchasing fish, fruits, and vegetables (M=3.8, SD=1.2). Additionally, the expiry date was prioritized when purchasing packaged foods [26]. Food adulteration remains a significant issue, with common practices involving the use of harmful substances like calcium carbide, formalin, and toxic dyes in fruits, vegetables, and fish [53]. As reported by Essuman et al., many consumers have encountered adulterated food during food preparation [13]. This underscores the importance of adhering to food safety guidelines, such as those outlined by the WHO, which highlight the need for proper food storage, safe water, and hygienic preparation practices [13, 39].

Furthermore, household income plays a role in food safety practices. In this study, the largest group of households earned between BDT 20,001 and 40,000 per month, a finding that aligns with previous research conducted by Junaid et al. [31]. Knowledge and attitudes about food safety also influence behaviors and practices, making it essential to understand the epidemiology of foodborne illnesses to guide prevention efforts, resource allocation, and the development of effective food safety policies [32, 47]. However, implementing effective food safety management systems remains a challenge for small and medium-sized food businesses. While larger organizations may have the resources to implement Good Manufacturing Practices (GMP), Good Hygienic Practices (GHP), and Hazard Analysis Critical Control Points (HACCP), smaller businesses require additional support. Customized workshops, easy-to-use guidelines, and ongoing training are necessary to ensure compliance and long-term sustainability in food safety practices [6, 7, 22]. Government, industry players, and educational institutions must collaborate to create accessible resources and monitoring systems to enhance the effectiveness of food safety programs. This study is limited to 19 districts and does not explore the regional variations in food safety practices across other areas of Bangladesh. Additionally, while the study highlights food safety knowledge and practices, it does not delve deeply into the direct impact of food safety education programs on consumer behaviour. Future research could explore these aspects to further understand the broader scope of food safety practices across different socio-economic groups.

In Bangladesh, the government has established a comprehensive legal framework to ensure the public's right to access hygienic and safe food throughout all stages of production, distribution, and consumption. Key legislative measures include the Food Safety Act 2013, the Animals Slaughter Restriction and Meat Control Amendment Ordinance 1983, the Bangladesh Standard and Testing Institution Amendment Act 2003, the Pesticides Ordinance 1971 along with the Pesticide Rules 1985, the Inspection and Quality Control Ordinance 1983, the Fish Products Inspection and Quality Control Rules 1997, and the Consumer's Right Protection Act 2009. Complementing these laws, the government has introduced several policies such as the Bangladesh Environment National Food and Nutrition Policy 1997, the National Nutrition Policy 2015, the National Food Policy 2006, the National Agriculture Policy 1999, and the National Health Policy 2011. Additionally, civil society organizations, such as the Consumer Association of Bangladesh, have recently emerged to actively advocate for food safety, while print and electronic media have played a significant role in raising public awareness and monitoring food safety practices, thus supporting government efforts [32, 14].

5. Conclusion

This study points out key gaps in what people in Bangladesh know and do about food safety, showing we need targeted action. Things like education level play a big role in how people think about food safety. While some folks are aware, many still don't feel sure about their food safety knowledge when it comes to bugs like Hepatitis A that can

make you sick. Street food sellers and buyers need more help with cleanliness and food rules in risky city areas. The results show it's crucial to teach food safety and enforce rules better to cut down on food-related illnesses. Good public health campaigns that focus on teaching how to handle food right, and following safety rules are key to making people more aware and careful. Also, plans should think about different groups of people to make actions work better, boosting health outcomes for all kinds of folks.

Abbreviations

FGDs	Focus Group Discussion
GMP	Good Manufacturing Practices
GHP	Good Hygienic Practices
WHO	World Health Organization
BDT	Bangladeshi Currency
HACCP	Hazard Analysis Critical Control Points

Supplementary Material

The supplementary material can be accessed at https://doi.org/10.11648/j.xxxx.2025xxxx.xx

Acknowledgments

The author expresses heartfelt gratitude to the consumers who participated in the survey and shared their valuable insights. The author also appreciates the guidance from faculty professors and public health experts, whose contributions were essential to the success of this research.

Author Contributions

Md. Abdullah Al Mamun Hridoy: Writing original manuscripts, conceptualization, methodology, software, visualizations, and formal analysis.

Md. Hafijul Islam: Writing original draft, software, visualizations, and data collection.

Andleeb Masood: Review and editing, Data collection and validations.

Zulfaqar Sa'adi: Review and editing.

Niraj Bohora: Writing original draft, and data collection.

