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INVESTIGATING THE AWARENESS OF FOOD SAFETY AMONG BUYERS AND SELLERS IN A LOCAL MARKET - A TASTE OF SAFETY

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ABSTRACT
This research aims to assess the food safety knowledge among buyers and sellers in the city market, particularly in the post-pandemic context. The study focuses on understanding the extent to which individuals adhere to food safety and hygiene measures. The method used in this research is quantitative and conducted in the Mohammadpur city market, involving 101 buyers and 101 sellers selected for interviews. The research employed a structured questionnaire to gather information on participants' age, gender, level of education, and training on food safety. The results of the study indicate that a total of 202 participants, with an average age of 38.16 years, were involved. Gender distribution shows that the majority of buyers (72%) and sellers (87%) were male. The analysis demonstrates a significant relationship ($p<0.001$) between the level of education, training on food safety, and overall knowledge of food safety among buyers. This research implies the need for enhanced monitoring and regulation of activities conducted by food vendors to reduce potential risks and the transmission of foodborne illnesses. The implementation of regulations, promotion of hygienic practices, and food safety control measures are crucial steps to achieve this objective. Local authorities, with smooth execution of their duties, play a vital role in ensuring the effectiveness of these measures.

Keyword: FOOD Safety, Hygienic Surfaces, Foodborne Diseases, Dhaka, Bangladesh.

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INTRODUCTION

Bangladesh, which gained independence in 1971, is the youngest nation in South Asia and shares a history with its neighbors. About 60 percent of Bangladesh's population lives in rural regions, making it the most densely inhabited nation in the world. Agriculture, which cultivates 70 per cent of the land area, employs around 40 per cent of the people and accounts for approximately 13.3 per cent of the gross domestic output (GDP). The majority of the agricultural economy may be broken down into the subsectors of crops (55 %), fisheries (22 %), livestock (14%), and forests (9%) (Alemayehu et al., 2021). Rice, jute, wheat, tea, legumes, aquaculture, oilseeds, fruits and vegetables are only a few of the many crops that are grown in Bangladesh (Jamali et al., 2023). Other crops including Agriculture has a significant role in meeting the demands of the nation in terms of food, nutrition, and livelihood, and as a result, it makes a contribution to the continued growth and development of the economy (Yeasmin et al., 2023). Even though agriculture is a significant

contribution to the national economy, it has not advanced beyond a subsistence level due to variable crop yields and a lack of built infrastructure (Bou et al., 2018). These issues need to be addressed to improve the nation's food security and safety in light of the additional demand that is being placed on arable land by the expansion of urban areas. A strong economic growth rate of nearly 8%, with the service sector providing roughly 50% of the GDP, together with urban population expansion and expenditure, is leading to an increase in the demand for processed food that is of high quality in the nation (Li et al., 2020)

Despite seeing significant expansion over the course of the previous decade, the agro-food processing sector's contribution to the nation's gross domestic product (GDP) has remained below 2%. The manufacturing sector is dominated by industries such as ready-made clothing production (Paul S., et al. 2023). Processing agricultural and food products account for around 1.5 per cent of overall exports and had a value of more than 420 million USD in 2018 (Waltenburg et al., 2021). Even though Bangladesh's proportion of agricultural and food exports is relatively low, the country sells food goods to more than 140 nations (Mihalache et al., 2021).

A scientific method and discipline describing the handling, preparation, and storage of food in a way that decreases the risk of food-borne illness is known as food safety, commonly called food hygiene. It is considered an epidemic of food-borne disease when two or more cases of a similar illness occur after consuming the same meal (Al Banna et al., 2021). All sorts of safety measures need to be put in place to forestall any potential dangers to people's health. To safeguard consumers from harm, this is where food defense and food safety intersect. The first set of guidelines in this school of thought are those that ensure consumer and market security, then those that govern the relationship between industry and the market ((Al Banna et al., 2021)). The evaluation of industry-to-market practices in food safety takes into account the food's origins, which includes labelling practices, food hygiene, additives, and pesticide residues (Meher et al., 2022). It also takes into account policies on biotechnology and food and guidelines for the management of government import/export inspection and certification systems for foods. Assumption of food safety during marketing and primary emphasis on safe food handling and preparation for consumers characterize market-to-consumer methods (Jubayer et al., 2020).

