



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**

# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 12, December 2022

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.118

 9940 572 462

 6381 907 438

 [ijirset@gmail.com](mailto:ijirset@gmail.com)

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# Hygiene and Sanitary Practices of Street Food Vendors: A Review

Gargi Saxena<sup>1\*</sup>, Priyanka Saini<sup>2</sup>

Senior Assistant Professor, Department of Home Science, IIS (Deemed to be UNIVERSITY), Gurukul Marg, SFS,  
Mansarovar, Jaipur, India<sup>1</sup>

Post Graduate Student. Department of Home Science, IIS (Deemed to be UNIVERSITY), Gurukul Marg, SFS,  
Mansarovar, Jaipur, India<sup>2</sup>

\*Corresponding author

**ABSTRACT:** Street foods are defined as ready-to-eat foods and beverages sold by vendors and hawkers especially in the streets and other similar public places. Street foods have offered a lot of advantages like they provide a good amount of energy at low cost, are delicious, easily available, as they require minimal capital and expertise. Indian street foods are such as *Samosa, kachori, Pakora, idli sambhar, dosa, upma, uttapam, papdi chaat, Mirchi Vada, Dahi Vada, tikki-chhole, chhole-bature, aloomatar kofta, bhelpuri, sevपुरi*, burger, sandwich, momos are served with different types of *Chutney*. *Chutney* prepared at home are hygienic and safe but the chutneys served by street food vendors are of poor microbial quality and thus possess a large number of pathogens as they are unhygienically prepared. Street food vendors also keep the food uncovered when not in use, they also follow poor personal hygiene such as never wear the head covers, aprons and gloves, had unclean nails. The vendors who are selling street foods are not aware of the hygienic and sanitary practices which further deteriorate the quality of food leading to food poisoning and other food-borne diseases such as tuberculosis, typhoid, fever, and cholera.

**KEYWORDS:** Hygiene, Microbial quality, Practices, Street foods, Sanitation.

## I. INTRODUCTION

Street foods are defined as “ready to eat foods and beverages prepared and or sold by vendors and hawkers especially in the street and other similar public places” [1]. Street food represents a significant part of urban food consumption for millions of low and middle-income consumers in urban areas daily [2]. Street foods ensure food security for low-income group urban populations [3]. Important socio-economic role played by street foods in developing countries is it provides a regular source of income for millions of low or unskilled men and women (FAO, 2011). Vendors prepare the street food at home or at the roadside stalls. These foods contain snacks like crisps and drinks like soft drinks; mostly cooked foods such as *idli, dosa, paani poori*, etc are also sold on sites [4].

Street food vending gives financial profit for vendors; still, a majority of street food vendors usually have poor knowledge of food safety [5].

Sanitation is the application of a science to provide wholesome food handled in a hygienic environment by healthy food handlers to prevent contamination [6]. Maintenance of food safety requires proper sanitation practices. The outbreak of foodborne illnesses can contribute due to lack of hygienic practices. Foodborne illnesses are generally increasingly public health concerns worldwide and result from food contaminated by pathogenic microorganisms, mycotoxins, or chemical hazards. Food spoilage and foodborne illness are mainly caused by microorganisms [7].

Uses of artificial colors such as yellow are causing health hazard problems. Not following proper garbage removal facilities, the main cause of poor environmental conditions [8]. Microbiological status of Street vended foods depends on

the environmental and various others factors such as raw materials quality of use, handling and food processing, microorganism's ability to resist the preservation and storage treatment and contamination during post- process phase [9].

Microbial load of street food increases due to unhygienic place of preparation, unsafe water being used for washing the utensils, unclean utensils used for cooking and serving, cooked food are not stored at ideal temperature, ones cooked the food is held on the cart till it is sold to consumer or left unsold and poor personal hygiene of vendors [10, 11]. Mishandling of food and improper hygiene exposes the food to pathogenic bacteria and consumption of such foods can cause foodborne illnesses [12, 13,14]. Due to poor personal hygiene, the vendors would be the carriers of intestinal bacteria and other pathogens like *E. coli*, *Salmonella*, *Shigella*, *Campylobacter* and *S. aureus* which time to time transfer these foodborne hazards to consumers [15]. A human being suffering from severe foodborne illness caused by pathogenic bacteria showed symptoms like headache, fever, stomach cramps, vomiting and loss of appetite if they are not treated properly it may have become very serious [16].

## II. STREET FOODS

Street foods constitute an important source of nutrition for many city dwellers and their preparation and sale provides the hawkers with a precious basis of income [17]. Street foods are a significant source of food for many urban dwellers, both in terms of energy intake and food expenditure [18].

