FOOD CONSUMPTION PATTERNS OF LOWER-INCOME HOUSEHOLDS IN RURAL AREAS OF PENINSULAR MALAYSIA

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Introduction

Malaysia is a country of diverse races and religions, and one of the countries in Southeast Asia that has a vibrant economy, political stability and constant growth of industrial development. Strong economic growth has also changed the lifestyle of its people as well as in terms of food intake, not only in urban areas, but also in rural areas. Currently, the consumption of foods that are high in calories and protein are common among Malaysians (Zainal Badari, Arcot, Haron, Paim, Sulaiman & Masud, 2012). This has increased the risk of chronic diseases, such as heart disease, diabetes mellitus, stroke and hypertension (Malaysia Ministry of Health, 2010). Lifestyle changes in adults lead to unhealthy eating habits, socioeconomic pressure, and smoking and decreased physical activity, which lead to an increase in chronic disease risk factors (Lam & Khor, 1997).

Various factors have contributed to the nutritional status of the population, such as unhealthy lifestyle, poor eating habits and unhealthy food intakes (He & Evans, 2007; Norlaila, 2008). In addition, socioeconomic factors also influence the nutritional status and food intakes of the population. Poverty is one of the main factors contributing to the poor nutritional status and dietary intakes (Vorster, 2002; Rousset, Droit-Volet & Broirie, 2006). This also contributed to the risk of chronic diseases because the poor often have no choice other than to rely on monotonous low nutrient dense diets (Cannon, 2001). Although the lower-income populations spent more of their income on buying foods, the spending was more on energy-dense foods with higher palatability due to the lower prices (Abbott, 2009; Zhang & Chen, 2007). A

healthy diet is perceived to be more expensive (Giskes, Turrell, Patterson & Newman, 2002; Giskes, Van Lenthe, Brug, Mackenbach, & Turrell, 2007; Kearney & McElhone, 1999) coupled with limited access to healthy food, especially in rural areas (Buras, 2006).

There is great interest in developing countries to study the balanced and diversified diets, especially due to under-nutrition or over-nutrition and their consequences (Underwood, 1998; McCrory, Fuss, McCallum, Yao, Vinken, Hays, & Robert, 1999; WHO/FAO, 1996). However, the estimation error of food intake has been the major problem in dietary intake surveys of the target population. Thus, the main objective of the present study was to determine the food consumption patterns of lower income households in the rural areas of Peninsular Malaysia.

Methods

Interview location and sampling

The interview of food intake was carried out in Peninsular Malaysia from March to May, 2011 (for a duration of two months). Peninsular Malaysia (*Semenanjung Malaysia*), also known as West Malaysia, is a part of Malaysia that shares a border with Thailand in the north. It consists of eleven states and two federal territories, which contributes approximately 80.0% of the Malaysian population, and is where the majority of economic activities take place. The present study location was chosen by stratified random sampling, as shown in Figure 1. Peninsular Malaysia was divided into four zones in this study namely – north, south, east and central – in which one state was chosen for each zone. Following the selection of state, one district was chosen randomly for each state and a sub-district was selected for each district. Finally, one village was chosen from the selected sub-district to represent each zone.

For each village, the respondents were chosen through systematic sampling by selecting the odd-numbered houses in the village. The following criteria were used for: the respondents must be the head of the household or their spouses, should come from two-parent households with children and the monthly income should fall under the low-income category (MYR2300 and below per month). The total number of respondents in this survey was 302. However, after the inspection and review of the returned questionnaires, only 280 respondents were fulfilled the criteria and eligible for this study. The present study was approved by the Human Research Ethics Advisory Panel–Science/Engineering of the University of New South Wales, Australia and Medical Research Ethics Committee of the Faculty of Medicine and Health

Sciences, University Putra Malaysia. Consent letter was obtained from each respondent before the interview.

