

ADHERENCE TO CODEX GUIDELINES BY STREET FOODS VENDORS OF URBAN VADODARA IN GUJARAT

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ABSTRACT

In the present study street food vendors were surveyed to assess the extent of adherence to Codex Guidelines for street foods. Using purposive sampling 40 street food vendors selling different foods namely *Pavbhaji, Chinese noodles, Panipuri, Orange juice, Dahi puri, Kaju draksh ice cream, Cold cocoa and Fruit salad* were surveyed. Results indicated that all the vendors followed 39.64% of practices laid by Codex India. Of all the practices, vendors violated the more than 95% of the practices of proper waste disposal and maintaining good environmental sanitation. Vendors violated more than 60% of the practices for unit hygiene, food hygiene, transportation of prepared food and hygienic practices and more than 40% of the practices for transportation of raw ingredients, indoor area, outdoor area, hygiene at the vending site, preliminary food preparation and serving utensil hygiene. In conclusion the studied foods pose a health risk to the consumers eating at these sites.

Key words : Street foods, Codex India, Vendors, Personal hygiene, Food handling Practices

In the Indian context, the liberalization of the economy and its resulting effects on consumer habits have led to a majority of people eating out of homes. This emerging trend is especially prevalent among the middle class Indians, as dining out is increasingly perceived as a form of entertainment and a source of convenient foods. Street kiosks constitute nearly 50% of all consumer food service units in the Indian market, which cater mainly to the lower income bracket ([www.euromonitor.com/consumer food service in India](http://www.euromonitor.com/consumer-food-service-in-india)).

Street-vended foods or its equivalent Street Foods are defined 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). Street food vendors are mostly uninformed of Good Handling Practices (GHP) and causes of diarrheal diseases (Mensah *et al.*, 2002), which can increase the risk of street food contamination (Bhaskar *et al.*, 2004, Bryan *et al.*, 1988a). Street foods are frequently associated with diarrhoeal diseases due to their mishandlings (Akinyele, 1998; Bryan, 1988; King *et al.*, 2000). Chakraborty and Canet (1996), Chandrasekhar *et al.* (2001, 2003) and Sheth *et al.* (2005a, 2005b) conducted studies on microbial contamination of street foods. Presence of pathogens such as coliforms, fungus, *E. coli*, *S. aureus*, *Salmonella* and

Shigella has been correlated to the poor sanitary practices in the preparation and sale of street foods. There are reports of foodborne illness associated with the consumption of fruit juices at several places in India and elsewhere (Parish, 1997; Sandeep *et al.*, 2001).

Street food industry is mostly in unorganized sector and there is a need to keep more vigil on the quality and safety of such foods in the interest of the protection of the health of the population consuming it. The Codex Alimentarius Commission (CAC) has done commendable work for ensuring the safety of street foods and has brought out a Code of Hygienic Practice for the preparation and sale of street foods (The User Manual on Codex). This code contains a series of requirements and practices to be observed in the preparation and sale, in the street, of food beverages for direct consumption. The code applies to the places, where these are prepared, to the points of sale and to the means of transport used. Street food vending wherein preparation, partly or completely, may be carried out elsewhere and/or in different stages, offers great challenges in the observance of hygienic practices. This study was conducted with the broad objective of assessing the adherence to Codex guidelines by the street food vendors of urban Vadodara of Gujarat State.

METHODOLOGY

Interview schedule and on-the-spot observations were used to fill the semi-structured questionnaire for

obtaining information on Code of hygienic practices followed by street vendors of Vadodara city of Gujarat State, India, for the preparation and sale of street foods. Pre-testing was done by administering the questionnaire to 10% of the sample size. The responses of those were excluded from the study. Their suggestions were noted and necessary changes were incorporated to form the final questionnaire. The most popular and populated vending sites were selected for the survey. Street food vendors selling most popular street foods were selected for the survey.

Using purposive sampling, 40 street food vendors from the five zones of Vadodara city, selling different foods namely, *Pavbhaji*, *Chinese noodles*, *Panipuri*, *Orange juice*, *Dahi puri*, *Kaju draksh ice cream*, *Cold cocoa* and *Fruit salad* were surveyed.

