

Exploring the Impact of Trainings on Food Safety and Hygiene Practices among Street Food Vendors in Chandigarh

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ABSTRACT

Global health is currently concerned about the hygiene and food safety of street foods and to formalize the unorganized sectors by providing capacity building trainings and to improve the abilities of street food vendors. The present study was conducted in Chandigarh city on street food vendors' population to assess the impact of food safety trainings on practices followed by trained and untrained vendors for food safety and hygiene. A cross-sectional study was conducted among 387 street food vendors in Chandigarh. The data were collected using structured questionnaire derived from WHO Five Keys to Safer Food Manual. Independent sample t-test was applied to check the level of significance. Significant differences were found between the five statements of food safety and hygiene practices of trained and untrained food vendors out of 28 statements. Furthermore, there was no positive correlation between the demographic profile of the trained food vendors and their knowledge, attitudes and practices regarding food safety and hygiene. However, for not trained food vendors, the variable "education" was positively correlated with their attitude towards food safety and hygiene practices. Laws governing food safety need to be updated, and new steps need to be taken to restructure how food vendors are trained. This will make it possible for food vendors to better understand, apply and maintain their practices regarding food safety and hygiene.

Key words: Street food, food vendors, demographics, food safety, hygiene

INTRODUCTION

India is renowned for its diverse regions, cultures and cuisines, which are vividly represented through its street food. Street food in India offers a glimpse into the country's multicultural fabric, showing a wide range of flavours, ingredients and aromas. Street food is essentially prepared food or beverages that are sold by vendors and peddlers in public spaces, reflecting the lives, experiences and culinary traditions of the people. One of the key characteristics of street food is its affordability, rich flavours and easy accessibility (Moussavi *et al.*, 2016). In India, there are two categories of food vendors: Certified and uncertified. The Food Safety and Standards Authority of India (FSSAI) have begun the registration procedure for street food vendors nationwide. As per section 92 of the Food Safety and Standards Act, 2006, the FSSAI introduced a draft of regulations in 2010

regarding food safety and standards (Bellia *et al.*, 2022). Part 3.2 of these regulations stipulates that all Food Business Operators (FBOs) in India must comply with the outlined procedures and either register or obtain a license (Zakir Shehasen and Sualeh Mohammed, 2020).

Licensing and registration of Food Business Operators (FBOs) is a crucial requirement under the FSSAI, aiming at streamlining licensing processes and ensuring compliance at the central or state level. The 2010 Food Safety and Standards Regulation outlined the need for registration of all FBOs under local administration bodies (Kotwal *et al.*, 2018). However, despite the significance of street food, there are multiple challenges associated with street food vending that cannot be ignored (Bellia *et al.*, 2022). Many vendors operate in unsanitary conditions with inadequate lighting and proximity to sources of contamination. Hygienic practices, food

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handling, and waste disposal are often lacking, with vendors unaware of food poisoning risks (Samapundo *et al.*, 2015). Street food contamination arises from various factors, including poor preparation techniques, inadequate packaging, vehicle, and industrial emissions, improper waste disposal and pollution in vending areas (Samapundo *et al.*, 2016; Ngozi *et al.*, 2019). Toxic metals and chemical contaminants pose health risks from excessive intake, leading to various health problems (Kumar *et al.*, 2017). The given study was planned with the objective of assessing the impact of trainings on the food safety and hygiene practises among both trained and untrained street food vendors.

MATERIALS AND METHODS

A cross-sectional study was conducted among 387 street food vendors in Chandigarh. The data were collected using structured questionnaire derived from WHO Five Keys to Safer Food Manual. Following the data collection, an internal consistency reliability test was performed to evaluate the Cronbach's alpha values for statements based on a 5-point Likert scale that assessed the attitude and practices on food safety and hygiene of food vendors. The scale's Cronbach's alpha score was found to be 0.76, which indicated that the scale's items and factors had a good level of internal consistency. In order to determine whether the food safety training influenced the practices of trained and untrained street food vendors towards food safety and hygiene, the following null hypothesis was framed: H_0 1: The food safety and hygiene practices of trained and untrained street food vendors do not show any significant distinctions. The analysis of data collected from respondents showed that data were normally distributed, and hence parametric tests were applied throughout the study. An independent sample t-test was applied on 387 food vendors to check the differences in the group mean on the respondents who were segregated as FSSAI trained (205) and untrained (182) street food vendors. IBM SPSS Version 26 was used for analysis. Ethical clearance was taken from the Institute Ethical Committee, PGIMER, Chandigarh (IEC-07/2022-2518) and MMIMSR, MM (DU), Mullana (IEC no. 2303).