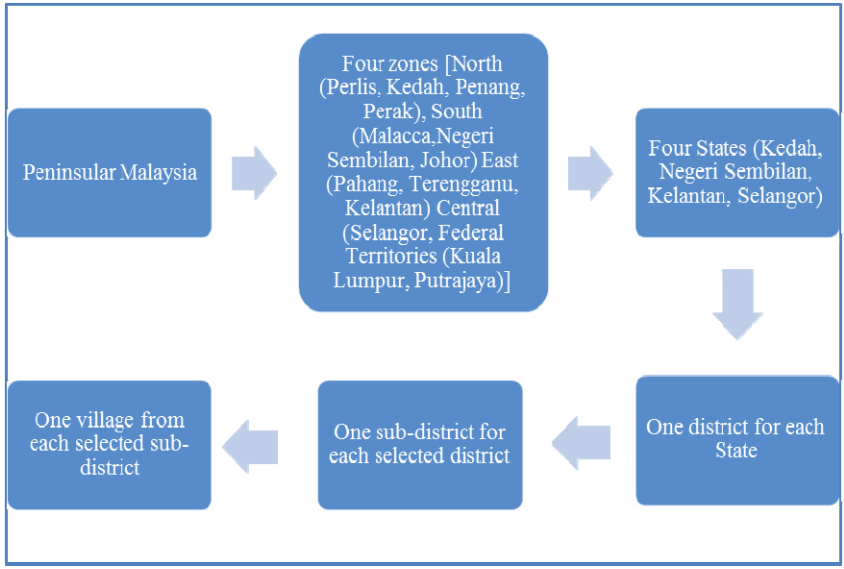

Figure 1: Selection of Study Locations

Interview instruments

Respondents' backgrounds

A questionnaire was developed to obtain the socioeconomic details of the respondents. The questionnaire consisted of three sections, a) Socioeconomic information including location, sex, race, age, education level, household size, household income and occupation; b) Monthly household expenditure; and c) Monthly household food expenditure. This questionnaire was administered by a trained interviewer along with the investigator to collect the information from respondents.

Food frequency questionnaire

The food frequency questionnaire (FFQ) was designed and used to determine the food consumption patterns of the respondents. The FFQ was developed and adapted from the food frequency questionnaires of MANS (Norimah, Safiah, Jamal, Siti, Zuhaida, Rohida,Fatimah, Siti, Poh, Kandiah, Zalilah, Wan, Fatimah, & Azmi, 2008). The FFQ consisted of two components: a) a

list of foods and portion size of foods and b) a set of frequency-of-use response categories. A total of 126 items of food was listed in this FFQ and was divided into 15 groups. The respondents were asked to choose only one response regarding the frequency of intake for each food item the following responses: more than six times per day, 4-5 times per day, 2-3 times per day, once a day, 5-6 times per week, 2-4 times per week, once a week, 1-3 times per month, or no intake. Both questionnaires (respondent backgrounds and FFQ) were tested on a smaller number of respondents than the actual interview, and the improved version was used in this study.

The food intake pattern was then estimated using the method suggested by Chee, Zawiah, Ismail, & Ng (1996) with minor modification. The food consumption data was given a 5-point scale ranging from 5 = daily, 4 = 4-6 times/week, 3 = once a week, 2 = 1-3 times/month and 1 = never/no intake. A score was calculated for each of the food items using the following equation:

$$\text{Score} = \frac{R_1S_1 + R_2S_2 + R_3S_3 + R_4S_4 + R_5S_5}{5}$$

Where:

R5 – R1: Percent respondents selecting a rating
S5 – S1: Scale point
5: Maximum scale point

The food intake was divided into three categories: most consumed foods (80.0-100), moderately consumed foods (30.0-79.9) and less consumed food (≥10. 0-29.9). The food list was therefore divided into six groups based on the Malaysian food pyramid to further explore the food intake pattern of respondents. Non-alcoholic beverages were included in this process as part of the food intake of the respondents.

Statistical analyses

IBM SPSS statistics version 20 software (IBM Corporation, Armonk, NY, USA) was used to perform statistical analyses. Descriptive statistics were expressed as mean to present the household socioeconomic factors, such as area of residence, sex, age, race, household size, education level/year of education, household income, mean household food expenditure, occupation, and food intake categories.

Results

Socioeconomic factors

The socioeconomic factors of the respondents are shown in Table 1. Most of the respondents were women (76.4%) and aged between 36-45 yr. (35.4%) and 46-55 yr. (25.4%), respectively, with a mean age of 46.5 years. It is obvious that the majority of the rural population were Malay (99.3%), while other races mostly resided in urban or sub-urban areas. Sixty-one percent of the respondents had a household size of 3 to 5 persons with the mean household size being 5.2. A monthly household income below MYR2300 was categorized as lower-income, MYR2301 to 5599 as middle-income, and MYR5600 and more as higher-income (Malaysia Prime Minister Department, 2011). The mean monthly household income of respondents was MYR862, where 46.4% of them had monthly household incomes between MYR501-1000. The information on the education level of respondents indicated that 32.9% of them had finished their primary school and upper secondary school. Other respondents had finished their lower secondary school (22.9%). Because the majority of respondents were women, most of them were housewives (62.5%) and relied on their husbands' incomes.

