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Assessment of Knowledge, Attitude and Practices Concerning Food Safety among Restaurant Workers in Putrajaya, Malaysia

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Abstract
The aim of this study is to evaluate the knowledge, attitudes and practices on food safety held by food handlers working in restaurants in Putrajaya, Malaysia. Inappropriate food handling is the main factor contributing to food borne disease outbreaks. A total of 127 food handlers were randomly selected from 23 restaurants and the data collected in September 2013 through self-administered questionnaires were analyzed using the SPSS version 16. Generally knowledge of food safety was good with the mean score 90.3 ± 7.787. However, respondents lacked knowledge about the hazards of reheating cooked food (75.1 ± 25.662) and the safe temperature of cooked food (71.9 ± 33.548). Knowledge differed significantly by age groups (F=2.530; *p*=0.044). Respondents had positive attitudes about food safety, with a mean score of 93.9 ± 6.813, although there were significant differences between trained and untrained workers (t=2.406; *p*=0.018); Malaysian ethnic groups (F=2.502; *p*=0.034); Malaysians and non-Malaysians (t=3.273; *p*=0.001) and due to differences in education levels (F=6.057; *p*=0.003). The mean score for practice was 92.9 ± 7.647 and again there were significant differences related to education levels (F=1.345; p=0.003), gender (t=-2.120; *p*=0.036) and ethnicity of Malaysian workers (F=2.502; *p*=0.034). A strong relationship was found between knowledge and attitudes about food safety (r=0.266; *p*=0.002) and between knowledge and practice (r=0.203; *p*=0.022). In conclusion, this study suggests that food handlers in Putrajaya restaurants displayed good knowledge, a positive attitude and an excellent practices regarding food safety. Yet results showed the food workers still lack basic knowledge of food safety, particularly related to reheated food and safe temperatures for cooked food.
Keywords: Knowledge, Attitude, Practices, food safety, Putrajaya, Malaysia.

1. Introduction

Food borne illness which includes food poisoning is a major cause of morbidity worldwide, resulting in substantial costs to individuals, food manufacturers, both national and international economics (Olsen *et al.* 2000). The World Health Organization (WHO 2008) has defined food poisoning outbreaks as the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food. It was also stated that the hands of food handlers can be the source in spreading harmful microorganism through cross contamination, and if food handlers ignore the importance of washing hands. Bas *et al.* (2006) suggested that food handlers should have excellent hygiene knowledge, attitude and practice (KAP) to ensure cross contamination can be reduced, thus protecting the consumers from food borne diseases. Griffith *et al.* (2000) in his report indicated that most of the food poisoning cases were due to unhygienic handling of food and lack of cleanliness in food preparation. Adak *et al.* (2002) in his study reported that in England and Wales, food borne diseases were estimated to be 1.3 million cases, 21,000 hospitalizations and 500 deaths annually. It was also noted in their findings that up to 70% of the food borne illnesses in the USA, the UK and Netherlands were associated with catering or food service establishments. In Australia, about 5.4 million cases, 15,000 hospitalizations and 120 deaths were reported annually (AGHDA 2005). Spearing *et al.* (2000) in his study stated that outbreak of food borne disease costs the hospitals in Australia more than AU$120,000.00 or US$95,000 annually and the amount of more substantial to indirect costs such as medical, investigative, loss of productivity and miscellaneous. Food poisoning cases are on the rise in Malaysia, as evident in the incidence rate (IR) of 56.25 cases in 2011 compared to 23.1 per 100,000 populations in 2002 (MOH 2012). In Malaysia contexts, restaurant means any place where people pay to sit and eat meals that are cooked and served on the premise (Act 536). Mean while under the Food Hygiene Regulations 2009 (Act 281) it is a mandatory for any person directly involved in food handling to possess a valid training certificate before being engaged as food workers. This study will explore the socio demographic characteristics, the level of KAP and will also determine their relationships.

