

Knowledge, Education Level and Food Handling Practices among Street Food Vendors: A Systematic Review

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Abstract

Background: Street food is the food prepared and sold by vendors in public places for immediate consumption. The street food business is an unorganized sector that has expanded immensely in last few decades. Due to its affordable price and readily available services, it is highly in demand and is a major part of country's economy. The rise in living standard, along with consumers' concern about health and food hygiene, food safety across the world is the basic requirement. This review, is done to highlight the existing knowledge about nutrition and food safety among Street Food Vendors (SFVs) and also the requirement of training to practice the same.

Objectives: The broad objective of this review article is to review the researches on hygiene practices followed by SFVs. Specific objectives of this study are, to explore the education level and knowledge of SFVs and to analyse the food safety practices followed by them to highlight the requirement of training.

Methods: A systematic and detailed search using different databases was done for relevant literature on the topic. Appropriate articles relevant to the study were chosen and data was summarized in the review.

Result: In the studies reviewed, it could be observed that most of SFVs are at least educated till primary level and they are aware about the food safety and hygiene practices too, but lack of practice is seen due to lack of resources and training. To make a permanent change in their behaviour, continuous reinforcement on importance of food safety practice is required.

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Keywords: street food, street food vendors, mobile vendors, safe food, food hygiene and sanitation.

1. Introduction

Eating out has become a regular ritual for many people. Some eat out of necessity and many eat out of choice. Today's fast paced lifestyle and increased mobility leaves little time for preparing and eating meals at home. Therefore, many people are increasingly opting to eat out especially at workplaces, colleges or during travels and the most easy, palatable and accessible option is street food (Singhal, 2021).

Foods and beverages which are prepared and sold by the sellers on places like streets, festival areas and consumed by the consumers on the run are known as street food (Sanlier and Sezgin, 2016). Street food vendors (SFVs) offer food for public sale without having a permanently built structure, but with a temporary static structure, mobile stall or head-load (Akinbode et al., 2011). Vendors can be stationary, on pavements and other public/private areas or mobile, on public transport or carrying their wares on pushcarts, cycles and baskets on their heads (Taylor et al., 2016). Mobile and stationery SFVs operate day and night in car parks, factories, markets and near offices, where there are numerous customers. Street food include foods such as meat, fish, fruits, vegetables, grains, cereals, frozen products and beverages. Types of preparation includes foods without any preparation, ready-to-eat food and food cooked on site. They also make a very large contribution to the national economy (Aluko et al., 2014). Due to increase in patronage, the street food sector of the economy has expanded in low and middle-income

countries and provides access to a diversity of inexpensive food for variety of customers (Comfort and Chukuezi, 2010). During the last few decades, the street food sector has expanded rapidly, both in terms of providing access to a diversity of inexpensive foods and in offering job opportunities for many urban residents (Amoah et al., 2006).

While a large number of people are opting to eat outside and the frequency of eating outside has also increased lately, so the quality of prepared food is a big question. The availability of safe food is a basic human right and contributes to sound health and productivity (Aluko et al., 2014). But food safety is threatened by numerous pathogens that cause a variety of Food Borne Diseases (FBDs). Every country has an agency that oversees food safety and regulates what additives are allowed in food and what levels of unavoidable contaminants are acceptable (Borchers et al., 2010). Effective national food safety systems are necessary to maintain the safety of food so as to protect the consumers (Favalli et al., 2006; FAO, 2006).

World Health Organization (WHO) has developed five main keys to safer food, which include keeping clean, separating raw and cooked food, cooking thoroughly, keeping food at safe temperatures and using safe water and raw materials (WHO, 2007).

The Hazard Analysis and Critical Control Point (HACCP) system provides a complete review of the food production chain and identifies major hazards and critical control points where contamination can either be limited or prevented (Favalli et al., 2006; FAO, 2006). The HACCP safety principles are accepted globally as an effective tool for evaluating and controlling risk in foods and ensuring food quality and safety (Parr et al., 1993). The system is an ideal tool adaptable for infection and contamination control and food hygiene practices in food vocations (Kuei-Mei and Wei-Kang, 2011).

