

## Evaluation of Knowledge, Attitude and Practices of Food Handlers in Campus Cafeterias

Nurul Amelia Mustaffa<sup>b</sup>, Roshanida A. Rahman<sup>\*.a</sup>, Mimi Haryani Hassim<sup>b</sup>, Norzita Ngadi<sup>b</sup>

<sup>a</sup>Department of Bioprocess and Polymer Engineering, Faculty of Chemical & Energy Engineering, Universiti Teknologi Malaysia, 81310, Johor Bahru, Johor, Malaysia.

<sup>b</sup>Department of Chemical Engineering, Faculty of Chemical & Energy Engineering, Universiti Teknologi Malaysia, 81310, Johor Bahru, Johor, Malaysia.  
[roshanida@cheme.utm.my](mailto:roshanida@cheme.utm.my)

The aim of this study is to assess the knowledge, attitude and practices (KAP) of food safety among food handlers of cafeterias in a university campus. It is a common scenario for university students in Malaysia to have their meals in cafeterias within the campus area. In a normal academic semester session, the number of students in the campus can be thousands at one time. The issue of hygienic level in cafeterias in universities is alarming since the number of students in a university campus is much higher than in a school. In general, food handlers should pay serious attention towards food hygiene and safety in order to avoid foodborne disease. It is highly critical to investigate thoroughly the hygienic level in the cafeterias inside the campus so that to totally understand the level of risk students are exposed to when having their meals in the cafeterias. To get such information is fundamental in strategising means to ensure the level of hygiene in the cafeterias is at least, acceptable for non-harmful effects to the students. This has motivated the design and execution of this study. In this study, all cafeterias in a selected university campus located in Peninsular Malaysia were evaluated for their level of hygiene. There was a total of 30 cafeteria's food handlers altogether included in the investigation. The KAP level was assessed by giving out properly designed questionnaires to the food handlers. It is important for food handlers to equip themselves with knowledge on good food handling practices. Beside knowledge and law enforcement, the attitude of the food handlers also is another important factor that may influence the occurrence of foodborne disease. Basically, all three traits; knowledge, attitude and education, are compulsory to achieve safe food handling practice. Therefore all these three aspects were taken into account in details in this study. Based on the findings, correlations between these aspects were established. Besides, appropriate recommendations to overcome the problems revealed from this study are also provided.

### 1. Introduction

Foodborne diseases (FBD) can be translated as food-transmitted diseases as it is a medium of transmission for contaminants to consumers (WHO, 2006). Unsafe food intake is a common problem in every single part of the world, but such issue is difficult to quantify since the parameter of measurement is not well defined. Food contaminants may cause numerous infectious diseases including fatal cancers (Fukuda, 2015). Food and waterborne diseases had caused almost 50 incidence rate per 100,000 populations in 2013 as reported by the Ministry of Health Malaysia (2014). With around 30 M populations in Malaysia, this implies that for every 2000 people in Malaysia, one person was statistically infected by foodborne or waterborne diseases. Even though these diseases had shown a decreasing pattern from the number in year 2012 (61 incidence rate per 100,000 populations), the number of incidence is still considerably high (Ministry of Health Malaysia, 2012).

The government of Malaysia had come out with laws regarding foods as Food Regulations 1985. These regulations provide guidelines for food handlers in Malaysia on the do's and the don'ts in food businesses. There is always a chance for cross-contamination to occur during processing, preparation and service steps (Carrasco et al., 2012). The food handlers may be the agent or vector in spreading viruses if the importance of

food safety and good food handling practices are neglected (Seaman and Eves, 2010). Poor environmental sanitation, insufficient safe water supply and unhygienic food handling practices are also some of the factors that cause foodborne diseases outbreak (Siow and Sani, 2011). During short period of time to prepare dishes from raw foods, food handlers may have not following good food handling practices such as uncovered dish for excessively long time or not cleaning hands before handling raw or cooked foods.

