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Determinants of the use of nutritional information among grocery shoppers in Penang

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Abstract

The consumption of processed food products is common today. The Ministry of Health and consumer associations in Malaysia are actively promoting the use of nutritional information displayed on food labels to inculcate healthy eating habits among Malaysians. This study investigates the use of nutritional information among grocery shoppers in one particular state in Malaysia, i.e. Penang. A survey involving 404 respondents was carried out in Penang for the purpose of this study. A logit model was estimated based on the survey data to examine the factors that affect the use of nutritional information by shoppers. The results indicate that gender, age, education, time spent on grocery shopping, price/cost considerations, smoking status and health status are significantly related to the use of nutritional information when purchasing processed food products. The findings of this study are used to propose measures that can be taken to motivate more consumers to use nutritional information when purchasing processed food products. The steps taken should be targeted at the following groups of individuals: men, older and less educated shoppers, speedy shoppers, price-sensitive buyers, smokers and individuals with health problems. Strategies such as introducing pricing policies and self-checkout stations that saves time for shoppers should be considered to increase the likelihood of using nutritional information among grocery shoppers.

Keywords: healthy eating habit, ingredients, nutritional claim, nutritional information, nutrition label, processed food products

Introduction

The type of food and the culture of eating in Malaysia has changed over time. Ali and Abdullah (2012) note that eating out has become a common practice for many Malaysians. Aside from this, processed foods which are easily available are widely used in households since it reduces the time taken for preparing meals. The changes in dietary practices are associated with the health status and disease patterns in any given population (Khor et al., 1998). Non-chronic communicable diseases such as cardiovascular disease, diabetes mellitus, hypertension and cancer are the leading causes of morbidity and mortality. In Malaysia, non-chronic communicable diseases is estimated to account for 73 percent of total deaths (World Health Organization, 2014). One way to tackle the problem of non-chronic communicable diseases is to make consumers aware of the nutritional content of the food they eat. Omar et al. (2017) point out that there is increasing consumer awareness about nutrition value and

food fortification for healthcare based on survey findings regarding the consumption of packaged food in Malaysia.

The Second National Plan of Action for Nutrition of Malaysia (NPAN II) highlighted the effective use of nutritional information on food labels as a guide in making food choices and educating children on nutrition. The use of nutritional information contributes to the well-being of society. According to the Malaysian National Health and Morbidity Survey in 2006, the percentage of Malaysians using nutritional information is still very low even though the Ministry of Health organises activities regarding healthy eating from time to time. This indicates that there is room for improvement in the government's efforts to promote awareness on the use of nutritional information.

This study aims to investigate demographic, socio-economic and health-related factors that affect the use of nutritional information (i.e. list of ingredients, nutrition label and nutritional claims) when consumers purchase processed food products. The study is based on a sample of consumers that is selected from one state in Malaysia, i.e. Penang. This study focuses on Penang because the state government has been proactive in making Penang cleaner, greener, safer and healthier. The various initiatives that have been undertaken in line with this vision include reducing the consumption of plastic bags, banning the use of polystyrene boxes and plates at official functions and promoting recycling to reduce waste (Penang Green Council, 2013). In addition, it was recently suggested to make public places in Penang fully smoke-free and also to reduce lifestyle diseases (such as diabetes, hypertension and high cholesterol) in Penang through policy-making and awareness campaigns (The Star, 2018). The combat against such diseases would necessarily include the promotion of healthy eating habits and the use of nutritional information. The findings from the present study can serve as a guide to the government and consumer associations in their efforts to implement measures that will increase the use of nutritional information when shoppers purchase processed food products.

Literature review

The use of nutritional information is considered as an act of information search and consumers will continue checking nutritional information as long as the cost of checking does not outweigh the benefits. The cost of checking nutritional information is reflected by the time spent on reading the information displayed on the food package while the benefits are the healthier food choices that consumers make that can reduce their risk of contracting chronic diseases.

