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Food safety knowledge, attitude and hygiene practices of fast-food restaurants in Tabuk, Saudi Arabia

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Abstract

Despite achievements in knowledge and technology in the last few years, foodborne diseases are still a worldwide concern. With the increasing rate of food eaten away from home, food safety knowledge and practices play a substantial role in preventing foodborne diseases and protecting the health of consumers. In its latest report on the foodborne illness problem, the World Health Organization (WHO) recorded that 420,000 deaths and 600 million cases occur each year because of foodborne illness. This study aims to evaluate the food safety knowledge, attitudes, and hygiene habits of fast-food restaurant workers in Tabuk, Saudi Arabia. A cross-sectional survey was carried out among several food handlers from various fast-food establishments. Data were collected through a structured questionnaire assessing their knowledge, attitudes, and self-reported habits regarding food safety and hygiene. The results revealed that while the majority of participants had adequate knowledge of the principles of food safety, there were gaps in their attitudes and reported practices. Significant correlations were found between knowledge levels, educational attainment, and years of experience. The study highlights the need for continuous training and reinforcement of food safety protocols in the fast-food industry to ensure consumer protection and prevent foodborne illnesses.

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Introduction

Food safety is a global substantial concern despite technological developments, regional strategies, and investments in recent years. Health administrators, researchers, and institutions are pursuing strategies to alleviate the hazards and effects of foodborne sickness (Thimoteo da Cunha, 2021). Thus, food safety is a very important issue in the food service industry, particularly in fast-food restaurants, where large volumes of food are prepared and served to numerous customers daily. Foodborne illnesses pose significant public health risks and can have severe consequences for consumers, as well as detrimental effects on the reputation and financial viability of food establishments (Prentice and Jebb, 2003). Research has indicated that the upsurge in foodborne infections can be attributed to inappropriate food safety habits in homes, as home settings can hold a group of foodborne pathogens (Moreb *et al.*, 2017).

In Saudi Arabia, the rapidly growing fast-food sector has raised concerns about the observance of food safety standards as well as the implementation of proper hygiene practices (Fahad *et al.*, 2021). Tabuk, a major city in northwestern Saudi Arabia, has witnessed a surge in fast-food establishments catering to diverse consumer preferences. However, little is known about the food safety knowledge, attitudes, and hygiene habits of food supervisors in these establishments. The current study aims to bridge this gap by assessing the current state of food safety awareness and habits among fast-food restaurant workers in Tabuk.

The outcomes of this research will bring about worthy perceptions into the strengths and weaknesses of food safety practices in the local fast-food industry, enabling targeted interventions and training programs to enhance food safety compliance and protect public health. Additionally, the study contributes to the broader understanding of food safety challenges in the fast-food sector, informing policymakers and industry stakeholders in developing effective strategies and regulations.

Food safety is a multidisciplinary field that encompasses various aspects of food production, handling, and consumption. Numerous models and theories have been developed to comprehend and address food safety issues, providing a theoretical foundation for research and practice in this area. Here's an overview of some relevant theoretical backgrounds. The Hazard Analysis Critical Control Point (HACCP) system is a widely recognized and organized approach to food safety management. It is a systematic approach to identifying, evaluating, and managing food safety risks. It is centred on the principle of identifying potential risks, identifying serious control points, determining critical restrictions, and implementing observing and corrective measures.

The HACCP framework is grounded in the principles of risk assessment and preventive measures, aiming to ensure food safety throughout the food production chain. HACCP is developed to be used in all sectors of the food industry from planting, processing, harvesting, manufacturing, distribution, and marketing to preparing food for consumption (HACCP Principles & Application Guidelines, 2022).

The Theory of Planned Behaviour (TPB) is a social psychology theory that has been applied to understand and predict food managers' aims and manners in respect of food safety practices (Pereira, 2005). Corresponding to the TPB, a person's manner is affected by their views, individual norms, and apparent behaviour control. The theory connects beliefs to behaviour. The theory claims that three core elements, specifically, attitude, individual norms, and apparent behavioural control, together shape the person's behavioural intents. In turn, a principle of TPB is that behavioural intention is the most proximal determining factor of human social behaviour. This theory provides a framework for examining the factors that shape food handlers' attitudes and intentions toward food safety practices.

The Knowledge-Attitude-Practice (KAP) Model is widely used in health education and promotion

studies, including food safety research (Jaworowska, 2013). It suggests that knowledge influences attitudes, which consecutively impact habits or conduct. By assessing food handlers' knowledge, attitudes, and practices, researchers can identify gaps and design targeted interventions to improve food safety compliance. According to Payette and Shatenstein (2005), the choice of food and associated behaviours are influenced by biological changes, health status caused by functional abilities and aging, which are facilitated on a large scale by family, societal and commercial aspects determining factor of healthy eating stem from individual and collective factors. Individual factors comprise gender, age, educational level, health and biological problems, psychological features, lifestyle practices, and awareness, manners, opinions and behaviours, as well as other general nutritional determining factor like culture, income and social status.

