



Short communication

Microbiological quality of selected street food items vended by school-based street food vendors in Dhaka, Bangladesh



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ABSTRACT

A cross sectional study was conducted to assess the microbiological quality of local food items vended by the school-based street food vendors in Dhaka City. A total of 80 schools from 19 school-zones of Dhaka City and its outskirts were chosen for the study. A total of 110 food samples, one each from 110 school-based street food vendors, were collected for laboratory analysis. Face to face interviews were conducted with the food vendors using a pre-tested questionnaire. The food samples were analyzed for coliform counts in the Public Health Laboratory, Institute of Public Health, Dhaka, which is a national level central food testing laboratory in Bangladesh. Microbiological criteria recommended by the International Commission on Microbiological Specifications for Foods (ICMSF) were considered to classify food samples as 'satisfactory' (total coliforms <100 per g or ml) and 'unsatisfactory' (total coliforms ≥ 100 per g or ml). Multivariable logistic regression was used to explore the association of selected socio-demographic characteristics of school-based street food vendors with the presence of unsatisfactory levels of coliforms in their food items. Of the 110 school-based street food samples analyzed in the laboratory, 44% were unsatisfactory. Among different items of street vended foods, 54% of sliced fruits samples, 59% of *jhalhuri* samples, 29% of *chotpotis* samples, 53% of *vajavuji* samples, and all (100%) *sharbat* samples were unsatisfactory, while all samples from *achar* (100%) and ice cream (100%) were found to be satisfactory. Logistic regression models showed that the food samples collected from the vendors belonging to the age group '15–24 years' and the vendors possessing an educational status higher than primary level were less likely to be unsatisfactory, while the food samples collected from the vendors having a daily income of more than 200 Bangladeshi Taka (equivalent to 3.00 USD) were more likely to be unsatisfactory. Our study findings reflected poor microbiological quality for a considerable proportion of the school-based street vended foods indicating a health threat to the school children of Dhaka City.

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1. Introduction

Microbiologically contaminated food and drinking water are considered as important vehicles of foodborne disease transmission throughout the world (WHO, 1999). Several studies illustrate that foodborne diseases have been causing high morbidity in both urban and rural Bangladesh over the past few decades (Haq and Rahman, 1991; Henry et al., 1990; Islam et al., 1993, 2008; Luby et al., 2006; Ram et al., 2007; Saha et al., 2009; Sheikh et al., 2002). Poor hygienic condition during food preparation and the lack of awareness about

food safety are possibly the most common causes of foodborne illnesses (WHO, 1999).

Street vended foods are becoming popular among urban people as they are inexpensive, convenient and attractive (WHO, 1996). The World Health Organization (WHO) has defined street vended foods as "foods and beverages prepared and/or sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation" (WHO, 1996). Since street vended foods and beverages are considered to cause transmission of foodborne infection worldwide (Aidara-Kane et al., 2000; Estrada-Garcia et al., 2004; Kruey et al., 2001; Mensah et al., 2002; Mosupye and von Holy, 2000; Muleta and Ashenafi, 2001; Murindamombe et al., 2005), the microbiological quality of street vended food is an important concern. The microbiological contamination of street vended food is considered to be a significant contributor to foodborne diseases, and the consumers of certain street vended foods are somehow at risk of contracting foodborne diseases (INFOSAN, 2010).

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School going children, regular consumers of these certain street vended foods, are at particular risk in relation to most foodborne diseases (WHO, 1996). A considerable number of street food vendors are selling various attractive and colorful food-items targeting school going children around several school-based locations in Dhaka City and its outskirts. A description of some local food items that are commonly vended to school children is shown in Table 1. Although street food has become an important source of accessible and affordable meals for urban populations in many developing countries (INFOSAN, 2010), the street food items vended to the school children (Table 1) are not consumed as main meals in the context of Bangladeshi culture and tradition; rather these local food items have been established as light snacks and drinks among the school children for many years.

Bacterial contamination of the food and beverages vended by street food vendors around the schools might be a common occurrence in Bangladesh, although the exact level of contamination is not properly known. To explore the extent of the problem, we carried out this study which was aimed to assess the microbiological quality of the food items vended by the school-based street food vendors in Dhaka City. So far to our knowledge the present study represents the first microbiological quality survey of school-based street vended foods in Bangladesh. Although a number of studies on street vended foods were carried out in many countries like Botswana (Murindamombe et al., 2005), Mexico (Estrada-Garcia et al., 2004), Senegal (Aidara-Kane et al., 2000), Ethiopia (Muleta and Ashenafi, 2001), Cambodia (Kruy et al., 2001), Ghana (Mensah et al., 2002), South Africa (Mosupye and von Holy, 2000), Brazil (Hanashiro et al., 2005), India (Ghosh et al., 2007), and Bangladesh (Faruque et al., 2010; Islam et al., 2010), these studies were not exclusively concentrated on school-based street vended foods.

