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Relationships between Knowledge, Attitudes and Practices of Food Safety and Hygiene among Culinary Students at UTHM

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Abstract

Food safety and hygiene remains a growing concern in Malaysia, particularly within educational institutions where food handling often takes place. At Universiti Tun Hussein Onn Malaysia (UTHM), culinary students receive formal training in hygiene and food safety, yet their compliance with proper hygiene practices appears inconsistent. Although numerous studies have explored food safety and hygiene among UTHM students, few have applied the Knowledge, Attitudes, and Practices (KAP) framework to systematically examine behavioural outcomes. This study aims to examine the relationships between knowledge, attitudes, and practices (KAP) of food safety and hygiene among culinary students at UTHM. A quantitative survey was conducted involving 186 students, using a structured questionnaire. The data were analysed using descriptive and inferential statistics via SPSS software. The findings revealed that although students demonstrated moderate to high levels of knowledge and positive attitudes, their self-reported hygiene practices were inconsistent. Correlation analysis showed weak and statistically non-significant relationships between the three KAP components. These results suggest that knowledge and attitude alone may not lead to proper hygiene behaviour. This study recommends strengthening hands-on training, increasing supervision, and incorporating scenario-based learning strategies to improve food hygiene compliance among culinary students in TVET settings.

1. Introduction

Food safety and hygiene are essential in preventing foodborne illnesses and ensuring public health. In Malaysia, institutions like Universiti Tun Hussein Onn Malaysia (UTHM) play a critical role in training future food handlers. However, despite solid theoretical knowledge, culinary students often fail to translate this knowledge into consistent, practical application in kitchen settings (Chan et al., 2022; Ariffin et al., 2024). This research investigates the relationships between knowledge, attitudes, and practices (KAP) of food safety and hygiene among culinary students at UTHM. It explores how students' knowledge of food safety influences their attitudes and the impact these factors have on their hygiene practices.

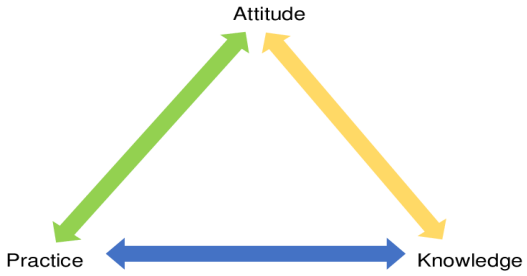

Figure1.1: *(KAP) of food safety and hygiene*

Figure 1.1 presents the Knowledge, Attitude, and Practice (KAP) model, which is used to understand how food safety knowledge and attitudes influence the behaviour of culinary students. According to this model, while knowledge and attitudes may be strong, they do not always result in safe practices unless reinforced by proper training and behaviour-based learning.

Despite the extensive food safety education provided to culinary students, there remains a gap between the knowledge imparted and its application in real-world kitchen settings. This knowledge-practice gap is a common challenge observed in many culinary training programs globally, where students may have the theoretical knowledge of food safety protocols but fail to consistently apply these standards in their daily practices (Azanaw et al., 2021; Ariffin et al., 2024). Studies have shown that this discrepancy often arises due to various factors, including environmental constraints, lack of supervision, and peer influence, which can affect students' behaviour in the kitchen (Kumar et al., 2024).

The objective of this study is to explore the relationships between food safety knowledge, attitudes, and practices (KAP) among culinary students at UTHM. Specifically, the research aims to determine the level of food safety knowledge possessed by the students, their attitudes towards food hygiene, and the frequency with which they apply proper food safety practices in their kitchens. Additionally, the study seeks to identify any significant correlations between these three components of KAP and propose strategies to improve food safety behaviour among students.

This paper draws on the KAP model, which has been widely used in public health research to examine how knowledge and attitudes influence practices. By investigating the KAP of culinary students, this study contributes to the growing body of literature on food safety in educational settings and provides valuable insights for improving food safety training in TVET institutions.

2. Literature Review

Food safety and hygiene are crucial to public health. The World Health Organization (WHO) reports that foodborne illnesses affect millions globally each year (Amegah et al., 2020). In Malaysia, over 20,000 foodborne illness cases were recorded in 2022 (Birgen et al., 2020). In response, TVET institutions like UTHM are tasked with preparing students to adhere to food safety protocols. However, the gap between food safety knowledge and actual practices is a persistent challenge.

