

Food safety knowledge, attitude, and practice of consumers in Malaysia: a review

¹Aspian, N.A., ^{1,2,*}Tunung, R., ³Jamaluddin, F., ²Ismail, Z., ¹Sharkawi, I., ¹Alan, R., ⁴Lepun, P., ^{1,2}Rosli, A., ⁵Nillian, E. and ⁶Anyi, U.

¹Faculty of Humanities, Management and Science, Universiti Putra Malaysia Bintulu Sarawak Campus, 97008 Bintulu, Sarawak, Malaysia

²Institut EkoSains Borneo, Universiti Putra Malaysia Bintulu Sarawak Campus, 97008 Bintulu, Sarawak, Malaysia

³JR Statistics Research Centre, Cyberjaya, Selangor, Malaysia

⁴Faculty of Agricultural and Forestry Sciences, Universiti Putra Malaysia Bintulu Sarawak Campus, 97008 Bintulu, Sarawak, Malaysia

⁵Faculty of Resource and Science Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia

⁶Molecular Laboratory, Microbiology Unit, Pathology Department, Sarawak General Hospital, 93586 Kuching, Sarawak, Malaysia

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Abstract

Food safety is a crucial issue in every country. Without a good food safety system, a country will suffer economically and socially. This paper aims to revisit the literature on food safety knowledge, attitude, and practice in Malaysia and globally. Foodborne illnesses are caused by food that has been contaminated at any stage of the food production, delivery, and consumption chain. Non-compliance with food handling guidelines linked to a lack of food safety awareness was the leading cause of foodborne illnesses. This paper highlighted consumers' role in preventing foodborne diseases by following food safety recommendations when preparing food at home. Hence, studies on consumers' food safety knowledge, attitude, and practice are very important for future development programs on food safety guidelines, and to ensure successful implementations.

1. Introduction

Food safety has always been a crucial issue in every country, whether it is a developed country or a developing country, and more so when it is a poor country. Without a good food safety system, the country will suffer not only socially, but also economically. For instance, the economic impact of foodborne diseases in the United States alone is approximately as high as \$80 billion, including treatment costs, expenses connected to lost productivity, and decreased life quality of affected persons (Okour *et al.*, 2020). In Malaysia, every year, there are cases related to foodborne diseases and at times, it causes death. In the past five years, from 2016 to 2021, the cases of foodborne diseases were in the hundreds range, even with the 2020 lockdown. According to data from Malaysia Annual Report Food Safety and Quality 2021, food poisoning cases grew consistently between 2017 and 2019. 2017 had 401 cases which increased to 496 cases in 2018 and reached its

peak at 516 cases in 2019. The cases dropped down to 288 cases in 2020 and 123 cases as of September 2021 (Zainal, 2021). Although it has dropped significantly, it is still an alarming number.

According to World Health Organization (WHO) (2022), foodborne illnesses are caused by food that has been contaminated at any stage of the food production, delivery, and consumption chain. The effect of foodborne illness varies depending on the microorganism involved and the common symptoms are such as diarrhoea, stomachache, headache and feeling lethargic. In Malaysia, the Prevention and Control of Infectious Diseases Act 1988 (Act 342) has listed cholera, dysentery, food poisoning, Hepatitis A, and typhoid/paratyphoid fever as diseases that can emerge from a bad source of food and water.

Many foodborne infections are caused by the negligence of food sellers, and most occurrences occur in

*Corresponding author.

Email: tunungrobin@gmail.com

festivals or educational settings. For example, in 2016 there were 23 foodborne disease cases in Terengganu's schools and *Salmonella* spp., *Bacillus cereus* and *Staphylococcus* were detected (Abdullah and Ismail, 2021). Their study also reported that the top two causes of food poisoning outbreaks in Terengganu's schools were improper cooking and reheating followed by improper storage. In 2018, 83 cases of food poisoning were reported across the country due to the consumption of "laksa" which had *Salmonella* spp. and caused 2 deaths (New Straits Times, 2018). Meanwhile, in 2020 and 2022, there were numerous reported cases of food poisoning due to buying "puding buih" online and from the stall, respectively. In 2020, 99 cases were reported and after investigation, it was found that the vendor had used expired eggs to make "puding buih" and 1 death was reported while in 2022, 2 cases involving children were reported (Mustafa, 2022). It was worth noting that the number might be higher but not reported due to their mild symptoms, and also their complicated chain monitoring systems (Soon et al., 2011; Abdul-Mutalib, 2015).

