

Exploring the Food Safety Practices of Food Handlers in University Campus Eateries- A cross sectional study

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Abstract

Food handlers are one of the key factors responsible for food contamination. Providing health education regarding hygiene and sanitation to all employees working in food establishments is the most cost-effective measure in ensuring food safety. The present study was an attempt made to explore the food-safety situation of a university campus by assessing the KAP of food handlers working in the eateries in and around the campus.

Methodology: A community based cross sectional study was planned with aim to study the food safety practices among the food handlers working in eating establishments in the vicinity of University Campus. The relevant data was collected using a pre designed, semi structured, validated questionnaire and purposive sampling technique. All the food handlers working in eateries in and around our university were approached to assess their knowledge, attitude and practices about the safe food handling and hazards associated.

Results: Our study findings revealed that most of the workers were young (56% below 28 y), unmarried (52.34

%) male (76.5%) from neighboring states. All our study subjects were literate ,23.4% were graduates while almost all remaining had dropped out after 10th or 12th class.51% food handlers have more than two years of work experience and 76.5% reported working hours more than 8 hours. 68.8% of the respondent of our study were apparently healthy, most of them had good knowledge about food safety and have average attitude towards food handling practices and personal hygiene while on observations safe food handling practices were found to be compromised.

Conclusions: Food handlers’ knowledge attitude and practices about safe food handling needs to be addressed to improve food safety measures. Providing hygiene and sanitation training to all employees working in food establishments is the most cost-effective measure in ensuring food safety.

Keywords: Food-hygiene, Food-safety, Knowledge, Attitude, Practice, food safety regulations

Introduction

The fundamental human necessity of sustenance, referred to as food, is vital for survival and the continual development of life. The health and well-being of individuals is intricately tied to the quality of their dietary intake. The impact of food on health can manifest as either well-being or ill-health and its causes varies from an insufficiency of essential nutrients to the consumption of contaminated food.

In response to evolving lifestyles and dietary patterns, the food industry has rapidly expanded, providing a practical solution for busy individuals who struggle to regularly cook at home. This industry caters to the demand for convenience and accessibility, offering sustenance to those with packed schedules, such as university students and staff members who often commute from nearby areas.

Food, from its inception in production to its final consumption, is susceptible to contamination at various stages of its journey. This susceptibility is amplified when food handlers mishandle the products they deal with. The probability of food becoming contaminated hinges significantly on the health status of these handlers and the extent to which they comprehend and follow proper food safety practices. Contamination, whether intentional or accidental, can jeopardize lives, underscoring the urgent need for stringent hygiene standards and thorough knowledge among food handlers. Having adequate knowledge, correct attitude about safe food practices is pivotal in preventing foodborne infections.

With this perspective in mind, the present research aims to evaluate the food safety measures implemented by individuals responsible for food handling in eating establishments located both within and around the university campus from north India. This study addresses

the imperative of harmonizing food safety practices to safeguard public health within the community.

Methodology

A Community based Cross sectional study was planned with aim to study the food safety practices among the food handlers working in eating establishments in the vicinity of University Campus. The objectives were 1. To assess knowledge, attitude and food safety practices among food handlers. 2. To assess health and food safety awareness of food handlers. 3. To educate them about safe food handling practices. After getting approval from Institutional ethics committee, all the eateries like hotels, restaurants, food outlet in the vicinity of our university campus were enlisted. There were 27 eateries in the vicinity of the University, each were having about 4-5 food handlers working in it and involved in storage, preparation and serving of food. The purposive sampling technique was used and all 135 workers were approached to participate in the study. Study subjects were selected as per the inclusion /exclusion criteria. Inclusion Criteria were 1.all food handlers above age 18 years, 2. Food handlers involved in in storage, preparation and serving of food, 3. Food handlers willing to participate and giving consent. Exclusion Criteria were 1. Food handlers below 18 years of age 2. Food vendors working at tea stalls. 3. Food handlers not available for interview even after three consecutive attempts. 4. Food handlers not willing to participate in the study. The definition of food handler used was as per Codex Alimentarius is 'Any person who directly handles packaged or unpackaged food, food equipment and utensils or food contact surfaces and is therefore expected to comply with food hygiene requirements.'¹

A pre designed, semi structured, validated questionnaire was used for collecting relevant information.