RESULTS AND DISCUSSION

Information was collected regarding vendor category, the number of respondents (N), average value (mean), standard deviation (S. D.), t-value, degrees of freedom (d. f.), and p-value for each of the 18 variables of food safety related to food vending practices among trained and un-trained vendors (Table 1). Variables 1 to 9 relate to the ailments that temporarily prevent vendors from vending or cooking food. The average values for vendors who received training and those who did not were compared, and the p-values, which measured statistical significance above 0.05. This suggested that the two groups had no significant distinction regarding the health issues that hindered them from vending or cooking food. Variables 10 to 13 pertained to the management of leftover food. The study did not find any significant differences between trained and untrained vendors in terms of the variables related to food vending. The mean values for variables 10, 11, 14 and 15 were similar for both the groups, and the p-values for these variables were greater than 0.05. This indicated that there was no significant distinction between the two groups in terms of managing leftover food and cleaning utensils. However, for variables 12 and 13, although the mean values for trained and untrained vendors differed, the p-values were still greater than 0.05, suggesting that the observed differences were not statistically significant. Similar results were demonstrated by Mwove *et al.* (2020) in Kiambu, Kenya and Ncube *et al.* (2020) who performed their study on urban restaurants in Zimbabwe. Table 2 provides various details for each variable, such as the average value (mean), the measure of variability (standard deviation), the statistical significance (t-value), the amount of available information (degrees of freedom), and the probability of obtaining the observed results by chance (p-value). The variables included different types of hand washing behaviours, such as using clean water, soap and water, or disinfecting solution and water, in addition to washing hands after certain activities, such as handling money, garbage, or raw foods. The p-values for most variables were not statistically significant, indicating that there was no significant

Table 1. Independent sample t test statistics for food safety practices adopted by trained and not trained food vendors