To make it easy for consumers to make informed choices about the food they eat, FSSAI has now introduced a voluntary scheme called Hygiene Rating Scheme for food service establishments (Singhal, 2021). It has identified 144 street food clusters across the country that would be jointly audited with state authorities for cleanliness and hygiene. Clusters would be encouraged to comply with certain standards and those meeting the criteria would get a "clean street food hub certificate". A successful example of this initiative can be seen at

Ahmedabad's Kankaria Lake area. It is the city's picnic spot and has 66 SFVs. It has become India's first clean street food hub. A plaque with the FSSAI certification is on display there, giving much comfort to the 1.2 crore people who grab a bite there every year. By this initiative, FSSAI wants to ensure that all food business operators across the country adhere to certain standards and hygiene. It will also help in improving the prospects of the estimated 20 lakh SFVs in India and give a boost to tourism. (Duttgupta, 2018).

Street food business is expanding rapidly and has become a significant part of the urban and rural food supply. But its safety is still a question due to the on site preparation of food and mobile nature of this business. Also, with the increasing consumer concerns about food hygiene, it becomes very important to follow good food hygiene practices to avoid FBDs.

Since hygiene rating scheme is a very new initiative by FSSAI, it is limited to few cities till now. At most of the places, SFVs are following hygiene practices as per their knowledge and training provided to them. But consumers are not completely aware about the hygiene maintained by SFVs during food preparation. Hence, this study is done to review the researches of hygiene practices followed by SFVs, so that their current knowledge about food safety practices and knowledge that is translated into practice can be evaluated, which further will guide the authorities to design training programs. It will also help the authorities to decide the intervals in which training is required by the SFVs. And the specific objectives of this study are, to explore the education level and knowledge of SFVs and to analyse the food safety practices followed by them to highlight the requirement of training.

2. Methodology

A systematic review was conducted of the hygiene practices used by SFVs. Studies published in different databases like google scholar, research gate and PubMed were screened for relevant literature on the topic. The search was made by using keywords like street food, street food vendors, mobile vendors, stationary vendors, food service, safe food, food hygiene and sanitation and implementation of street food laws. Available published data were vast, so appropriate articles relevant to the study were chosen. The citations of the selected articles were

also referred to find further relevant articles. The research articles published in the period of 1996-2021 were selected. The articles reviewed were chosen if they met the following criteria: (a) the study was carried out for a street food service unit, (b) the study evaluated the knowledge, attitude of SFVs about hygiene practices or food handling practices followed by the SFVs or requirement of training by SFVs, (c) availability of full-text article in English. Around 100 articles were downloaded and after screening, 55 articles were excluded because they did not meet the inclusion criteria or did not pertain to the topic. Thus 45 articles were selected that complied with the goal of this study and the inclusion criteria. The research articles were classified on the basis of topics like education level of SFVs, knowledge and attitude of SFVs on food safety practice, safe food handling practices (procurement of raw material practice, use of utensils, personal hygiene and food handling and use of leftover food) and requirement of training. After extraction and classification of data, they were summarised under the designed sub-topics.

3. Results

Food safety is a critical issue globally and every person is at risk of FBDs. WHO (2007) defines FBDs as infectious diseases,

caused by pathogens that enter the digestive system through the ingestion of unsafe food. In most urban cities, the consumption of street food is associated with FBDs from insanitary food vending locations. Ensuring the safety of food prepared and sold under such unhygienic conditions is difficult (Almeida et al., 1996; Kaferstein, 2003). Researches have been conducted to see the actual implementation of the laws made by the government to ensure safe food. Many researchers conclude that periodic training of the vendors regarding safe food handling may help in improving the situation. Also, the provision of basic sanitation, water supply and waste management by the government are recommended to minimize the gap between knowledge and practice of safe street food vending (Bhattacharjya and Reang, 2013).

3.1 Education level of SFVs

SFV is any person who handles food, regardless of whether s/he prepares or serves it (Isara and Isah, 2009). Education of SFVs plays an important role in increasing awareness about the importance of food safety practices (Reddy et al., 2020). But, SFVs are generally from the economically disadvantaged sector of the society and are therefore perceived as illiterates or having low educational qualification.