All the study subjects were explained thoroughly the purpose of the study before getting their oral consent to participate in the study. Data regarding socio-demographic variables & food safety knowledge & practices, personal hygiene was obtained as per the proforma. Observations made regarding, appearance, level of cleanliness, personal hygiene, condition of hair, hands, nails, habit of spitting, covering of mouth while sneezing and coughing and noted. Data collected by interviewing the food handlers and observing food handlers while they were engaged in their everyday jobs to see their food handling practices and collect information on food preparation and handling in the eateries. Sensitization about safe food practices done and corrections of actions was suggested during the survey. A checklist was used by data collectors to assess the food handling practices. The data collected was compiled and analyzed by using the software Statistical package for social sciences version 21.

Results

An attempt was made to approach 135 food handlers, 4 were not available and 3 from one eatery were unwilling to participate. The observations & findings were obtained from 128 food handlers. The background characteristics of the respondents described in Table no1. Majority of the food handlers (56.3%) were between the age group of 18-27 years and 76.5% were males. 54.7% were educated up to 12th standard. Food handlers involved exclusively in cooking were in majority (45.3%) and 51.6% had work experience of more than 2 years. Most of them 76.5% engaged in work for more than eight hours.

Table 1: Background characteristics of the respondents

Age	N (%)
18-27	72(56.3%)
28- 37	44(34.3%)

>37	12(9.4%)
Gender	
Male	98 (76.5%)
Female	30(23.5%)
Education	
Up to 10 th	28 (21.9%)
Up to 12 th	71 (54.7%)
Graduate	29 (23.4)
Marital Status	
Married	58(45.3%)
Unmarried	67 (52.34%)
Divorced /separated /widowed	3(2.3%)
Nature of work	
Cooking only	58(45.3%)
Serving only	36(28.1%)
Both cooking and serving	34(26.6%)
Work Experience	
<1 year	40(31.2%)
1-2 years	22(17.2%)
>2 years	66(51.6%)
Working hours	
<8	30(23.5 %)
>8	98(76.5%)
Total	128 (100%)

Table no 2 shows the knowledge of respondents regarding food handling. Majority of the food handlers (89.1%) correctly responded that improper handling of food is a health hazard and importance of washing hands before handling food. 86% had knowledge regarding use of protective clothing like cap, gloves, apron which reduces risk of contamination.82.3% didn't receive any formal training on food hygiene, most of them responded that they had on job, hands on training of handling food.

Table 2: Knowledge of respondents regarding food handling

Knowledge of the respondents	Yes N (%)	No N (%)
Improper storage of food leads to health hazard	114 (89.1%)	14(10.9%)
Use of protective clothing like cap, gloves, apron can reduce risk of contamination	110 (86%)	18 (14%)
Washing of hands before handling food	114(89.1%)	14(10.9%)
Preparation of food in advance causes contamination	100(78.2%)	28(21.8%)
Incorrect cleaning of refrigerator, grinding and slicing machine can cause contamination	96 (75%)	32 (25%)
Training on food hygiene	23(17.7%)	105(82.3%)

Table 3: Attitude of the respondents

Attitude	Agree	Disagree	Don't Know
Hygiene Practices of food handlers can prevent disease	76 (59.4%)	34 (26.5%)	18 (14.1%)
Hand washing practice while handling food, money and using lavatories can reduce the risk of food contamination	97 (76 %)	3 (2.2%)	28 (21.8%)
Same cloth can be	23 (18%)	98	7

used to clean kitchen premises and utensils		(76.5%)	(5.5%)
Food can be handled when you have fever, cough, diarrhea and skin lesions	33(25.7%)	40(31.2%)	55 (43.1%)
Can use cosmetics, jewelry, nail paints while handling food	3(10%)	17 (56.6%)	10 (33.4%)

The attitude of the respondents regarding food safety is shown in table no 3. 76% agreed that hand washing practices while handling food and using lavatories can reduce risk of food contamination. 31.2 % disagreed that food can be handled during fever or episodes of illness. 56.6% female respondents disagreed to use of cosmetics and nail paints while handling food.

