

Vendors and Consumers Status and Microbial Analysis of Open Restaurant Foods in Patuakhali District University

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Abstract

Open restaurant food vendor and consumer status as well as hygienic condition of different types of food at Dumki, Patuakhali upazila, and Kuakata union of Patuakhali district were determined. Ninety shops with 180 open restaurant food samples were collected. Among the food vendors, 97.78

Index terms— open restaurant; vendor; microbial analysis; salmonella; E. coli.

1 I. Introduction

Open restaurant food vending and consuming is a popular type of informal self-employment in the Patuakhali district, providing the vendors with a means to sustain their livelihoods. Vendors sell a great variety of products from different kinds of vending units. A study in Uganda (Ayalew, M. S., 2008) showed that most vendors earned more than the minimum civil service wage and many earned more than the minimum wage. In developing countries, drinks, meals, and snacks sold by street food vendors widely consumed by millions of people (FAO, 1988). In Bangladesh, the quality and quantity of food supplies by vendor systems are not so inadequate but unhygienic for health. The street foods provide an affordable source of nutrients to many sectors of the population (Ohiokpehai, 2003). Within this context, street foods as informal food supply system, opportunities for resource-poor groups in urban and peri-urban environments, not only as a means of employment but also as an effective way of providing low-cost nutrition to the people (Codjia, 2000).

The present study also showed a daily income of vendors to be up to TK. 1746.50 with a net profit up to TK. 283.00./day. Though this figure is not that encouraging, however, when the credibility in terms of safety of street foods will increase, it will contribute to better earnings of the vendors. They tied to retailers, cooking units, and other food system actors. Specific consumer groups with street food eating habits found to exist. Among various types of informal sector activities, food vending is distinctive in the sense that it provides a need for the urban inhabitants and involves issues of hygiene and food safety. A large number of dwellers from different spheres of life such as students, tourists, rickshaw drivers, cart pullers, and other such workers rely on open restaurant food vendors for their daily meals. Urban food vending provides employment and income for many people. However, street foods are frequently associated with many food and water born disease like, diarrhea, hepatitis, typhoid, etc diseases due to their handlings and use of dirty water. The open restaurant foods vendors are not aware of all about health hygienic and microbial aspects of food and drinking water. Especially the coastal belt of Bangladesh is naturally rich in soil and water-borne pathogens.

2 II. Materials and Methodology a) Sample selection and sample size

90 open restaurants and 90 consumers included in the present survey were therefore, a purposive sample chosen primarily to represent some of the key characteristics associated with them.

3 b) Interview schedule design

The interview schedule developed for collecting socioeconomic information, health aspects of food, and environmental aspects of food after developing the Interview schedule it was pre-tested among five sellers, and five consumers and necessary correction done for the final Interview schedules. Those Interview schedule field tested, modified, and standardized. c) Equipment and general procedure for microbial examination i. All glass equipment, e.g., Petri dish, Pipette, Test tube, Beaker & other glass wares were washed, rinsed, dried, and treated a hot air oven for sterilization. Sterilization is done by dry heat at 170°C for 1 hour. ii. All the media prepared for microbial growth sterilized by steam pressure using 121 °C at 15 lb/ square inch pressure for 5 minute.

4 d) Preparations of food samples

Homogenate food samples prepared by taking 10gm of both superficial & inner layers of samples and weighed on a sterile weighing paper using sterile scalpels or forceps, and washing with alcohol before & each batch of samples and between samples washed with hot water and sterilized with alcohol. These meshed samples inserted aseptically into sterile cotton plugged conical flask containing 0.9% sterile sodium chloride solution by using sterile forceps.

5 e) Bacteriological analysis

Three different types of media were recommended for the growth of Salmonella and E. coli. The colonies developed on the plates and counted after incubation for 24-48 hours at 37°C and pH of the media adjusted to 7.2 prior to sterilization. Inoculated plates incubated at 37 °C for 24 -48 hours to facilitate viable bacterial growth.

6 f) Total aerobic plate count

Duplicate pour plates of four successive decimal dilutions prepared. The plates incubated at 37°C for 24-48 hours, and duplicate plates counted and calculated. Average counts expressed as colonyforming units per gram or ml of sample.