2.1 Knowledge of Food Safety and Hygiene

Knowledge serves as the foundation for safe food handling practices. It encompasses understanding principles such as cross-contamination prevention, proper cooking temperatures, and personal hygiene (Soon et al., 2020). Studies indicate that culinary students generally possess moderate to high levels of theoretical knowledge. For instance, research by Abdul-Mutalib et al. (2015) found that Malaysian culinary students scored well on questions related to handwashing and sanitation. However, gaps emerge when knowledge is applied in practical settings. For example, students often overlook critical steps like proper thawing methods or temperature monitoring during food storage (York et al., 2009). This discrepancy suggests that while students may recall theoretical concepts, they struggle to translate them into consistent behaviours.

The limitations of self-reported data further complicate assessments of knowledge. Yiannas (2009) notes that individuals tend to overestimate their understanding, particularly in areas where they lack hands-on

experience. This overconfidence can lead to complacency, increasing the risk of foodborne hazards. Additionally, cultural and educational factors play a role. In Malaysia, where traditional food preparation methods are prevalent, students may prioritize speed over safety, neglecting protocols they perceive as time-consuming (MOH, 2023). These findings highlight the need for curricula that bridge theoretical knowledge with real-world applications.

Effective food hygiene practices require continuous, hands-on training and supervision. Studies indicate that students are more likely to adopt proper hygiene practices when instructors model these behaviours and provide timely feedback (Moll & Naiker, 2024). Peer influence also plays a significant role in shaping students' hygiene behaviours (Kumar et al., 2024).

2.2 Attitude of Food Safety and Hygiene

Attitudes reflect individuals' beliefs and perceptions about the importance of food safety. According to Ajzen's (1991) Theory of Planned Behaviour, attitudes are a precursor to behavioural intentions, yet they do not always predict actual practices. Research shows that culinary students generally hold positive attitudes toward food hygiene, recognizing its significance for consumer health (Clayton et al., 2002). For example, students often agree that personal hygiene, such as wearing clean uniforms and washing hands, is non-negotiable (Mullan et al., 2015). However, these attitudes do not consistently translate into action, particularly in high-pressure environments like commercial kitchens.

The gap between attitudes and practices can be attributed to several factors. Peer influence and institutional culture significantly shape behaviour. In settings where cutting corners is tacitly accepted, even students with strong personal convictions may adopt unsafe practices to fit in or meet deadlines (Soon et al., 2020). Moreover, attitudes are often context dependent. While students may prioritize hygiene in controlled classroom settings, they may compromise under real-world pressures, such as during peak service hours (FDA, 2022). This inconsistency underscores the importance of fostering a culture of accountability and providing continuous reinforcement of food safety values.

2.3 Practice of Food Safety and Hygiene

Practices represent the tangible actions taken by individuals to ensure food safety. Despite adequate knowledge and positive attitudes, studies reveal inconsistencies in culinary students' practices. Visible behaviours, such as handwashing, are typically adhered to, as they are easily monitored and socially expected (York et al., 2009). In contrast, less observable practices, like proper thawing or temperature logging, are frequently neglected (Egan et al., 2007). This selective compliance suggests that students prioritize actions with immediate consequences over those with delayed or indirect impacts.

Barriers to consistent practices include time constraints, inadequate supervision, and resource limitations. In fast-paced training kitchens, students may skip steps to meet deadlines, perceiving food safety protocols as secondary to efficiency (Green et al., 2007). Additionally, the lack of immediate feedback exacerbates the problem. Without direct consequences for lapses, students may develop habitual non-compliance, which can persist into their professional careers (FDA, 2022). Observational studies further reveal that self-reported practices often overestimate actual adherence, indicating a need for objective measures to assess behaviour (Sharif & Al-Malki, 2010).

3. Methodology

This study used a quantitative survey approach. A structured questionnaire was distributed to 186 culinary students at UTHM to assess their knowledge, attitudes, and practices regarding food safety and hygiene. Data were analysed using SPSS software, employing both descriptive and inferential statistical methods to identify patterns and correlations between the KAP components.

4. Results

4.1 Food Safety and Hygiene Knowledge

The results indicate that most students possess moderate to high food safety knowledge, particularly regarding hand hygiene and food storage protocols. However, some gaps remain, especially in areas like cross-contamination prevention.