The study's emphasis on food safety awareness among municipal market consumers and sellers, particularly post-pandemic, is significant. Proper storage, sanitation, temperature management, and contamination avoidance are stressed in the study. The results emphasize the need to monitor and regulate food sellers to reduce foodborne disease risks. Local authorities enforce rules, promote hygiene, and execute adequate food safety control systems, according to the findings. The study provides useful insights into local food safety knowledge and proposes ways to improve safety procedures, which is especially important post-pandemic.

METHOD

General Objectives

To assess the level of knowledge about food safety among buyers and sellers in a municipality market.

Specific Objective

a. To assess the level of knowledge of buyers I.
b. To assess the level of knowledge of sellers II.
c. To know awareness about food safety III.
d. To determine the quality of food IV.
e. To observe their practice regarding food safety V.
f. To know the socio-demographic condition of both buyers VI and sellers.

Study Design

This was a quantitative cross-sectional study.

Study Location

This study was undertaken at Mohammadpur municipality market in Dhaka.

Study Period

This study was conducted between, November 2020 – January 2021.

Study Population

Food buyers and sellers were the primary respondents for this study.

Study Sample

Simple random sampling was used for this study.

Sample Calculation

To estimate proportion:

$$N= (Z2pq)/d2$$

Here,

n = Number of samples
Z = Level of significance / confidence level (at 5% level, z=1.96)
p = Expected proportion of event or prevalence of the event. (p is assumed 50%)
q =1-p = 1-0.50 = 0.50
d = allowable error/precision in the estimates of 'p' (proportion)

By using the above formula, the sample size is 384

However, due to time and resource constrain total sample size taken was 202 for this research.

Eligibility Criteria

Inclusion criteria: Must be a regular buyer and seller of Mohammadpur municipal market.

Exclusion criteria:

a. People below 18 years of age were out of this study.
b. Any respondents who are not psychologically fit to understand the questions
c. Any respondents who was not willing to participate in

Development of Research Instrument

We used a questionnaire that has already been pilot tested for this investigation. Full questionnaire administration will be carried out by us. We checked the collected data against pre-tested data to make sure it was accurate.

Data Collection

From March 2022 to May 2022, was kept for data collection. Researchers solely administered the whole questionnaire.

Data Analysis

As the primary software, SPSS 23 and Microsoft Excel were used for age distribution, occupational distribution, distribution of educational status, etc. STATA 24 was used for some statistical analysis as food safety knowledge. JASP was kept on standby for any kind of complication.

Data Presentation and Interpretation

Three standard approaches were combined in a way that was consistent with the data. The three methods are the textual, tabular, and graphical approaches e.g. bar chart, pie chart. New to the data set is the inclusion of a demographic table and chart. All comparisons will be shown in an appropriate chart, whether its a bar graph, pie chart, or scatter plot. Applications in statistics will underpin all visual graphics representation tables.

Data Quality Management

We managed the data's quality by checking it for consistency, uniqueness, completeness, validity, and correctness. In order to ensure the quality of the data, questionnaires were randomly distributed and examined for mistakes such as missing information, duplicates, inconsistencies, repetitions, incompletes, etc.

Ethical Issues

a. The study was performed with the consent of the respondent. There was no harm to humans or animals in this study.
b. Their anonymity was guaranteed, and the information gathered was only used for research.
c. ERB clearance was taken from the University of South Asia.

Limitation

Because of the pandemic situation, respondents were available to take interviews.
Self-bias may take place when answering the questions.

