

Safe food handling knowledge and practices of Universiti Sultan Zainal Abidin cafeteria food handlers

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Abstract

Food safety has become a huge concern among health authorities in Malaysia due to the serious impact of foods being mishandled during preparation, processing, or storage, especially in food service environments. Therefore, this study was conducted to study knowledge and practices of safe food handling among Universiti Sultan Zainal Abidin (UniSZA) cafeteria food handlers. In this study, the questionnaires were modified from the previous study and distributed to fifty-five respondents who were selected using a convenience sampling method. The result was analysed and computed by using IBM SPSS version 21.0. This study found the average mean scores for all twenty items of knowledge towards safe food handling among food handlers involved in this study was 17.89 ± 2.96 . This indicates the majority of 87.3% ($n = 48$) respondents had 'good' knowledge while 7.3% ($n = 4$) respondents had 'fair' knowledge and another 5.5% ($n = 3$) had 'poor' knowledge score towards safe food handling. Besides, the majority of respondents had 'good' practices while none of the respondents had 'poor' and 'fair' score levels towards practices of safe food handling. The average mean score of practices toward safe food handling among food handlers involved in this study was 25.16 ± 1.32 . The results showed a positive correlation between the safe food handling knowledge and practices of UniSZA cafeteria's food handler (p -value = 0.013). In conclusion, according to the score levels of safe food handling knowledge among food handlers of UniSZA cafeteria, the result revealed that the majority of the food handlers had a good level of knowledge and practices towards safe food handling. Good knowledge and the right practice among food handlers in their working premises would help to ensure that more harm to food can be avoided.

1. Introduction

Food safety has become a huge concern among health authorities in Malaysia due to its serious impact. Foods can be mishandled during preparation, processing, or storage, especially in food service environments. Various factors may be causing foodborne diseases, including foods from unsafe sources, inadequate cooking, contaminated equipment, and poor personal hygiene (Abdullah Sani and Siow, 2014). Despite the health authorities' efforts, foodborne illness cases are still happening throughout the country (Mustafar, 2018). A human can acquire several diseases by ingesting some pollutants, including poisons, chemical compounds, toxic gases, and bacterial toxins. Furthermore, foodborne

diseases (FBDs) can cause disability, and the toxins produced by the bacteria or other toxic substances in food are the causes of the disease. It is important to know that poisoning is the cause of morbidity and mortality worldwide (Hernández-Cortez *et al.*, 2017).

World Health Organisation (WHO) reported that almost 1 in 10 people fall ill and die every year after eating contaminated food (WHO, 2020). Food safety handling and food security are linked together because unsafe food creates a vicious cycle of disease, particularly affecting infants, young children, the elderly, and the sick. The trend of food poisoning cases in Malaysia is increasing each year. According to the MOH

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statistics, a total of 5,265 food poisoning cases in the country's school canteens and cafeterias, which is equivalent to 43% of the 12,122 food poisoning cases reported in 2014 (Mustafar, 2018).

Food handlers are the most common source of contamination, which tends to spread harmful organisms through the faecal-oral route or skin lesions, as well as unclean kitchen utensils or kitchen counters (Abdul-Mutalib *et al.*, 2015). Despite food handlers having the skills and knowledge to handle food safely, human handling errors have been associated with most food poisoning. Many studies about the knowledge and practices of food handlers have been conducted worldwide. However, there is a lack of studies that examine the knowledge and practices of food safety among food handlers in our local universities (Abdullah Sani and Siow, 2014). Meals prepared in the cafeteria should receive special attention since the foods are consumed daily by the students. Most of the implicated food poisonings occurred on the food premises of schools and academic institutions. Many of these diseases occur during the food processing in the preparation stage at food service sites.

Mishandling food may be implicated in 97% of all foodborne illnesses associated with cafeteria outlets (Abdullah Sani *et al.*, 2014). Even though food premises inspections are routinely carried out, and a scoring system has been developed to evaluate food premises, food handlers are still responsible and participate in the final stage of preventing foodborne diseases. Safe food handling includes microbiological food hazards, optimal food storage temperatures, cross-contamination risks, and the importance of personal hygiene (Norhaslinda *et al.*, 2016). Therefore, this study focuses on safe food handling knowledge and practices among food handlers, especially in UniSZA to reduce the risk of foodborne cases and safe food to be consumed by the students.

