FOOD VARIETY AND ITS CONTRIBUTING FACTORS AMONG PUBLIC UNIVERSITY STUDENTS IN KLANG VALLEY

Tatiana Suhaimi[1], Norhasmah Sulaiman[2] and Syuhaily Osman[1]

Abstract

This study was conducted to determine the contributing factors towards food variety among public university students in Klang Valley. A total of 400 students from Universiti Putra Malaysia, International Islamic University Malaysia, Universiti Kebangsaan Malaysia, and Universiti Teknologi Mara were chosen using multistage random sampling. Accordingly, a face-to-face interview was conducted with the students to obtain information on the (i) demographic characteristics, (ii) food choice's motive, (iii) food neophobia, (iv) social support, (v) emotion, (vi) nutritional knowledge, and (vii) food variety. The data were analysed using descriptive and multivariate analyses with the application of binary logistic regression via Statistical Package for the Social Sciences (SPSS). This study found that a majority of the students (95.25 %) had a low level of food variety, particularly in every food group such as (i) cereal and grains (96.75 %), (ii) meats and poultry (79.25 %), (iii) fish and seafood (91.50 %), (iv) milk and dairy products (93.25 %), (v) legumes (85.25 %), (vi) vegetables (75.25 %), and (vii) fruits (93.50 %). Furthermore, the results from binary logistic regression showed that the respondents who chose food based on sensory motive and those who were in the neophobic category had 1.54 and 5.55 likelihood to have low level food variety, respectively. Plus, the respondents with high level of nutritional knowledge were 5.40 more likely to have low level of food variety compared to their counterparts. In order to address these issues, it is highly recommended for relevant ministries, financial education agencies, and universities to collaborate and plan intervention programmes on increasing food variety among university students without compromising their food budget.

Keywords: Food Variety, Food Choice, Public University Students, Klang Valley.

Introduction

Food variety is one of the recommendations to increase our chances to have a healthy and balance diet (Michels & Wolk, 2002). It helps our body to absorb adequate nutrients (Azadbakht, Mirmiran, & Azizi, 2005; Torheim, Barikmo, Parr, Hatløy, Outtara, & Oshaug, 2003), gain various types of required nutrients (National Health and Medical Research Council, 2013), and lower the risk of chronic diseases (Azadbakht, Mirmiran, & Azizi, 2005). Notably, food variety is also recommended in the dietary guideline of most countries including South Africa (Steyn, 2013), North America (Soto-Méndez, Hernández, Orozco, Vossenaar, & Solomons, 2011), Australia (National Health and Medical Research Council, 2013), Thailand (Sirichakwal & Sranacharoenpong, 2008), and South Korea (Paik, Kim, Moon, Yoon, Joung, Shim, & Jung, 2008).

In Malaysia, food variety is recommended in the Malaysian Dietary Guidelines 2010 (National Coordinating Committee on Food and Nutrition, 2010). Based on the Malaysian Food Pyramid in the guideline, Malaysians are advised to vary their food intake according to several food groups such as (i) cereal and grains, (ii) meats and

[1] Faculty of Human Ecology, Universiti Putra Malaysia.
[2] Department of Nutrition and Dietetics, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

poultry, (iii) fish and seafood, (iv) milk and dairy products, (v) legumes, (vi) vegetables, and (vii) fruits.

As stated by Clausen, Charlton, Gobotswang, and Holmboe-Ottesen (2005), food variety is measured by counting the number of different types of food taken in a period of time. Although food variety is a simple calculation, it can describe the quality of individual dietary intake (Torheim *et al.,* 2003). Furthermore, food variety was also suggested to be one of the indicators for having a healthy diet (Weinstein, Vogt, & Gerrior, 2004).

Food variety is recommended for all ages, especially in early adulthood or among young adults. A study showed that this age group has the tendency to develop an unhealthy dietary habit (Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). The Federal Interagency Forum on Child and Family Statistics (2014) categorised young adults as individuals with age between 18 and 24 years old. At this age, most young adults enrol in university (Leslie, Owen, Salmon, Bauman, Sallis, & Lo, 1999).