| S. No. | Variables | Category of the vendors | No. | Mean | S.D. | t | df | p- value |
|--------|--|-------------------------|-----|--------|--------|--------|--------|----------|
| 1. | Fever | Not trained | 182 | 4.3846 | .91964 | .194 | 385 | .846* |
| | | Trained | 205 | 4.3659 | .97408 | .195 | 383.53 | .846 |
| 2. | Cough and colds | Not trained | 182 | 4.0385 | 1.1290 | .200 | 385 | .842* |
| | | Trained | 205 | 4.0146 | 1.2065 | .201 | 383.92 | .841 |
| 3. | Diarrhoea | Not trained | 182 | 4.2527 | .93541 | .758 | 385 | .449* |
| | | Trained | 205 | 4.1756 | 1.0517 | .764 | 384.99 | .446 |
| 4. | Nausea | Not trained | 182 | 3.2912 | 1.5115 | 1.597 | 385 | .111* |
| | | Trained | 205 | 3.0390 | 1.5837 | 1.602 | 382.97 | .110 |
| 5. | Vomiting | Not trained | 182 | 4.3132 | 1.0594 | -.503 | 385 | .615* |
| | | Trained | 205 | 4.3659 | .99892 | -.501 | 373.20 | .616 |
| 6. | Sore eyes | Not trained | 182 | 3.1538 | 1.5586 | 1.994 | 385 | .047 |
| | | Trained | 205 | 2.8244 | 1.6769 | 2.003 | 384.18 | .046 |
| 7. | Stomach cramps | Not trained | 182 | 3.3242 | 1.4638 | 2.275 | 385 | .023 |
| | | Trained | 205 | 2.9707 | 1.5777 | 2.285 | 384.24 | .023 |
| 8. | Sick member of family | Not trained | 182 | 3.0275 | 1.2323 | -.163 | 385 | .870* |
| | | Trained | 205 | 3.0488 | 1.3238 | -.164 | 384.12 | .870 |
| 9. | Lesions on the hands | Not trained | 182 | 3.0879 | 1.5707 | 2.029 | 385 | .043 |
| | | Trained | 205 | 2.7561 | 1.6357 | 2.034 | 382.61 | .043 |
| 10. | Throw away | Not trained | 182 | 3.1868 | 1.5514 | -.867 | 385 | .387* |
| | | Trained | 205 | 3.3268 | 1.6165 | -.869 | 382.65 | .385 |
| 11. | Eaten at home | Not trained | 182 | 2.1429 | 1.2837 | -.060 | 385 | .952* |
| | | Trained | 205 | 2.1512 | 1.4285 | -.061 | 384.94 | .952 |
| 12. | Refrigerated and reheated | Not trained | 182 | 2.1044 | 1.2810 | 1.716 | 385 | .087* |
| | | Trained | 205 | 1.8829 | 1.2547 | 1.714 | 377.59 | .087 |
| 13. | No answer/no left-over | Not trained | 182 | 2.5879 | 1.5052 | -1.257 | 385 | .210* |
| | | Trained | 205 | 2.7902 | 1.6449 | -1.263 | 384.64 | .207 |
| 14. | Washing with soap and water | Not trained | 182 | 4.7637 | .76107 | .275 | 385 | .784* |
| | | Trained | 205 | 4.7415 | .82634 | .276 | 384.47 | .783 |
| 15. | Washing with hot water | Not trained | 182 | 2.5055 | 1.1973 | .845 | 385 | .399* |
| | | Trained | 205 | 2.4000 | 1.2508 | .847 | 382.80 | .397 |
| 16. | I dispose off meals that had passed their expiration date. | Not trained | 182 | 3.1044 | 1.2592 | 1.236 | 385 | .217* |
| | | Trained | 205 | 2.9463 | 1.2532 | 1.235 | 379.15 | .218 |
| 17. | I keep prepared food for not more than 2 h at room temperature when finished cooking | Not trained | 182 | 3.1923 | 1.4456 | 3.494 | 385 | .001 |
| | | Trained | 205 | 2.6732 | 1.4704 | 3.498 | 381.00 | .001 |
| 18. | I purchase raw materials from questionable sources in order to keep food costs low | Not trained | 182 | 3.0330 | 1.4899 | 1.690 | 385 | .092* |
| | | Trained | 205 | 2.7707 | 1.5533 | 1.694 | 382.68 | .091 |

Table 2. Independent sample t test statistics for hygiene practices adopted by trained and not trained food vendors

| S. No. | Variables | Category of vendors | No. | Mean | S.D. | t | df | p-value |
|---|-------------------|---------------------|-----|-------|--------|--------|--------|---------|
| I always wash hands with | 1. Clean water | Not trained | 182 | 4.879 | .42919 | -.082 | 385 | .935* |
| | | Trained | 205 | 4.882 | .48096 | -.082 | 384.98 | .934 |
| 2. Soap and water | Not trained | Trained | 182 | 4.500 | .67921 | 1.603 | 385 | .110* |
| | | Not trained | 205 | 4.375 | .82865 | 1.622 | 382.62 | .106 |
| 3. Disinfecting solution and water | Not trained | Trained | 182 | 2.978 | 1.5483 | 1.498 | 385 | .135* |
| | | Not trained | 205 | 2.736 | 1.6115 | 1.502 | 382.58 | .134 |
| I always wash hands whenever I am | 4. Touching money | Not trained | 182 | 3.087 | 1.5707 | 2.029 | 385 | .043 |
| | | Trained | 205 | 2.756 | 1.6357 | 2.034 | 382.61 | .043 |
| 5. Handling garbage | Not trained | Trained | 182 | 4.890 | .33076 | -1.507 | 385 | .133* |
| | | Not trained | 205 | 4.941 | .33794 | -1.509 | 381.34 | .132 |
| 6. Blowing of nose | Not trained | Trained | 182 | 4.868 | .38505 | -1.234 | 385 | .218* |
| | | Not trained | 205 | 4.917 | .39352 | -1.235 | 381.36 | .218 |
| 7. After eating meals | Not trained | Trained | 182 | 4.879 | .37417 | -.987 | 385 | .324* |
| | | Not trained | 205 | 4.917 | .38085 | -.988 | 381.05 | .324 |
| 8. After using the toilets | Not trained | Trained | 182 | 4.906 | .31016 | -1.214 | 385 | .226* |
| | | Not trained | 205 | 4.946 | .33144 | -1.218 | 383.92 | .224 |
| 9. Handling raw foods | Not trained | Trained | 182 | 2.989 | 1.2525 | -.492 | 385 | .623* |
| | | Not trained | 205 | 3.053 | 1.3217 | -.494 | 383.35 | .622 |
| 10. Scratching | Not trained | Trained | 182 | 3.126 | 1.2616 | .914 | 385 | .361* |
| | | Not trained | 205 | 3.009 | 1.2445 | .913 | 378.31 | .362 |
| 11. I undergo medical examination after every six months | Not trained | Trained | 182 | 3.159 | 1.2401 | .880 | 385 | .379* |
| | | Not trained | 205 | 3.048 | 1.2277 | .879 | 378.65 | .380 |
| 12. I dispose off soiled gloves, tongs, spoons, forks, plates in proper dust bins | Not trained | Trained | 182 | 4.659 | .70859 | -1.471 | 385 | .142* |
| | | Not trained | 205 | 4.756 | .58496 | -1.454 | 351.96 | .147 |

