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Original Research Article

Vendors and Consumers Status, Water Quality and Microbial Analysis of Street Side Foods in Patuakhali District

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ABSTRACT

A total of 90 shops were selected for data collection and 240 street food samples were collected. Maximum vendors 92.22% were male and age between 21-40 years. Majority (71.11%) of them were primary educated. About 92.33% vendors had owned business. The majority (62.28%) of them daily net profit up to TK. 500. Virtually 88.89% had no license. 68.89% of the vendors used stored water for cleaning utensils followed by pond and river water. About 77% of the vendors did not cover their food while selling. All of them use tube-well water as drinking water. About 58.89% of the vendors disposed their garbage on the roadside and a few (21.11%) threw them in the pond. During vending 37.78% vendor were kept their food in the open showcase. Only 1.11% consumer had the well knowledge about nutrition and 5.557% in hygiene. 38.89% consumers were student where degree or above educated. Most of the consuming areas (57.78%) were station. About 38.89% consumers had no idea of food preservation. Majority (57.77%) of consumers, consume always in road side. 77.77%of consumer's were eaten roadside food as it saves time and easy access, although only 61.11% of them received it as unhygienic food. But it was gratifying to observe that nearly 72% of the consumers cut their nails properly. About one third (31.90%) of the samples were contaminated where 17.67% for *E. coli.* and, 15% for *salmonella* in street food.

Key Words: Street food; Vendor; Microbial Analysis; Salmonella; *E. Coli; Food nutrition*

1. INTRODUCTION

Street foods are described as wide range of ready-to-eat foods and beverages prepared and/or sold by mobile or stationary vendors and hawkers especially on streets and around public institutions such as schools, hospitals, railway stations and bus terminals. Street foods feed millions of people daily with a wide variety of foods that are relatively cheap and easily accessible. Street foods offer a significant amount of employment, often to persons with the little education and training (FAO, 1997).

Street foods play an important role in developing countries in meeting the food demands of the urban dwellers. Food security in terms of adequate quantity and quality of food to lead an active and healthy life must be considered as the prime function of a food system. FAO reports that street foods have significant nutritional implications (providing nutritionally balanced diets, sufficient in quantity and presenting options for variety and choice) for consumers, particularly from middle and low-income sectors of the population who depend heavily on them (Mwangi, 2002).

In developing countries, drinks, meals and snacks sold by street food vendors are 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 population (Ohiokpehai, 2003).

Within this context, street foods as an informal food supply system, provided 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).

Street food vending and consuming is a popular type of informal self-employment in Patuakhali district, providing the vendors with a means to sustain their livelihoods. They are basically tied to retailers, cooking units and other food system actors. Specific consumer groups with specific street food eating habits are found to exist. Selling food in the streets is a widespread phenomenon in the Patuakhali district. A large number of dwellers from different spheres of life such as students, tourists, rickshaw drivers, cart pullers, and other such workers rely on street food vendors for their daily meals. Urban street foods vending provides employment and incomes 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. Street foods are well appreciated by consumers, because of their taste, low price and availability at right time. The vendors in street side vendors are illiterate are not aware of all about health hygienic and microbial aspects of food and drinking water. Bangladesh especially the coastal belt is naturally rich in soil and water borne pathogens and internationally open door of a diseases invasion. So, it is considered worthwhile to embark upon the vendor's status and food and water quality of street side and open restaurants in the coastal Patuakhali district.

2. MATERIALS AND METHODOLOGY

2.1 Sample selection and sample size

The 90 street food vendors 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.

2.2 Interview schedule design

The study instruments constitute an Interview schedule consisting of name, age, sex, income, name of district, awareness about cleanliness. Water supply system, advantages and disadvantage of street food vending and selling and also consuming, types of foods and its preparation system time of selling: sources of water, etc. The interview schedule was 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 were done for the final Interview schedules. Those Interview schedule were field tested, modified as necessary and standardized.

2.3 Data collection

The key information collected in the survey was therefore restricted to the following four aspects. They were:

- Type of vendor
- Nature of the street food business
- Type of food and materials used
- Vendors and consumers availability for follow-up studies

2.4 Equipment and general procedure for microbial examination

a) All glass equipments e.g., Petri dish, Pipette, Test tube, Beaker & other glass wares were washed, rinsed, dried and treated in hot air oven for sterilization. Sterilization is done by dry heat at 170˚c for 1 hour.

b) All the media prepared for microbial growth were sterilized by steam pressure (autoclave). Sterilization is done by autoclave at l21˚c at l5 lb/ square inch pressure for 5 minute.

2.5 Selection and collection of food products

The available food samples from the interviewed vendor's shops were collected.

