

Exploring The Landscape of Food Safety Knowledge and Practice among Malaysian Secondary School Students

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To Link this Article: <http://dx.doi.org/10.6007/IJARPED/v13-i2/21155>

DOI:10.6007/IJARPED/v13-i2/21155

Published Online: 15 April 2024

Abstract

Introduction: Food safety remains a critical public health concern, particularly among school children, as evidenced by escalating instances of foodborne illnesses globally. Despite various efforts, there is a need to assess and enhance knowledge about food safety practices among secondary school students. This study aims to assess the food safety knowledge of secondary school students in the East Coast of Malaysia. **Methods:** A cross-sectional study was conducted at a secondary school in Kelantan, East Coast, Malaysia. Data were collected through a self-administered questionnaire involving 82 students aged 13 to 17 years. The questionnaire covered socio-demographic information, food safety knowledge, and hygiene practices. Statistical analysis was performed using SPSS, employing descriptive statistics. **Results:** The study revealed varying levels of food safety knowledge among students. While many demonstrated awareness of certain practices, gaps existed, particularly in recognizing symptoms of food poisoning. Fast food restaurants were identified as the most common locations for students. The majority recognized preventive measures but exhibited misconceptions in certain areas, emphasizing the importance of comprehensive education. The findings highlight the critical role of students as both consumers and potential future food handlers. The study aligns with global concerns regarding foodborne illnesses, highlighting the imperative for systematic and targeted food safety education for this age group and stressing the significance of promptly recognizing and addressing symptoms of food poisoning. **Conclusion:** The results provide valuable insights for public health practitioners, educators, and policymakers to develop effective strategies for preventing foodborne illnesses in schools and promoting a culture of food safety.

Keywords: Food Safety, Secondary School Students, Knowledge, Practices, Foodborne Illnesses.

Introduction

Food safety is a pressing public health concern both locally and globally, with rising instances of foodborne illnesses necessitating urgent attention, particularly among vulnerable populations such as school children. The escalating instances of consuming unhealthy food have grown more severe, not only affecting the general public but also raising concerns, particularly among school children, despite various efforts undertaken by authorities (Scallan & Hoekstra, 2011). Indeed, there are likely many individuals who have not yet recognized the significance of acquiring knowledge about food safety. These include proper handwashing, food preparing to reduce cross-contamination, and cooking and storing foods at the correct temperature (Lando et al., 2016).

According to Ehuwa (2021), the number of foodborne illnesses is increasing and causes a public concern especially when mortality due to the illness was reported. Globally, it is estimated that 48 million people fall sick with 128,000 are hospitalized and 3000 died of food poisoning (CDC, 2018). In addition, one-third of these incidences occur among school children, and are associated to diarrheal diseases, that are resulted from food contaminated with pathogens such as norovirus, *Escherichia coli*, and *Salmonella* (WHO, 2019).

The prevalence of foodborne diseases in Malaysia, particularly among school children, is alarming. The statistics provided highlight the seriousness of the issue, with a significant number of reported cases and associated mortality rates. In Malaysia, the prevalence of foodborne diseases persists as a longstanding public health concern, with incidence rates recorded at 44.18/100,000 population in 2010, 50.42/100,000 population in 2014, and 47.2/100,000 population in 2016. The mortality rate associated with food poisoning was reported at 0.041/100,000 population in 2016 (MOH, 2016). According to the National Health and Morbidity Survey III (NHMS III), concerning self-reported acute diarrheal illness within two weeks among children, the highest incidence is noted in teenagers aged 15-19 years (7.7%), succeeded by children aged 0-4 years (4.5%) and 5-9 years (3.4%). Moreover, there were 32 out of 202 reported episodes (15.8%) of food poisoning in Ministry of Education (MOE) schools, while 17 episodes (8.4%) occurred in schools not registered with the MOE in Malaysia. This indicate the current state of food poisoning cases in schools is alarming. Student food poisoning incidents typically arise from the consumption of food prepared in school canteens, hostel kitchens, or as part of supplementary food programs.

