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The Effect of Health Knowledge, Nutrition Label Use and Attitude towards Nutrition Label on Healthy Food Choice among Malaysian Consumer

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Abstract

This study determines the effect of health knowledge on nutrition label use and attitude, and consequently on healthy food choice among Malaysian consumer. This study adopted the positivist, deductive and quantitative approach. A sample consisted of 420 Malaysian consumers, aged at least 15 years old, which selected using systematic street-intercept sampling method. Data, which collected using a self-administered questionnaire, were analysed using descriptive statistics and structural equation modelling (SEM). The findings reveal the significant positive effect of health knowledge on attitude towards nutrition label and attitude towards nutrition label on healthy food choice. Though the findings add to the existing literature, provide useful information on how nutrition label could assist in guiding the consumer to make a healthier food choice and serve as a reference point that could stimulate and guide future researchers and other relevant parties, this study is still limited by several factors that require replication in future research.

Keywords: Nutrition Label Use, Attitude, Knowledge, Healthy Food Choice, Structural Equation Modeling (Sem), Malaysian Consumer

Introduction

Advances in food technology have resulted in an abundance of processed foods to be available in the market (Bosman, Merwe, Ellis, Jerling, & Badham, 2014). Although processed foods bring more harms than goods, given a hectic life that society is facing, avoiding from consuming processed food seems impossible (Tee, 2011). Realizing the threat from processed food consumption, the global and local policymakers have put forward the consumer's health protection as their major concern (Onete, Voinea, Filip, & Dina, 2014). In order to protect the consumer's rights, Weatherill (2013) and; Chapman and Liberman (2005) emphasize that consumer should be given the right information on the content of the food product.

As to provide the nutrition content of food products and assist the consumers to make informed decisions while purchasing a product, it was highlighted the significant role of nutrition label (Campos, Doxey, & Hammond, 2011; K. Grunert & Wills, 2007; K. G. Grunert, Wills, & Fernández-Celemín, 2010). In relation to that, the Ministry of Health Malaysia gazetted amendments to Food Regulations 1985 in 2003 (The Ministry of Health Malaysia (MOH), 2009) and made the nutrition label as compulsory in Malaysia. Due to that, the food manufacturers in Malaysia are obliged to provide the nutritional benefits of their food product (Suhor, Yusoff, Ismail, Aziz, & Razman, 2014). While the food manufacturers have made a move to provide factual, clear, and relevant information about food nutrition, which satisfy the consumers' rights to be properly informed (Owen, 2014), it has been argued that the consumers themselves have failed to exercise their right, particularly by not using the nutrition label in making healthier food choices (Bosman, et al., 2014; Brownell et al., 2010).
In particular, it has been reported that the use of a nutrition label is still low in developing countries (Ambak et al., 2014; K. Grunert & Wills, 2007). Furthermore, it is raised that even though the customer in the emerging countries are becoming extra conscious about the food nutrition, the use of nutritional label among consumers in making purchases is minimal (Darkwa, 2014; Kumar & Ali, 2011; Norazlanshah et al., 2013; Rose, 2012). In Malaysia, there is no exception, based on the limited empirical evidence on the utilization of the nutritional label, the usage level is found poor (Azman & Sahak, 2014; Ministry of Health Malaysia, 2013). Although Malaysian consumer is aware of the importance of nutrition label, they rarely use the nutrition label even during purchasing processed food products (Azman & Sahak, 2014; Darkwa, 2014; Kumar & Ali, 2011; Ministry of Health Malaysia, 2013; Norazlanshah, et al., 2013; Rose, 2012). As to promote the nutrition label use among Malaysian consumer, the Ministry of Health Malaysia has revised the Malaysian Dietary Guidelines (MDG) in 2010 (Ministry of Health Malaysia, 2011). By doing so, the consumer is encouraged to use the nutrition label when buying and consuming processed foods (Yasin, Ahmad, Nordin, Ghazali, & Abdullah, 2015).
Up to now, much research has been conducted to investigate the role of the nutrition label since 1995 (Drichoutis, Lazaridis, & Nayga Jr, 2006; K. Grunert & Wills, 2007). Most of the studies have been focusing on the understanding of consumer behavior toward the use of nutrition label (Bosman, et al., 2014; Madhvapaty & Singh, 2014). Since 2005, more and more studies have attempted to address the effect of the nutrition label on consumer behaviors, particularly on purchase intention (Burton, Howlett, & Tangari, 2009; Godwin, Speller-Henderson, & Thompson, 2006; Norazlanshah, et al., 2013; Prathiraja & Ariyawardana, 2003). In the Malaysian context, few studies have investigated the impact of consumers' health knowledge, use of nutrition label and attitude towards nutrition label on their healthy food choice (Ju et al., 2010; Ng et al., 2015; Norazmir, Norazlanshah, Naqieyah, & Anuar, 2012; Zheng, Xu, & Wang, 2011). Hence, this study seeks to determine the effect of health knowledge on nutrition label use and attitude towards nutrition label, and consequently on the inclination towards healthy food choice among Malaysian consumer.

Literature Review

Nutrition Label

The nutrition label is a description used to inform the consumer on the nutrition properties of food that helps the customer in purchasing and consuming nutritious food (Azman & Sahak, 2014). According to Malaysia Dietary Guidelines, nutrition label is a list of the nutrient level

of a product displayed on the food label (The Ministry of Health, 2013). In addition, it refers to the information about the nutrition content of individual food products in order to enable the customers to choose the nutritionally appropriate food (Grunert & Wills, 2007, p. 385). Specifically, Miller and Cassady (2015) explain nutrition label as a label that contains information on calorie, portion size, and daily value from a few macronutrients, vitamins, and minerals such as fat, carbohydrate, and calcium.