2. Materials and Methods

This cross sectional study was carried out over a period of six months from March to September 2013. The

location of the study was in Federal Territory of Putrajaya, Malaysia. It involved 23 restaurants and 305 food workers from five Precincts. Ethical aspects were given due consideration before the collection of information. Signed consent forms were also obtained from all food workers who participated in this study. The tool used was self-administered questionnaire and based on previous studies (Noor Azira *et al.* 2012; Tokuc *et al*. 2009; Acikel *et al.* 2008; Gomes-Neves *et al.* 2007). The questionnaire was prepared in both National language and in English. The structured questionnaire was consolidated into four parts; Part A was designed to collect demographic information of the respondents which includes nationality, race, gender, age, and monthly income, the highest education qualification, having experience as food handlers and attending training before being employed as food workers. Part B consists of 11 items on knowledge of food workers towards food safety. The respondents were asked questions on food storage, safe temperature, proper clothing, hand washing, reheating of food, cross contamination and vaccination. A three Likert scale (1=correct; 2=wrong and 3=not sure) was used. A 'Not sure'' was included as to reduce the response bias in the multiple choice answers. Those who answered correctly will score '5' points, whereas those with the answer "wrong" or "not sure" will get '1' or '3' points, respectively. The score range was between 1 and 55. The scores were converted to 100 points. Those scored less than 85% were considered as having poor knowledge on food safety. Part C consists of 13 items which measures the attitude of the respondents on food safety. Questions asked were related to touching of cooked food with bare hands, refreezing of frozen food, using separate kitchen utensils for cooked and raw food, using same towel to clean many places, wearing jewellery while handling food, rubbing hands on face or hair while working, smoking while handling food, using apron to clean hands, covering of mouth when coughing or sneezing and hand washing before start working. A three Likert scale (1= agree, 2=not agree, and 3=not sure) was used. Those who answered "agree" or "not agree", where applicable, will score '5' points, whereas those with the answer "not sure" will get '1' point. The score range was between 1 and 65. The scores were converted to 100 points and those scored less than 85% were considered as having negative attitude on food safety. Part D of the questionnaire consisting of a list of 13 practices that would indicate food handlers' practices towards food borne disease prevention. The respondents were asked to indicate their practices on food safety by using a three Likert scale (5 or 1=Never, 5 or 3 =Always and 1=Sometimes). The score range was between 1 and 65 and was converted to 100 points. The score below 85% is considered as having poor practices towards food safety. Questionnaires went under a pilot test comprising of 32 food workers and they were not included in the actual survey. The Cronbach's alpha for all items was found to be greater than 0.65 and was considered acceptable to be applied to the population of the study (Mohd Salleh & Zaidatun 2001). All statistical analyses were conducted using SPSS version 16. ANOVA and sample t-test were used to determine the differences between the socio demographic and KAP towards food safety among respondents. Test parameters were compared using independent sample t-test and ANOVA (confidence interval 95%) and Pearson Product-moment Correlation was also used to establish relationship between all the variables.

3. Results and Discussion

3.1 Demographic characteristics

The distribution of socio demographic characteristics of the respondents is shown in **Table 1**. Of the total respondents, 81 or 63.8% were non-Malaysians, of which 63 (77.8%) were Indian nationals, 17 (21.0%) were Indonesians and 1 (1.2%) was from Thailand. Despite there was no official data on the exact number of foreigners involved as food workers in Malaysia, but based on statistics from the Ministry of Labour and Human Resources (2012) it was reported that there was a shortage of man power in hotel and restaurants industry. The report indicated that between 4.0 % and 5.7% or total average 55,452 workers needed in food related industries for the period of 2007 to 2010 in Malaysia. As for the Malaysians, the number corresponds to the population by ethnic groups in Putrajaya, which comprising of 81,000 or 93.5% Malays, 7,000 or 8.1% were other Bumiputras such as Sabahans and Sarawakians, 1000 or 1.2% were Indians, 500 or 0.6% were Chinese, 500 or 0.6% were others and 2,200 or 2.5% were non-Malaysians (Department of Statistics Malaysia 2013). The median age of the respondents was 28 years old with the youngest was 19 years old and the oldest was 54 years old. One hundred and two or 80.3% of the respondents were males and 25 or 19.7% were females. Only 9 or 7.1% of them earned RM2000 to RM3900 per month and none of the respondent earned more than RM4000 monthly.

