



A cross-sectional investigation into the elements affecting food handlers' comprehension of food hygiene in chosen urban areas of Karnataka

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Abstract

Study Background: Microorganisms thrive on nutrient-rich food, which can be contaminated through various sources including water, air, dust, equipment, sewage, insects, rodents, and workers. The evolving nature of food production, handling, and preparation techniques underscores the importance of food hygiene as a crucial aspect of healthy living. Food hygiene encompasses all necessary conditions and measures throughout the food supply chain, from production to distribution.

Objectives: A cross-sectional study was conducted to evaluate the factors influencing food handlers' understanding of food hygiene in selected urban areas of Karnataka.

Methodology: The research employed a descriptive approach, focusing on 10 urban areas in Karnataka. Using a multi-stage sampling technique, 100 food handlers were selected. Data collection was performed using a structured knowledge questionnaire comprising two sections.

Findings: The study revealed an overall knowledge mean score of 22.64 (SD±5.580), indicating inadequate food hygiene knowledge among food handlers. Of the 100 participants, 70(70%) demonstrated inadequate knowledge, 29(29%) showed moderately adequate knowledge, and only 1(1%) possessed adequate knowledge. A significant association was found between knowledge and training ($p = 0.005$).

Conclusion: The study's results highlighted that a majority (70%) of food handlers had insufficient knowledge of food hygiene. This finding highlights the critical importance of fostering awareness about food hygiene practices. By implementing comprehensive educational programs and outreach initiatives, empowering the food handlers with essential knowledge regarding safe food handling, proper cooking temperatures, and effective sanitation methods. Such proactive measures are vital in mitigating the risks associated with food poisoning and food-borne illnesses, ultimately leading to healthier communities and improved public health outcomes.

Keywords: Knowledge, food hygiene, food handlers

1. Introduction

Food-borne diseases pose a significant global health challenge, resulting in high morbidity and mortality rates. Annually, contaminated food and water cause 3-5 billion cases of infectious diarrhea and nearly 1.8 million deaths among young children worldwide. In the United States ^[1], the CDC reports an estimated 76 million cases of food-borne diseases annually, with approximately 5000 fatalities ^[3]. In India, diarrhea claims the lives of about 400,000 children under 5 years old annually. Many more suffer from Hepatitis 'A' and Enteric fever due to poor hygiene and unsafe food or water consumption (UNICEF 2012) ^[4].

Acute diarrheal illness, a widespread global issue, is estimated to cause 1.8 million childhood deaths annually, primarily in developing countries (World Health Organization, 2005). Assessing the impact of food-borne diseases is complex due to various factors. While not all gastroenteritis is food-borne, and not all food-borne diseases cause gastroenteritis, food serves as a crucial vehicle for pathogens of substantial public health concern. Ongoing studies aim to provide a clearer understanding of the global public health burden of gastroenteritis and food-borne illness.⁵ Common food handling errors that lead to food-borne illnesses include serving contaminated raw food,

inadequate cooking or reheating, sourcing food from unsafe origins, improper cooling, allowing excessive time between preparation and consumption, and eating undercooked foods. Food handlers play a crucial role in these occurrences, as hands can serve as vectors for pathogen dissemination through cross-contamination^[1]. Despite high rates of food hygiene education among food handlers, a significant proportion of food poisoning outbreaks can still occur due to poor food handling practices. While food handling education can influence practices, it is essential to provide food safety education to all staff in food processing businesses to promote behavioral changes and foster positive attitudes^[1, 7].

At the same time, a large number of people get sick every year due to spoiled food that they eat. Microorganisms, including bacteria, viruses and moulds found in food, can cause food poisoning^[8]. With the increase in urbanisation, industrialization, tourism and mass catering systems, food-borne diseases are increasing throughout the world^[9, 13].

Food businesses have become widespread in recent times in response to people's changing lifestyles and food consumption. They offer convenience and easy access to busy individuals who cannot prepare their meals regularly at home. In large-scale cooking, food passes through many hands, thereby increasing the chance of food contamination due to improper handling.

Strong statistical evidence shows that caterers cause 70% of all bacterial food poisoning^[10]. In 2003, a World Health Organization (WHO) report concluded that about 40% of reported food poisoning outbreaks in the WHO European region, especially in rural areas. According to the UK's Waste and Recourses Action Program, 33% of all food produced is wasted along the chill chain or at the consumer^[11].

Worldwide foods, food-borne diseases are a major health burden leading to high morbidity and mortality. The global burden of infectious diarrhoea involves 3-5 million cases and nearly 1.8 million deaths annually, mainly in young children, caused by contaminated food and water. According to the CDC, an estimated 76 million cases of foodborne disease are reported annually in the United States, with approximately 5000 deaths^[11, 17].

In India, food poisoning affecting 78 personnel was reported in 1998 by the armed forces at high altitude, where salmonella enteritidis was identified as the etiological agent and frozen fowl was the implicated food source for the outbreak^[2]. Anyone can get food poisoning, although the very young, the very old and the very debilitated are most susceptible; anyone can acquire foodborne illness regardless of socioeconomic status, race, sex, age, occupation, education or ea of residence^[3]. Control of food-borne

diseases is based on avoiding contaminated food, destroying contaminants, and preventing further spread of contaminants. Prevention depends upon proper cooking and storing practices and personnel hygiene of food handlers^[12, 18, 22].