RESULTS AND DISCUSSION

Most of the vendors (67.5%) were in the age group of 30-45 yrs and all the vendors surveyed were males. All of them were literate and many were educated upto higher secondary (70%) and about one third of them were graduates (30%). In a Peruvian study, it was reported that high educational levels of the vendors correlated with better hygienic practices (Bhat and Waghay, 2000). Although in the present study all the vendors were literate up to higher secondary levels, findings from many other studies (Sheth *et al.*, 2005a, 2005b; Sheth and Sukul, 2005) indicate that education is important for adhering to food safety norms. Most of these vending units (97.5%) were unlicensed and did not have electricity supply. None of the units had running water supply. Street food vendors frequently conduct their trade with minimal regulations because the existing policies covering street food are not fully enforced (Bryan, 1988 and Bryan *et al.*, 1988). Also it is reported that the number of persons seeking food vending permits in New York City, U.S.A., exceeded the number of permits available (Taylor *et al.*, 2000). Hence, many street vendors bypass this system and sell their food illegally (*i.e.*, without a food permit) on the street, remaining transient to avoid prosecution. Certification of vendors, in terms of national food hygiene regulations, allows for better control and coordination of the sector within the Metro (Anonymous, 2000).

Contaminated raw ingredients are one way in which pathogens are introduced into the processing environment. In the present study, most of the vendors purchased raw ingredients from wholesaler and only semi-processed items, sauces and milk were purchased from retailers. Most of the vendors reported that they bought labeled and packed food ingredients. Mean desirable practices

(%) followed by different vendors for purchase of inputs and ingredients was 66.39% (Table 1).

Transport vehicles are part of the food chain where contamination can occur. Most vendors reported that inputs and ingredients were not transported together with toxic and/or chemical substances (77.5%), purchase quantities of raw materials corresponded to adequate storage/preservation capacity (77.5%) and stock of products are rotated on a first in, first out basis (80%). Also many of them (52.5%) reported that foods and non-edible products like soap, disinfectants, pesticides and other toxic or poisonous substances were kept in separate areas. Only some of them reported that the vehicle, containers and packaging used for transportation were adequately cleaned and disinfected every time before use (35%). Shelves, boxes and storage space were cleaned and protected from dust and other contaminating agents by 30% of vendors. Mean desirable practices (%) followed by different vendors for transport, reception and storage of inputs and ingredients were 57.92%.

Bacterial contamination can occur in the kitchen by a variety of means, including water, people, pets, pests and raw foods. In kitchen, the pathogens are easily spread by cross contamination throughout the kitchen, e.g. onto knives, cutting boards, worktops, sinks, dishcloths etc. (Beumer and Kusumaningrum, 2003; Gorman *et al.*, 2003; Hilton and Austin, 2000). Majority of the vendors in the present study reported that containers for water storage are cleaned as often as necessary (97.5%) and water used for general purposes (washing inputs and recipients) was potable (67.5%). Most of them reported that indoor areas were not sufficiently lit, kept as clean as possible at all times (85%) and were situated near sources of contaminants (87.5%). Many vendors (60%) reported that equipments used are made from appropriate materials (steel) for easy cleaning and disinfecting. They also reported that fuel, toxic substances or inflammable products were not kept in direct contact with food. Most vendors (97.5%) reported that containers previously used for substances that are toxic or harmful to human health, such as insecticides, paints or motor oil were not used for food. All the vendors reported that waste water was not adequately disposed off and therefore may be presenting a hazard to potable water, food, surrounding area or food handlers. All the vendors reported that the working area, including surfaces in contact with food was not in a good condition and was not properly maintained. These surfaces were not washed with potable water and disinfected appropriately. Mean desirable practices (%) followed by different vendors for facilities for indoor areas of food preparation were 46.67% and it ranged from

