



Consumers' Attitudes and Constraints towards Food Safety and Hygiene Practices in Ludhiana City

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The study attempted to analyse the consumers' attitudes towards food safety and hygiene practices. Further, an effort was made to analyse the constraints towards food safety and hygiene practices. A total of 200 consumers were randomly selected. The results of the study revealed that street food is not good for health (2.96), followed by food poisoning may occur after consumption of street food (2.28), it is important to follow hygiene practices (1.60) and contamination may occur due to poor hygiene practices (1.60) to maintain food safety and hygiene practices. Four factors came out from the study that confines consumers toward food safety and hygiene practices i.e. food safety knowledge and training, food poisoning, hygiene practices and food contamination. Lack of knowledge, adulterated food and poor hygiene practices were major constraints faced by consumers. The study also recommended that education and training programs on food safety and hygiene practices help create awareness among consumers.

Keywords: Food safety and hygiene practices; attitudes; constraints; consumers.

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1. INTRODUCTION

The prevalence of infectious illnesses is currently increasing globally [1]. Food users and administrators are advised to practice and promote personal hygiene in order to decrease food-borne illnesses [2]. Street food vending outlets are becoming more prevalent throughout the nation. Significant changes are needed to the hygiene and safety practices used in vending systems of food [3]. Most food-borne illnesses are due to a lack of awareness about food safety and proper food handling. It is crucial to implement an effective and on-going food safety education program [4]. Encouraging health consciousness and positive changes in food safety attitudes toward better practices are crucial to reduce persistent fear regarding food safety and avoiding a possible negative impact on the food system [5]. Food safety protects consumers from health risks related to common foodborne illnesses. Improvement in food safety knowledge of consumers, may ascertain the better food safety measures and knowledge. Food safety is a major concern globally and therefore the present study aims to study consumers' attitudes and constraints towards food safety and hygiene practices.

1.1 Review of Literature

Stratev et al [6] concluded that participants knowledge of food safety was high (85.06 per cent), and attitudes toward food safety were positive (70 per cent) with practice of food safety being above average (65.28 per cent). Consumer knowledge of safe food handling procedures was significantly influenced by consumers' educational levels [7]. The risk and incidence of foodborne disease are likely to be reduced through an improvement in consumer food-handling behaviour [8].

Al-Kandari et al [9] found most food handlers (70 per cent) have adequate knowledge, particularly about personal cleanliness (93 per cent). Food handlers usually show significant behaviour, especially for personal hygiene (27.6 per cent). Odeyemi et al [10] revealed consumers in Cameroon had lowest awareness of food safety in Africa (73.15) followed by Ghana (78.19) and Nigeria (88.16). Asian consumers in Iran had the lowest level of awareness about food safety (73.33 per cent) compared to Malaysia (88.36) and Pakistan (89.42). Baptista et al [11] reported respondents had positive attitudes, such as understanding of correct seafood thawing

techniques and awareness of the possibility of acquiring an illness from eating raw seafood.

Food handlers and the chosen clients received education on personal cleanliness, food safety, and hygiene practices through pamphlets [12]. Tutu et al [13] revealed that knowledge and habits related to food safety were positively correlated. Illes et al [14] revealed that the participants knew the least about the significance of wearing protective equipment when giving foods to students (50 per cent), while respondents were most educated (93 per cent). Tuglo et al [15] concluded that over half of the street cooked food handlers had good level of knowledge, attitudes, of food safety. Registering as street cooked food handlers was significantly associated with good knowledge and hygiene practices of food safety.

Lagerkvist et al [16] examined with covariates related to socio-demographic, socioeconomic, and socio spatial variables as well as health or dietary outcomes, latent class modelling revealed that having more education than a primary school education, spending a large percentage of one's income on food, or not keeping the refrigerator at the ideal temperature were all indicators of the latent class with better practices. Kuo and Weng [17] concluded that grade of students was strongly related to knowledge, attitude, and practice, and that grade was significantly correlated with knowledge and attitude but not practice. Abdul-Rashid et al [18] concluded that there was no statistically significant correlation between the output for food safety and the total percentage values for knowledge, attitude and practice ($p > 0.05$). Alhashim et al [19] revealed that need for intervention programmes, particularly focusing on consumers with lower educational qualifications and income status, to improve the knowledge, awareness, and attitudes of Saudi consumers of food from food trucks owned by family producers on food safety and foodborne illness in order to control foodborne diseases. Djekic et al [20] examined the most important players in the food delivery system are food processors and food inspection agencies. The country of origin has a greater impact on customer image than gender, which has a smaller impact. Food hygiene plays a key role in ensuring food safety. Guennouni *et al* [21] found gender, age, employment, and degree of schooling all significantly influenced knowledge of food storage ($p < 0.05$) 93 per cent of the hospital kitchen employees and (50 per cent) of the healthcare workers followed proper

food handling techniques. Kadam et al [22] concluded that information booklets were a useful tool for enhancing food handlers' understanding of and commitment to food safety and sanitation. Shamim et al [23] found most customers do check nutrition labels before buying highly processed food items; their usage is not as frequent as it should be suggested in order to encourage consumers in developing nations to adopt healthy eating habits, it is necessary to educate them about the advantages of reading nutrition labels.