It has been known that providing food handling education can influence the food handling practices. Education on food safety should be given to all staff in the food processing business so as to bring behavioural changes besides the adoption of positive attitudes^[1].

This problem mainly occurs among hostilities and working people. The investigator had encountered food handlers with poor hygienic practices like improper dishwashing and sanitising, not washing their hands, combing hair, and not wearing clean clothes because of their lack of knowledge. Thereby, it's an effort to investigation into the elements affecting food handlers' comprehension of food hygiene in chosen urban regions of Karnataka and create awareness among them by distributing an information booklet regarding food hygiene to improve their knowledge, which hopefully lead to better practice in preventing food-borne illness and food poisoning among the consumers in the selected urban area of Karnataka stateMaterials and methods.

2. Objectives

This cross-sectional investigation into the elements affecting food handlers' comprehension of food hygiene in chosen urban areas of Karnataka was conducted with aims to assess the knowledge regarding the food hygiene and to determine the association between selected demographic variables and knowledge of food handlers regarding food hygiene.

3. Research Methodology and Analysis

The study included 100 food handlers from various establishments, encompassing both vegetarian and non-vegetarian eateries, as well as small and large hotels. A multi-stage sampling approach was employed to select participants. A structured questionnaire was crafted to align with the study's objectives. Its development was informed by a comprehensive review of relevant literature, including academic studies, journals, and books. The questionnaire comprised two main sections: 1. Demographic Information and 2. Knowledge Assessment on Food Hygiene. Data from both sections of the questionnaire were examined using descriptive statistical methods, such as calculating means and standard deviations. To determine relationships between selected baseline variables and knowledge scores, inferential statistics were applied. Specifically, the chi-square (χ^2) test was utilised, with all analyses conducted using SPSS version 20.0.

4. Results

Table 1: Description of demographic variables such as age, gender, education, training, experience, type of food handled and religion.

n = 100

Sl. No	Demographic Variable	Frequency	Percentage (%)
Age group			
1	18-25 years	32	32%
2	26-35 years	20	20%
3	36-45 years	23	23%
4	Above 45 years	25	25%
Total		100	100%
Education Qualification			
1	High school	32	32%
2	Pre-university	25	25%
3	Middle school	17	17%
4	Undergraduate	10	10%
5	Primary school	8	8%
6	Illiterate	5	5%
7	Post graduate	3	3%
Total		100	100%
Training			
1	Taught by some one	50	50%
2	Trained	33	33%
3	Untrained	17	17%
Total		100	100%
Gender			
1	Male	85	85%
2	Female	15	15%
Total		100	100%
Experience			
1	>3 years	69	69%
2	1-3 years	21	21%
3	<1year	10	10%
Total		100	100%
Type of food handled			
1	Vegetarian	42	42%
2	Mixed	38	38%
3	Non vegetarian	20	20%
Total		100	100%
Religion			
1	Hindu	77	77%
2	Muslim	22	22%
3	Christian	1	1%
Total		100	100%

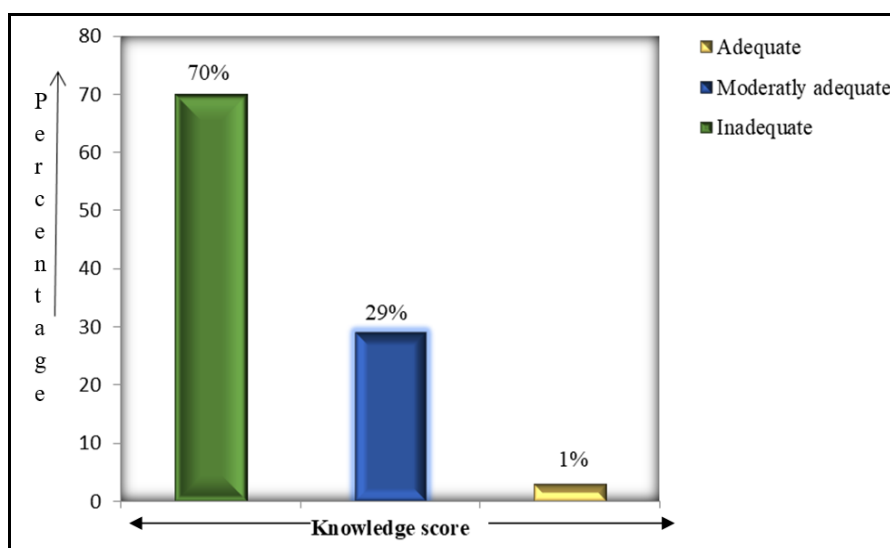


Fig 1: Distribution of food handlers according to their overall knowledge level regarding food hygiene n = 100

The results show that 70 (70%) had inadequate knowledge, 29 (29%) had moderately adequate knowledge, and only 1

(1%) had adequate knowledge regarding food hygiene.