Table 1. Mean desirable practices (%) followed by Street Food Vendors

Requirements	<i>Pavbhaji</i>	<i>Chinese noodles</i>	<i>Pani pari</i>	<i>Orange juice</i>	<i>Dahi pari</i>	<i>Kaju draksh ice cream</i>	<i>Cold cocoa</i>	<i>Fruit salad</i>	Total
Purchase of inputs and ingredients	58.00	71.43	60.00	0.00	66.67	100	100	75.00	66.39
Transport, reception and storage of inputs and ingredients	43.33	66.66	43.33	40.00	50.00	73.33	83.33	63.33	57.72
Indoor areas of food preparation	35.56	46.67	46.67	33.33	44.44	55.56	55.56	57.78	46.67
Outdoor areas of food preparation	25.71	57.14	42.86	22.86	48.57	46.67	50.00	46.67	42.20
Facilities to maintain hygiene at the vending site	25.00	32.50	30.00	46.66	37.50	80.00	40.00	40.00	51.77
Hygienic practices	20.00	23.33	28.33	25.00	35.00	48.33	50.00	45.00	34.79
Practices for preliminary food preparation	34.29	45.71	37.14	33.33	37.14	NA	NA	100	49.37
Practices for final food preparation	40.00	36.67	43.33	NA	30.00	100	100	100	71.35
Conditions of transport for prepared food	13.33	16.67	16.67	NA	16.67	60.00	60.00	60.00	34.76
Food hygiene	31.43	37.14	31.43	20.00	31.43	28.57	28.57	28.57	29.64
Unit hygiene	8.00	12.00	16.00	8.00	8.00	32.00	28.00	28.00	17.50
Environmental sanitation	0.00	6.67	3.33	6.67	0.00	3.33	3.33	3.33	3.33
Serving utensil hygiene	50.00	50.00	53.33	72.00	43.33	63.34	56.67	60.00	56.08
Handling and disposal of waste and pest control	0.00	0.00	0.00	0.00	2.86	2.86	5.71	0.00	1.43
Total	27.27	36.55	32.32	25.65	32.05	52.15	53.94	53.17	39.64

33.33% (*Orange juice*) to 57.78% (*Fruit salad*).

At many vending units (67.5%), it was found that the outdoor areas were protected from direct sun but only few units (20%) looked clean. None of the units were protected from dust and wind and these areas were in direct contact with public and customers. At some of the units (40%), equipments such as stoves or similar appliances, were constructed and maintained safely and adequately. Many of the vendors (82.5%), reported that the potable water brought by them at vending unit was enough to carry out food preparation at the vending site. At most units (85%) the area where food was prepared was at least 60-70 cm off the ground and the height was suitable for the quantity of food prepared, handled and kept. Mean value for the facilities available to the vendors for outdoor areas of food preparation was 42.20% and it ranged from 22.86% (*Orange juice*) to 57.14% (*Chinese noodles*).

At most of the vending units (97.5%) stainless steel knives were used. Some of the vendors (57.5%) reported that cooking was done in steel/anodized aluminum vessels and at most units (94.29%) after cooking food was turned in steel/anodized aluminum vessels. Only some of the vendors reported that every food item was covered before cooking (37.5%), during cooking (45.71%) and after cooking (31.43%). However, observations revealed that at most of the units (88.57%), cooked food was not protected from various sources of contamination. Also, at most of the units (80%), transportable potable water was not kept in an appropriate container that was easy to clean, hermetically sealed, fitted with cover and tap or stopcock. Such water was stored in partially open steel/plastic containers. Mean value for the facilities available to vendors to maintain hygiene at the vending site was 51.77% and it ranged from 25% (*Pavbhaji*) to 80% (*Kaju draksh ice cream*). In a bacteriological study carried out in India regarding the hygienic practices followed by 20 school canteens, a high percentage of *E. coli* was observed in food and water samples (96%) and in swab samples from contamination sources (97%) (Bansal and Kaul, 2004). Among sources of contamination, working surface, nails, knives and wiping cloth showed highest *E. coli* isolation (100%) while least isolation (85%) was observed in case of serving utensils. Only in 35% of canteens, drinking water was boiled.

