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Prevalence of Antibiotic-Resistant Bacteria in Street Foods Available in the Educational Institutions

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Abstract

The prevalence of antibiotic-resistant bacteria in street foods near educational institutions in Dhaka and nearby areas in Bangladesh is a pressing public health concern. This study aimed to identify and characterize the bacterial contaminants in food and water samples collected from various street food stalls (tea stalls, fruit juice stalls, panipuri/chotpoti stalls, and fried samosa/chicken stalls) and to evaluate their antibiotic resistance profiles. Samples were analyzed using selective media, and bacterial identification was confirmed through biochemical tests. The results revealed significant contamination with *E. coli* (68%), *Pseudomonas aeruginosa* (38%), *Salmonella spp.* (23%), *Klebsiella spp.* (18%), and *Enterobacter spp.* (10%). *E. coli* was the most prevalent, with counts up to 7.6×10^5 cfu/g in chicken and samosa stalls. Antibiotic resistance testing showed alarming levels of resistance, particularly in E. coli, which exhibited 100% resistance to ampicillin, cefuroxime, and cefoxitin. *Pseudomonas aeruginosa*, *Salmonella spp.*, and *Klebsiella spp.* also demonstrated significant resistance to multiple antibiotics. These findings indicate a high risk of foodborne illnesses and the potential for the spread of multidrug-resistant bacteria among students and staff in educational institutions. Improved hygiene practices and stringent monitoring of street food vendors are essential to mitigate these health risks.

Key Words: Street Foods, Microbiological Quality, Drinking Water, Foodborne Diseases, Antibiotic Resistance, *Escherichia coli*.

1. Introduction

Street foods are widely available and highly preferred in educational zones across Bangladesh. These foods are popular among students, teachers, and staff due to their affordability, accessibility, and variety. Vendors set up near schools, colleges, and universities, providing a range of options from traditional snacks to modern fast foods. This preference is driven by the convenience of quickly obtaining ready-to-eat meals during short breaks between classes or after-school activities, as reported by Imathiu (2017). A study by Banna et. al. (2022) found that a significant proportion of students regularly consume street foods, with items like samosa (a fried South Asian pastry with a savory filling, mostly vegetables, meat, or fish), jhalmuri (spicy puffed rice), panipuri/fuska (a deep-fried breaded hollow spherical shell filled with a combination of diced potato, onion, peas, and chickpea), chotpoti (a dish consisting of potatoes, dubli, onions, and topped with diced chilies or grated boiled eggs), noodles, petties, chicken fry, french fry, burger, fruit juice, lemon juice, sugarcane juice, and so on. The availability of street foods in educational zones also caters to the cultural and social aspects of food consumption. These areas often become social hubs where students gather, fostering a sense of community and providing a break from academic routines, as stated by Islam et. al. (2019).

However, while street foods are widely favored, there are concerns about their safety and hygiene. A primary concern is the contamination of street foods with pathogenic bacteria such as Salmonella, Escherichia coli, Shigella, and Staphylococcus aureus. These pathogens can cause severe gastrointestinal illnesses, including diarrhea, vomiting, and abdominal pain, as reported by Shi and Kang (2024) and Fusaru et. al. (2024).

Factors contributing to this contamination include the use of poor-quality raw materials, improper food handling, and unsanitary conditions at vending sites. Belina (2021) reported that many street food vendors lack basic hygiene practices and often operate in environments without access to clean water or adequate waste disposal facilities. Contaminated water is frequently used for preparing food and drinks. A study conducted by Nahidul-Islam (2022) found that street vendors often use untreated or inadequately treated water, leading to microbial contamination. Foods are often kept at ambient temperatures, which promotes bacterial growth. Environmental Contamination: Street food stalls are typically located in open areas exposed to pollution, dust, and pests.

Several studies have been conducted to assess the microbial quality of street foods in Bangladesh. Study by Sultana et. al. (2024). It was found that 85% of street food samples tested positive for *E. coli*, indicating fecal contamination. Another investigation by Mirza et. al. (2022) detected high levels of Staphylococcus aureus in street food samples, particularly those handled by vendors with visible wounds. Research by several groups, like Khairuzzaman et. al. (2014), Bani et. al. (2019), and Letuka et. al. (2021), has identified *Salmonella spp.* in the sampled street foods, which may result from cross-contamination from raw ingredients to cooked foods.

