



Original Article

Assessment of Hygienic conditions of Street Food Vendors and Identification of Hazardous points involved during Street Food Vending

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ABSTRACT

The provision of safe and nutritious food is a fundamental human right that contributes to good health, efficiency, and provides a foundation for people' sustainable development and poverty reduction. **Objectives:** To analyze the sanitary conditions of street food sellers and to identify potential hazards during street food vending. **Methods:** A cross-sectional study was carried out. Between September and November 2013, 100 street food vendors in three heavily populated neighborhoods of Lahore (Ravi town, Data Ganj Baksh, and Shahdara town) were assessed using a questionnaire and a food safety checklist. For the production of safe street food, hazards were identified along the phases involved in street food selling. The SPSS software was used to analyze the data. **Results:** 89% of vendors lacked hygiene and proper clothing, and 71% did not wash their hands before food preparation. 36% of vendors were afflicted with various diseases. Only 27% of the vending units were sufficiently clean and well maintained. The biggest concern with unsanitary food served by street food sellers was that only 19% purchased raw items from trusted sources. Only 18% of respondents used separate utensils for raw and RTE food storage, while 49% did not. The presence of fungal growth (26%) indicated the source of food-borne infections. There were six primary points/steps in street food vendors where contamination and hazardous threats existed. **Conclusions:** Most street foods were found unsanitary and hazardous. The food vendors were mainly ignorant and uninformed about food safety. Basic GHP and HACCP related precautionary measures should be taken.

INTRODUCTION

The availability of safe and nutritious food is the basic human right that contributing to good health, efficiency and gives a platform for sustainable development, and poverty alleviation of citizens [1]. The street food industry expanded rapidly during the last few decades and plays an important role in meeting the requirements of ready to eat foods [2]. This industry provides varieties of relatively cheap and easily accessible food to the millions of peoples in the developing countries [3]. Preparation and sale of street foods said to be an age-old activity and attracts all the age groups, especially the young generation. Street food industry has achieved new dimensions as a result of rapid urbanization. These foods are being served quickly and easily available at reasonable rates [4]. Street foods are defined by the FAO as ready-to-eat (RTE) food and

beverages prepared and sold by vendors especially in streets and other similar places for immediate consumption or at a later stage without further processing or preparation [5]. While street vended foods are appreciated for not only their unique flavors and their convenience, but also important for contributing to the nutritional status of the people. They are contributing to food security and provide a livelihood for low-income urban populations [6]. In contrast to the potential benefits, it is recognized that most of the food vendors are often poorly educated (lack of knowledge of food safety), unlicensed, untrained in food hygiene [7]. The traditional methods of preparation of ready to eat food, inappropriate holding temperatures and poor personal hygiene of food handlers are the main causes of contamination [8]. Food-borne

illnesses are common in most of the developing countries because of the increasing number of street food vendors with poor basic hygienic conditions [9]. The openly displayed foods can easily be contaminated by dust, smoke, insects, and hands of intending buyers, rains and drooping of birds. Microbial contamination of street-vended foods comes on inner surfaces of the food during peeling, slicing, handling, trimming and other processes like packaging, storing [10]. *E. coli*, *Salmonella typhi*, *Pseudomonas species*, *Staphylococcus aureus* and *Proteus species* causes potential health risks by contamination of food by during preparation, post cooking and other handling stages [7]. Food safety is a major concern with street foods as these foods are generally prepared and sold under unhygienic conditions, with limited access to safe water, sanitary services, or waste disposal facilities[11]. To introduce professional look to street food vendors, the street food safety management needs basic Hazard Analysis Critical Control Points (HACCP) and the prerequisite system in the form of good manufacturing practices (GMPs) and good hygienic practices (GHPs). Critical points and monitoring procedures need to be introduced for the safe street food preparation[12, 13]. The present study was carried out to determine the hygienic conditions of vendors and estimate the knowledge and food safety practices among street-food vendors in Lahore. This study also used to introduce basics of GHP and HACCP for the street food vendors.