School environments, encompassing canteens and hostel kitchens, represent potential sources of food contamination and outbreaks. Comprehending the factors contributing to these incidents is crucial for instituting effective preventive measures. In line with Muharnis & Dewi (2021), outbreaks of food poisoning in schools are attributed to various factors, with food handlers being the most common source of contamination. Food handlers play a crucial role in ensuring food safety across the entire production, distribution, storage, and preparation chain. According Linscott (2011), food contamination is linked to unhygienic kitchen utensils and counters. Furthermore, in accordance with Abdul-Mutalib et al (2015), surfaces of common kitchen items, such as cutting boards, wiping cloths, sinks, cleaning sponges, and knives, provide favourable breeding grounds for foodborne bacteria. The principal factors contributing to food poisoning outbreaks in school include delays between food preparation and consumption, the practice of storing prepared food at room temperature before serving, and instances of cross-contamination (Salleh et al., 2017).

The occurrence of foodborne illnesses in school is influenced by a combination of various factors. Proper personal hygiene and food handling practices play a crucial role in preventing foodborne illnesses. Evaluating the knowledge and practices of secondary school students in these areas can offer valuable insights into identifying and addressing gaps that require attention. According to Jevšnik et al (2008), among the primary contributing factors to outbreaks of food poisoning in schools are improper food preparation and storage, along with poor personal hygiene such as handwashing. Inadequate handwashing practices before meals and the absence of proper handwashing facilities are the principal contributors to the occurrence of acute diarrhea.

The research conducted by Weaver et al (2016) demonstrated that a significant proportion of students in Myanmar who exhibit inadequate handwashing habits had a heightened susceptibility to experiencing episodes of diarrhoea and vomiting, with approximately 43% of such individuals being affected. Younger students in Myanmar face a heightened risk of food poisoning, potentially attributed to their lower immunity levels against infections and their lack of responsibility in adhering to proper hygiene practices. Due to the increased likelihood of children and young adolescents engaging in unsafe food handling practices and relying solely on school canteens for meals, there is a significantly elevated risk of food poisoning.

The significance of the study lies in its exploration of food safety knowledge and practices among secondary school students in the East Coast of Malaysia, amidst rising instances of foodborne illnesses globally. With an alarming prevalence of such diseases, particularly among school children, understanding the factors contributing to outbreaks in school settings becomes crucial. Therefore, the study aims to assess students' knowledge and practices related to food handling and personal hygiene, essential components in preventing foodborne illnesses. By identifying and addressing gaps in knowledge and practices, the study seeks to contribute to the protection of students' health and well-being. Ultimately, this research is vital for implementing effective preventive measures and safeguarding the student population from the risks associated with foodborne illnesses.

In summary, studying food safety among secondary school students in the East Coast of Malaysia is essential for identifying risks, addressing gaps in knowledge and practices, and ultimately safeguarding the health and well-being of the student population. Overall, studying food safety among secondary school students in the East Coast of Malaysia is essential for identifying risks, addressing knowledge and practice gaps, and ultimately safeguarding the health and well-being of the student population. By enhancing food safety awareness and promoting proper hygiene practices, the study has the potential to contribute significantly to public health efforts in combating foodborne illnesses.

Material and Methodology

Research Design

A cross-sectional study was carried out at one of the secondary school 'X' in Kelantan which located in East Coast, Malaysia. To comply with the research's ethical consideration, the authors intended to give an initial 'X,' as it aims to keep the actual name of this school. The study was conducted from July to August 2023 to assess food safety knowledge related to food poisoning among 82 secondary school students aged 13 to 17 years. Inclusion criteria comprised students who were proficient in reading and understanding Bahasa Malaysia and buying food/eating outside from home at least one to three times in a month. Excluded from the study were students absent during data collection and those who did not obtain

approval from their parent/guardian. Respondents were selected through systematic random sampling with technical assistance from the teacher.

Instrumentation

The research data were collected through a self-administered questionnaire divided into three sections. The initial phase gathered socio-demographic information, encompassing gender, age, race, regularity, location, and factors influencing food purchasing or dining out. The second segment, comprising seven questions, obtained knowledge-related data, with each question offering three response options: 'yes,' 'no,' and 'unsure.' The third section aimed to assess respondents' practices in preventing food poisoning, with six questions utilizing a 4-point Likert scale, offering response options of 'never,' 'seldom,' 'sometimes,' and 'always.' All these questions adapted from the previous studied by (Mamot et al., 2021). A group of 15 respondents from a 'Y' secondary school in the east coast area participated in a questionnaire pilot test to verify the reliability and validity of the questions. The gathered data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 20.0. Descriptive statistics, including percentage and frequencies, were applied for all variables.