The presence of pathogenic microorganisms in street foods poses significant health risks to consumers. Foodborne illnesses caused by these pathogens pose significant public health risks, particularly to vulnerable populations like children and young adults. These illnesses can lead to severe health complications, increased healthcare costs, and academic disruptions due to absenteeism, as explored by Wu-Wu et. al. (2023) and Tambekar et. al. (2009). Previous research carried out by Ventola (2015), Akhter et. al. (2020), and Afrin et. al. (2022) has indicated the presence of antibiotic-resistant bacteria in street foods in various regions, underscoring the importance of monitoring and controlling these risks. However, there is a paucity of data specifically concerning the prevalence and types of antibiotic-resistant bacteria in street foods sold near educational institutions in Dhaka. Given the high consumption of these foods by students, who are particularly vulnerable to foodborne illnesses, it is crucial to understand the extent of this issue. Research on the microbial contamination of street foods in educational zones in Bangladesh is vital for protecting public health, supporting economic stability, enhancing academic performance, and fostering informed policy development. It provides a foundation for effective interventions and improves food handling practices, ultimately leading to safer and healthier educational environments.

This study aims to address this gap by investigating the presence and types of antibiotic-resistant bacteria in street foods sold at educational institutions in Dhaka City and nearby areas in Bangladesh. By doing so, we hope to highlight the potential public health risks and provide recommendations for improving food safety practices among street vendors.

2. Materials and Methods

Study Design and Collection of Samples

To conduct this study, a total of 60 food and water samples were taken from four different categories of street food stalls, i.e., a tea stall, a panipuri/chotpoti stall, a fried samosa/chicken stall, and a fruit juice stall operating in ten different educational institutions, including five universities and five school premises in Dhaka city and nearby areas. At least fifteen samples from each category of food stalls were collected for microbial quality analysis in the laboratory. Every sample was gathered and placed in sterile bottles. To prevent-false positive results, these samples were labeled correctly, stored, and delivered to the laboratory for microbiological investigation at 4 °C within 4 hours. All samples were examined sequentially to explore the existence of any microorganism, especially bacteria. Then the isolation and detailed characterization of all bacteria have been done following a series of biochemical tests such as gram staining, oxidase tests, motility tests, colony counts, etc. In addition, the antibiotic resistance capability of the identified bacteria was tested.

Chemicals and Reagents

Blood agar (40.0 g/L), MacConkey agar (51.5 g/L), Salmonella-Shigella (56.68 g/L), Muller-Hinton agar media (3 g/L), and antibiotic discs for sensitivity testing were purchased from Oxoid Ltd., UK. In addition, Muller-Hinson agar broth media and oxidase dies were obtained from Himedia Laboratories, India. Other reagents like crystal violet, grams of iodine, and carbon fuchsin were obtained from DLC, Bangladesh. 95% ethanol was purchased from SUPELCO, UK. Hand gloves, distilled water, test tubes, Petri dishes, and plastic containers (for sample collection) were collected from local suppliers in Bangladesh. For antibiotic sensitivity tests, commercial antibiotic discs containing specific concentrations of ampicillin, amoxicillin-clavulanate, ciprofloxacin, cefuroxime, cefixime, tetracycline, and cefoxitin are available in the local market.

Preparation of Media and Culture of Samples

A spread-plate culture technique was used to grow the bacteria in water samples. For the culture and isolation of microorganisms, more specifically bacteria, three agar media were used. They are: blood agar (40.0 g/L), MacConkey agar (51.5 g/L), and Salmonella-Shigella (56.68 g/L), respectively. All the media were prepared by following appropriate laboratory procedures. At first, agar powder was measured with an electrical balance and taken into a conical flask. Then mix with 1 liter of distilled water. The rest was heated in the autoclave at 121 °C for 15 minutes, except the Salmonella-Shigella media. The Salmonella-Shigella agar medium was placed in a water bath that

was heated to 45 °C. Mix the medium with gentle swirling and completely dissolve the medium. Cool to room temperature before pouring into the sterile petri dishes.

In the preparation of food samples, 90 ml of sterile peptone saline was added to 10 g of each sample, which was then vigorously shaken for two minutes to achieve a tenfold dilution. Then, using the plate count approach, serial dilutions of every food sample were grown. For the water sample, 10 ml of solution from each collected sample was centrifuged, and the sediment was used to spread over the agar media. Each sample was spread on selected media using the spread plate method and a sterile swab stick. Then the plates were incubated for 24 hours at 37 °C.