Von Bothmer and Fridlund (2005) opined that the nutrition intake of university students needs to be monitored despite their good health because they are inclined to develop unbalanced eating habit during this stage of life (Kolondinsky, Harvey-Berino, Berlin, Johnson, & Reynolds, 2007; Papadaki, Hondros, Scott, & Kapsokefalao, 2007). It is important for young adults to have healthy physical and mental states at this age as they are the leader of the future (Lee & Loke, 2005). In addition, it is essential to prevent chronic diseases such as heart disease and diabetes at a later age (Šatalić, Colić Barić, & Keser, 2007).

During the young adulthood stage, university students are undergoing transition as they no longer stay in their family home (Nelson *et al.,* 2008). Most of the students are given the opportunity to stay at the college residence during their study. However, this transition affects their dietary intake as they are now responsible for making their own food choice (Beasly, Hackett, & Maxwell, 2004; Colić Barić, Šatalic, & Lukešic, 2003).

In Malaysia, the higher institution is defined as a platform for university students to further their study in Diploma, Bachelor Degree, Master Degree, and Doctor of Philosophy. Higher institutions unite students from various races, religions, and cultures in one place. Therefore, university students need to adapt to various kinds of food from different culture (Ramlee, Norzaini, Faridah, Abdul Razak, & Maimun, 2009).

As the university students are staying at the college residence, they now need to make their own food choice. Tiu Wright, Nancarrow, and Kwok (2001) explained that there are many factors influencing food choice and ultimately, contributing to dietary intake. Food choice is a perspective on how an individual thinks, feels, and reacts towards food (Sobal, Bisogni, & Jastran, 2014). In particular, food choice affects food variety among students; thus, it is vital to analyse this topic.

This paper covers several factors influencing food choice, namely (i) food choice's motives, (ii) food neophobia, (iii) social support (family and friends), (iv) emotion, and (v) nutritional knowledge. Honkanen and Frewer (2009) suggested that food choice's motive need to be studied as it will affect an individual's dietary balance. Steptoe, Pollard, and Wardle (1995) identified nine food choice's motives: (i) health,

(ii) price, (iii) convenience, (iv) weight control, (v) natural ingredients, (vi) sensory, (vii) familiarity, (viii) ethic, and (ix) mood.

Moreover, food neophobia is an example of individual personality that influences the individual's dietary intake (Olabi, Najm, Baghdadi, & Morton, 2009). It is defined as the reluctance of an individual to try new, unfamiliar food. A study indicated that university students have low food variety due to their reluctance to try new food (Olabi *et al.,* 2009). As for social support, Wang, Ou, Chen, and Duan (2009) stated that families and friends are the people who have a high influence on university students' dietary intake.

Meanwhile, emotion also easily influences individual's dietary intake (Ouwens, van Strien, & van Leeuwe, 2009). A study depicted that university students in Germany, Poland, and Bulgaria tend to have unbalanced dietary intake due to emotion (Mikolajczyk, El Ansari, & Maxwell, 2009). In terms of nutritional knowledge, Kolodinsky *et al.* (2007) discovered that high nutritional knowledge will help university students to have a healthy and balanced diet.

Due to the limited literature on the topic, there is a need to study food variety and its contributing factors among public university students (Moy, Johari, Ismail, Mahad, Tie, & Wan Ismail, 2009). Nevertheless, food choice had never been explored as a contributing factor towards food variety among university students. Therefore, this study aims to determine that food choice is one of the contributing factors towards food variety among public university students in Klang Valley.

Methodology

This cross-sectional study targeted the student population in Klang Valley. Four main campuses of public universities were identified as the locations of study, namely Universiti Putra Malaysia (UPM), Universiti Kebangsaan Malaysia (UKM), Islamic International University Malaysia (IIUM), and Universiti Teknologi Mara (UiTM). Additionally, probability proportional sampling was adopted and the numbers of respondents varied based on the total undergraduate students enrolled in each university (Table 1).

Table 1: Numbers of Undergraduate Students and Respondents

University	Number of Undergraduate Students	Ratio	Number of Respondents
UPM	12,678	0.18	72
UKM	8,227	0.12	48
IIUM	15,750	0.23	92
UiTM	33,033	0.47	188
Total	**69,958**	**1.0**	**400**

Next, multistage random sampling was applied and three stages of sampling were executed in order to randomly select 400 respondents. Firstly, one college residence was randomly selected for each university. Secondly, among the entire college residence selected in each university, only one block residence was randomly

selected for the research. Finally, rooms in the selected block residences were randomly selected. Consecutively, the students in the selected rooms were invited to join this survey (Table 2).