RESULTS AND DISCUSSION

This research intends to measure the level of knowledge regarding food safety among buyers and sellers in a municipal market. In this research, 202 respondents participated and gathered the information based on the questionnaire.

The researcher gathered the data and numerically coded and input it, utilizing SPSS 23.0 version. This chapter has a graphical and thematic presentation of the results and a discussion based on what the research question asked.

Table 1 shows the age distribution among the respondents

Variables	N	Minimum (in Years)	Maximum (in Years)	Mean (in Years)	Std. Deviation
Age	202	18.0	78.0	38.16	2.0627
Valid N	202				

Table no- 1 shows that in total 202 participants were taken participated in this study. The average age of those participants was 38.16 years, and maximum age was 78 years, and the minimum age was 18 years.

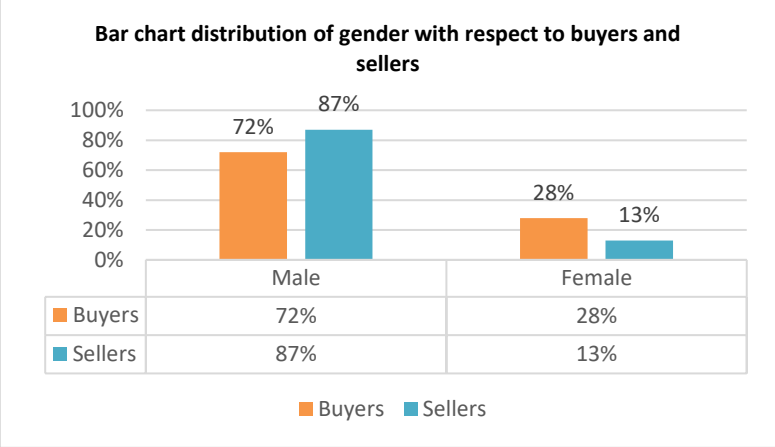

Figure 1. Bar chart distribution of gender with respect to buyers and sellers

Figure 1 shows the gender distribution based on buyers and sellers. In both the cases of buyers and sellers, the highest percentages were male: 72% and 87% (chronologically). Besides, female participants were low in both buyers and sellers.

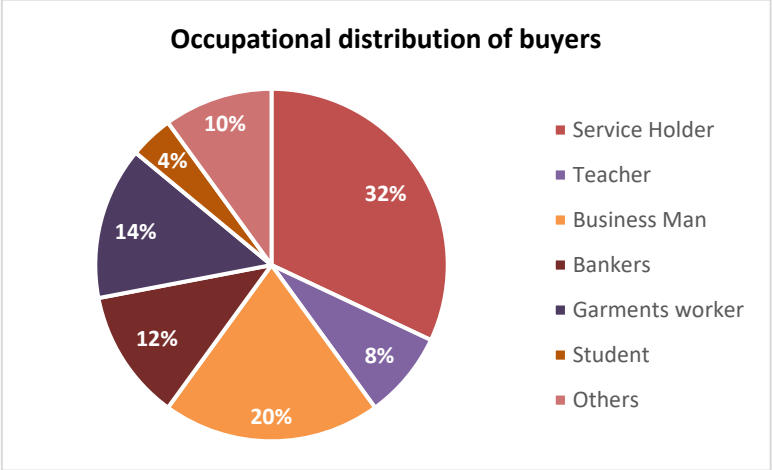

Figure 2. Pie chart of occupational distribution

Looking at Figure 2, we can see that out of 101 purchasers who participated, 32% were service holders, 20% were company owners, 12% were bankers, 14% were textile workers, 8% were educators, and the remaining 10% were from various professions.

Table 2. Frequency distribution of educational status among the buyers and sellers (N=202).

Educational Status	Buyers (%) (n=101)	Sellers (%) (n=101)
No Education	3%	24%
Primary	8%	42%
High school	10%	24%
SSC	10%	8%
HSC	22%	2%
Graduation	47%	0%

Table 2 shows that most of the buyers were complete their graduation (47%). Besides most of the sellers were completed their primary education (42%).