Hawkes (2013) highlights that nutrition label plays an important role as guidance to a better diet and a healthier life. In particular, it helps the consumers to choose healthier diets, stimulate the consumption of the healthy product, switch consumption from 'unhealthy' products toward 'healthy' products more easily, and make an informed judgement of a product's overall value (Azman & Sahak, 2014). According to Souiden, Abdelaziz and Fauconnier (2013), nutrition label is important on three main reasons, i.e. to give clear nutrition information, help consumers to make a decision on certain food and good eating habits, and avoid consumer confusion over the nutrition of food products. Besides, Department of Chemistry Malaysia (2016) stress that nutrition label is important to protect the consumer from health hazard and fraud in the preparation, selling, and usage of certain food. It also gives advantages to the local food industry in order to expand their product's profile to the international crowd (Aschemann-Witzel, de Hooge, & Normann, 2016).

Taking a slightly different viewpoint, nutrition label is also important as a mechanism to to protect and safeguard the consumer interest and rights towards quality products or services (Aggrawal, 2014; Kehinde, 2016; Njuguna, 2015; O'Hara, 2013; Oko & Linus, 2013), particularly the right to be informed, and the right to get safe products and services (Campos, et al., 2011; Ministry of Domestic Trade Co-Operatives and Consumerism, 2017). In the Malaysian context, consumers rights are also protected under the Consumers' Protection Act 1999 (APP) (Pesuruhjaya Penyemak Undang-undang, 2006). Those acts ensure consumer to have access to quality products and services (Zakuan & Yusoff, 2011). What is more, chapters V of APP 1999 outlined seven implied guarantees on good supply, in which one of them highlighted the issues pertaining to the quality standard on the good by the manufacturer (Pesuruhjaya Penyemak Undang-undang, 2006). Through the use of the label, the consumer can determine whether the nature and condition of the good are acceptable or not by taking into account the type of products, price, facts on the nutrition label, representation and other aspects stated in Section 32 (b) APP (Pesuruhjaya Penyemak Undang-undang, 2006).

According to Rezai, Shamsudin, Mohamed and Sook Ann (2014), due to rapid development in Malaysia's economy and an increase of populations, it is critically important to make sure that all processed food products are safe to consume. Moreover, a study by Abdul Latiff et al. (2016) has exposed that consumerism can protect the consumers in choosing and consuming safe food products. The findings also emphasize that the use of the nutrition label may encourage consumers to make smart decisions in purchasing healthy food products. However, the study only focuses on the effect of nutrition label use and does not look into other factors such as attitude towards nutrition label. Thus, it is vital for a new study to determine the effect of health knowledge on nutrition label use and attitude towards nutrition label, and consequently on the inclination towards healthy food choice among Malaysian consumer in order to improve the consumer awareness and exercise of their protected rights.

Health Knowledge

Health knowledge is commonly associated with an individual's ability to use health facts (Aygen, 2012; Bosman, et al., 2014). According to Chin et al., (2011), health knowledge can be defined as an individual's understanding regarding healthcare and are able to positively react in making health decision, while Johnston, Lorand, Shields and Suziedelyte (2015) define health knowledge as an individual's ability in knowing health information and healthcare. Besides, health knowledge is also referred as an individual's attitude in obtaining health information and keen on healthcare (Camerini, Schulz, & Nakamoto, 2012; Racey, Machmueller, Field, Kulak, & Newton, 2016).

In other research, health knowledge is also termed as health literation. In those studies, health knowledge is defined as the ability to understand and communicate about health (Ormshaw, Paakkari, & Kannas, 2013; Sørensen et al., 2012). According to Pleasant (2014), health knowledge refers to the ability to read and understand health materials, while Poureslami, Nimmon, Rootman and Fitzgerald (2016) relates health knowledge as the skill and efficiency of an individual to search, understand, evaluate, and use the health information. Apart from that, health knowledge can be referred to as an individual's action to access, understand, evaluate, and use health information to gain more knowledge in health (Palumbo, 2015), or how far for an individual to have the ability to get, process, and understand the basic health information in order to make the right health decision (Knight, 2017). Accordingly, in this study, health knowledge could be defined as the individual's ability to get, understand and use health information, including healthy eating pattern, in order to make the right health decision (Aygen, 2012; Bosman, et al., 2014; Chin, et al., 2011; Gellert, Detel, Ernsting, Oedekoven, & Kuhlmey, 2016; Johnston, et al., 2015).

Nutrition Label Use

Nutrition label use can be defined as the ability of an individual to read, understand, identify and translate the information shown in the graphic a format (chart, graph, table) on the nutrition label (Rose, 2012). According to Carbone (2013), nutrition label use refers to the reading, writing, speaking, listening and calculating the information on the nutrition label. In Nutbeam model (2000), the nutrition label use includes functional health use, which refers to basic skills to understand health information, knowledge, services and systems; interactive communication use that relates to communication and social skills to discuss the health issues and critical health use, which regards to the cognitive and social skills to analyse health information and make health-based decisions (McCaffery et al., 2013; Smith & Moore, 2012). In brief, nutrition label use refers to the ability of a person to obtain, translate, and use the information on the nutrition label (Carbone, 2013; Rose, 2012).

In the Malaysia context, previous studies on the nutrition label use are scarce. To date, only two studies have been found, which are Norazlanshah et al. (2013) that study on how nutrition label use affects the attitude towards nutrition label and Norazmir et al. (2012) that investigate the extent to which nutrition label use is capable of influencing the consumers tendency in choosing healthy food. In particular, these studies reveal that the level of nutrition label use among Malaysian is still at a moderate level. Hence, it is necessary to fill the gap in past studies by conducting a new study on the effect of nutrition label use towards nutrition label attitudes and healthy food choices.