Results

Assessable questionnaires were collected from a sample of 82 secondary school students, and the demographic characteristics of the survey respondents are presented in Table I. The respondents, aged 13 to 17 years, were predominantly Malay (98.8%), with females comprising 68.3%. The frequency of purchasing or consuming food outside varied, with 31.7% doing so 1-3 times per month and 26.8% once a week. Fast food restaurants were the most common locations (80.5%), followed by Asian cuisine (50%) and Mamak restaurants (40.2%).

Table I

Demographic data of respondents

	Characteristics	Frequency	Percentage (%)
Age	13 years	22	26.8
	14 years	14	17.1
	15 years	18	21.9
	16 years	12	14.6
	17 years	16	19.6
Gender	Female	56	68.3
	Male	26	31.7
Race	Malay	81	98.8
	Chinease	1	1.2
Frequency of purchasing consuming food outside			
	1-3 times per month	26	31.7
	Once a week	22	26.8
	2-3 days a week	22	26.8
	4-6 days a week	9	11

Everyday	3	3.7
Common locations consuming food outside (respondent answer more than one)		
Fast food restaurant	66	80.5
Asian cuisine restaurant	41	50
Mamak restaurant	33	40.2
School canteen	2	2.4
Western/ thai restaurant	2	2.4
Street food	2	2.4
Reasons for purchasing or dining outside (respondent answer more than one)		
Reasonable price	57	69.5
Trying new cuisine	55	67.1
High rating (e.g. social media/tripadvisor)	34	41.5
Food premise cleanliness grade	34	41.5
Recommendation from friends	33	40.2
Availability of food premise	27	32.9
A place to socialize	16	19.5

In terms of reasons for dining outside, 69.5% cited reasonable prices, 67.1% were motivated by trying new cuisines, and 41.5% considered high ratings. The cleanliness grade of food premises influenced 41.5%, while 40.2% relied on recommendations from friends. Availability of food premises and the opportunity to socialize were factors for 32.9% and 19.5%, respectively.

Table II

Food safety knowledge of the respondents

Questions	Responses n(%)		
	True	False	Unsure
Food(s) which highly risk to cause food poisoning			
Seafood	48 (58.5)	15 (18.3)	19 (23.2)
Rice	20 (24.4)	41 (50.0)	21 (25.6)
Canned foods	59 (71.9)	12 (14.7)	11 (13.4)
Vegetables	11 (13.5)	53 (64.6)	18 (21.9)
Fruits	8 (9.8)	59 (71.9)	15 (18.3)
An individual with food poisoning would have the following symptoms			
Diarrhea	80 (97.6)	1 (1.2)	1 (1.2)
Vomiting	78 (95.1)	1 (1.2)	3 (3.7)
Dryness of lips	18 (21.9)	39 (47.6)	25 (30.5)
Lethargy	63 (76.8)	9 (11.0)	10 (12.2)
Yelloweyes (Jaundice)	7 (8.5)	45 (54.9)	30 (36.6)
Fever	33 (40.3)	21 (25.6)	28 (34.1)
Bloody stool	22 (26.8)	35 (42.7)	25 (30.5)

Muscle pain	19 (23.2)	37 (45.1)	26 (31.7)
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Food poisoning can cause:

Death	48 (58.5)	14 (17.1)	20 (24.4)
Kidney failure	25 (30.5)	27 (32.9)	30 (36.6)
Dehydration	49 (59.8)	15 (18.3)	18 (21.9)
Respiratory failure	20 (24.4)	32 (39.0)	30 (36.6)

Food poisoning can be prevented with:

Ensure the food is thoroughly cooked	81 (98.8)	1 (1.2)	0
Using the same cloth to wipe countertop and plates	8 (9.8)	69 (84.1)	5 (6.1)
Using the coping board to cut different raw foods	7 (8.5)	63 (76.9)	12 (14.6)
Washing hand using soaps each time after using toilet	81 (98.8)	1 (1.2)	0
Washing egg before cooking	77 (93.9)	3 (3.7)	2 (2.4)
Eating cooked food that is kept at room temperature for 12 to 24 hours	8 (9.8)	61 (74.4)	13 (15.8)
Raw food should be kept separated from cooked food	76 (92.7)	2 (2.4)	4 (4.9)
Avoid pest such as rodents, cockroaches and flies harborage in food	80 (97.6)	1 (1.2)	1 (1.2)
Practice a good personal hygiene	78 (95.2)	2 (2.4)	2 (2.4)