Table 1: Socioeconomic Details of the Respondents (N=280)

Socioeconomic Details	Frequency (n)	Percentage (%)
Location		
Kedah	72	25.7
Negeri Sembilan	27	9.6
Kelantan	81	29.0
Selangor	100	35.7
Sex		
Men	66	23.6
Women	214	76.4
Age (Year)		
≤ 25	9	3.2
26-35	38	13.6
36-45	99	35.4
46-55	71	25.4
56-65	44	15.7
≥ 65	19	6.8
**46.5*		

Table 1: (continued)

Socioeconomic Details	Frequency (n)	Percentage (%)
Race		
Malay	278	99.3
Chinese	-	-
Indian	2	0.7
Others	-	-
Household Size (Person)		
1-4	122	40.0
5-8	155	55.4
≥ 9	13	4.6
**5.2*		
Monthly Household Income (MYR)		
≤ 500	80	28.6
501-1000	130	46.4
1001-1500	58	20.7
1501-2300	12	4.3
**862*		
Housing Type		
Terrace house	6	2.1
Village house	274	97.9
Type of Ownerships		
Own house	253	90.4
Rent	18	6.4
Other (family's house)	9	3.2
Education Level		
No formal education	24	8.6
Primary school	92	32.9
Lower secondary school	64	22.9
Upper secondary school	92	32.9
Certificate	4	1.4
Diploma	4	1.4
Occupation		
Clerical workers	9	3.2
Service workers & shop market sales workers	13	4.6
Agriculture & fisheries workers	19	6.8
Craft & related trade workers	8	2.9
Elementary occupations	19	6.8
Own business/own account workers	30	10.7
Pensioner	7	2.5
Housewife	175	62.5

*Mean

Monthly food expenditure

Table 2 shows the monthly food expenditure of the respondents based on 12 categories of food. The total mean food expenditure was MYR412.0 ± 244.0. The results showed that cereal and cereal products, chicken, red meat and products, and fish, seafood and products were among the highest expenditure. The monthly average expenses for these three categories of food were MYR77.00 ± 73.0, MYR55.00 ± 45.2, and MYR75.00 ± 72.2, respectively. These three categories of food are high in protein and energy. Expenditure on other foods was between MYR12.00 ± 11.4 to MYR31.00 ± 27.0 per month. The expenditure on vegetables (MYR28.00 ± 21.1), fruits (MYR31.00 ± 27.0), and milk and milk products (MYR25.00 ± 31.0) were low even though these categories of food were deemed to be healthy foods. Most foods considered healthy were expensive and could not be afforded by the respondents and the increases in food prices in the market were a burden to this group of the population, hence most of them bought cheaper foods to satisfy their food needs.

Table 2: Monthly Food Expenditure of the Respondents (N=280)

Food Category	Mean (MYR)
Cereals & cereal products	77.0
Chicken, meat & poultry products	55.0
Fish, seafood & products	75.0
Eggs	19.3
Legumes, nuts & products	13.3
Milk & milk products	25.0
Vegetables	28.0
Fruits	31.0
Non-alcoholic beverages	28.0
Bread spread	12.1
Confectioneries	24.3
Condiments	26.0
TOTAL	**412.0**

Food intake patterns

The FFQ was used to determine the food intake pattern of the respondents. Rice, fish sausages, sugar, saltwater fish and green leafy vegetables were the highly consumed foods, while plain water and tea were most consumed for non-alcoholic beverages, as shown in Figure 2. Plain water was among the highest intakes weekly with a score of 100 for the respondents. Rice is the main staple diet in Malaysia, and the main source of energy among

respondents (score of 99.3). Most of the respondents consumed lots of sugar weekly with a score of 92.0, the energy from which can contribute to the risk of obesity and diabetes. Fish sausage (*keropok lekor*) and saltwater fish were the main sources of protein and green leafy vegetables were the main sources of vitamins and minerals for respondents.

