Original Research

KNOWLEDGE, ATTITUDE AND PRACTICES REGARDING FOOD SAFETY AND HYGIENE AMONG FOOD HANDLERS IN A FIELD PRACTICE AREA OF A GOVERNMENT TERTIARY CARE CENTER IN SALEM, TAMIL NADU

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ABSTRACT

Background: Food safety is an important public health issue worldwide. Food contamination at different stages of preparation and handling can lead to food-borne diseases, which remain a major cause of morbidity and mortality, particularly in developing countries. Assessing knowledge, attitudes, and practices (KAP) among food handlers is essential for preventing food contamination and improving public health. **Objectives:** To assess the knowledge, attitude, and practices regarding food safety and hygiene among food handlers in a selected rural area of Salem district, Tamil Nadu, and to determine the association between socio-demographic factors and KAP levels. **Methods:** A community-based cross-sectional study was conducted among 200 households in the field practice area of a government tertiary care center, Salem, Tamil Nadu, from March 2024 to August 2024. Participants were selected using stratified random sampling from the village family register. Data were collected using a structured questionnaire covering socio-demographic characteristics and knowledge, attitude, and practices related to food safety and hygiene. Data were entered in Epi Info and analyzed using SPSS version 21. Descriptive statistics such as frequencies and percentages were used to summarize the data, and the Chi-square test was applied to assess associations between variables. A p-value <0.05 was considered statistically significant. **Results:** Among the 200 participants, 47% were aged 31–45 years and 78.5% were females. Good knowledge regarding food safety was observed in 60% of participants, while good attitudes and practices were observed in 57.5% and 66% respectively. About 78.5% were aware of food-borne diseases and 90% knew that hand washing prevents food contamination. Significant associations were observed between knowledge and attitude (p=0.009) and between knowledge and practices (p<0.001). Socioeconomic status and educational level were also significantly associated with knowledge and practices. **Conclusion:** Although a considerable proportion of participants demonstrated good knowledge and practices regarding food safety, several unsafe food handling practices still persist. Community health education programs and awareness campaigns are essential to improve food hygiene practices and prevent food-borne diseases in rural areas.

Keywords: Food Safety, Food Hygiene, Knowledge Attitude Practice, Food Handlers, Rural Population, Food-Borne Diseases, Public Health, Cross-Sectional Study.

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INTRODUCTION

Food is a fundamental necessity for human survival and plays an essential role in maintaining health and well-being. However, food can become contaminated at various stages, including production, processing, storage, transportation, preparation, and consumption. Ensuring safe food handling practices is therefore crucial for preventing

food-borne diseases and protecting public health. Food contaminated with harmful microorganisms such as bacteria, viruses, parasites, or chemical substances can lead to a wide spectrum of illnesses ranging from mild gastrointestinal disorders to severe complications such as malnutrition, systemic infections, and even cancer[1].

Food-borne diseases continue to be a major global public health challenge, particularly in developing countries where food safety infrastructure and awareness may be limited. According to the World Health Organization (WHO), unsafe food contributes significantly to the global burden of disease, causing approximately 3–5 billion cases of infectious diarrhoeal diseases each year and nearly 1.8 million deaths annually, especially among children[1]. In the Southeast Asian region alone, more than 150 million people suffer from food-borne illnesses each year, highlighting the magnitude of the problem[2]. Although regulatory authorities such as the Food Safety and Standards Authority of India (FSSAI) have established guidelines and standards for food safety, food contamination and food-borne outbreaks continue to occur due to inadequate implementation of hygienic practices and lack of awareness among food handlers[3].

Maintaining food safety and avoiding contamination are crucial tasks for food workers. Their level of knowledge, attitudes, and hygienic practices directly influence the safety and quality of food consumed by households and communities. Inadequate knowledge about safe food handling, poor personal hygiene, improper storage of food items, and unsafe cooking practices can significantly increase the risk of food contamination and disease transmission[4]. Studies conducted in different parts of the world have shown that poor food safety awareness among food handlers contributes to microbial contamination of food and increases the likelihood of food-borne illnesses[5].

