

Ready-to-eat food consumption practices, food safety knowledge and relation to gender and education level of consumers in Kuala Lumpur, Malaysia

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Abstract

This study was aimed to evaluate consumers' consumption practices of ready-to-eat (RTE) foods, food safety knowledge, and the relationship to gender and education level. A total of 258 consumers in Klang Valley, Kuala Lumpur, Malaysia were given questionnaires through convenience sampling. The results showed that the biggest motivation for consumers in purchasing RTE foods was convenience (47.3%). 40.7% of respondents purchase RTE foods more than twice a week, and 36.8% of respondents consumed RTE food at restaurants and cafes. A total of 54.3% of the respondents purchased RTE foods for lunch, and 48.1% of respondents usually spend RM11-RM20 per person. About 81% of respondents knew that the common symptom of foodborne disease is diarrhea, and 42.2% of respondents knew about the correct temperature for refrigeration. Most of the respondents (66.7%) knew that room temperature encourages the multiplication of bacteria, and 36.4% of respondents knew that bacteria will grow quickly at body temperature. About 60.9% of respondents knew that raw and cooked food should be separated to prevent the transfer of bacteria, and 62% of the respondents knew that placing raw meat in the plastic bag before putting it into the grocery basket decreases the chance of foodborne illness. However, only 10.1% of the respondents knew that the best way to clean a cutting board after using it for raw meat is by washing with bleach and water. Female respondents and those with higher education level generally had better food safety knowledge. This study could benefit RTE food marketers in gaining better insights into consumers' behavior patterns towards RTE food. This study could also contribute to knowing the baseline knowledge of consumers in food safety as it is essential for the development of effective health educational programmes.

1. Introduction

Worldwide, there is a growing demand for ready-to-eat (RTE) food (Priyadarshini, 2015). RTE food is food that is offered without additional cooking or preparation, which is packed at the premises where they are being sold or are ready for consumption (Heroux *et al.*, 2012; Priyadarshini, 2015). In Malaysia, the market of RTE food is increasing and has contributed significantly to the gross domestic product in Malaysia's food industry (Baskaran *et al.*, 2017). Determining consumer preferences towards food-related behaviours and convenience as a food attribute is as important as the

taste, health and price (Candel, 2001). Changes in lifestyle were considered as one of the major factors in purchasing RTE food, as well as the demand for convenience and hygienic food products (Priyadarshini, 2015). The development, maintenance and change of dietary patterns could be influenced by a variety of social, cultural and economic factors (Fotopoulos *et al.*, 2009). Factors such as employment status, income level, perceived time pressure, convenience orientation and food-related lifestyle may as well influence the purchase motivation of RTE meals (Geeroms *et al.*, 2007).

Due to the growing economic importance of the RTE

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food market, marketers require a better understanding of the factors that motivate a consumer's ready meal consumption (Olsen *et al.*, 2010). It is important to understand consumer decision-making in order for companies and marketers to come up with suitable marketing strategies (Bae *et al.*, 2010; Muniady *et al.*, 2014). In Malaysia, there is still a lack of research carried out to understand consumer behaviours better (Muniady *et al.*, 2014). Therefore this study intends to examine consumer consumption practices of RTE food in Malaysia.

However, the consumption of food prepared outside the home increases exposure to the risks posed by poor hygiene in food service (Feltus *et al.*, 2017). Annually in the U.S., foodborne diseases cause approximately 48 million illnesses, 128 000 hospitalisations, and 3 000 deaths (FDA, 2017). World Health Organisation (WHO) reported that every year 220 million children contract diarrheal disease, and 96 000 dies (WHO, 2019). To protect consumer health, FDA has established public health interventions such as demonstration of knowledge, controlling hands as a vehicle of contamination, time and temperature parameters for controlling pathogens, and the consumer advisory (USFDA, 2017). WHO has also been actively promoting safe food handling through systematic disease prevention and awareness programmes (WHO, 2019).