Table 2: Descriptive statistics for total knowledge score obtained

n = 100			
Variables	N	Mean	SD
Knowledge Score	100	22.64	5.80

The results of this study showed that the overall knowledge mean score was 22.64 (SD±5.80), which showed that food handlers had inadequate knowledge regarding food Hygiene, out of 100 food handlers 70 (70%) had inadequate knowledge 29 (29%) had moderately adequate knowledge and only 1 (1%) had adequate knowledge.

Data reveals that the majority, 82 (82%) of food handlers, had inadequate knowledge regarding food storage. The majority, 69 (69%) of them, had inadequate knowledge regarding food poisoning and food hygiene, and only 6 (6%) of them had adequate knowledge regarding the prevention of food poisoning.

Table 3: Association between the demographic variables and knowledge level of food handlers regarding food hygiene

n = 100										
Demographic variables	Category	Knowledge scoring						Total	χ^2 Value	P Value
		Adequate		Moderately Adequate		Inadequate				
		No	%	No	%	No	%			
Age group	18-25 years	1	13	7	22	24	75	32	3.026 DF = 6	0.805 NS
	26-35 years	0	0	6	30	14	70	20		
	36-45 years	0	0	6	26	17	74	23		
	Above 45 years	0	0	9	36	16	64	25		
Gender	Male	1	1.2	25	29.4	59	69.4	85	0.036 DF = 2	0.982 NS
	Female	0	0	5	33	10	67	15		
Education	Primary school certificate	0	0	5	62.5	3	37.5	8	12.24 DF = 12	0.426 NS
	Middle school certificate	0	0	5	29.5	12	70.5	17		
	High school certificate	0	0	7	21.8	25	78.2	32		
	Pre-university certificate	1	4	5	20	19	76	25		
	Undergraduate	0	0	4	40	6	60	10		
	Post graduate	0	0	0	0	3	100	3		
Training	Illiterate	0	0	2	40	3	60	5	14.6 DF = 4	0.005 S
	Trained	1	3	5	15	27	82	33		
	Untrained	0	0	8	47	9	53	17		
Experience	Taught by someone	0	0	15	30	35	70	50	1.133 DF = 4	0.889 NS
	Less than 1 year	0	0	2	20	8	80	10		
	1-3 years	0	0	5	23.8	16	76.2	21		
Type of food handled	More than 3 years	1	1.4	21	30.4	47	68.2	69	5.46 DF = 4	0.243 NS
	Vegetarian	0	0	15	35.7	27	64.3	42		
	Non-vegetarian	0	0	6	30	14	70	20		
Religion	Mixed	1	2.7	6	15.7	31	81.6	38	3.327 DF = 4	0.50 NS
	Hindu	1	1.3	22	28.7	54	70	77		
	Muslim	0	0	5	22.7	17	77.3	22		
	Christian	0	0	1	100	0	0	1		

NS-Not Significant S-Significant Association

Between the demographic variables and knowledge were analyzed using χ^2 test. The results reveal a significant association between knowledge and training (P = 0.005) and no significant association between knowledge and age group, gender, education, experience and religion.

5. Discussion

The results obtained are crucial for comprehending how demographic elements can affect awareness of food hygiene, which may subsequently influence food safety practices in various settings.

Age was divided into four groups: 18-25, 26-35, 36-45, and over 45 years. The chi-square result for age ($\chi^2 = 3.026$, DF = 6, P = 0.805) indicates no statistically significant relationship between age and knowledge levels. A considerable proportion of participants across all age ranges

showed insufficient knowledge, particularly those aged 18-25 and over 45. This suggests that age alone may not be a determining factor in food hygiene knowledge. The youngest group (18-25 years) exhibited the highest level of inadequate knowledge, potentially due to limited experience, while the oldest group might have received less education on modern food hygiene standards.

Training was the only demographic variable with a statistically significant association with knowledge levels ($\chi^2 = 14.6$, DF = 4, P = 0.005). Food handlers who had received formal training exhibited higher levels of adequate and moderately adequate knowledge compared to those who were untrained. Specifically, 82% of trained food handlers had inadequate knowledge, whereas 53% of untrained individuals had inadequate knowledge. This highlights the critical role that training plays in improving food hygiene

knowledge, reinforcing the need for structured training programs to enhance food safety practices.

6. Conclusion

This suggests that training is the most significant factor associated with food hygiene knowledge, underscoring the importance of formal training programs for food handlers. While other variables like age, gender, education, and experience showed no statistically significant associations, it is still important to consider these factors when designing interventions to improve food safety. For instance, younger and less educated food handlers may benefit from targeted educational programs. In contrast, training programs can be customised to address the specific needs of those handling different types of food.

Overall, this study highlights that food safety knowledge remains inadequate among a significant portion of food handlers. Public health policies should focus on implementing regular training sessions and updating the knowledge of food handlers, particularly in settings where formal education levels may be low. Improving food hygiene knowledge can reduce the risk of foodborne illnesses, ultimately promoting better health outcomes for consumers.

7. Conflict of Interest

Not available

8. Financial Support

Not available

9. References

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