Table 1: Education level of SFVs

Serial no.	Author	Year of research	Population (Place and no.)	Education level				Remarks
				Illiterate	Primary education	Secondary education	Higher secondary	
I	Aluko et al.	2014	Nigeria, 135 SFVs	10%	15%	41.9%	53%	Most of the SFVs are educated up to secondary level and are aware about the association of poor food handling practices and FBDs.
II	Muinde and Kuria	2005	Kenya, 80 SFVs	-	62%	36.3%	-	Predominantly SFVs are educated till primary level
III	Faruque et al.	2010	Bangladesh, 300 SFVs	25%	34%	-	-	The percentage of illiterate SFVs is high and their knowledge regarding registration of the cart and

								nutrient content of the street food prepared by them is also low.
IV	Reddy et al.	2020	Delhi and Hyderabad, 200 SFVs	36.5%	27%	19%	17.5%	High percentage of illiteracy among SFVs is observed.
V	Apanga et al.	2014	Ghana, 200 SFVs	33%	22%	38.5%	6.5%	A higher percentage of SFVs are educated upto secondary level.
VI	Choudhury et al.	2011	Assam, 80 SFVs	12%	35%	46%	7%	Researchers observed that most of the SFVs have knowledge about food safety which might be due to the good education level.
VII	Bhattacharya and Reang	2013	Agartala, 234 SFVs	21%	45%	33%	-	Most of the SFVs are educated till primary level.

Table 1 depicts the data on education level of SFVs from various studies done in 2005-2020 and most of the studies are from developing countries.

In the studies, it can be seen that SFVs have at least primary education and literacy has a positive impact on food safety and hygiene practices, but some literate SFVs are also unaware of the food safety practices and some are not able to translate their knowledge into practice due negligence or due to unavailability of the resources. To make a permanent change in SFVs' behaviour, recurrent trainings are required, so that their knowledge is converted into practice and some resources like clean water, clean sites can be provided by the government, so that SFVs don't have to compromise on the food safety due to the lack of resources.

Table 2 – Knowledge of SFVs on food safety practice and its implementation

Serial no.	Author	Year of research	Population (Place and no.)	Existing knowledge on food safety	Knowledge being converted into practice
1.	Choudhury et al.	2011	Assam, 80 SFVs	Knowledge of SFVs is below the WHO standards of food safety practices.	No

3.2 Knowledge and attitude of SFVs on food safety practice

Kalua (2001) opined that knowledge positively influences attitude formation and the recipient's comprehension of health facts. But it is seen that SFVs are often poor, have low education and lack knowledge on safe food handling, sanitation, hygiene, proper food service techniques, hand washing and use of potable water. This makes food safety amongst SFVs a major public health concern especially in urban areas of the developing world where street food industry is expanding rapidly (Rheinlander et al., 2008; WHO, 1996).

2.	Mukherjee et al.	2018	Kolkata, 106 SFVs	Majority of the SFVs are familiar with the term food hygiene and know lack of food hygiene can cause FBDs.	No
3.	Akwasi et al.	2020	Ghana, 340 SFVs	Most of the SFVs are well informed about food safety and hygiene practices.	Yes
4.	Ma et al.	2019	China, 100 SFVs	Knowledge of SFVs is lower in areas where per capita income and education level are low.	No
5.	Arif et al.	2012	Malaysia, 361 SFVs	SFVs have sufficient knowledge to handle food safely.	No

Table 2 clearly depicts that SFVs have knowledge about food safety and hygiene practices but that knowledge is not being translated into practice.

SFVs have a positive attitude towards food safety and hygiene practices and are aware about the food safety measures that are to be followed during preparation and serving of food, but there is a lack of practice. The knowledge that has been imparted to them is not being translated into practice. Only one study, done by Akwasi (2020) in Ghana revealed that knowledge is being turned into practice and researcher further stated that it might be due to the training programs organized by the municipal assembly in the city. Hence, for knowledge to be turned into practice, a permanent behavioural change is required which might be achieved with the help of continuous trainings in specific intervals.

3.3 Safe food handling practices

Studies have shown that FBDs prevention requires favourable hygienic conditions during food preparation, a phase in which the handler plays an important role, since he/she may carry pathogens. Risk factors during food handling could affect food safety at critical points such as procurement, which includes criteria used in the selection of raw materials. Other critical points involve hygienic practices during preparation of mixed ingredients, as well as cooking, storing, serving, sanitizing and waste management practices (Costarrica and Moron, 1996; Akyeh et al., 2009; Rane, 2011; WHO, 1996; FDA, 2014).