Besides knowledge and law enforcement, food handlers' attitude is an important factor that is essential in order to lower foodborne disease. All three traits; knowledge, attitude and education are compulsory to enable safe food handling practices (Toh and Birchenough, 2000). In a university campus, around hundreds of students go to residential college or campus cafeterias to get their daily meal. Therefore, an assessment on knowledge, attitudes and practices among food handlers at residential colleges and cafeterias regarding safety of food should be critically conducted. This assessment is a good approach to know the food safety level in a campus. Further actions or improvements can be proposed from this study.

## **2. Method**

In order to assess the demographic information, knowledge, attitude and practices (KAP) of food handlers, questionnaires are given out to 30 food handlers in the campus cafeterias. Questionnaires are divided into four parts; demographic study, knowledge, attitude and practices.

### **2.1 Part A: Demographic study**

Demographic study is a part to investigate on the background of the food handlers such as age, gender, education level, experiences, position, working status, training and vaccination. From the information obtained, the data is compared to the KAP level.

### **2.2 Part B: Knowledge of food handlers**

The questions in this part are based on the example from the available food safety manual (USDA, 2006). The scopes of the questions include personal hygiene, cleaning and sanitising, cross-contamination and food storage.

### **2.3 Part C: Attitude**

This part of the questionnaires is to assess food handlers' attitude during food handling processes towards prevention of foodborne diseases. Theoretical attitude can be drawn from the respondents' answers.

### **2.4 Part D: Practices of food handlers**

This part of questionnaires is to assess food handlers' attitude during food handling processes towards prevention of foodborne diseases. Theoretical attitude can be drawn from respondents' answers can portray the big picture of their perspectives.

## **3. Results and discussion**

Thirty respondents had answered the questionnaires given to them during the operating hours. It is expected from this study that the knowledge, attitude and practices (KAP) level among food handlers can be known and assessed.

### **3.1 Part A: Demographic study**

Demographic study is done to investigate and determine the relationship of food handlers' background with their theoretical KAP level about food safety. It is expected that food handlers from various background can achieve satisfactory or excellent level in the KAP assessment. The collected data is summarised in Table 1. It can be observed that majority of the respondents are adults, in the range of age between 21 to 40 years old. Male has represented (57 %) of the total numbers of respondents. The academic levels for most of the respondents fall into 'Primary School' category. It is expected for the respondents to at least complete the 'Secondary School' level. It is acceptable that no respondents had completed the 'Higher Education' level. This result can be further correlated with age and experience categories, which will be discussed in the latter section.

For the position (roles) in the cafeterias, most of the respondents are managers of the food handling services. This is followed by an equal number of food handlers who work in cooking and preparation section. Most of the respondents (80 %) have more than 5 year's experiences; considered as expert, of working in food handling services. It can be correlated with the academic level of the respondents that were found to be lower than secondary school. As most of the respondents are young adults as shown in the age category, it is almost impossible to obtain more than 5 years working experiences after completion of secondary school. It is

understandable that the respondents have low academic level achievement along with the long working experience.

Majority of the workers are fix workers equipped with formal training. However it is rather at disappointing level to discover the number of respondents that had taken anti-typhoid shot at surprisingly low percentage of 23 %.

*Table 1: Food handlers' background*

Category	Range	Quantity	%
Age	21 - 40 years old	20	67
	> 40 years old	10	33
Gender	Male	17	57
	Female	13	43
Education	No schoolings	2	7
	Primary school	15	50
	Secondary schools	13	43
	Higher Education	0	0
Position	Cook	7	23
	Manager	16	53
	Preparation	7	23
Experience	< 3 years	2	7
	3.1 > 5 years	4	13
	> 5 years	24	80
Status	Permanent	23	77
	Temporary	2	7
	Contract	5	17
Training	Formal	20	67
	No	10	33
Shot	Yes	7	23
	No	23	77

### 3.2 Part B: Knowledge of Food Handlers

The questions were constructed based on the common causes of foodborne illness. The answers from the respondents are summarised in Table 2 as follows.