Some studies proved that consumers' knowledge regarding food safety is also important in preventing foodborne illness (Low et al., 2016; Ruby et al., 2019). Ruby et al. (2019) claimed that consumers play a crucial role in preventing foodborne diseases by following food safety recommendations when preparing food at home. They believed that noncompliance with food handling guidelines linked to a lack of food safety awareness was the leading cause of foodborne illnesses.

There have been many studies across the world regarding food safety knowledge, food safety attitude and food safety practices (KAP) mostly conducted among food handlers and vendors. Studies have shown that food handlers and vendors have higher knowledge of food safety, but they might not follow and implement the knowledge (Lee et al., 2017). In Malaysia, several studies have investigated the food safety KAP of students, food handlers in canteens and restaurants, as well as street food vendors. To the best of the author's knowledge, only a few studies have investigated food safety KAP among consumers in Sarawak, Malaysia.

Bolek (2020) mentioned that evaluating consumer knowledge, attitudes, and behaviours is critical for developing and implementing food safety rules and risk communication strategies that are effective and as stated by Ruby et al. (2019), there has been no formal educational program that educates the general public about food safety knowledge and procedures. Hence sometimes there will be cases like "puding buih" and "laksa" food poisoning.

Therefore, this study will focus on reviewing the food safety knowledge, food safety attitude and self-reported practices of consumers in Malaysia. The findings of this study will be useful for future research as well as local governments and educational institutions in identifying elements of food safety and targeted groups, in order to increase food safety awareness among customers, educate the local population, and decrease cases of foodborne infections.

2. Food safety

2.1 Definition

WHO (2022) defines food safety as having access to sufficient amounts of safe and nutritious food. In addition, foodborne illness is caused by food that has been contaminated at any stage of the food production, delivery, and consumption chain. They also stated that foodborne diseases are not only caused by bacteria, viruses and parasites but also can occur from prions and chemicals. Food safety cannot be taken lightly as one wrong step and it can cause lives to be taken. Although food poisoning cases rarely cause death, the experience is not pleasant.

Nevertheless, foodborne illness has a direct impact on the health of the community, as well as on the economy. According to WHO (2022), the World Bank reported that foodborne disease-related productivity losses in low- and middle-income countries total \$95.2 billion annually, and the annual treatment costs of foodborne illness are estimated at \$15 billion. Moreover, in the United States alone, approximately as much as \$80 billion USD was used annually to pay for the treatment costs and expenses connected to lost productivity (Okour et al., 2020).

2.2 Foodborne diseases in Malaysia and globally

Globally, out of 7.8 billion people in the world, 4.3 million of them have experienced foodborne diseases annually (Lee and Yoon, 2021). WHO, in their article titled "Estimating the Burden of Foodborne Diseases" (2021) observed that unsafe food causes 600 million illnesses and 420,000 deaths annually with 30 out of 100 of foodborne mortality occurring in children under 5 years old. They also estimated that 33 million healthy lives have been victims of foodborne diseases.

Lee and Yoon (2021) identified the most common microbial agent that was involved was *Campylobacter*. For example, foodborne illness in the United States was always due to *Campylobacter* and *Toxoplasma gondii*, while Europe and Australia have the most *Campylobacter* and *Salmonella* cases compared to other countries. It was understandable because *Campylobacter*

and *Salmonella* were the common bacteria that cause foodborne disease the first could be found in raw poultry, beef, and other meats while the latter were commonly found in chicken, beef, pork, eggs, fruits, vegetables, and even processed foods (Griffiths, 2016). Other than those countries, Japan and Malaysia were also reported to have *Campylobacter* cases (Abdul-Mutalib *et al.*, 2015; Lee and Yoon, 2021).