Figure 3 shows the top-ten moderately consumed foods of the respondents. It seems that local cakes (*kuih)* were amongst the highest intake of this category with a score of 85.1. This was followed by chicken egg, coffee, biscuits, herbs (*ulam*), bread, sweetened condensed milk, chicken, chilli/tomato sauce and cabbages. Respondents tended to eat local cakes (*kuih*), biscuits and bread for their breakfast and during tea-time. Chicken egg and chicken were another source of protein after fish and fish sausage (*Keropok lekor*) while sweetened condensed milk was used in tea or coffee. However, sweetened condensed milk is not a good source of calcium for respondents because of the higher sugar content than milk. Herbs (*ulam*) are the vegetables that are eaten raw by respondents weekly, normally during lunch and dinner, eaten with spicy sauce or *sambal*. The results indicated that longan, energy drink, herbal drink, fermented shrimp sauce (*cencalok*), dried fruits, bird eggs, mutton, yoghurt, sago, and chapatti were among the top-ten less consumed foods of the respondents (Figure 5.4).

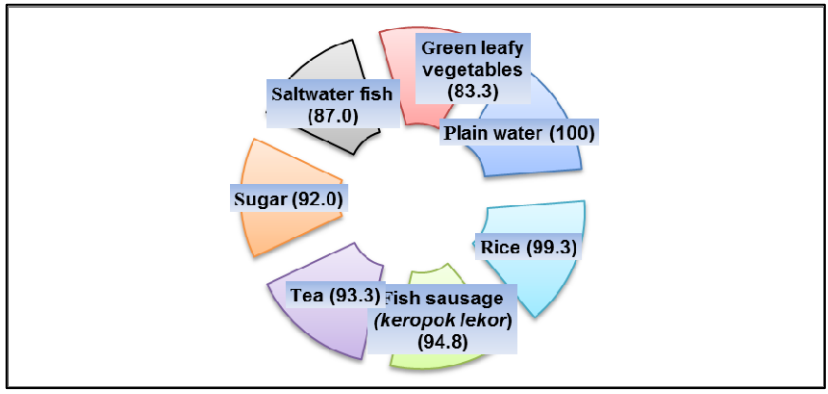

Figure 2: Highly Consumed Foods (Score: 80.0-100)

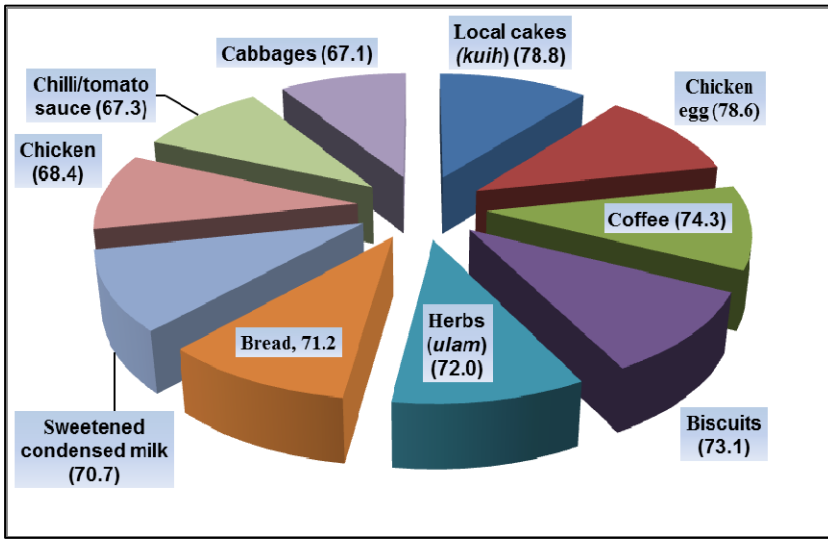

Figure 3: Top Ten Moderately Consumed Foods (Score: 30.0-79.9)

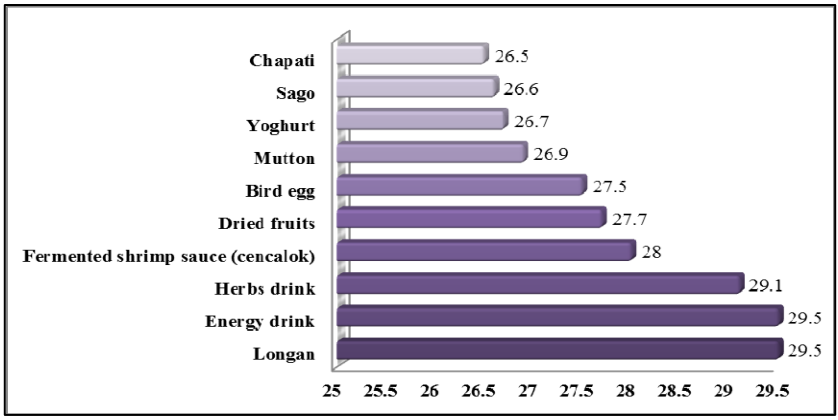

Figure 4: Top Ten Less Consumed Foods (Score: ≤29.9)