Table 1. Socio demographic characteristics of the respondents (n=127)

Variables	Frequency (n)	Percentage (%)
Nationality		
Malaysians	46	36.2
Non-Malaysians	81	63.8
Country Of Origins For Non-Malaysian (n=81)		
India	63	77.8
Indonesia	17	21.0
Thailand	1	1.2
Ethnicity For Malaysians (n=46)		
Malays	30	65.2
Sarawakians	10	21.7
Indians	3	6.5
Sabahans	2	4.3
Chinese	1	2.2
Gender		
Male	102	80.3
Female	25	19.7
Education Status		
No formal education	3	2.4
Primary & secondary	100	78.7
Cert, dip or degree	24	18.9
Age Groups		
Less than 19 years	5	3.9
20-29 years	71	55.9
30-39 years	36	28.3
40-49 years	13	10.2
More than 50 years	2	1.6
Monthly Income (Ringgit Malaysia)		
500-999	31	24.4
1000-1499	66	52.0
1500-1999	21	16.5
2000-3999	9	7.1
Experience As Food Handler		
Yes	109	85.8
No	18	14.2
Attending Training		
Yes	49	38.6
No	78	61.4

As indicated by the Economic Planning Unit, Prime Minister's Department (2005), those who were paid more than RM4000.00 monthly were under the bracket of high income groups. In term of education status, 3 or 2.4% were with no formal education, while the rest attained primary and secondary education, certificate, diploma or degree levels. One hundred and nine or 85.8% respondents had working experience as food handler and 49 or 38.6% of the respondents had attended the Food Handlers' Training Program (FHTP) before being engaged as food workers. The result was in line with the previous studies which stated only between 37.5% and 55% food handlers attended food hygiene training before being employed as food workers (Tan *et al.* 2013; Bas *et al.* 2006; Walker *et al.* 2003; Maizun & Naing 2002).

3.2 Knowledge on food safety

Generally the knowledge of the respondents was good with the mean score 90.3 (possible score 100) and the bench mark set for this study was at 85. It was also considerably higher compared to 70% as set by King County (2012) which stated that the passing mark to obtain a certificate for those who attended food hygiene training. However, it was noted that there was lacked of knowledge under items on reheating of food (75.1 ± 25.662) and safe temperature of cooked food (71.9 ± 33.548). The result showed that the scores were higher compared to the study done by Noor Azira *et al.* (2012), where it was reported that the mean score for food handlers' KAP were 83.9 ±13.26; 82.8 ±10.94 and 77.0 ±14.98, respectively. Questions that most frequently answered incorrectly (wrong and not sure answers) were related to reheating of cooked food which was more likely to contribute to

food contamination (53.6%), safe temperature of cooked food (47.7%) and preparation of food in advance is more likely to contribute to food poisoning (21.3%). **Table 2** showed that there was significant difference of the mean score of knowledge by age groups (F=2.530; *p*=0.044). Although the results contradicted to the study carried out by Siow & Norrakiah (2011) where it was reported that the age group was not significant compared to the knowledge, but Maizun & Naing (2002) had reported in their study that the duration of experience as food handler had influenced on the level of knowledge on food safety (*p*=0.019). The result in this study was also supported by Lorraine *et al.* (2013) who carried out a study among 499 trained and 199 untrained food handlers in British Columbia, Canada of which the results suggested that age group had a significant association (*p*=0.001). It was well aware that many studies had recorded the association between the above mentioned variables and the mean scores of knowledge. They had identified factors such as attendance on food hygiene training, education status, and experience as food handlers, monthly income, gender and nationality had influenced the knowledge level (Lorraine *et al.* 2013, Siow & Norrakiah 2011; Tareq *et al.* 2011; Maizun & Naing 2002). Similar finding was also found by Pichler *et al.* (2014) in which they indicated that food handlers who had attended food safety training had a higher knowledge compared to those without training ($p \leq 0.001$).

3.3 Attitudes on food safety

This study showed the respondents had a positive attitude towards food safety with the mean score 93.9 ±6.813. However the questions which the score were less than 85, showed that only 66.1 % or 84 of respondents agreed they should not rub hands or face, hair etc. while working, 84.3% or 107 of respondents agreed they should not smoke while working, 77.2% or 98 agreed that defrosted food should not be refrozen, 80.3% or 102 did not agree raw food and cooked food should not necessarily be kept separated, and 83% or 106 agreed that separate kitchen utensils must be used to prepare cooked and raw food.