Several studies have assessed the knowledge, attitude, and practices (KAP) related to food safety among food handlers in various settings. Research conducted in India has demonstrated that although some individuals possess basic awareness regarding food hygiene, many still follow unsafe food handling practices due to lack of education, inadequate training, and poor access to health information[8]. Similar findings have been reported in studies conducted in Malaysia, Ethiopia, and Ghana, where gaps in food safety knowledge and hygiene practices among food handlers were identified[7]. These studies emphasize the importance of community-based health education and awareness programs to promote safe food handling practices.

In rural communities, household food handlers—particularly women responsible for food preparation—play a vital role in maintaining food hygiene. However, limited awareness, socioeconomic factors, and traditional cooking practices may influence food safety behaviors in such settings. Understanding the existing level of knowledge, attitudes, and practices related to food hygiene among rural populations is therefore essential for designing effective public health interventions.

Hence, the present study was conducted to assess the knowledge, attitude, and practices regarding food safety and hygiene among food handlers in a selected rural area of Salem district, Tamil Nadu, and to determine the association between socio-demographic factors and food safety practices.

Aim and Objectives

Aim

To assess the knowledge, attitude, and practices regarding food safety and hygiene among food handlers in a field practice area of a government tertiary care center in Salem, Tamil Nadu.

Objectives

1. To evaluate the knowledge, attitude, and practices related to food safety and hygiene among food handlers in a selected rural area of Salem district, Tamil Nadu.
2. To determine the association between socio-demographic factors and the knowledge, attitude, and practices related to food safety and hygiene among the study population.

MATERIALS AND METHODS

Study Design and Settings

A community-based cross-sectional study was conducted to assess the knowledge, attitude, and practices regarding food safety and hygiene among food handlers in a rural area. The study was conducted in the field practice area of a government tertiary care center in Salem, Tamil Nadu. The area consists of several households with predominantly rural populations where food preparation is primarily carried out within households. The village consists of several households with predominantly rural populations where food preparation is primarily carried out within households.

Study Period

The study was conducted over a period of six months from March 2024 to August 2024. During this period, data collection was carried out through household visits by the investigator.

Study Population

The study population included adult residents of the field practice area of the Government tertiary care center in Salem who were actively involved in food preparation and food handling in their households. In most households, women were responsible for cooking and food handling; therefore, they constituted the majority of respondents in the study.

Sample Size

The required sample size for the study was calculated using the standard formula for estimating sample size in prevalence studies:

$$n = \frac{4pq}{d^2}$$

Where:
n = required sample size
p = prevalence of the variable under study
q = 1 – p
d = allowable error (precision)

The prevalence value (p) was obtained from a previous study conducted among rural populations in Tamil Nadu, which reported a prevalence of 15% for inadequate food safety awareness. Considering a 95% confidence interval and 5% allowable error, the minimum required sample size was calculated to be 200 participants. Therefore, a total of 200 respondents were included in the present study.

Sampling Technique

A stratified random sampling method was used to select participants for the study. The family register maintained in the health records of the field practice area served as the sampling frame. Households were first identified from the family register, and eligible participants who were responsible for food preparation were selected. From each household, one respondent who met the inclusion criteria was selected. In cases where more than one individual was involved in food preparation, one participant was selected randomly.

Eligibility Criteria

Inclusion Criteria

Participants were included in the study if they met the following criteria:

- Individuals actively involved in food preparation and handling within their households.
- Adults aged 18 years and above.
- Participants who were willing to provide informed consent to participate in the study.

Exclusion Criteria

Participants were excluded from the study if:

- The household members were not available even after two consecutive visits by the investigator.
- Individuals were not directly involved in food preparation or handling.
- Participants declined to provide informed consent.

Data Collection Tool

Data were collected using a pre-designed and pre-tested structured questionnaire. The questionnaire was developed based on previously published studies on food hygiene and safety and was modified to suit the local context of the study population.

The questionnaire consisted of Four Major Sections:

1. **Socio-Demographic Characteristics:**

This section collected information regarding age, gender, education level, occupation, marital status, family size, and socioeconomic status.

2. **Knowledge Related To Food Safety and Hygiene:**

Questions in this section assessed participants' awareness regarding food-borne diseases, sources of food contamination, safe food storage, hand hygiene practices, and knowledge about hygienic food preparation.

3. **Attitude Towards Food Hygiene and Safety:**

This section included questions assessing participants' perceptions and attitudes towards safe food handling practices such as checking food labels, purchasing food from reliable sources, and maintaining kitchen hygiene.