7 g) Coliform count

The coliform count of the food and water samples determined using membrane filter technique. The plates incubated at 35°C for 24 hours.

8 h) Data management and analysis

The quality of the data entry process commenced as the questionnaires collected from the surveyed areas after the process of cleaning the mistakes. Data entry process managed to apply doubled data entry errors. All questionnaires edited and the data were cleaned, and entered into a computer. The data were analyzed by SPSS 20.0 package. Results expressed as frequencies and percentages.

9 III. a) Results of open restaurant food vendor i. Socio-economic and demographic profile of open restaurant food vendors

Most of the vendors were male (97.78%). About 68% of them were age between 21-40 years (mean about 31 years) while, 23.33% were age between 41-60 years. About 73.33% of vendors were married, 43.33% of them had a family size of 5 or less, and the rest 56.67% had a family size higher than 5. About 54% of vendors who had primary education followed by nearly 10%, 5.56%, and 5.56% vendors had SSC, HSC, and Degree education respectively, and 24.44% of vendors were illiterate. Only 3.33% of vendors in Patuakhali had Degree education while, 20% of them were illiterate in Dumki comprising the lowest percentage among the three survey areas.

10 ii. Ownership and reason for doing food vending business

The survey, it was revealed that 74.45% vendors owned and half of the vendors (51.11%) had the opinion that due to the low investment, and skill required they had come into the open restaurant food vending business (Figures 1). The majority of the open restaurant food vendors had been doing business from 4 to 10 years in respective of the areas surveyed with the mean is 38.887%. In Kuakata, no open restaurant food vendors had been starting business up to one year. located near the side of drain, sewerage, toilet and dustbins.

11 vi. Nature of business and daily capital/net profit

The vendors were unsatisfied about their investment, daily income, and net profit of the food vending business. Forty-one percent of vendors invested up to TK. 100000 in their business. Nearly 40% of vendors' daily sales range between TK. 1001-2000 and 81% make a net profit of more than TK. 500 daily. It observed that the average investment was higher in the Kuakata area amount in TK 97383 and less in Dumki amount in TK 78000. Patuakhali area placed in between the other two with TK 97333. However, more than 50% of vendors reported

that net profit met 100% of their family expenditure. During the survey, it was revealed that (86.667%) worked all time. Food vending in residential areas was comparatively higher (90%). Seventy-five percent of the vendors worked for 13-18 hours in a day. The maximum sale was at noon and lowest was at morning. Winter was the season of maximum sale and while minimum during the summer. It was difficult to maintain the vending during the summer and rainy season, and consumers did not go outside. Winter season was more comfortable for both vendors and consumers. The majority (57.22%) of the vendors continued their business from morning to midnight. 77.23% of vendors washed their hand before preparing foods. However, 60% food handlers did not clear their hands before serving food which support the report of Bangkok where over 60% of street food vendors washed preparation equipments and eating utensils once it day (FAO, 1994).

viii. Licenses/permits

About 67% of the vendors replied when they asked whether they had to pay shop rent for doing their vending businesses. The rest 33% of vendors had own shop. All vendors agreed that they did not pay money to the Police, market committee, and others. Over 100% of the street food vendors felt they should have a license for their business but, 74.44% had. The few, who said they had the licenses, had a business permit or foodselling permit. The food vendors told whether they had any training on food safety and food serving or not. Cent percent of the vendors had no training either on food safety or on food serving irrespective of the survey areas.

ix. Food safety profile

In street food vending, the raw material source was important as their contamination from this point could persist through preparation, processing, and cooking. Quality of the raw materials were important to the safety of vended food because of the biological, chemical and physical hazards that might be introduced to the vending operations and which may persist through preparation and processing.

Water, environment, sanitation and personal hygiene

Cent percent reported that the source of drinking water for consumers was stored water that was collected from the nearby tube well. The water always stored in plastic drums without lids, thus making it more susceptible to contamination. Most of the male labor brings water, and 67.777% bring 3 or less.