After collection food samples are tested for the study. Sixteen types of food samples were collected from street food shop where interior decoration is beautiful and offering standardized foods, quick and amiable service of their employees sometimes

2.6 Bacteriological analysis

Three different types of media were recommended for the growth of *Salmonella* and *E. coli*. The colonies developed on the plates were compared and counted after incubation for 24-48 hours at 37˚c. p^H of the media was adjusted to 7.2 prior to sterilization. Inoculated plates were incubated at 37˚c for 24-48 hours to facilitate viable bacterial growth.

2.7 Culture of *E. coli.*

PDA media was used for culture of *E coli*. For the desired volume, the chemical ingredients of each media were first weighed and distilled water was added. The media was dissolved in water bath at boiling temperature. P^H of the media was adjusted to 7.4-7.6 and then autoclaved at 121˚c for 15 minutes at 15 1bl/sq. inch pressure. Inoculated plates were incubated for 24 hours at 37˚c to facilitate *E. coli.* growth.

2.8 Culture of *Salmonella*

Salmonella and Shigella agar (SS agar) were used for culture of *Salmonella*. For the desired volume the chemical ingredients of each media were first weighed and distilled water was added. The media was dissolved in water bath at boiling temperature. P^H of the media was adjusted to 7.4 - 7.6. Not autoclaved. Inoculated plates were incubated for 24 hours at 31˚c to facilitate Salmonella growth.

2.9.1 Total aerobic plate count

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

2.9.2 Coliform count

Coliform count of the street food and water samples were determined by using membrane filter technique. The plates were incubated at 35°C for 24 hours and colonies of coliforms were determined.

2.9.3 Biochemical characteristics of the bacteria biochemical test

Following test were done for the identification of particular isolate according to the criteria described by Albert Balowset. (1991), collins*et al.* (1989).AOAC (1984) &Harrigan*et al.* (1966). Triple super iron agar (TSI) Inoculated TSI medium with an inoculating needle by stabbing the colony and streaking the slant, incubated for 24 hours at 31˚c. Hydrogen Sulphide production is indicated by the presence of a black precipitate for *Salmonella.*

2.10 Data management and analysis

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

3. RESULTS

3.1.1 Socio-economic and demographic profile of Street Food Vendors

The respondents were male and female aged between 10 to 75 years from different work field of life. Among the interviewed food handlers 92.22% were male and 7.78% was female. The age ranges between l0-75 above of them 75.557% were between 21-40 years, followed by 41-60 years age group (13.33%). Majority of them were primary educated (71.11%). The marital status of street food vendors were 73.33% married and divorced and widow/widower was 5% respectively. Family size of the vendors was 44.44% had number 5 or less and 55.56% had the size 5 or more.

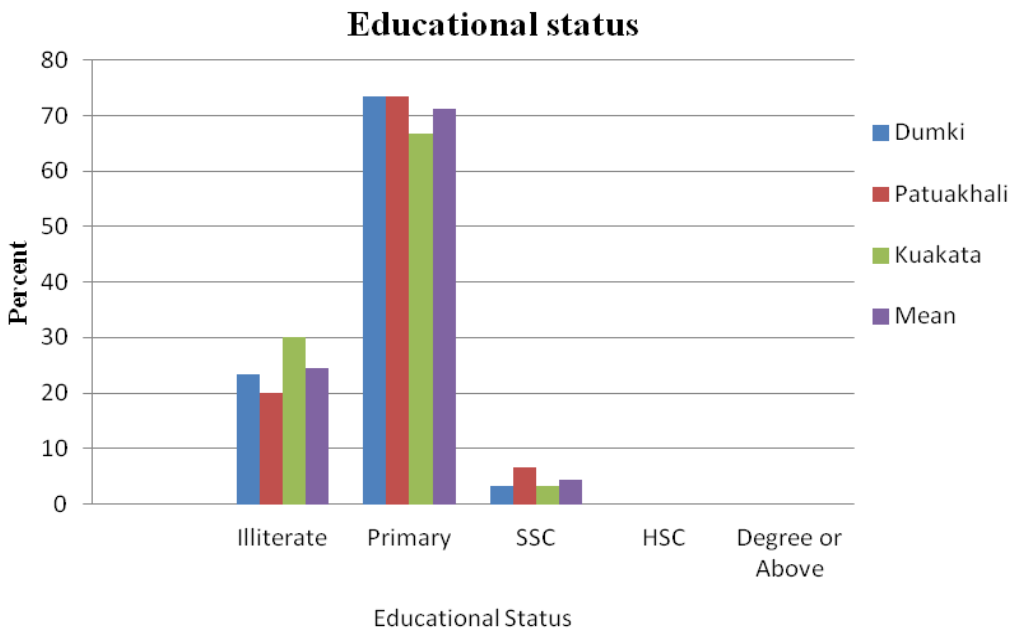

Figure 1: Educational status of the street side food vendor

3.1.2 Ownership and reason for doing food vending business

In survey it was revealed that 92.33% vendors owned the business and most of the vendors (45.557%) had the opinion that due to the low investment required and low skill required they had come into the street food vending business.