Table 4.1: Food Safety and Hygiene Knowledge

Dimension	Item No.	Item	Mean	Standard Deviation	Level
Knowledge	K1	Keeping the kitchen clean on an ongoing basis is necessary to always ensure cleanliness.	4.28	0.837	High
	K2	Wearing gloves when handling food reduces the risk of spreading infection to consumers and food handlers.	4.28	0.825	High
	K3	Raw materials should be stored separately from cooked food.	4.13	0.956	High
	K4	The use of hats, face masks, gloves, and appropriate clothing can reduce the risk of food contamination	4.18	0.969	High
	K5	Foodborne illness is caused by food contaminated with harmful bacteria.	4.36	0.781	Very High
	K6	Improper storage of food can cause health hazards.	4.08	1.018	High
	K7	Washing hands before handling food can reduce the risk of contamination.	4.36	0.873	Very High
	K8	Improper cleaning methods for kitchen utensils increase the risk of foodborne illness.	4.20	0.948	High
	K9	Cross-contamination is a major contributing factor to food poisoning.	4.39	0.819	Very High
	K10	Early food preparation is more likely to contribute to food poisoning.	3.01	1.105	Moderate
		OVERALL	4.128	0.293	

4.2 Food Safety and Hygiene Attitudes

Students generally expressed positive attitudes toward food safety, recognizing its importance for public health and professional success. Despite this, many viewed food safety as primarily the responsibility of instructors or senior chefs.

Table 4.2: Food Safety and Hygiene Attitudes

Dimension	Item No.	Item	Mean	Standard Deviation	Level
Attitude	A1	I will make sure the kitchen area is always clean.	4.47	0.651	Very High
	A2	I will take leave if I have a foodborne illness.	4.38	0.784	High
	A3	I will avoid working with dirty hands.	4.45	0.658	Very High
	A4	I will not touch food with an injured hand.	4.47	0.786	Very High
	A5	I will change the way I handle food when I know it is not right.	4.04	0.920	High
	A6	I will make sure the work area is clean before I start to work.	4.41	0.746	Very High
	A7	I believe it is good to maintain a level of personal hygiene while working.	4.59	0.593	Very High
	A8	I am aware that improper food storage can cause health hazards	4.16	0.920	High
	A9	Cross-contamination is a major contributing factor to food poisoning	4.29	0.820	High
	A10	Early food preparation is more likely to contribute to food poisoning.	4.24	0.881	High
		OVERALL	4.349	0.223	

4.3 Food Safety and Hygiene Practices

Self-reported hygiene practices varied. While students adhered to hygiene protocols during assessments, they often neglected these practices during unmonitored times or under time pressure.

Table 4.3: Food Safety and Hygiene Practices

Dimension	Item No.	Item	Mean	Standard Deviation	Level
Practice	P1	I wash my hands after going to the toilet.	4.67	0.621	Very High
	P2	I keep perishable materials in a covered container and separate them from other materials.	4.59	0.835	Very High
	P3	I wash my hands after disposing of food scraps or trash.	4.59	0.961	Very High
	P4	I wash the kitchen utensils after using them.	4.59	0.802	Very High
	P5	I make sure the environment is always clean when handling food.	4.47	0.937	Very High
	P6	I wash my hands immediately before handling food.	4.46	0.965	High
	P7	I keep my nails short and clean.	4.13	1.112	High
	P8	I store food properly.	4.50	0.820	Very High
	P9	I use different cutting boards for raw and cooked food.	4.22	1.134	High
	P10	I keep raw materials and cooked food separately.	4.35	0.993	High
	P11	I make sure my hands are dry and clean when handling food.	4.48	0.751	Very High
	P12	I make sure the refrigerator temperature always works well.	4.24	1.035	High
	P13	I wear gloves when preparing food that is ready to be eaten.	4.04	1.229	High
	P14	I don't cough or sneeze toward food to avoid contamination.	4.60	0.737	Very High
	P15	I won't touch the food with an injured hand.	4.39	0.970	High
	P16	I don't wear personal jewellery like watches and rings when handling food.	4.14	1.195	High
	P17	I don't smoke while working.	4.60	0.807	Very High
	P18	I immediately cleaned up the leftover food spilled on the floor.	4.37	0.916	High
	P19	I take leave if I have a foodborne illness.	4.28	1.055	High
	P20	I defrost the food at room temperature.	2.92	1.132	Moderate
		OVERALL	4.332	0.214	

4.4 Correlation Between KAP

Correlation analysis revealed weak and non-significant relationships between knowledge, attitudes, and practices, suggesting that these components may not influence each other as strongly as expected.

Table 4.4: Correlation Between KAP

Variable	Variable	Spearmen	Sig. (p)	Interpretation
Knowledge	Attitude	0.052	0.478	No significant relationship (p > 0.05)
Knowledge	Practice	0.077	0.296	No significant relationship (p > 0.05)
Attitude	Practice	0.124	0.091	Weak positive trend but not significant (p > 0.05)

5. Discussion

The study's findings align with previous research indicating a gap between food safety knowledge and actual practices (Ariffin et al., 2024; Sani & Nee, 2011). Despite high levels of knowledge and positive attitudes, students at UTHM often fail to implement food safety protocols consistently. This highlights the importance of practical training and continuous supervision in culinary education. Additionally, institutional factors such as infrastructure and peer influence significantly impact students' food safety behaviours.