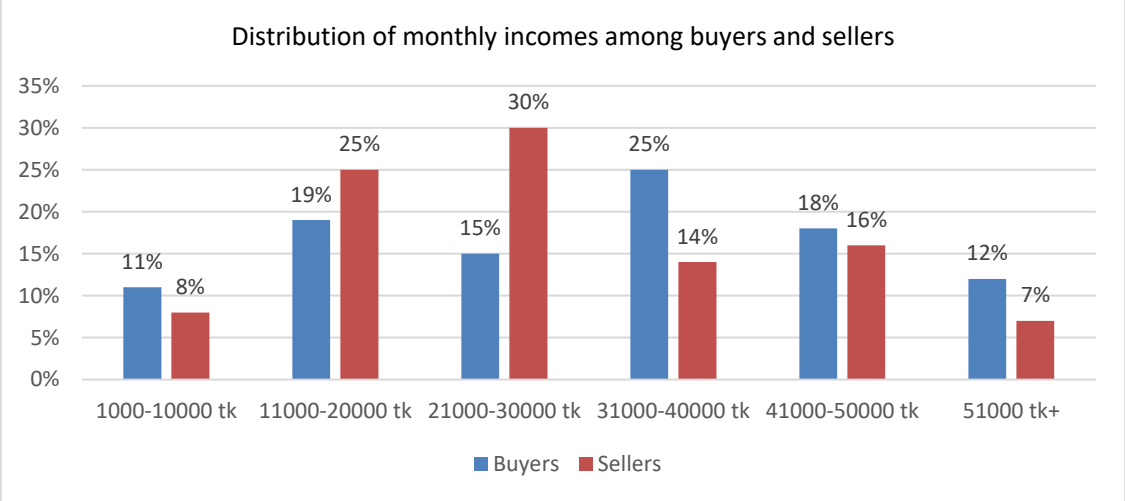

Figure 3. Distribution of monthly incomes among buyers and sellers

Figure 3 shows the monthly income of buyers and sellers. The above bar chart shows that 25% of buyers have 11000-20000 tk monthly earnings, and 11% of buyers' monthly income is between 1000-10000 tk. Besides, a maximum of 30% of the seller's monthly income is between 21000 and 30000 tk.

Table 3. The Response of the Buyers and Sellers to the Food Safety Knowledge Statements.

Q No.	Food Safety Knowledge Statement	Buyers		Sellers	
		Yes (%)	No (%)	Yes (%)	No (%)
1	Always, contaminated foods exhibit a change in color, odor, or flavor.	51.5%	49.5%	38%	62%
2	Healthy individuals might create disease by transferring germs to food.	58.15%	41.75%	53.5%	46.5%
3	Cooked foods lack microorganisms.	48%	52%	54%	46%
4	Contact between raw and cooked foods increases the likelihood of food contamination.	77%	23%	82.5%	17.5%
5	Hygiene of the hands helps avoid food contamination.	87.5%	12.5%	46%	54%
6	An individual with a contagious illness, such as diarrhea, the flu, or a sore throat, poses a threat of food contamination.	73.75%	26.25%	37.5%	62.5%
7	The cleanliness and sanitization of cooking equipment are crucial for food safety.	46.70%	53.30%	28%	72%
8	The usage of jewelry, such as rings and watches, during food preparation causes contamination.	56.85%	43.15%	11%	89%
9	Foods that are inappropriate for eating always do not have a terrible smell and taste of spoil	78%	22%	37%	63%

Table 3 showed the food safety knowledge-related question and its response from the buyers and sellers.

Table 4: Correlation with socio-demographic variables and food safety knowledge of buyers.