3.1.3 Nature of the vending business and period of business of street food vending

In survey areas, 54.445% vending shops were ambulant and 38.89% of vending shops were semi-ambulant in. Street food business requires low investment. Most of the vendors own the business and reportedly work for 13-18 hours running their street food vending as the principal business. A small number of vendors are engaged part time in street food vending. Nearly 77.78% of the food vendors reported that food vending was their principal business while only 22.22% of them accepted street food vending as a part time business.

Table 1: Type of vending shop of the street food vendors

Characteristics	Dumki	Patuakhali	Kuakata	Mean
Type of shop (%)				
Ambulant	50	53.33	60	54.445
Semi-ambulant	40	36.67	40	38.890
Stationary	10	10	0	6.667

3.1.4 Location and proximity of vending shops

In the survey area it was observed that 23.333% of the vending shops were located on the footpath, 45.553% of the vending shops were located on the sidewalks in three survey areas and the rest were located in all other possible areas (near aisles of the bazaar, school, restaurant and office vicinity Thirty percent of food vending shops in patuakhali and 26.67% in Dumki area and nearly 20% vending business in Kuakata area were located by the side of drain. Shops were located both drain and dustbin was 34.443% and rest were sewerage, manhole and dustbins.

3.1.5 Nature of business and daily capital/net profit

Twenty two percent vendors invested up to TK. 5000 and 20001-40000 was 35.553% in their business. Nearly 41.113% vendors' daily sale range between TK. 1001-2000 and 56.667% make a net profit of up to TK. 500 on a daily basis. However, more than 63.33% vendors reported that net profit met 100% of their family expenditure.

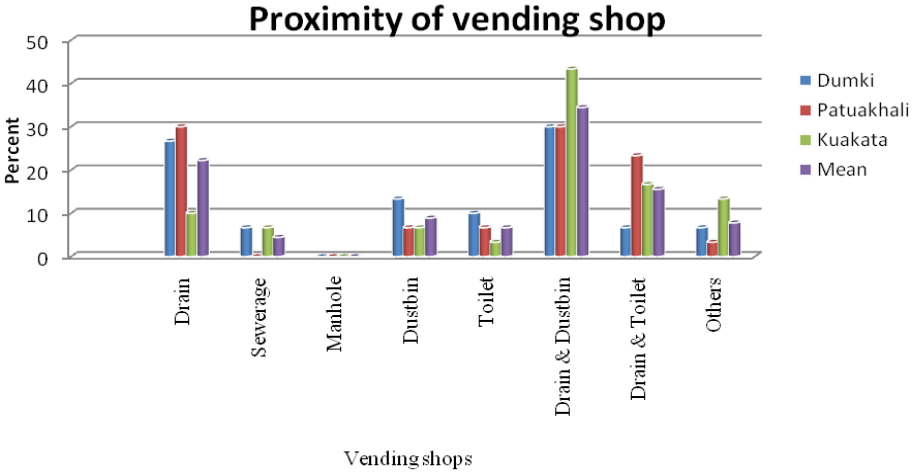

Figure 2: Proximity of vending shop of the street side food vendor

Table 2: Investment and income of the street food vendors

Upazila Name	Minimum (TK)	Maximum (TK)	Mean (TK)	Standard Deviation
Investment of the street food vendors				
Dumki	500	50000	27,617	± 15468.93
Patuakhali	800	50000	25,443	± 16148
Kuakata	500	40000	28,383	± 12530
Daily income of the street food vendors				
Dumki	1000	3500	2830	± 776
Patuakhali	800	4000	2393.33	± 1293.73
Kuakata	1000	4500	3296.33	± 931.62
Daily Net income of the street food vendors				
Dumki	250	1000	540	± 269.23
Patuakhali	250	1000	581.67	± 253
Kuakata	300	1200	723.33	± 299

3.1.6 Working Schedule of the vendors

Most of the vendors (83.33%) vended there for 7 days of a week. Food vendors in areas such as Dumki and Patuakhali had comparatively greater (83-86%) percentage of vending days (Table 31 and Figure 23). Fifty percent of the vendors worked for 6-12 hours a day. The maximum sale was at afternoon time irrespective of the areas. Winter was the season of maximum sale and while it was minimum during the rainy season. It is difficult to maintain the vending shop during the rainy season and consumers do not find it convenient to go outside and buy street food. Comparatively winter is more comfortable for both vendors and consumers.