Every year, there will be cases of food poisoning among the citizens of Malaysia. The cases will occasionally rise each month but will increase dramatically when it's Ramadhan due to the increase of Bazaar Ramadhan stalls. As evidence, the last Ramadhan alone recorded 93 cases due to buying food from Bazaar Ramadhan (Bakar, 2022). Due to high cases of food poisoning during Ramadhan 2022, Malaysia Health Minister, Khairy Jamaluddin has urged consumers who had experienced rotten food consumption at the bazaar to immediately lodge a complaint to the local authority to take action (Malay Mail, 2022). Meanwhile, State Health Director Datuk Dr Kasemani Embong advised consumers to practice the method of seeing, smelling and tasting to avoid bad food consumption (Malay Mail, 2022).

It is also reported that the real number of citizens that had been sick from food poisoning might be higher but not reported due to their mild symptoms, misinterpretation of the symptoms and its complicated chain monitoring systems (Soon *et al.*, 2011; Abdul-Mutalib, 2015). A study by Meftahuddin (2002) revealed that more than half of food poisoning occurrences were in elementary and secondary schools while 0.4 per cent of food poisoning episodes are caused by food served in public food courts. His claims then were supported by Soon *et al.* (2011) who stated that the major cause of food poisoning in Malaysia is always related to food vendors that are closer to educational places or food vendors that work in schools. Nevertheless, Abdullah and Ismail (2021) affirmed that food poisoning is one of Malaysia's top five communicable diseases.

2.3 Research on food safety knowledge, attitude and practice

In Ghana, two studies on food safety KAP of food vendors or food handlers were done by Akabanda *et al.* (2017) and Tuglo *et al.* (2021). However, their targeted respondent differed, with Akabanda *et al.* (2017) focused on institutional food handlers while Tuglo *et al.* (2021) focused on street food handlers. In the study by Akabanda *et al.* (2017), it was discovered that although the respondents were knowledgeable regarding hygienic measures, cleaning, and sanitation processes, their knowledge about disease transmission was limited with

most of them not knowing that *Salmonella* and Hepatitis A are foodborne pathogens. Nevertheless, most of them were familiar with the effects of foodborne diseases on one's body with the majority agreeing that typhoid fever and bloody diarrhea are transmitted by food. Comparing their studies, it was discovered that street food handlers' food safety KAP was weak although still in the excellent range because more than half of them have good food safety KAP. A total of 67.3% have good knowledge, 58.2% have a good attitude, and 62.9% practice good food safety. Both studies also have many similarities; most of their respondents were female and did not attend food safety training courses. Although Akabanda *et al.* (2017) agreed that their respondent showed good food safety KAP, they also believe that it does not necessarily prove that their respondent practices strict hygiene. They suggest continuous food safety education, particularly for those in lower levels of education, while Tuglo *et al.* (2021) urged the District Health Directorate to supervise food handlers to ensure their knowledge links to their practices.

In Pakistan, specifically in the Lahore district, Ahmed *et al.* (2021) discovered that the majority of food handlers had positive attitudes toward food safety and engaged in excellent food safety practices, but their food safety knowledge was poor. In addition, education, working title, working period and years of experience in the food service sector were significantly ($p < 0.05$) associated with food handlers' knowledge, attitudes, and practices regarding food safety. In their study, they also found that attitude and knowledge significantly correlated with practices.

Other than the countries mentioned above, there were also other countries that conducted research regarding food safety KAP in their own country. For example, some researchers have investigated food safety knowledge, attitudes, and practices of street food vendors and consumers in Haiti (Samapundo *et al.*, 2015), Ho Vietnam (Samapundo *et al.*, 2016) and China (Ma *et al.*, 2019) whereas other studies focus on only one subject, such as consumers or vendors. For example, Odeyemi *et al.* (2019) studied food safety KAP among consumers in developing countries, while Mihalache *et al.* (2021) conducted research on food safety knowledge, food shopping attitude, and safety kitchen practices among Romanian consumers.