Gemeda et al [24] observed vegetable food safety; contamination with soil was the main issue of tomato dealers. The significance of quality water and sanitation for food safety was unknown to about (17 per cent) of street sellers. In about (85 per cent) of the stalls, tomatoes were exhibited in full sunshine. About (37 per cent) of the sellers reported that rodents were active at night and could come into touch with tomato display surfaces. Rosales et al [25] revealed that in-depth interviews, the street food sellers believed that the availability of clean water and sanitary facilities supported good personal and food hygiene practices.

2. METHODOLOGY

The present study is based on primary data. Primary data was collected through a pre-tested and non-disguised questionnaire. A pilot survey was conducted to test the questionnaires. The study was conducted during 2023. The questionnaire was divided into four parts: socio-demographics, attitudes, of consumers towards food safety and hygiene practices, and constraints towards food safety and hygiene practices [15].

This study applied a cross-sectional design to gather data on consumers' attitudes and constraints. One consumer has been considered as one sampling unit for the purpose of the collection of primary data. The size of the sample was 200 consumers' respondents' selected through convenience sampling technique from Ludhiana city. The study was conducted in Ludhiana city of Punjab. Respondents were asked their responses using a Likert scale of 1 to 5 (1=strongly agree and 5=strongly disagree). In this study, descriptive analysis was used. After the completion of the interview schedule, a thorough check-up of the data was made. Analysis of the collected data was done using suitable statistical tools like mean, frequency, t-test, and factor analysis.

3. RESULTS AND DISCUSSION

Table 1 depict demographic profile of the respondents among all the respondents majority 56.50 per cent were female followed by 43.50 per cent were male and majority of respondents (25 per cent) age group was 18-25 years followed by 21.50 per cent were between 26-30 age group.

Table 1 depicts the demographic aspects of the respondents. It shows the type of the family of the respondents of which 147 (73.5 per cent) were belonging nuclear families and 53 (26.5 per cent) belongs to joint family.

3.1 Source of Awareness of Food Safety and Hygiene Practices

The source of awareness to the respondents is also important major sources of information regarding food safety and hygiene practices presented in the Table 2.

Table 2 depicts the sources of awareness for consumers: The internet was the major source for 50 (25 per cent) respondents, family and friends were the source of awareness for 34 (17 per cent) respondents, magazines and newspapers were the source for 24 (12 per cent) respondents, attending seminars was a source of awareness for 23 (11.5 per cent) respondents, watching television was the source for 20 (10 per cent) persons, and 49 (24.5 per cent) respondents responded that all the above were sources of awareness for them. There was no major source of awareness; all the sources together were helpful in providing awareness to consumers.

3.2 Consumers' Attitude towards Food Safety

The attitudes of consumers regarding food safety are important. Consumers had different opinions towards food safety and hygiene practices and result have been presented in the Table 3.

The mean of all the variables have been compared with the (mid value=3) of the scale and results have been presented in the Table 3. The highest mean score was observed to statement street food is not good for health (2.96), followed by food poisoning may occur after consumption of street food (2.28) and lowest mean score was observed to it is important to read labels while purchasing food products (1.42) [23].

Table 1. Demographic profile of the respondents (n=200)

S. No.	Particulars	Frequency	Per cent (%)
1.	Gender of the respondents		
a)	Male	87	43.50
b)	Female	113	56.50
2.	Age of the respondents (years)		
a)	Below 18	12	6.00
b)	18-25	50	25.00
c)	26-30	32	16.00
d)	31-40	43	21.50
e)	41-50	38	19.00
f)	Above 50	25	12.50
3.	Educational qualification		
a)	Secondary	21	10.50
b)	High school	36	18.00
c)	Undergraduate	76	38.00
d)	Post graduate and above	67	33.50
4.	Occupation		
a)	Student	68	34.00
b)	Government employee	24	12.00
c)	Private employee	39	19.50
d)	Self-employee	41	20.50
e)	Home maker	28	14.00
5.	Family type		
a)	Nuclear	147	73.50
b)	Joint	53	26.50

(Source: Primary data)

