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FOOD SAFETY BEHAVIOURS OF HOSPITALITY STUDENTS IN MALAYSIA: A STUDY ON KNOWLEDGE, ATTITUDE AND PRACTICE.

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Abstract: *Foodborne illnesses continue to pose serious health risks, often stemming from poor hygiene, improper food handling, and limited food safety knowledge. Studies have shown that being well-informed about food safety can greatly reduce these risks, especially for those directly involved in preparing food. This study aims to understand how knowledge, attitudes, practices, and behaviour around food safety are connected, focusing on hospitality students in Malaysia who regularly handle food. An online survey gathered responses from 213 students, and the data were analyzed using SPSS software. The results reveal a statistically significant relationship between food safety knowledge and attitudes with behaviours, reinforcing the need for targeted educational interventions. The findings advocate for the integration of robust food safety training programs to cultivate responsible food handling practices and uphold public health standards. This research contributes to the growing body of literature emphasizing the pivotal role of informed and conscientious food handlers in reducing the incidence of foodborne illness.*

Keywords: *Knowledge, Attitude, Practice, Foodborne Illness, Behavior*

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Introduction

Foodborne disease refers to any illness caused by consuming contaminated food with dangerous bacteria, viruses, or parasites (WHO, 2022). While food poisoning is the term used to describe an infectious illness brought on by consuming contaminated food (Adam et al, 2020). Diarrheal is an example of a common condition linked to a foodborne infection and ranked as the 8th most prevalent cause of mortality globally (WHO, 2020). Thus, foodborne diseases have a significant influence on public health.

As stated by World Health Organization (2022), nearly 1 in 10 people worldwide, or 600 million, were expected to get sick from eating contaminated food and about 420 000 people die every year. In Malaysia, the number of foodborne diseases remains stable from 2013 to 2018. According to research by Zakaria (2022), the number of foodborne outbreaks in Malaysia during a six-year period have stayed steady. Meanwhile, current data from Statista Research Department (2023) stated that in 2021, there were approximately six thousand food poisoning cases in Malaysia caused by food borne diseases. The rise in the number of food poisoning cases is concerning and should be contained. Foodborne illnesses can be developed at any point in the chain of food production, distribution, and consumption due to contamination. (WHO, 2022). Inappropriate food handling also occurs in food production, food processing, storage, and consumption (Chen et al., 2018).

Previous research by Mutalib et al. (2012) identified the contribution of foodborne outbreaks is a lack of knowledge of food hygiene and safety during preparation, processing, and storing. Although there are countless studies have explored the relationship between food safety knowledge, attitude, and practices toward food safety behaviour, (Sanlier et al., 2019, Ali et al., 2018, Osaili et al., 2022) limited attention has been given to the food handlers especially internship students in the Hotel and Management faculties. Little is known to what extent of the impact of food safety and hygiene knowledge, attitude, and practices during and after completing their internship.

It is necessary to apprehend the level of hygiene practice from hospitality students as there are many significant gains as they pursue their career development. Hotel and Management interns need to have a solid awareness of food hygiene procedures and safety precautions to ensure the quality of the food and avoid foodborne illness (Jeinie et al., 2016). Lack of knowledge in food safety and hygiene can reduce their performance of appropriate safety practices during food preparation (Ovca, Jevšnik, & Raspor, 2014). Therefore, this study focuses on exploring the relationship between food safety knowledge, attitude and practice towards food safety behaviour to decrease the cases of food poisoning that happened in Malaysia.

Literature Review

Food Safety Behavior

Food safety behaviour refers to consumers' behaviour towards food safety and hygiene. It is influenced by the knowledge, attitudes, and practices (KAP) (Kwol et al., 2020). Food safety behaviour refers to the actions taken to ensure that food is safe for consumption. People are becoming more interested in an open kitchen where customers may watch the chef's behaviour at work to improve their perception of the food quality and cleanliness. As a result, these businesses are growing in popularity with customers who value cleanliness and food safety

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(Sohn & Lee, 2018). The behaviour of every food handler is important in helping prevent food-borne illness. The cleanliness and hygiene of those people who prepare food and proper handling of food in the preparation stage are some of the critical factors in food safety (Meier, 2018 cited in Aquino, 2021).