Table 3: Selling time of food of the street food vendors

Characteristics		Dumki	Patuakhali	Kuakata	Mean
Selling days in a week (%)					
	5 Days	6.67	6.67	10	7.780
	6 Days	10	6.67	10	8.89
	7 Days	83.33	86.67	80	83.333
Selling hours in a day (%)					
	6-12 Hour	66.67	60	66.67	64.447
	13- -18 Hours	33.33	40	33.33	35.553
Highest selling time in a day (%)					
	Morning	23.33	23.33	20	22.22
	Noon	6.67	0	0	2.223
	After noon	53.33	63.33	76.67	64.443
	Night	16.67	13.33	3.33	11.11
	All the day	0	0	0	0
Lowest selling time in a day (%)					
	Morning	6.67	20	30	18.89
	Noon	66.67	60	60	62.223
	After noon	16.67	10	6.67	11.113
	Night	10	10	3.33	7.777
	All the day	0	0	0	0
Highest selling time in year (%)					
	Summer	13.33	10	0	7.777
	Rainy	0	0	0	0
	Autumn	0	0	0	0
	Winter	53.33	56.67	70	60
	Eid	33.33	33.33	30	32.22
Lowest selling time in a day (%)					
	Summer	23.33	26.67	30	26.667
	Rainy	63.33	60	66.67	63.333
	Autumn	6.67	3.33	3.33	4.443
	Winter	0	0	0	0

3.1.7 Licenses/Permits

Almost 70% of the vendors replied in the positive when they were asked whether they had to pay for doing their vending businesses. The rest 30% vendors agreed that they were paying money to the shop rent. Over 100% of the street food vendors felt they should have license for their business but virtually 88.89% had no license. The few, who said they had the licenses, had a business permit or food-selling permit. The food vendors were asked whether they had any training on food safety and/or food serving or not. Cent percent of the vendors replied that they had no training either on food safety or on food serving irrespective of the survey areas. There was almost no monitoring and supervision of the street food vending system or the vendors.

3.1.8 Food Safety Profile

The vending shops used tube well water and most of the vendors used drum. The environment of the vending area was not satisfactory. Ninety percent of the vendors did not paid any rent for their vending carts but 10% of the vendors named the police and others as their rent collectors. Most of the male labor (97.78%) brings water and 65.557% bring 3 or less than 3 times and 93.33% had no tube well and did not take any measures for purification of drinking water. About 77% of the vendors did not cover their food while selling. Sixty five percent cleaned the utensils in their shop but 31.11% cleaned on the roadside. Almost (68.89%) all food vendors used stored water for cleaning the utensils Time between food making and food selling more than 5 hours was 67.77% and 32.223% was 5 or less, 82.223% of street food vendors were used soybean oil and frequency of using oil was 1 used by 70% of the vendor. Food serving practice was very poor. Thirteen percent vendors did not know about food safety.

3.1.9 Safe water using practices

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

3.1.10 Mode of display of street food

Majority of the vendors displayed their foods in food cart in Kuakata area while vendors used Push cart and Side chest for display their food in Dumki and Patuakhali areas (Table 34). The utensils they used were made up of many different materials such as melamine, aluminum, stainless steel and ceramics. It has been also observed some vendors used only paper instead of a plate.

3.1.11 Food service

Most of the vendors served food to the consumers with bare hands in Dumki and Patuakhali area as against some vendors who used plate/cup in Kuakata area. Fifty percent vendors used spoon and paper box for food serving. About 58.89% of the vendors disposed their garbage on the roadside and a few (21.11%) threw them in the pond. The roadside was reported to be the place of best choice (almost 66.67%) for disposal of used water. The use of public toilets or open places outside was the highest among the vendors, irrespective of the wards surveyed. Some of the vendors used their own house as the second option. In all areas surveyed, almost all vendors washed their hands using soap water after using the toilet. (Table 36)

3.1.12 Source of food sold and personal hygiene of the street food vendors

Sixty eight percent of food vendor cooked/prepared foods in advance in their home and 21% vendors made their foods for vending from hotel kitchen. All vendors collected food ingredient from kacha market and stored them in the home and shop. During vending 37.78% vendor were kept their food in the open showcase. About 90% of them usually did not cover their head during vending, 53.33% were found to use unclean towels but 75.557% of the vendors' cut their nails properly and 53.333% wore neat and clean attire, none was found to use hand gloves, 51.113% were vaccinated and

52.223% had no knowledge about hygiene during survey conducted.

3.1.13 Supervision and monitoring of the open restaurant food vendors

In the survey areas it was observed that 57.777% of street food vendors said that shops were supervised regularly and 92.280% were mobile court. Vendor's opinion that supervision occurred yearly at 67.39% and 57.107% fined several times.

Table 4: Supervision and monitoring of the street food vendors

Characteristics		Dumki	Patuakhali	Kuakata	Mean
Regularly supervised (%)					
	Yes	70	73.33	30	57.777
	No	30	26.67	70	42.223
Who supervised (%)					
	City Corporation	0	0	0	0
	NGOs	0	0	0	0
	Market administration	0	0	0	0
	Police	9.52	13.64	0	7.72
	Mobile Court	90.48	86.36	100	92.28
	Others	0	0	0	0
Interval of supervision (%)					
	Daily	0	0	0	0
	Weekly	0	0	0	0.
	Monthly	14.29	13.64	0	9.31
	Quarterly	28.57	22.73	0	17.1
	Yearly	47.62	54.55	100	67.39
	Sometimes	9.52	9.09	0	6.203
Have ever been fined? (%)					
	Yes	80.95	72.73	66.67	73.45
	No	19.05	27.27	33.33	26.55
How many times? (%)					
	1- 3 times	58.82	62.5	50	57.107
	2-4 times	23.53	31.25	50	34.927
	7-10 times	17.65	6.25	0	7.967
	> 10 times	0	0	0	0