Figures 5 to 10 show the top-ten food intakes of the respondents based on the Malaysian Food Pyramid groups. They showed that the top-ten food intakes for rice, noodles, bread, cereals, cereal products and tubers group had scores from 38.7 to 99.3, vegetable group (37.8 – 83.3), fruit group (41.6 – 55.1), fish, poultry, meat and legumes group (48.0 – 94.8), milk and milk products (23.1 – 70.7), and fats, oil, sugar and salt (47.8 – 92.0). Most of the scores of these groups were between moderately consumed foods to highly consumed

foods except for the fruit group and milk and milk products group. For the rice, noodles, bread, cereals, cereal products and tubers group, rice became the main source of carbohydrates and energy to the respondents followed by bread, bun, egg noodles and flat bread (*roti canai*). However, the flatbread (*roti canai*) was also a source of fat because one of the ingredients was margarine, and it was also cooked with palm oil.

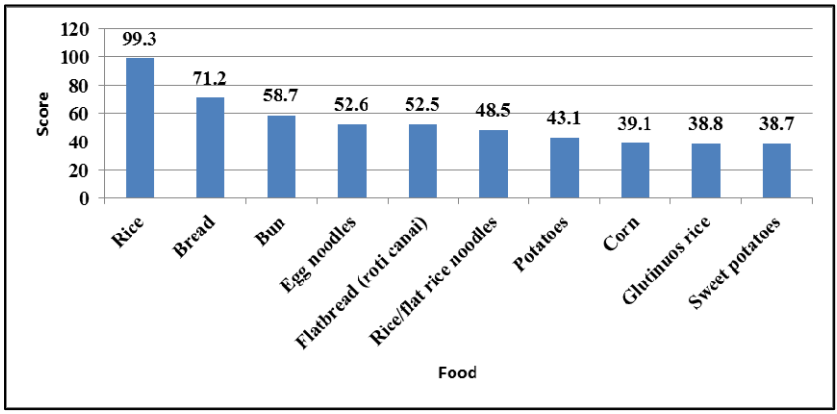

Figure 5: Top Ten Consumed Foods Of Rice, Noodles, Bread, Cereals, Cereal Products and Tubers Group (Score: 99.3 – 38.7)

The sources of vitamins and minerals were from the vegetables (Figure 6) and the fruits group (Figure 7) when more varieties were consumed. Furthermore, these two groups of food also provide dietary fibre and bioactive compounds, such as phytochemicals that used to reduce a cancer cells to the respondents. In the vegetables group, it seems that green leafy vegetables; herbs (*ulam)*; cabbage; bean vegetables, such as long bean and green bean; gourd vegetables, such as cucumber, bitter-gourd, and brinjal; and bean sprouts were moderately consumed and scored more than 50.0. Meanwhile, fruits were also consumed moderately by respondents with the highest score was for banana (55.1). Other fruits that scored more than 50.0 were mango, pear, watermelon and papaya.

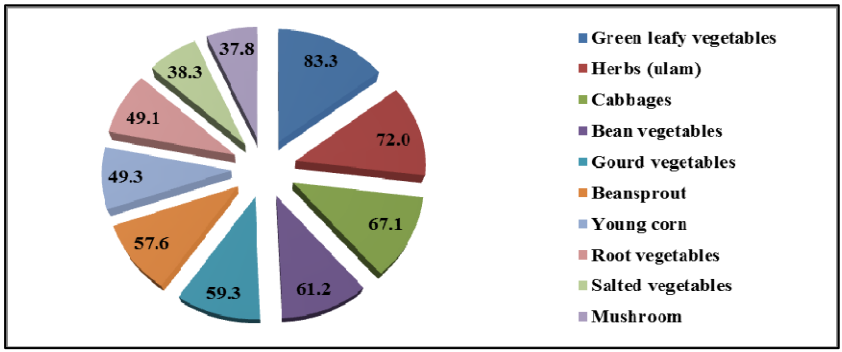

Figure 6: Top Ten Consumed Foods from the Vegetables Group (Score: 83.3 – 37.8)