It is important to improve consumers' food safety knowledge and practice, as consumers have a pivotal role in preventing foodborne disease (Kennedy *et al.*, 2005). It is therefore important to understand the baseline of consumers' food safety knowledge to facilitate the development of effective health education programmes in Malaysia. Most previous studies on food safety knowledge in Malaysia have mainly focused on specific groups, namely youths and local food handlers (Woh *et al.*, 2016), hence this study aims to investigate the food safety knowledge of the general consumers in Klang Valley, Kuala Lumpur, Malaysia. The overall objectives of this study are to assess consumers' consumption practices of RTE foods, their food safety knowledge and the relationship to gender and education level.

2. Materials and methods

The survey instrument was developed based on previous studies (Bae *et al.*, 2010; Carbas *et al.*, 2013; Maysenburg *et al.*, 2014). The questionnaire consisted of three parts to assess the demographic profile of the respondents, the consumption practices of RTE foods including factors that motivated consumers to purchase RTE foods, and food safety knowledge among

consumers.

A pilot test was performed with 45 consumers who purchased RTE meals. Based on the results, the questionnaire was modified for the demographic section. The finalized questionnaire was distributed to 320 respondents (after sample size calculation) by convenience sampling at shopping malls in Ampang and Kepong area in Klang Valley, Kuala Lumpur, Malaysia, and was collected over 3 months. Out of the 320, 300 questionnaires were collected, resulting in a response rate of 93.8%. After deleting incomplete responses, 258 responses were finally applied for data analysis.

Data were analyzed using IBM SPSS Statistics 21 by performing descriptive analysis and Chi-square tests. Ethical approval for this study was obtained from UCSI University Ethics Committee. Both informed and written consents were sought from all participants. The assurance of anonymity and confidentiality was maintained throughout the study.

3. Results and discussion

The purpose of this study was to assess consumers' consumption practices of RTE food, their food safety knowledge, and the relationship to gender and education status. The results of this study could help RTE food marketers gain better insights into consumers' attitude and behavior patterns towards RTE food (Bae *et al.*, 2010).

The demographic characteristics of the 258 respondents were presented in Table 1. 61.2% of the respondents were female and 38.8% were male, mostly aged 20-30 years old (53.5%), followed by 31-40 years old (30.6%), 41-50 years old (10.5%), and >50 years old (5.4%). Majority respondents received tertiary education with 41.9% Degree holders and 13.6% postgraduate level. The rest were Diploma level (22.5%), SPM (20.2%) and others (1.9%). 55% of the respondents were Malays, and up to 60.5%, respondents were single. A majority received income of less than RM10 000 per year and worked for more than 5 years.

The consumers' consumption practices of RTE foods were presented in Table 2. According to the survey results, the biggest motivator for RTE foods was convenience (47.3%). This is similar to the findings by Chae *et al.* (2008) targeting university students and from another study by Bae *et al.* (2010) targeting consumers in Korea. Brunner *et al.* (2010) also stated that convenience is one of the big trends in the food business. Convenience involves more than just saving time as it also includes minimizing physical and mental effort associated with planning and preparing meals. In this

Table 1. Demographic characteristics of the respondents (n=258)

Profile Respondents		Frequency (%)
Gender	Male	100 (38.8)
	Female	158 (61.2)
Age	20-30 years old	138 (53.5)
	31-40 years old	79 (30.6)
	41-50 years old	27 (10.5)
	>50 years old	14 (5.4)
Race	Malay	142 (55)
	Chinese	61 (23.6)
	Indian	42 (16.3)
	Others	13 (5.0)
Marital Status	Single	156 (60.5)
	Married	96 (37.2)
	Others	6 (2.3)
Highest Education Level	SPM or equivalent	52 (20.2)
	Diploma or equivalent	58 (22.5)
	Degree or equivalent	108 (41.9)
	Postgraduate or equivalent	35 (13.6)
	Others	5 (1.9)
Income per year	<RM 10 000	94 (36.4)
	RM11 000 – RM20 000	61 (23.6)
	RM21 000 – RM30 000	53 (20.5)
	>RM30 000	50 (19.4)
	None	22 (8.5)
Working Period	Less than a year	43 (16.7)
	1-5 years	80 (31.0)
	More than 5 years	113 (43.8)