4. **Food Hygiene Practices:**

This section assessed the actual practices followed by participants during food preparation and handling, including washing of fruits and vegetables, food storage practices, use of cooking utensils, reheating of food, hand washing practices, and waste disposal methods.

Data Collection Procedure

During household visits, in-person interviews were used to gather data. The investigator gave the participants an explanation of the study's goals and purpose before distributing the questionnaire. Participants were assured that their responses would remain confidential and would be used only for research purposes.

Every interview lasted between fifteen and twenty minutes. Before recording the participant's answers, the investigator made sure they understood each question.

Ethical Considerations

The Institutional Ethics Committee of Government Mohan Kumaramangalam Medical College in Salem examined and approved the study protocol. Before any data was collected, all participants provided written informed consent. Participant information was kept completely confidential.

Data Management and Statistical Analysis

The collected data were coded and entered into Epi Info software and subsequently analyzed using the Statistical Package for Social Sciences (SPSS) version 21. Descriptive statistics such as frequencies, percentages, and mean scores were used to summarize the socio-demographic characteristics and KAP variables.

Knowledge, attitude, and practice scores were categorized as good or poor based on the mean score obtained. The association between knowledge, attitude, practices, and socio-demographic variables was assessed using the Chi-square test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 200 participants involved in food preparation and handling within their households were included in the study. The findings are presented under socio-demographic characteristics, household characteristics, knowledge, attitude, and practices regarding food safety and hygiene.

Socio-Demographic Characteristics

The socio-demographic profile of the study participants is shown in Table 1. Nearly half of the participants (47%) belonged to the 31–45 years age group, while 29.5% were aged 46–60 years. Only 5.5% of respondents were above 60 years of age. Females constituted the majority (78.5%) of respondents.

Regarding education, 28% were illiterate, 26% had completed high school, and 25% had middle school education. Only a small proportion had higher education such as graduation (8.5%) or professional degrees (2%).

Table 1: Socio-Demographic Characteristics of Study Participants (N = 200)

Variable	Category	Frequency	Percentage (%)
Age	15–30 years	36	18.0
	31–45 years	94	47.0
	46–60 years	59	29.5
	>60 years	11	5.5
Gender	Male	42	21.0
	Female	157	78.5
	Transgender	1	0.5
Education	Illiterate	56	28.0
	Primary school	15	7.5
	Middle school	50	25.0
	High school	52	26.0
	Diploma	6	3.0
	Graduate	17	8.5
	Professional degree	4	2.0

Household Characteristics

Household characteristics related to cooking practices are shown in Table 2. Most households (78%) had a separate room for cooking, while 22% did not. The majority of participants (93%) used gas or induction stoves for cooking. Almost all respondents (98%) reported following a mixed diet, and 55.5% reported having a smoke outlet in their kitchen.

Table 2: Household Characteristics (N = 200)

Variable	Category	Frequency	Percentage (%)
Separate cooking room	Yes	156	78.0
	No	44	22.0
Cooking fuel	Gas/Induction	186	93.0
	Others	14	7.0
Dietary practice	Vegetarian	4	2.0
	Mixed diet	196	98.0
Smoke outlet in kitchen	Yes	111	55.5
	No	89	44.5

Knowledge Related to Food Hygiene and Safety

Knowledge regarding food hygiene and safety is summarized in Table 3. About 78.5% of participants were aware of food-borne diseases, and 83% knew that flies could transmit food-borne diseases. Awareness regarding proper storage of raw food materials was reported by 83.5% of respondents. However, gaps in knowledge were observed. About 62% were unaware that repeated washing of rice reduces nutritive value, and 60% were unaware of using separate cutting boards for vegetarian and non-vegetarian foods.

Table 3: Knowledge Regarding Food Hygiene and Safety (N = 200)

Variable	Yes N (%)	No N (%)
Awareness of food-borne diseases	157 (78.5)	43 (21.5)
Flies cause food-borne diseases	166 (83.0)	34 (17.0)
Rodents cause food-borne diseases	152 (76.0)	48 (24.0)

Proper storage of raw food materials	167 (83.5)	33 (16.5)
Hand washing prevents disease	180 (90.0)	20 (10.0)
Importance of iodized salt	154 (77.0)	46 (23.0)

Attitude towards Food Hygiene

Participants' attitudes towards food safety practices are shown in Table 4. Most respondents (80%) checked the expiry date of food products, while 66.5% checked the brand name before purchasing food. Approximately 70.5% took care while purchasing eggs.