As shown in **Table 2**, there were significant differences in attitude between trained and untrained food handlers (t=2.406; *p*=0.018), education levels (F=6.057; *p*=0.003), ethnicity for the Malaysians (F=2.502; *p*=0.034) and among non-Malaysians (t=3.273; *p*=0.001). These findings were consistent with the results by Tareq *et al.* (2011) who stated that food workers who enrolled in food hygiene training had higher score of attitude compared to those who did not (p=<0.05). Another study by Noor Azira *et al.* (2012) among 64 food handlers also showed that there were significant correlation between education level and attitude (p=0.008). However, a study by Bass *et al.* (2006) showed that there was no significant difference in attitude (p=>0.05) among 764 trained and untrained food handlers in Turkey.

3.4 Practices on food safety

On average the respondents had good practices on food safety which was 92.9 ±7.647. However there was a bad practice on touching of food that was not wrapped up with bare hand and the average score was 78.9 ± 25.611. **Table 2** shows that there were significant differences between the mean score on practices and their education levels (F=6.057; *p*=0.003), genders (t=2.120; *p*=0.036) and ethnicity for Malaysians (F=2.502; *p*=0.034). Similar findings were reported in a study carried out by Lorraine *et al*. (2013) among 645 trained and untrained food handlers in British Columbia, Canada which revealed that the ethnic background of food workers will affect the average KAP scores (*p*=0.001). In the same study it was suggested that education played a very important role in determining the levels of knowledge and attitude, where workers with college and university education scored higher than those with high-school (*p* = 0.0152). While Toh & Birchenough (2000), in a study among 100 hawkers showed that those respondents with an upper secondary school education demonstrated better knowledge than those with a lower secondary school education (*t*=0.032, *p*=0.05), primary school education (*t*=0.001, *p*=0.05) and no formal education (*t*=0.000, *p*=0.05). In the same study they reported that hawkers with lower secondary school education demonstrated better knowledge of personal hygiene than hawkers with no formal education (*t*=0.045, *p*=0.05).

Table 2. Mean score of KAP by socio demographic characteristics (n=127)

Variables		n	Knowledge			Attitude			Practice	
			Mean [a]		Sig.	Mean [b]		Sig.	Mean [c]		Sig.
Ethnicity for Malaysians	Malays	30	91.5	F = 2.095	0.071	95.7	*F = 2.502*	0.034*	95.7	*F= 2.502*	0.034*
	Sarawakians	10	84.0			98.8			98.8		
	Sabahans	2	89.1			95.4			95.4		
	Chinese	1	100			100			100		
	Indian	3	96.9			96.9			96.9		
Nationality	Malaysians	46	90.2	t = -0.73	0.942	96.5	*t= 3.273*	0.001*	91.5	*t = - 1.615*	0.109
	Non-Malaysians	81	90.3			92.6			93.8		
Country of origin	Indian	63	89.3	F = 2.455	0.093	92.3	*F=0.238*	0.789	92.3	*F= 0.238*	0.789
	Indonesian	17	93.8			93.5			93.5		
	Thailand	1	92.7			90.8			90.8		
Gender	Male	102	90.7	t =-1.261	0.210	92.6	*t= -1.398*	0.165	92.2	*t = - 2.120*	0.036*
	Female	25	88.5			95.7			95.8		
Monthly income (RM)	500-999	31	90.1	F = 0.182	0.909	92.5	*F= 0.410*	0.746	92.9	*F= 0.410*	0.746
	1000-1499	66	90.7			94.2			94.2		
	1500-1999	21	89.6			95.0			95.0		
	2000-3999	9	89.1			93.8			93.8		
Age	Less than 19 years old	5	84.0	F = 2.530	0.044*	96.3	*F= 0.576*	0.681	96.3	*F= 0.576*	0.681
	20-29 years old	71	89.1			93.4			93.3		
	30-39 years old	36	92.2			95.1			95.1		
	40-49 years old	13	92.7			93.6			93.6		
	> 50 years old	2	96.4			92.3			92.3		
Education status	No formal education	3	85.5	F = 0.821	0.442	81.5	*F=6.057*	0.003*	81.5	*F= 6.057*	0.003*
	Primary and secondary education	100	90.1			94.6			94.6		
	Diploma or equivalent, including degree	24	91.4			93.1			93.1		
Experienced	Yes	109	90.5	t = 0.808	0.425	93.8	*t = 0.705*	0.482	92.6	*t = - 1.360*	0.176
	No	18	89.9			95.0			95.2		
Attended Training	Yes	49	91.2	t = 1.037	0.302	95.8	*t=2.406*	0.018*	94.1	*t = 1.345*	0.181
	No	78	89.7			92.9			92.2		