Human handling errors have been associated with most incidences of food poisoning (Norrakiah, 2014). Food handling errors and bad personal hygiene may allow pathogens to develop and reproduce in large enough quantities to infect humans (Abdullah, 2015). Examples of foodborne diseases that are caused by unhygienic food handlers are Salmonella, E. coli, and Listeria. Foodborne outbreaks can be caused by a lack of knowledge, attitude, and practice in food poisoning prevention. According to Ali et al. (2018), food safety behaviour is influenced by knowledge, attitudes, and practices (KAP) of food handlers. The connection between knowledge, attitude, and behaviour regarding food safety was first articulated by Schwarz (1975).

Food Safety Knowledge

According to several studies (Moreaux et al., 2018; Kim and Jung, 2018; Sayuti et al., 2020), knowledge, behaviour, and attitudes of individuals are crucial in preventing food poisoning. Knowing how to handle and prepare food safely to avoid foodborne illness is known as understanding food safety. Certified food handlers tend to have greater knowledge of food safety compared to non-certified handlers. According to studies, university grads scored the highest understanding of food safety (Gkana and Nychas, 2018; Tabrizi et al., 2017). This shows that knowledge about food safety can be acquired through formal education.

According to Aquino et al., (2021), food safety knowledge significantly and positively influenced attitudes towards food safety. This indicates that food handlers are more likely to have a positive attitude toward food safety when they have sufficient knowledge about food safety procedures and requirements (Aquino et al., 2021). When it comes to improving the food safety attitudes of fast-food restaurant food handlers, knowledge about food hygiene is an essential element. Previous study on food vendors' knowledge of food safety highlighted their inadequate and low level of knowledge, particularly in storage, which could lead to inadvertently poor food safety practices and behaviours (Madaki and Bavorova, 2019)

Osaili et al., (2013) revealed that lack of knowledge regarding basic food hygiene including critical cooking and temperature of food, cross-contamination, and personal hygiene among food handlers also contribute to improper handling of food. In Malaysia, numerous reports on food poisoning outbreaks have been attributed to Salmonella (Mohd, 2017; Zalani et al., 2017). Knowledge regarding foodborne pathogens particularly Salmonella was low. This knowledge is important as Salmonella contamination alone was responsible for 33% of these outbreaks (Olugbenga et al., 2021). Previous study showed that increased understanding of food safety was substantially correlated with sociodemographic characteristics, such as how frequently one cooked (Morleen et al., 2020)

Based on Syahirah et al. (2019) study suggests that biological learning, which is the basis for comprehending food safety, is related with higher knowledge. Studies on knowledge gaps that students still need to fill to improve their understanding of food safety can provide valuable insights to the Ministry of Education and the Ministry of Health.

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Food Safety Attitudes

Food safety attitude refers to an individual's beliefs, thoughts, and actions towards food safety. It was discovered that attitudes toward food safety and food safety practices are strongly connected (Aquino et al., 2021). It was shown that training in food safety did not always transform information into attitudes or attitudes and practices (Zanin et al., 2017). People's attitudes toward food safety are influenced by their knowledge of it, which may lead to behavioural changes (Tutu et al., 2020).

The degree of consumer awareness and understanding is crucial in this regard (Baser et al., 2017). Attitude is a measure of the level and degree to which an individual has a favourable or unfavourable evaluation and assessment of behaviour. Food safety attitudes also have a significant influence on food safety behaviour (Baser et al., 2017). Lack of or inadequate training in food safety may unintentionally lead to poor hygiene habits, which would further encourage food contamination (Tabit a Teffo, 2020). This suggests that it is crucial to train food workers in food safety to protect consumers from food poisoning and other health risks that could result from consuming contaminated food. Lawrences et al., (2021) suggest in the study that it is important to register food handlers to go through a food safety training course to encourage them to practice good hygiene.