study, other factors for respondents to buy RTE foods are to try out different types of food (22.1%), because home cooking is difficult (17.1%), and due to its cheap price (13.6%).

For the expenses of purchasing RTE food, the average expenses per person for a single purchase of an RTE food was between RM11 – RM20 (48.1%), and only 38.8% respondents spent less than RM10. This interestingly shows that the respondents are willing to pay extra for the convenience they seek, even though most of the respondents (36.4%) received income of less than RM10 000 per year. This is similar to the study by Brunner *et al.* (2010), which stated that convenience shoppers were less price-sensitive.

Most respondents (40.7%) consume RTE foods more than twice a week, and up to 36.8%, respondents purchased RTE food at restaurants and cafes. Besides that, a majority (54.3%) of the respondents purchased RTE foods for their lunch. This shows that most of the respondents purchased RTE foods for full meals. This is in concordance to findings by Bae *et al.* (2010) who reported that consumers purchased RTE foods for full

Table 2. Consumers' RTE food consumption practices (n=258)

Item	Level	n (%)
	Convenience	122 (47.3)
Which factor motivates you to buy RTE food?	To try out different types of food	57 (22.1)
	Home cooking is difficult	44 (17.1)
	Cheap price	35 (13.6)
How frequently do you consume RTE food?	Once a month	41 (15.9)
	Once a week	45 (17.4)
	Twice a week	67 (26.0)
	More than above	105 (40.7)
Where do you usually purchase your RTE food?	Restaurants and cafes	95 (36.8)
	Supermarkets or discount marts	69 (26.7)
	Food courts	60 (23.3)
	Convenience stores	34 (13.2)
What is the expenditure of purchasing RTE food per person?	<RM10	100 (38.8)
	RM11-RM20	124 (48.1)
	RM21-RM30	27 (10.5)
	RM31-RM40	0 (0.0)
	>RM40	7 (2.7)
Which mealtime do you purchase RTE food?	Breakfast	40 (15.5)
	Lunch	140 (54.3)
	Dinner	48 (18.6)
	Between meals	30 (11.6)
Where do you get sources of purchasing information?	Direct recommendation (family, friends, etc.)	103 (39.9)
	Comparison between purchasing places	70 (27.1)
	Advertising media	52 (20.2)
	Others	33 (12.8)

meals. However, it is worthy to note that this study did not highlight whether the respondents consumed full meals or meal components in the survey forms. Hence, further research is needed in order to have a general idea of consumers' consumption practices of full meals and meal components (Scholliers, 2015). In this study, the rest of the respondents usually purchase RTE foods during dinner (18.6%), breakfast (15.5%) and in between meals (11.6%). Other common venues to purchase RTE foods were supermarkets or discount marts (26.7%), food courts (23.3%) and convenience stores (13.2%).

The findings in this study show that the most common source of purchasing information was a direct recommendation from family, friends and others (39.9%). Only 27.1% of respondents stated that comparing prices between purchasing places was their source of purchasing information. Another study by Bae *et al.* (2010) also stated that the most common source of purchasing information was direct comparison at the place of purchase. About 20.2% of respondents stated that advertising media was their source of purchasing information. RTE food marketers would find these

findings valuable since they could link their marketing strategy with consumers' perception and attitudes towards RTE meals.