3.3.a Procurement of raw material practice

The safety of street food is affected by several factors starting from the quality of the raw materials to food handling and storage practices (Muyanja et al., 2011). Choudhury et al. (2011), in his research, observed that most of the mobile SFVs purchase the condiments, spices, nuts and dry foods from open markets like haat (traditional weekly market) and about 56% of mobile SFVs use unbranded and unpacked condiments and spices. It is evident from these findings that there exists a strong relationship between factors like type of vendor and average monthly income of the vendor with their procurement practices.

Rane (2011) in his study, revealed that non-food grade chemical additives, such as colorants, preservatives and contaminants such as pesticide residues and unpermitted colouring agents such as textile dyes, are found in some street foods. This was also supported by Gurudasani et al. (2005) in his research conducted in Vadodara. Researchers opined that proper use of salt, spices and sugar is an important means of preventing food spoilage, but the desire to keep prices low may lead to the purchase of unbranded ingredients containing unpermitted chemical additives from unauthorized suppliers, subsequently chemicals such as colorants may also be added to mask the poor quality of raw materials. This was confirmed by a study done in Calcutta by Chakravarty and Canet (1996). In the study, the samples that were suspected of adulteration

were analysed and in 30 out of 50 samples, unauthorized food additives were detected.

In the studies mentioned above, a relationship between the size of enterprise and procurement practices can be observed. As most of the vendors strive to keep the prices of food low, they try to buy low cost raw materials from unbranded manufacturers/retailers. Such raw materials can result in chemical contamination of food. Sometimes colourants are also added to mask the poor quality, resulting in chemical contamination of food.

3.3.b Use of utensils

Use of proper utensils for cooking and storage of prepared food is often critical to the safety of street vended foods. Poor quality of material coupled with improper practices may lead to biological contamination. The design, construction and maintenance of equipment and utensils is very important to ensure food safety, as their poor maintenance may lead to the inability to effectively clean and sanitize surfaces. This may then result in the build up of residues of food, facilitating microbial growth, leading to an increased likelihood of contamination (Kaul and Agarawal, 1988).

Study carried out by Akyeh et al. (2009) in Ghana revealed that SFVs source their utensils from both branded and unbranded manufacturers/retailers. Some of the street food samples have higher levels of lead, cadmium, arsenic, mercury and copper than average food samples, suggesting possible leaching from the utensils. Metallic contamination might be due to the use of inferior quality utensils to store food. Similar findings were reported by Barro et al. (2006) in his study in Ouagadougou. Researchers found that lead from the pots obtained from unbranded manufacturers could leach into the food. These pots are manufactured using scrap metals that could come from diverse sources such as derelict cars, car batteries and industrial machinery, which are obviously not suitable for use with foods and interviews with vendors also showed that some of their utensils come from informal sources. Unbranded raw materials from informal sources are bought to keep the prices of street food low.

In the above cited studies, it could be observed that SFVs are under constant pressure of keeping the prices low. And to do so, many SFVs are using unbranded utensils to cook and store

food that are usually made up of materials that are not suitable for storing or cooking food. It can lead to leaching of some harmful metals into the food, resulting in metallic contamination of the food.

3.3.c Personal Hygiene and Food Handling

Barro et al. (2006) in his study in Ouagadougou, opined that poor personal hygiene has been found to be associated with the transmission of pathogens amongst SFVs. Use of hands to exchange money and touching of food while serving the food is prevalent, which can harbour large number of food borne pathogens. After a few awareness raising campaigns, most of the SFVs understand the need to maintain personal hygiene, but only few of them are actually practising it.

Muinde and Kuria (2005) in their study in Nairobi observed that some vendors start their duties without even taking a proper bath. Some SFVs even sleep at the vending sites in order to protect their wares. Handling food without maintaining personal hygiene can result in transmission of harmful pathogens to food. The hygiene maintained by SFVs during handling and cooking of street food was also noted and it was found that they do not wash fresh food properly. The preparation surfaces used by the vendors has remains of food prepared earlier, more than one food types are prepared at the same surface and these can promote cross contamination.

Akyeh et al. (2009) in his study in Ghana, found that although a large proportion of vendors said they wash their hands after some major activities but about 13% of them do not do that with soap. The reason behind not washing hands was revealed by Addah et al. (2014), in his study conducted in Ghana, that the SFVs think it is not necessary to do that while others also fear that the smell of soap will be transferred to the food. Similar findings were reported by Barrett et al. (2008) in his study, in USA. Researchers noted that food is subjected to repeated biological contamination from unwashed hands and the materials used for wrapping such as leaves, old newspapers and reusable polyethylene bags.