*Table 2: Knowledge of food handlers (n = 30)*

No	Question	Percentage (%) of respondents answer correctly (n = 30)
1.	Washing hand before handling food will reduce risk poisoning.	100
2.	Raw food should be kept or stored separately from cooked food.	93
3.	Raw food should be kept on lower shelf and ready food should be stored on upper shelf.	50
4.	Bacteria is the main cause of food poisoning.	93
5.	Temperature plays a big role in bacterial growth.	93
6.	Improper thawing or reheating of food will increase the risk of contamination.	93
7.	Food can only be reheated once.	93
8.	Defrosted food cannot be frozen again.	70
9.	Choose the bacteria that can cause food poisoning.	0
10.	Tick the right temperature range that indicates danger zone temperature.	23
	Total Mean Percentage (%)	71

From the questionnaires, it was found that the food handlers are aware of the importance of proper hand washing in order to reduce the potential of being a vector for the bacteria. In order to assess food handlers' knowledge on risk of contamination, a detailed question regarding the storage of raw food in the refrigerator was asked. Only 50 % of the total numbers of food handlers manage to give the correct answer. The percentage represents the low level of understanding on the risk of contamination during storage process. The

food handlers are proven to be lack of knowledge as none of the food handlers could identify all the bacteria listed in the answers choices that may possibly cause food poisoning.

Most of the food handlers recognised *E. coliform* as one of the most infamous bacteria. Only 6 % of the food handlers could recognise *Salmonella* sp. as one of the pathogenic bacteria and none could identify *Pseudomonas aerobae*. It is important for the food handlers to recognise these most commonly found pathogenic bacteria. By knowing the type of bacteria and its mechanism, the food handlers can understand the risk of contamination and the harm of bacteria that may affect the food safety.

### 3.3 Part C: Attitude of food handlers

The respondents' have positive attitude as food handlers as majority of them had scored above the satisfactory level. Most of the food handlers scored 80 % or above for all 10 questions in this section. The data is summarised in Table 3.

*Table 3: Food handlers' attitude*

No	Question	Percentage (%) of correct answer (n = 30)
1.	It is my responsibility to practice safe food handling.	100
2.	I am willing to attend training regarding food hygiene.	90
3.	I believe good personal hygiene can prevent foodborne (keep short nails, wash hands regularly, cover hair, etc).	100
4.	I wash my hands every time before handling foods, after a toilet visit, sneeze and getting cuts.	93
5.	I don't touch cooked foods using my hand.	100
6.	I use different chopping boards for vegetables and meat.	77
7.	I use different dustbin for wet and dry waste.	80
8.	I always make sure raw foods are in good condition before cook.	100
9.	If I am provided with safe food handling practices guideline, I will surely follow all of it even without supervision of my superior.	100
10.	If food training is given, I would practice a better food handling.	100
Total Mean Percentage (%)		94

All the food handlers had scored above satisfactory level by showing a good attitude corresponding to the questions given. The respondents agree that they are responsible to practice safe food handling and are certainly willing to attend any training to enhance their knowledge, attitude and practices in food safety and hygiene. All respondents also agree on the statement to willingly follow all of the safe food handling practices. Even without supervision of their management superior, they are willing to follow all the guidelines upon provided.

All respondents also agree on statement that good personal hygiene can prevent foodborne disease. Good personal hygiene practices include keeping their nails short, washing hands regularly and keeping their head covered. However, through an observation during the survey session, none of the male workers had a hair cover while working at the food stall.

Most of the respondents claimed that they wash hands every time before handling foods, after a toilet visit, sneeze and getting cuts. This is important as hands are the common transfer media for bacteria cross contamination. Diseases could be spread by food handlers in case of bad practice of food hygiene and safety issue.

All of the respondents also agree on keeping a good attitude in treating the cooked foods by not touching the cooked foods using hands. It is good to discover that the food handlers have good attitude in food hygiene and safety. The respondents are found to be slightly disagree (77 %) to use different chopping boards as according to the type of food that need to be processed. It is claimed to be unpractical to segregate between vegetables and poultry chopping board usage. It is also found that a small amount of food handlers (20 %) disagree with a requirement to use different dustbins segregating the wet and dry waste, all of the respondents claimed to ensure the raw foods are in good condition before cooking in order to keep the food safe to be consumed.