Attitude towards Nutrition Label

Attitude can be defined as a form of mental stability and brain's nerve of the individual to give a response (positive or negative) through experience towards an object or idea (Allport, 1935). Furthermore, attitude is a form of the human inclination to consistently react towards an object or situation (Banaji & Heiphetz, 2010). According to Soleimani and Hanafi (2013), attitude is an evaluation and belief, either positive or negative, towards an object or situation. Moreover, attitude can be referred to as a reaction of feeling or impression of an individual, either happy or sad, which reflected through attitude change (Koller & Walla, 2015), or a way of thinking by an individual that is prone to give response positively or negatively towards an idea, object or situation (Roy & Kareem, 2016).

Attitude can be divided into cognitive, affective, and behavioural components (Eagly & Chaiken, 1993). Cognitive component refers to the belief formed based on the information gained from direct and indirect experience (Harreveld, Nohlen, & Schneider, 2015; Kwon & Vogt, 2010). Affective component refers to reactions to positive and negative emotional experience or preferences with an object or situation (Schamari & Schaefers, 2015). Behavioural attitudes component is defined as an individual's overt action toward an object or situation (Amsteus, Olsson, & Paulsson, 2015). Thus, attitude can be defined as the individual's belief, emotion and action derived from the experience towards an object or situation (Aygen, 2012; Kwon & Vogt, 2010).

With respect to the attitude towards nutrition label, Cannoosamy, Pugo-Gunsam and Jeewon (2014) define it as a form of feelings or perception of an individual towards nutrition label, while Samant, Crandall and Seo (2016) refer attitude towards nutrition label as a form of evaluation in an individual's mind that may induce the tendency to use the nutrition label in making food selection. Hence, in this study, attitude towards nutrition label can be explained as individual feelings, perception and evaluation, either positive or negative, towards nutrition label when purchasing food products (Cannoosamy, et al., 2014; Graham & Laska, 2012; Samant, et al., 2016).

Previous studies on consumer attitudes towards nutrition label use, particularly in Malaysia, are still limited. As for now, Ng et al. (2015) and; Shah Alam and Mohamed Sayuti (2011) have researched on this issue and found that attitude plays a significant role towards customers' decision on the food product and purchase decision. Furthermore, a study conducted by Norazlanshah et al. (2013) found that the majority of university students had a moderate level of attitudes towards the use of nutrition labels. Hence, it is necessary to fill the gap in previous research by studying the role of attitude towards the nutrition label on the consumer tendency in choosing healthy food.

Healthy Food Choice

Food choice is an automatic process and habit shown by an individual in determining either to accept or decline food products (Han, Back, & Barrett, 2009; Jacquier, Bonthoux, Baciu, & Ruffieux, 2012). Besides, food choice can be defined as a complex phenomenon, which affected by internal and external factors of an individual in order to evaluate food product (Ares, Mawad, Giménez, & Maiche, 2014). Moreover, Vabø and Hansen (2014) define food choice as an individual's behaviour affected by multiple interaction factors, i.e. physiology, psychology, and motivation in order to make a decision on what food to consume. According to Ooi, Mohd Nasir, Barakatun Nisak and Chin (2015), food choice is a sensory, physiology,

and psychological responses of an individual towards social, environment, economy, and promotional activities done by the food industry.

With regards to healthy food choice, it is commonly defined as the reaction to an individual's decision to consume food with the right ratio of protein, vitamins, fats, carbohydrates and mineral (Salmon, Fennis, de Ridder, Adriaanse, & De Vet, 2014). According to Kim, Lee, Gon Kim and Kim (2013) and; While, Mötteli, Keller, Siegrist, Barbey and Bucher (2016), healthy food choice is an act by an individual to consume food with less fat, less sugar, high fibre, fruits and vegetables. Hence, in this research, healthy food choice is referred to as the individual's tendencies to consider, choose and consume a food product with the ratio of protein, vitamins, fats, carbohydrates and minerals (Kim, et al., 2013; Mötteli, et al., 2016; Salmon, et al., 2014).

Previous studies show that consumers can make better and healthier food choices through the effective use of nutrition label (Magistris, Gracia, & Barreiro-Hurlé, 2010; Miller & Cassady, 2015). However, the efforts made to address and encourage the individual to make healthy food choices is not an easy task (World Health Organization, 2012, 2015). This is because different individual tends to have different behaviours (Zheng, et al., 2011). Though little research has tacked the issue, it has been evidenced that nutrition label use and attitude can significantly influence healthy food choice (Barreiro-Hurlé, Gracia, & De-Magistris, 2010; Trendel & Werle, 2015). Further, Cooke and Papadaki (2014) reveal that the level of healthy food choices among university students, particularly in the UK, was at a moderate level. Thus, it raises the importance to study the role of nutrition label in educating and encouraging consumers in making healthy food choices (Norazlanshah, et al., 2013).

Health Knowledge and Nutrition Label Use

Misra (2007) reveals knowledge as an insignificant influencer of label reading behaviour. However, Campos et al., (2011) find out that individuals with lower levels of nutrition knowledge strongly associated to label non-use, which indicate that individual with greater nutrition knowledge is more likely to use nutrition label. In addition, Barreiro-Hurlé, Gracia and De-Magistris (2010) report that by possessing nutrition knowledge, the level of nutrition facts panel use might significantly increase. This highlights that the consumers who are equipped with nutrition knowledge are more likely to use their nutrition knowledge, specifically by reading the nutrition labels while shopping for food products.