Safe water using practices

One of the striking findings found in the survey was that 100% of vendors did not take any measures for purification of drinking water, which implies a definite possibility of contamination. Drinking water did not boil irrespective of the location.

x. Mode of display of food by open restaurant vendor

The majority of the vendors displayed their foods in baskets/trays, bowl, and shelves in survey area while vendors used showcase in Patuakhali and Kuakata areas. The utensils they used made up of many different materials such as melamine, aluminum, stainless steel, and ceramics. Some vendors used only paper instead of a plate. Tissue paper used 68.89% of vendors. Table ??:

xi. Protective display of food About 64% of the vendors did not cover their food during selling. 56.67% cleaned the utensils in their shop but 13% on the roadside. Two thirds of food vendors used stored water for cleaning the utensil. The time between food making, and food selling more than 5 hours was 61.11%, and 38.89% was 5 or less. Ninety percent of open restaurant vendors used soybean oil and frequency of using oil was one used by 70% of the vendors.

xii. Food servicing system of open restaurant food vendor

Eighty-three percent of the vendors served food to the consumers with plate and polythene in Dumki area as against 66.67% vendors who used plate in Kuakata area. About 28.89% of the vendors disposed of their garbage in the pond, and (27.78%) threw them in the drain and roadside. Pond and river was the place of best choice (about 47.78%) and 36.667% on the roadside for disposal of used water. The use of public toilets or open places outside was the highest among the vendors. Some of the vendors used their own house as the second option. In all areas almost all vendors washed their hands using soap water after toilet.

xiii. Source of food sold by the vendors

A majority of the vendors prepared their food at home and brought to the streets for marketing. A single vendor was engaged in selling more than one food item. Almost 55.557%t of food vendor cooked/prepared foods in advance in their hotel kitchen while 28.89% vendors bought their foods for vending from open front place etc. 11.11% of vendors brought cooked food from home, 5.556% of vendors prepared food from other places remain for ready to eat. Among the interviewed consumers maximum were male (83.33%) and age ranged between 10-60 years. It found that majority of them were married (55.577%), and 1.11% of divorced. A majority consumer

had S.S.C/ H.S.C. education (34.66%) followed by Illiterate (10%), and higher educated (30%). Consumers were from different occupations. The majority of them were students (38.89%) followed by the business (32.223%), and employer (14.4%). Maximum (31.113%) consumer was with no income.

19 ii. Nature of consuming area of the consumer

Most of the consuming areas (57.78%) were station; middle classes were 36.667%, and slum 5.557%. In Dumki 70% of consumers consumed food in the station.

20 iii. Personal hygiene of the consumers

The survey report of the consumers observed that almost 68.89% found to use a clean dress. But 72% of the consumers cut their nails properly. None found to use hand gloves during survey conducted. Vaccinated consumers were 52.223% of the total consumers.

21 iv. Personal hygiene

The source of drinking water collected from the nearby tube well and stored in plastic drums without lids. Before food eating, 44.447% of consumers washed hand, and never washed hand at 21.11%. The majority percent (75.557%) of consumers said that vendors cleaned their dirty plates throughout the day; Most of the consumer (61.113%) told foods did not clean and 52.223% told foods were not cover properly. Cleaning table and food serving done the same person. Used water disposed at the roadside. The majority of the vendors displayed their foods in baskets/trays, bowl, and shelves, while vendors used showcase. About 38.89% of consumers had no idea of food preservation and 46.667% told vendors preserved food normally. A majority of consumers consumed always in road side. Major portion of consumer's ate roadside foods as it was safe time and easy access, although only 61.11% of them received it as unhygienic food. The same report found in Peru where the sanitary conditions utensils and tables judged to be substandard in 76 to 89 % of the inspection (FAO, 1990).

vi. Knowledge regarding food nutrition of the consumer Knowledge regarding foods nutrition of the consumers was not satisfactory. Only 22.223% of consumers had knowledge about nutrition and 18.89% in hygiene. Through media and school campaign, people could learn more told 34.447% and 58.887% said that media and the internet were the best way to learn more. Seventy-three percent consumers had idea about food borne pathogen and 74.443% told this pathogen sometimes caused diseases. vii. Food safety perception and behavior of the consumer It observed that 60% of the consumers suffered from diseases like diarrhea, stomach upset etc. To avoiding disease 62.223% consumers opinion ate less food.