Md. Saiful Islam: Data collection and validations.

Monoara Akter Lima: Data collection and validations.

MD. Khalid Hasan: Data collection and validations.

Dewan Hasan Al Mostakim: Data collection and validations.

Asif Al Jami Rajin: Data collection and validations.

Mominul Haque: Data collection and validations.

Pritam Kummer Barmon: Data collection and validations.

Md. Mahdi Hasan Munna: Data collection and validations.

Md. Musfikur Rahman: Data collection and validations.

Nusrat Bahar: Data collection and validations.

Anik Sarker: Data collection and validations.

Md. Mehedi Hasan: Data collection and validations.

Kazi Rafsan Zaman: Data collection and validations.

Munni Begum: Data collection and validations.

Declaration of Generative AI in Scientific Writing

While preparing this work, the author(s) used Generative AI to check the grammar. After using this tool, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

Funding

This research received no specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Abdul-Mutalib, N. A., Abdul-Rashid, M. F., Mustafa, S., Amin-Nordin, S., Hamat, R. A., & Osman, M. (2012). Knowledge, attitude and practices regarding food hygiene and sanitation of food handlers in Kuala Pilah, Malaysia. *Food control*, *27*(2), 289-293.

[2] Ahmed, M. U., Hossain, M. I., Maraj, M. A. A., & Islam, M. M. (2024). MICROBIAL HAZARDS IN STREET FOODS: A COMPREHENSIVE STUDY IN DHAKA, BANGLADESH. *Global Mainstream Journal*, *1*(3), 1–15. https://doi.org/10.62304/ijhm.v1i3.158

[3] Al Banna, M. H., Disu, T. R., Kundu, S., Ahinkorah, B. O., Brazendale, K., Seidu, A. A.,... & Khan, M. S. I. (2021). Factors associated with food safety knowledge and practices among meat handlers in Bangladesh: a cross-sectional study. *Environmental Health and Preventive Medicine*, *26*(1), 84.

[4] Al Mamun, M., Rahman, S. M. M., & Turin, T. C. (2013). Knowledge and awareness of children's food safety among school-based street food vendors in Dhaka, Bangladesh. *Foodborne pathogens and disease*, *10*(4), 323-330.

[5] Al-Kandari, D., Al-abdeen, J., & Sidhu, J. (2019). Food safety knowledge, attitudes and practices of food handlers in restaurants in Kuwait. *Food control*, *103*, 103-110.

[6] Antle, J. M. (1995). *Choice and efficiency in food safety policy*. American Enterprise Institute.

[7] Antle, J. M. (1996). Efficient food safety regulation in the food manufacturing sector. *American Journal of Agricultural Economics*, *78*(5), 1242-1247.

[8] Artık, N., Güçer, Y., & Poyrazoğlu, E. S. (2024). Impact of Climate Change on Agricultural Production and Food Security. *Akademik Gıda*, *Yeşil Dönüşüm Özel Sayısı*, 45–50. https://doi.org/10.24323/akademik-gida.1554438

[9] Barua, P., Sukonya Banik, K., Saha, S., & Musa, S. (2023). Parasitic Contamination of Street Food Samples From School-Based Food Vendors of Dhaka City, Bangladesh. *Bangladesh Journal of Zoology*, *51*(2), 217–229. https://doi.org/10.3329/bjz.v51i2.70781

[10] BBS (2019) Household income and expenditure survey 2016–17. Bangladesh Bureau of Statistics, Dhaka.

[11] Chakma, S., Hoque, M. S., & Alam, A. N. (2015). Identification of food habit of urban and rural people in the Southern District of Bangladesh.

[12] Din, A. U., Han, H., Ariza-Montes, A., Vega-Muñoz, A., Raposo, A., & Mohapatra, S. (2022). The Impact of COVID-19 on the Food Supply Chain and the Role of E-Commerce for Food Purchasing. *Sustainability*, *14*(5), 3074. https://doi.org/10.3390/su14053074

[13] Essuman, E. K., Teye, E., Dadzie, R. G., & Sam-Amoah, L. K. (2022). Consumers' knowledge of food adulteration and commonly used methods of detection. *Journal of Food Quality*, *2022*(1), 2421050.

[14] FAO, (2022). World Food and Agriculture – Statistical Yearbook 2022. https://openknowledge.fao.org/server/api/core/bitstreams/0c372c04-8b29-4093-bba6-8674b1d237c7/content

[15] Faour-Klingbeil, D. (2022). Food safety knowledge, attitudes, and practices among food handlers in foodservice establishments in the Arab countries of the Middle East. In *Food safety in the Middle East* (pp. 227-273). Academic Press.