3.1.14 Knowledge regarding food nutrition of the consumer

Knowledge regarding food nutrition of the open restaurant vendor was not satisfactory. Only 1.11% consumer had the well knowledge about nutrition and 5.557% in hygiene. Food safety, food serving and other knowledge was very poor. Food preparation and hotel management knew moderately 48.89% and 34.33% vendors. Sixty seven percent moderately knew consumers perception.

Table 5: Knowledge regarding food nutrition of the street food vendors

Characteristics	Location	Well	Not so well	Moderate	Bad	Very bad	None
Knowledge regarding food (%)							
Nutritional	Dumki	0	10	20	33.33	26.67	10
	Patuakhali	0	6.67	26.67	30	26.67	10
	Kuakata	3.33	0	33.33	26.67	33.33	3.33
	Mean	1.11	5.56	26.67	30	28.89	7.78
Hygiene	Dumki	0	10	26.67	30	26.67	6.67
	Patuakhali	3.33	13.33	23.33	33.33	20	6.67
	Kuakata	6.67	13.33	26.67	26.67	23.33	3.33
	Mean	3.33	12.22	25.56	30	23.33	5.56
Food preparation	Dumki	3.33	3.33	50	43.33	0	0
	Patuakhali	3.33	3.33	46.67	40	6.67	0
	Kuakata	0	3.33	50	33.33	13.33	0
	Mean	2.22	3.33	48.89	38.89	6.67	0
Food safety	Dumki	0	0	16.67	46.67	16.67	13.33
	Patuakhali	0	6.67	20	40	16.67	16.67
	Kuakata	0	0	40	33.33	16.67	10
	Mean	0	2.22	25.56	40	16.67	13.33

3.1.15 Consumer aspect of the street food vendors

In Kuakata tourist was the regular customer and no student ate there. On the other hand in Dumki and PatuakhaliUpazila there was no tourist. Labor, Rickshaw puller and Driver was

the regular customer and it about 70%. Seventy two percent ate these foods for easy access and safe time and 90% for taste.

3.1.16 Types of vended street food

In the survey areas it was observed that 46% street vendors sold chatpati, fuska and halim. Other vendors sold chola, bread, singara, dal vaji, puripiyaju etc.

Table 6: Types of vended food of the street food vendors

Types of vended food								
Location	Chatpati	Halim	Fuska	Chaitapitha	Chola	Bread	Dal vaji	Singara
Dumki	40	40	40	16.67	56.67	26.67	53.33	53.33
Patuakhali	46.67	46.67	46.67	23.33	53.33	30	50	56.67
Kuakata	53.33	53.33	53.33	53.33	46.67	53.33	53.33	53.33
Mean	46.667	46.667	46.667	31.11	52.223	36.667	52.22	54.443

3.2.1 Socio-demographic characteristics of the consumers

Among the interviewed consumers maximum were male (83.33%) and age ranged between 10-60 years of them 76% consumers were between 21-40% year followed by less than 20 or 20 years (13.33%) and 41-60 years (10%). All types of people were eaten street foods.

3.2.2 Nature and Consuming operation of consuming area of the consumer

Most of the consuming areas (57.78%) were station; middle classes were 36.667% and slum areas 5.557%. In Dumki 70% consumers consumed food in the station. Seventy five percent of the vendors worked for 13-18 hours a day. The maximum consumer consumed was at afternoon time and lowest was at morning irrespective of the areas.

3.2.3 Perception about eating street food and homemade food of the consumer

Street foods were tastier, and easy to got but it was so much risky to consumption told 87.777% consumer. On the other hand cent percent consumer believed that home foods were more healthy and hygiene. Consumers were bought these foods for the reason of taste, cheaper, safe time, easy access and nutrient supply were 54.447%, 42.223%, 77.777%, 77.777% and 21.110% respectively.

Table 7: Perception about eating street food and homemade food

Characteristics		Dumki	Patuakhali	Kuakata	Mean
Street foods (%)					
	Tastier, Faster & Risky	86.67	83.33	93.33	87.777
	Tastier & Faster	13.33	16.67	6.67	12.223
Home foods (%)					
	Healthy & Hygiene	100	100	100	100
	Unhealthy & Unhygienic	0	0	0	0

3.2.4 Personal hygiene of the consumers

The survey report of the consumers observed that almost 68.89% were found to use clean dress. But it was gratifying to observe that nearly 72% of the consumers cut their nails properly. Of the food consumers surveyed, none was found to use hand gloves during survey conducted. Vaccinated consumers were 52.223% of the total consumers. To avoiding disease 62.223% consumers opinion was eat less street food. Most consumers ate street food to look the facilities of the shop and 40% had no personal education about it.