Table 2: Numbers of Rooms and Respondents in Each Selected Block Residence

Block Residence	Number of Rooms	Total Respondents
Kelah (UPM)	36	72
K5C (UKM)	24	48
Salahuddin Al-Ayubi (IIUM)	46	92
Delima (UiTM)	94	188
Total	**200**	**400**

A questionnaire was distributed and a face-to-face interview was performed to gain information from the respondents. There were three different parts in the questionnaire, namely Part A (Respondent's Background), Part B (Food Choice's Factors), and Part C (Food Frequency). In Part B, few instruments were used to determine the food choice's factors among the respondents : (i) food choice's motive, (ii) food neophobia, (iii) social support (family and friends), (iv) emotion, and (v) nutritional knowledge. Particularly, food choice's motive was measured using Likert scale ranging from 1 (not very important) to 5 (very important).

Meanwhile, in Part C, the respondent's food frequency was converted into food variety using food variety score. This research referred to the formula devised by Clausen *et al.* (2005) to calculate the food variety score for each respondent (Table 3).

Table 3: Calculation for Food Variety Score

Food Frequency	Score
>6 times/day; 4-5 times/day; 2-3 times/day; once per day	7
5-6 times/week; 2-4 times/week	4
Once/week; 1-3 times/month	1
Never	0

Source : Clausen *et al.* (2005)

The data were analysed using Statistical Package for the Social Sciences (SPSS). Descriptive and multivariate analyses were performed to determine that food choice is a contributing factor towards food variety among public university students in Klang Valley. Apart from that, the reliability test was done and most of the instruments attained more than 0.70 for Cronbach Alpha's value.

Results and Discussions

Background of Respondents

The background of the respondents is summarised in Table 4; a total of 400 respondents from four universities participated in this research. Notably, the percentage of female students was higher than the male students. This can be explained by the fact that most public universities in Malaysia have higher number of female students compared to the male students. For example, a study by Ganasegeran, Al-Dubai, Qureshi, Al-abed, Rizal, and Aljunid (2012) proved that the universities in Malaysia enrolled approximately 70.50 % female students. In addition, a majority of the respondents were Malays (95.75 %), whereas the average age of the students was 22 years old. Furthermore, second year students attributed to approximately 41.00 % of the participants in this research.

Table 4: Background of Respondents

Variable	Frequency (n)	Percentage (%)
Sex		
Male	92	23.00
Female	308	77.00
Ethnic		
Malay	383	95.75
Chinese	8	2.00
Indian	1	0.25
Bumiputera	7	1.75
Others	1	0.25
Age		
18-19 years old	6	1.50
20-21 years old	123	30.75
22-24 years old	271	67.75
Average = 22 years old		
University and College		
Residence		

UPM (Kolej Kelima)	72	18.00
UKM (Kolej Aminuddin Baki)	48	12.00
IIUM (Mahallah Salahuddin)	92	23.00
UITM (Kolej Delima)	188	47.00
Years of Enrolling		
1	121	30.25
2	164	41.00
3	98	24.50
4	17	4.25

Food Choice's Factors

Food Choice's Motive

As presented in Table 5, the most vital motives chosen by the respondents were price (mean score=4.50) and sensory (mean score=4.39). Similarly, other researchers also found that price was a fundamental food choice's motive in Malaysia (Asma, Nawalyah, Rokiah, & Mohd Nasir, 2010), Russia (Honkanen & Frewer, 2009), Belgium (Eertmans, Victoir, Vansant, & Van den Bergh, 2005), Japan and New Zealand (Prescott, Young, O'neill, Yau, & Stevens, 2002).

Price is a crucial motive as money is the medium to buy food from the stores. Chamber, Lobb, Butler, and Traill (2008) revealed that young adults are more likely to indicate higher importance for price as their food choice's motive compared to the adults. This corresponded with the choice of the respondents in this study. Moreover, the significance of sensory was aligned with the findings of a research by Asma *et al.* (2010).The research indicated that Malaysians place high emphasis on the sensory aspects – smell, taste, and appearance– before purchasing any food.