[16] Gemeda, B. A., Amenu, K., Girma, S., Grace, D., Srinivasan, R., Roothaert, R., & Knight-Jones, T. J. (2023). Knowledge, attitude and practice of tomato retailers towards hygiene and food safety in Harar and Dire Dawa, Ethiopia. *Food Control*, *145*, 109441.

[17] Haque, M. L., Oosterveer, P., & Vignola, R. (2024). Food safety concerns and purchase choices among poor households in the urbanising global south: the case of Dhaka, Bangladesh. *Food Security*, *16*(4), 933-950.

[18] Haque, M. L., Oosterveer, P., Vignola, R., & Rasheed, S. (2023). Dealing with food safety concerns among urban poor when eating out: social practices in Dhaka, Bangladesh. *Frontiers in Sustainable Food Systems*, *7*. https://doi.org/10.3389/fsufs.2023.1248638

[19] Härtel, I., & Yu, H. (2018). Food security and food safety law. *Handbook of Agri-Food Law in China, Germany, European Union: Food Security, Food Safety, Sustainable Use of Resources in Agriculture*, 57-126.

[20] Hashanuzzaman, M., Bhowmik, S., Rahman, M. S., Zakaria, M. A., Voumik, L. C., & Mamun, A. A. (2020). Assessment of food safety knowledge, attitudes and practices of fish farmers and restaurants food handlers in Bangladesh. *Heliyon*, *6*(11).

[21] Hassan, M. Z., Islam, M. S., Salauddin, M., Zafr, A. H. A., & Alam, S. (2017). Food safety knowledge, attitudes and practices of chotpoti vendors in Dhaka, Bangladesh. *Journal of Enam Medical College*, *7*(2), 69-76.

[22] Henson, S., & Jaffee, S. (2006). Food safety standards and trade: Enhancing competitiveness and avoiding exclusion of developing countries. *The European Journal of Development Research*, *18*, 593-621.

[23] Hoffmann, S., White, A. E., McQueen, R. B., Ahn, J.-W., Gunn-Sandell, L. B., & Scallan Walter, E. J. (2024). Economic Burden of Foodborne Illnesses Acquired in the United States. *Foodborne Pathogens and Disease*. https://doi.org/10.1089/fpd.2023.0157

[24] Hoffmann, V., Moser, C., & Saak, A. (2019). Food safety in low and middle-income countries: The evidence through an economic lens. *World Development*, *123*, 104611.

[25] Hoque, M. (2023). UNVEILING THE SILENT THREAT: FOOD ADULTERATION IN BANGLADESH. *International Journal of Biological Innovations*, *05*(02), 21–26. https://doi.org/10.46505/IJBI.2023.5203

[26] Hossain, R. (2019). Safe Food in Bangladesh: Perception and Influences on Safe Food Purchasing. *Griffith University: Brisbane, Australia*.

[27] Hossen, M. T., Ferdaus, M. J., Hasan, M. M., Lina, N. N., Das, A. K., Barman, S. K.,... & Roy, R. K. (2020). Food safety knowledge, attitudes and practices of street food vendors in Jashore region, Bangladesh. *Food Science and Technology*, *41*, 226-239. https://bbs.gov.bz/events/event/world-food-safety-day-2019-food-safety-everyones-business/

[28] Ishra, R., Khanam, R., & Soar, J. (2022). Influence of food safety concerns on safe food purchasing at rural and urban consumers in Bangladesh. *Appetite*, *179*, 106306.

[29] Islam, S., Tanjia, N., Mitra, A. K., Hossain, S. J., Hossain, A., Jasika, M. T., & Suhi, S. S. (2023). Lack of Food Safety and Hygienic Practices among Street Vendors in Dhaka, Bangladesh: Implications for Consumers' Health. Preprints. https://doi.org/10.20944/preprints202307.0344.v1

[30] Jubayer, M. F., Kayshar, M. S., Hossain, M. S., Uddin, M. N., Al-Emran, M., & Akter, S. S. (2020). Evaluation of food safety knowledge, attitude, and self-reported practices of trained and newly recruited untrained workers of two baking industries in Dhaka, Bangladesh. *Heliyon*, *6*(9).

[31] Junaid, A. B., Nasreen, R., Ravichandran, N., & Ahmed, F. (2014). Indian cosmeceutical market: A study of consumer preferences and consumption patterns. *Journal of Clinical & Experimental Dermatology*, *5*(212), 25-95.