Biochemical Tests for the Identification of Bacteria

To identify the bacteria, present in the food and water samples, biochemical tests were performed after culture by performing the following tests:

Gram staining

For this test, crystal violet and Gram's iodine were used as the primary and moderate stains, respectively. 95% ethanol was used for decolorization, and safranin was used for counterstain. The result is interpreted according to the purple and red colors for gram positive and gram negative, respectively, by observing under a light microscope with oil immersion.

Oxidase Test

A wet filter paper was used to differentiate E. coli from Pseudomonas aeruginosa. A freshly made 1% solution of dimethyl-p-phenylene-diamine dihydrochloride in water was soaked on filter paper. Then, a small amount of bacterial growth was rubbed on it with an aluminum loop. No color on the filter strip indicates the bacteria are E. coli whereas an immediate purple color indicates the bacterial colony is Pseudomonas aeruginosa.

Motility Test

The motility test is used to determine whether an organism is motile or not. Motile organisms contain flagella, which help them travel beyond the point of inoculation. Motile bacteria are generally bacilli, although a few motile cocci do exist. A small drop of a cultured bacteria colony was taken from the petri dish and placed into the cavity slide with 1 drop of saline. A thin, small

smear was created and was ready to be observed through the electronic microscope with a 40X objective.

Colony Count

The single colony-forming unit (CFU) of bacteria was counted following the plate count method. In this case, a 10 μL sample was taken, and the serial dilution technique was applied up to the dilution factor of 10^5 for forming a single colony. After allowing the bacteria to grow on the plates for 24 hours at 37 °C, individual colonies are counted on a plate.

Antibiotic Sensitivity Test

The Kirby-Bauer method was used to examine the in vitro susceptibility of isolated bacteria to various antimicrobial drugs, utilizing antibiotic disc diffusion on Muller-Hinton agar (3 g/L) as per the proposal by Bauer et. al. (1966). It enabled the determination of the antibiotic's effect, which demonstrates the pathogen's inhibition to a degree proportionate to the diameter of the zone of inhibition produced by the antimicrobial's diffusion encircling the disc onto the agar medium. Commercial antibiotic discs containing AMP = ampicillin (10 g); AZM = azithromycin (10 g); CIP = ciprofloxacin (5 g); CXM = cefuroxime (30 g); TE = tetracycline (10 g); and FOX = cefoxitin (15 g) were used in this study. In brief, a pure culture of a specific strain was added to 5 mL of Mueller-Hinton broth and incubated at 37 °CC for an overnight period. The 0.5 McFarland standard was used to account for the turbidity of broth cultures that were actively growing, as reported by Owusu et. al. (2021).

3. Results

Sample Analysis, Identification, and Characterization of Bacteria

In this study, after the collection of food and water samples from four different categories of street food stalls (**Figure 1**), the samples were sealed immediately to avoid environmental contamination and labeled.

Figure 1. Representative photos of the food stalls from whice samples were collected for microbial analysis. (A) tea stall; (B) panipuri/chotpoti stall; and (C) a fruit and fruit juice selling stall.

Figure 2 shows representative images of patterns of growth of bacteria using three selective media, i.e., blood agar, MacConkey agar, and Salmonella-Shigella agar, respectively. Images confirm the successful growth of bacteria present in the collected water samples. The spread-plate approach was employed to assess the presence of microorganisms in the samples.

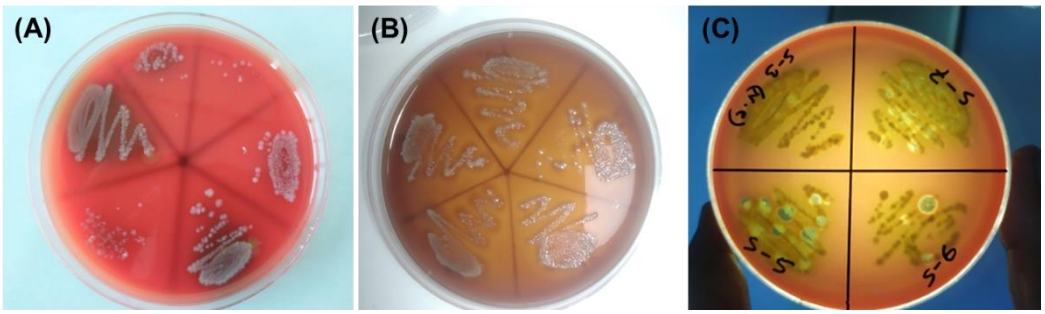

Figure 2. Growth patterns of bacteria exist in various water samples. The spread-plate culture technique was followed using various culture media: (A) Blood Agar Media; (B) Salmonella-Shigella Agar Medium; and (C) MacConkey Agar Media.