In contrast, the mean scores of familiarity (3.82) and ethic (3.53) signified that they were the least important motives to the respondents. This result contradicted with a research on three main ethnics in Kuala Lumpur by Amrul Asraf, Nurul Shahnaz, and Chua (2014). In their study, Malays rated familiarity as one of the prominent food choice's motives. The study depicted that Malays prefer to choose food that is familiar due to the issue on halal status and religion constraint (Amrul Asraf, Nurul Shahnaz, & Chua, 2014). Apart from that, ethic was also rated as the least important factor among the food choice's motives in this research. This signalled that the respondents did not exercise high care about politics and environment when choosing their food.

Table 5: Food Choice's Motives According to Importance

Food Choice's Motive	Mean Score	Standard Deviation
Price	4.50	0.63
Sensory	4.39	0.69
Health	4.32	0.63
Mood	4.20	0.64
Natural Ingredients	4.05	0.80
Convenience	4.00	0.67
Weight Control	3.97	0.84
Familiarity	3.82	0.79
Ethic	3.53	0.94

Food Neophobia

As illustrated in Table 6, food neophobia was classified into two categories, namely neophilia and neophobic. Contrary to a neophobic person, a neophilia person has the tendency and willingness to try different types of new food (Kim, Eves, & Scarles, 2009). Approximately 61.00 % respondents were discovered to bewilling to try new food (neophilia) and this may be related to the increase of age. Dovey, Staples, Gibson, and Halford (2008) claimed that the probability of a person to have food neophobia decreases as they grow older.

Nonetheless, this result was dissimilar to the findings of a research by Rosmaliza, Khairunnisa, Mohd Salehuddin, and Mohd Shazali (2015). In particular, they discovered increasing food neophobia among students in institutions of higher education at Shah Alam, Subang, and Klang. However, the respondents in the current research were noted to have exposure to a variety of food in their cafeterias as they were staying at the college residence. This may be the reason for them to be willing to try new and diverse types of food.

Table 6: Classification for Food Neophobia

Classification	Frequency (n)	Percentage (%)
Neophilia (willingness to try)	244	61.00
Neophobic (reluctance to try)	156	39.00

Social Support (Family and Friends)

Table 7 shows that a lot of the respondents received positive support from their family and friends. Although the respondents stayed at the college residence, family (83.74 %) still play a vital role in supporting and influencing their dietary intake. Past studies demonstrated that family support can help the respondents to have a better and healthy diet (Cohen, Kristal, Neumark-Sztainer, Rock, & Neuhouser, 2002;

LaCaille, Dauner, Krambeer, & Pedersen, 2011). Accordingly, the respondents in this study were also expected to practice a healthy dietary intake.

As the respondents were living in the college residence, their closest social support was their friends. The data indicated that 66.25 % respondents received positive support from their friends. A research by LaCalille *et al.* (2011) illustrated that dietary intake among undergraduate students is easily influenced by their friends. Similar findings were attained in are search on African-American students (Gruber, 2009).

In other words, this study found that a majority of the respondents received higher support for dietary intake from their family compared to their friends. This result was similar to the findings of a study among young women in Australia (Ball & Crawford, 2006). Plus, several other studies also discovered that family support still plays an important role although the respondents live away from home (Sallis, Grossman, Pinski, Patterson, & Nader, 1987; Tay, Tan, Diener, & Gonzalez, 2013). Overall, both social supports influenced the dietary intake of the respondents. Accordingly, positive social support was concluded to exert good impact towards the respondent's dietary intake (Cohen & Avieli, 2004; Darbes & Lewis, 2005).

Table 7: Classification of Support from Family and Friends

Social Support	**Family**		**Friends**	
	Frequency (n)	**Percentage (%)**	**Frequency (n)**	**Percentage (%)**
Negative	65	16.25	135	33.75
Positive	335	83.75	265	66.25

Emotion

This research determined that 58.00 % of the respondents were easily influenced by emotion prior to making a food choice (Table 8). According to Macht (2008), increased or decreased food intake was evident if the respondents were influenced by emotion while making a food choice. Furthermore, Konttinen's (2012) study among undergraduates in America revealed a tendency to consume unhealthy food if they are under pressure or emotionally disturbed.