Furthermore, Petrovici, Fearne, Nayga Jr and Drolias (2012) reveal nutrition knowledge as a significant predictor of consumers use of Nutrition Fact Information. Along the similar line, Gracia, Loureiro and Nayga (2007) discover that consumer's nutrition knowledge positively influence the nutrition label use when shopping. Miller and Cassady (2015) further highlight that both subjective and objective nutrition knowledge will significantly influence self–reported nutrition label use. Similarly, Cooke and Papadaki (2014) find out that nutrition knowledge significantly predicts the nutrition label use. However, the effect is negative, indicating that the higher knowledge, the lower the tendency for the consumer to use nutrition labels. Further, they argue that the relationship between knowledge and label use may remain negative unless the consumers are given proper education on the nutrition label. Once nutrition label knowledge improves, only then, its effect on the usage can be positive. Hence, it could be assumed that the effect of nutrition knowledge on nutrition label use might be significant, but the direction may be negative, particularly in societies with a low level of nutrition knowledge.

Past studies on health knowledge in Malaysia are limited. To date, only four studies have been found, which are Norazlanshah et al. (2013), Nurliyana et al. (2011), Sani and Siow (2014) and Koo, Lee, Hidayah and Hazwani (2018). Norazlanshah et al. (2013) and Nurliyana et al. (2011) studied the effect of nutrition knowledge on food purchases. Sani and Siow (2014) investigated the relationship of knowledge, attitude and practices of food handlers on food safety, while Koo, Lee, Hidayah and Hazwani (2018) examined about of knowledge, attitudes and practices of schoolchildren towards whole grains. Hence, it is necessary to fill the gap in past studies by conducting a new study on the effect of health knowledge on attitudes towards nutrition label. Up to now, it has been found that despite high nutrition knowledge, students seldom use food label during buying food product (Nurliyana, et al., 2011). Besides, Norazlanshah et al., (2013) highlight that consumers with a higher level of nutrition knowledge are more likely to read nutrition label when purchasing food. However, both studies failed to reveal a significant relationship between the level of nutrition knowledge and nutrition label use. By relating to Cooke and Papadaki (2014), it could be assumed that the results might be due to the low nutrition knowledge among Malaysian consumers.

Despite the insignificant results on the relationship between the nutrition knowledge and nutrition label use in Malaysia context, provided the significant results of most of the extant studies, it worth's to expect that health knowledge plays an important role affecting the use of nutrition label use among consumers. Therefore, the following hypothesis is suggested to be tested in this research:

H_1: Consumers health knowledge has a significant effect on the nutrition label use.

Health Knowledge and Attitude towards Nutrition Label

Aertsens, Mondelaers, Verbeke, Buysse and Van Huylenbroeck, (2011) find out that objective and subjective knowledge significantly and positively influence attitude towards organic food, implying the positive effect of knowledge on attitude. Further, Marietta, Welshimer, and Anderson (1999) report a significant positive correlation between health knowledge and attitudes towards nutrition labels. Similarly, Kigaru, Loechl, Moleah, Macharia-Mutie and Ndungu (2015) reveal a significant relationship between nutrition knowledge and attitudes. Along a similar line, Acheampong and Haldeman (2013) explain that consumers with high nutrition knowledge are more likely to have positive attitudes about healthy eating. Furthermore, Baser, Ture, Abubakirova, Sanlier and Cil (2016) show that food safety knowledge significantly influences the attitude of staff working in hotels in Turkey (Baser, et al., 2016). However, a recent study by Mogre, Aryee, Stevens and Scherpbier (2017) highlights that consumers nutrition-related knowledge does not correlate with their attitudes.

In Malaysia's context, Sani and Siow (2014) reveal that there is a significant positive correlation between the food safety knowledge and attitudes, indicating that food safety knowledge level of food handlers will influence their attitudes in handling food safely. Furthermore, according to Koo et al. (2018), there is a positive association between one's knowledge and attitude towards whole grain consumption.

Thus, the previous studies reveal that both knowledge and attitudes are significantly related and, health knowledge significantly influences consumer attitude in a positive direction. Accordingly, it could be assumed that health knowledge serves as a significant determinant of consumer attitude toward nutrition label. As a result, the following hypothesis is suggested:

H_2: Consumers health knowledge has a significant effect on the attitude towards nutrition label.

Nutrition Label Use on Healthy Food Choice

Graham and Laska (2012) and; Barreiro-Hurlé, Gracia and De-Magistris (2010) find out that nutrition label use significantly and positively predicts the healthy food choice among consumer. The results indicate that the higher the usage of the nutrition label, the higher the reported healthy food choice. Besides, Campos et al. (2011) show that nutrition label use may promote healthier eating. Furthermore, Cooke and Papadaki (2014) show that the use of nutrition label has a significant and negative effect towards dietary quality, indicating that nutrition label use might not be sufficient to trigger higher dietary quality among consumer. That is, nutrition label use does not induce the consumer to purchase a healthy food product. In addition, they emphasize that the effect of nutrition label use on healthy food choice will remain negative unless the consumer is well equipped the nutrition knowledge.

In the context of Malaysia, Norazmir et al. (2012) reveal that the nutrition label use is low among young adults and due to that they have less tendency to choose and purchase healthy food. Besides, a study conducted by National Health and Morbidity Survey (2015) report the low-level nutrition label use among Malaysian consumer, which trigger them to choose unhealthy food and consequently lead to bad health results.

Accordingly, it could be expected the significant relationship between nutrition label use and healthy food choice. Hence, the following hypothesis is suggested:

H_3: The nutrition label use has a significant effect on healthy food choice.

Attitude towards Nutrition Label and Healthy Food Choice

Previous studies show that consumers' attitude is very important in making purchasing decision of food products (Harker, Gunson, & Jaeger, 2003; Magnusson & Hursti, 2002; Schifferstein, 2001). Graham and Laska (2012) also emphasize that the attitude towards preparing healthy food is significant when consuming healthy foods. Furthermore, Costell, Tárrega, & Bayarri (2010) point out that consumer attitude affects their choices of healthy food. Cooke and Papadaki (2014) support the findings by revealing that attitude plays a significant role in practising healthy diet and a positive attitude towards nutrition label induce the consumer to choose healthy food (Cooke & Papadaki, 2014). Similarly, Trendel and Werle (2015) show that attitude does have a significant influence on the consumer's tendency to make healthy food choices.