Variables	Knowledge		P value
	Good	Poor	
Gender			
Male	55%	45%	0.053
Female	62%	38%	
Level of education			
No Education	28%	72%	
Primary	30%	70%	
High school	53%	47%	0.001*
SSC	58%	62%	
HSC	55%	45%	
Graduation	68%	32%	
Training on food safety			
Yes	83%	17%	0.003*
No	46%	66%	
Attitude			
Favourable	52%	48%	0.067
Unfavorable	44%	56%	

Table 4 shows that level of education, and training on food safety of buyers have a significant ($p<0.001$) relationship with the knowledge of food safety.

Interpretation: $p<0.05$ = Significant value.

Table 5: Correlation with socio-demographic variables and food safety knowledge of sellers.

Variables	Knowledge		P value
	Good	Poor	
Gender			
Male	31%	69%	0.005*
Female	10%	90%	
Level of education			
No Education	13%	87%	
Primary	27%	73%	
High school	33%	67%	0.001*
SSC	45%	55%	
HSC	0%	100%	
Graduation	0.0%	0.0%	
Training on food safety			
Yes	0.0%	0.0%	0.001*
No	20.5%	79.5%	
Attitude			
Favourable	18%	82%	0.003*
Unfavorable	67%	33%	

In table 5 shows that, food seller has inadequate knowledge about food safety. In point of gender prospection, 90% of female have poor knowledge.

Interpretation: p-value <0.05 = Significant Value.

In the current inquiry, the city of Dhaka was chosen as the research object for the evaluation of food merchants' and customers' awareness of the importance of maintaining food safety. Previous research was used to develop questionnaires that were used in a study that was designed

to be cross-sectional. The food safety knowledge and attitude questionnaire were in accordance with the requirements of Bangladesh at the national level. This study's primary objective was to evaluate the food safety awareness of customers and sellers in Dhaka, Bangladesh, as well as the food handling practices of vendors. There are, to our knowledge, relatively few studies evaluating and reporting these crucial features of street food safety in Dhaka city.

This study assessed the food safety and hygiene knowledge of customers and sellers at a municipal market. In this survey, the majority of respondents were between 18 and 78 years of old (Table 1). The majority of purchasers and vendors were male, with males accounting for 72% and 87% of the respective populations respectively (chronologically). In addition, the number of female participants was low in both the buyer and vendor categories (Figure 1). This pattern is consistent with what was discovered in earlier research, which found that the majority of food sellers are women between the ages of 20 and 40 who have completed either their second or their postsecondary education (Ma et al., 2019). On the other hand, several studies have shown that the majority of people who work as food sellers are male and have either no formal education or just basic school as their greatest level of education (Amedewonu, 2020).

This research evaluated the characteristics related to food safety knowledge among food vendors and purchasers at Mohammadpur Municipal Market ((Nurudeen, A. A., Lawal, A. O., & Ajayi, 2020)In this survey, the overall food safety awareness of merchants was poor. Nonetheless, within the individual frameworks, respondents were more educated than others about some food safety problems ((Omer, 2022)).

For example, the majority of respondents were aware that washing hands before work, wearing gloves, hats, and aprons, and cleaning tools properly lower the risk of food contamination (Omer, 2022)They were, however, less educated about high-risk categories for food poisoning as well as specific food borne disorders and food borne microorganisms. Consistent with prior research, food vendors are more educated about hand washing and the use of protective equipment than they are about other aspects of food safety (Abdullah Sani, N., & Siow, O. N. (2014). Knowledge, 2023)

Our data demonstrated that education, job experience, training, and income are all strongly linked with food safety knowledge (Isanovic et al., 2022). In particular, food vendors with a postsecondary degree and food safety training indicated a larger chance of having an extensive understanding of food safety (Adraro et al., 2020). Parallel research done in South Africa validated the conclusion by demonstrating that the educational level and professional training of meat handlers were substantially connected to their level of knowledge and food safety measures (Ashuro et al., 2023)).