The respondents demonstrated (table II) varying levels of food safety knowledge based on their responses to specific questions. Regarding foods highly prone to causing food poisoning, the majority correctly identified seafood (58.5%), canned foods (71.9%), and vegetables (64.6%), while misconceptions were observed for rice (50.0%) and fruits (71.9%). Symptoms associated with food poisoning were well-recognized, with high percentages attributing diarrhea (97.6%) and vomiting (95.1%) to the condition. However, there were notable gaps in recognizing symptoms like dryness of lips, lethargy, yellow eyes (jaundice), fever, bloody stool, and muscle pain. Participants acknowledged the potential consequences of food poisoning, including death (58.5%) and kidney failure (30.5%). Preventive measures were generally well-understood, with a high consensus on ensuring thorough cooking (98.8%) and handwashing with soap after using the toilet (98.8%). Nevertheless, some misconceptions were evident, such as using the same cloth for countertop and plates (84.1%) and eating cooked food kept at room temperature for 12 to 24 hours (74.4%). Overall, the study highlights both positive awareness and areas for improvement in food safety knowledge among the respondents.

Table 3

Food safety hygiene practice of the respondents

Questions	Responses <i>n</i> (%)			
	Never	Seldom	Sometimes	Always
I wash my hand clean with liquid soap before eating	7 (8.6)	2 (2.4)	8 (9.8)	65 (79.2)
I do not spit around the food premise	31 (37.8)	3 (3.7)	4 (4.9)	44 (53.6)
I reject food premise that harbor pets like cockroaches/flies/rodents	4 (4.9)	2 (2.4)	4 (4.9)	72 (87.8)
I reject food premise of which the food handlers are smoking during food handling	6 (7.3)	1 (1.2)	9 (10.9)	66 (80.6)
I will see doctor if exhibit food poisoning	7 (8.6)	5 (6.1)	11 (13.4)	59 (71.9)
I do not choose food premise of which the cooked food is left at room temperature for a long period	8 (9.8)	4 (4.9)	17 (20.7)	53 (64.6)

Table III unveiled a variety of patterns in the food safety hygiene practices of the respondents. A significant majority consistently reported always washing their hands with liquid soap before eating (79.2%), while a smaller percentage admitted to never or seldom adhering to this practice. Spitting around the food premises was infrequently reported, with 53.6% always abstaining from such behavior. Rejecting food premises hosting pests like cockroaches, flies, or rodents was a common practice, with 87.8% always adhering to this hygiene measure. Similarly, the majority (80.6%) consistently avoided food premises where food handlers smoked during food handling. In the event of exhibiting symptoms of food poisoning, a substantial portion (71.9%) expressed a willingness to seek medical attention. However, varying levels of consistency were observed in rejecting food premises with cooked food left at room temperature for an extended period, with 64.6% reporting always adhering to this precaution.

Discussion

Although many students consume food prepared by parents, a notable portion opts to purchase food from public services like school canteens, markets and restaurants. However, the safety of food prepared in these establishments, particularly by school canteen, small restaurants or street vendors, has been a longstanding public concern. The World Health Organization's 2015 report emphasized that a significant proportion of foodborne diseases from improperly prepared or mishandled food, whether at home, in restaurants, or in markets. Consequently, this study primarily focusing on the students' role as food consumers and assesses their fundamental food safety knowledge and practices towards the food. The respondents demonstrated varying levels of food safety knowledge based on their responses to specific questions. Additionally, studies by Courtney et al (2016) have highlighted the food safety knowledge, attitudes, and self-reported practices of secondary school students, emphasizing the need for more systematic and targeted education on food safety for this age group. This is particularly pertinent as most school-going adolescents do not engage in cooking or food preparation themselves. In line with Zyoud et al (2019) stated that the need for improved food safety knowledge and practices among this demographic is underscored by the study's findings, which are consistent with research conducted in various regions,

including Iran, Palestine, China, and the West Indies. A survey among the school adolescents in Australia and United Kingdoms revealed that most of them were least knowledgeable on common food sources of foodborne illness pathogens (Mullan et al., 2015).

