



Food court hygiene assessment and food safety knowledge, attitudes and practices of food handlers in Putrajaya

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Article history

Received: 29 January 2015

Received in revised form:

4 May 2015

Accepted: 4 May 2015

Abstract

This cross sectional study aimed to explore the pattern of socio-demographic distribution, to assess the level of KAP of food safety; and the relationship with the level of premise cleanliness in the food courts at Putrajaya. Distribution of food handlers socio-demographic profile was Malaysian (62.0%), male (70.4%), working experienced in food industry (82.0%) and attended food handler training (85.0%). The mean age was 28.7 years and 85.4% having income not less than RM 1,500 monthly. 78.5% of the food handlers at educational level were found as primary/secondary school. 15.0% of the respondents had not attended the food sanitation training. The findings reveal that food handlers' KAP were high with a mean percentage score more than 79.0%. The majority of the food courts in Putrajaya had consistently moderate level of cleanliness (63.5%) with the mean of 83.03%. Only 27.4% of the food courts were in the level of clean situation (>89% of premise cleanliness score) and 9.1% were not in the clean condition (<70% of premise cleanliness score).

Keywords

Food hygiene

Food safety

Food handler

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Introduction

KAP study was conducted to investigate a certain topic to identify what people know (Knowledge), how they feel (Attitude) and what they do (Practice) related to human behaviour. A KAP survey is a representative study to collect information on what is known, believed and done in relation to a particular topic of a specific population (Wood and Tsu, 2008).

According to a survey conducted to uncover out-of-home dining habits of consumers by The Nielsen Company in 2010 (MIFB, 2010) discovers that 67% of Malaysians dine at restaurants at least once a week. Consumers would have less time to prepare their food, instead they will opt to eat away from home (Shazali and Dayang, 2006).

Food and tourism are inextricably linked (Boniface, 2003; Hall and Mitchell, 2000; Hjalanger and Richards, 2002; Long, 2004) and eating is a physical necessity for every tourist which generates substantial revenues (Au and Law, 2002). Most outbreaks of food poisoning have been implicated to human handling errors (Greig *et al.*, 2007).

Malaysia has been known as the Food Heaven. Food safety issue had become priority with the

changed of Malaysians lifestyle eating outside and the increasing number of tourists coming in Malaysia. The image of Putrajaya will be ruined if foods provided are not safe and dirty food premises are operating as usual without any effort to change it.

Food illness cases are on the rise in Malaysia, despite various attempts made by the Malaysian government through the National Food Safety Policy. The incidence rate of 46.1 cases per 100,000 populations was reported in 2011 and an increasing 2.8 cases per 100,000 from the previous year (MOH, 2013).

It is important to have an understanding of the interaction on prevailing food safety KAP of food handlers in order to minimize the occurrence of foodborne illness.

Material and Methods

Samples

The total numbers of food stalls located at those six food courts were 64 stalls and total amount of food handlers were 286. All the food stalls and food handlers were selected as the sample in this study. Only 274 respondents were correctly filled, retrieved

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and analyzed of the 286 questionnaires distributed to food handlers with the response rate of 95.8%.

Survey Instrument

A modified self-administered questionnaire was prepared for the study based on the previous research conducted by Nurul Huda (2008). The questionnaire consisted of four parts of modified questionnaires and a 3-point rating scale was used to indicate the frequency of food safety.

Data Analyses

A cross-sectional survey was administered to explain the relationship between knowledge and attitudes, knowledge and practices, association between socio-demographic profile related to KAP in food safety and the relationship of KAP on the food premises cleanliness level.

Validity and Reliability

The reliability of the food safety questionnaires designed was also determined by a pilot study on 30 food handlers at food court. By using the Cronbach Alfa test, the reliability coefficient test for knowledge, attitudes and practices were 0.714, 0.780 and 0.764 respectively. A minimum standard of 0.7 indicated acceptable internal consistency for each questionnaire (Santos, 1999).

Results and Discussion

Sample Characteristics

A visual inspection of their histograms and normal Q-Q plots showed that the data of KAP collected were approximately normally distributed.