This study's results are in accordance with those of previous research (Abdullahi et al., 2020)) in showing that most participants did not fully grasp the extent to which food vendors and buyers understood the importance of food hygiene (Abdullahi et al., 2020)). On the other hand, studies in Korea, Ethiopia, Iran, and Malaysia revealed that most food vendors lacked proper food hygiene knowledge and abilities (Faour-Klingbeil, 2022).

While there is still a considerable gap, the current study's conclusions that personal and environmental hygiene are generally good are in line with those of previous research that found that

food vendors produce relatively safe food by maintaining the minimum required level of hygiene standards because they rely on repeat business to sustain their livelihood (Islam et al., n.d.)

Limitation of the study

When analyzing our findings, it is important to keep in mind that this study did have few limitations. Because it is cross-sectional research, we can't draw any firm conclusions about probable causes and effects. The study may not be representative of the nation as a whole because of the specific sites of the Dhaka municipal market that were analyzed.

CONCLUSION

To prevent and manage potential risks and the transmission of food-borne illnesses, heightened vigilance and regulation of food vendor practices are essential. Local authorities, equipped with the authority to carry out their responsibilities unhindered, play a crucial role in achieving this goal. Safeguarding public health requires the establishment of cohesive, effective, integrated, and proactive strategies for managing both mobile and stationary food vendors. These strategies should prioritize aspects such as vendor registration, formal training in hygiene practices, regular medical certifications, and routine inspections of personal and environmental hygiene.

REFERENCES

Abdullah Sani, N., & Siow, O. N. (2014). Knowledge, attitudes and practices of food handlers on food safety in food service operations at the U. K. M. (2023). *Food Handlers' Food Safety Knowledge, Attitudes, and Practices in Taman Negara, Kuala Tahan*.

Abdullahi, B. S., Maiha, S. B., & Lawal, H. K. (2020). Hygiene, food safety practices and sanitation in some food service centres in Zaria, Kaduna State, Nigeria. *American Journal of Food Science and Technology*, *8*(5), 206–210.

Adraro, W., Mamo, G., Mamo, A., Muluken, M., Sahile, S., Derkiyab, E., & Toru, T. (2020). *Intestinal Parasites And Associated Factors Among Food Handlers In Mizan-Aman Town, Bench Maji Zone, Southwest Ethiopia*.

Al Banna, M. H., Disu, T. R., Kundu, S., Ahinkorah, B. O., Brazendale, K., Seidu, A.-A., Okyere, J., Rahman, N., Mondal, S., & Matubber, B. (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), 1–12.

Alemayehu, T., Aderaw, Z., Giza, M., & Diress, G. (2021). Food safety knowledge, handling practices and associated factors among food handlers working in food establishments in Debre Markos Town, Northwest Ethiopia, 2020: institution-based cross-sectional study. *Risk Management and Healthcare Policy*, 1155–1163.

Amedewonu, D. K. (2020). *Assessment of food hygiene practices among street food vendors in Ayensuano District Ghana*. University of Cape Coast.

Ashuro, Z., Zeysse, N., & Ayalew, M. (2023). Meat hygiene knowledge, handling practices and associated factors among meat handlers in Gedeo zone, Ethiopia. *Scientific Reports*, *13*(1), 15149.

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). Elsevier.

Islam, M. A., Shafique, K. M. A., Islam, M. T., & Islam, M. S. (n.d.). *KNOWLEDGE AND PRACTICE ON FOOD HYGIENE AMONG FOOD HANDLERS OF SELECTED RESTAURANTS IN SYLHET CITY,*

BANGLADESH.

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).

Li, X., Gong, P., Zhou, Y., Wang, J., Bai, Y., Chen, B., Hu, T., Xiao, Y., Xu, B., & Yang, J. (2020). Mapping global urban boundaries from the global artificial impervious area (GAIA) data. *Environmental Research Letters*, *15*(9), 94044.

Meher, M. M., Afrin, M., Talukder, A. K., & Haider, M. G. (2022). Knowledge, attitudes and practices (KAP) of street food vendors on food safety in selected areas of Bangladesh. *Heliyon*, *8*(12).