Table 1 summarizes the microbial contamination in all kinds of food samples from various food stalls. The samples were tested for catalase activity, motility, Gram staining, and identified bacterial colonies. The sources include tea stalls, fruit juice stalls, panipuri/chotpoti stalls, and samosa/chicken stalls. *E. coli* was common in all samples. In addition, it was also found that water samples from tea stalls were contaminated by *Pseudomonas aeruginosa* and *Salmonella typhi*. *Pseudomonas aeruginosa, Enterobacter spp., and Klebsiella spp.* were identified in the foods, and water samples were collected from the fried food shops (like samosa, chop, dal puri, etc.).

Panipuri/chotpoti *was contaminated by Klebsiella spp*. Moreover, *Pseudomonas aeruginosa* and *Enterobacter spp*. were found in fried food stalls. All of the bacteria are motile except *Klebsiella spp.* In addition, all bacteria are gram-negative and show positive results in the catalase test.

Table 1. Biochemical profiles of identified bacteria from various water samples used for washing dishes, plates, and cups of various street food stalls in various zones of Dhaka city in Bangladesh.

Sample sources	Catalase test	Motility	Gram Staining Test	Identified Bacteria	Colonies per unit (cfu/g)
Tea Stall	+	+	-	*E. coli*	3.2×10^5
	+	+	-	*Pseudomonas aeruginosa*	3.0×10^5
	+	+	-	*Salmonella typhi*	1.9×10^5
Fruits juice stall	+	+	-	*Pseudomonas aeruginosa*	6.1×10^5
	+	+	-	*E. coli*	6.8×10^5
Panipuri/chotpoti stall	+	+	-	*E. coli*	6.9×10^5
	+	-	-	*Klebsiella spp.*	3.7×10^5
Fried samosa/ chicken stall	+	+	-	*E. coli*	7.6×10^5
	+	+	-	*Pseudomonas aeruginosa*	4.5×10^5
	+	+	-	*Enterobacter spp.*	5.1×10^5
	+	-	-	*Klebsiella spp*	6.6×10^5

For more characterization, after the isolation and identification of bacteria that grew on multiple culture plates, colonies were counted manually, and an average number of colonies was calculated per unit. The colony count for each identified bacteria is also given in **Table 1**. Samples from the fruit juice, panipuri/chotpoti stalls, and fried foods stalls were found to be maximally loaded with bacteria (6.8×10^5 to 7.6×10^5 cfu/g). *Salmonella typhi* in a tea stall found significantly less loading (1.9×10^5 cfu/g). A very common and maximum amount of contamination was found to be caused by *E. coli* up to 7.6×10^5 cfu/g in chicken and samosa stalls.

Table 2. Total number of bacteria identified from various kind of food stall sources and their antibiotic response profiles.

Identified bacteria	Sources and number of samples found various bacterial species					Summary of antibiotics sensitivity of isolated bacteria; Frequency (%)		
	Tea Stall (n=15)	Fruits juice stall (n=15)	Panipuri/ chotpoti stall (n=15)	Samosa/ chicken stall (n=15)	Comparative ratio of bacteria (n=60)	Sensitive (S)	Intermediately sensitive (I)	Resistant (R)
E. coli	8	12	11	10	41 (68%)	5 (12%)	7 (17%)	29 (71%)
P. aeruginosa	5	10	-	8	23 (38%)	8 (35%)	3 (13%)	12 (52%)
Salmonella spp.	6	8	-	-	14 (23%)	3 (21%)	5 (36%)	6 (43%)
Klebsiella spp.	-	-	6	5	11 (18%)	6 (43%)	2 (15%)	3 (22%)
Enterobactor spp.	-	3	-	3	6 (10%)	2 (33%)	1 (17%)	3 (50%)

Here, Inhibition zone size for- Sensitivity (S) > 17 (mm); Intermediately sensitive (I) 15-16(mm); and Registrant (R) <14(mm).