Mujanja et al. (2011), in his study in Uganda, found that the cups and plates used in the vending business are washed and rinsed with soap and cold water by 76.9% of the SFVs. Some SFVs in Kampala (14.5%), Jinja (5.6%) and Masaka (1.4%)

wash utensils with only cold water and a scouring towel during the peak vending hours. This practice promotes cross contamination from utensils to the cooked food due to greasy and dirty rinse water, thus posing a public health risk to the consumers. Less than 10% of SFVs, use hot water and soap. During the focus group discussions, the vendors claimed that water supply was sufficient, but at a cost. Due to the cost attached to water, the SFVs use water sparingly and there is tendency of recycling washed water many times. The researchers also observed that majority of the SFVs cook food well in advance of consumption. The food is prepared in the morning and is sold throughout the day. However, some cooked food such as cooked banana is left on the cooking charcoal stove during sale. WHO (1996) reported that foods that are cooked immediately prior to consumption are safer than those which have been cooked and stored at ambient temperature. Only 28.6% of the vendors in Masaka reheat the food before sale. Although, reheating of cooked food is a magic step for eliminating hazards resulting from improper holding, but it can be abused by SFVs due to lack of food safety knowledge and temperature measuring devices.

Ma et al. (2019) in his study in China, revealed that SFVs generally do not wear jewellery (66.7%) or smoke while handling food (70%) or reuse utensils without cleaning them to prepare food (57.8%). However, barely half of the SFVs store raw, cooked or partially cooked food in sealed and separate containers and they are generally poor at cleaning their utensils with only 1/3rd of the SFVs using soapy water.

The study conducted by Akwasi et al., (2020), in Ghana, showed contrasting results. The study unfolded that the majority of the SFVs (85.2%) practice good food handling during serving. Most of the SFVs (91.1%) serve food hot, 84.1% protect their food from flies and 89.1% do not allow customers to make contact with food being served. Majority of the SFVs (56.4%) do not handle food with bare hands and most of them use plates for serving food (92.8%), while SFVs use disposable bowls or newspaper for serving food (7.1% and 2.9%, respectively). Researcher further mentioned that good hygiene practices are significantly associated with license and training status. This finding emphasizes the

importance of training on influencing food handling practices of SFVs.

Abdalla et al. (2009) in his study in Atbara city, revealed that in Sudan, only 34% of vendors wash their food thoroughly before cooking. In case of most of the SFVs, food is either not washed at all or washed only once before cooking mainly due to insufficient water supply. Also, in 94% of the carts, food is exposed to flies and only 38% SFVs reheated the food before serving. Such practices can lead to microbial contamination of food.

Bari et al. (2014), in his study, in Bangladesh, discussed that the absence of water points near work places of SFVs and poor drainage facilities make them unable to practice good hygiene. Moreover, some SFVs wash their hands in the same bucket that is used for cleaning utensils which may lead to the contamination of food. Furthermore, washed plates are often stored in an unclean corner, plastic bowl or cardboard box, leading to recontamination of the plates.

In the studies, personal hygiene and food handling by SFVs were assessed and it can be deduced that SFVs are using water to wash the dishes but either they are not using water in good amount because of the cost attached to it or are not washing the dishes with hot water and soap especially during peak hours to avoid any delay in service. Street food is famous for convenience and quick service and due to the same reason, most of the SFVs prepare food in advance and do not prepare it just before serving, but the major problem lies in the fact that food is not covered and stored properly till the time of serving. Also, they focus more on the colour and taste of food than the nutritional value and hygiene. As stated by Muinde and Kuria (2005), same oil is used several times resulting in the formation of free fatty acids that harm the body. It can also be related to the low level of knowledge of SFVs about the art of maintaining nutritional quality of the food.

In the studies, it can be seen that most of the SFVs are aware about the importance of maintaining personal hygiene but are not following it. Only in one study done in Ghana by Akwasi et al. (2020), good food handling practices being followed by SFVs can be observed, which might be due to trainings provided by the municipal assembly. Hence, it shows the importance of trainings in developing good food handling

and hygiene practices among SFVs. Also, municipal assembly can collaborate with other organizations interested in street food safety to ensure effective implementation of food safety policies and organize more training programs based on the latest research.