### 3.4 Part D: Practices of food handlers

In this part, the food handlers were asked about their practices on food safety and hygiene. The data obtained is summarised into Table 4.

The first question received good percentage (87 %). This question asked about the food handlers' hand washing practices. Most of the food handlers claimed that they will wash their hands after sneezing, visiting toilet, got an abrasion, lesion or cut, scratching and also whenever they are handling foods.

The respondents also claimed that they will take leave if they have symptoms of continuous coughing, fever, stomach ache or cramps and flu. This question had scored slightly above the acceptable level (77 %). It is important for the food handlers to know when they are supposed to take leave. This practice can reduce the risk of contamination and directly increase the food safety and hygiene level. In order to clean from the aspect of cleaning the work station, the food handlers are practicing a good hygiene practices. The respondents had scored slightly above the satisfactory level (77 %). It is discovered that less than half (40 %) of the respondents use warm water to clean the work station. Warm water above 60 °C can work as disinfectant as bacteria is paralysed or dead at this range of temperature.

*Table 4: Food handlers' practices on food safety and hygiene*

No. Questions	Yes (n=30)	No (n=30)	Percentage (%)
1. I wash hands if I:			
Sneeze	26	4	87
After toilet visit	26	4	87
Got an abrasion, lesion or cut	24	6	80
Scratching	26	4	87
Handling food	28	2	93
		Mean (%)	87
2. I will take leave if:			
Continue coughing	24	6	80
Fever	24	6	80
Stomach-ache or cramps	22	8	73
Flu	22	8	73
		Mean (%)	77
3. I use these to clean work station:			
Table cloth	30	0	100
Water	22	8	73
Warm water (above 60 °C)	12	18	40
Disinfectant (Alcohol, Dettol, Chlorine)	22	8	73
Mop	26	4	87
Detergent (Soap)	26	4	87
		Mean (%)	77
4. Leftover food management			
Thrown away	24	6	80
Refrigerated and reheated	10	20	67*
Eaten at home	12	18	40
		Mean (%)	62
5. I thaw food by:			
Letting it at room temperature to defrost itself in a covered container	22	8	73
Letting it at room temperature to defrost itself in an open container	4	26	87*
Put in under running tap water	8	22	27
Put it in chill section in refrigerator	24	6	80
		Mean (%)	67
6. I do not refreeze defrosted food	12	18	40
7. I cover all the foods on the food stall	24	6	80
8. I clean my work station before and after I start and finish my works.	28	2	93
9. It is not necessary to use thermometer to determine suitable meat temperature to cook.	28	2	7*
		Mean (%)	55
		Total Mean (%)	71

\* is a percentage taken from 'No' response as it is the correct answer

Question 5 assesses the practices of food handlers in thawing food as a part of the management of raw food. The mean score obtained (67 %) had shown that the management is in a moderate level. Food handlers are supposed to score higher for this question as thawing food is one of the most common acts practiced in daily food handling processes. For Questions 7 (80 %) and 8 (93 %), the respondents received good scoring. Most of the respondents do cover cooked foods and also clean their work station before and after finishing their works. For Questions 6 and 9, the respondents did quite poorly with scores of below 50 %. The food handlers tend to refreeze defrosted food. For Question 9, most of the respondents did not use thermometer to determine the suitable meat temperature to cook. Meat or any poultry can be the most potential vector for pathogenic bacteria. Therefore, food handlers should score higher in this section by practicing the use of thermometer in order to ensure the poultry has reached the safe temperature to be cooked as dishes. The last question requires the respondents to score on the aspects listed as according to the priority when purchasing raw foods. From this research, it is predetermined that the quality of the food is defined as features such as the food origin or flavouring (FAO and WHO, 2003). Nutritional value and packaging are also contributing to the quality justifications (Caswell and Mojduszka, 1996). From this study, it is discovered that 'Quality' is the main priority, followed by the 'Price'. It is expected that the aspect of 'Freshness' will be ranked higher than the third position. Even though the score difference between 'Price' and 'Freshness' is small, it indicates the attitude of food handlers towards purchasing raw foods. The respondents may have disregarded the freshness of the food by choosing over the raw foods with lower price. The respondents were explained in advanced that 'Quality' is different with 'Freshness'. In this research, freshness means time interval between arrivals of the product to the store time of purchasing. The freshness of food is further quantified as smell, taste and appearance of the food itself. The 'Quantity' aspect was ranked as fourth and followed by 'Brand' as the last one chosen by the respondents.