In the urban informal economy, street food is an important section and makes a remarkable role in the economy in developing countries [19]. The street food business is characterized by micro-scale operations, traditional food processing technology is used, and this sector allows easy to entry because it requires low investment [20].

## III. STREET VENDORS

A study conducted in Kollam district to assess the problems of street vendors observed that in the mainstream of the urban economy the formal sector plays an integral role. They estimated that in informal sector, involvement of the number of people is increasing day by day. Apart from this, they face increasing competition to maintain their economic situation [21].

The challenges faced by the street vendors in their business development were fluctuation in economy, social insecurity, weather versatility, barriers towards credit facility, health issues, differentiation, working instability, unawareness about legal rights and fleeting implementation of government policies and programs [21].

The quality of life of 56 street vendors of Tiruchirappalli City, Tamil Nadu, India was studied. The important parameters assessed were physical health, psychological health, social relations and environmental factor. The results represented that the respondents had a low level of physical health (55.4%), psychological health (51.8%), social relationship (73.2%) and poor personal satisfaction in terms of environmental factor (55.4%). General personal satisfaction of street vendors signified that 50% of the vendors were of low level and 50% of the vendors were of the abnormal state of personal satisfaction. The overall quality of life of street vendors indicated that 50% of vendors were of low level and another 50% of vendors were of the high level of quality of life [6].

It has been reported that street vendors take loans from money lenders at an exceeding rate of interest, not only for their economic activity but also for social security purposes. It has been reported that street vendors have very long working hours, which is increasing rapidly over the years. Neither have they enjoyed safety nor security at the workplace as they face constant harrying by local officials. Some factors like current working hours, security concerns at their workplace and extensive rent sought by local authorities not only deteriorate the working conditions of street vendors but contribute to their economic deprivation as well [22].

It was revealed that the vendors in Mumbai constitute highly vulnerable and miserable part of the urban working poor [22]. The average earnings of vendors were generally higher than the official minimum wage and even earn more than school teachers or government clerks [23].



Street vendors organize a business venture and consider it to risk so they belong to the group of entrepreneurs. They play a major role in economy by contributing in boosting up the overall activity and in the regulation of materials and their services [24].

#### **IV. PERSONAL HYGIENE AND SANITARY PRACTICES OF STREET FOOD VENDORS**

The observation of handling practices of street food vendors showed inadequate hygienic practices, and assessment of street food safety revealed that they do not satisfy the Vietnam hygiene standard of specific foods [25]. A study conducted to understand the practices of food handling hygiene among vendors, showed lack of knowledge and practices about food hygiene and sanitary conditions among the street food vendors. When street food vendors maintain proper hygiene and sanitation practices of their vicinity of street stall it would reduce the food contamination and outbreaks of foodborne diseases [26].

It has been reported that poor hygiene and food safety practices were followed by street food vendors of Delhi city [27]. The study on quality assessment of street foods based on the location of food stalls in Tirumala, reported that stalls located in dusty roadside areas were highly contaminated with microorganisms indicating the prevailing unhygienic conditions of street foods [28].

Only a few vendors reported that the food stored at the right temperature could prevent spoilage and very few of them mentioned that inappropriate storage of food could be dangerous to health [29].

Poor personal hygiene of the vendors was responsible for the contamination of street foods. Other leading causes of cross-contamination of bacterial pathogens were touching the floor, washing utensils without the use of soap, handling of dishcloths, touching food without the use of gloves after their preparation and serving water without washing hands [30].

Food contamination in Allahabad City was primarily caused by poor water quality and unhygienic condition during food preparation, peeling of fruits and vendors prepared food before consumption, and generally vending location of street food was crowded and located in dusty areas [31]. Food was mostly prepared in the morning by half of the vendors. Tap water was used by most of the vendors for food preparation. Utensils were also washed directly in tap water or in cold water kept in a bucket. Covering of food items was not preferred and flies were seen near the stalls. The use of fork or spoon was rare, and most of the vendors served food by bare hands, without the use of gloves. Vendors were not wearing a head cap and were not wearing overcoats. Some of the food handlers use to wash their hands before food preparation and after using the toilet [32].

The contamination of fruit juices was primarily caused by poor personal hygiene and some of the key risk behaviors of the vendors [33]. Lack of awareness related to responsibility of food handlers to follow hygiene and safety practices, leads to contamination of street foods in Delhi City [34]. The risk of food contamination was increased owing to the lack of proper knowledge of safe food preparation and food handling practices among the street food [35, 36]. There was a lack of knowledge regarding food safety and lack of formal training regarding safe food preparation among the vendors, ultimately leading to an increased risk of food contamination [37].