Despite lack of previous studies on the consumers' attitudes towards nutrition label use, particularly in Malaysia, a study by Ng et al. (2015) indicates that a poor attitude towards nutrition labels are less likely to induce healthy food choices. That is, poor attitude towards nutrition label make the consumer act irrationally and consequently lead to unhealthy food choices (Ng, et al., 2015). Similarly, Shah Alam and Mohamed Sayuti (2011) stress that attitude significantly and positively affects consumer food purchase intentions.

Hence, it can be predicted that the attitude towards nutrition label may have a significant effect on the consumer tendency in choosing healthy food. It is, therefore, the following hypothesis is suggested:

H_4: The attitude towards nutrition label has a significant effect on healthy food choice.

Methodology

This research adopts a quantitative approach and the deductive method. Data were collected at Federal Territory of Putrajaya, as it has been revealed as the with the highest overweight and obese residents (Table 1) (Survey-NHMS, 2015) and the highest mean of household

consumption expenditure (Table 2) (Department of Statistics, 2015). This research only considers individuals aged 15 years old and above, which considered as the age category that can make rational considerations in purchasing (Euromonitor International, 2011), and the total population to account for this research is 50,059. This research involved a sample of 420 respondents, which decision were made based on the Sampling Schedule by Krejcie and Morgan (1970), the recommendation of Bartlet, Kotlik and Higgins (2001) to add 10 to 30 percent of respondents to cater the nonresponses and other constraints and the rule of thumb for the appropriate sample size for Structural Equation Modeling (J. F. Hair, Black, Babin, & Anderson, 2010). The sample for this research was selected using the systematic street-intercept method. The unit of analysis is the individual resident of Putrajaya.

Table 1: Percentage of Overweight and Obesity by State 2015

No.	State	Percentage
1.	**Federal Territory of Putrajaya**	**62.8**
2.	Melaka	53.7
3.	Perlis	52.5
4.	Negeri Sembilan	51.2
5.	Kedah	50.6
6.	Johor	49.1
7.	Selangor	49.0
8.	Federal Territory of Kuala Lumpur	48.6
9.	Sarawak	48.5
10.	Terengganu	47.5
11.	Perak	47.3
12.	Kelantan	46.5
13.	Pahang	46.3
14.	Pulau Pinang	44.4
15.	Sabah	41.6

Source: National Health and Morbidity Survey-NHMS (2015).

Table 2: Household Consumption Expenditure 2014

No.	State	Consumption Expenditure (RM)
1.	**Federal Territory of Putrajaya**	**5627**
2.	Federal Territory of Kuala Lumpur	5559
3.	Selangor	4646
4.	Melaka	3809
5.	Johor	3808
6.	Pulau Pinang	3505
7.	Federal Territory of Labuan	3497
8.	Negeri Sembilan	3117
9.	Terengganu	3088
10.	Pahang	2963
11.	Sarawak	2826
12.	Kedah	2791
13.	Perak	2760
14.	Kelantan	2578
15.	Perlis	2575
16.	Sabah	2355

Source: Department of Statistics Malaysia (2015).

This research used a questionnaire as an instrument to obtain data. The items used to measure the constructs were adapted and modified from various studies. In particular, 14 items of nutrition label use were adapted from Aygen (2012), Bosman, et. al (2014), and Godwin, et al. (2006), 10 items on attitude towards nutrition label were adapted from Aygen (2012) and Bosman, et. al (2014), while six items on healthy food choice were adapted from Han, Hsu, & Lee (2009).

Prior to commencing the actual data collection, two pilot tests were conducted involving two groups of people, i.e. the experts and the potential respondents (Darusalam & Hussin, 2016; Malhotra, 2009; Shukla, 2008). The pilot test aims to ensure the content validity of the measurement items (Ibrahim, Arip, & Bistamam, 2015). Besides pilot test is also used to improve the questionnaire by identifying the time taken by the respondent to complete a questionnaire, examining the appropriateness of the questionnaire in terms of the item sequence, the wording and level of difficulty and determining the problems encountered while respondents answering to the questions (Maldaon & Hazzi, 2015; Malhotra, 2009; Saunders, Lewis, & Thornhill, 2009; Yin, 2014) and determine the validity and reliability of the scale (Darusalam & Hussin, 2016; Pa, 2014; Saunders, et al., 2009).

Once a panel of three experts agreed with the content of the questionnaire, the questionnaire was tested to 100 respondents. To test the construct validity and instrument reliability, the Exploratory Factor Analysis (EFA) and Cronbach's Alpha were performed, respectively. The EFA procedure resulted in the Kaiser-Meyer-Olkin (KMO) value exceeding the 0.6 with significant Bartlett's test, indicating that the data is sufficient to proceed with factor analysis (Huck, 2012; Zainol, Yasin, Omar, & Hashim, 2014). Next, the results of EFA had yielded in the four factors with the total explained variance of 63.597 per cent. All items loaded on its corresponding factor with a loadings greater than 0.5 (Hair et al., 2010), indicating that items

are a good measure of the factor that it is supposed to measure, which consequently proves the validity of the items (Bhattacherjee, 2012; Garson, 2013; Gaskin, 2012b; Hair, et al., 2010; Pallant, 2015). Further, the Cronbach's alpha values for all constructs are all higher than the suggested threshold of 0.7 (Hair, et al., 2010). Thus, the reliability of the scale used is satisfactory.

Once the questionnaire items were finalized, the actual data collection was conducted. Since it is pertinent to protect the interest of the respondents, this research adopted several measures to ensure the ethical research conduct, including voluntary participation, anonymity and confidentiality (Bhattacherjee, 2012; Saunders, et al., 2009; Sekaran & Bougie, 2009). Data were analysed using descriptive statistics and structural equation modelling (SEM).