difference in hand washing behaviour between trained and untrained vendors. On the other hand, when considering the variable “consistently wash hands whenever handle money,” the obtained p-value was 0.043. This result indicated a notable distinction in hand washing habits between the two groups for this specific variable. [The personal hygiene practices of both rural and urban areas were found similar as both scored low in the use of protective gear like gloves, caps and aprons while preparing and serving food (Adane *et al.*, 2018; Kotwal *et al.*, 2018). Furthermore, it was found that there was a significant difference in the practices of trained and not trained food vendors for 9 out of 13 statements regarding hygiene. This meant that the training provided by FSSAI significantly influenced the hygiene practices of trained food vendors. Similar responses were studied by Adane *et al.* (2018) during their study in Ethiopian street food vendors and by Hossen *et al.* (2020) on food vendors in Jashore region, Bangladesh].

The combined analysis of results of Tables 1 and 2 revealed that significant differences were found between the mean responses of practices of trained and not trained food vendors towards food safety for only 4 out of 18 statements, whereas there were significant differences in responses of trained and not trained food vendors pertaining to hygiene for only 1 out of 10 statements. This meant that in totality there was a significant difference in the food safety and hygiene practices of trained and not trained food vendors for only 5 out of 28 statements. Hence, it was postulated that our null hypothesis “ H_0 : There was no significant difference between the food safety and hygiene practices of trained and untrained street food vendors” was accepted for 23 out of 28 statements and rejected for 5 out of 28 statements.

Further in this regard, a Pearson correlation test was applied to determine the relationship between demographic profile of food vendors and their knowledge, attitude and adoption of food safety and hygiene practices. The demographic variables that were taken into consideration were age, gender, education and income of food vendors. As our sample elements were segregated as “Trained” and “Not trained” food vendors, two separate tests were applied.

The analysis of the data from Table 3

demonstrated that no significant positive correlation was discovered between the trained food vendors’ “age” and “gender” their knowledge and attitudes regarding food safety and hygiene, and the food safety and hygiene practices they implemented. Further in this regard, it was discovered that the food vendors’ “education” and “income” were negatively connected with their knowledge, attitudes and practices regarding food safety and hygiene. The only positive relationship that was revealed as per the correlation matrix was between the variables “knowledge of the food vendors regarding food safety and hygiene practices” and “attitude of the food vendors regarding food safety and hygiene practices” ($r=0.708$) and “food safety and hygiene practices adopted by food vendors” ($r=0.645$).

The analysis of the test data from Table 4 showed that there was no significant correlation between the untrained food vendors’ “age” and “gender” their knowledge and attitudes towards food safety and hygiene, and the food safety and hygiene practices they employed. In addition, it was discovered that the untrained food vendors’ “education” was negatively correlated with their knowledge of and adoption of food safety and hygiene practices, but that it was positively correlated with their attitude towards these practices ($r=0.319$) and this was supported in the study done by (Adetunji *et al.*, 2018) on Saudi Arabian food handlers. However, there were also contrasting findings from other studies where more than 50% of the participants exhibited good hygiene practices (Dora-Liyana *et al.*, 2018).