3.3.d Use of leftover food

Muyanja et al. (2011) in his study, in Uganda, noted that majority of vendors use the refused food condiments to feed their families at home or the workers eat it up. Less than 20% of the SFVs recycle leftovers for sale yet proper methods of storing leftover food are not used. Recycling of leftover cooked food with freshly prepared food result into increased microbial load in the food. FAO and WHO (1996) indicated that if food cannot be served immediately, it should be kept hot or cooled down rapidly and reheated completely to a temperature of at least 70 degree Celsius (C) before eating.

Research conducted by Abdalla et al. (2009) in Sudan and Kenya depicted higher (22% and 32% respectively) consumption of leftover food at home. In a study conducted by Comfort and Chukuezi (2010), the percentage of food stored in refrigerated form was much higher, 44% in Ghana, 63% in India, 21% in Kenya and 33% in Nigeria.

On the contrary, Odonkor et al. (2011), in his study revealed that in Sudan only 2% of food vendors refrigerate their leftover food for reheating the next day and 30% of the vendors throw their leftover food.

Muinde and Kuria (2005) in their study in Nairobi disclosed that 35% of the vendors said that they usually have left-overs and out of those, 32.1% consume the leftovers and the rest store them for the following day's sale. Vendors store left-over food in open place (26%), refrigerator (21%) and plastic containers (21%) while 16% keep them either in polythene bags or in cupboards for sale in the next day. Most of the vendors store their left overs in ambient temperatures, this is quite risky because safety from contamination by pathogenic organisms is not assured and the maintenance of optimal qualities of colour, texture and nutritive value are not put into consideration.

As per the researches, many SFVs feed their family members with leftover food or eat it up, some SFVs refrigerate it, but some percentage of SFVs use the leftover food for next day's

sale and store in unhygienic places and at temperature that is favourable for the growth of pathogens. This might be due to lack of knowledge about how to use the leftover food in a way that is efficient and hygienic. According to WHO (1996), SFVs should attend food safety and hygiene training, at least once a year and subsequently refreshers training to update their knowledge and improve their food handling and safety practice.

3.4 Requirement of training

Successful food hygiene training and the consent of safe food handling practices learnt during training are critical elements in the control of FBDs. It is true for food handlers belonging to all sectors. But, it is more urgent for SFVs because they are more exposed to environmental hazards and are predominantly from much weaker socioeconomic backgrounds and yet cater to the general mass (Choudhury et al., 2011).

Choudhury et al. (2011), in a study conducted in Guwahati, provided training to 80 SFVs to evaluate the existing Knowledge, Attitude and Practice regarding food safety and hygiene practices and the change of the same after training. The study clearly revealed that knowledge and practice of SFVs regarding food safety, hygiene and nutrient conservation can be improved by imparting interactive training time to time. Thus it is recommended that future intervention programmes may be planned in the same manner.

Similar opinion was shared by Jevsnik et al. (2021), in his study in Slovenia, that there is a need to change incorrect hygiene related behaviour patterns, which can be achieved with a systematic approach, regular employees' training and constant active surveillance of the employees' personal hygiene and food handling techniques. Existing national professional guidelines of good hygiene practices for food business operators should, therefore pay more attention to SFVs as part of the future updates. Additionally, specific and street vendor tailored food safety training programmes should be developed and delivered.

Balkaran and Kok (2014), in a study in South Africa, opined that generally SFVs display the knowledge of food safety and

hygiene. This knowledge of food safety can however be improved if a sufficient number of vendors receive training in basic hygiene practices. Committees should be established in order to educate vendors and to help them assimilate into the food supply chain in the safest and most efficient way possible. The practices examined in the study also indicate that SFVs can provide food of good quality if emphasis is placed on hygienic practices and regulatory compliance; therefore training can be regarded as crucial in ensuring food safety. The new norms and regulations should emphasize the need for changes in vendors' attitudes based on equally necessary changes in their understanding of personal hygiene and food safety must be remembered that the basis for altering the present situation in the desired manner will be provided by training, education and communication.

Kumar et al. (2017), in his study in Hyderabad, concluded that education and training of SFVs may offer a cost effective way to reduce the incidence of FBDs. The effectiveness of food hygiene training could be greatly improved where training is based on effective health education theories and models (Ehiri et al., 1997). The first step towards employing a behaviour change communication model among vendors involves identification of the key issues associated with microbial contamination of street food. Thus, investigating the critical control points leading to microbial contamination with a view to identify simple and practical approaches to reduce contamination will help in reducing the FBDs. Incorporation of behaviour change communication component in the food safety training programmes in changing the behaviours for those prioritized risk behaviours will have a good impact.