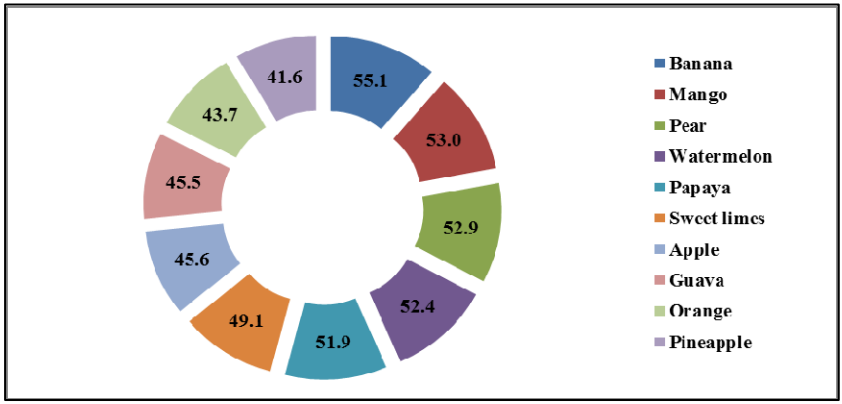

Figure 7: Top Ten Consumed Foods from the Fruits Group (Score: 55.1 – 41.6)

The fish, meat, poultry and legume group provide rich sources of protein to the respondents (Figure 8). However, this group is also high in fat, especially if meat, chicken and eggs are consumed excessively. The highest score for this group was fish sausage (*keropok lekor*) (94.8) followed by saltwater fish (87.0). These two food items are good sources of protein and unsaturated fat and were highly consumed by the respondents weekly. Other food items in this group were consumed moderately.

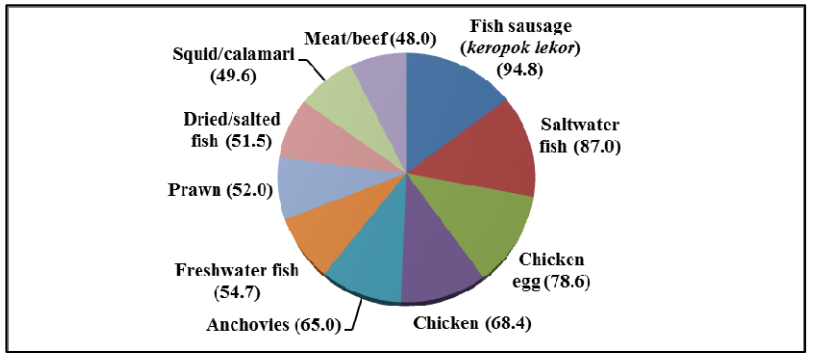

Figure 8: Top Ten Consumed Foods From the Fish, Meat, Poultry and Legumes Group (Score: 94.8 – 48.0)

Milk and milk products provide calcium, riboflavin and protein in the respondents' diet. It seems that the intake of this group by the respondents was moderate to less (Figure 9). Sweetened condensed milk was consumed more (70.7), even though its content was higher in sugar than milk. The higher price of fresh milk or UHT milk is the most probably main factor for respondents to choose sweetened condensed milk as part of their food intake. Powdered milk became the second highest intake of milk among respondents (42.1), followed by evaporated milk (40.3). For the fat, oils, sugar and salt group, it was recommended to eat this kind of food less. However, some of the food items in this group (Figure 5.10) such as sugar (92.0), local cakes (*kuih)* (78.8), biscuits (73.1), thick soy sauce (67.1) and thin soy sauce (61.7) were consumed highly to moderately by respondents. Food items in this group can contribute to high intakes of fat, sodium and energy, and, if consumed excessively, can increase the risk of obesity, hypertension, diabetes and heart disease.

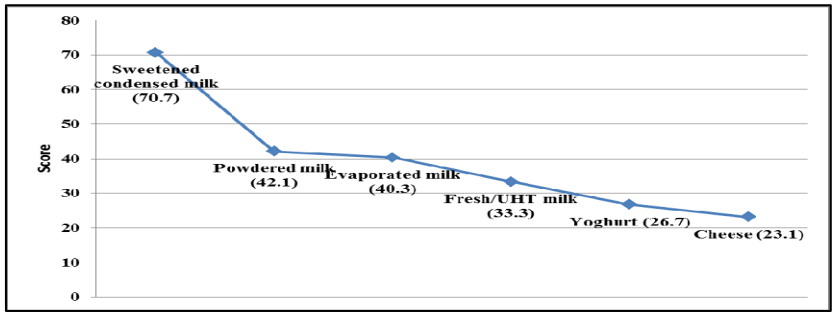

Figure 9: Top Ten Consumed Foods from Milk And Milk Products Group (Score: 70.7 – 23.1)