Table 4: Attitude towards Food Hygiene and Safety (N = 200)

Variable	Category	Frequency	Percentage
Check brand while buying food	Yes	133	66.5
	No	67	33.5
Check expiry date	Yes	160	80.0
	No	40	20.0
Check milk label/expiry	Yes	162	81.0
	No	38	19.0
Take care while buying eggs	Yes	141	70.5
	No	59	29.5

Practices Related to Food Hygiene

Food hygiene practices followed by the participants are shown in Table 5. Most participants reported good handwashing practices (96%), while 79.5% properly stored raw food materials. However, only 38% used separate cutting boards for vegetarian and non-vegetarian foods, and 64% did not store cooked food properly.

Table 5: Food Hygiene Practices Among Participants (N = 200)

Practice	Good n (%)	Poor n (%)
Presence of flies in kitchen	140 (70.0)	60 (30.0)
Presence of rodents	141 (70.5)	59 (29.5)
Proper storage of raw food	159 (79.5)	41 (20.5)
Separate knife for veg/non-veg	76 (38.0)	124 (62.0)
Hand washing regularly	192 (96.0)	8 (4.0)
Proper washing of fruits/vegetables	162 (81.0)	38 (19.0)

Association between Knowledge and Attitude

Table 6: Association between Knowledge and Attitude (N = 200)

Association between attitude and knowledge		Knowledge Mean Score		Total	P Value
		Good	Bad		
Attitude Mean Score	Good	78(39.0%)	37(18.5%)	115(57.5%)	.009
	Bad	42(21.0%)	43(21.5%)	85(42.5%)	

Chi-square test: p = 0.009 (Statistically significant)

On comparing, the association between attitude and knowledge was found to be statistically significant.

Association between Attitude and Practices

Table 7: Association between Attitude and Practices (N = 200)

Association between attitude and practices		Practices Mean Score		Total	P Value
		Good	Bad		
Attitude Mean Score	Good	82(41.0%)	33(16.5%)	115(57.5%)	.065
	Bad	50(25.0%)	35(17.5%)	85(42.5%)	

Chi-square test: p = 0.065 (Not significant)

In this study population, the association between attitudes with practices was found to be statistically not significant.

Association between Knowledge and Practices

Table 8: Association between Knowledge and Practices (N = 200)

Association Between Knowledge and Practices		Practices Mean Score		Total	P Value
		Good	Bad		
Knowledge Mean Score	Good	95(47.5%)	25(12.5%)	120(60.0%)	<0.001
	Bad	37(18.5%)	43(21.5%)	80(40.0%)	

Chi-square test: $p < 0.001$ (Highly significant)

The above study population shows that practices were closely linked to knowledge and hence the association between knowledge and practices were found statistically significant.

DISCUSSION

In this cross-sectional study, data were collected using a structured questionnaire to evaluate the knowledge, attitude, and practices related to food safety and hygiene among households in the field practice area. The findings revealed that the majority of study participants belonged to the 31–45 years age group, and individuals in this age group demonstrated better awareness regarding food safety and hygiene practices[6]. The study population consisted mainly of female respondents (78%), which reflects the important role of women in food preparation within households[5]. Among the participants, many had completed high school education, which may have contributed to improved knowledge regarding food hygiene and safety practices[7]. In addition, a significant proportion of female respondents were housewives (40%), who were primarily responsible for food preparation and handling in their homes[8].

Most of the families included in the study consisted of two to five members, which is similar to observations reported in other household-based studies[6]. The study population also included vulnerable groups such as antenatal mothers and children under five years of age, who are more susceptible to food-borne diseases[1]. Household environmental conditions play an important role in maintaining food hygiene. In the present study, the majority of households had a separate room for cooking, which helps maintain better kitchen hygiene[9]. Furthermore, many kitchens were equipped with smoke outlets, which improve ventilation and reduce indoor air pollution. Most households used gas or induction stoves for cooking, which are considered cleaner and safer cooking fuels[10]. Additionally, the majority of participants followed a mixed dietary pattern.