Food Safety Practice

To guarantee that food handlers have the necessary information to adhere to food safety practices and regulations, it is crucial to provide education and training. According to this study, food handlers with strong food safety awareness had almost two times greater probabilities of using appropriate handling practices than those with little understanding (France et al., 2020). Previous study indicated that food handlers' knowledge, attitudes, and practice about food safety are influenced by their job experience (Artwell et al., 2020). Kim and Cho (2019) evaluated food handlers working in Korean hospitals and discovered that age and education level had an impact on total KAP scores, with higher education levels being related to better results. When the socioeconomic level (SES) of the subjects was compared to their Knowledge, Attitude, and Practise (KAP) ratings, it was shown that the older the subjects were, the higher their scores on attitude and practise for food safety.

Numerous research on food safety in the hospitality sector have shown that having enough knowledge and having a positive attitude does not always convert into excellent practices (Odonkor, 2020). According to the study, generally, the responders' average practice score was 68.2%, which is satisfactory. Street vendor food is a popular choice among consumers as it is cheap, convenient, and easily accessible. The environment in which the food is prepared and sold is concerned about sanitation and hygiene level of potential food-borne diseases (Jan, 2019).

According to research, those who were well-informed on personal hygiene were more likely to wash their hands properly with soap and water before, during, and after handling food or using the lavatory (Ghezzi S., 2021). Additionally, food handlers who have received food safety training are more likely to have a positive outlook, which enhances food safety procedures (Auad et al., 2019). Prior to beginning their industrial training, every student at the hospitality school must complete a course in food handling. According to Food and Agriculture

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Organization for the United Nations (2021), training should be given to students handling food at least once every six months to once a year to guarantee food safety compliance and efficacy When handling and preparing food, it is dangerous to leave it at room temperature for more than six hours since this might raise the risk of foodborne illness as stated by Genevie (2019). Hot and humid climates could also promote the growth of food-borne pathogens which could spread more rapidly in an unhygienic environment, especially in the kitchen (Genevie, 2019).

Theoretical framework – Knowledge, Attitudes and Practices (KAP)

The Knowledge, Attitude, and Practice (KAP) model served as the theoretical foundation for establishing the proposed relationships. According to this model, knowledge has a positive impact on an individual's attitude, which subsequently influences their behavior or practices. In this context, food handlers' safety knowledge is a key factor in shaping their attitudes, which in turn affects their practices related to personal hygiene, kitchen cleanliness, and disease prevention measures.

The KAP (Knowledge, Attitude, and Practice) theory is widely recognized in the field of public health for examining individuals' health-related behaviors (Luo et al., 2022). Originally developed in the 1950s, it has been frequently applied in studies related to food handling and food safety (Fariba et al., 2018). The theory suggests that food handlers are more likely to adopt and apply proper food safety practices when they possess adequate knowledge and hold positive attitudes toward food safety (da Vitoria et al., 2021). Numerous studies have utilized the KAP framework to assess the adoption of food safety and hygiene practices among food handlers (Zanin et al., 2017; A.R. Suhaila et al., 2020; Halim-Lim et al., 2023; Hishamuddin et al., 2024). The study is designed and interpreted based on the framework presented in Figure 1. Based on KAP theory, food handler will be assessed on three key components, namely knowledge of food safety, attitudes toward food safety, and actual practices that ensure food safety. This study will examine the relationship between each component of the KAP model and the food safety behavior of food handlers.