Table 3 presents the consumers' food safety knowledge. Generally, most of the respondents had good food safety knowledge. A majority of the consumers (42.2%) knew that the temperature in the refrigerator should be at 2- 8°C and our findings are similar to the study by Garayoa *et al.* (2005) which stated that a majority (71.5%) of their students knew the correct temperature values for refrigeration. In this current study, most respondents (36.4%) knew that bacteria will grow quickly at the body's temperature 37°C, and 66.7% knew that room temperature encourages the multiplication of bacteria. With regards to cross-contamination issues, 60.9% knew that raw and cooked food should be separated to prevent the transfer of bacteria, and 62% respondents also knew that placing raw meat in the plastic bag before putting it in the grocery basket decreases the chance of foodborne illness. A majority (81%) knew that the common symptom of foodborne illness is diarrhea. This shows that the respondents had adequate food safety knowledge. This is most possibly due to the fact that most of the respondents were of Degree level and were somehow exposed to the

basic food safety knowledge. This was also similar to the study by Garayoa *et al.* (2005) which reported that higher education level students had better food safety knowledge.

However, not many respondents knew that the best way to clean a cutting board after using it for raw meat is by washing with bleach and water (10.1%). Most respondents (59.7%) answered washing with soap water is the best way, 24.8% of respondents answered rinsing well with water, and 5.4% stated wiping it out with a dishrag. According to Garayoa *et al.* (2005), cross-contamination is a well-recognized factor in foodborne illness outbreaks. Factors such as contact between raw products and cooked meals inside the refrigerator and use of the same tool for different food handling tasks without proper washing are an important risk factor for cross-contamination.

A Chi-square test for independence indicated no significant differences between gender and the food poisoning knowledge ($p > 0.05$) except for the last question which had a significant difference with gender ($p < 0.05$). Based on Table 4, female respondents had better food poisoning knowledge compared to male respondents. Studies had shown the women have a

Table 3. Consumers' food safety knowledge (n=258)

Item Level	n (%)	
	10°C	19 (7.4)
Temperature in the refrigerator should be at or below	*2°C - 8°C	109 (42.2)
	-18°C	77 (29.8)
	I don't know	53 (20.5)
At one's body temperature (37°C), what will happen to food bacteria?	Die	31 (12.0)
	No growth	86 (33.3)
	*Grow quickly	94 (36.4)
	Grow slowly	47 (18.2)
Which factor encourages multiplication of bacteria?	Refrigeration	29 (11.2)
	*Room temperature	172 (66.7)
	Sterilization and pasteurization	25 (9.7)
	I don't know	32 (12.4)
Why should you separate raw and cooked food?	There will spoilage of food	57 (22.1)
	The flavour will be affected	32 (12.4)
	*Bacteria will transfer from raw to cooked food	157 (60.9)
	I don't know	12 (4.7)
Placing raw meat in the plastic bag before putting it into the grocery basket	Increases your chance of foodborne illness	47 (18.2)
	*Decreases your chance of foodborne illness	160 (62.0)
	Makes no difference in foodborne illness	51 (19.8)
Which one is the common symptom of foodborne illness?	Headache	20 (7.8)
	*Diarrhea	209 (81.0)
	Skin rashes	16 (6.2)
	I don't know	13 (5.0)
What is the best way to clean a cutting board after it is used for raw meat?	Wiping it out with a dish rag	14 (5.4)
	Washing with soap water	154 (59.7)
	Rinsing it well with water	64 (24.8)
	*Washing with bleach and water	26 (10.1)