Additionally, the variable “income” showed a significant correlation with food vendors’ knowledge and attitudes towards food safety and hygiene practises but not with the food safety and hygiene practices that they actually adopted ($r = - 0.041$). As with trained food vendors, the correlation matrix revealed that knowledge of the untrained food vendors regarding food safety and hygiene practises was positively correlated with their attitude regarding food safety and hygiene practises ($r = 0.689$) and food safety and hygiene practises adopted by them ($r = 0.308$). The responses of the food vendors pertaining to the hygiene practices postulated that all the food vendors were adopting 9 out of 10 hygiene practices irrespective of the fact whether they were trained or not (Aluh and Aluh, 2017).

Table 3. Relationship between demographic profile of "Trained" food vendors and their knowledge, attitude and adoption of food safety and hygiene practices

| Correlation Statistics | Demographic variables of the "Trained" food vendors | | | | Attitude of the food vendors regarding food safety and hygiene | Food safety and hygiene practices adopted by them |
|---|---|--------|-----------|--------|--|---|
| | Age | Gender | Education | Income | | |
| Knowledge of the food vendors regarding food safety and hygiene practices | Pearson correlation | 0.059 | -0.288 | -0.345 | 0.708 | 0.645 |
| | Sig. (2-tailed) | 0.318 | 0 | 0 | 0 | 0 |
| Attitude of the food vendors regarding food safety and hygiene practices | N | 205 | 205 | 205 | 205 | 205 |
| | Pearson correlation | 0.016 | -0.23 | -0.407 | - | - |
| Food safety and hygiene practices adopted by food vendors | Sig. (2-tailed) | 0.785 | 0.001 | 0 | - | - |
| | N | 205 | 205 | 205 | - | - |
| Food safety and hygiene practices adopted by food vendors | Pearson correlation | 0.048 | -0.223 | -0.361 | - | - |
| | Sig. (2-tailed) | 0.93 | 0.001 | 0 | - | - |
| N | 205 | 205 | 205 | 205 | - | - |

Table 4. Relationship between the demographic profile of "Not trained" food vendors, their Knowledge, attitude and food safety and hygiene practices adopted

| Correlation statistics | Demographic variables of the "Not Trained" food vendors | | | | Attitude of the food vendors regarding food safety and hygiene | Food safety and hygiene practices adopted by them |
|---|---|--------|-----------|--------|--|---|
| | Age | Gender | Education | Income | | |
| Knowledge of the food vendors regarding food safety and hygiene practices | Pearson correlation | -0.054 | 0.117 | 0.307 | 0.689 | 0.308 |
| | Sig. (2-tailed) | 0.345 | 0.468 | 0 | 0 | 0 |
| Attitude of the food vendors regarding food safety and hygiene practices | N | 182 | 182 | 182 | 182 | 182 |
| | Pearson correlation | -0.071 | -0.11 | 0.451 | - | - |
| Food safety and hygiene practices adopted by food vendors | Sig. (2-tailed) | 0.34 | 0.14 | 0 | - | - |
| | N | 182 | 182 | 182 | - | - |
| Food safety and hygiene practices adopted by food vendors | Pearson correlation | -0.062 | -0.276 | -0.041 | - | - |
| | Sig. (2-tailed) | 0.409 | 0.961 | 0.581 | - | - |
| N | 182 | 182 | 182 | 182 | - | - |

CONCLUSION

The present study incorporates the KAP model to study the impact of food safety trainings on food safety and hygiene practices followed by street food vendors. Food safety attitudes acted as a mediator by influencing food safety awareness and knowledge. Results showed significant positive correlation of education with the attitude towards food safety and hygiene practices. This emphasised the need to prioritize improvement of the food safety knowledge and attitudes of food handlers, through measures such as the provision of basic and advanced food safety training programmes, in order to enhance the use of safe food handling practices. Such food safety training programmes should focus on correcting the undesirable practices. Food safety laws should be revised to include a requirement for managers in the food service sector to provide periodic food safety training to food handlers. FSSAI should strengthen the food safety laws so that they can aid in building a positive food safety culture among food vendors. Additionally, efforts should be made to establish essential infrastructure at the vending sites and develop a code of practice for the street food vendors.

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