Table 2 provided illustrates the data on bacterial contamination in food samples, along with their antibiotic resistance profiles. As mentioned earlier, among the total 60 food and water samples from four different categories of street food stalls, five (5) different species of bacteria were identified. More specifically, the maximum number of samples (41 out of 60 samples) were contaminated by *E. coli* (68%), followed by *Pseudomonas aeruginosa* (38%), *Salmonella spp. (23%), Klebsiella spp. (18%), and Enterobactor spp. (10%). E. coli, Pseudomonas aeruginosa, and Klebsiella spp.* were detected in all four categories of samples. This study found that there was no sample that was not contaminated by at least a single bacterium.

Antibiotic Resistance Profile

To investigate the antibiotic resistance of the isolated bacteria from the dishwashing water, zone of inhibition screening is a quick, qualitative way to assess an antimicrobial agent's capacity to prevent the growth of microorganisms. As shown in **Figure 3**, with pathogen inhibition proportional to the size of the zone of inhibition brought on by antimicrobial diffusion into the

agar medium around the disc, it was possible to determine how effective the antibiotic was, while no zone of inhibition indicates the antibiotic is not able to stop bacterial growth.

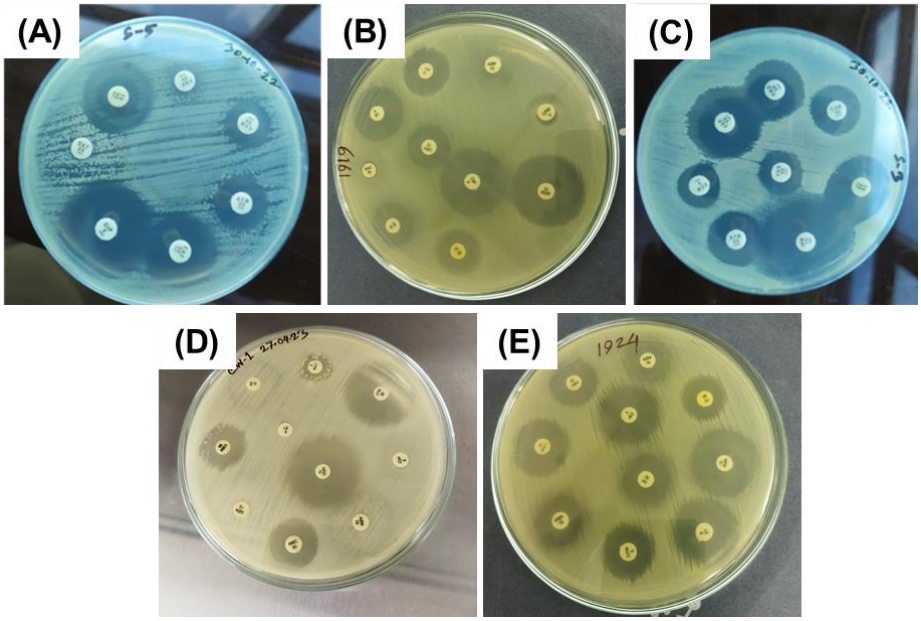

Figure 3. Images of antibiotic sensitivity tests showing a clear zone of inhibition against the growth of isolated bacteria (A) *Pseudomonas aeruginosa*, (B) *E. coli*, (C) Salmonella typhi, (D) *Klebsiella spp*., and (E) *Enterobactor spp*. using different kinds of antibiotics as summarized in **Table 2.**

In addition, **Table 2** also provides a summary of the sensitivity patterns of the above-mentioned five isolated bacteria against six commonly used antibiotics (AMP = ampicillin; AZM = azithromycin; CIP = ciprofloxacin; CXM = cefuroxime; TE = tetracycline; FOX = cefoxitin). The results show that 71% of *E. coli* (n = 41) are resistant and 29% are sensitive to these five commonly used bacteria, whereas *Klebsiella spp.* (n = 11) shows the highest sensitivity (43% and 57% are resistant) against these five antibiotics. In addition, about 52% of *Pseudomonas aeruginosa* (n = 23) and 50% of *Enterobactor spp.* (n = 6) are resistant to various antibiotics. In the case of *Salmonella spp.* (n = 14), 43% are sensitive and 57% have antibiotic resistance. More details about the resistance profiles of each bacterium against individual antibiotics have been stated in **Table 3** in the next section.

Table 3. Summary of antibiotic resistance profiles against various bacteria responsible for the contamination of dishwashing water used by the street food vendors. Here, S stands for sensitivity (> 17 mm) and R for resistance (<14 mm) based on the calculated zone of inhibition (mm).