Table no. 4 represents practices adopted by food handlers based on observations of data collector. 78.1 % and 76.6% food handlers observed hand hygiene practices while handling food and using apron while cooking respectively.70.3% did not separately store raw and cooked food and 39.1% touched unwrapped food with bare hands. As per table no. 5, means of dishing out food was mostly by spoon (37.5%) and 28 % were doing it with bare hands. 84.3% food handlers had clean nails. 68.7% used gloves while handling food and 82.8% had their head covered, while preparation and serving food. Most of the respondent were having good personal hygiene and 68.8% were free from any symptoms and apparently healthy (as shown in Figure 1)

Table 4: Food hygiene practices of the food handlers

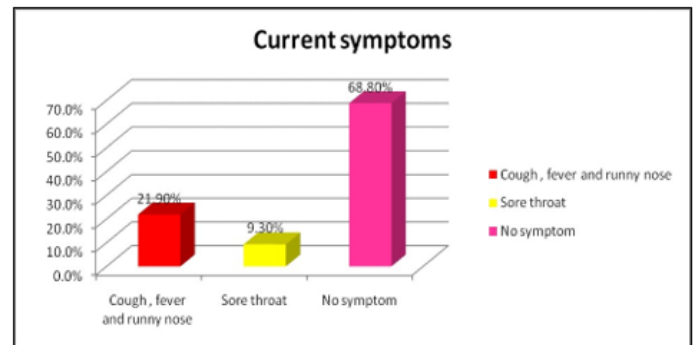
(based on observations)

Practices	Yes N (%)	No N (%)
Touch unwrapped food with bare hands	50(39.1%)	78(60.9%)
Freeze defrosted food	56(43.8%)	72(56.2%)
Do not separately store raw and cooked food	38(29.7%)	90(70.3%)
Use separate utensils for raw and cooked food	92(71.9%)	36(28%)
Use same towel to clean many places	24(18.8%)	104(81.2%)
Rub hands on face , hair , ears while working	26(20.3%)	102(79.7%)
Smoke While working	2(1.6%)	126(98.4%)
Clean work area before work	94(73.4%)	34(26.6%)
Use apron while cooking and food handling	98(76.6%)	30(23.4%)
Wash hands before handling the food	100(78.1%)	28(21.9%)
Use tissue while coughing and sneezing	24(18.8%)	104(81.2%)
Water provision at the site of food preparation & handling	112(87.5%)	16(12.5%)

Table 5: Other food handling practices observed

Practice	N (%)
Means of dishing out food	
Bare hands	36(28%)
Ladle	12(9.4%)
Spoon	48(37.5%)
Both ladle and spoon	32(25%)
Conditions of finger nail	
Clean	108 (84.3%)
Unclean	20 (15.6%)
Head covering	
Present	106 (82.8%)
Absent	22 (17.2%)
Adequate protection from flies and dust	
Yes	102(79.7%)
No	26(20.3%)
Use of gloves while handling food	
Yes	88(68.7%)
No	40 (31.3%)

Figure 1: Distribution of subjects as per current symptoms



Discussion

The gradual rise in urbanization, industrialization, tourism, the growth of the education sector and the increasing influence of economic globalization have consistently resulted in a notable surge in the number of food establishments worldwide^{2,3}. This trend is similarly evident in our country too, where food establishments are proliferating rapidly. The educational institute campuses not only give opportunity for students but also provides a better business opportunity to many, food business is one of those. The eateries surrounding the university campus is lifeline of students, employees, patients and their attendants. They are epitome of convenience and comfort as far as their diet is concerned. Being an unorganized sector, eateries may potentially compromise food hygiene

standards. Consequently, there is a potential risk of food-borne illnesses, which are prevalent in both developed and developing nations due to the widespread deficiencies in food hygiene and sanitation practices, as documented by many researchers worldwide^{3,4,5}

Our study findings revealed that most of the workers were young (56% below 28 y), unmarried (52.34 %) male (76.5%). Similar observations were reported in studies conducted in Maharashtra^{6,7}, Karnataka⁸, Delhi⁹ and Punjab¹⁰ while Gous S¹¹ et al reported that most of the workers in their study were above 30, they reported that these were either holding managerial post or hired for dishwashing.

In our study area, most of the food handlers working in the eateries are from border districts of UP or Bihar. Those are the healthy youths came here in search of job, as the food handlers' job doesn't require any formal training or qualification, moreover they don't have to worry about their food. None of them was illiterate, though 76.6% had dropped school after 10th or 12th class while 23.4% were graduated. Our study findings differ from studies conducted by Udigiri Rekha⁸(2.9% graduates), Sakore DN⁶ et al (1.9% graduates) & many other studies conducted before Covid Pandemic. Our study findings also highlight the post pandemic problem of unemployment among educated youth.