With regard to attitudes toward food safety practices, the study found that 66.5% of participants were aware of the importance of checking brand names while purchasing raw food items, and 81% reported checking the brand, labeling, and expiry date before buying food products. These findings indicate that many participants had a positive attitude toward safe food purchasing practices. Additionally, 61% of respondents reported controlling rodents in the kitchen by closing entry points, indicating awareness regarding rodent-related contamination. However, 73% of respondents reported that their families had experienced food-borne illness due to street food consumption, suggesting that street food remains a potential health risk within the community[3].

Regarding knowledge related to food safety and hygiene, the results showed that 78.5% of participants were aware of food-borne diseases, while 72.5% understood the modes of transmission. Knowledge regarding contamination through rodents was reported by 76% of respondents, and 83.5% were aware of proper storage of raw food materials. Similarly, 83% of participants knew that fruits and vegetables should be washed before consumption[3]. However, only 40% of participants reported using separate knives for cutting vegetarian and non-vegetarian foods, indicating a gap in safe food handling practices. In addition, 67.5% of respondents were aware that overcooking food can reduce its nutritional value, and 90% knew that proper hand washing helps prevent food-borne diseases[5]. The majority of respondents (84.5%) were aware of proper disposal of kitchen waste, while 43.5% had knowledge regarding the importance of deworming. The findings also indicated that the average knowledge score increased with the educational level of the respondents, highlighting the role of education in improving food safety awareness.

In terms of food hygiene practices, the study revealed that about 70% of participants reported the presence of flies in their kitchens, and 70.5% reported rodent infestation, which may increase the risk of food contamination[3]. Regarding food storage practices, 79.5% of participants stored raw food items properly, indicating relatively good storage practices. About 83% of respondents prepared fresh

food daily, while 32% reported reheating cooked food. Most participants (79%) used healthy cooking oil, although 38% reported reusing cooking oil, which may pose health risks. Additionally, 85% of respondents washed fruits and vegetables properly, and 66% reported cooking vegetables adequately[12].

Hand hygiene practices were generally good among the study population. Nearly 96% of respondents reported washing their hands before food preparation, and 82% maintained proper hand hygiene practices[12]. Proper hand washing before and after food handling is essential in preventing food-borne illnesses. Approximately 60% of households used separate water sources for cooking and drinking, while 28% of participants reported frequent consumption of street food. Regarding deworming practices, 21% of households reported deworming all family members, whereas 17% reported deworming only children.

The study also examined the relationship between knowledge, attitude, and practices related to food hygiene. A significant association was observed between knowledge and attitude, whereas the association between attitude and practice was less significant, suggesting that positive attitudes alone may not always translate into safe food handling practices[11]. However, the results confirmed that food hygiene practices were closely linked with the level of knowledge, indicating that improved awareness can lead to better hygienic practices.

Furthermore, the study found that knowledge was significantly associated with age group, while gender showed no significant association with knowledge, attitude, or practices[13]. Educational status of the respondent was significantly associated with knowledge levels, and the education of the head of the household was significantly associated with food hygiene practices[6]. Additionally, socioeconomic status showed a significant association with both knowledge and practices related to food hygiene, emphasizing the influence of social and economic factors on household food safety behaviors.

CONCLUSION

Food safety is an essential component of public health and involves maintaining hygiene throughout the food chain from production to consumption. Food contamination at any stage can lead to outbreaks of food-borne diseases and pose significant health risks. The findings of the present study highlight several gaps in food hygiene practices among the study population. Many unsafe practices observed were mainly associated with inadequate knowledge regarding proper food handling and hygiene measures. This emphasizes the need to improve awareness about food safety among rural communities. Strengthening health education and awareness programs can help promote safer food handling practices. Collaborative efforts from local government authorities, non-governmental organizations (NGOs), and community groups are necessary to implement effective food safety interventions and reduce the burden of food-borne illnesses in rural areas.

Recommendation

Improving community awareness about food hygiene and safe food handling is essential to prevent food-borne diseases. Health education programs should promote the use of smoke outlets in kitchens, discourage excessive use of aluminium vessels, and highlight nutrient loss from repeated washing of rice. Emphasis on proper hand hygiene for food handlers is important. Awareness campaigns through posters, health programs, and street plays can effectively educate communities.

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