Collective factors of healthful food consumption, such as reachable food labels, a suitable food buying setting, the spreading of the "healthy eating" message, suitable societal help and providing effective, communal-based meal distribution services have the ability to spread alimentary habits and consequently promote healthful eating to Food safety culture is a concept that underlines the shared values, beliefs, and norms within an institution that influence food safety behaviours and practices (Payette and Shatenstein, 2005). A robust food safety culture is assumed to foster a pre-emptive approach to food safety, where all stakeholders are committed to preserving high standards and continually developing food safety practices.

The risk analysis framework, as outlined by the National Advisory Committee on Microbiological Criteria for Foods, comprises three elements: hazard evaluation, hazard control, and hazard communication (Hamed and Mohammed, 2019). The World Health Organization identifies five factors related to the existence of foodborne sicknesses comprising unsanitary habits and inadequate cleanliness by food supervisors, insufficient cookery

measures, inappropriate storing without bearing in mind temperature requirements, cross-contamination, and obtaining food from insecure sources. Food supervisors who are concerned with food production and preparation are responsible for the majority of these factors. Food management comprises all stages of storage, cookery, and conserving food until the stage of ultimate consumption. This framework provides a systematic methodology for recognizing and analyzing food safety risks, implementing appropriate control measures, and communicating risk-related information to relevant stakeholders.

These theoretical backgrounds provide valuable perspectives and frameworks for understanding and addressing food safety issues in the fast-food industry. Researchers can draw upon these theories and models to design their studies, interpret findings, and develop effective interventions and strategies for improving food safety knowledge, attitudes, and practices among food handlers. While knowledge is essential, food handlers' attitudes and perceptions towards food safety also play a significant role in shaping their practices (Jaworowska *et al.*, 2013). Several studies have explored the relation between attitudes and food safety behaviours, with some suggesting that positive attitudes are associated with better compliance (Payette and Shatenstein, 2005; Hamed and Mohammed, 2019). However, conflicting findings have also been reported, highlighting the need for further investigation into the complex interplay of factors influencing food handlers' attitudes and behaviours (Buccheri *et al.*, 2010). Observational studies and self-reported data have been used to assess food handlers' hygiene practices in various food service settings, including fast food restaurants (Soares *et al.*, 2012; Tabachnick and Fidell, 2007; Pallant, 2020). These studies have identified common areas of concern, such as inadequate hand wash, improper temperature control, and cross-contamination. However, the reliability of self-reported data has been questioned, and observational methods may not capture the full range of practices.

The effectiveness of training programs and intervention strategies in enhancing food safety knowledge, attitudes, and practices among food handlers was investigated (Dancey and Reidy, 2011). While some studies have reported positive outcomes, others have highlighted the need for tailored and culturally appropriate approaches to ensure sustained behaviour change.

This study aimed to understand food handlers' knowledge, attitudes, and practices in the fast-food industry, as well as the need for effective training and intervention strategies in Tabuk, Saudi Arabia, and the cultural and socioeconomic factors that may influence food safety compliance.

Materials and methods

Study design

The present study utilized a cross-sectional questionnaire design to evaluate the food safety knowledge, attitudes, and hygiene habits of fast-food restaurant workers in Tabuk, Saudi Arabia.

Study population and sampling

The population of the study consisted of food managers who work in fast-food restaurants in Tabuk. A stratified random sampling technique was used to ensure representation from different types of fast-food establishments (e.g., local chains, international franchises, and independent restaurants). The sample size was calculated using a formula for estimating proportions, considering a confidence level of 95% and a margin of error of 5%.

Data collection

Data were gathered utilizing a constructed survey, which was developed, based on former studies and adjusted to the local context. The questionnaire consisted of four main sections:

1. Demographic information (e.g., age, gender, education level)
2. Food safety knowledge assessment (multiple-choice questions covering areas such as personal hygiene, and food handling)
3. Attitudes toward food safety (Likert-scale statements to measure perceptions and beliefs)

4. Self-reported hygiene practices (frequency of specific practices related to hand washing, food preparation, and cleaning procedures).

Data collection procedures

Data collection was carried out by trained research assistants who visited the selected fast-food restaurants. Participants were briefed about the study objectives and afforded informed approval before filling out the survey. Privacy and secrecy were guaranteed throughout the process.

Data analysis

The data collected were analysed utilizing proper statistical software. Informative statistics (frequencies, percentages, means, and standard deviations) were calculated to sum up the demographic characteristics, knowledge levels, attitudes, and reported practices. Inferential statistics, such as t-test, were employed to examine relationships between variables and identify considerations related to food safety knowledge, attitudes, and habits.