METHODS

Based on the observations, cross sectional study was conducted to collect information on the hygienic and sanitation conditions. 100 street food vendors of 3 densely populated areas of Lahore (Ravi town, Data Ghanj Bhaksh and Shahdra town) were surveyed using questionnaire and food safety checklist between September to November 2013. The hygienic conditions of one hundred street food vendors were studied by using questionnaire and food safety checklist. The data collected from street food vendors included: hygienic status of food vendors and vending units, food & utensils handling practices, water source, cleanliness & sanitation, and waste management. Hazards were identified along the steps involved in street food vending for production of safe street food. The data were analyzed using SPSS version 21.0. Descriptive statistics such as frequencies and percentages were used to calculate observed parameters.

RESULTS

In this study the food safety and hygiene practices of street food vendors in three densely populated areas of Lahore city had been studied. It was observed that street vendors were mostly ambulant (83%), and some were stationary

(17%) having proper shelters. The main food categories consisted of breakfast meals, frozen products, beverages, fruits, and vegetables etc.(Figure 1).

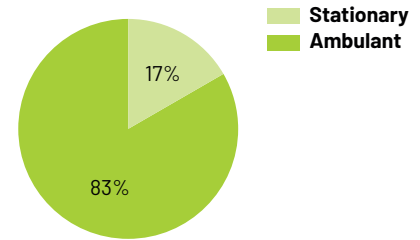


Figure 1: Mode of Vending

The present study included 100 street food vendors, out of which 89% had poor cleanliness and lack of proper clothing and 71% were not washing hands before food preparations. The health status of vendors was also affecting during handling of food because of blowing of nose and sneezing. 36% of vendors were suffering from different type of illnesses. The vending units were not properly clean and well maintain only 27% had proper vending units with covering and cleanliness of food stored. The vending units were not constructed in such a way to minimize the entry of flies and pests. Presence of flies and improper covering of raw and RTE foods were mostly prevalent among food vending units. The main issues of unhygienic food sold by street food vendors was only 19% were purchasing raw foods from reliable sources. Only 18% were using separate utensils for raw and RTE food storage and 49% were not storing raw and RTE foods separately. Storage of hazardous foods was also improper, just 21% were using temperature control strategy to prevent the foods from spoilage. As shown in Table 1, only 34 % was using potable water and 63% were reused water for washing of utensils. The status of cleanliness and sanitation of raw vegetables and fruits were also very poor, only 45% were cleaning fruits and vegetables properly and 38% were washing utensils before using them in preparation of foods. Nothing of them was using any sanitizer for prevention from microbial loads. The presence of fungal growth (26%) showed that improper hygienic conditions are present which could be the cause of food borne illnesses. Waste produced during the preparation of foods was not properly disposed off after the end of activities. There were 63% of chances of contamination during disposal of waste (Table 1).

Hygienic status of food vendors	Yes	No	NA
Cleanliness & Proper clothing	11	89	-
Hand washing	29	71	-
Vendors Healthy	64	36	-
Vending Units	Yes	No	NA
Clean and well maintain	27	73	-
Minimize dust & pests' entry	14	86	-

Food & Utensils Handling Practices	Yes	No	NA
Reliable source	19	77	4
Storage of Raw & RTE separately	2	49	49
Separate Utensils	18	82	-
Temperature control	21	79	-
Water Source	Yes	No	NA
Potable water usage	34	66	-
Reused water	63	37	-
Cleanliness & Sanitation	Yes	No	NA
Cleanliness of raw vegetables and fruits	45	55	-
Fungal growth	26	74	-
Cleaning utensils before use	38	62	-
Sanitizing utensils	0	100	-
Waste Management	Yes	No	NA
Properly disposal of waste	34	66	-
Chances of contamination during disposal	63	37	-

Table 1: Hygienic conditions observed during survey

There were 6 major points/steps in street food vending where chances of contamination and hazards risks are present. Table 2 shows the hazards and their control measures to reduce the risks of unhygienic practices.