Most of the respondent of our study were apparently healthy, had good knowledge about food safety and have average attitude towards food handling practices and personal hygiene while on observations safe food handling practices were found to be compromised. Knowledge is described as the proficiency and abilities acquired by an individual through either personal experience or formal education. Most of our study subjects were graduates and educational level of individuals had great impact upon the knowledge.

Research studies conducted on the Knowledge, Attitudes, and Practices (KAP) of food handlers has yielded diverse findings. Knowledge, when linked with attitudes, can serve as a precursor to behavior change, as observed in studies by Rosnani A H et al¹². and Mendagudali R R et al¹³. However, it's worth noting that several researchers have reported that knowledge does not significantly impact the practices of food handlers, as demonstrated by Abdol Mutalib and Farida Hanim et al.

A study conducted by Sakore D N⁶ al. revealed that food handlers generally exhibited a good knowledge score, unfavorable attitudes, and an average score for their practices.

Attitude is the expression of a positive or negative evaluative response towards something which is manifested through one's beliefs or intended actions while Practice includes the established customs or standards that evolve over time and significantly shape an individual's behavior and approach to tasks. According to Meher MM¹⁴ et al., the educational level and training of food handlers have been found to exert a significant influence on their attitudes and practice in the Street food vendors. Similar observations were made by few researchers like K R Robert et al¹⁵, SM CHE Has et al. ¹⁶, M Firdaus Siau A et al.¹⁷, who found that attitudes towards food safety was better in highly educated food handlers as compared to food handlers with lower education level.

The study conducted by SM CHE Has et al ¹⁶ concluded that, training has shown a remarkable improvement in food safety knowledge and practice among food handlers, although it hasn't had a similar impact on their attitudes. They further stated that, attending food hygiene training on previous occasions also significantly influenced food handlers' knowledge, but attitudes and practices remained largely unaffected. Their findings

highlighted the importance of consistently offering food hygiene training to ascertain its effectiveness in improving food handlers' Knowledge, Attitudes, and Practices (KAP) related to food safety. Sinha S et al¹⁸ study highlighted a remarkable improvement in the knowledge scores of food handlers after participating in an educational intervention, which consisted of interactive training sessions. This improvement extended to their understanding of proper techniques for food preparation, cooking, storage, and distribution. The present study results revealed that the food handlers are good at knowledge regarding food safety and awareness about overall health but the attitude and practices needs to be addressed. Despite of the limitations, the study could be basis of further research on in-depth assessment of KAP correlates, including the eateries environmental conditions and microbial assessment.

Conclusion

Food handlers' health and food handling practices impose great impact on food born infections and their spread. After the pandemic of Covid19, awareness about health, personal hygiene and use of personal protective equipment has been increased among general population including food handlers. The safe food handling practices can be ensured by regular periodic Training (informal or formal), health & sanitation inspections, periodic preventive treatments like deworming. Government authorities, experts from health and other sectors, NGOs and academics should collaborate to enhance awareness, with a particular focus on addressing the challenges associated with Knowledge, Attitudes, and Practices (KAP) related to food safety. Adopting a comprehensive approach for food safety regulations would be the most cost-effective approach to promote the sustainability of the food industry.

Limitations

The current study has following limitations. Firstly, the research was conducted exclusively at one private university campus in northern India, which may limit the generalizability of its findings. Secondly, it was of a cross-sectional nature and findings are restricted by the relatively small sample size, making it unable to establish causal association. Furthermore, the self-reporting structure may have introduced the recall bias, acquiescence bias and social desirability bias. Future research endeavors should consider employing longitudinal designs and larger, more diverse samples to address these limitations.