2. Material and methods

2.1. Study location and sampling

This cross sectional study was conducted by the Epidemiology Unit, Department of Microbiology, Institute of Public Health (IPH),

Mohakhali, Dhaka, Bangladesh in collaboration with the Public Health Laboratory (PHL) of the same institution. Public Health Laboratory (PHL) has been working as the 'central food testing laboratory' in Bangladesh since its establishment in 1953. The duration of the study was 3 months. For the present study, we defined 'school-based street food vendors' as the persons who vended a variety of local food items among the school children during school hours at the school entry, or at the side of outer school-wall, or on the streets around the school within approximately 50 m of distance from the school entry or outer school-wall of any primary or high school within the territory of Dhaka City Corporation (DCC).

A total of 80 schools from 19 school-zones of Dhaka City and its outskirts were selected for the study ensuring a representation of schools from all the 19 zones. A total of 110 food samples from 110 school-based street food vendors (i.e. one food sample from each selected food vendor) were collected for laboratory analysis. We selected those food vendors who were available within surrounding areas/streets of the pre-selected schools during study period, gave informed consent for interviewing them, and also agreed to provide food samples for laboratory analysis. Due to logistic constraints, a non-probability convenience sampling technique was applied for selection of schools and school-based street food vendors, and also for collection of food samples from these vendors.

2.2. Questionnaire for face to face interviews

Four well-trained field data collectors conducted face to face interviews with the school-based street food vendors employing a pre-tested questionnaire. The duration of each interview was approximately 30 min. The researchers themselves performed pre-testing of the questionnaire with 20 school-based street food vendors. A three-page structured questionnaire consisting of 24 closed and open ended questions was finalized after a required modification. The variables included in the questionnaire were general characteristics of school-based street food vending such as location of food vending, type of food item vended, number of child customer per day and duration of food vending around the school, and the socio-demographic profile of

Table 1

^aDescription of local food items vended to school children by school-based street food vendors, Dhaka, Bangladesh, 2006.

Food item	Brief description	Key ingredients	Method of cooking	Method of serving	Possible sources of contamination
<i>Chotpoti</i>	This is a quick street food and one of the main popular hot and sour snacks among the urban people in Bangladesh.	White pea, chickpea, potato, egg, onion, green chili, tomato, cucumber, coriander bay leaf, lemon juice, main spices include salt, tamarind, black pepper, red chili powder and dried cumin.	Soaking overnight and boiling	Served with spoon in reusable plate	Utensils, water, cut pieces of onion, green chili and coriander bay leaves
<i>Achar (Pickles)</i>	These are sweet, sour, and spicy pickled vegetables and green fruits; very popular food item among the school children in Bangladesh.	Vegetables, green fruits, mustard oil, chili, salt, sugar, and a variety of spices.	Boiling followed by drying, preserved in mustard oil	Served with spoon/hand on pieces of newspaper or old book paper	Spoon, hand, pieces of newspaper, old book paper
<i>Jhalmuri</i>	This is a popular street food item in Bangladesh, which is basically a mixture of puffed rice and a variety of spices.	Puffed rice, peanuts, mustard oil, green chili, onion, tomato, fresh ginger, salt and lemon juice.	No cooking, mixing puffed rice with mustard oil	Served with spoon/hand in a cone made from pieces of newspaper or old book paper	Spoon, hand, pieces of newspaper, old book paper, cut pieces of onion and green chili
<i>Vajavuji (Piaju/beguni/bora etc.)</i>	<i>Piaju</i> (onion lentil fritter) and <i>beguni</i> (fried eggplant/brinjal slice) are snacks of great demand in Bangladesh and liked by people of all ages.	Wheat/rice flour, red lentil (for <i>piaju</i>), eggplant/brinjal (for <i>beguni</i>), soybean oil, onion, chili, salt and other spices.	Mashing followed by deep frying in soybean oil	Served with spoon/hand on pieces of newspaper or old book paper	Spoon, hand, pieces of newspaper, old book paper
<i>Sharbat</i>	This includes a variety of sweet drinks, usually served chilled.	Water, sugar, ice, lemon juice, sugar-cane juice, and other fruit juices.	No cooking, mixing in water with or without ice, or direct juice	Served in reusable glass, cup or bottle	Glass, cup, bottle, water

^a Adapted with permission. Source: Al Mamun, M., Rahman, S.M., Turin, T.C., 2013. Knowledge and awareness of children's food safety among school-based street food vendors in Dhaka, Bangladesh. *Foodborne Pathogens and Disease* 10, 323–330.

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