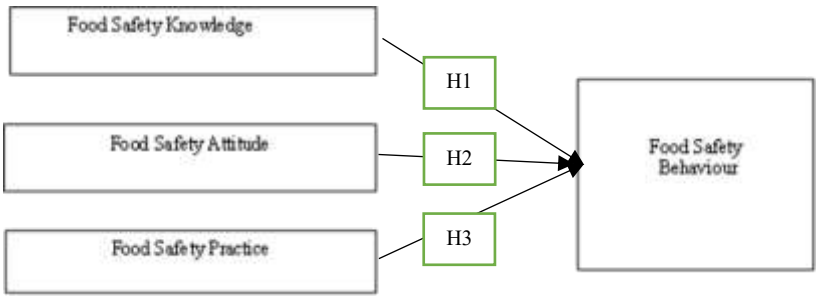

Figure 1: Conceptual Framework of The Study

Hypothesis Development

H1: There is a positive relationship between food safety knowledge and food safety behaviour
H2: There is a positive relationship between food safety attitude and food safety behaviour
H3: There is a positive relationship between food safety practice and food safety behaviour

Methodology

Research in this paper was carried out among hospitality students in Malaysia that have direct contact with food. Using Raosoft, assisted in deciding how many intern students should be included in the study with 95% critical value resulting in a required minimum sample size of

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190 eligible respondents to ensure that the sample was representative and that the findings were accurate and trustworthy. This research was quantitatively conducted through online surveys via Google Forms. The purposive sampling technique was used in this research.

Questionnaire Design

The questions were adopted from previously published studies with some modifications. (Osaili et al., 2018; Webb and Morancie, 2015; Sani and Siow, 2014; Mutalib et al., 2012). Before conducting the survey, a pilot test was conducted to get the participants' understanding level. The questions consisted of six parts.

Section one of the questionnaire contained the questions on screening questions to identify and recognize candidates who have requirements or qualities for this research. The second section, five questions were asked about food safety behaviour adapted from the study by Baser et al., (2017). For the third section, the questions were about food safety knowledge consisting of five questions adapted from the study by Madaki et al., (2021) & Baser et al., (2017). All questions that measured knowledge of food safety were measured on a five-point scale from strongly agree, agree, not sure, disagree, and strongly disagree.

In addition, food safety attitudes were evaluated with a total of five questions adopted by Madaki et al., (2021). To assess food safety attitudes, a five-point scale, like the one used for measuring food safety behaviour and food safety knowledge was utilized. Fourth section, the questions of food safety practice were assessed with five questions adopted by Mutalib et al., (2012). Lastly was the demography of the respondents, it consisted of questions such as gender, age group, current educational level, and the frequency of cooking in a week.

Results and Analysis

The data acquired from 213 genuine respondents via a questionnaire were analysed using the statistical package for society science (SPSS) version 26.0 software. Utilising the SPSS software, descriptive tests, reliability tests and Pearson correlation were employed to address the study's research topics.

Demographic of the respondents.

According to the demographic profile of the respondents in Table 1, the data showed that there is only minimal disparity between the percentages of males and females participating in the questionnaire. The female respondents are 52.1% while male respondents are 47.9% out of 213 respondents. For the age range, 22-23 years old are the highest percentage of respondents who had participated in the survey (36.2%). In terms of the educational level, bachelor's degree was recorded at 57.3%, which is slightly higher than the Diploma level (42.7%). Furthermore, it is also recorded that the highest frequency of cooking per week is between 1-3 times (46.0%). Nearly half of the respondents answered that range of frequencies.

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Table 1: Descriptive analysis of the Demographic Respondents.

Item	Category	Percentage (%)	Total (n)
Gender	Male	47.9	102
	Female	47.9	111
Age	18-19 years old	8.9	19
	20-21 years old	29.1	62
	22-23 years old	36.2	77
	24-25 years old	23.9	51
	26-27 years old	0.9	2
	28-29 years old	0.9	2
Current educational level	Diploma	42.7	91
	Degree	57.3	122
How many times do you cook in a week?	1-3 times	46.0	98
	4-6 times	29.1	62
	7-9 times	16.4	35
	10-12 times	4.2	9
	13-15 times	1.9	4
	16-18 times	2.3	5

Reliability Test

This analysis demonstrates that each variable Cronbach's Alpha value falls between 0.640 - 0.755, which all the variables are acceptable which are food safety behaviour, food safety knowledge, food safety attitude and food safety practices.