Ethical considerations

Participants (196) in the study were optional, and contributors' anonymity and confidentiality were maintained throughout the research process. They were treated respectfully and were allowed to stop participation whenever they liked.

Descriptive statistics

Descriptive statistics can be used to understand sample characteristics and the frequency distribution of responses to different questions. After inputting the data into SPSS, frequencies and percentages were calculated for demographic variables.

Results

Demographic characteristics

Based on the data given in Table (1), most of the contributors' ages were between 20 and 40 years (66.3%) and the oldest who are over 60 are only (1.5%). 48% of them are males and 52% females. As for the educational level, the majority (76.5%) have a

university degree while (23.5%) of them do not have a university degree. Almost half of the participants (54.6%) are government employees, (25.5%) are still students, (11.2%) work in the private sector and (8.7%) of them have no job. Concerning the question "Do you have chronic diseases?", (88.3) of the participants answered "no", while only (11.7%) answered "yes".

Table 2 shows that the mean column shows that means range from 2.96 (statement 10) to 4.00 (statement 4), indicating that on average, participants agreed with the statements, as the means are above the test value of 0 used in the one-sample t-tests.

Descriptive statistics of the questionnaire's statements

No statistically significant differences attributable to gender were found. Subsequently, one-way analysis of variance (ANOVA) was performed to detect differences between age groups, educational levels, and occupational statuses. Statistically significant differences were found in some

questions attributable to age, with the older age group (40 years and above) being more likely to agree that fast food is unhealthy and causes health problems.

Using Pearson correlation coefficient, a strong positive correlation was found between the frequency of fast-food consumption and the occurrence of health issues among respondents themselves or their family/friends. The higher the frequency of fast-food consumption, the higher the probability of health problems.

Exploratory factor analysis

An exploratory factor analysis was carried out utilizing Principal Component Analysis with Varimax rotation. Three main factors explaining approximately 60% of the total variance in the data were extracted. The first factor represented "health and nutrition awareness," the second factor represented "cleanliness and safety in fast food restaurants," and the third factor represented "fast food consumption habits and practices".

Table 1. The demographic characteristics of the sample (N= 196)

Variable	Levels	Frequency	Percentage (%)
Age	Under 20	16	8.2%
	20-40	130	66.3%
	40-60	47	24%
	Over 60	3	1.5%
Gender	Male	94	48%
	female	102	52%
Educational level	Below Bachelor's	46	23.5%
	Bachelor's	150	76.5%
Occupation	No job	17	8.7%
	Student	50	25.5%
	Government employee	107	54.6%
	Private sector employee	22	11.2%

Table 2. Descriptive statistics of the questionnaire's statements (N=196)

Statement		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Standard deviation	Mean
1-Do you have fast-food?	N	79	66	22	25	4	8.93	3.79
	%	40.3%	33.87%	11.2%	12.8%	2%		
2-How often do you have fast-food?	N	55	93	32	11	5	1.2	3.92
	%	28%	47.4%	1.6%	5.6%	2.6%		
3-Do your family members or friends have fast-food?	N	86	53	12	42	3	1.12	3.90
	%	43.9%	27%	6.1%	21.4%	1.5%		
4-How often do them (your family members and friends) have fast-food?	N	76	72	22	24	2	1.1	4.00
	%	38.8%	36.7%	11.2%	12.2%	1%		
5-Did you have any health	N	51	38	53	21	33	1.51	3.27

problems because of having fast-food?	%	26.0%	19.4%	27%	10.7%	16.8%		
6-Did your family members or friends have any health problems because of having fast-food?	N	66	43	45	24	18		
	%	33.7%	21.9%	23%	12.2%	9.2%	1.47	3.58
7-Are you satisfied with the cleanness of the fast-food restaurants in Tabuk?	N	36	84	40	10	26		
	%	18.4%	42.9%	20.4%	5.1%	13.3%	1.34	3.47
8-Did you heard about poisoning cases because of having fast-food?	N	76	33	18	62	7		
	%	38.8%	16.8%	9.2%	3.2%	3.6%	1.45	3.56
9-Do workers in fast-food restaurants follow the cleanness and prevention measures required for safety?	N	37	84	42	15	18		
	%	18.9%	42.9%	21.4%	7.7%	9.1%	1.33	3.54
10-Is there suggestions or customers' satisfaction evaluation box?	N	26	48	62	14	46		
	%	13.2%	24.5%	31.6%	7.2%	23.5%	1.46	2.96
11-Are you aware of sound nutrition principles?	N	79	34	11	62	10		
	%	40.3%	17.3%	5.6%	31.6%	5.2%	1.49	3.56
12-Are you interested in the number of calories in the meal before, having it?	N	53	46	45	36	16		
	%	27%	23.5%	23%	18.3%	8.2%	1.41	3.72
13-Do you know that fast-food causes a lot of diseases as it is full of a lot of saturated fats and oils?	N	69	14	7	102	4		
	%	35.1%	7.1%	3.6%	52%	2%	1.38	3.21
14-Did your family or physician warns you of the hazards of having fast-food?	N	74	34	17	64	7		
	%	37.7%	17.3%	8.6%	32.6%	3.8%	1.5	3.53
15-Are you generally satisfied with having fast-food?	N	24	59	60	13	40		
	%	1.22%	30.1%	30.6%	6.6%	20.4%	1.4	3.07