*Indicates correct answer

Table 4. Chi-square tests on food safety knowledge and gender

Variables		Male (Cluster 1)	Female (Cluster 2)	p value
Temperature in the refrigerator should be;	10°C	9 (9.0%)	10 (6.3%)	0.106
	2-8°C	41 (41.0%)	68 (43.0%)	
	-18 °C	36 (36.0%)	41 (25.9%)	
	I don't know	14 (14.0%)	39 (24.7%)	
Growth of food bacteria at body's temperature (37°C)	Die	11 ((11.0%)	20 (12.7%)	0.421
	No growth	38 (38.0%)	48 (30.4%)	
	Grow quickly	37 (37.0%)	57 (36.1%)	
	Grow slowly	14 (14.0%)	33 (20.9%)	
Factor that encourages multiplication of bacteria	Refrigeration	15 (15.0%)	14 (8.9%)	0.251
	Room Temperature	68 (68.0%)	104 (65.8%)	
	Sterilization & pasteurization	8 (8.0%)	17 (10.8%)	
	I don't know	9 (9.0%)	23 (14.6%)	
Reason to separate raw and cooked food	There will be spoilage of food	28 (28.0%)	29 (18.4%)	0.269
	The flavour will be affected	13 (13.0%)	19 (12.0%)	
	Bacteria will transfer from raw to cooked food	54 (54.0%)	103 (65.2%)	
	I don't know	5 (5.0%)	7 (4.4%)	
Placing raw meat in the plastic bag	Increases your chance for food borne illness	20 (20.0%)	27 (17.1%)	0.723
	Decreases your chance for food borne illness	59 (59.0%)	101 (63.9%)	
	Makes no difference in food borne illness	21 (21.0%)	30 (19.0%)	
Common symptoms of foodborne disease	Headache	12 (12.0%)	8 (5.1%)	0.076
	Diarrhea	79 (79.0%)	130 (82.3%)	
	Skin rashes	3 (3.0%)	13 (8.2%)	
	I don't know	6 (6.0%)	7 (4.4%)	
Best way to clean a cutting board after used for raw meat	Wiping it out with the dish rag	8 (8.0%)	6 (3.8%)	0.030*
	Washing with soap water	59 (59.0%)	95 (60.1%)	
	Rinsing it well with water	18 (18.0%)	46 (29.1%)	
	Washing with bleach and water	15 (15.0%)	11 (7.0%)	
Total		100 (38.8%)	158 (61.2%)	

*(p < 0.05)

higher knowledge of food poisoning compared to men (Sanlier, 2009; Akabanda *et al.*, 2017; Zeeshan *et al.*, 2017). According to research done by Carbas *et al.* (2012), women had a much accurate knowledge on preventing cross contamination when preparing or cooking food. Food mishandling was thought to be more serious among young male adults with an education level beyond high school compared to other groups. Majority of the respondents answered correctly except for the last question in which male respondents had better knowledge on the right way to clean the cutting board after using for raw meat compared to female respondents.

A Chi-square test for independence indicated no significant differences between education and the food poisoning knowledge (p > 0.05) except for the first and third question which had a significant difference with education (p < 0.05). From Table 5, generally, respondents who had tertiary education level had better food poisoning knowledge compared to the lower education level respondents. Studies had shown those with tertiary education had a better grasp of food poisoning knowledge compared to those with lower education (Sanlier, 2009). Being tertiary educated, consumers may expose to proper food handling, better

personal hygiene and proper storage facilities. A recent meta-analysis reported that training in food safety could increase knowledge and improves attitudes about hand hygiene practices and emphasize on the positive effect of hand washing before eating meals (Pichler *et al.*, 2013). Awareness programs can be done at schools and universities to emphasize proper food safety practices so that people would be better equipped with food safety knowledge in order to decrease the risk of foodborne illness. Knowledge empowers and recognition of personal responsibility could increase food safety awareness (Aluko *et al.*, 2013).