Previous research suggests that demographic, socio-economic and health-related factors influence the use of nutritional information. The first group of factors, i.e. demographic variables, includes gender, age and ethnicity. Past studies found that females seem to be more likely to use nutrition labels compared to males (Guthrie et al., 1995; Mannell et al., 2006; Kim et al., 2014; Cheah et al., 2015). For females, nutritional information is used to make food choices as they are more interested and concerned about their physical image, diet and health (Cheah & Yip, 2017). In addition, they tend to possess more nutritional knowledge than men (Grunert et al., 2012). The second factor that may influence the use of nutritional information is age. Cheah and Yip's (2017) study found that older people often suffer from visual impairment and consequently face constraints in using nutrition labels which generally consists of small print. Visual impairment tends to be more pronounced after the age of 50; globally, 65 percent of those with visual impairment and 82 percent of those who are blind are over 50 years of age (Chader & Taylor, 2013). It was also argued that aging worsens consumers' comprehension level and this limits the use of nutritional information in the older

cohorts of grocery shoppers. The third demographic factor is ethnicity. The evidence on the relationship between ethnicity and use of nutritional information is limited. In the study by Cheah et al. (2015), Malays have been found to be using nutrition labels more than Chinese and Indians. However, other studies (Kim et al., 2001; Sinclair et al., 2013) show that ethnicity is not significantly related to the use of nutritional information.

Past research findings show that socio-economic factors also have an influence on the use of nutritional information. Higher educated individuals are most likely to use nutrition labels because higher education levels leads to higher levels of information search and understanding (Guthrie et al., 1995; Drichoutis et al., 2005; Mannell et al., 2006; Magistris et al., 2010; Ranilović & Colić, 2011; Sinclair et al., 2013; Kim at al., 2014; Cheah et al., 2015). Well-educated individuals are aware of the relationship between diet and disease and the knowledge they have enables them to comprehend nutritional information better than others (Guthrie et al., 1995; Cheah et al., 2015). Another factor is the time spent on grocery shopping. Studies show that the time people spend on grocery shopping has a positive effect on the use of food labels (Lin et al., 2004; Drichoutis et al., 2005). Spending more time on grocery shopping increases the likelihood of using nutrition labels because checking nutritional information takes extra time. The consideration about price is another socio-economic factor that influences the use of nutritional information. According to Drichoutis et al. (2005) people who prioritise price when shopping for food products are less likely to use nutritional information. This is because the search for nutritional information and for lower prices act competitively. A price-sensitive shopper spends more time searching for good bargains than checking nutritional information.

The last set of factors is health-related variables such as smoking status and health status. The smoking status of respondents is taken into account in some empirical studies and it was found that respondents who smoke are less likely to use nutrition labels (Kim et al., 2014; Cheah et al., 2015). Studies also show a positive effect of health status on the search for nutrition information (Kim et al., 2001; Lin et al., 2004). Empirical evidence also shows that people with chronic diseases such as hypertension, diabetes and dyslipidemia are more likely to be non-users of nutritional information as shown in a Korean study by Kim et al. (2014).

Methods

This study uses data that was obtained from a survey conducted in Penang. The survey questions were worded in the two languages that are widely used by Malaysians, i.e. Malaysia language and English. A pilot study involving ten respondents was conducted prior to carrying out the full survey involving respondents aged 18 years and above. In the survey, respondents were asked whether they use nutritional information (i.e. whether they check the list of ingredients, nutrition label and/or nutritional claims) found on labels when purchasing processed food products. Respondents were also asked to provide information pertaining to demographic, socio-economic and health-related factors. Data collection was conducted from November to December 2017. The sample used in this study consists of 404 respondents. Contingent quota sampling is used in this study. It is akin to stratified probability sampling given that a specific number of respondents from different subgroups are selected. The difference is that respondents are selected by convenience rather than randomly. The quotas are pre-determined (i.e. based on gender, age and ethnic groups) and the researchers attempted to fill the various quotas as far as possible. Respondents consisted of individuals aged 18 and above (i.e. in the working age group) who are likely to make decisions regarding the purchase of food products. Given that respondents are selected by convenience, the

survey was not confined to shoppers who were interviewed in grocery outlets; interviews with shoppers was conducted in residential areas as well. The sample was stratified by gender, age and ethnicity to reflect Penang's population. The sample comprises 50 percent males, 25 percent elderly (above the age of 50) and 50 percent Malays. This is rather similar to the gender, age and ethnic profile of Penang's population, where 50 percent of the state's population are males, 23 percent of Penang's population are over the age of 50 and 45 percent of Penangites are Malays (Department of Statistics, 2017).