Findings

Out of 420 questionnaires distributed, only 395 responses are valid and used in further analysis. The respondent is slightly dominated by female respondents (54.5%) with an average age of 30.71 years old, which 53.8 per cent of the respondents are in the age range of 25 to 34 years old. Most of the respondents hold a Bachelor degree (57.4 %), work as technical and support staff, and reported an average monthly income of RM2897.42 per month.

Preliminary Analysis

The screening of the data reveals that all variables have no missing values. It is, therefore, the data are used for further analysis without replacement of missing responses or deletion of variables with missing data (Hair, et al., 2010). Further, three important SEM assumptions are checked, which include normality, outliers and multicollinearity.

An inspection of the skewness and kurtosis values reveals all the skewness and kurtosis values fall within the acceptable range of ± 2, after deletion of one item i.e. HK5 (Garson, 2012). Further, Mardia's coefficient of multivariate kurtosis of 226.8 (49.82) is too large as compared to the acceptable value (Garson, 2012). Thus, the finding implies that the sample has a severe multivariate nonnormality distribution. Provided that extreme nonnormality can produce an unreliable result, standardized z scores and Mahalanobis distance values were examined for potential outliers (Gao, Mokhtarian, & Johnston, 2008). Following Gao et al. (2008), only true outliers should be deleted. This is important not only to reduce the extreme nonnormality but also to sustain the representativeness of the sample.

Examination of the standardized z scores shows six observations have a z score that falls outside the acceptable range of ± 4, indicating that six observations are the extreme cases or outliers. Accordingly, the observations (i.e. 17, 82, 187, 350, 351, 365) were deleted, leaving the remaining data 414 for further analysis (the results are too large to attach). Next, the examination of the Mahalanobis distance values using a $p1<0.001$, 19 extreme outliers (Coakes & Steed, 2003; Kline, 2011; Tabachnick & Fidell, 2007). After removal of true outliers (19 observations), the Mardia's coefficient drops from 226.8 to 183.4, that is by 19.14 per cent. Hence, the deletion has lowered the multivariate nonnormality. Even though the multivariate kurtosis does not reach the threshold value, the multivariate kurtosis is considered to be in the acceptable range of nonnormality (Gao, et al., 2008). That is, the data are reliable and representative of the desired population with the exclusion of the extreme outliers. Accordingly, the data is fit to be used in the subsequent analysis.

Next, the multicollinearity problem was checked by inspecting the inter-construct correlations and factor loadings. Since the correlations among constructs and factor loadings are all below 0.9, the multicollinearity problem does not appear to affect the results (Garson, 2012; Hair, et al., 2010). As no significant violation is found, the data is suitable for further analysis.

Validation of the Measurement Model

The measurement model was assessed by using confirmatory factor analyses (CFA) with maximum likelihood estimation method, particularly by examining the goodness-of-fit indices as well as the construct reliability and validity.

The results of the confirmatory factor analyses (CFA) show a significant chi-square (χ^2) value of 1683.764 (df = 458, $p < 0.05$), the normed χ^2 values of 3.676, CFI of 0.793 and RMSEA of 0.082. Both the chi-square and normed chi-square meet the acceptable threshold levels of a good fit model, but not for CFI and RMSEA values (Table 3). Accordingly, based on the overall goodness-of-fit indices, the measurement model does not adequately fit the data. Therefore, model modification is necessary to improve the goodness-of-fit.

The model modification was carried out by following three steps. The steps include checking the standardized factor loadings, standardized residual covariance matrix and modification indices. The rule of thumb of an acceptable factor loading is above 0.5 or ideally 0.7 (Hair, et al., 2010), which indicate that the value below 0.5 should be deleted to achieve satisfactory model fit. Examination of standardized regression weights shows six items with loading below 0.5 (i.e. HK6, NLU1, NLU2, NLU4, ATD1 and ATD9). Hence, six items were deleted as to improve model fit and the measurement model was respecified. After re-specification, the fit indices of the modified model have shown an improvement, but the CFI value still below the threshold. Hence, the standardized residual covariance matrix was examined.

Examination of the standardized residuals shows that item NLU11 has a large residual of 7.95, which exceed the threshold of ±4 (Byrne, 2010; Garson, 2012; Groenland & Stalpers, 2012; Ho, 2006; Mohd Sobhi, 2013). Since the item potentially contributes model misfit, the item was removed and the measurement model was respecified. After re-specification, the fit indices of the modified model achieve the satisfactory fit and hence adequate with validity and reliability assessment.

Table 3: Goodness-of-fit (GOF) Indices

GOF statistics	χ^2 (df, p)	χ^2/df	CFI	RMSEA
Initial GOF results	1683.764 (458, 0.000)	3.676	***0.793***	***0.082***
GOF after 1st modification	877.603 (293, 0.000)	2.995	***0.88***	0.071
GOF after 2nd modification	645.066 (264, 0.000)	2.659	0.910	0.065
Acceptable value*	Significant at $\alpha = 0.05$	1-5	> 0.9	< 0.08

* based on Schumacker and Lomax (2004), Reisinger and Mavondo (2007), Hair et al. (2010) Garson (2012) and Gaskin,(2012a)

Based on Table 4, the construct reliability (CR) and the average variance extracted (AVE) values are all above the threshold of 0.7 and 0.5, respectively (Hair, et al., 2010), indicating that the items used to measure their respective construct are internally consistent in their measurement. To achieve convergent validity, the AVE value for each construct should be

greater than 0.5, the standardized factor loadings higher than 0.5 or ideally 0.7 and CR value exceeds 0.7 (Hair, et al., 2010). The results show the AVE, CR and standardized factor loadings values that above the recommended threshold (Hair, et al., 2010). Therefore, the convergent validity is evidenced. As for discriminant validity, the square root of the AVE must greater than its corresponding inter-construct correlations (IC) (Chiu & Wang, 2008; Fornell & Larcker, 1981; Ramayah, Lee, & Mohamad, 2010). Given that the square root of the AVE for each construct is higher than its corresponding inter-construct correlations (IC), the discriminant validity is also supported. By achieving the model fit and demonstrating acceptable construct reliability and validity, the model is appropriate for use to test the proposed hypotheses.