Respondents' Demographic Profile

Table 1 presents the distribution of socio-demographic profile data for 274 food handlers at Putrajaya Food Courts were collected in the categories of nationality, gender, age, monthly income, educational level, working experience and attended food handler training.

Knowledge

In general the level of food handlers' knowledge was high with a mean percentage score of 84.1%. Food handlers demonstrated excellent knowledge in the categories of food storage temperatures, storage of foods, self-hygienic and high risk foods. Based on Table 2, all of the food handlers (100.0%) agreed that improper storage of foods may cause a health hazard to customers.

Seven topics score more than 75%. In this study,

food safety knowledge of the food handlers were poor in two subjects regarding reheating food (52.9%) and safe temperature of cooked food (52.2%). This study demonstrates that although food handlers may be aware of the need for personal hygiene but they do not comprehend crucial aspects link to temperature values with cooking temperature needed for the control of microbiological hazards.

There was considerable confusion concerning the effect of temperature during cooking of foods which have an influence on bacterial growth. The poor understanding of temperature treatment is the main critical control point in a process of food preparation and a major hindrance to the effectiveness in the implementation of food safety program.

Two factors significantly influencing the knowledge of food handlers in Putrajaya were the age of respondent ($p < 0.05$) and attended food handler training ($p < 0.001$). A Turkey post hoc test revealed that the level of knowledge depended on the age groups. There is a significant difference in knowledge between the aged group of 18-28 years and the aged group of 39-48 years ($p < 0.05$) and as well as the aged group of 18-28 years and the aged group of more than 48 years ($p < 0.05$). However, there were no differences between the aged groups of 18-28 years and the age group of 29-38 years ($p > 0.05$).

The age group of 18-28 years have the mean level of knowledge of 7.33 ± 2.2 compared to the age group 29-38 years (9.17 ± 1.8), 39-48 years (9.55 ± 1.6) and the age group > 48 years (9.31 ± 1.7). The result shown that the level of knowledge increase accordingly to the level of age group and decreasing when it reached the age group > 48 years. The level of food safety knowledge and food safety handling among young food handlers a low and similar findings were reported by Byrd-Bredbenner *et al.*, (2007). Earlier studies shown that the food safety knowledge and practice tends to increase with age. Additional food safety education should be given to younger respondents (Albert 1995; Rimal *et al.*, 2001).

Result shown that there is a significant difference in knowledge between the food handlers attended food handler training and not attended food handler training. The mean of the knowledge for food handlers attended food handler training (9.43 ± 1.7) was higher compared to those who were not attended food handler training (8.2 ± 1.9). Training for food handlers may result in improved food safety knowledge, practices and hygienic awareness (Thompson *et al.*, 2005). Medeiros *et al.*, (2011) found improving food safety knowledge and belief through training had a positive effect on food handling practices. Training is essential to ensure that workers have the

Table 1: Descriptive socio-demographic profile characteristics of the food handlers (n=274)

Characteristic	Demographic characteristics	Number (%)
Nationality	Malaysian	170 (62.0%)
	Non Malaysian	104 (38.0%)
Gender	Male	193 (70.4%)
	Female	81 (29.6%)
Age	≤28	206 (75.2%)
	29-38	61 (22.3%)
	≥39	7 (2.6%)
	500-999	62 (22.6%)
Monthly Income	1000-1499	172 (62.8%)
	1500-1999	29 (10.6%)
	2000-3999	10 (3.6%)
	>4000	1 (0.4%)
Education Level	No formal education	15 (5.5%)
	Primary/Secondary School	215 (78.5%)
	Diploma or equivalent, including Degree	44 (16.1%)
Working experience	Yes	225 (82.1%)
	No	49 (17.9%)
Attended training	Yes	233 (85.0%)
	No	41 (15.0%)

awareness and knowledge necessary to comply with food hygiene demands, although these do not always result in a positive change in food handling behaviour (Clayton *et al.*, 2002; Seaman and Eves, 2006).