Nome of Food stall	Identified bacteria	Name of Antibiotic					
		AMP	**AZM**	**CIP**	**CXM**	**TE**	**FOX**
Tea Stall	*E. coli.*	R	S	S	R	R	R
	Pseudomonas aeruginosa	S	S	R	S	S	S
	Salmonella spp.	R	S	R	R	S	S
Panipuri/ chotpoti stall	*E. coli.*	R	S	S	R	R	R
	Klebsiella spp.	R	R	R	R	S	R
Fried samosa/ chicken stall	*E. coli.*	R	R	S	R	R	R
	Pseudomonas aeruginosa	S	S	R	S	S	S
	Enterobactor spp	R	S	R	S	S	R
	Klebsiella spp	R	R	R	R	S	S
Fruits juice stall	*E. coli.*	R	S	S	R	S	R
	Pseudomonas aeruginosa	S	S	R	S	S	S
	Enterobactor spp	R	S	R	S	R	R
	Salmonella spp.	R	S	R	S	R	S

In addition, Table 3 shows that *E. coli* exhibited 100% resistance to AMP, CXM, and FOX antibiotics, whereas AZM and CIP antibiotics are highly sensitive to this bacterium. *Pseudomonas aeruginosa* was not assessed as having significant antibiotic resistance except for CIP. *Salmonella spp.*, found in the samples of tea stalls and fruit juice stalls, shows resistance to AMP, CXM, and CIP, whereas AZM, TE, and FOX are sensitive against this bacterium. Alarming results were observed in the case of *Klebsiella spp.* from panipuri/chotpoti, and fried chicken/samosa food shops; all of the antibiotics showed resistance except for TE. In addition, *Enterobacter spp.* identified in the samples from fruit juice and fried samosa or chicken stalls are sensitive only to AMP and CIP.

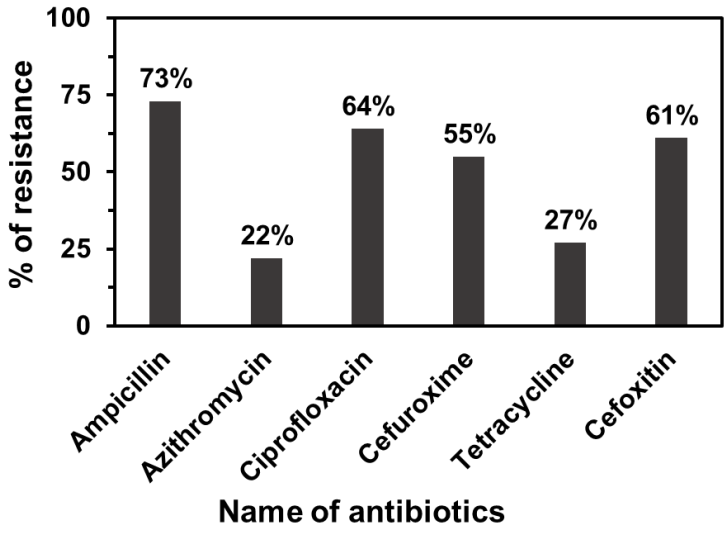

Figure 4. Comparative percentage of resistance of various commercial antibiotics against bacteria reported in various food and water samples available in the educational premises.

From **Figure 4**, we can see that the resistance to ampicillin is quite significant (73%). Ciprofloxacin (64%) and cefoxitin have shown modest percentages (55%) of resistance. Azithromycin and tetracycline have shown the lowest percentage of resistance (22% and 27%, respectively).

4. Discussion

Bangladesh has a high insistence on street foods, mostly in the capital city of Dhaka. The demand is increasing day by day. The reasons behind the popularity of street foods are that they are easily available, there are lots of variations, and different types of foods are also low in price, which is under the range of students. A recent study by Ahmed et. al. (2009) and Bhalla et. al. (2019) shows that the majority of microbiological diseases are caused by a variety of food-borne infections. Because of overcrowding, high demand, and some other factors, street food vendors are unable to maintain their hygiene and food safety, especially with the water they use to make foods, serve drinks, and wash dishes. Using unhygienic and contaminated water to make foods or to wash dishes can cause some common water-related illnesses like diarrhea, giardiasis, dysentery, typhoid fever, *E. coli* infection, and salmonellosis. Nearly 70% of the collected samples in this study were identified as contaminated with various pathogenic bacteria, like *Salmonella typhi*, *E. coli*, *Pseudomonas aeruginosa*, *Klebsiella spp.*, and *Enterobacter spp.* Therefore, results show that