Pearson Correlation Coefficient

The correlation coefficient analysis shows that food safety knowledge positively affects food safety behaviour of food handlers (0.353). According to this hypothesis, there is an expectation that food handlers will adhere to safe handling methods as their understanding of food safety develops. Research has indicated that educational and training initiatives can enhance the food handling practices of food handlers, hence reducing the likelihood of food contamination (Ali et al.,2022). All the respondents receive proper training and knowledge from the university as their formal education since they are taking the course that involves food handling. The respondents pursue a planned curriculum that includes a wide range of food safety-related subjects, guaranteeing a deep comprehension of important ideas and procedures. The courses are carefully designed to fulfil the individual requirements of the learners, considering the many facets of food handling, preparation, and administration. For example, Diploma students take Food Hygiene subject that covers all about food safety. Since p.value <0.000 for food safety knowledge is smaller than the alpha value of 0.05, there is a weak correlation between food safety knowledge and food safety behaviour.

Next, the Pearson Correlation coefficient of food safety attitude is 0.571 shows that attitude and behaviour have a positive relationship. It indicates that a food safety attitude is seen as higher than food safety knowledge. The level of education significantly influences one's attitude. The respondents came from two different levels of education: diploma and degree. This shows that the education background positively affects the attitudes of the respondents regarding food safety hygiene (Booth., 2012). A proper education helps people develop critical thinking abilities, which allow them to assess information, counter presumptions, and conduct unbiased

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analysis of situations. According to Prapulla (2023), critical thinking enhances intellectual capacities, promotes multi-perspective thinking, and fosters analytical and creative thinking. This critical mindset shapes a positive attitude based on facts and analysis by encouraging a more thorough and logical approach to many aspects of life. Since p.value <0.000 for food safety attitude is smaller than the alpha value of 0.05, there is a moderate correlation between food safety attitude and food safety behaviour.

Lastly, the Pearson correlation analysis between food safety practice and food safety behaviour showed a weak negative correlation (r = –0.26), which was not statistically significant (p = 0.707). This indicates that there is no meaningful relationship between the two variables in this study. The lack of significance suggests that self-reported food safety practices may not directly translate into observable food safety behaviour. This may be due to discrepancies in perception versus action, social desirability bias in responses, or external factors influencing behaviour more strongly than personal practice.

Table 2: Pearson Correlation Coefficient

		Food safety knowledge	Food safety attitude	Food safety practice
Food safety behaviour	Pearson Correlation	.353**	.571**	-.26
	Sig. (2 tailed)	.000	.000	.707
	N	213	213	213

Discussion and Conclusion.

The objective of this study was to investigate the food safety knowledge, attitude and practices towards hospitality student's behaviour as a food handler. Result revealed that food safety knowledge has significant influences on food handlers' behaviour. This demonstrated that participants were aware of the dangers of food contamination from unhygienic food handlers. Understanding food safety, including appropriate storage temperatures, identifying bacteria associated with food, and being mindful of food expiration dates, can help prevent food contamination. Comparable research also has demonstrated that food handlers are well-informed on this matter (France et al.,2020). Sufficient knowledge and attitude are considered essential for enabling optimal food safety procedures. To offer standard-compliant hygiene procedures, food handlers can build their hygienic knowledge of food safety on the fundamental presumptions provided by the KAP model (Kwol et al.,2020). Demonstrating proficiency in handling raw materials, cooked food, and defrosted items reflects the positive approach of food handlers in effectively managing food. Numerous research studies have demonstrated the connection between food handlers' knowledge, attitudes, and hygiene practices and how those factors affect food hygiene (Kholis E. et al.,2021).