Regarding the question responses, means and standard deviations were calculated for each question. It was observed that the highest mean was for the question " How often do them (your family members and friends) have fast-food??" (mean 4.0) in statement 4, while the lowest mean was for the question " Is there suggestions or customers' satisfaction evaluation box??" (mean 2.96) in statement 10.

Through these analyses, it is evident that most participators are conscious of the detrimental impacts of fast food on health, but there are some doubts about the adherence of fast-food restaurants to appropriate hygiene and safety practices. It was also noted that there is a robust correlation between frequent fast-food eating and the presence of health problems. Older age groups seem to be more conscious of the health risks of fast food, perhaps due to their personal experience or knowledge of the complications of lifestyle-related diseases. Factor analysis revealed three distinct dimensions related to

health and nutrition awareness, cleanliness in fast-food restaurants, and fast-food consumption habits. These dimensions can be used to design awareness strategies and targeted interventions to improve health and nutrition in the community.

Discussion

Food safety in the fast-food industry has been a subject of increasing concern globally. Several attempts have been made to investigate the knowledge, attitudes, and practices of food handlers in various contexts, shedding light on the challenges and opportunities for improving food safety compliance.

Food managers' knowledge of food safety principles is a crucial element in ensuring safe food handling practices. As stated by Prentice and Jebb (2003) in their study, there are varying levels of knowledge among food handlers, often influenced by factors such as educational attainment, training, and work experience. This agrees with Egan *et al.* (2007),

Pereira *et al.* (2005), and Lee *et al.* (2017) who mentioned that inadequate knowledge can lead to poor hygiene practices and an increased risk of foodborne illnesses.

The outcomes of the present study supply a worthy understanding of the food safety knowledge, attitudes, and hygiene habits of fast-food restaurant workers in Tabuk, Saudi Arabia. The outcomes revealed that while most of the participants had adequate awareness of food safety principles, there were gaps in their attitudes and reported practices, which is consistent with previous studies. The high level of awareness about the potential health risks of fast-food consumption amongst the participants is consistent with the study of Prentice and Jebb (2003) which has highlighted the growing public concern about the impact of fast food on health.

However, the low mean score for the question regarding adherence to hygiene and safety practices in fast-food restaurants raises concerns about the application of food safety procedures in these establishments. This finding aligns with Egan *et al.* (2007) and Lee *et al.* (2017) that have identified gaps in food safety practices and the need for stricter monitoring and enforcement mechanisms.

The positive association between the frequency of fast-food consumption and the occurrence of health issues supports the well-established link between unhealthy dietary patterns and the development of chronic illnesses (Pereira *et al.*, 2005; Jaworowska *et al.*, 2013). This finding emphasizes the necessity of supporting healthful eating habits as well as raising awareness about the potential long-term consequences of frequent fast-food consumption. The age-related differences in responses, with older individuals being more likely to recognize the health risks of fast food, may be attributed to personal experiences or increased knowledge about lifestyle-related diseases. This finding highlights the need for targeted educational and awareness campaigns tailored to different age groups and their specific needs and concerns. The exploratory factor analysis identified three distinct dimensions related to health and nutrition awareness, cleanliness and safety in

fast-food restaurants, and fast-food consumption habits and practices. These dimensions provide a framework for designing interventions and strategies to address the multifaceted aspects of fast-food eating and its influence on public health.

The study was conducted in a specific geographic location, and the findings may not be generalizable to other regions or countries with different cultural and socioeconomic contexts.

Conclusion

This study highlights the importance of addressing food safety knowledge, attitudes, and hygiene practices in the fast-food industry to safeguard public health and guarantee customer trust. While the findings indicate adequate knowledge levels among food handlers in Tabuk, there is a need for targeted interventions to bridge the gaps in attitudes and practices. Continuous training, monitoring, and the promotion of a strong food safety culture are crucial for enhancing food safety compliance and preventing foodborne illnesses. Extra investigation is required to investigate the effectiveness of intervention strategies and to address the specific challenges faced in different cultural and regulatory contexts.

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