eating these foods can easily lead to serious health issues. *E. coli* can cause a variety of intestinal and extra-intestinal infections, such as diarrhea, urinary tract infections, meningitis, peritonitis, septicemia, and gram-negative bacterial pneumonia, as stated by Bhowmik et. al. (2022). A serious infection can cause symptoms like high fever, a lung infection, chills, confusion, and shock. *Klebsiella spp. is a* gram-negative bacterium that can cause different types of healthcare-associated infections. It can lead to a range of illnesses, including pneumonia, a bloodstream infection, meningitis, and so on. *Salmonella spp.* infections can be more life-threatening and lethal, as reported by Popa and Papa (2021). It causes diarrhea that can be bloody, stomach cramps, a high fever, and occasionally nausea and vomiting (Urban et. al., 2022). *Enterobacter* species are responsible for causing many nosocomial infections and less commonly community-acquired infections, including urinary tract infections (UTI), respiratory infections, soft tissue infections, osteomyelitis, endocarditis, and many others, as said by Dunne et al. (2022).

The results for antibiotic resistance show that commonly used antibiotics like ampicillin and ciprofloxacin are highly resistant (73% and 64%, respectively). This means that, while eating these street foods, people can easily become infected by the above-mentioned antibiotic-resistant bacteria. The result of the study also showed that consumers of those foods and waters have a significant risk of contracting illnesses as well as developing multi-drug resistance, as mentioned by Bauer et. al. (1966). This set of circumstances will be more lethal for small children and the general public. An extension in apprehension between food manufacturers, suppliers, customers, and inspection authorities may improve food safety.

5. Conclusion

This study revealed that the water and street foods consumed by the students and other staff in the educational premises in Dhaka and nearby areas are highly contaminated by various disease-causing bacteria like *E. Coli* (68%) followed by *P. aeruginosa,* (38%)*, Salmonella spp., (23%), Klebsiella spp. (18%) and Enterobactor spp. (10%)*. Therefore, customers who are eating varieties of street foods are at high risk of developing diseases. Particularly, young people and students are under threat of being infected by microorganisms. Moreover, antibiotic susceptibility tests demonstrated that multi-drug-resistant organisms may also develop due to the resistance to growth inhibition of most of the antibiotics against these bacterial pathogens in foods. This means that street food stalls like tea stalls, panipuri/chotpoti stalls, fried samosa/chicken stalls, and fruit juice

stalls can be one of the very common sources of developing and spreading antibiotic-resistant bacterial infections among the students and young generations of Bangladesh. The study's findings could be attributed to the increased social awareness of improper processing, poor handling techniques, and contaminated foods, which can endanger consumers' health, especially among students and staff in educational zones in our country.

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Conflicts of Interest: The authors declare no conflict of interest.

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Aims: The prevalence of antibiotic-resistant bacteria in street foods near educational institutions in Dhaka and nearby areas in Bangladesh poses a significant public health concern. This study aimed to identify and characterize bacterial contaminants in food and water samples collected from various street food stalls (tea stalls, fruit juice stalls, panipuri/chotpoti stalls, and fried samosa/chicken stalls) and evaluate their antibiotic resistance profiles.

Methodology and Results: A total of 60 samples were collected from street food vendors operating near educational institutions. Samples were analyzed using selective media, and bacterial identification was confirmed through biochemical tests. The results revealed significant contamination with E. coli (68%), Pseudomonas aeruginosa (38%), Salmonella spp. (23%), Klebsiella spp. (18%), and Enterobacter spp. (10%). E. coli was the most prevalent, with counts up to 7.6 x 10^5 cfu/g in chicken and samosa stalls. Antibiotic resistance testing showed alarming levels of resistance, particularly in E. coli, which exhibited 100% resistance to ampicillin, cefuroxime, and cefoxitin. Pseudomonas aeruginosa, Salmonella spp., and Klebsiella spp. also demonstrated significant resistance to multiple antibiotics.

Conclusion, Significance, and Impact of Study: These findings indicate a high risk of foodborne illnesses and the potential for the spread of multidrug-resistant bacteria among students and staff in educational institutions. The study underscores the need for improved hygiene practices and stringent monitoring of street food vendors to mitigate these health risks. Enhanced regulatory measures and public health interventions are essential to ensure the safety of street foods and protect public health in educational settings.