There was an absence of maintenance of food safety aspects such as handwashing with soap and water at the preparation, collection and display of food in about half of the vendors. Only a few vendors had using head cap while preparing food and had cut nails in a frequently [38].

Water supply facility in the vendors has an insufficient resulted in an unsanitary method of washing their utensils and counters, and most vendors have not worn aprons, personal hygiene observed very few vendors without wearing a head cap and cleaning fingernails. The study showed that there was a significant correlation between personal hygiene and sanitation to vendors in their educational attainment, garbage disposal method [39].

The transmission of the pathogens, and bacteria found in the environment and humans could be facilitated through food, from the hands of the vendors, due to improper personal hygiene [40, 41]. It has been reported that hands were one of the

most important factors in the contamination and the spreading of fecal-oral transmitted bacteria [42,43]. Food served by vendors without using gloves to the customers increases the risk. Rice, pork, salads and other foods were usually served with spoons without using gloves. Poor personal hygiene practices of vendors such as dirty clothing, unhygienic handling and serving practices, contaminated hands, and lack of knowledge of hygienic practices resulted in maximum contamination [44].

During food handling, some of the vendors were chewing tobacco and after every serving, most of the vendors did not wipe their hands. Cross-contamination of food could be caused by chewing tobacco during food handling and preparation. Outside of the vending side on the ground, some of the vendors threw the waste while beside the vending side a few vendors threw the waste. Unhygienic conditions such as poor maintenance of premises, poor personal hygiene, and deposit of slime on poorly cleaned utensils were the causes of contamination [45].

Contamination of street foods due to unhygienic preparation and using low quality of raw materials for cooking has also been reported [46]. The poor hygiene conditions of the food vendors, faulty holding and inappropriate processing methods led to the contamination of the street foods [47].

The preparation of street foods in environmentally unhygienic conditions, presence of flies and dust and their sale in unsanitary locations, where the vending carts were located on footpaths, near drains or sewerage, resulted in exposure of the food to contamination [6].

It has been observed that some of the vendors did not wear head cap and few of them have not covered their skin lesion [48]. Most of the vendors have prepared food in unhygienic conditions. Only a few of them have worn apron during cooking or serving food, while most of the food handlers have handled food without using gloves [49].

Majority of the vendors do not use aprons, gloves, and hairnet. Most of the vendors have long and dirty nails. Coughing, sneezing, and touching of hair during handling of food was also observed among these vendors. While serving food, all the vendors handled money. Most of the vendors have worn jewellery and other accessories also [50].

Washing hands after food handling operations, after eating/drinking and after handling money was not found to be a common practice among most of the street food vendors. Most of the vendors were not using a head cap and apron [51]. The scarcity of adequate water sources and lack of knowledge regarding food safety were two main constraints in food handling practices [52].

In India, food hawkers are unaware of food regulations and they have not attended any training on basic food hygiene. They also lack basic services like potable water supply and proper waste disposal systems, thus they inhibit the ability to provide safe food [53].

In India, there is unawareness of responsibility among majority of the street vendors regarding food preparations and food regulations. The unavailability of facilities like good quality water and proper waste disposal system probes as a barrier in availability of safe food for the consumers [54]. A number of continents like Asia, Africa and South America have reported the re-use of water by vendors for cleaning utensils and dishes due to scarcity of potable water [46].

The street food vendors when assessed on their perceptions of the current hygiene facilities and services at the local markets revealed inadequacies in services such as garbage removal and pest control, which could compromise the safety of street food [55].

## **V. MICROBIAL QUALITY OF STREET VENDED FOODS**

A study conducted by [56] revealed that unhygienic conditions during food preparation and storage of food at inappropriate temperatures, exposure to flies, dust, wind and contaminants resulted in high viable microbial count such as spores, yeast, Gram -ve rod and Gram +ve cocci in a number of food items from the streets of Salem district of Tamil Nadu, India, as compared to some homemade food items.

A study on microbiological analysis of large numbers of carrot and onion samples, indicated contamination by *E.coli*. Uncovered left Peeled and cut fruits were found to be contaminated by *E. coli* as compared to the covered fruits. Panipuri vendors who did not use soap at the vending unit had significantly higher contamination of fecal coliforms as compared to those who had used soap [14].