Attitudes

Table 3 shown that majority of the respondents reported positive attitudes in food safety handling. 67.9% of the respondents agreed that defrosted food should not be refrozen. Twelve topics score more than >78%.

Overall the attitudes of the food handlers toward food safety were at the high level of satisfaction except topic related to refrozen of defrosted food. The attitudes of defrosted and refrozen foods are still low among food handlers. Refreezing food that has been completely thawed can pose a risk, as this process will cause bacteria to multiply and increased their growth. Freezing food merely slows pathogens growth and it does not kill food pathogens (Julie, 2012).

The education level of food handlers ($p < 0.05$) significantly influencing the attitudes of food handlers. there is a significant difference in attitudes between the primary/secondary school group and the no formal education group ($p < 0.05$) and as well as

the primary/secondary school group and the diploma or equivalent, including a degree group ($p < 0.05$). However, there were no significant differences between the no formal education groups and the diploma or equivalent, including a degree group ($p > 0.05$).

The mean level of attitudes increase accordingly to the level of education which shown that the mean for no formal education was 9.07 ± 3.2 , Primary/Secondary school was 10.55 ± 2.2 and Diploma or equivalent, including a degree was 11.50 ± 1.6 . Study shows that a positive link occurred between the education and the attitude scores of food handlers by demonstrating better attitudes with those having upper education compared to food handlers with no formal education and with primary/secondary.

Toh and Birchenough (2000) affirmed that education as an important link to the two variables (knowledge and attitudes; culture and environment). According to the Theory of Planned Behavior (Ajzen, 2002), measuring food safety attitudes is important since people act in accordance with their intentions which influenced by attitudes. The Constructivism Theory states that the learner builds new ideas based upon past knowledge and past experiences (Bush, 2006).

Table 2: Respondent's food safety knowledge (n=274)

Topics	Correct (%)	Wrong (%)	Not Sure (%)
1. Improper storage of foods may cause health hazard to customers.	274 (100%)	0 (0.0%)	0 (0.0%)
2. The importance to know the temperature of the refrigerator/freezer to reduce the risk of food spoilage.	268 (97.8%)	2 (0.7%)	4 (1.5%)
3. The use of cap, masks, protective gloves and adequate clothing can reduce the risk of food contamination.	273 (99.6%)	0 (0.0%)	1 (0.4%)
4. Wearing gloves while handling food reduce the risk of transmitting infection to consumers and staff.	260 (94.9%)	11 (4.0%)	3 (1.1%)
5. Washing hands before handling food reduce the risk of contamination.	273 (99.6%)	1 (0.4%)	0 (0.0%)
6. Preparation of food in advance is more likely to contribute to food poisoning.	223 (81.4%)	25 (9.1%)	26 (9.5%)
7. Reheating food is more likely to contribute to food contamination.	145 (52.9%)	66 (24.1%)	63 (23.0%)
8. An incorrect application of cleaning and sanitization procedures for equipments (refrigerator, slicing machine and mincer) increase the risk of food borne disease to consumers.	234 (85.4%)	16 (5.8%)	24 (8.8%)
9. Cross contamination is the main factor contributed to food poisoning.	206 (75.2%)	1 (0.4%)	67 (24.5%)
10. The safe temperature of cooked food is >141°F or <40°F (>63°C or <-5°C).	143 (52.2%)	6 (2.2%)	125 (45.6%)
11. Typhim-V1 Vaccination can prevent from typhoid infection.	234 (85.4%)	1 (0.4%)	39 (14.2%)

Practices

The response of food handlers to the practice questions on food safety is presented in Table 4. All the respondent (100.0%) cleans the work area before start work and seven topics score more than 74%. 64.6% of respondents never use apron as a towel to clean hand, 62.4% of respondents never use the same towel to clean many places, 59.9% of respondents never touch food that does not wrapped up with bare hand, only 48.2% of respondents never refreeze defrosted foods and the most disappointed practices was all of the respondents (100.0%) rub their hands on face, hair etc. while working.