For future studies, it is recommended to investigate the consumers' actual food handling practices to understand whether consumers' understanding of food safety corresponds to their food safety practices. Garayoa *et al.* (2005) stated that there was a considerable difference between knowledge and behavior of their respondents, as well as stated by Lee *et al.* (2016) in which perceived knowledge failed to be translated into practices. Understanding the baseline knowledge and actual behaviours in a target group are essential to facilitate the development of effective health education programmes. Consumers could also benefit from food safety education and information (Altekruse *et al.*, 1999;

Table 5. Chi-square tests on food safety knowledge and education level

Variables		Lower Education (Cluster 1)	Tertiary Education (Cluster 2)	<i>p</i> value
Temperature in the refrigerator should be;	10°C	8 (7.0%)	11(7.7%)	0.046*
	2-8°C	39 ((33.9%)	70 (49.0%)	
	-18 °C	37 (32.2%)	40 (28.0%)	
	I don't know	31 (27.0%)	22 (15.4%)	
Growth of food bacteria at body's temperature (37°C)	Die	17 (14.8%)	14 (9.8%)	0.531
	No growth	37 (32.2%)	49 (34.3%)	
	Grow quickly	43(37.4%)	51 (35.7%)	
	Grow slowly	18 (15.7%)	29 (20.3%)	
Factor that encourages multiplication of bacteria	Refrigeration	21 (18.3%)	8 (5.6%)	0.009*
	Room Temperature	67 (58.3%)	105 (73.4%)	
	Sterilization & pasteurization	11 (9.6%)	14 (9.8%)	
	I don't know	16 (13.9%)	16 (11.2%)	
Reason to separate raw and cooked food	There will be spoilage of food	29 (25.2%)	27 (19.6%)	0.239
	The flavour will be affected	14(12.2%)	18 (12.6%)	
	Bacteria will transfer from raw to cooked food	64 (55.7%)	93 (65.0)	
	I don't know	8 (7.0%)	4 (2.8%)	
Placing raw meat in the plastic bag	Increases your chance for food borne illness	27 (23.5%)	20 (14.0%)	0.045*
	Decreases your chance for food borne illness	62 (53.9%)	98 (68.5%)	
	Makes no difference in food borne illness	26 (22.6%)	25 (17.5%)	
Common symptoms of foodborne disease	Headache	11 (9.6%)	9 (6.3%)	0.376
	Diarrhea	88 (76.5%)	121 (84.6%)	
	Skin rashes	8 (7.0%)	8 (5.6%)	
	I don't know	8 (7.0%)	5 (3.5%)	
Best way to clean a cutting board after used for raw meat	Wiping it out with the dish rag	8 (7.0%)	6 (4.2%)	0.736
	Washing with soap water	66 (57.4%)	88 (61.5%)	
	Rinsing it well with water	30 (26.1%)	34 (23.8%)	
	Washing with bleach and water	11 (9.6%)	15 (10.5%)	
Total		115 (44.6%)	143 (55.4%)	

*($p < 0.05$)

Bruhn and Schutz, 1999). In addition, it is also valuable to investigate the association between food safety knowledge across age, income level, and other factors.

There were some limitations to this study. The data were collected using a convenience sampling approach which decreased the external validity of the results. The sampling area of the respondents was limited to only a small part of the Klang Valley, Kuala Lumpur, Malaysia. Thus, future studies should consider using a broader and systematic design to better represent the population.

4. Conclusion

From this study, it can be concluded that the major motivation for consumers to purchase RTE foods was due to convenience, and consumers seem to be less price-sensitive. RTE food marketers could use this data to help them understand consumer behaviour towards RTE meals. It would be beneficial to conduct further measures on a national basis, such as research to include smaller towns and rural areas, with a bigger sample size to reflect the demographic composition of Malaysia. Other factors such as cultural factors, social factors, and psychological factors should also be considered in

determining consumers' behaviour.

This study also examined consumers' food safety knowledge. Generally, consumers had adequately good food safety knowledge. It is recommended to assess the relationship between food safety knowledge across age and income level. It would be valuable to investigate the consumers' actual food handling practices, to have an insight on whether consumers' understanding of food safety corresponds to their food hygiene practices. Identifying the baseline knowledge and actual behaviours in a target group could facilitate the development of more effective health education programmes.

Conflict of interest

The authors declare no conflict of interest.

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