2. Materials and methods

2.1 Study design

This research study was an observational study that focused on studying knowledge and practices of safe food handling among food handlers of UniSZA cafeteria in Gong Badak Campus. This study was carried out from 1st June 2021 to 31st January 2022. This study also aimed to identify the association between safe food handling knowledge and practices. The samples of this study represent food handlers who work at UniSZA cafeteria. The data were taken by questionnaire on sociodemographic variables, knowledge on food handling, and food handling practices.

2.2 Ethical consideration

For ethical consideration, ethical approval was submitted to UniSZA Human Research and Ethics Committee (UHREC). The UHREC evaluated the ethics of this study and ensured that the study followed all the rules and guidelines that should be implied. A consent form was given to every participant in this study to prove their agreement to join the research. The consent form was prepared to ensure that data obtained in the study was fully informed and the confidentiality of participants was protected. Information of the participants obtained was not exposed to the public. All forms were anonymous and have been entered and kept in the software. Only researched team members can assess the data. All the data were published only for knowledge.

2.3 Sampling

In this study, convenience sampling was used for quick data collection to gather elements for the sample at least a complicated method (Rohin *et al.*, 2020). This study was estimated to include up to 32 premises in UniSZA with available food handlers. The study then proceeds by explaining the objectives, procedure, and importance of the research to the respective participants before data collection. Consent forms were given to the participants to obtain approval. The participants were assured anonymity and all the information provided was kept confidential and only used for research purposes. The participants attended an interview session to answer the questionnaire provided by the research researcher on an actual day for data collection.

All participants were given a consent form and information sheet before taking part in this study. This consent was to make sure that the respondents were willing to take part voluntarily in this study. All data collected from this study was considered confidential. The data was used only for study purposes. Before conducting the research, the food handler had been briefed about this study and the procedure before they signed the consent form.

A face-to-face interview was conducted in this study but with several modifications as this study had to add appropriate Standard Operation Procedure (SOP) of Movement Control Order (MCO) due to the Pandemic COVID-19 (Mohd Adzim Khalili *et al.*, 2014). The participant was required to scan MySejahtera when they entered the UniSZA area. The participant was interviewed by session to avoid crowded and close contact. The researcher used a closed-ended questionnaire in this interview. The data collection was collected from a questionnaire form consisting of three sections, the sociodemographic profile, knowledge of

safe food handling, and self-report practices of safe food handling. It comprises two main scopes, including the level of knowledge and level of practices regarding safe food handling. The interview session lasted around 20 minutes to be completed.

2.3.1 Sampling size

The sample size was calculated based on a single proportion as follows:

$$n = (z/\Delta)^2 p (1-p)$$

Where n = estimated sample size, z = Z score for Type 1 error (α), p = population proportion practice score of food safety and Δ = absolute precision.

Based on a pilot study of previous research, absolute precision was set at 5% with a confidence level of 95% while the population proportion practice score of food safety was 89% (Abdullahi *et al.*, 2016). Z score was 1.96 (5% for Type I Error).

$$n = \left(\frac{196}{0.05}\right)^2 (0.89)(1 - 0.89) = 150$$

Considering the 10% dropout rate:

$$n = \left(\frac{150}{1 - 0.1}\right) = 167$$

Final sample size:

Hence, $n \sim 167$

2.4 Questionnaire

2.4.1 Socio-demographic variables questionnaire

The first section is socio-demographic profiles containing personal information such as respondent name, gender, age, race, level of education, typhoid vaccination status, and food handler's training certificate.

2.4.2 Level of knowledge of food handling questionnaire

The second section consists of twenty closed-end questions regarding general knowledge of food handling. The questionnaire was developed by combining questionnaires from previous studies by different researchers. The questionnaire was used to measure the variables of interest in the level of knowledge of safe food handling among food handlers in UniSZA's cafeteria Gong Badak. The answer choices were divided into three categories such as 'disagree', 'not sure' and, 'agree'. Each correct answer carries 1 mark, while any wrong answer and 'not sure' carry 0 marks. The total scores of knowledge were converted into percentages and categorised either as poor (less than 50%), fair (51% to 69%), or good (70% and above). The score ranges were adapted and modified from Dora-Liyana *et al.*

(2018).