Based on the above results, five aspects of personal hygiene is not practiced properly by the majority of food handlers in Putrajaya which related to use of apron as a towel to clean hand, use the same towel to clean many place, touch food that does not wrapped up with bare hand, refreeze defrosted foods and rub their hands on face, hair etc. while working. The main strategies to increase food safety knowledge and practices are food handler training and education.

Few studies suggested that lack of knowledge may result in poor hygiene practices among food handlers (Lambiri *et al.*, 1995; Cakiroglu and Ucar, 2008). However, in the previous study, there was considerable evidence that 63% of food handlers with knowledge of food safety actions did not

conduct behavior in favor of food safety (Clayton *et al.*, 2002). This proved that food handlers might not practice food safety when handling foods although most of the food handlers in this survey gave positive answers. Hence, motivation, initiative, and training, should be provided to encourage food handlers practicing appropriate attitudes and procedures during food preparation (Nurul Huda, 2008).

Results shown that two factors significantly influencing food handlers practices were the nationality of food handler ($p < 0.05$) and education level ($p < 0.05$).

Non-Malaysian have a higher level of practices compared to Malaysian. The mean of the practices for non-Malaysian was 10.88 ± 1.5 compared to Malaysian was 10.01 ± 2.6 . Usually our society have a negative view that non-Malaysian food handlers have poor self-hygiene compared to the local food handlers, but the results showed otherwise in Putrajaya. This situation may occur due to the compliance of existing regulations among non-Malaysian food handlers.

There is a significant difference in practices between the no formal education group and the primary/secondary school group ($p < 0.05$). However, there were no significant differences between the no formal education groups and the diploma or equivalent, including a degree group ($p > 0.05$). The mean level of practices was higher among food handlers with education compared to food handlers

Table 3: Respondent's food safety attitudes (n=274)

Topics	Agree (%)	Not Agree (%)	Not Sure (%)
1. Food should not be touched with wounded hand.	267 (97.2%)	6 (2.2%)	1 (0.4%)
2. Defrosted food should not be refrozen.	186 (67.9%)	68 (24.8%)	20 (7.3%)
3. Separate kitchen utensils must be used to prepare raw and cooked food.	249 (90.9%)	9 (3.3%)	16 (5.8%)
4. Raw food and cooked food not necessarily to be separated.	47 (17.2%)	219 (79.9%)	8 (2.9%)
5. The same towel can be used to clean many places.	24 (8.8%)	244 (89.1%)	6(2.2%)
6. Jewellery (including wedding ring) and a watch can be worn while handling food.	50 (18.2%)	215 (78.5%)	9 (3.3%)
7. We should not rub our hands on face, hair, etc. while working.	268 (97.8%)	6 (2.2%)	0 (0.0%)
8. We should not smoke while working.	266 (97.1%)	8 (2.9%)	0 (0.0%)
9. Apron can be used as a towel to clean hand.	18 (6.6%)	253 (93.3%)	3 (1.1%)
10. We must cover our mouth and nose when coughing or sneezing.	268 (97.8%)	5 (1.8%)	1 (0.4%)
11. We must cover our mouth and nose when coughing or sneezing.	274 (100%)	0 (0.0%)	0 (0.0%)
12. Working with dirty hands should be avoided.	274 (100%)	0 (0.0%)	0 (0.0%)
13. Hands should be washed before start working.	274 (100%)	0 (0.0%)	0 (0.0%)

without formal education and the average scores increased with the education level.

Food Safety Knowledge, Attitudes and Practices of the Food Handlers

There were 11 items to assess the respondents' knowledge of food safety and hygiene practice and 13 items each to assess the attitudes and practices. One mark was given for correct answer; zero mark was given for wrong answer.

Analysis of relationship using Pearson bivariate correlation showed positive relationships between knowledge and attitude ($r=0.233$, $p<0.01$) and between attitudes and practices ($r=0.217$, $p<0.05$).