#### 4. Conclusions

Overall, this research aims to determine the KAP level on food safety for food handlers in campus cafeterias. Another aim of the study is to determine the relationship between KAP levels of food handlers. From the research, it is known that the level of knowledge and attitude of food handlers in practicing safe and hygienic food handling are above the satisfactory level. This finding is concluded based on the positive outcomes for all the three categories evaluated (knowledge, attitude and practices) (respondents scored above 50 % for all the categories). It can be proposed that following this study, a lot of improvements need to be made in order to improve the awareness of food handlers towards food safety and hygiene. By enforcing regular check-up or periodic training, it is possible to have a better and much healthier environment for food services especially to vulnerable groups like students in campus area.

#### Reference

- Carrasco E., Morales-Rueda A., García-Gimeno R.M., 2012, Cross-contamination and recontamination by *Salmonella* in foods: A review, *Food Research International* 45 (2), 545-556
- Caswell J.A., Mojduszka E.M., 1996, Using informational labelling to influence the market for quality in food products, *American Journal of Agricultural Economics* 78 (5), 1248-1253
- Food and Agriculture Organization of the United Nations (FAO), World Health Organization (WHO), 2003, *Assuring Food Safety and Quality: Guidelines for Strengthening National Food Control Systems*, FAO and WHO, Rome, Italy.
- Fukuda K., 2015, Food safety in a globalized world, *Bulletin of the World Health Organization*, 93 (4), 209-284.
- Ministry of Health Malaysia (MOH), 2012, Health Facts 2012: July 2012, MOH/S/RAN/31.12(TR) <[www.moh.gov.my/images/gallery/stats/heal\\_fact/health\\_fact\\_2012\\_page\\_by\\_page.pdf](http://www.moh.gov.my/images/gallery/stats/heal_fact/health_fact_2012_page_by_page.pdf)> accessed 12.08.2016.
- Ministry of Health Malaysia (MOH), 2014, Health Facts 2014: June 2014, MOH/S/RAN/73.14(TR), <[www.moh.gov.my/images/gallery/publications/HEALTH%20FACTS%202014.pdf](http://www.moh.gov.my/images/gallery/publications/HEALTH%20FACTS%202014.pdf)> accessed 11.08.2016
- Seaman P., Eves A., 2010, Perceptions of hygiene training amongst food handlers, managers and training providers – A qualitative study, *Food Control* 21, 1037-1041.
- Siow O.N., Sani N.A., 2011, Assessment of knowledge, attitudes and practices (KAP) among food handlers at residential colleges and canteen regarding food safety, *Sains Malaysiana* 40 (4), 403-410.
- Toh P.S., Birchenough A., 2000, Food safety knowledge and attitudes: Culture and environment impact on hawkers in Malaysia. Knowledge and attitudes are key attributes of concern in hawker foodhandling practices and outbreaks of food poisoning and their prevention, *Food Control* 11, 447-452.
- World Health Organization (WHO), 2006, WHO consultation to develop a strategy to estimate the global burden of foodborne diseases, WHO, Geneva, Switzerland, <[www.who.int/foodsafety/publications/foodborne\\_disease/fbd\\_2006.pdf](http://www.who.int/foodsafety/publications/foodborne_disease/fbd_2006.pdf)> accessed 12.08.2016.