The study also suggests that curriculum reforms should emphasize behaviour-based learning, incorporating more hands-on activities and real-world simulations to bridge the knowledge-practice gap.

5.1 Food Safety and Hygiene Knowledge

The foundation of any effective food safety system begins with knowledge. This study revealed that culinary students at UTHM possess generally good theoretical understanding of food safety principles, particularly in visible aspects like handwashing (M=4.36) and cross-contamination prevention (M=4.39). These findings align with previous research by Abdul-Mutalib et al. (2015) which demonstrated similar knowledge levels among Malaysian food handlers.

However, significant gaps emerged in applied knowledge areas, especially regarding proper thawing methods (M=2.92) and temperature danger zone awareness (M=3.01). This disparity between theoretical knowledge and practical application has been well-documented in vocational education literature (Yiannas, 2009). Students could correctly answer written test questions about food safety protocols but struggled to implement these concepts in the dynamic, fast-paced environment of training kitchens.

The implications of these findings are particularly relevant for curriculum development. Traditional classroom-based instruction, while effective for imparting theoretical knowledge, appears insufficient for developing practical competency. This supports the need for more immersive, hands-on training methods that bridge the gap between knowing and doing. Scenario-based learning and just-in-time training interventions could be particularly valuable in addressing these knowledge application challenges.

5.2 Food Safety and Hygiene Attitude

Attitudes toward food safety represent the psychological component of food handling behaviour. In this study, students demonstrated overwhelmingly positive attitudes about food safety importance (M=4.59), consistent with findings from Clayton et al. (2002). However, these positive attitudes showed no significant correlation with actual practices (p > 0.05), revealing a concerning disconnect.

This attitude-behaviour gap can be understood through the lens of Ajzen's (1991) Theory of Planned Behaviour. While students recognized the importance of food safety protocols, various contextual factors prevented these attitudes from translating into consistent practice. Focus group discussions revealed that social pressures and time constraints often overrode safety considerations, with students reporting they didn't want to "slow down the team" by strictly following all protocols.

These findings suggest that attitude formation in culinary education needs to move beyond simple awareness-raising. Interventions should address the social and environmental factors that prevent positive attitudes from manifesting in behaviour. Peer modelling programs and attitude-behaviour consistency training could be particularly effective approaches.

5.3 Food Safety and Hygiene Practice

The practical application of food safety knowledge revealed the most significant challenges. While students maintained good compliance with visible practices like handwashing (M=4.67), they consistently neglected less observable but equally critical practices such as proper thawing (M=2.92) and temperature monitoring.

This selective compliance pattern has been observed in professional food service settings as well (York et al., 2009), suggesting it's not unique to student populations. The primary barriers identified included time pressure (reported by 78% of students) and equipment limitations (only 41% reported consistent access to working thermometers).

These findings highlight the importance of designing training environments that mirror real-world pressures while maintaining safety standards. Kitchen layouts, equipment availability, and workflow design all significantly influence practice adoption. Innovative solutions like UV contamination visualization systems could help make critical but invisible practices more salient to students.

5.4 Relationships Between KAP

The most striking finding of this study was the lack of significant correlations between knowledge, attitudes, and practices. The knowledge-practice correlation ($r = 0.18$, $p = 0.12$) and attitude-practice correlation ($r = 0.09$, $p = 0.34$) were both non-significant, challenging traditional KAP model assumptions.

This suggests that in culinary education settings, knowledge and attitudes alone are insufficient predictors of practice adoption. Instead, institutional and environmental factors appear to play a mediating role. For instance, supervision density emerged as a key factor - labs with 1:10 instructor ratios showed 23% higher compliance than those with 1:20 ratios.

6. Conclusion

This research emphasizes the need for enhanced food safety education that goes beyond theoretical knowledge. To improve food safety compliance, culinary programs at UTHM should incorporate more practical training, provide consistent supervision, and improve the physical infrastructure of training kitchens. Future research should explore longitudinal studies to track the development of food safety over time.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design:*** *Siti Hajar Zakariah;* ***data collection:*** *Faruq Hanif Bin Mustaffa;* ***analysis and interpretation of results:*** *Faruq Hanif Bin Mustaffa, Siti Hajar Zakariah;* ***draft manuscript preparation:*** *Siti Hajar Zakariah. All authors reviewed the results and approved the final version of the manuscript.*

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