Previous study reported that improved knowledge will lead to behavioral changes involving improved practices, and also suggested that other factors, including staff attitudes, can limit the improvements of practices among staff (Griffith, 2005). Furthermore based on Toh and Birchenough (2000), there were strong correlation between knowledge and food handling practices. Most researchers agree that intervention in food safety by providing knowledge to food handlers with the expectation those workers will translate this knowledge into practice (Green *et al.*, 2008). The majority of studies support knowledge as a prerequisite to safe food handling practices (Daniels *et al.*, 2001; Lin *et al.*, 2004).

In general, the food handlers' knowledge and attitudes were high with a mean percentage

score more than 80.0%. The food safety practices (79.5%) of food handlers were lower compared to the knowledge (84.1%) and attitudes (91.4%). Previous research shown that food service managers and employees receiving training on proper food handling practices and obtaining adequate food safety knowledge does not always translate into improved behaviours (Robert *et al.*, 2008). Clayton *et al.*, (2002) pointed out that food handlers may be aware of the need to carry out certain practices but without the provision of adequate resources these practices become difficult, if not possible to implement.

All the individual items of KAP were analyzed and divided into three categories namely poor (<50%), moderate (50%-79%) and good (>79%). Only minority of the food handlers in Putrajaya had consistently poor knowledge (3.6%), attitudes (0.4%) and practices (6.9%). The food safety attitudes (84.4%) among food handlers were high compared to knowledge (73.3%) and practices (58.5%). This study revealed a discrepancy between stated knowledge and practices for routine protective measures, suggesting that knowledge alone is probably insufficient to promote positive attitudes and safe practices.

Previous studies have shown that increasing the level of knowledge through training does not necessarily lead to changes in the attitude and behaviour of food handlers (Ansari-Lari *et al.*, 2010; Angelillo *et al.*, 2000; Clayton *et al.*, 2002; Ehiri *et al.*, 1997). There were other factors, which

Table 4: Respondent's food safety practices (n=274)

Topics	Every time (%)	Sometime (%)	Never (%)
1. I touch food that does not wrapped up with bare hand.	2 (0.7%)	108 (39.4%)	164 (59.9%)
2. I refreeze defrosted foods.	27 (9.9%)	115 (42.0%)	132 (48.2%)
3. I use separate kitchen utensils to prepare raw and cooked food.	266(97.1%)	7 (2.6%)	1 (0.4%)
4. I do not separate the storage of raw food with cooked food.	10 (3.6%)	61 (22.3%)	203 (74.1%)
5. I use the same towel to clean many places.	15 (5.5%)	88 (32.1%)	171 (62.4%)
6. I use jewellery and a watch while working.	1 (0.4%)	33 (12.0%)	240 (87.6%)
7. I rub my hands on my face, hair, etc. while working.	54 (19.7%)	220 (80.3%)	0 (0.0%)
8. I smoke while working.	1 (0.4%)	17 (6.2%)	256 (93.4%)
9. I clean the work area before start work.	274 (100%)	0 (0.0%)	0 (0.0%)
10. I use my apron as a towel to clean my hand.	0 (0.0%)	97 (35.4%)	177 (64.6%)
11. I chew gum while working.	0 (0.0%)	24 (8.8%)	250 (91.2%)
12. I wash my hands before start work.	271 (98.8%)	2 (0.7%)	1 (0.4%)
13. I use a tissue when I am coughing or sneezing.	208 (75.8%)	63 (23.0%)	3 (1.1%)

have a significant impact on employers' behaviour are correlated with organizational climate in the company, level of job satisfaction and labour conditions; and with relations between employees and their supervisors.

The result shown that more effort still need to be carry out by the food authorities to improve the level of practices in food safety among food handlers in Putrajaya.

The Cleanliness Status of Food Courts

The cleanliness of the food courts score were analyzed using factor analysis and ranked into three categories namely not clean (inspection score <70%), moderate clean (70%-89%) and clean (>89%). Majority of the food courts in Putrajaya had consistently moderate level of cleanliness (63.5%) with the mean of 83.03%. Only 27.4% of the food courts were in the level of clean situation and 9.1% were in the condition of not clean. This situation can be related to the low level of food safety practices among food handlers in Putrajaya as shown in Figures 1.