Table 2. Source of awareness to the consumers (n=200)

S. No	Particulars	Frequency	Per cent (%)
1	Attend Seminar	23	11.50
2	Magazines and newspapers	24	12.00
3	Watching TV	20	10.00
4	Internet	50	25.00
5	Family and friends	34	17.00
6	All the above	49	24.50
	Total	200	100

(Source: Primary data)

Table 3. Consumers attitude towards food safety and hygiene practices (n = 200)

Statements	Mean	Std. Dev.	t- value	p-value
Consumer attitude towards food safety				
Street food is not good for health	2.96	1.30	-0.43	0.66
Food poisoning may occur after consumption of street food	2.28	1.07	-9.46	<0.001
Storing cooked and raw food together cause food borne illness	2.05	1.07	-12.47	<0.001
Food adulterations can have harmful effects	1.77	1.13	-15.29	<0.001
Checking the ingredients of packed food is important	1.66	0.99	-18.99	<0.001
Training towards food safety and hygiene is important	1.58	0.93	-21.55	<0.001
Always fresh food is to be preferred	1.54	0.94	-21.85	<0.001
Proper preservation of food is to be followed	1.54	0.96	-21.37	<0.001
Knowledge of food safety is important to you	1.44	0.95	-22.90	<0.001
Reading labels is important while purchasing food products	1.42	0.91	-24.41	<0.001

Consumers attitude towards hygiene practices				
It is important to follow hygiene practices	1.60	0.75	-26.15	<0.001
Contamination may occur due to poor hygiene practices	1.60	0.84	-23.43	<0.001
Washing hands frequently is important	1.52	0.87	-23.95	<0.001
We should not touch food when fingers are cut	1.51	0.91	-22.93	<0.001
Unhygienic practices lead to microbial infection	1.47	0.94	-22.81	<0.001
Vegetables are to be thoroughly washed before cooking	1.42	0.87	-25.58	<0.001
Cleaning the surface before and after use is necessary	1.42	0.85	-25.92	<0.001

*Significant at 5% level of significance

Table 4. Factors extracted of food safety attitudes

Factor	Factor Name	% of variance	Items	Item Loading
1.	Food safety knowledge and training	39.94	Knowledge of food safety is important to you	0.814
			Training towards food safety and hygiene is important	0.783
			Reading labels is important while purchasing food products	0.775
			Checking the ingredients of packed food is important	0.662
			Always fresh food is to be preferred	0.799
			Food adulterations can have harmful effects	0.586
			Proper preservation of food is to be followed	0.662
2.	Food poisoning	14.26	Street food is not good for health	0.751
			Food poisoning may occur after consumption of street food	0.656
			Storing cooked and raw food together cause food borne illness	0.559
Hygiene practices				
3.	Hygiene practices	46.43	Washing hands frequently is important	0.768
			Using gloves while preparing food avoid contamination (mostly street food)	0.683
			Vegetables are to be thoroughly washed before cooking	0.838
			Cutting boards are to be washed before and after the use	0.881
			Cleaning the surface before and after use is necessary	0.776
			Contamination may occur due to poor hygiene practices	0.669
			Unhygienic practices lead to microbial infection	0.719
4.	Food contamination	15.97	Utensils used for cooking and serving should be washed	0.723
			Contamination may occur due to poor hygiene practices	0.861
			We should not touch food when fingers are cut	0.839

Table 3 depicts that the highest mean score was observed to the statement it is important to follow hygiene practices (1.60) followed by contamination may occur due to poor hygiene practices (1.60). Lowest mean score was observed to utensils used for cooking and

servicing should be washed and used (1.43) followed by vegetables are to be thoroughly washed before cooking (1.42) followed by cleaning the surface before and after use is necessary (1.42) similar results were reported by (Tuto *et al*, 2020) [11].

3.3 Factor Analysis

Factor analysis was used for finding out the principal dimensions on which the respondents evaluated attitudes towards food safety and hygiene practices. The following section presents the results of factor analysis.

3.4 Factors of Food Safety Knowledge

Factor analysis was run using SPSS and the results have been discussed as follows. The value of Kaiser Meyer Olkin (KMO) came out to be 0.859 and 0.869 for food safety and hygiene practices respectively. Value of chi-square for Bartlett's Test of Sphericity came out to be 666.47 and 912.39. This value was found to be significant ($p < 0.001$) with 45 degrees of freedom. Value of KMO and results of Bartlett's Test of Sphericity indicated factor analysis could be performed on the given data set. Results from factor analysis have been presented in Table 4.

3.5 Factor Definitions

A total of four factors were extracted from the principal component analysis: two from food safety and two from hygiene practices. These two factors were able to explain 54.21 per cent and 62.40 per cent of the variance in the data, respectively. Factor loadings and variances have been presented in Table 4. Factor definitions for the extracted factors have been provided as follows:.