The objective of this study is to analyse the relationship between demographic, socio-economic as well as health-related factors and the use of nutritional information (i.e. checking information in the ingredients list, nutrition labels and/or nutritional claim). A logit model is used since the dependent variable is a dummy variable, where Y = 1 if a respondent uses any nutritional information when shopping for groceries and 0 otherwise. The logit model is as follows:

$$L_i = \ln \frac{Pi}{(1-Pi)} = \alpha + \beta_i X_i + \varepsilon$$

where P_i is the probability of using nutritional information, $(1-P_i)$ is the probability of not using nutritional information, $\ln \frac{Pi}{(1-Pi)}$ represents the log of odds of using nutritional information, X_i are the independent variables, α is the constant, β_i are the parameters to be estimated and ε is the error term. The model is estimated using the maximum likelihood estimation method. The odds ratio was calculated by exponentially converting the estimated coefficients where the dividing line between a positive and negative relationship is 1 and not 0. The list of independent variables that are used in the logit model and their measurements are presented in the Table 1.

Table 1. List of independent variables and measurements

Variables	Measurements
Male	1= male; 0 = otherwise Reference group is female
Age50+	1= age is above 50; 0 = otherwise Reference group is age 50 and below
Malay	1= Malay; 0 = otherwise Reference group is non-Malay (i.e. Chinese, Indian and others)
Tertiary	1= highest level of education is tertiary education; 0 = otherwise Reference group is non-tertiary education
Shopping Time	1= 30 minutes and above spent on grocery shopping; 0 = otherwise Reference group is less than 30 minutes spent on grocery shopping
Price Sensitive	1= price-sensitive i.e. perceive price as important when buying food products; 0 = otherwise Reference group is not price-sensitive
Smoker	1= smoker; 0 = non-smoker Reference group is non-smoker
Unhealthy	1= unhealthy i.e. has health problems, 0 = otherwise Reference group is healthy

Results and discussion

This section is divided into two parts. The first part compares the characteristics of users and non-users of nutritional information in the sample. The second part discusses the findings of this study based on the logistic regression analysis.

Sample characteristics

Table 2 displays the descriptive statistics of the sample of 404 respondents which comprises 228 respondents (56.4 percent) who use nutritional information and 176 (43.6 percent) who do not use nutritional information when shopping for processed food products. Males constitute 49.8 percent of the entire sample. There is a higher percentage of males in the category of non-users of nutritional information as compared to the category of nutritional information users (i.e. 68.2 percent versus 35.5 percent). This implies that users of nutritional information are predominantly women. The age variable indicates that there is a higher percentage of elderly (above the age of 50) in the group that does not use nutritional information in comparison to the group that uses nutritional information (i.e. 49 percent versus 11 percent). This implies that the use of nutritional information is noticeably lower in the category of older shoppers in contrast to relatively younger shoppers (i.e. below the age of 50). In terms of ethnicity, about 49.8 percent of the respondents are Malays while the other half of the respondents are non-Malays. More than half the number of nutritional information users are Malays while two fifths of the non-users are Malays.

Table 2. Characteristics of users and non-users of nutritional information

Variables	Total (n=404)		Users of nutritional information (n=228)		Non-users of nutritional information (n=176)	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Male	0.4975	0.0249	0.3553	0.4796	0.6818	0.4671
Age 50+	0.2450	0.2450	0.1114	0.3185	0.4148	0.4941
Malay	0.4975	0.0249	0.5746	0.4955	0.3977	0.4908
Tertiary	0.4778	0.4975	0.6570	0.4754	0.2443	0.4309
Shopping time (above 30 minutes)	0.5594	0.4970	0.6623	0.4740	0.4261	0.4959
Price Sensitive	0.7599	0.0213	0.7193	0.4503	0.8125	0.3914
Smoker	0.1188	0.0161	0.0351	0.1844	0.2272	0.4202
Unhealthy	0.3490	0.0237	0.2281	0.4205	0.5057	0.5014