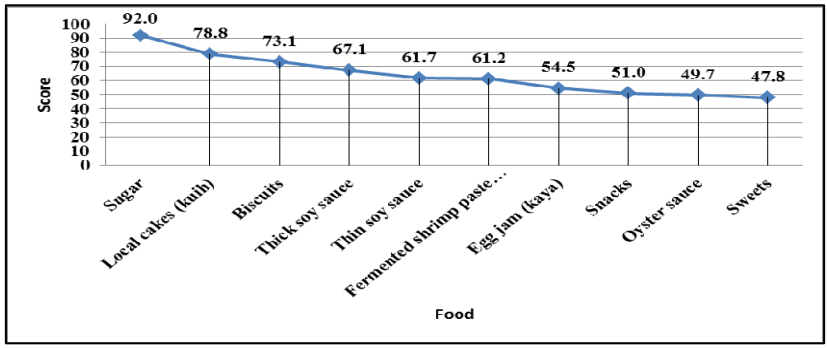

Figure 10: Top Ten Consumed Foods from Fat, Oils, Sugar and Salt Group (Score: 92.0 – 47.8)

Discussion

The present study focused on dietary and food intake patterns of lower-income households in the rural areas of Peninsular Malaysia. In the present study, the mean food expenditure of respondents was MYR412.0. This is supported by the data from the Malaysia Department of Statistics (2011), which showed that Malaysians spent an average of MYR444.0 monthly on food. Further analyses for the present study showed that the respondents spent an average of 48.0% of their total monthly income on food for their families; such a level of spending is assumed to be very high for the low-income population. However, this result was not supported by other studies. The Malaysia Department of Statistics (2011) reported that the average monthly spending in terms of the percentage of income for Malaysian households was only 20.3%. Chang (2010) also reported that the average spending on food was 24.0% by Malaysian households, while other studies showed that Malaysians spent 34.0% of their income on food (Yusof & Duasa, 2010).

It was assumed that increased food price was the main factor that contributed to the high proportion of monthly income spent on food among respondents in the present study. The report by Trostle (2008) showed that the price of food commodities, such as grains, vegetable oils, meats, seafood, sugar, bananas, and various other commodities, which are the basis for human consumption as staple foods, have increased by more than 60.0% since 2006. The high price of foods, especially staple foods, will adversely affect vulnerable rural and urban households in East Asia (Brambhatt & Christiansen, 2008). FAOSTAT (2003) reported that one third of the daily calorie intake in East Asia was supplied by rice followed by wheat (12.4%). This report is supported by the present study where cereals and cereal

products were among the highest expenses for food with the monthly average being MYR77.00. The purchase of foods considered healthy, such as fruits, vegetables and milk, was low among respondents, which may be due to the higher prices, and, hence, cheaper foods were an alternative for them to satisfy their food needs. However, a study by Ishida, Law and Aita (2003) showed that the consumption of meat and meat products, fruits, vegetables and milk but not cereals, such as rice and wheat, was high among Malaysians.

It is very important for individuals to have appropriate foods with adequate nutrients, and, the best way to meet the nutrient requirements is to consume a varied diet from all food groups, as suggested by the dietary guidelines (NCCFN, 2010). Eating a wide variety of foods is considered as a key to diet adequacy (Oldewage-Theron & Kruger, 2008). However, the respondents in the present study preferred foods that were high in fat, sugar and salt. The importance of fats and oils in the diet is well-known, but the excessive intake in the diet may affect cardiovascular health and also contribute to excess calorie intake (NCCFN, 2010), while the high intake of sugar and salt in the diet could lead to a high risk of certain diseases, such as diabetes (Zhang & Chen, 2007), high blood pressure (He & McGregor, 2003), obesity (Mazlan, Horgan, Whybrow, & Stubbs, 2006), heart disease (Howard & Wylie-Rosett, 2002) and could displace micronutrient-dense foods from the diet resulting in the risk of vitamin and mineral deficiency (NCCFN, 2010).

Foods from fish, poultry, meat, and legumes group, which are rich in protein and saturated fat, should contribute 10.0 to 15.0% of the total daily caloric intake and should be taken moderately (NCCFN, 2010). In the present study, it shows that saltwater fish, chicken egg, chicken, tofu and beef were among the most consumed foods by the respondents. It seems that white meat (fish and chicken) was preferred by respondents, however, excessive intakes of white meat and red meat in the diet can increase the risk of colon cancer (Singh & Fraser, 1998). The diets that are high in red and processed meat and refined grains were associated with type 2 diabetes in women (Fung, Schulze, Manson, Willett, & Hu, 2004) and could increase the risk of hypercholesterolemia and coronary heart disease (WHO, 2003).