Table 8: Classification for Emotional Eating

Emotional Eating	**Frequency (n)**	**Percentage (%)**
Easily influenced	232	58.00
Hardly influenced	168	42.00

Nutritional Knowledge

Table 9 depicts that a majority of the respondents had high nutritional knowledge (95.80%) despite their diverse study courses. This was similar to a study by Azizi, Aghaee, Ebrahimi, and Ranjbar (2011) among students in Azad University in Iran. More than 50.00 % of the respondents provided the right answers regarding nutritional knowledge, indicating that the university students were familiar with nutritional knowledge. Kolodinsky *et al.* (2007) claimed that high nutritional knowledge will lead the students to practise a healthy diet. Therefore, the respondents in the present study were predicted to practise a healthy diet as well since they also demonstrated good nutritional knowledge.

Table 9: Classification for Nutritional Knowledge

Nutritional Knowledge	Frequency (n)	Percentage (%)
Low	17	4.30
High	383	95.80

Food Variety

Referring to Table 10, it was found that more than 75.25 % of the respondents had low food variety in each food group. This was aligned with a research among university students in Kuala Lumpur by Gan, Mohd, Zalilah, and Hazizi (2011). The research found that most of the students did not take several food groups such as fish and seafood, milk and dairy products, legumes, vegetables, and fruits. This affected the food variety intake among the students.

For the cereal and grain group, a high number of the students (96.75 %) had low food variety. Notably, this was probably caused by the respondents' inclination to only take rice as their main food from this group. According to Malaysian Adults Nutrition Survey (2008), 97.00 % of the respondents consumed rice twice per day. Furthermore, rice is the staple food for Malaysians. Therefore, it was not surprising for the respondents in this study to have low food variety under the cereal and grain group.

Among the food groups, the respondents consumed slightly higher variety for meat and poultry food group (20.75 %). The same result was obtained by a research among adults in America which found that the respondents tend to vary their meat and poultry intake (Foote, Murphy, Wilkens, Basiotis, & Carlson, 2004). Although Malaysian Adults Nutrition Survey (2008) highlighted that Malaysians tend to consume more than the recommended amount for this food group (Norimah *et al.,* 2008), it also showed that Malaysians only take chicken and egg frequently in their daily meals. Therefore, the food variety for this food group was still low in spite of the excessive intake.

The results for the fish and seafood, milk and dairy products, and legumes food groups were identical to the findings reported by Moy *et al.* (2009). Moreover, there were female students who did not take any food from these three food groups. Thus, the food variety for these food groups was low. However, a research by Ganasegeran *et al.* (2012) on the medical students in Malaysia showed a different result. The respondents in that study were found to have high food variety, especially in the legumes group. This may be attributed to the different socioeconomic characteristics, academic backgrounds, and cultures.

The data for vegetables and fruits food groups were aligned with the data for young adults in the United States (Richards, Kattelmann, & Ren, 2006; US Department of Health and Human Services, 2010), students in Alexandria University (Abolfotouh, Bassiouni, Mounir, & Fayyad, 2007), and students in America (Huang, Harris, Lee, Nazir, Born, & Kaur, 2003). All of these studies reported that the respondents had low food variety for vegetables and fruits. In Malaysia, other studies also arrived at the same results (Hakim, Muniandy, & Danish, 2012; Moy *et al.,* 2009).

On the whole, Nielsen, Siega-Riz, and Popkin (2012) opined that young adults make poor food choice when they choose their own food. Meanwhile, Khalid, Nosheen, Raza, Ishaque, Ahmad, Ahmad, & Rubab (2011) stressed the difficulty of getting various types of fresh vegetables and fruits at the university. This was the most likely reason for these respondents to have low food variety for vegetables and fruits. The respondents from this study needed to buy the food available at the university's cafeterias since they were staying full time at the college residence.

By combining all seven food groups, it was found that 95.25 % respondents demonstrated low food variety. This was dissimilar with the study among low income households in Malaysia (Shamsul Azahari, Jayashree, Sharifah, Laily, Norhasmah, & Jariah, 2012). In that study, the respondents scored higher percentage for medium level food variety (34.00 %) as compared to the low level (33.70 %) and high level (32.30 %) of food variety. Nonetheless, there was only a minor difference between the percentages for the medium level and the low level of food variety. Therefore, the respondents may potentially be categorised in the low food variety level.