2.4 Research on food safety knowledge, attitude and practice in Malaysia

In Malaysia, there are studies concerning food safety during the COVID-19 pandemic Wan Nawawi *et al.* (2022) conducted a study on the food safety KAP of Malaysian Food Truck Vendors during the COVID-19

Pandemic. They discovered that food truck vendors generally have a positive attitude ($M = 94.8$, $SD = 5.95$), good practices ($M = 84.7$, $SD = 6.62$) and fair knowledge ($M = 78.8$, $SD = 9.09$) regarding food safety during the COVID-19. They also carried out a hierarchical regression analysis, which revealed that the education level of food truck vendors and their knowledge of food safety are significant predictors of food safety practices. Aside from that, Soon *et al.* (2021) conducted a study for Malaysia and Indonesia on food safety and evaluation of intention to practice safe eating measures during the COVID-19 pandemic.

According to Soon *et al.* (2021), the COVID-19 pandemic has impacted consumers' relationships with food via purchasing, increased home cooking, or measures taken during food shopping, food delivery, and eating out. The researchers observed that consumers in Indonesia and Malaysia exhibited a high level of food safety knowledge, good attitudes, and consistent practices of hand hygiene, washing, and sanitization, as well as compliance with social distancing measures while shopping or dining out. Moreover, attitude, subjective norms, and perceived behavioural control were found to be important factors of consumers' intention to adopt safe dining out measures with the multiple regression models explained between 63% and 73% of the variance and provided useful frameworks for understanding consumers' adherence to safe eating out practices.

Soon *et al.* (2021) also found no significant difference between gender or educational differences in food safety knowledge. However, for age, food safety knowledge and food safety practice were shown to differ significantly. However, for attitude, it was found that students in university education had a more positive attitude than those with primary and secondary education. In Ma *et al.* (2019) study, they found out that street food vendors had low food safety KAP while the youngest consumers had better food safety knowledge and attitude compared to the older consumers. A study by Ruby *et al.* (2019) found that the level of food safety knowledge differed by gender, age, education level, employment and food preparation frequency. For practices, Jores *et al.* (2018) found no significant connections between age, gender, level of education, race, and family size towards food safety.

Low *et al.* (2016) conducted a study about factors that influence food hygiene knowledge among youth in Kuala Lumpur, Malaysia and found that knowledge was significantly associated with gender, level and field of study and father's educational level. Similarly, Mirzaei *et al.* (2018) discovered that socioeconomic status has been a crucial factor in the food safety KAP of male

adolescents and concluded that the level of adolescents' food safety KAP depends on their parents and their education level. They also identified poor awareness of food safety as one of the most significant factors influencing the occurrence of foodborne infections.

Aside from that, a number of studies have demonstrated that knowledge and attitude are also among the factors that might be used to predict the practices of food handlers or consumers. According to Soon *et al.* (2011), food safety knowledge does not directly influence food safety practices; instead, attitude has been found as a significant element influencing food safety practices. This was supported by Mihalache *et al.* (2021), who reported that knowledge and attitude depicted significant effects on self-reported safety kitchen practices and accounted for 30% of the variance in food safety practices utilized by Romanian consumers. However, Ruby *et al.* (2019) argued that attitude and knowledge were the weakest factors that determined consumers' food safety intentions.

Other than that, Bolek (2020) also reported that Turkish consumers had a great concern about food safety, and it was due to their lack of knowledge of food safety. One misconception that consumers and vendors always believe is that reheating cooked food will avoid food poisoning and contamination. This was supported by Ma *et al.* (2019) and Bolek (2020). Bolek (2020) then opposed this by stating reheating cooked foods indeed can contribute to food poisoning and bacteria can transfer from raw to cooked food.

Bolek (2020) also found out that consumers' food safety knowledge was hugely affected by what they saw in media such as television, and what they read in newspapers and scientific journals, although it varies by age. This then was supported by Mirzaei *et al.* (2018), who found out that most adolescents learn about food safety from the Internet and virtual communication social networks.

In Malaysia, there were also a lot of studies that have been done to assess food safety knowledge, attitude, and practice of food vendors or food handlers, whether institutionally (Siau *et al.*, 2015; Norhaslinda *et al.*, 2016; Lee *et al.*, 2017; Dora-Liyana *et al.*, 2018), street vendor (Jores *et al.*, 2018) or home-based (Nur Izyan *et al.*, 2019). As for food safety KAP of consumers, there are only a few studies done in Malaysia, in particular Sabah and Sarawak.