(i) Food safety knowledge and training: The results revealed that food safety knowledge and training are important, and it was an important factor with 39.94 per cent variance explaining and seven statements loaded on this factor, i.e., knowledge of food safety, training, reading labels, ingredients, fresh food, food adulteration, and preservation of food.

(ii) Food poisoning: information regarding food poisoning and storing cooked and uncooked food together. The factor explains 14.26 per cent of the variance in the data.

(iii) Hygiene practices: The third important factor that emerged from the factor analysis was

hygiene practices. It was found that 46.43 per cent of the variance explains the factor. Eight statements have been loaded on this factor, all of which are interlinked. It clearly depicts that hygiene practices such as washing hands, using gloves, washing vegetables, washing cutting boards, cleaning surfaces, utensil washing, and other unhygienic practices are important.

(iv) Food contamination: This factor deals with causes that would lead to contamination of food, which includes contamination and the importance of hygienic practices. You should not touch food when your fingers are cut. The factor explains about 15.97 per cent of the variance in the data.

Table 5 shows constraints faced by the consumers while following the food safety and hygiene practices. There is lack of equipment to maintain hygiene (1.65), lack of awareness (1.72) [26,27], lack of proper food storage (1.73) and Adulteration and contamination in ready to eat food (2.06) were reported important constraints towards food safety and hygiene practices.

3.6 Constraints Faced by Consumers towards Food Safety and Hygiene Practices

Factor analysis was performed on the statements which were related to Constraints faced by the consumers while following the food safety and hygiene practices and the results were evaluated by observing the KMO and Bartlett's test values presented in the table. The value of Kaiser Meyer Olkin (KMO) came out to be 0.818. Value of chi-square for Bartlett's Test of Sphericity came out to be 513.76. This value was found to be significant ($p < 0.001$) with 28 degrees of freedom. Results from factor analysis have been presented in Table 6.

Factor definitions: Two factors were obtained from principal component analysis. These factors were able to explain 59.49 per cent of the variance in the data. Factor loadings and means have been presented in Table 6. Factor definitions for the extracted factors have been provided as follows:.

Lack of knowledge: This factor deals with constraints such as lack of awareness, knowledge, and education, availability of safe food, and lack of equipment. This factor explained 32.65 per cent of the variance in the

Table 5. Constraints faced by consumers towards food safety and hygiene practices

Statements	Mean	Std. Dev.	t-value	p-value
Adulteration and contamination in ready to eat food	2.06	1.10	-11.98	<0.0001
Lesser availability of safe and hygiene food in market	1.90	1.00	-15.51	<0.0001
Outbreak of bacterial diseases and other pathogens	1.81	0.87	-19.20	<0.0001
Poor hygiene practices in food chain	1.76	0.98	-17.69	<0.0001
There is lack of knowledge and education	1.75	0.88	-19.82	<0.0001
There is lack of proper food storage	1.73	0.99	-18.12	<0.0001
There is lack of awareness about food safety	1.72	0.92	-19.40	<0.0001
There is lack of equipment to maintain hygiene	1.65	0.95	-19.93	<0.0001

*Significant at 5% level of significance

Table 6. Extracted factors of constraints

Factor	Factor Name	% of variance	Items	Item Loading
1.	Lack of knowledge	32.65	Lack of awareness about food safety	0.889
			Lack of knowledge and education	0.878
2.	Adulterated food and poor hygiene practices	26.84	Out-break of bacterial diseases	0.585
			Availability of safe and hygiene food	0.617
			Adulterated food	0.726
			Poor hygiene practices	0.748
			Lack of food storage facilities	0.645
			Lack of equipment to maintain food hygiene	0.546

data. This factor primarily provides information about the lack of awareness among consumers regarding food safety and hygiene.

FOOD CONTAMINATION

This factor deals with causes that would lead to the adulteration of food, which includes bacterial diseases, the availability of safe food, food adulteration, poor hygiene practices and a lack of equipment. This factor explains 26.84 per cent of the variance in the data. Thus, this factor was dealing with adulterated food and poor hygiene practices

4. CONCLUSION

A considerable number of consumers had positive attitudes towards food safety and hygiene practices. There is a need for training and education regarding food safety and hygiene practices for different ages of consumers; this would lead to better understanding of food safety and hygiene practices. The major constraints faced by consumers were a lack of awareness, knowledge, and education regarding food safety and hygiene practices. Thus, creating a proper understanding among consumers regarding food safety and hygiene practices would lead to a better understanding of food safety and hygiene practices.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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