Table 4: Evaluation of the Measurement Model

Construct *(Loadings)*	Inter-construct Correlations (IC)				AVE	CR
	HK	NLU	ATD	HFC		
Health knowledge (HK) - *(0.573, 0.783, 0.82, 0.695)*	0.724[b]				0.524	0.812
Nutrition Label Use (NLU) - *(0.392, 0.713, 0.836, 0.838, 0.771, 0.629)*	0.088	0.713			0.509	0.856
Attitude Towards Nutrition Label (ATD) - *(0.509, 0.623, 0.758, 0.792, 0.742, 0.791, 0.741, 0.494)*	0.249	0.091	0.691		0.500	0.877
Healthy Food Choice (HFC) - *(0.794, 0.84, 0.846, 0.775, 0.697, 0.651)*	0.322	0.021	0.472	0.770	0.594	0.897

Note:
AVE = average variance extracted = Σ squared loadings/n,
CR = construct reliability = $(\Sigma \text{ loading})^2/[(\Sigma \text{ loading})^2 + \Sigma(1\text{-factor loading}^2]$
[a] square root of AVE (diagonal elements in bold)

Hypotheses Testing

The results reveal that goodness-of-fit indices for the structural model are all within the accepted thresholds. Hence, the overall model fit is adequate to test the proposed hypotheses. Based on Table 5 and Figure 1, the R^2 indicates health knowledge (HK) only able to explain 0.8 per cent of the total variance in nutrition label use (NLU). The effect of health knowledge (β=0.092, p>0.01) on nutrition label use is not significant. Thus, H_1 is not supported. Next, R^2 indicates that HK able to explain the variance attitude towards nutrition label (ATD) by 6.9 per cent, and the effect of HK on ATD is significant and positive (β=0.263, p<0.01). Thus, H_2 is supported. Finally, R^2 indicates that 23 per cent of the variance in healthy food choice (HFC) is explained by the NLU and ATD. Further, the effect of ATD on HFC is significant and positive (β=0.479, p<0.01), but the effect NLU on HFC is insignificant (β=-0.017, p>0.001). Thus, only H_4 is supported, but not H_3. Thus, only two hypothesized relationships proposed i.e. H_2, and H_4 are supported.

Table 5: Summary of the Hypotheses Testing

Hypothesized path	Expected direction	Standardized estimate	t-value	Result
R^2 (NLU) = 0.008				
H_1: HK → NLU	+	0.092^{ns}	1.536	Not Supported
R^2 (ATD) = 0.069				
H_2: HK → ATD	+	0.263^{***}	4.073	Supported
R^2 (HFC) = 0.23				
H_3: NLU → HFC	+	-0.317^{ns}	-0.327	Not supported
H_4: ATD → HFC	+	0.479^{***}	7.009	Supported
Goodness-of-fit statistics: χ^2=672.069 (df=248, p=0.000), χ^2/df=2.71, CFI=0.907, RMSEA=0.066				

Note:
HK – health knowledge, NLU – nutrition label use, ATD – attitude towards nutrition label, HFC – healthy food choice
Acceptable values: significant χ^2, χ^2/df within 1-5, CFI > 0.9, RMSEA < 0.08
*** p < 0.01, ^{ns} not significant

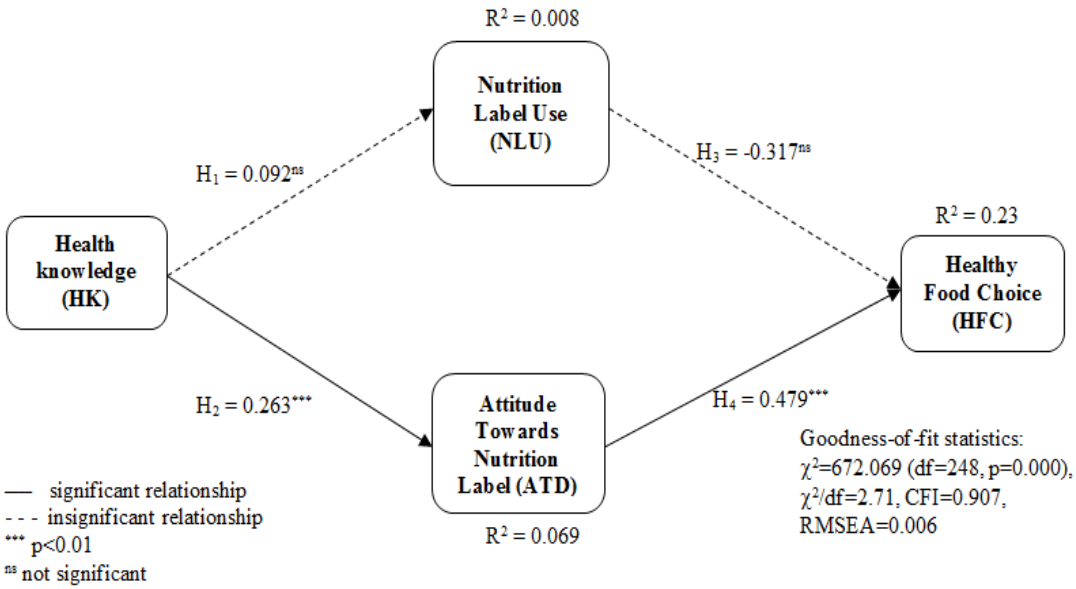

Figure 1: Test Results of the Proposed Structural Model

Discussion

This study seeks to determine the effect of health knowledge on nutrition label use and attitude towards nutrition label, and consequently on the inclination towards healthy food choice among Malaysian consumer. The findings reveal that health knowledge significantly influences attitude towards nutrition label, but not nutrition label use. Accordingly, the findings indicate that consumer health knowledge will influence their attitude towards nutrition label, which supports the previous studies Baser et al. (2016) and Zhu and Xie (2015). That is, the more knowledgeable the consumer about health, the more favourable their attitude towards nutrition label. Thus, to promote positive attitudes towards the nutrition