2.4.3 Self-reported practices of food handling questionnaire

The third section consists of 13 closed-end questions regarding self-practices of food handling. The questionnaire was developed by combining questionnaires from previous studies by different researchers. The questionnaire was used to measure the variables of interest in the level of practices of safe food handling among food handlers in UniSZA's cafeteria Gong Badak. The answer choices are divided into three categories such as 'never', 'sometimes' and 'often'. Each 'never' answer carries 0 marks, while any 'sometimes' answer carries 1 mark and 'often' carries 2 marks. The total scores of practices were converted into percentages and categorized either as poor (less than 50%), fair (51% to 69%) or good (70% and above). The score ranges were adapted and modified from Dora-Liyana *et al.* (2018).

2.4.4 Pilot study

The questionnaire was pilot-tested on 10 non-participating individuals to ensure clarity of interpretation (Abu Hassan *et al.*, 2006). They were asked to fill out a questionnaire and identify their problems and suggestions. All suggestions were considered and utilised to modify the questionnaires before data collection. The questionnaires were also translated into Bahasa Melayu in the same format. Cronbach's Alpha analysis was used to measure internal consistency or reliability. The pilot test revealed that each part scored higher than 0.70, indicating that the device was reliable enough to be used. As a result, only minor modifications were made to enhance the subjects' understanding of statements in the questionnaire.

2.5 Statistical analysis

The data was analysed using SPSS version 21.0. The socio-demographic characteristics of respondents and their scores respective to knowledge, and practices were summarised using descriptive statistics. Descriptive statistics include mean, frequency, and standard deviation. The categorical data were presented as frequency and percentage. As for the first and second objectives which are to determine the level of safe food handling knowledge and practices of UniSZA's cafeteria food handler, descriptive statistics were used to summarize data. Other than that, Fisher's Exact Test was used to measure the correlation between knowledge, and practice. This test was two-sided and a p -value < 0.05 will be considered statistically significant.

3. Results and discussion

The results collected were analysed. The main parts of the result include demographic characteristics of respondents, score level of knowledge and practices regarding safe food handling, and correlation between safe food handling knowledge among UniSZA cafeteria food handlers and safe food handling practices UniSZA cafeteria food handlers. Results were analyzed for a total of 55 respondents involving food handlers who work at UniSZA's cafeteria, Gong Badak Campus.

3.1 Demographic characteristics of respondent

The socio-demographic characteristics of fifty-five (n = 55) food handlers in UniSZA's Cafeteria are represented in Table 1. Most of the respondents were females (67.3%), with a minority of males (32.7%). The result showed a different finding from other studies in which the percentage of female respondents did not exceed 50%, and most of the food handlers at Jordan University were males at 90.6% (Osaili *et al.*, 2018). However, this data was slightly the same in other studies, where most street food handlers were female, with a lower proportion of 60%, in comparison to their male counterparts (Marutha and Chelule, 2020). The dominance of females in the food services or catering business could be attributed to the traditional food preparation responsibilities at home (Parry-Hanson Kunadu *et al.*, 2016). Studies in 2019 also supported that women are more likely to be involved in food handling

Table 1. Distribution of sociodemographic characteristics of the respondents (n = 55).

Variable	Frequency	Percentage (%)
Gender		
Male	18	32.7
Female	37	67.3
Race		
Malay	55	100
Age		
25 and above	21	38.2
Below 25	34	61.8
Educational level		
Degree	24	43.6
Diploma	20	36.4
SPM	11	20
Working experiences in food services		
Less than 2 years	27	49.1
More than 2 years	28	50.9
Food handlers training certification		
No	2	3.6
Yes	53	96.4
Typhoid vaccination		
No	1	1.8
Yes	54	98.2

activities because they are traditionally responsible for and skilled in food preparation, as well as providing food for households (Isoni Auad *et al.*, 2019)

Table 1 shows 80% of them have an education at the College/University level. The percentage of the respondents who were diploma and degree leavers was 43.6% and 36.4%, respectively, while another 20% of the respondents recruited in this study were SPM leavers. Compared to previous studies reported by Abu Bakar *et al.* (2020), most of the respondents of food handlers in Public Universities were aged between 21 to 30 years old and they had at least secondary school as their highest education background.

Approximately (50.9%) of food handlers with direct or indirect contact with food have more than two years of experience in the food service sector. The staff was involved in the preparation of food, food servers, cleaning and washing, and other job responsibilities such as the cashier or manager. Less than half (49.1%) of the respondents have less than two years of experience in food services. The result showed slightly the same as other studies, most food handler has one to three years of working experience in food service (Abu Bakar *et al.*, 2020). However, studies in 2019 showed approximately (44.3%) of food handlers with direct or indirect contact with food have one to five years of experience in the food sector (Al-Kandari *et al.*, 2019).