3.2.5Water, environment, sanitation and personal hygiene

The water was almost always stored in plastic drums without lids. Most of the consumer (73.33%) believed stored water used for utensils cleaning and 13.33% used pond water. Before food eating 44.447% consumers were washed hand and never washed hand at 21.11%. After food eating 53.33% consumers were washed hand and never washed hand at 25.557%, 55.553& used soap and 44.447% used plain water. Majority percent (75.557%) of consumers

said that vendors clean their dirty plates throughout the day.

3.2.6Mode of display of street food

It has been also observed some vendors used only paper instead of a plate. About 38.89% consumers had no idea of food preservation and 46.667% told vendors preserved food normally.

3.2.7 Knowledge regarding food nutrition of the consumer

Knowledge regarding food nutrition of the consumer was not satisfactory. Only 22.223% consumer had the well knowledge about nutrition and 18.89% in hygiene. Food safety, food serving and other knowledge was very poor. Through media and school campaign people could learned more told 34.447% and 58.887% said that media and internet was the best way to learn more. Seventy three percent consumers had the idea about food borne pathogen and 74.443% told this pathogen sometimes caused disease. Cent percent told license necessary. Most of the consumer (70%) said these foods shops were supervised mobile court yearly basis. Sixty one percent consumers opinion was these foods were unhygienic.

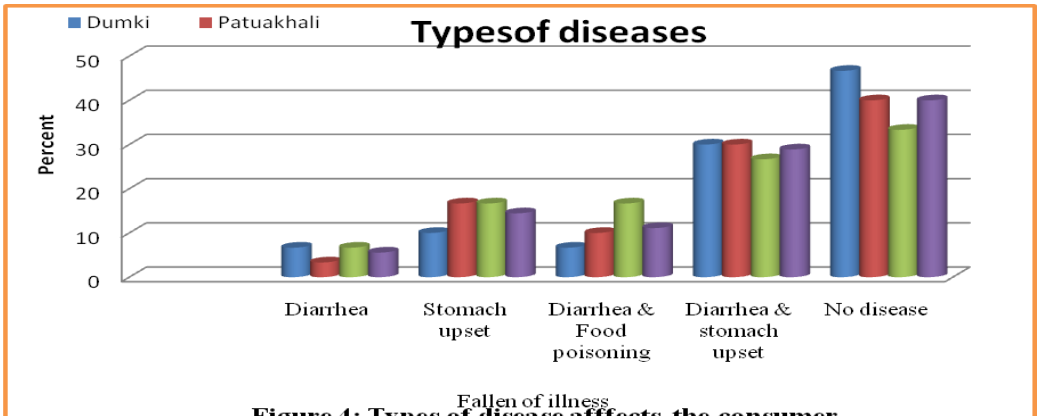

Figure 4: Types of disease afffects the consumer

3.2.8 Criteria for choosing vendor of the consumer

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

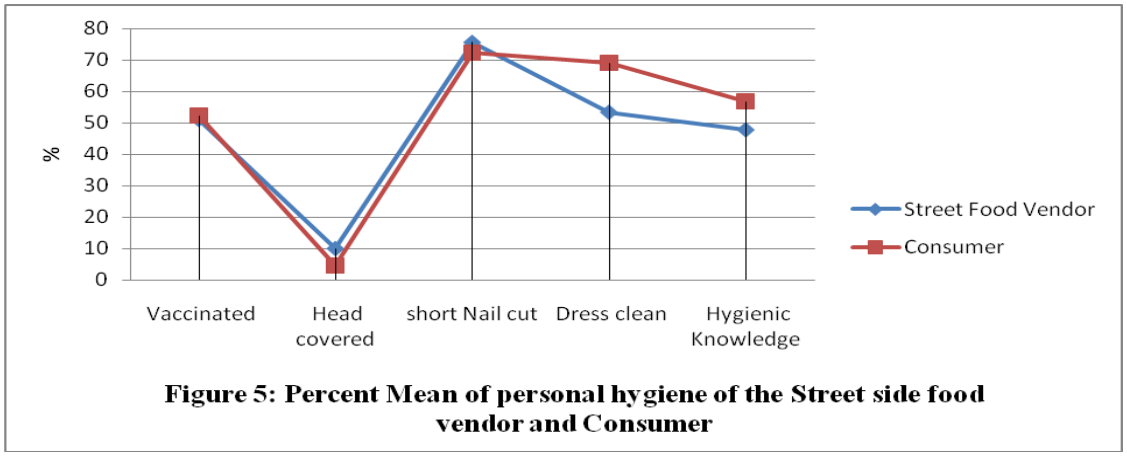

Figure 5: Percent Mean of personal hygiene of the Street side food vendor and Consumer

3.3.1 Results of Microbial analysis

Total Viable Count:

Maximum (83%) of the sample bear gram negative bacteria and Salmonella. The percentage of *E. coli*. was less than *Salmonella*. Water is highly contaminated for *E. coli* (100%) than s*almonella* (50%).