22 viii. Criteria for choosing vendor of the consumer

Nearly 50% of consumers ate street food where the place was clean, and 83.333% shift where they found better option. Preferences of choosing a place 98.89% of consumers select cleanliness, 67.777% for freshness, 47.777% for time, and 30% for low price.

23 IV. Discussion

Maximum vendors (31%) were between 21-40 years of age, which supports the data of the Bangkok where the average age is 36 years (FAO, 1994). Maximum food vendors 95% were male. But it is extremely opposite to other countries and cities like Bangkok where the female is 69.3% and Honduras, Indonesia, and Nigeria where percentage increases to 90% and above (FAO, 1990).

In Bangladesh, about 25% of the men received help from their wives and 12% employed female helpers (Bhat & Waghray, 2000). In contrast, other countries (e.g. Nigeria, Ghana, Uganda, and the Kenya) including Botswana, the majority of vendors are women who balance the income-generating opportunities of street vending with traditional household and child care duties (Mwangi, 2002).

In Mexico City (Muñoz de Chavez et al, 2000) found that men and women divided their tasks and responsibilities. Women cooked the food to be sold later in the day, while the men were responsible for buying all that was necessary for preparation of the food. Women worked an early shift in the stall, until about noon, when the men took over and stayed late. Men were responsible for cleaning the stalls, while women washed the utensils and dishes at home. About 72.22% food vendors aged between 21-40 years with a mean age of years. Bhat and Waghray (2000) reported that the average age of the vendors in Asian countries were 20-45 years. Studies conducted in most Latin American Countries showed a similar trend compared to the one in Asian countries. In Jamaica however the age of vendors ranged from 14 to 78 years, with a mean age of 35.5years and female vendors being older compared to their male counterparts (Bhat and Waghray, 2000)

A majority of the vendors displayed their foods in baskets/trays, bowl and shelves in survey area while vendors used showcase for display their food in Patuakhali and Kuakata areas.

The storage conditions were poor. The majority of the cases food stored at room temperature in plastic containers. The uncooked food products are left at ambient temperature for long periods.

Majority of the handler used stored water for cleaning utensils (68.89%) followed by pond and river water (15%). Majority of handler used plate (27.78%) followed by paper & polythene (49.45%) as a serving

media. Tube well water used 100% as drinking water. It found that many vendors simply re-used the water, especially for cleaning utensils equipments and dishes due to difficulties in obtaining clean portable water (FAO and PAHO, 1985).

Hygiene during handling and cooking of street foods observed. It found that vendors did not wash fresh foods properly. Vendors did not wash their hands and utensils only once because they had not enough water. None of the cases, the vendors and the assistants did practice good personal hygiene; uniforms and aprons were not in use. Hanashiro et. al. (2005) examined microbiological quality of selected street foods from a restricted area of Sao Paulo city, Brazil and observed that personal hygiene of vendors during handling and cooking is very important as it causes serious health hazards to the consumers.

There was also hardly any inspection of the shops from the municipal or other appropriate C authorities. This is similar to most developing countries which have no specific legislation or control systems for street food vending (Jayasuriya, 1994).

The most important finding of this study was the correlation between the socio-economic results regarding the hygiene practices of street vendors and the findings of the microbiological survey. The results of 5 other studies done among street food vendors in South Africa had similar conclusions ??Mosupye FM et.al.2000).

This was a qualitative study of bacterial contamination for E. coli and Salmonella. Almost half (52.33%) of the samples contaminated where 17.67% positive for E. coli. and, 15% for salmonella in Open restaurant food. The positive case for Open restaurant food sample was 30 out of 180 sample (16.67%). The positive for Open restaurant foods sample was 35 out of 180 samples (19.44%) for salmonella.