Meanwhile, a study among the elder people in Botswana, South Africa, also resulted in high percentage of low food variety (Clausen *et al.,* 2005). According to their study, low food variety was associated with poor health. Hence, the respondents in the present research were at risk to have poor health in the long term.

Table 10: Level of Food Variety by Food Group

Food Group	Frequency (n)	Percentage (%)
Cereal and Grains		
Low (0-66)	387	96.75
High (67-133)	13	3.25

Meats and Poultry		
Low (0-41)	317	79.25
High (42-84)	83	20.75
Fish and Seafood		
Low (0-41)	366	91.50
High (42-84)	34	8.50
Milk and Dairy Products		
Low (0-23)	373	93.25
High (24-48)	34	6.75
Legumes		
Low (0-13)	341	85.25
High (14-28)	59	14.75
Vegetables		
Low (0-34)	301	75.25
High (35-70)	99	24.75
Fruits		
Low (0-58)	374	93.50
High (59-119)	26	6.50
Total (7 food groups)		
Low (0-279)	383	95.25
High (280-560)	17	4.25

Food Choice as the Contributing Factor for Food Variety

The binary logistic regression analysis proved that the entire model is significant (Table 11). This was supported by the p-value of the omnibus tests of model coefficients (χ^2=28.51, df=14, p=0.01), as well as the p-value of Hosmer and Lemeshow goodness of fit (p=0.55). Pallant (2010) established that the p-value in omnibus tests of model coefficients must be below 0.05. On the contrary, the p-value for Hosmer and Lemeshow goodness of fit must be more than 0.05. Based on these values, this model was considered as significant and can be used to predict food choice as a contributing factor for food variety. Furthermore, Cox and Snell R Square

and Nagelkerke R Square values for food choice were predicted to be contributing about 7.00 % to 23.00 % to the variance in food variety.

Table 11: Model Indication for Food Choice as a Contributing Factor for Food Variety

Model Indication	**Value**
Omnibus tests of model coefficients	$\chi^2 = 28.51$, df = 14, p = 0.01
Hosmer and Lemeshow test	p = 0.55
Cox and Snell R Square	0.07
Nagelkerke R Square	0.23

Table 12 indicates that sensory (p<0.00), food neophobia (p<0.00), and nutritional knowledge (p<0.05) significantly predicted food variety among the respondents. The respondents who chose based on their sensory motive were discovered to be 1.54 more likely to have low food variety. These respondents were influenced by the external factors of the food such as smell, taste, texture, and appearance. Meanwhile, the respondents who were not concerned about the sensory motive tend to have higher food variety.

Previous research among three ethnics in Kuala Lumpur – Malay, Chinese, and Indian –also highlighted the prominence of sensory motive in influencing food intake (Amrul Asnaf, Nurul Shahnaz, & Chua, 2014). The research revealed that sensory motive has significant importance in the respondents' food choices. People were more likely to choose food based on its external factor. According to Kilcast (2013), people were usually attracted by the combination of colours on the food. However, this preference did not guarantee high food variety among the respondents.

On the other hand, food neophobia significantly predicted high food variety among the respondents. Neophobic respondents were 5.55 more likely to have low food variety as opposed to neophilia respondents. An earlier research on children also achieved the same results (Falciglia, Couch, Gribble, Pabst, & Frank, 2000). Kim, Eves, and Scarles (2009) defined a neophobic person as someone who is not willing to try any new food. As a result, neophobic individuals are inclined to not vary their food intake. Veeck (2004) added that they consistently attempt to avoid trying any new food.

Similarly, a number of studies among children (Cooke, Carnell, & Wardle, 2006; Coulthard & Blissert, 2009) and young adults (Knaapila, Silventoinen, Broms, Rose, Perola, Kaprio, & Tuorila, 2010) demonstrated that food neophobia leads to low food variety. Therefore, food neophobia prevented the respondents from having a balanced diet (Knaapila *et al.,* 2010; Schickenberg, Van Assema, Brug, & De Vries, 2008). In this study, neophobic respondents were more inclined to have unbalanced diet rather than neophilic respondents.