Table 8: *Salmonella* Test of street side food

Salmonella test of street side food										
Food sample test result for *Salmonella.*						Food sample test result for *Salmonella*				
Sample size: 05						Sample size: 05				
Characteristics		Dumki	Patuakhali	Kuakata	Mean	Characteristics		Dumki	Patuakhali	Kuakata	Mean
Food item: Chatpati (%)						Food item: Salad (%)					
	+(ve)	20	0	20	13.33		+(ve)	0	40	20	20
	- (ve)	80	60	80	73.33		- (ve)	80	60	80	73.33
	No	0	40	0	13.33		No	20	0	0	6.67
Food item: Halim (%)						Food item: Puri (%)					
	+(ve)	0	20	20	13.33		+(ve)	20	40	20	26.67
	- (ve)	100	40	80	73.33		- (ve)	80	60	60	66.67
	No	0	20	0	6.67		No	0	0	20	6.67
Food item: Fuska (%)						Food item: Piyaju (%)					
	+(ve)	20	20	0	13.33		+(ve)	0	20	20	13.33
	- (ve)	60	60	40	53.33		- (ve)	80	80	80	80
	No	20	20	60	33.33		No	20	0	0	6.67
Food item: Chitoipitha (%)						Food item: Gilapi (%)					
	+(ve)	40	20	20	26.67		+(ve)	20	40	40	33.33
	- (ve)	60	80	60	66.67		- (ve)	80	60	60	66.67
	No	0	0	20	6.667		No	0	0	0	0
Food item: Washing water (%)						Food item: Dal vaji (%)					
	+(ve)	40	20	20	26.67		+(ve)	20	20	0	13.33
	- (ve)	60	80	80	73.33		- (ve)	80	80	80	80
	No	0	0	0	0		No	0	0	20	6.67
Food item: Moa (%)						Food item: Jhalmuri (%)					
	+(ve)	20	0	20	13.33		+(ve)	20	20	0	13.33
	- (ve)	40	60	60	53.33		- (ve)	80	80	80	80
	No	40	40	20	33.33		No	0	0	20	6.67
Food item: Golgulia (%)						Food item: Khurma (%)					
	+(ve)	20	0	20	13.33		+(ve)	0	0	0	0
	- (ve)	80	100	80	86.67		- (ve)	0	0	0	0
	No	0	0	0	0		No	100	100	100	100
Food item: Singara (%)						Food item: Drinking Water (%)					
	+(ve)	0	0	20	6.67		+(ve)	20	20	20	20
	- (ve)	80	80	80	80		- (ve)	80	60	80	73.33
	No	20	20	0	13.33		No	0	20	0	6.67

3.3.2 Drinking Water and washing Water

The drinking water served by the vendors is mostly supplied tap water, stored in the plastic/tin utensils. In Dumki coliform contamination found to be still present. Kuakata is a populous area. The septic tanks are closely located. The septic tanks require adequate outflow of the liquid effluent and repeated emptying of fecal sludge.

Microbial contamination of ready-to-eat foods sold by street vendors and hawkers has become a major health problem. Street food vendors are mostly uninformed of good hygiene practices (GHP) and causes of diarrheal diseases (Mensah *et al.* 2002), which can increase the risk of street food contamination (Bhaskar*et al.* 2004; Tambekar *et al.* 2009).

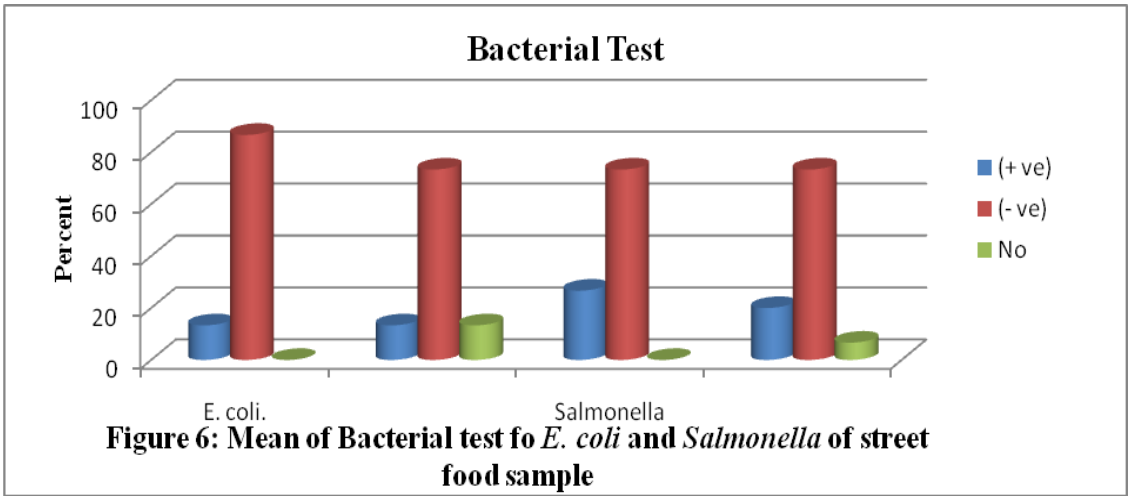

Figure 6: Mean of Bacterial test fo *E. coli* and *Salmonella* of street food sample