24 V. Conclusion

Open restaurant foods have become a big part of the present-day urban scenario in many countries. The hygienic practices in question included food preparation, handling of utensils; a place for food preparation, personal hygiene, and methods of storing cooked food. Due to a lack of proper knowledge and guidance on food vending, vendors prepared it in explicitly unhygienic and unsanitary conditions. Improving the safety of food in any developing country is a great challenge. One of the major driving forces towards efforts to improve food vending is the contribution. As food vendors are doing their business without having a license, therefore, vendors are given clear legal status, so they can claim their entitlements to pursue their livelihoods. The vending foods contaminated with E. coli and Salmonella that causes a major health problem.

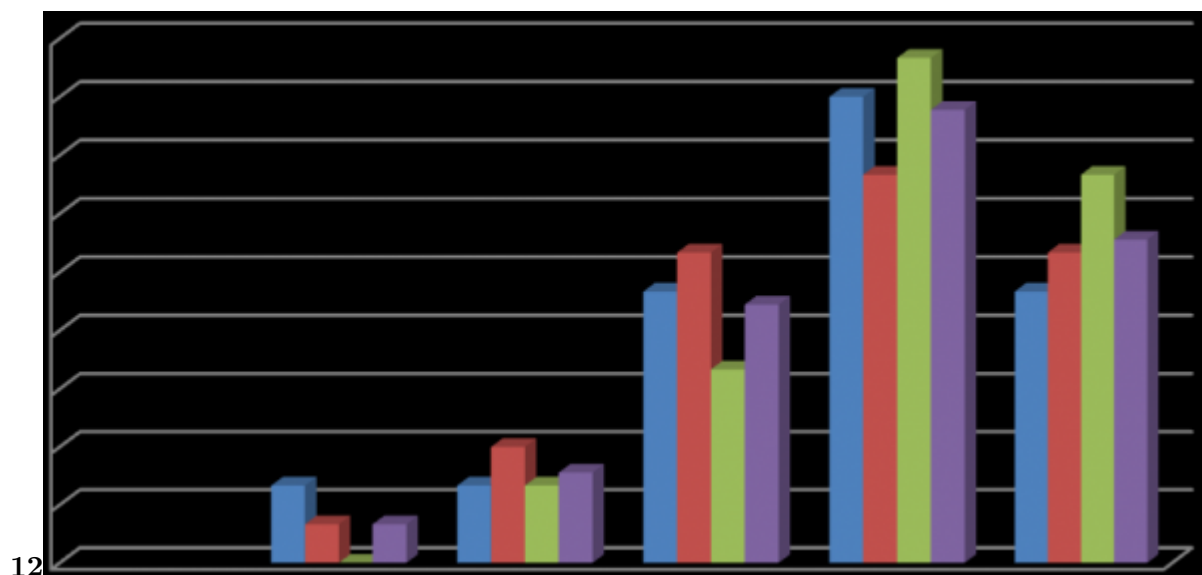


Figure 1: Figure 1 :Figure 2 :