*p <0.05
[a] 90.3 ± 7.787 (mean score knowledge); [b] 93.9 ± 6.813 (mean score of attitude); [c] 92.9 ± 7.647 (mean score of practices)

3.5 Mean Score between KAP and demographic characteristics on food safety

As illustrated in **Table 2** there was a significant difference in knowledge in relation to genders of the respondents (F=4.493; *p*=0.036). It was also noted there was no significant differences of knowledge when compared to other variables such as ethnicity for Malaysians, nationality, monthly income, age groups, education status, experience and attending training before being engaged as food workers. Further analysis showed that there was significant difference of attitude when compared between Malaysians and non-Malaysians (F=10.715; *p*=0.001), those who had attended and not attended food training program (F=5.789; *p*=0.018) and based on ethnicity for Malaysians (F=2.362; *p*=0.034). However, the two notable significant differences in term of practice were ethnicity for Malaysians (F=2.362; *p*=0.044) and between the Malaysians and non-Malaysians (F=5.946; *p*=0.004). While Norrakiah & Siow (2014) also suggested that a significant positive correlation was observed between knowledge and attitudes, knowledge and practices and, attitudes and practices (*p*=<0.05). These findings suggested that the knowledge level of food handlers will influence their attitudes and practices towards food safety.

Table 3. Correlations between mean score of KAP (n=127)

Aspect		Mean (SD)	Knowledge	Attitude
Knowledge	Pearson Correlation	90.3 ± 7.7868	1	0.266
	Sig. (2-tailed)			0.002*
Attitude	Pearson Correlation	93.9 ± 6.8128	0.266	1
	Sig. (2-tailed)		0.002*	
Knowledge	Pearson Correlation	90.2 ± 7.7868	1	0.203
	Sig. (2-tailed)			0.022*
Practice	Pearson Correlation	92.9 ± 7.6469	0.203	1
	Sig. (2-tailed)		0.022*	
Attitude	Pearson Correlation	93.9 ± 6.8128	1	0.119
	Sig. (2-tailed)			0.181
Practice	Pearson Correlation	92.9 ± 7.6469	0.119	1
	Sig. (2-tailed)		0.181	

* Correlation is significant at the 0.01 level (2-tailed).

3.6 The correlations of mean score of KAP on food safety among respondents

As shown in **Table 3**, analysis using Pearson correlation test showed that there were correlations between the mean of scores of knowledge and attitude (r=0.266; *p*=0.002) and knowledge and practice (r=0.203; *p*=0.022). The finding suggested there were positive relationships between both knowledge and attitude; knowledge and practice. It can be anticipated that as knowledge increased, attitude and practice will improve accordingly. Similar finding was recorded by Norrakiah & Siow (2014) which found that a significant positive correlation was observed between knowledge and attitudes, knowledge and practices and attitudes and practices (*p*=<0.05). These findings indicated that food safety knowledge level of food handler's will influence their attitudes and practices in handling food safely. However this study showed that there was no correlation between the mean score of attitude and the mean score of practice.