The sample consists of 193 individuals with tertiary education while 211 respondents have lower education levels (i.e. no formal education, primary education or secondary education). The data shows there is a disproportionately high percentage (65.7 percent) of nutritional information users who possess tertiary education. This means that most nutritional information users are highly educated. In contrast, about one quarter of the number of non-users have a tertiary education while the other three quarters have lower education levels. The time factor is also taken into account in this study. Time spent on grocery shopping is divided into two categories: (i) 30 minutes or more and (ii) below 30 minutes. The data shows that nearly two thirds of nutritional information users spend more than half an hour on grocery shopping. Conversely, more than half the number of non-users of nutritional information spend a short time (less than 30 minutes) for grocery shopping. Therefore, there is a higher percentage of speedy shoppers (i.e. taking less than 30 minutes to shop) in the category of non-users than in the category of users. Unlike nutritional information users, non-users are able to do their grocery shopping more quickly because they do not need to spend time checking nutritional information. The priority given to price of goods when purchasing food products is also taken account in this study. Three quarters of the respondents pay attention to the price factor. The data shows that 71.9 percent of users place importance on the price when purchasing food products; the corresponding figure is higher (81.3 percent) for non-users of nutritional information. The very high percentage of price-sensitive individuals in the category of non-users reflects that the use of nutritional information and the search for low prices act competitively as noted earlier.

Two health-related factors are examined in this study. The first is smoking status. Only a minority group (11.9 percent) in the sample are smokers. Among the users of nutritional information, 3.5 percent are smokers; the corresponding figure is 22.7 percent for non-users of nutritional information. The negligible percentage of smokers among those who check nutritional information suggests that the large majority of individuals who are concerned about eating healthily also adopt a healthy life style by avoiding nicotine. The other health-related variable is the issue of health problems. It is interesting to note that about half the number of non-users of nutritional information suffer from health problems while only about one fifth of users of nutritional information have ill health. This result indicates that checking nutritional information helps grocery shoppers make healthier food choices, which thereby reduces the numbers of individuals that have poor health.

Empirical results

Table 3 shows the results of the logit model. The coefficients of the logit model represent the log of odds of using nutritional information when shopping for processed food products. The likelihood-ratio test is a statistical test which is carried out to test the goodness of fit of the model. Based on the estimated regression model, the likelihood ratio statistic (LR) of the logit model (130.80) is higher than the critical value of the chi-squared statistic ($\chi^2 = 18.48$) and the probability value of the LR statistic is almost zero. This suggests that the model is a good fit for the data.

The results show that the dummy variable for gender (Male) has a statistically significant negative relationship with the dependent variable. Males have lower odds of using nutritional information (odds ratio = 0.49) than females. This result is consistent with the findings of other studies such as Guthrie et al. (1995), Nayga (1996), Kim et al. (2001), Mannell et al. (2006) and Kim et al. (2014) which suggest that females are more likely to use nutritional information. This is because women are more interested in diet and health issues (Nayga, 1996) and the role of females as the meal planner is prevalent in most households (Falola, 2014).

The regression model includes a dummy variable for age. The dummy variable Age50+ refers to respondents above the age of 50 while the base group comprises individuals who are less than 50 years old. The coefficient for the age dummy variable (Age50+) has a negative sign and is significant. The results indicate that senior shoppers above the age of 50 have lower odds of using nutritional information (odds ratio = 0.58) than relatively younger shoppers (i.e. below 50 years of age). Younger shoppers have a higher likelihood of using nutritional information because they may have a better understanding of nutritional information than older shoppers as aging is said to worsen the comprehension level of an individual (Liu et al., 2015). This finding is similar to the results of earlier studies, e.g. Cheah et al. (2015) and Cheah and Yip (2017). Older individuals are also at a disadvantage with respect to checking nutritional information because they often suffer from visual impairment and consequently face difficulty in using nutritional information on food labels that are generally in small print.