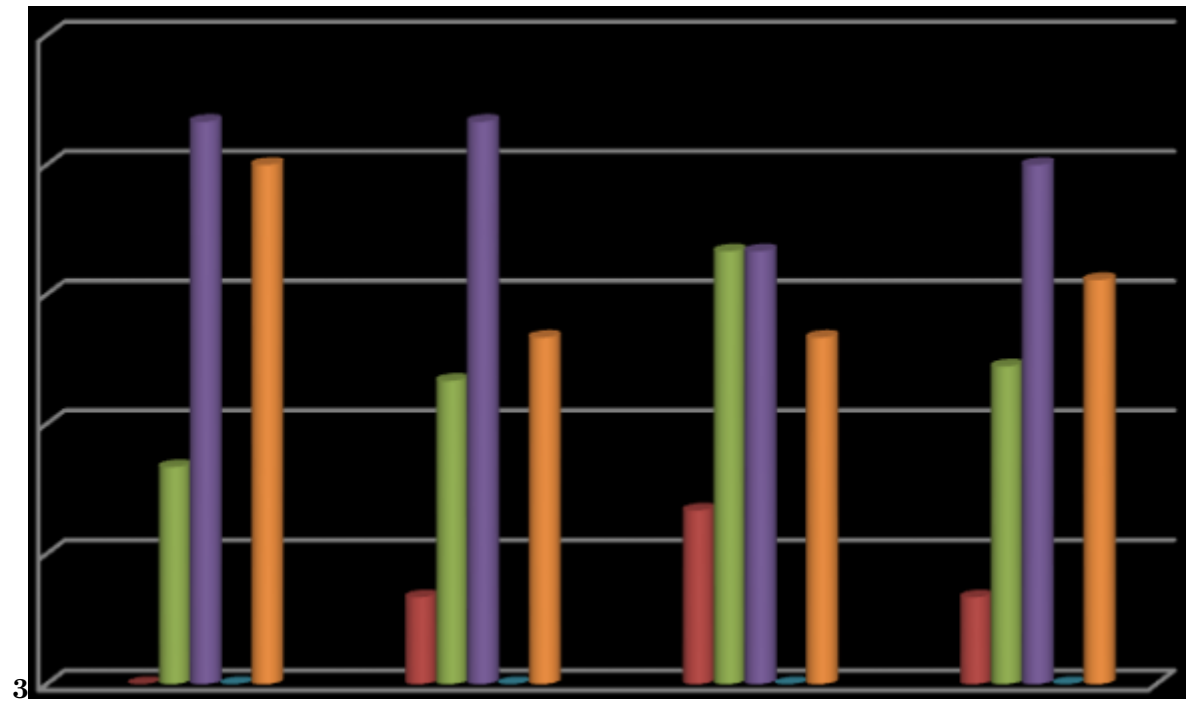


Figure 2: Figure 3 :

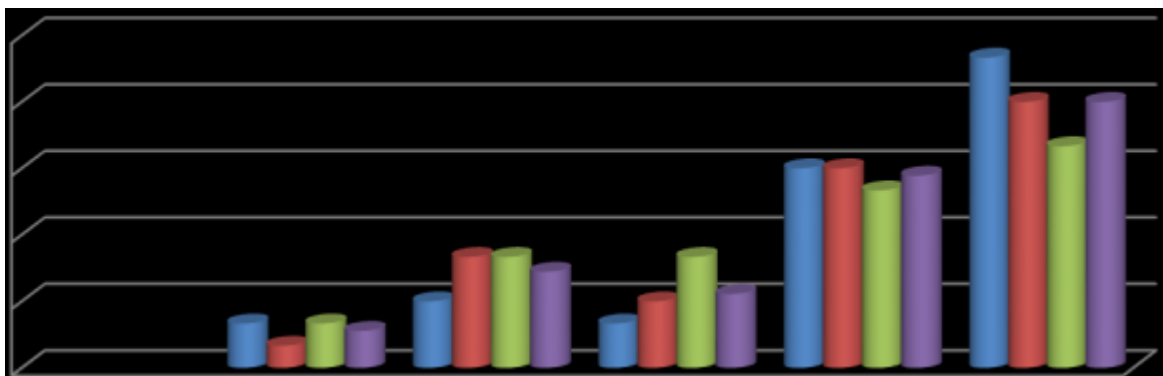


Figure 3:

1

Upazila Name	Minimum (TK)	Maximum (TK)	Mean (TK)	Standard Devia- tion
Investment of the open restaurant food vendors				
Dumki	20000	300000	78000	± 39315.57
Patuakhali	20000	250000	97333	± 49320.274
Kuakata	1500	320000	97383	± 57894.95
Daily income of the open restaurant food vendors				
Dumki	1000	6000	3780	± 1954.023
Patuakhali	1000	7000	4,395	± 2064.84
Kuakata	1500	8000	5400	± 1975.15
Daily net income of the open restaurant food vendors				
Dumki	400	2400	1,357	± 485.43
Patuakhali	450	2500	1140	± 560.54
Kuakata	500	3000	1,653	± 691.34
Shop rent of the open restaurant food vendors				
Dumki	1200	3000	2005.556	± 485.64
Patuakhali	1000	3500	2278.261	± 674.17
Kuakata	1200	5000	2133.33	± 866.79

[Note: vii. Working schedule of the vendors]

Figure 4: Table 1 :