The knowledge, attitudes and practices significantly influencing the cleanliness of food courts in Putrajaya ($p < 0.05$). This result shown that it

is important to improve the KAP of the food handlers in order to increase the level of food safety and cleanliness of food courts in Putrajaya.

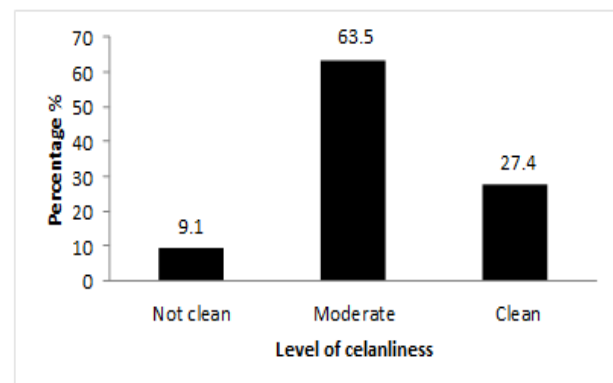


Figure 1: The cleanliness scores of food courts in Putrajaya

Conclusions

This study provides information and reveals many critical issues about the KAP in food safety of food handlers in food courts at Putrajaya.

In summary, this study provides information and reveals many issues about the food safety KAP of food handlers and the cleanliness of food courts in Putrajaya. Result from this study shown that

food handlers' knowledge and attitudes level can be categorized as high with the mean score of 84.1% and 91.4%. However, knowledge and attitudes were not turned into safe practices with the mean score of 79.5%. Previous study shown that food handlers might be aware of the food safety attitudes they should have, but 63.0% of their respondents admitted that they seldom practice such positive attitudes (Clayton, 2002). This proved that although most of the food handlers in this survey gave positive answers but they might not practice it when handling foods. In another study conducted in school food service, it was established that the food safety knowledge was high but the safe food handling was not practiced during food preparation (Henroid and Sneed, 2004). It seems that although food handlers knowledge is sufficient but physical facilities might be an obstacle in guaranteeing that proper food safety practices.

In spite of having some years of experience, 15.0% of the food-handlers in food courts at Putrajaya had never attended any food safety training. Although the present of Food Hygiene Regulation 2009 required every person employed in a food service establishment should be attended food handler training at the time of joining work and at least once during their employment period. The findings of the previous studies highlight the importance of incorporating regular training among food handlers in food safety and personal hygiene (Githiri *et al.*, 2009; Muinde and Kuria, 2005). Study reported that improved knowledge will lead to behavioural changes involving better practices in handling of food and also suggested that other factors including staff attitudes can limit the improvements of staff practices in food safety (Griffith and Clayto, 2005).

This study shown that the level of cleanliness in food courts at Putrajaya still needs to be improve as Putrajaya is well known as one of cleanest city in Malaysia. The majority of the food courts in Putrajaya had consistently moderate level of cleanliness (63.5%) with the mean of 83.03%. Only 27.4% of the food courts were in the level of clean situation and 9.1% were not in the clean condition.

As the lack of food safety practices among food handlers and unhygienic premises in Putrajaya will pose a health risk to consumers, it is important to carry out the continuous research, food safety surveillance and risk assessment on the KAP of food handlers and the cleanliness of food courts. Besides, the enforcement of existing laws on food safety should be carry out frequently at food courts as well as to establish control measures and to understand the interaction between KAP food handlers and cleanliness of food courts. By this, the safety of foods

serve at the food courts can be ensured.

Finally, the responsibility of having positive attitude towards food safety lie on the shoulder of the management team and food handlers. Managers should develop methods to motivate their food handlers to practice food safety and not only be content with their attainment of structural design requirement for hygiene practice. Food handlers should take their own initiatives to enhance their knowledge in food hygienes and profiling themselves to be more positive towards food safety practices. A chain of personal, social and workplace factors influences the practices of the food handler, and these factors need to be investigated in order for a change in behaviour to take place (Green *et al.*, 2007).

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