[32] Khairuzzaman, M. D., Chowdhury, F. M., Zaman, S., Al Mamun, A., & Bari, M. L. (2014). Food safety challenges towards safe, healthy, and nutritious street foods in Bangladesh. *International journal of food science*, *2014*(1), 483519.

[33] Hridoy, M. A. A. M., Saha, S., Paul, P. B., Chowdhury, T. A., Al Mizan, A., Islam, R. U.,... & Hasan, M. M. (2025) Evaluating the Socio-Economic Conditions of fishers and Sustainability of Small-Scale Fisheries in the Kalni River, Bangladesh. *Ege Journal of Fisheries and Aquatic Sciences*, *42*(1), 41-47.

[34] Kuboka, M., Grace, D., Artursson, K., Lindahl, J., Carlsson, G., & Mutua, F. (2024). Food safety in informal public markets in Kenya: perceptions of stakeholders in the food chain. *Frontiers in Sustainable Food Systems*, *8*. https://doi.org/10.3389/fsufs.2024.1411318

[35] Lamm, K. W., Randall, N. L., & Diez-Gonzalez, F. (2021). Critical food safety issues facing the food industry: a Delphi analysis. *Journal of Food Protection*, *84*(4), 680-687.

[36] Masud, L. B., Hossain, M. I., Faruk, M. O., Tuha, M. A. S. M., Akash, S. R., Islam, K. R., Sahabuddin, M., & Ali, M. S. (2023). *Bacterial risk evaluation of widely consumed fast foods by the younger population in Bangladesh and its potential health effects*. https://doi.org/10.1101/2023.07.30.551147

[37] Michael Alurame Eruaga. (2024). Policy strategies for managing food safety risks associated with climate change and agriculture. *International Journal of Scholarly Research and Reviews*, *4*(1), 021–032. https://doi.org/10.56781/ijsrr.2024.4.1.0026

[38] Nasreen, S., & Ahmed, T. (2014). Food adulteration and consumer awareness in Dhaka City, 1995-2011. *Journal of health, population, and nutrition*, *32*(3), 452.

[39] Nilratan Halder, (2024). How food hygiene and food safety are compromised. https://today.thefinancialexpress.com.bd/editorial/how-food-hygiene-and-food-safety-are-compromised-1731594326

[40] Noor, R. (2016). "Microbiological quality of commonly consumed street foods in Bangladesh." Nutrition & Food Science 46(1): 130-141.

[41] Owoeye, R. S., Ijigbade, J. O., & Bunmi, A. O. (2023). Assessment of Food Safety Practices among Smoked Fish Sellers in Ekiti State, Nigeria. *Asian Food Science Journal*, *22*(9), 122-130.

[42] Pires, S. M., Jensen, J. D., Jakobsen, L., Ethelberg, S., & Christensen, T. (2022). Health and Economic Burden of Seven Foodborne Diseases in Denmark, 2019. *Foodborne Pathogens and Disease*, *19*(9), 581–589. https://doi.org/10.1089/fpd.2022.0031

[43] Prabhakar, S. V. R. K., Sano, D., & Srivastava, N. (2010). Food safety in the Asia-Pacific Region: current status, policy perspectives and a way forward. *Sustainable consumption and production in the Asia-Pacific region: Effective responses in a resource constrained world*, 215-238.

[44] Rahman, R., Scharff, R. L., & Wu, F. (2023). Foodborne disease outbreaks in flour and flour‐based food products from microbial pathogens in the United States, and their health economic burden. *Risk Analysis*, *43*(12), 2519–2526. https://doi.org/10.1111/risa.14132

[45] Rego, J. do N. M., Viegas, A. L. de J. S., Sauaia, B. B., Amorim, J. R. A., De Matos, L. S., Lima, O. G. de S., Da Silva, P. I. F., Lima, T. de A., & Sauaia, B. A. (2024). Acute gastroenteritis due to food poisoning in public spaces: A dissertation review. *International Seven Journal of Health Research*, *3*(3), 911–918. https://doi.org/10.56238/isevjhv3n3-010

[46] Robeul Islam, Avijit Banik, Hasnain Anjum, Md. Iqbal Hossain, & Rafsan Abir. (2024). Microbial characterization of street food collected from Dhaka city, Bangladesh. *GSC Biological and Pharmaceutical Sciences*, *26*(1), 107–113. https://doi.org/10.30574/gscbps.2024.26.1.0538