label, it is extremely important to increase consumer awareness and knowledge about health first. The insignificant effect of health knowledge on nutrition label use seems to be inconsistent with previous studies such as Petrovici et al. (2012), Miller and Cassady (2015) and, Cooke and Papadaki (2014), but somehow supports the findings by Nurliyana et al. (2011) in the Malaysian context. Thus, it could be suggested that despite being knowledgeable about health, it may not be sufficient to drive the customer to use the nutrition label when making purchases.

In addition, the findings show that healthy food choice is significantly affected by the attitude towards nutrition label, but not by nutrition label use. The findings seem to concur with Ng et al. (2015) and; Shah Alam and Mohamed Sayuti (2011), which highlight that attitude plays a significant role on customers' decision on the food product and purchase decision. Besides, the findings support the findings of the extant studies, which show that preference towards healthy diet (Cooke & Papadaki, 2014) and tendency towards reading nutrition label during food purchases (Graham & Laska, 2012) will induce the consumer to choose healthier products. Similar results were found in Graham and Laska (2012) suggesting that attitude towards preparing healthy food is significant on healthy food choice. Similarly, Trendel and Werle (2015) suggested that affective attitude has a significant impact on healthy food choice. Therefore, it could be concluded that favourable attitude towards nutrition label is more likely to encourage the customer to choose healthier food products. That is, the more positive the attitudes toward nutrition label, the higher the intention to choose healthy food among the Malaysian customer.

The findings seem to contradict with the previous studies, which indicate that the nutrition label use has a positive and significant effect on healthy food choice (Barreiro-Hurlé, et al., 2010; Graham & Laska, 2012) as the findings fail to reveal a significant relationship between nutrition label use and healthy food choice. However, the findings provide support to a few studies such as Cooke and Papadaki (2014) and Sacks et al. (2009), which pointed out that the nutrition label use may not lead to healthy food choice because their purchase decision is largely depended on other factors, particularly price. This is rather true in Malaysia where the consumer is rather to forego health aspects in order to buy cheaper products.

Accordingly, the nutrition label can help to educate and promote healthy food choice among Malaysian consumers. Though the nutrition label use is still low Malaysian consumer (Norazlanshah, et al., 2013), their attitude towards nutrition label is positive to the extent that it may induce the customer to choose healthier food product. Hence, to promote the customer to use the nutrition label, the consumer should be educated first about the concept and application of the nutrition label. Only then, the nutrition label use can have the significant impact on the healthy food choice (Cooke & Papadaki, 2014), and consequently, help the consumer to exercise their rights to be informed and access safe and quality food products.

In implication, the findings add to the existing literature on the significant roles of nutrition label to encourage consumers to make smart purchases over food products and serve as a reference point that could stimulate and guide future research on the nutrition label.

Besides, the findings provide useful information on how nutrition label could assist in guiding the consumer to make a healthier food choice. In particular, consumers need to increase their knowledge about the nutrition label in order to improve nutrition label literacy. Consumers may upgrade nutrition label knowledge by reading books, brochures or magazines related to the nutrition label and attending nutrition label educational campaigns (Hawkes, 2013;

Kimura, 2011). The consumer also needs to spend a little time to read nutrition labels before making a purchase decision (Norazmir, et al., 2012). They must embed in their mind that they must be more health conscious than price conscious.

In addition, more campaigns should be held to educate the consumer on the importance of the nutrition label. Television program such as Cook It Up! that demonstrates healthy food cooking and provides guidance on how to read nutrition label easily, could be one of the best ways as a starting point. The relevant parties, such as the Ministry of Domestic Trade Cooperatives and Consumerism (KPDNKK), Muslim Consumers Association of Malaysia (PPIM), Federation of Malaysian Consumers Associations (FOMCA), and Consumers Association of Penang (CAP) should take an initiative to design effective programs in educating the consumers of the nutrition labels. KPDNKK may as well make it compulsory for the nutrition label to be written in Malay (Azani, 2017; Noor, 2017). In addition, clear and colored fonts used on the nutrition label could be more appealing to consumers to read the nutrition label (Graham & Laska, 2012). Therefore, attractive nutrition labels could enhance nutrition label knowledge in protecting consumers right and helping them choosing healthy food. The Ministry of Higher Education (MOHE) and The Ministry of Education (MOE) should also take part in organizing educational programmes pertaining to nutrition label (Survey-NHMS, 2015; E.-S. Tee, 2011). For example, modules on a balanced diet could be published and distributed to schools in Malaysia and be used during teaching and learning session.

This research is limited to several factors. First, this study is limited to the residents in Putrajaya, a territory in Malaysia with the highest overweight and obese residents. Therefore, the generalisation of the findings must be interpreted with the utmost caution and to increase the generalisation, replication of this research is suggested covering a wider area of research locations. This study only examines the effect of health knowledge, nutrition label use, and attitudes towards nutrition label on healthy food choice. There are other variables that could significantly impact healthy food choice such as demographic factors and motivation (Barreiro-Hurlé, et al., 2010; Cooke & Papadaki, 2014) have not been taken into account. Hence, future research should include these variables to determine whether these additional variables could increase the explanatory power of the framework.

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