The coefficients for the ethnicity dummy variable (Malay) has a positive sign but is not significantly related to the likelihood of checking nutritional information. The odds of using nutritional information is only 1.42 times higher for Malays than for those in the reference group (non-Malays). The result in this model which shows the higher odds of using nutritional information for Malays is similar to the findings of Cheah et al. (2015); however, unlike this study, the research by Cheah et al. showed that ethnicity has a significant influence on the use of nutritional information.

The dummy variable for education (Tertiary) refers to post-secondary education while the base group comprises those without tertiary education (no formal education, primary education and secondary education). The highest education level (Tertiary) attained by respondents is found to have a positive and significant impact on the likelihood of checking nutritional information. Respondents with tertiary education have a higher likelihood to use nutritional information compared to respondents with lower levels of education. The odds of checking nutritional information for respondents who have tertiary education are 2.94 times higher than the odds for respondents without tertiary education. Highly educated individuals are more likely to use nutrition labels because higher education level leads to higher levels of information search, understanding and nutritional knowledge (Guthrie et al., 1995; Drichoutis et al., 2005; Mannell et al., 2006; Magistris et al., 2010; Ranilović & Colić, 2011; Sinclair et al., 2013; Kim at al., 2014; Cheah et al., 2015).

The dummy variable for time spent on grocery shopping (Shopping Time) refers to more than 30 minutes spent on grocery shopping while the base group includes respondents who take less than 30 minutes for grocery shopping. The coefficient for the variable Shopping Time is positive and significant. This indicates that the likelihood of checking and using nutritional information differed between respondents who spend more than 30 minutes for shopping and those who take less than 30 minutes. The odds of checking or using nutritional information for respondents that spend more than 30 minutes on grocery shopping is 1.79 times higher than the odds for respondents that spend less than 30 minutes on grocery shopping. Spending more time on grocery shopping increases the likelihood of using nutritional information because searching for nutrition information takes extra time (Lin et al., 2004; Drichoutis et al., 2005).

The coefficient for the variable Price Sensitive has a negative sign and is significant. This indicates that the likelihood of checking or using nutritional information is lower among respondents who prioritise price when purchasing food products. According to Drichoutis et al. (2005) people who think that price is more important when shopping for food are less likely to use nutrition labeling. This is because searching for nutritional information and for lower prices act competitively. Price-conscious respondents use more time searching for food items that are affordable than checking nutritional information when they are purchasing food products.

The last two variables in the model are health-related factors. The coefficient for the variable Smoker has a negative sign and is significant. This indicates that the likelihood of checking and using nutritional information differed between smokers and non-smokers. The odds of checking nutritional information for smokers are lower (odds ratio = 0.27) than the odds for non-smokers. This result is similar with the findings of previous studies, e.g. Cheah et al. (2015) and Kim et al. (2014). The low odds of smokers using nutritional information suggests that most smokers ignore nutritional information when purchasing food products; this is not surprising since smokers in Malaysia also ignore labels on cigarette packs (i.e. pictorial warnings of cancer) when purchasing cigarettes.

The other health-related variable used in the model is labelled as Unhealthy. The coefficient for the variable Unhealthy has a negative sign and is significant. This indicates that the likelihood of using nutritional information differed between individuals with health problems and those without health problems. The odds of checking using nutritional information for respondents with health problems are lower (odds ratio = 0.56) than the odds for healthy respondents. This finding is similar to the results obtained by Kim et al. (2014) which show that Koreans with chronic diseases such as hypertension, diabetes, and dyslipidemia fall under the category of non-nutrition label readers.

Table 3. Results of Logit Model

Independent variables	Variable name	Estimated coefficient (β)	Odds ratio (e^{β})	z-score	Std. Error
Gender	Male	-0.7142***	0.4896	-2.73	0.2614
Age	Age50+	-0.5399*	0.5828	-1.66	0.3249
Ethnicity	Malay	0.3496	1.4184	1.40	0.2493
Education	Tertiary	1.0772***	2.9365	4.07	0.2648
Time used for grocery shopping	Shopping Time	0.5826**	1.7907	2.36	0.2473
Sensitive to price	Price Sensitive	-0.4877*	0.6140	-1.68	0.2899
Smoking status	Smoker	-1.3042***	0.2714	-2.88	0.4534
Health status	Unhealthy	-0.5841**	0.5576	-2.17	0.2689
Constant		0.5032			