In this study, most of the respondents (96.4%) had participated in food safety training program and gain the certificates. The results show only 3.6% (n = 2) have no food handler training certification. It shows a positive result compared to the result reported in previous studies where more than half (58.0%) of the food handlers in Kuwait restaurants have not participated in any food safety training program and only 14.7% have attended a food safety course more than two years ago (Al-Kandari *et al.*, 2019).

Although typhoid vaccination and food handlers' training certification from certified trainers appointed by the Ministry of Health Malaysia is a compulsory requirement for all food handlers, there was one respondent (1.8%) who did not get the typhoid vaccination while the rest were vaccinated (98.2%). According to Dora-Liyana *et al.* (2018), the data reported only 98.5% of food handlers were vaccinated, and 92.5% possessed valid training certification.

However, in this study, the finding of the socio-demographic profile was not focused on being related to the knowledge and the practices of the food handlers. None of the independent variables tested in this study had any predictive power on the outcome of sufficient

food safety knowledge and practices. Characteristics such as formal education, age, gender, the race would therefore not be suitable bases to assess whether institutional food handlers in the study area would have the knowledge and practices that would impact safe food handling.

3.2 Score level of safe food handling knowledge of respondents

In Table 2, the results represent the score level of safe food handling knowledge of UniSZA cafeteria's food handlers who successfully answered the questionnaire. Overall, the average mean score for all 20 items of knowledge about safe food handling among food handlers involved in this study was 17.89 ± 2.96 . Thus, indicating the majority of 87.3% ($n = 48$) respondents had 'good' knowledge while 7.3% ($n = 4$) respondents had 'fair' knowledge, and another 5.5% ($n = 3$) had 'poor' knowledge score towards safe food handling.

It is very important to know how university food handler acquired their knowledge on food preparation to establish their knowledge of food handling. In this study, the level of knowledge was high as most questions were answered correctly by food handlers. The result shows a positive knowledge in the categories of food hygiene and appropriate food handling. Most respondents strongly agree with all 20 questions regarding safe food handling.

Table 3 shows ten questions regarding knowledge of safe food handling, which focused on food hygiene among respondents who answered the questionnaires.

The question regarding whether washing hands before work reduces the risk of food contamination was correctly answered by most respondents, 96.5% ($n = 53$), followed by 3.6% ($n = 2$) who answered, 'not sure'. More than half of the respondents also agreed that wearing gloves was not a substitute for hand cleansing, and the same gloves used when handling fruits cannot be used to handle meat. Other than that, results showed that most of the respondents correctly answered the question regarding keeping nails short and unpainted reduces the risk of food contamination 94.5% ($n = 52$), and not wearing rings, watches, and necklaces minimizes food contamination was 96.4% ($n = 53$).

The majority of 98.8% ($n = 54$) respondents 'agreed' that cleaning and sanitizing utensils reduces the risk of food contamination and 90.0% ($n = 50$) respondents agreed that using the same dish towels to wipe hands can be a source of food contamination. However, there are 9.15% ($n = 5$) respondents were 'not sure' whether, unhealthy food handlers may contaminate food with microbes that cause foodborne diseases, food handlers with cuts or wounds on their hands do not need to be kept away from food handling activities and, food handlers' health status must be periodically checked.

Table 4 shows ten questions regarding knowledge of safe food handling, which focused on appropriate food handling among respondents who answered the questionnaires. Question regarding whether inadequate thawing of food can contribute to bacterial food poisoning. was correctly answered by most respondents, 92.7% ($n = 51$), followed by 7.3% ($n = 4$) who answered,

Table 2. Score level of safe food handling knowledge of UniSZA cafeteria's food handlers ($n = 55$).

Knowledge	Poor	Fair	Good	Score (Mean \pm SD)
Food Handler's Score	0 - 10 (0 - 50%)	11 - 14 (51 - 69%)	15 - 20 (70 - 100%)	17.89 \pm 2.96
Frequency (n)	3	4	48	
Percentage n (%)	5.5	7.3	87.3	

Table 3. Score of each question regarding knowledge towards safe food handling (food hygiene) ($n = 55$).