4. Conclusions

Based on preliminary search, there was a clear gap in the literature as there was no study on KAP was carried in Putrajaya. Although this study is a replication of previous studies carried locally and abroad on this subject matters, but the study managed to reveal some pertinent points for the effective management of food safety in Putrajaya. One of the most profound differences compared to other studies done locally, the existing of new trend where 63.8% of those involved in food handling in Putrajaya were non-Malaysians, mainly from India. Even though this study has achieved its objective of assessing the level of KAP of food handlers in Putrajaya, which was found to be good on the level of knowledge, having positive attitude and excellence practices towards food safety**,** on the other hand, the findings also revealed that the respondents were still lacking in vital points on food safety such as reheating of cooked food, safe temperature of cooked food, preparing of food in advance is more likely to contribute to food poisoning. In view of the present trend, it is important for the authority to review the curriculum, teaching methodology and range of language used as to commensurate the effectiveness of the training. Furthermore, based on the preliminary literature review, there was no study on this issue despite similar studies had been carried out in Scotland, the United Kingdom and the British Columbia, Canada (Ehiri & Morris, 1997; Walker *et al.,* 2003; Lorraine *et al.,* 2013). With that note, it is recommended that an exploratory study should be carried out by the relevant authorities to evaluate the effectiveness of the Food Hygiene Training Course that is currently put in place in Malaysia since 1996 (Jinap *et al*. 2003). There is a need for the present curriculum and the contents of the food hygiene training program to be revised accordingly. What is more important, this study also showed that there were correlation between the score of mean knowledge and attitude and the mean score knowledge and practice. In another words it can be suggested that the knowledge had influenced the attitude and practices of food handlers.

Another point to be looked into is that based on the observation at the preliminary stage of data collection, it is important for the relevant authority to keep and maintain a complete food handlers' data base. Having this register is vital as the relevant authority will be able to monitor every aspect the food workers need to adhere continuously and vigorously. As stipulated under the regulation 30, 31 and 32 the Food Hygiene Regulations 2009 (Act 281), the licensing authority has an obligation to monitor diligently the compliance of the regulations. All food workers should be medically examined, they should undergo food handlers' training, those who suffers or suspected to be suffering from food and waterborne diseases should not be allowed to enter any food premise and all food handlers should maintain a high degree of personal hygiene and personal cleanliness. This study had managed to compile and collate a complete list of restaurants with their food workers in Putrajaya. This could be an initial effort in building a data base of food handlers for food hygiene monitoring purposes.

As a conclusion, this study can be used as a stepping stone for other researchers to embark on studies concerning food safety in Putrajaya. It is hoped this study will bring about positive managerial implications where the relevant health authority is able to utilize the information to develop more effective strategies towards improving the food safety in the federal administrative centre, in ensuring that food sold, served and consumed in restaurants are not only safe but most importantly, the food borne diseases can be prevented in Putrajaya.

5. Limitation of the study

The study was based on food handlers working in restaurants in Putrajaya and the study sample may not be the exact representative of food handlers' population in major restaurants in Malaysia, nevertheless the results of this study are very close to the prevailing situation in the general population. And this study may experience from the usual limitation of a cross sectional study whereby, there is a possibility that the respondents did not give the true information on the monthly income, highest educational level attained, and their working experience as food handlers. However efforts were made to get all possible information by explaining to the respondents the importance of giving the true information and all the details given were confidential in nature as suggested by Tatek *et al.* (2012).

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Biography

The first author is a trained Environmental Health Officer, holding a post as a Principal Assistant Director and currently attached to the Environmental Health Division, Department of Local Government, Ministry of Urban Wellbeing, Housing and Local Government, Malaysia. He obtained his Diploma in Environmental Health from the Royal Society of Health (London) in 1981 and Bachelor in Science (Occupational Health and Environmental Health), University Putra Malaysia in 2003. During the tenure of his 33 years in the Ministry of Health Malaysia he was awarded fellowships to broaden his skills in the field of Environmental Health, of which he attended a Disease Surveillance Fellowship at the BCIT & UBC, British Columbia, Canada (1995), a post basic training on Environmental Health Management Course at the UWE, Bristol, UK (1997-1998), and a 3 week course in Environmental Health Management at the University of Curtin, Australia (2007). He was invited to develop a Field Epidemiology Training Program (FETP) by the HEALTH CANADA in 1996 and in 1992, 1993 and 1999 he served the Malaysian Medical Mission in the Kingdom of Saudi Arabia. As defined by the World Health Organization (WHO), food safety is part of the essential task of Environmental Health; he decided to embark himself in food safety study with regards to Knowledge, Attitudes and Practices among the food workers in Putrajaya.

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