The findings indicate that fast food restaurants are the most common locations that students regularly visit. This can be attributed to the diverse, readily available food choices, reasonable price, as well as a conducive environment for socializing, with students' inclination toward purchasing external food influenced by their mothers' busy schedules in meal preparation. This aligns with a study conducted by Davis and Pechmann (2023), which found that college students prefer for fast food due to its convenience and availability on campus. The study further revealed that over 70% of surveyed college students consumed fast food at least once a day and those in close proximity to schools have the potential to transform into social hubs for students deeply connected to their academic community.

This study revealed that there are still students lacking knowledge about vegetables, rice, and fruits as foods susceptible to food poisoning. Understanding of this food is crucial, considering its daily consumption and its significance as a vital source for the health of both the body and brain, contributing to enhanced academic performance. According to MacLellan et al (2008), the primary goal of school students is to excel academically, and it is believed that a well-balanced diet contributes to the academic success of students at all levels. This assertion is substantiated by findings from previous studies, demonstrating the positive impact of daily consumption of milk, vegetables, and fruits (Lee & Wan, 2014). As students are both consumers and potential future food handlers, it is essential for them to enhance their knowledge in the field of food safety.

Recognizing signs and symptoms of food poisoning is a crucial aspect of addressing this issue. This study showed, there are students who lacked awareness that symptoms like dryness of lips, fever, and bloody stool are indicative of food poisoning. Delayed treatment of food poisoning can lead to complications such as dehydration, kidney failure, and, in severe cases, death. According to Marissa & Kathryn (2018), common symptoms of food poisoning encompass nausea, vomiting, abdominal cramps, and diarrhea, along with additional possibilities such as fever and abdominal pain. Salmonella emerges as the predominant microorganism causing food poisoning, contributing significantly to both hospitalizations and fatalities linked to foodborne illnesses. Globally, 48 million people suffer from a foodborne illness annually, with 128,000 requiring hospitalization and 3,000 succumbing to these conditions each year (CDC, 2019). In line with a study by Pogreba et al (2015), factors leading to outbreaks of food poisoning also include the consumption of undercooked or improperly thawed meat or poultry, cross-contamination facilitated by infected food handlers, and the presence of flies, cockroaches, and rats in the food environment, acting as vectors for the transmission of the disease.

Nevertheless, while the majority of students in this study acknowledged preventive measures, misconceptions were evident in specific areas, such as wiping countertops and plates with the same cloth, consuming cooked food that has been kept at room temperature for 12 to 24 hours, and using a single cutting board for various raw foods. This indicate the importance of providing comprehensive health education to address these misconceptions. In general, most students demonstrate a positive inclination towards awareness and compliance with good hygiene and food safety practices. They exhibit positive behaviors, such as avoiding establishments with pests and smoking during food handling, with particular emphasis on the crucial practice of handwashing. The Hand hygiene is currently recognized

as a crucial element in the prevention of infections. The school's emphasis on health education regarding the importance of hand hygiene during the COVID-19 season has positively influenced the students. This is apparent in the research by Almoslem et al (2021), where the majority acknowledges the significance of handwashing with soap as an essential measure in preventing food poisoning. Insufficient awareness regarding proper handwashing practices raises significant health concerns, particularly in the heightened risk of various communicable diseases.

In summary, it is crucial to emphasize both theoretical knowledge and practical application of food safety principles among school students. As known, students are consumer and also a future food handler. Therefore, there is a need for them to enhance their knowledge in the field of food safety, as knowledge correlates with current practices. The school bears the responsibility of organizing campaigns and health education programs to promote food safety awareness among various groups, including teachers, parents, food handlers, and students. Developing a comprehensive food safety module is an initiative in preventing foodborne diseases among school students. Finally with the acquired knowledge, there is optimism that it can positively influence consumer behavior in preventing food poisoning.

Conclusion

In conclusion, this study underscores the imperative of enhancing food safety knowledge and practices among secondary school students. It highlights the prevalence of misconceptions and knowledge gaps regarding food safety, particularly concerning the identification of high-risk foods and symptoms of foodborne illnesses. Tailored educational initiatives, such as the development of a comprehensive food safety module and targeted interventions, emerge as crucial strategies to mitigate these risks effectively.

By addressing these challenges, educators, policymakers, and public health practitioners can significantly reduce the incidence of foodborne illnesses among school students. The findings of this study not only contribute to the existing literature on food safety but also provide actionable insights for designing effective interventions and educational programs. Ultimately, through concerted efforts and a focus on education, there is optimism for a positive impact on consumer behavior and a reduction in the occurrence of food poisoning cases among school-aged individuals.

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