No.	Questions	Answer, n (%)		
		Disagree	Not sure	Agree
1	Washing hands before work reduces the risk of food contamination.	0 (0.0%)	2 (3.6%)	53 (96.4%)
2	Wearing gloves is not a substitute for hand cleansing.	1 (1.8%)	14 (25.5%)	40 (72.7%)
3	The same gloves used when handling fruits cannot be used to handle meat.	0 (0.0%)	4 (7.3%)	51 (92.7%)
4	Keeping nails short and unpainted reduces the risk of food contamination.	1 (1.8%)	2 (3.6%)	52 (94.5%)
5	Not wearing rings, watches, and necklaces minimize food contamination.	0 (0.0%)	2 (3.6%)	53 (96.4%)
6	Cleaning and sanitizing utensils reduces the risk of food contamination.	0 (0.0%)	1 (1.8%)	54 (98.2%)
7	Use the same dish towels to wipe hands as a source of food contamination.	1 (1.8%)	4 (7.3%)	50 (90.0%)
8	Unhealthy food handlers may contaminate food with microbes that cause foodborne	0 (0.0%)	5 (9.15%)	50 (90.9%)
9	Food handlers with cuts or wounds on their hands do not need to be kept away from	0 (0.0%)	5 (9.15%)	50 (90.9%)
10	Food handlers' health status must be periodically checked.	0 (0.0%)	5 (9.15%)	50 (90.9%)

Table 4. Score of each question regarding knowledge towards safe food handling (n = 55).

No.	Questions	Answer, n (%)		
		Disagree	not sure	Agree
1	Inadequate thawing of food can contribute to bacterial food poisoning.	0 (0.0%)	4 (7.3%)	51 (92.7%)
2	The correct temperature for the refrigerator is 14 °C and the freezer is below -18°C.	0 (0.0%)	13 (23.8%)	42 (76.4%)
3	The temperature danger zone of foods is in between 5 - 63°C.	1 (1.8%)	13 (23.6%)	41 (74.5%)
4	Food should be served within 4 hours after cooking it.	1 (1.8%)	4 (7.3%)	50 (90.9%)
5	Well-cooked food can reduce microbes that cause foodborne diseases.	0 (0.0%)	4 (7.3%)	51 (92.7%)
6	Food that is unfit for consumption always presents colour, taste or smell changes.	0 (0.0%)	5 (9.1%)	50 (90.9%)
7	Eating food one day past its expiration date poses a risk to health.	2 (3.6%)	1 (1.8%)	52 (94.5%)
8	Washing fruit and vegetables under running water and peeling them is enough to make these foods safe for consumption.	1 (1.8%)	6 (10.9%)	48 (87.3%)
9	Hair contains various types of bacteria and can be a main source of food contamination.	0 (0.0%)	9 (16.4%)	46 (83.6%)
10	Contact between raw materials and cooked foods contributes to food contamination	0 (0.0%)	2 (3.6%)	53 (96.4%)

'not sure'. More than half of the respondents agreed that the correct temperature for a refrigerator was 14°C and a freezer was below -18°C, temperature danger zone of foods was between 5°C-63°C. However, 13 respondents answered, 'not sure'. Other than that, results showed that most of the respondents correctly answered the food question should be served within 4 hours after cooking it 90.9 % (n = 50), and well-cooked food can reduce microbes that cause foodborne diseases 92.7% (n = 51).

The majority of 90.9% (n = 50) respondents 'agreed' that food that was unfit for consumption always presents colour, taste, or smell changes, and 94.5% (n = 52) respondents agreed that eating food one day past its expiration date poses a health risk. However, there are 12.7% (n = 7) of respondents were 'not sure' and 'disagreed' whether washing vegetables and fruits under running water and peeling them was enough to make these foods safe for consumption. Results showed that most of the respondents mostly agreed with the question regarding hair containing various types of bacteria and can be the main source of food contamination 83.6% (n = 46), and well-cooked food can reduce microbes that cause foodborne diseases, 96.4% (n = 53).