Food safety KAP among Malaysian students also has been studied. Ali *et al.* (2018) conducted a study on KAP of food safety and hygiene among 869 students attending private institutions in Kedah. The researchers discovered

that the students did have a good knowledge and attitude towards food safety and hygiene. They also discovered that the majority of their respondents feel that food handlers are accountable for the safety of the food. This finding contradicts the findings of a few previous research, which showed that food handlers have high knowledge and attitude, but their real practices are weak. Ali *et al.* (2018) also said that one of the reasons for the poor extensive knowledge among respondents was due to a low level of awareness among the general population, which meant that less attention was paid to the respondents' techniques of consuming and preparing food. They also claimed that the level of student's knowledge influenced their attitudes and perceptions and that increasing students' knowledge improved both attitudes and perceptions.

The findings of Ali's study, which showed that students did have a good knowledge and attitude towards food safety and hygiene, are refuted by the findings conducted by Mohd Yusof *et al.* (2018). However, Mohd Yusof *et al.* (2018) only conducted research on dietetic students and food handlers at a public university in Malaysia and did not include students from private universities in their research. In their study, the overall mean percentage of dietetic students is higher than that of food handlers because dietetic students receive training in food safety education. In addition, there was found to be no significant difference in KAP toward food poisoning across different genders, ages, educational levels, or economic levels among food handlers. On the other hand, for dietetic students, a significant difference ($p = 0.008$) was detected between the genders and knowledge while a significant correlation ($p = 0.048$) between age and practice. In addition, this study discovered a strong correlation between knowledge and attitude ($p = 0.032$), as well as knowledge and practice ($p = 0.017$), regarding food poisoning among food handlers.

An interesting study was carried out by Lee *et al.* (2017) where they not only studied the food safety KAP of food handlers but also made a hand swabs test to see if there were any pathogens involved when they were making the food. It has been reported that the majority of the respondents have a moderate level of food safety knowledge with a good attitude and self-reported practices. However, many of the food handlers in the food court were found to have microbial counts exceeding the standards and almost half of the respondents had been detected to have the presence of *Salmonella* on their hands while 2 individuals had *V. cholerae* and only 1 out of 85 respondents have *V. parahaemolyticus* detected while making the food. What is more alarming, Lee *et al.* (2017) mentioned that the majority of the food handlers did not wear gloves while

handling the food. Thus, they conclude that good food safety knowledge does not equal good food safety practices and propose examining the variables that impede knowledge transfer. Their study also recommends that the present national safe food handling course be improved to reflect Malaysian food handlers' multi-cultural and educational backgrounds as they discovered that 61% of their respondents were foreign workers. To conclude, this study also explores a new way to understand and make early prevention to avoid foodborne diseases.

In Sarawak, there have been two studies about food safety KAP of food vendors, and both were in Kuching. Although there has been a study about food safety KAP in Kuching, it solely focused on food vendors with Mizanur *et al.* (2012) focused on food safety KAP of people in Northern Kuching City, Sarawak, while Jores *et al.* (2018) studied the factors associated with food hygiene practices specifically on Padawan people. It was noted that the majority of food vendors in Northern Kuching City had taken at least one food safety training compared to people in Padawan, which only consisted of 35.9% of 117 respondents. However, Mizanur *et al.* (2012) revealed that all food vendors in Northern Kuching City, Sarawak had poor food safety knowledge but had high scores on attitude and food safety practices, while Jores *et al.* (2018) observed that out of 117 respondents in Padawan, less than 20% of them have good food safety knowledge and attitude with only 7.7% have good food safety practices. Nevertheless, Jores *et al.* (2018) concluded that most of the respondents have average food safety KAP.

3. Conclusion

There are studies regarding food safety KAP in different countries whether among food vendors or consumers. Some found that knowledge and attitude link with practices while some found otherwise. Hence, more study needs to be done to see which factors significantly predict food safety practices. From all those studies, it was also discovered that the majority of food vendors have good knowledge and attitudes, but it does not reflect their true practices of food safety. Hence, consumers, as the last person who will consume the food, need to have adequate food safety KAP to prevent foodborne illnesses from being spread widely. Evaluating consumer knowledge, attitudes, and behaviours is critical for developing and implementing food safety rules and risk communication strategies that are effective.

Conflict of interest

The authors declare no conflict of interest.

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