4. DISCUSSION

About 72.22% food vendors were aged between 21-40 years with a mean age of years that is correlated with the findings of Bhat and Waghray (2000) Majority of them were primary educated The educational level and background of most street vendors are low the highest educational level they achieve is only elementary school (RAFA Report: 1989/4).

Generally they are poor investors and their socio-economic status is almost same irrespective of the socio-economic status of the areas where they vend their foods. The vendors are very hard working. They work seven days of week and 13-18 hours in a day. A study in other countries also showed the vendors as hard working and earning quite well and daily income of vendors to be up to TK. 1001-2000 with a net profit up to TK. 500.00./day is nearly similar a study in Uganda (Ayalew, M. S., 2008)

Majority of the handler used stored water for cleaning utensils (68.89%) followed by followed by pond and river water (15%). Majority of handler use plate (27.78%) followed by paper & polythene (49.45%) as a serving media. Tube well water used 100% as drinking water. It was found that many vendors simply re-use the water, especially for cleaning utensils equipments and dishes due to difficulties in obtaining clean portable water (FAO and PAHO, l985).

Knowledge regarding food nutrition of the open restaurant vendor was not satisfactory. Only 4.44% consumer had the well knowledge about nutrition and 8.89% in hygiene. Food safety, food serving and other knowledge was very poor. Food preparation and hotel management knew moderately 66.67% and 55.557% vendors. Food serving practice was very poor. Fifteen percent vendors did not know about food safety. Fifty one percent moderately knew consumers perception.

Hygiene during handling and cooking of street foods was observed. It was found that vendors did not wash fresh foods properly. Vendors who sold food washed their hands and utensils only once because they did not have enough water. None of the cases, the vendors and the assistants did practice good personal hygiene; uniforms and aprons were not in use. Hanashiroet. 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.

All knew that they needed a permit for preparing and selling of street foods. There was also hardly any inspection of the shops from the municipal or other appropriate authorities. This is similar to most developing countries which have no specific legislation or control systems for street food vending (Jayasuriya, 1994).

Most of the consuming areas were station; middle classes were one third and slum areas were low. In Dumki 70% consumers consumed food in the station. Maximum consumers were male and highest consumers were between 21-40 years of old. Majority consumers were student where Degree or above education was major portion followed by labor and employer were medium. Because the economic levels of the participant varied but all students had diets consisting largely of street food. These indicate that street foods play a major role overall diet for students in Indonesia (Street Food Project Report No. 3, 1990).

It was observed that 60% of the consumers were suffered from diseases like diarrhea, stomach upset etc. To avoiding disease 62.223% consumers opinion was eat less street food. Most consumers ate street food to look the facilities of the shop and 40% had no personal education about it. Majority of consumers, consume always in road side. Major portion of consumer's intake roadside food as it is 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 was judged to be substandard in 76 to 89 % of the inspection (FAO, 1990).

The highest rate of contamination in different foods was found in street side shops and vendors whereas in middle and high class hotels the rate of contamination was low. This comparatively higher bacterium in food samples suggests contamination from water, practice of inadequate hygienic measures, mishandling, improper storage inadequate cooking and above all unhygienic condition of the retail shops. Same study in Pune, India disclosed that water stored for consumers and used by a number of street vendors showed heavy bacteriological contamination of fecal origin. It may be the primary source of diarrheal diseases of street food consumers. The quality of water supply in Pune city has always met the WHO standards for drinking water. This indicates contamination of the water by the street food vendors during its handling and storage. Similar result were reported from Peru and Colombia (FAO and PAHO, 1985)

CONCLUSION

Street foods play an important socio-economic role in terms of employment potential, and in meeting, in part, the food and nutritional requirements of consumers at prices affordable to the lower income groups. The negative aspects include creation of problems of hygiene and sanitation, potential disturbance in the lives of other people, and a possible contribution to the deterioration of law and order within the city. Street food vendors practiced minimal hygienic and sanitary practices. The hygienic practices in question included food preparation, handling of utensils; place for food preparation, personal hygiene and methods of storing cooked food. Due to lack of proper knowledge and guidance on street food vending, vendors prepared their foods in explicitly unhygienic and unsanitary conditions. As street food vendors are doing their business without having license, therefore, it is important that street vendors are given clear legal status so they are able to claim their entitlements to pursue their livelihoods.

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