2

Characteristics	Dumki	Patuakhali	Kuakata	Mean
water bringing person				
Male labor	93.33	90	93.33	92.22
Female labor	6.67	10	6.67	7.78
Water bringing times				
≤ 3	66.67	73.33	63.33	67.78
> 3	33.33	26.67	36.67	32.22
Have own tube well				
Yes	6.67	10	66.67	27.78
No	93.33	90	33.33	72.22
Water disposal place				
Drain	10	13.33	6.67	10
Dustbin	6.67	6.67	3.33	5.56
Roadside	26.67	40	43.33	36.67
Others (Pond,River etc)	56.67	40	46.67	47.78

Figure 5: Table 2 :

4

Year 2020
12

Figure 6: Table 4 :

5

Characteristics	Dumki
Food selling time (%)	
Only Morning	0
Only Noon	0
Only After noon	0
Only Night	0
Throughout the day	6.67
Morning to Mid night	93.33
xiv. Personal hygiene of the open restaurant vendors	
All of them usually did not cover their head	
during vending, 47.78% used dirty towels. But nearly 80% of the vendors' cut their nails properly, and 61.11% used hand sanitizer.	
xv. Supervision and monitoring of the open restaurant food vendors	
About 88.89% of open restaurant vendors said that shops supervised regularly, and 87.65% were mobile court. Supervision occurred yearly and fined several times	
xvi. Open restaurant food ingredient	
Most of the vendors (93.33%) said that street food ingredients were bought from Kacha markets and	

Figure 7: Table 5 :

6

Characteristics	Location	Well	Not so well	Moderate	Bad	Very bad	None
Nutritional	Dumki	3.33	6.67	20	23.33	40	6.67
	Patuakhali	3.33	10	26.67	26.67	23.33	10
	Kuakata	6.67	10	26.67	20	26.67	10
	Mean	4.44	8.89	24.45	23.33	30	8.89
Hygiene	Dumki	0	20	30	36.67	13.33	0
	Patuakhali	0	10	36.67	30	23.33	0
	Kuakata	3.33	13.33	33.33	26.67	20	3.33
	Mean	1.11	14.44	33.33	31.11	18.89	1.11
Food preparation	Dumki	0	0	83.33	10	6.67	0
	Patuakhali	0	0	76.67	13.33	10	0
	Kuakata	0	3.33	66.67	16.67	13.33	0
	Mean	0	1.11	75.56	13.33	10	0
Food safety	Dumki	0	0	10	40	33.33	16.67
	Patuakhali	0	0	13.33	43.33	26.67	16.67
	Kuakata	3.33	6.67	20	33.33	23.33	13.33
	Mean	1.11	2.22	14.44	38.89	27.78	15.56

Figure 8: Table 6 :

8

Location	Types of vended food							
	Rice	Fish Egg curry	Chicken	Beef	Bread	Khichuri	Brainy	
Dumki	100	96.67	100		66.67	50	53.33	36.67
Patuakhali	100	100	93.33		70	46.67	43.33	33.33
Kuakata	100	100	56.67		90	56.67	83.33	16.67
Mean	100.00	98.8	83.333		75.557	51.11	59.99	35.55

b) Results of consumers of Open Restaurant food

i. Socio-demographic characteristics of the consumers

Figure 9: Table 8 :

7

Figure 10: Table 7 :

9

E. coli. test of open restaurant food									
Charact	Dumki	Patuakhali	Kua kata	Mean	Character	Dumki	Patuakhali	Kua kata	M
eris- tics					istics				
	Food item: Rice (%)					Food item: Khichuri (%)			
-(ve)	60	60	40	53.33	-(ve)	80	80	80	80
No	40	40	60	46.67	No	20	20	20	20
	Food item: Fish (%)					Food item: Biriani (%)			
-(ve)	80	60	80	73.33	-(ve)	40	40	60	40
No	20	40	20	26.67	No	60	60	40	53.33
	Food item: Egg curry (%)					Food item: Vegetables (%)			

Figure 11: Table 9 :

10

Name of food	Sample size	E.coli.(-ve)	Percent (%)	Salmonella (+ ve)	Percent (%)
Open Restaurant food sample	180	32	17.78	25	13.89

Figure 12: Table 10 :

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