Note: ***, **, * indicate 1%, 5% and 10% level of significance, respectively

Conclusion

This study examines the factors that affect the use of nutritional information among grocery shoppers in Penang. The results of this study indicate that demographic factors (i.e. gender and age), socio-economic factors (i.e. education, time spent on grocery shopping and price sensitivity) and health-related factors (i.e. smoking and health status) are significantly related to the use of nutritional information among grocery shoppers in Penang. The results show that the odds of using nutritional information are higher for respondents who are tertiary-educated and spend more than 30 minutes for buying groceries. On the other hand, the odds of using nutritional information are lower for males, the elderly (above the age of 50), price-sensitive buyers, smokers and those with health problems.

The results of this study have several important policy implications. The findings can be used as a guide in directing efforts to promote the use of nutritional information. For example, individuals who are male, older, without tertiary education, spend short time for grocery shopping, price-sensitive, smokers and have health problems are less likely to use the nutritional information on the food packages of processed foods. Hence, the steps taken by the government and consumer associations to promote the use of nutritional information when buying processed food products should be targeted at these groups.

Firstly, there must be health care programs (e.g. seminars, talks, etc.) targeted at senior citizens related to the theme of healthy eating and the link between diet and disease. Educating older individuals on nutrition will influence them to use nutritional information when purchasing food products.

The second group that has a lower likelihood of using nutritional information is those who have not attained tertiary education in comparison to individuals with tertiary education. Since many individuals do not enjoy the privilege of pursuing tertiary education that can help expand their knowledge and understanding about issues related to nutrition and health, it is necessary to ensure that nutrition knowledge is imparted to students at the earlier stages of education (primary and secondary levels). The knowledge on nutrition and health that students gain in school will help them make more informed decisions in the purchase of food products by using nutritional information that is displayed on food packages.

Another target group in efforts to promote the use of nutritional information is those with health problems and smokers. Given that individuals with health problems tend to visit doctors, it is suggested that hospitals should organise sessions to educate patients on nutrition and health, including the need to use nutritional information when purchasing food. The presence of nutritionists in hospitals will also enable patients to seek advice on their diet and the choice of foods that suit their health condition. A better understanding of the importance

of diet and nutrition will encourage patients to use nutritional information when purchasing food products.

This study also shows that shoppers who give importance to price are less likely to use nutrition labels. Government intervention is needed to reduce the price of nutritious food products through the use of subsidies. With subsidies, there will be a drop in the price of nutritious food products so that it is more affordable for consumers. Price-sensitive consumers will purchase nutritious foods when the price of nutritious products becomes affordable.

Time is an important determinant of the use of nutritional information. The total time spent on grocery shopping is the summation of time spent on selecting food products and time taken in queuing up at the cashier's counter. The introduction of self-checkout stations is likely to save shoppers' waiting time. This will be particularly beneficial for speedy shoppers who shop in a hurry (i.e. spend less than half an hour for grocery shopping) because it will enable them to spend some time to look at the nutritional information when purchasing their food products.

Apart from the abovementioned strategies, improving the display of nutritional information on food packages will go a long way in encouraging shoppers to use it. One method of simplifying the display of nutritional information is by adopting colour-coded nutrition labels that was introduced in the United Kingdom (Emrich et al., 2017). This system uses traffic light colours to signify the level of nutrients in food products, i.e. red indicates high level, yellow is used for medium level and green shows low level. The use of a colour-coded system will be useful for both the elderly who have difficulty reading small print as well as less educated shoppers who simply have to look at the colours to find out the nutritional content of the product. It is also time-saving as consumers can find out about the product by simply glancing at its colour-coded nutritional label.

Finally, it is noted that the findings of this study are also relevant for businesses for the purpose of marketing their food products. For instance, highly educated shoppers and women who are usually meal planners are more likely to be on the lookout for nutritious food products when shopping for groceries. Therefore, advertisements and promotion campaigns that aim to highlight the nutritional content of processed food products ought to be directed at these groups.

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