Aluko et al. (2014) concluded that pre-employment training and refresher training for all SFVs should be mandatory before potential SFVs are licenced to operate. This will enable SFVs to understand and adopt basic requirements into their practice to reduce the incidence of FBDs. Moreover, implementation of the national regulations on food control and ensuring compliance with hygienic and other standards and regulations should be encouraged and monitored. Also, the need to wash hands with soap and clean water after using the toilet and appropriate hand drying equipment in food

vending premises should be a priority in training and health promotion activities for SFVs.

In the studies stated above, researchers commonly agree that training plays a pivotal role in increasing awareness about food safety, thereby reducing the incidents of contamination. Regular trainings in specific intervals are required to make a permanent change in behaviour of SFVs. Also, tailor made trainings based on identified risk behaviours will help in designing a food specific training programs and designing behaviour change communication to improve the food safety practices among SFVs.

4 Conclusion

Street food is predominantly an informal nature of enterprise, which is very common in developing countries. In addition to providing access to tasty, palatable, delicacies, it also provides job opportunities to many people and contributes to economic development of the country. SFVs are the people who handle food, either on stationary carts or mobile carts. They are generally from the economically weaker section of the society and people have a pre-set notion about them, that SFVs are illiterate or less educated, but it could be observed in the studies that most of the SFVs are at least educated till primary level. Researchers like Ohiokpehai (2003) and Klontz et al. (1995) support that generally higher education level implies higher food safety knowledge and practice, but it is seen that some of the literate SFVs are also not aware about the food safety principles and even if they are aware, they are not translating their knowledge into practice. Health ministries of developing countries are conducting trainings to aware the SFVs about food safety practices, but it seems like these trainings are only increasing their knowledge and that knowledge is not being turned into practice (Aderoju and Omemu, 2008).

Also, SFVs are aware about the importance of personal hygiene, especially hand washing, but only few are actually practising it. Abdalla et al. (2009), in his study opined the reason for not washing hands is insufficient water supply. Because of the mobile nature of street food business, vendors feel difficulty in getting safe water wherever they go and buying water for preparing food adds more cost, so they

refrain washing hands. So, if government provides some basic amenities like clean water, then SFVs might start maintaining good personal hygiene. Only in one study conducted in Ghana by Akwasi et al. (2020), good food handling practices being followed by SFVs can be seen, which might be due to trainings provided by the municipal assembly. Hence, it shows the role of trainings in developing good food handling and hygiene practices among SFVs. Also, municipal assembly can collaborate with other organizations interested in street food safety to ensure effective implementation of food safety policies and to strengthen and sustain the training programs by organizing regular trainings based on evidence from research.

Safety of food is also affected by the quality of raw materials and it is observed that in a race to keep the prices low, SFVs sometimes compromise on the quality of raw material. Some of the SFVs buy unbranded and unpacked materials that contain unpermitted chemicals, which might be harmful for health.

Most of the SFVs have leftover food at the end of the day and majority of them either consume the food or feed their families, but some of them re-serve the food next day and they store it in unhygienic conditions like in polythene bags or at open place which might lead to contamination by pathogens.

Also, most of the researches have been conducted in foreign countries, very few studies are done in India, hence more studies should be conducted in India to understand the knowledge of SFVs about food safety practices and if that knowledge is translated into practice or not, so that authorities can plan training programs accordingly.

In the studies available, it is noted that SFVs are aware about food safety practices, this shows that they have received trainings about proper hygiene and handling of food, but there is lack of practice. To make food safety practice a habit, continuous trainings might help, because to bring a permanent behavioural change, continuous reinforcement is required. And to bring behavioural change, it is very important to improve education level of SFVs and impart training on regular intervals, so that the knowledge can be translated into practice. Along with providing the basic

amenities like clean site and water, government can also plan for more frequent inspections, which might result in good hygiene practices by SFVs on site. Hygiene rating of street food in all the cities by the government will also help consumers to be aware about the safe and hygienic food stalls in their city. And as stated by Al-Kandari et al. (2019), food safety is the shared responsibility of the government, SFVs and consumers. So, as consumers, we should also be comfortable in paying extra for the proper hygiene followed by the SFVs.

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