Nurudeen, A. A., Lawal, A. O., & Ajayi, S. A. (2020). Quality Assessment of Vended'Pito'and Safety Practices of Vendors in Different Markets in Ibadan. *Nigerian Food Journal*, *38*(1).

Omer, A. M. K. A. O. (2022). *Knowledge, Attitude and Practices of Food Hygiene among Street Food Vendors in (Elouzuzab) South Khartoum*. Sudan University of Science & Technology.

Waltenburg, M. A., Rose, C. E., Victoroff, T., Butterfield, M., Dillaha, J. A., Heinzerling, A., Chuey, M., Fierro, M., Jervis, R. H., & Fedak, K. M. (2021). Coronavirus disease among workers in food processing, food manufacturing, and agriculture workplaces. *Emerging Infectious Diseases*, *27*(1), 243.

Abdullah Sani, N., & Siow, O. N. (2014). Knowledge, attitudes and practices of food handlers on food safety in food service operations at the U. K. M. (2023). *Food Handlers' Food Safety Knowledge, Attitudes, and Practices in Taman Negara, Kuala Tahan*.

Abdullahi, B. S., Maiha, S. B., & Lawal, H. K. (2020). Hygiene, food safety practices and sanitation in some food service centres in Zaria, Kaduna State, Nigeria. *American Journal of Food Science and Technology*, *8*(5), 206–210.

Adraro, W., Mamo, G., Mamo, A., Muluken, M., Sahile, S., Derkiyab, E., & Toru, T. (2020). *Intestinal Parasites And Associated Factors Among Food Handlers In Mizan-Aman Town, Bench Maji Zone, Southwest Ethiopia*.

Al Banna, M. H., Disu, T. R., Kundu, S., Ahinkorah, B. O., Brazendale, K., Seidu, A.-A., Okyere, J., Rahman, N., Mondal, S., & Matubber, B. (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), 1–12.

Alemayehu, T., Aderaw, Z., Giza, M., & Diress, G. (2021). Food safety knowledge, handling practices and associated factors among food handlers working in food establishments in Debre Markos Town, Northwest Ethiopia, 2020: institution-based cross-sectional study. *Risk Management and Healthcare Policy*, 1155–1163.

Amedewonu, D. K. (2020). *Assessment of food hygiene practices among street food vendors in Ayensuano District Ghana*. University of Cape Coast.

Ashuro, Z., Zeysse, N., & Ayalew, M. (2023). Meat hygiene knowledge, handling practices and associated factors among meat handlers in Gedeo zone, Ethiopia. *Scientific Reports*, *13*(1), 15149.

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). Elsevier.

Islam, M. A., Shafique, K. M. A., Islam, M. T., & Islam, M. S. (n.d.). *KNOWLEDGE AND PRACTICE ON FOOD HYGIENE AMONG FOOD HANDLERS OF SELECTED RESTAURANTS IN SYLHET CITY, BANGLADESH*.

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).

Li, X., Gong, P., Zhou, Y., Wang, J., Bai, Y., Chen, B., Hu, T., Xiao, Y., Xu, B., & Yang, J. (2020). Mapping global urban boundaries from the global artificial impervious area (GAIA) data. *Environmental Research Letters*, *15*(9), 94044.

Meher, M. M., Afrin, M., Talukder, A. K., & Haider, M. G. (2022). Knowledge, attitudes and practices (KAP) of street food vendors on food safety in selected areas of Bangladesh. *Heliyon*, *8*(12).

Nurudeen, A. A., Lawal, A. O., & Ajayi, S. A. (2020). Quality Assessment of Vended'Pito'and Safety Practices of Vendors in Different Markets in Ibadan. *Nigerian Food Journal*, *38*(1).

Omer, A. M. K. A. O. (2022). *Knowledge, Attitude and Practices of Food Hygiene among Street Food Vendors in (Elouzuzab) South Khartoum*. Sudan University of Science & Technology.