[47] Sarker, A., Islam, T., Rahman, S., Nandi, R., & Kim, J.-E. (2021). Uncertainty of pesticides in foodstuffs, associated environmental and health risks to humans—a critical case of Bangladesh with respect to global food policy. *Environmental Science and Pollution Research*, *28*(39), 54448–54465. https://doi.org/10.1007/s11356-021-16042-3

[48] Sarker, A., Kim, J.-E., Islam, A. R. M. T., Bilal, M., Rakib, M. R. J., Nandi, R., Rahman, M. M., & Islam, T. (2022). Heavy metals contamination and associated health risks in food webs—a review focuses on food safety and environmental sustainability in Bangladesh. *Environmental Science and Pollution Research*, *29*(3), 3230–3245. https://doi.org/10.1007/s11356-021-17153-7

[49] Shamsuzzaman, M. M., Mozumder, M. M. H., Mitu, S. J., Ahamad, A. F., & Bhyuian, M. S. (2020). The economic contribution of fish and fish trade in Bangladesh. *Aquaculture and Fisheries*, *5*(4), 174-181.

[50] Siddiky, N. A., Khan, M. S. R., Sarker, M. S., Bhuiyan, M. K. J., Mahmud, A., Rahman, M. T.,... & Samad, M. A. (2022). Knowledge, attitude and practice of chicken vendors on food safety and foodborne pathogens at wet markets in Dhaka, Bangladesh. *Food Control*, *131*, 108456.

[51] Tamanna, I. M. (2024). Food adulteration and inadequate hygiene practices endangering public health in Bangladesh. *Discover Food*, *4*(1), 109. https://doi.org/10.1007/s44187-024-00191-8

[52] Tarannum, R. (2021). Food hygiene knowledge, attitudes and practices of food handlers in Bangladeshi homes.

[53] The Daily Star, 1 November 2009. Trader fined for selling fish treated with formalin. https://www.thedailystar.net/news-detail-103948

[54] The Daily Star. (2022, July 27). *Bangladesh's literacy rate now 74.66%.* https://www.thedailystar.net/youth/education/news/bangladeshs-literacy-rate-now-7466-3080701

[55] Van Boxstael, S., Habib, I., Jacxsens, L., De Vocht, M., Baert, L., Van de Perre, E.,... & Uyttendaele, M. (2013). Food safety issues in fresh produce: Bacterial pathogens, viruses and pesticide residues indicated as major concerns by stakeholders in the fresh produce chain. *Food Control*, *32*(1), 190-197.

[56] Wertheim-Heck, S. C., Spaargaren, G., & Vellema, S. (2014). Food safety in everyday life: Shopping for vegetables in a rural city in Vietnam. *Journal of Rural Studies*, *35*, 37-48.

[57] WHO. (2015). *Estimating the burden of foodborne diseases*. World Health Organization. https://www.who.int/activities/estimating-the-burden-of-foodborne-diseases

[58] World Bank. (2024). *GDP per capita (current US$)*. World Bank Group. https://genderdata.worldbank.org/en/indicator/ny-gdp-pcap-cd

[59] Yamane, T. (1973). Statistics: An introductory analysis.

[60] Yeasmin, D., Baker, M., Kamal, A. H. M., Islam, M. S., Rahman, M., Winch, P. J., & Unicomb, L. (2023). Exploring customers' perceptions of food adulteration at bazaars and supermarkets in Dhaka, Bangladesh; a qualitative exploration. *BMC public health*, *23*(1), 206.

[61] Zai, B., McReavy, S., Hogan, G., Ng, V., Papadopoulos, A., Young, I., & Grant, L. E. (2024). Identifying the impact of climate variables on biological and chemical contaminants of preharvest foods and their associated food safety risks: a scoping review protocol. *BMJ Open*, *14*(8), e083749. https://doi.org/10.1136/bmjopen-2023-083749

[62] Żurek, J., & Rudy, M. (2024). Impact of the COVID-19 Pandemic on Changes in Consumer Purchasing Behavior in the Food Market with a Focus on Meat and Meat Products—A Comprehensive Literature Review. *Foods*, *13*(6), 933. https://doi.org/10.3390/foods13060933

[63] Hossen, M. T., Ferdaus, M. J., Hasan, M. M., Lina, N. N., Das, A. K., Barman, S. K., Paul, D. K., & Roy, R. K. (2021). Food safety knowledge, attitudes and practices of street food vendors in Jashore region, Bangladesh. Food Science and Technology, 41(suppl 1), 226–239. https://doi.org/10.1590/fst.13320