References

1. Food and Agriculture Organization of the United Nations: Food Quality and Safety Systems – A Training Manual on Food Hygiene and the Hazard Analysis and Critical Control Point (HACCP) System.
2. WHO G. The WHO international health regulations and the promotion of food safety in international trade.
3. Alamneh AA, Ketema DB, Simienuh MM, et al. Food hygiene practice and its associated factors among food handlers working in food establishments during the COVID-19 pandemic in East Gojjam and West Gojjam Zones, North West Ethiopia. *SAGE Open Medicine*. 2022;10.
4. Kambhampati LL. Improving food safety through prevention: CDC's Food Safety Prevention Status Report. CDC Environ Health Serv Branch. 2013;79(2).
5. Iwu AC, Uwakwe KA, Duru CB, Diwe KC, Chineke HN, Merenu IA, Oluoha UR, Madubueze UC, Ndukwu E, Ohale I. Knowledge, attitude and practices of food hygiene among food vendors in

- Owerri, Imo State, Nigeria. *Occupational Diseases and Environmental Medicine*. 2017;5(01):11-25.
6. Sakore DN, Parande MA, Bhattacharya S. Knowledge, attitude, and practice regarding food hygiene among food handlers of eating establishments of a medical college, Pune, Maharashtra: A cross-sectional study. *Med J DY Patil Vidyapeeth* 2023; 16:160-6.
 7. Sangole SS, Lanjewar AG, Zodoev SP. Personal hygiene and its association with some factors in food handlers. *Indian Journal of Occupational and Environmental Medicine* 2002; 6: 71-74,79.
 8. Udgiri, Rekha S; Masali, KA. A Study on the Health Status of Food Handlers Employed in Food Establishments in Bijapur City. *Indian Journal of Community Medicine* 32(2):p 131-132, Apr–Jun 2007. | DOI: 10.4103/0970-0218.35652
 9. Malhotra R, Lal P, Krishna Prakash S, Daga MK, Kishore J. Evaluation of a Health Education Intervention on Knowledge and Attitudes of Food Handlers Working in a Medical College in Delhi, India. *Asia Pacific Journal of Public Health*. 2008;20(4):277-286. doi:10.1177/1010539508322242
 10. Mohan V, Mohan U, Dass L, Lal M. An Evaluation of Health Status of Food Handlers of Eating Establishments in Various Educational and Health Institutions in Amritsar City, *Indian Journal of Community Medicine* 2001;26(2):80-84.
 11. Gous Sayyad, Bhurke D P, Ataulla Mohammed. (2016). Study of Health Status of Food Handlers Working At Food Establishments in Jalgaon City, Maharashtra. *IOSR Journal of Dental and Medical Sciences*. 15. 54-58. 10.9790/0853-1509065458. Rosnani, A.H., Son, R., Mohhidin, O., Toh, P.S. & Chai, L.Y. 2014. Assessment of knowledge, attitude and practices concerning food safety among restaurant workers in Putrajaya, Malaysia. *Food Science and Quality Management*, 32: 20-27.
 12. Mendagudali, R.R., Akka, K.D., Swati, I.A., Shedole, D.T. & Bendigeri, N.A.D. Knowledge, attitude, and practices of food safety among women of Khaza bazar, the urban field practice area of KBN Institute of Medical Sciences, Kalaburagi, Karnataka. *International Journal of Medical Science and Public Health* 2016, 5(3): 516- 520.
 13. Meher MM, Afrin M, Talukder AK, Haider MG. Knowledge, attitudes and practices (KAP) of street food vendors on food safety in selected areas of Bangladesh. *Heliyon*. 2022 Dec 8;8(12):e12166. doi: 10.1016/j.heliyon. 2022.e12166. PMID: 36531639; PMCID: PMC9755364.
 14. Roberts KR, Barrett BB, Howells AD, Shanklin CW, Pilling VK, Brannon LA. Food safety training requirement and food handlers' knowledge and behaviour. *Food protection trends*. 2008;28:252-60
 15. Has SM, Jaafar SN, Chilek T. An assessment on pre- and post-food hygiene training on food safety's KAP level among food handlers in Kuala Terengganu Kuala Nerus. 2018;47(4):61-9. 13.
 16. Mohd Firdaus Siau, A., Son, R., Mohhidin, O., Toh, P.S. & Chai, L.C. 2015. Food court hygiene assessment and food safety knowledge, attitudes and practice of food handlers in Putrajaya. *International Food Research Journal* 2015, 22(5): 1843-1854.
 17. Sinha S, Sandhu NK. Effectiveness of educational intervention on KAP of food handlers and barriers to implementation of food safety: a cross sectional comparative study. *Int J Community Med Public Health* 2023; 10:2192-6.