Overall, the average mean score for all 20 items of knowledge about safe food handling among food handlers involved in this study was (17.89±2.96). This indicates the majority of 87.3% (n = 48) respondents had 'good' knowledge while 7.3% (n = 4) respondents had 'fair' knowledge, and another 5.5% (n = 3) had a 'poor' knowledge score towards safe food handling. In previous studies of food safety knowledge, attitudes, and practices

of food handlers in restaurants in Kuwait, the overall food safety knowledge level of food handlers was found to be satisfactory (70.1%) with a mean score (53.59±16.683) with a total of 30 questions regarding knowledge on safe food handling (Al-Kandari *et al.*, 2019). Other findings were reported by Lestanyo *et al.* (2017), where the studies of safe food handling KAP of food handlers in hospital kitchen, their study showed that respondents' knowledge of safe food handling was quite high. Most participants agreed that safe food handling had to be implemented in their daily routine jobs.

3.3 Score level of safe food handling practices of respondents

Table 5 shows the level scores of practices on food safety among UniSZA's food handlers who successfully answered the questions regarding safe food handling practices. Overall, the average mean score of practices toward safe food handling among food handlers involved in this study was 25.16±1.32. The majority of 100% of respondents had 'good' practices while none of the respondents had 'poor' and 'fair' score levels towards practices of safe food handling. According to Suhaila (2018), food poisoning and other foodborne illnesses can be prevented by food hygiene practices and effectiveness.

There were 13 questions regarding practices towards safe food handling. The results showed 92.7% (n = 51) of total respondents answered 'often' in the question regarding whether they wash their hands before and do work with the right hand-washing procedures (Table 6).

Table 5. Score level of safe food handling practices of UniSZA cafeteria's food handler.

Practices	Poor	Fair	Good	Score
				(Mean±SD)
Food Handler's Score	0 - 13	14 - 18	19 - 26	
	(0 - 50%)	(51 - 69%)	(70 - 100%)	25.16±1.32
Frequency (n)	0	0	55	
Percentage n (%)	0	0	100	

In comparison, the remaining answered 'sometimes' 7.3% (n = 4). The food handlers in UniSZA claimed that they wash their hands before and do work with the right hand-washing procedures. Unclean hands can be a source of food poisoning and foodborne diseases. Up to 88.0% (n = 264) of the street food vendors reportedly washed their hands before handling food, while the rest never did (Marutha and Chelule, 2020).

In this study, the result showed for both questions regarding taking off any jewellery items when they handle food was 94.5% (n = 52) and putting on a clean and suitable uniform before starting work was 94.5% (n = 52), where most of the respondents often practised the routine. Other than that, 98.2% of respondents also reported that they often avoid smoking when they prepare food. Studies reported by Al-Kandari *et al.* (2019) showed that most of the respondents were not wearing jewellery (86.1%), smoking, or eating (90.8%) during food preparation. This showed a good result in practising safe food handling while preparing the foods. Another study also reported a good result of safe food handling practices where 77.5% of handlers reported never using jewellery or adornments, and 82.5% claimed to keep their hair completely covered with a cap (Isoni Auad *et al.*, 2019).

Table 6 also shows that the majority, 98.2% (n = 54), of the respondents often practice checking the refrigerator's temperature before storage. This finding aligned with results obtained by Dora-Liyana *et al.* (2018), who reported that the food handlers at boarding schools in the Northern region of Malaysia check the temperature of the refrigerator before they store food. Other than that, in this study, the result also reported that 98.2% of the respondents who successfully answered the question were practising using a thermometer to determine a suitable meat temperature to cook. A

temperature that can hit 74°C could kill bacteria, although spores and toxins may survive thus reducing the risk of getting the foodborne disease (Bintsis, 2017).

A similar result showed that most of the respondents, 92.7% (n = 51), often practising to not touching food when their fingers are cut, and the cut is not well covered. Other than that, the results showed most respondents, 89.1% (n = 49), reported that they were absent from work if they had any foodborne illness, while the remaining 9% were still present for work (n = 6). This shows a good result among UniSZA food handlers. However, a study found that 6 (20%) out of 30 people still work when they have lesions on their hands, and most food handlers would still work even though they have diarrhoea symptoms.

The percentage of respondents who often practised changing gloves between the handling of raw and ready-to-eat foods was 87.3%, while the remaining answered 'sometimes' were 12.7% (n = 7). It was very important to always practice good hygiene when it comes to contact with food. Changing gloves is a must to avoid any cross-contamination and causing foodborne illness. A similar percentage, 98.2% (n = 54), showed most of the respondents answered 'often' for questions regarding whether they cover all the foods in the food stall and clean their working area after work. However, there was one respondent who chose 'some time'. Cleaning the workspace before and after preparing food was crucial to practice.