The respondents get their energy from rice, noodles, bread, cereals, cereal products and the tubers group, as rice (the main staple food in Malaysia), bread and buns were the top three foods from this food group that were eaten by respondents weekly. The foods from this food group should be consumed at 8-12 servings per day (NCCFN, 2010). However, the present study shows that only rice was highly consumed by respondents, but not for other cereal product. This result is supported by Yeong-Sheng (2008) who reported that the consumption per capita of cereal foods among Malaysians had decreased

and that cheap protein meat and poultry increased starting from the 1970s. This was also reported by Tee (1999) who indicated that the calorie intake from cereals decreased from 60.0% in the 1960s to 40.0% in late 1990s, while the FAO reported that the calorie intake/capita/day from cereals for Malaysia decreased from 48.0% in 2005 to 46.0% in 2007 (FAOSTAT, 2010); this is assumed to have decreased over time. This trend can increase the dual-burden of malnutrition in Malaysia (Saibul, Shariff, Khor, Kandiah, Ghani, & Rahman, 2009; Tee, 1999). Other studies also showed the same results where there was a decline in food intake from cereals in their study population (Le, Le &Nquyen, 2003; Sook, 2003).

The respondents' intake of vegetables, such as herbs (*ulam*) and cabbage, were moderate except for green leafy vegetables. These groups provide vitamins, minerals and bioactive compounds to the human body (NCCFN, 2010) and should be taken in adequate quantities to prevent and lower the risk of some cancers, as well as reduce blood pressure (World Cancer Research Fund/American Institute of Cancer Research [WCRF/AICR], 2007). However, the intake was considered low. This study also indicated that the intake of fruits was low among the respondents. There was a low consumption of fruits and vegetables among Malaysian men (85.0%) and women (85.5%) based on the World Health Survey in the year 2002-2003 (Hall, Moore, Harper, & Lynch, 2009). On average, Malaysians consumed 103.5g vegetables and 151.5g fruits per capita/day for the years 2000-2007 (FAOSTAT, 2010), which is below the recommendation of 400g vegetables and fruits per day by WHO (2003). Previous studies showed that individuals with lower-income status had a low consumption of fruits and vegetables (Kearney, McCartney, McCarthy, Burke, Knox, & Barton, 2008; Yen, Tan, & Nayga, 2011).

The intake of the milk and milk products group was the lowest. Although milk is known to be an excellent source of calcium and considered to be good for both the bones and brain health, the lack of promotion among Malaysians (Babolian & Ab Karim, 2010) and higher price on the market (Lehr & Chong, 2010) makes it less available in their daily diets. This study is supported by a previous study which revealed that the consumption of milk was very low among Malaysian adults (Norimah *et al.,* 2008). Milk, fruits and vegetables were assumed to be expensive foods among lower-income groups (Giskes *et al.,* 2007) and people with a lower-income could not afford these foods due to the higher prices (Zainal Badari *et al.,* 2012).

The study's limitations must be considered in attempting to measure the food intake pattern among the lower-income groups in the rural areas of Malaysia. The present study used a small sample size of lower-income groups for each zone that only represents a small proportion of the lower-income population

in rural areas of Malaysia. Thus, the results obtained cannot be generalized for all lower-income populations. Thus, expanding the study area can increase the sample size and improved the power of data. Besides expanding the study area, single parent households and single adults should be included as respondents because their food intake also affects the food intake pattern of the Malaysian population. The use of the FFQ and 24 hour-recall method with food portion sizes must be accompanied with dietary tools/aids to minimise errors in estimating food intake.

Conclusion

In the present study, most of the respondents spent more of their monthly food expenses on the foods that were high in energy and protein, possibly due to the lower price and preference by the family members. Food such as rice, sugar and green leafy vegetables were mostly consumed foods while foods from vegetables, fruits, and milk and milk products groups were less consumed by the respondents. It seems that healthy food were not preferred by the respondents which may be due to the higher price in the market and are not affordable by them. Thus, the healthy eating education should be promoted and implemented among the lower-income households to ensure the nutrient requirements can be achieved as recommended by the RNI of Malaysia.

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