Food handlers are most important sources for the transfer of microorganisms to the food from their skin, nose, bowel and also from the contaminated food prepared and served by them. In the present study it was observed that none of the vendors had completely covered hair during food handling but many of them (57.5%) had short

and clean nails. Many vendors reported that they refrained from spitting (75%), sneezing (32.5%) and smoking (50%) during handling food. Although many of them (62.5%) wore appropriate clean clothing but none of them wore apron. Also many vendors (67.5%) did not wear rings or bracelets while handling food. All the vendors were found to handle food and money at the same time. In a study, pieces of money made of metal and copper were collected from street food vendors and were analyzed for their microbiological status (Barro *et al.*, 2006). It was found that the coins carried various bacteria. Other investigators have also reported similar results (Abrams and Waterman, 1972; Barry, 2002; Brady and Kelly, 2002, Wendy and Bonifazi, 2002). The currency notes and coins are in permanent movement, passing in all environments that constitute a reservoir and source of various bacteria as pathogenic surfaces (Pomperayer and Gaylarde, 2000).

Although many vendors (67.5%) in the present study reported that they washed their hands and forearms with potable water and disinfecting soap after use of toilet but none of them reported to wash hands after direct handling of fresh foods such as fruits and vegetables and before handling of prepared or semi prepared foods. Mean desirable hygienic practices (%) of the street food vendors was low (34.79%) and it ranged from 20% (*Pavbhaji*) to 50% (*Cold cocoa*).

Only 16.67% vendors protected fruits and vegetables from cross contamination. Many vendors (53.33%) reported that parts or items of fruits and vegetables in poor condition were not removed and fruits and vegetables were not peeled, squeezed and/or cut with hygienic equipment. Many vendors (60%) reported that fruits and vegetables were washed before using them. Only at 16.67% units, it was found that previously prepared fruits and vegetables were kept in hygienic and properly covered recipients. At 50% of the units, it was found that flour, sugar, salt and similar products contained humidity and were not kept/stored in covered containers to prevent contamination. Mean desirable practices (%) of the street food vendors for preliminary food preparation for all the vendors was 49.37% and it ranged from 33.33% (*Orange juice*) to 100% (*Fruit salad*).

FDA has determined that improper cold holding of food is the most frequent temperature violation for nearly all facility types. For example, in a survey of fast food restaurants, 31% were out of compliance in that potentially hazardous foods were being stored at temperatures above 41° F (FDA, 2000). In the present study, most vendors (80%) reported that time between preparation and consumption of foods was not more than 6 hrs when foods were kept at a temperature above 60°C.

Vendors selling items such as *ice cream*, *cold cocoa* and *fruit salad* reported that foods were stored up to one day at a maximum temperature of 5°C and chilling time for hot foods was not more than three hours to reach a temperature of 5°C. Many of the vendors (82.86%) reported that use of leftovers was avoided and only what could be sold in a day was prepared. Only 37.5% vendors reported that reheating was practised only for the quantity to be served. Mean desirable practices (%) of the street food vendors for final food preparation were 71.35% and it ranged from 30% (*Dahi puri*) to 100% (*Kaju draksh ice cream*, *Cold cocoa*, *Fruit salad*).

None of the vendors in the present study reported that the vehicles in which they transported the prepared food have a separate compartment protected from direct sun, wind, dust, rain and other contaminants but most of them (97.14%) said that the food is transported in steel/anodized aluminum vessels properly sealed and protected from outside contamination. Vendors selling *ice cream*, *cold cocoa* and *fruit salad* reported that temperature was controlled for foods, avoiding room-temperature exposure, and separate thermal boxes were used for two types of prepared foods. Mean value for conditions of transport observed by the vendors for prepared food was 34.76% and it ranged from 13.33% (*Pavbhaji*) to 60% (*Kaju draksh ice cream*, *cold cocoa*, *fruit salad*). In 1994, an estimated 224,000 persons developed salmonellosis from nationally distributed brand of ice cream (Hennessy *et al.*, 1996). *S. enteritidis* was the cause, and the most likely scenario was that pasteurized ice cream premix was transported by a tanker trailer that had carried non-pasteurized eggs just before being loaded with the premix. Eggs are a known source of *S. enteritidis*.