Lastly, nutritional knowledge was also significantly correlated to food variety among the respondents. Nevertheless, the respondents with high nutritional knowledge were 5.40 more likely to have low food variety. This was similar to the

study among university students by Sajwani *et al.* **(**2009). Although these students possessed high nutritional knowledge, they failed to apply the knowledge in their daily dietary intake.

In fact, Frazao and Allhouse (2003) highlighted that consumers are more likely to be concerned about the taste, convenience, and price rather than the various nutrients contained by the food. Even though they were aware that most of the food that they consumed was unhealthy, they continued to consume the food to satisfy their hunger (Frazao & Allhouse, 2003). Therefore, having extensive nutritional knowledge did not guarantee a person to have healthy and balanced diet (Dyer, Fearon, Buckner, & Richardson, 2004). From the viewpoint of the current study, this may occur because the respondents tend to choose their food based on sensory compared to the nutrients.

However, this result contradicted with the findings of Kolodinsky *et al.* (2007) among the students in America. Their study proved that having high nutritional knowledge will result in balanced diet. Another study among the medical students in China (Sakamaki, Amamoto, Mochida, Shinfuku, & Toyama, 2005) also obtained the same results. As medical students, they had superior nutritional knowledge than the non-medical students. Nevertheless, the study also found that these students had high risk to get chronic disease due to bad food habit. This illustrated that individuals with higher nutritional knowledge were not excluded from having low food variety.

Table 12: Food Choice as a Contributing Factor for Food Variety

Factor	**B**	***Exp (B)*** ***(Adjusted Odd ratio)***	**Sig.**
Food Choice's Motives			
Health	0.26	1.30	0.09
Mood	-0.16	.085	0.27
Convenience	0.05	1.05	0.77
Sensory	**0.43**	**1.54**	**0.00****
Natural Ingredients	-0.28	0.76	0.21
Price	0.13	1.14	0.54
Weight Control	0.20	1.22	0.21
Familiarity	-0.27	0.76	0.18
Ethic	-0.15	0.86	0.32
Food Neophobia			
Neophilia			
Neophobic	**1.71**	**5.55**	**0.02***
Family Support			
Low			
High	0.02	1.02	0.98

Friend Support			
Low			
High	0.32	1.37	0.60
Emotion			
Easily influenced			
Hardly influenced	0.38	1.15	0.54
Nutritional Knowledge			
Low			
High	**1.69**	**5.40**	**0.05***

*** Significant at 0.05 level; **Significant at 0.01 level**

Conclusions, Implications, and Recommendations

In conclusion, a majority of the respondents had low food variety. This is a very concerning matter since food variety is one of the indicators to have balanced and healthy diet. The respondents are encouraged to be less concerned about the sensory factor but to pay more focus on consuming various food groups to obtain sufficient nutrient based on the Recommended Nutrient Intake for Malaysia (2017). Moreover, the respondents need to apply nutritional knowledge before choosing their food and try to overcome food neophobia by trying numerous types of food available in the cafeterias. This is one of the opportunities for the respondents to increase their food variety during every meal.

Notably, a practical implication was discovered in this research. Sensory motive was indicated to cause the respondents to choose the same food and consequently, to have low food variety. Thus, the respondents need to be exposed with the importance of nutrient contents in each food rather than focusing on the sensory factor. Therefore, universities should collaborate with the food sellers in the campus to conduct health campaigns. For instance, putting up posters at the cafeterias and food stalls can increase the students' knowledge of the nutrient contents in each food that they consume. This may encourage the students to vary their food intake based on the nutrient contents and not merely via the sensory factor.

Future researchers can extend the food variety research to universities in regions other than Klang Valley. A study among other ethnic groups is also vital. Moreover, future researchers may concentrate on other factors besides the 14 factors explored in this research. Last but not least, it is highly recommended for other researchers to organise collaboration with relevant ministries, financial education agencies, and universities to develop food plan and food coupon system that focus on food variety within the budget of university students. This measure will significantly improve the chances of the respondents to have a balanced diet as recommended in Malaysian Dietary Guidelines (MDG) everyday.

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