Multiple training can increase the knowledge thus increasing the awareness about food safety. Training programs are typically designed with a structured curriculum that covers key aspects of food safety. This also includes following recommended cooking temperatures, preventing cross-contamination, following storage precautions, and emphasizing the need of good personal hygiene. A well-thought-out curriculum guarantees thorough instruction on all necessary subjects. This program needed to be continuous and updated to keep the dynamic field of food safety still relevant with the most recent laws, scientific discoveries, and industry best practices. It is essential to reconsider the structure and methodology of food safety training initiatives to

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guarantee that they effectively modify the conduct of food handlers (Yeargin et al.,2021). Lee et al. (2018) study indicates that the knowledge and attitude factors were shown to have a significant link with the practice, with a p-value of less than 0.05. The study also showed that food truck vendors' knowledge and education levels on food safety are important indicators of their actual food safety procedures (Wan Nawawi et al., 2022). This study has demonstrated that both diploma and degree students acquire knowledge of food safety during their studies. Meanwhile, food safety practices have no relationship with food safety behaviour. This result is aligned with France N. et al., (2020) study that showed the implementation of proper hand hygiene practices by food handlers was not substantially supported by the study's finding. From the questionnaire, there are respondents who answered that they practised to wear jewellery and watches while handling food. This act shows although the respondents are well educated, they still did not care about hygiene. The knowledge about wearing accessories might cause cross contamination did not impact their practices. This occurs because certain organizations either permit such actions to take place or, in some instances, leaders fail to monitor and address the situation, allowing employees to continue wearing jewellery. In addition to this, the students were also observed not using gloves while handling food and using aprons to wipe or dry their hands. The researchers recommend that organizations enforce a thorough examination of attire and work practices to ensure adherence to established guidelines Previous studies by Aquino et al (2021) showed the opposite result where food safety attitude and food safety practice are strongly connected, and this might lead to the change of the behaviour of food handlers. This shows that people may know the correct practices but not apply them in real life behaviour.

Recommendations and Future Research.

Knowledge, attitudes, and practice (KAP) of food handlers on food safety have attracted extensive global research (Rebouças et al., 2016; Al-Shabib, Mosilhey, & Husain, 2016; Bou-Mitri, Mahmoud, Gerges, & Jaoude, 2018; Zanin, Cunha, Rosso, Capriles, & Stedefeldt, 2017). Still, there isn't much research that looks at students as food handlers through observation. Gaining comprehensive food safety knowledge during academic training contributes to the development of positive attitudes, which in turn support the effective and safe management of food. This underscores the need to prioritize strategies that enhance food handlers' awareness and attitudes toward food safety to ensure safer food handling practices.

Further research is necessary to have a deeper understanding of how sociodemographic characteristics impact food handlers' attitudes and knowledge about food safety. Meanwhile, the limitations on local published studies on this category of student as food handlers also need to be taken as serious issues. Furthermore, the findings of this study offer opportunities for future research, where more studies are needed to assess knowledge, attitudes, and food safety practices among students from other institutions because of their differences in needs, food safety facilities, and sociodemographic characteristics.

It is recommended that relevant authorities revise and update the existing food safety curriculum by establishing standardized guidelines and ensuring continuous monitoring for compliance with food safety regulations. To support the adoption of safe food handling practices, a tiered approach to training, ranging from basic to advanced levels should be implemented. Additionally, the food industry can play a crucial role by providing supplementary training opportunities for students, equipping them with practical insights and

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aligning their practices with industry standards. This approach helps ensure that students can implement proper food safety procedures without compromise.

For future research, it is recommended to incorporate additional variables into the study to enhance the depth of analysis and provide a more comprehensive understanding of the subject matter. Additionally, utilising a diverse sampling strategy that includes participants from various demographics, institutions, or backgrounds may contribute to a more accurate and representative dataset. This approach will not only enrich the findings but also ensure greater generalizability and applicability of the results to a broader population.

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