Steps	Hazards/Risks	Precautionary Measures
Purchasing of Raw food	Contamination	<ul style="list-style-type: none"> Raw food should from reliable source
Storage of food	Microbial contamination	<ul style="list-style-type: none"> Proper storage in clean containers Time and temperature control Covering for prevention from flies and pests
Water source	Microbial & Chemical contamination	<ul style="list-style-type: none"> Use of potable water Avoid reused water
Preparation of food	Cross contamination	<ul style="list-style-type: none"> Separate utensils for raw and RTE food Washing of raw fruits & egetables Hand washing before preparation of food
Vending units	Environmental & Microbial contamination	<ul style="list-style-type: none"> Proper construction of vending units Prevention from entry of dust, wind, and rain Use of sanitizers to prevent risks of contamination
Waste management	Cross contamination & Growth of pathogens	<ul style="list-style-type: none"> Proper disposal of waste at appropriate place Cleanliness of vending units and surroundings

Table 2: Identification of Hazards in different steps of street food vending

DISCUSSION

This study focused on the hygienic conditions of the street food vendors in Lahore. Street food vendor's hygiene practices and foods were observed in order to sketch out basic strategies for GHP and HACCP to improve the safety of street foods. Most of the street food vendors were ambulant, their vending units are not properly constructed. The vending units did not prevent the entry of flies, pest, and dust particles. The chances of contamination of foods

add more due to the presence of air borne particles as a result of heavy vehicles traffic and overcrowding [14]. Poor hygienic conditions of food vendors and vending units were the main cause of food contamination. Food vendors were unaware of the knowledge of food safety. The majority of vendors had improper clothing; few of them were using aprons and masks. The health status of food vendors was also poor, some of them were suffering from cold, fever and other types of diseases. Same results were showed by Adjrah *et al.*, in 2013 [5]. Raw material from non-reliable source was 77% which showed the chances of contamination and adulteration of raw foods. Some vendors purchase low price adulterated ingredients from non-authorized suppliers. Raw meat, poultry and vegetables are usually contaminated with a lot of food borne pathogens, such as *B. cereus*, *C. perfringens*, *C. jejuni*, *E. coli*, *L. monocytogenes*, *Salmonella* and *S. aureus* [15]. Conditions of utensils and food storage bins are very important for the food safety point of view. Proper storage and separate utensils for raw and RTE foods were mostly absent. Fungal growth and cross contamination are caused by ineffective cleaning and absence of sanitizers. Same results were observed by Rane S. in India [15]. In another study it was indicated that uncleaned utensils were the cause of re-contamination of RTE foods. Because of the contamination of utensils by dishwater, the foods became health hazards itself [16]. Potable water is an essential requirement in public health prospective. A large number of food vendors were not using potable water for cooking and washing purpose. Many street vendors (63%) tend to reuse water for cleaning and washing purpose due to shortage and unavailability of potable water. Yadav *et al.*, conducted a study in Allahbad City and had been found that heavy contamination in RTE samples sold by street food vendors is due to the use of poor-quality water during preparation of food [14]. Proper waste management is the backbone for the prevention of contamination of foods from microbes and other spoilage bacteria. In the present situation only 37% of food vendors were disposing waste in a manner to avoid from cross contamination. Chumber *et al.*, observed that nearly 60 percent of the vendors threw wastewater alongside the vending units making the environment surrounding unhygienic [17]. Filthy environment due to improper waste disposal attracts the flies and other pests which are the main cause of contamination [18]. The observed hygienic conditions of food vendors draw a clear picture that there is lack of good hygiene practices and basic food safety knowledge among food handlers. Good personal hygiene and HACCP application reduces the chance of contamination of ready to eat products [19, 20]. The main steps involved in the causation of contamination of food during street food

vending were identified by using data obtained from survey. At the end 6 basics steps were identified, where chances of hazards and risks of contamination may occur during street food vending. The basic GHP and HACCP related preventive measures could be helpful in reduction of contamination and risks of hazards for street food vending business. In Allahabad, Gadi *et al.*, also observed the food vendors in city and devised 5 key critical control points for identify the hazards during food production chain [12].

CONCLUSIONS

The study demonstrated that most of the street foods were vended in unhygienic and hazardous environment in Lahore city. The food vendors were mostly uneducated and unaware of the knowledge of food safety. Basic GHP and HACCP related precautionary measures described should follow for prevention from contamination of food. Free training and education sessions on GHP and HACCP by the public institutions play an important role for the development of good street food vendors for the developing countries.

Conflicts of Interest

The authors declare no conflict of interest.

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