Waltenburg, M. A., Rose, C. E., Victoroff, T., Butterfield, M., Dillaha, J. A., Heinzerling, A., Chuey, M., Fierro, M., Jervis, R. H., & Fedak, K. M. (2021). Coronavirus disease among workers in food processing, food manufacturing, and agriculture workplaces. *Emerging Infectious Diseases*, *27*(1), 243.

Abdullah Sani, N., & Siow, O. N. (2014). Knowledge, attitudes and practices of food handlers on food safety in food service operations at the U. K. M. (2023). *Food Handlers' Food Safety Knowledge, Attitudes, and Practices in Taman Negara, Kuala Tahan*.

Abdullahi, B. S., Maiha, S. B., & Lawal, H. K. (2020). Hygiene, food safety practices and sanitation in some food service centres in Zaria, Kaduna State, Nigeria. *American Journal of Food Science and Technology*, *8*(5), 206–210.

Adraro, W., Mamo, G., Mamo, A., Muluken, M., Sahile, S., Derkiyab, E., & Toru, T. (2020). *Intestinal Parasites And Associated Factors Among Food Handlers In Mizan-Aman Town, Bench Maji Zone, Southwest Ethiopia*.

Al Banna, M. H., Disu, T. R., Kundu, S., Ahinkorah, B. O., Brazendale, K., Seidu, A.-A., Okyere, J., Rahman, N., Mondal, S., & Matubber, B. (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), 1–12.

Alemayehu, T., Aderaw, Z., Giza, M., & Diress, G. (2021). Food safety knowledge, handling practices and associated factors among food handlers working in food establishments in Debre Markos Town, Northwest Ethiopia, 2020: institution-based cross-sectional study. *Risk Management and Healthcare Policy*, 1155–1163.

Amedewonu, D. K. (2020). *Assessment of food hygiene practices among street food vendors in Ayensuano District Ghana*. University of Cape Coast.

Ashuro, Z., Zeysse, N., & Ayalew, M. (2023). Meat hygiene knowledge, handling practices and associated factors among meat handlers in Gedeo zone, Ethiopia. *Scientific Reports*, *13*(1), 15149.

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). Elsevier.

Islam, M. A., Shafique, K. M. A., Islam, M. T., & Islam, M. S. (n.d.). *KNOWLEDGE AND PRACTICE ON FOOD HYGIENE AMONG FOOD HANDLERS OF SELECTED RESTAURANTS IN SYLHET CITY, BANGLADESH*.

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).

Li, X., Gong, P., Zhou, Y., Wang, J., Bai, Y., Chen, B., Hu, T., Xiao, Y., Xu, B., & Yang, J. (2020). Mapping global urban boundaries from the global artificial impervious area (GAIA) data. *Environmental Research Letters*, *15*(9), 94044.

Meher, M. M., Afrin, M., Talukder, A. K., & Haider, M. G. (2022). Knowledge, attitudes and practices (KAP) of street food vendors on food safety in selected areas of Bangladesh. *Heliyon*, *8*(12).

Nurudeen, A. A., Lawal, A. O., & Ajayi, S. A. (2020). Quality Assessment of Vended'Pito'and Safety Practices of Vendors in Different Markets in Ibadan. *Nigerian Food Journal*, *38*(1).

Omer, A. M. K. A. O. (2022). *Knowledge, Attitude and Practices of Food Hygiene among Street Food Vendors in (Elouzuzab) South Khartoum*. Sudan University of Science & Technology.

Waltenburg, M. A., Rose, C. E., Victoroff, T., Butterfield, M., Dillaha, J. A., Heinzerling, A., Chuey, M., Fierro, M., Jervis, R. H., & Fedak, K. M. (2021). Coronavirus disease among workers in food processing, food manufacturing, and agriculture workplaces. *Emerging Infectious Diseases*, *27*(1), 243.