Only 22.86% vendors supplied salt, sugar, mustard, ketchup, mayonnaise and similar products to be used by the consumers in single portion units or in dispensers that will avoid their contamination. At all the vending unit, easy contact between personal belongings and the area of food preparation, storage and/or consumption was seen. Mean desirable practices (%) followed by vendors for food hygiene was 29.64% and it ranged from 20% (*Orange juice*) to 37.14% (*Chinese noodles*).

It was observed that none of the vending unit had running tap water facility with antiseptic soap for washing hands. Most units (57.5%) sales area was used for personal belongings such as clothes, napkins etc. Only 12.5% vendors reported that when not in use, the sales stall is kept under cover in a clean place. Very few vendors reported that they immediately mopped up the serving area to keep them dry and free from flies (10%) and few

used detergents for washing of food preparation and serving area etc after every shift (12.5%). Mean desirable practices (%) followed by vendors for unit hygiene was 17.5% and it ranged from 8% (*Pavbhaji*, *Dahi puri*, *Orange juice*) to 32% (*Kaju draksh ice cream*).

No facility was available to the vendors by the local authority to prepare and serve food in a hygienic environment and therefore these vendors sell food near road that was not protected from contaminants originating from traffic, pedestrians, domestic animals and/or vectors. None of them used pesticide/insecticide for keeping the surroundings pest and insect free and few vendors (7.5%) had surroundings clean and free from insects, flies etc. The waste disposal facility was not adequate in almost 87.5% of the units. Garbage was seen strewn all around the unit. Mean value for environmental sanitation for all the vendors was extremely poor (3.33%).

Street vendors in various parts of the world are known to wash their utensils in water that has been used previously for similar purpose, perhaps many times (WHO, 1984). In a study, it was reported that most vendors used dish washing waters in buckets placed on the floor (Barro *et al.*, 2006). The waters for washing and rinsing the utensils were rarely renewed and generally were observed to be dirty, explains their poor bacterial quality (Mensah *et al.*, 2002; Mosupye and Van Holy, 1999; Muinde and Kuria, 2005). In the present study most of the vendors (97.5) washed the utensils immediately after use and they used commercial detergents for washing utensils. Almost none of them (97.5%) had a two-tub system one for initial dip and wash and second for rinsing and cleaning. All of them used synthetic scrubbers/coconut fiber for washing utensils. At most units (70%), the serving and dinning vessels were kept in uncovered and damp place. None of the vendors used separate forks, tongs, and spoons/towels for serving the food. The mean desirable practices (%) followed by vendors for serving utensil hygiene was 56.08% and it ranged from 43.33% (*Dahi puri*) to 72% (*Orange juice*). Similar results were found in various street food studies (Sheth *et al.*, 2005a, 2005b).

It was found that only 10% of the vendors had waste bin with proper lids. At all the vending sites, waste bins were kept near the food handling area. None of the vendors had waste containers that were waterproof and easy to clean. Also none of the vendors collected and disposed waste water separately from solid wastes. All the vendors threw waste water onto the ground near the vending unit. Also, some of the food wastes were thrown onto the ground near the unit attracting insects and animals, such as flies, dogs and cats. Pest control was not carried

out by any of the vendors. Mean desirable practices (%) followed for disposal of waste and pest control by different vendors was 1.43%.

Findings of present study reinforce the concerns of FAO/WHO, which indicate that the majority of street food vendors lack the appropriate knowledge and expertise in the application of food hygiene and good food handling practices (FAO/WHO, 2003). Thus, food safety education of all the street food vendors along with enforcement of food code and its adherence by the appropriate local government bodies continue to remain a hallmark to reduce the incidences of food borne illnesses.

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ADHERENCE TO CODEX GUIDELINES BY STREET FOODS VENDORS

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