3.4 The associations between the safe food handling knowledge, and practices of UniSZA cafeteria's food handler.

Table 7 represents the associations between the safe food handling knowledge and practices of UniSZA

Table 6. Score of each question regarding practices towards safe food handling.

No.	Questions	Answer, n(%)		
		Never	Sometimes	Often
1	Do you wash your hands before and work with the right hand-washing procedures?	0 (0%)	4 (7.3%)	51 (51%)
2	Do you not touch food when your fingers are cut and the cut is not well covered?	1 (1.8%)	3 (5.5%)	51 (92.7%)
3	Do you change gloves between your handling of raw and ready-to-eat foods?	0 (0%)	7 (12.7%)	48 (87.3%)
4	Do you take off any items of jewellery when you handle food?	0 (0%)	3 (5.5%)	52 (94.5%)
5	Do you put on a clean and suitable uniform before starting work? (e.g.: apron, hairnet, shoes, gloves)	0 (0%)	3 (5.5%)	52 (94.5%)
6	Are you absent from work if you have any foodborne illness?	0 (0%)	6 (10.9%)	49 (89.1%)
7	Do you check the refrigerator's temperature before storage?	0 (0%)	1 (1.8%)	54 (98.2%)
8	Do you store raw food and ready-to-eat food separately?	0 (0%)	8 (14.5%)	47 (85.5%)
9	Do you use a thermometer to determine a suitable meat temperature to cook?	1 (1.8%)	1 (1.8%)	53 (96.4%)
10	Do you thaw food by putting it under running tap water?	0 (0%)	1 (1.8%)	54 (98.2%)
11	Do you avoid smoking when you prepare food?	0 (0%)	1 (1.8%)	54 (98.2%)
12	Do you cover all the food on the food stall?	0 (0%)	2 (3.6%)	53 (96.4%)
13	Do you clean your working area after work?	0 (0%)	1 (1.8%)	54 (98.2%)

cafeteria's food handlers who participated in this study. By using Fisher's Exact Test, the p-value is 0.013 which is less than 0.05. Hence, it accepts the alternate hypothesis and rejects the null hypothesis. Thus, there was a positive correlation between the safe food handling knowledge and practices of UniSZA cafeteria's food handlers. The result concluded that the assumption of knowledge and practice were strongly supported.

Knowledge is the key element to influence the outcome of attitudes and practices among food handlers. According to a study in 2018, it shows the association of food handlers with good knowledge will have good attitudes and good practices (Mohlisi Mohd Asmawi et al., 2018). In another study, there were significant positive associations between knowledge and practices. This suggests that the food safety knowledge of respondents will most likely influence their practices regarding the safe handling of foods (Parry-Hanson Kunadu et al., 2016). In contrast, another study also showed that the relationship between knowledge score and practice score shows a weak positive relationship. In other words, the attitude was believed to have a higher impact on practice rather than knowledge towards practices. Therefore, a good score in knowledge may not always turn into a good practice (Akabanda et al., 2017).

Table 7. Associations between the safe food handling knowledge, and practices of UniSZA cafeteria's food handler.

Level	Confidence Interval	P-value
Knowledge - Practices	0.009 - 0.014	0.013

*Fisher's Exact Test was applied

4. Conclusion

According to the score level of safe food handling knowledge among food handlers of UniSZA Cafeteria, the result has revealed that most of the food handlers had a good level of knowledge and practices towards safe food handling. The majority of 100% of respondents had 'good' practices while none of the respondents had 'poor' and 'fair' score levels towards practices of safe food handling. Knowledge of food hygiene practices is important for the food handlers to carry out good food hygiene practices and produce food that is safe for consumption.

Poor hygiene conditions of food premises, insufficient food hygiene practices during preparing and serving food, and personal hygiene of food handlers are the most probable causes of foodborne illness. Areas of most concern were the storage of food in the danger zone, practices that could lead to cross-contamination of food, multiple freeze-thaw cycles, and thawing of frozen food at room temperature. These gaps could be resolved with risk-based training of food handlers in institutional facilities using appropriate training aids to encourage

understanding and appreciation of the applications of food safety principles in their day-to-day operations. Habits must be changed to obtain a sustained improvement in food safety practices, and this can only be accomplished through continuous and gradual training, monitoring, and resource improvement.

Conflict of interest

The authors declare no conflict of interest.

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