In a study it has been indicated that the reason behind the microbe's growth could be that *chole* which are boiled in the morning and used till late night are added to *chaat*, while in burger chopped raw vegetables like tomato, cabbage, and onion are added. These vegetables are cut in bulk in the morning and used throughout the day, which has greater chances of microbial growth [57].

A lack of hygiene in handling and poor water quality for the preparation of foods indicated the presence of *E.coli* in the street vended foods. *E. coli* acts as an indicator of fecal contamination and this can be spread from person-to-person [58].

Soil or intestinal origins are the main sources of food pathogens. The presence of microorganisms was implicated by certain unhygienic conditions, concerned with the location of the food stalls, especially dusty roadside areas [28].

## VI. INCIDENCES OF OUTBREAK OF FOODBORNE DISEASES

Foodborne diseases are caused by pathogenic bacteria, virus, protozoa and also due to chemical contamination of food which has a wide spectrum of illness [53]. Around 70% of diarrhoea cases reported in developing countries were associated with the consumption of unwholesome food prepared by street food vendors [59]. A study in Tamil Nadu and stated that *E. coli* and Salmonella were mainly present in street foods because of poor sanitary conditions of street food vendors, which is an extreme reason for foodborne diarrheal diseases [60]. It has been stated that the prevalence of *Staphylococcus aureus* could be caused by food handlers who do not follow proper personal hygiene during food preparation. *Staphylococcus aureus* is one of the major pathogens for food poisoning. Salmonella is an important factor for food safety hazards of beverages. Salmonella was reported in some of the rice samples. The food samples are unsafe for consumption when the presence of these pathogens in their in food samples [61].

Some of the street food vendors have used the Unsanitary handling practice of street foods which has been usually found to be the source of contamination. Pathogens like *Escherichia coli*, *Salmonella*, *Shigella*, *Campylobacter* and *S.aureus* which are eventually transmission of foodborne diseases to the people. Organisms are present in the feces, nose, and skin, the food handler's hands are the most important vehicle for transfer these organisms to the food [46].

The microbial quality of street foods collected from Johannesburg, South Africa during preparation and holding time revealed the predominant populations of *Bacillus* spp., *Staphylococcus* spp., Enterobacteriaceae and *Alcaligenes* spp. *Bacillus cereus* in 17%, *Clostridium perfringens* in 1%, *Staphylococcus aureus* in 3% and *Vibrio metchnikovii* in 2% of the food samples [61]. The dominant contaminant bacteria reported in different street food samples collected from Gangtok and Nainital were enterobacteriaceae, *Staphylococcus* spp. and *B. cereus* [62].

A study conducted to assess the microbiological profile of street vended foods in Cochin, Kerala, India, revealed high degree of contamination in unprocessed foods and semi-processed foods. *Staphylococcus aureus* was observed in all the samples of both the beverages (carrot juice and watermelon juice), the Total *Coliform* count and the *E.coli* count was very high in *Bhelpuri* and Coconut *chutney*. *Salmonella* was present in *Kozhukatta* and carrot and watermelon juice. *Vibrio cholera* was present in all the samples [63].

Dish water was also collected and food preparation surfaces swabbed during preparation and display. The Mishandling and improper hygienic measures of street foods can lead to contamination of food by pathogens which can cause serious foodborne illness [17].



The food sold by street-vendor was reported to be contaminated with different pathogenic bacteria due to improper personal hygienic practices followed by them, improper handling, and storage practice of foods and also food vendors were not aware of foodborne diseases. The stimulating potential health problems to consumers in Gwalior could be foodborne diseases [64]. The microbial quality of street foods collected from Jaipur city was observed to be poor, as the SPC, total Coliform count and total staphylococcal count was found to be very high. The HACCP also reported that each and every step of processing contributed a lot of microbes into the street foods [65].

The preparation and storage of street foods was done in a dirty environment, near contaminated sources and generally were left uncovered leading to exposure to flies and dust. The consumption of such street foods was the main reason for foodborne diseases [46].

## VII. CONCLUSION

This review has indicated that street food vendors follow poor hygiene and sanitary practices during preparing, handling and storage of raw material and cooked foods. All of the food vendors were not using head cap, gloves, and apron. They had unclean and long nails. They were also found to worn jewellery and other accessories. They had scarcity of facilities like adequate water supply, potable water supply and proper waste disposal systems. Street food vendors were not aware of the responsibilities regarding food hygiene and safety practices as they have not undergone any training. Mishandling of street foods deteriorate the quality of food, which can cause public health problems like food poisoning, foodborne illness, or foodborne diseases like tuberculosis, typhoid, fever, and cholera.

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