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Food Intake and Nutritional Status among Adults: Sharing the Malaysian Experience

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Abstract: Nutritional status of the people of a country is mainly influenced by the food they intake regularly. Taking improper amount of food results in mal-nutrition (i.e., overweight, obese or under nutrition) which ultimately affects physical well-being of the people. Nutritional status of people is also closely linked with dietary fat intake. This paper focuses on food intake and nutritional status among adults in Malaysia. The paper reviews currently available information on dietary food intake and nutritional status of Malaysian adults. Literatures were identified for review through a comprehensive search by using electronic and non-electronic databases. Based on the review of literature, it was found that nutritional status of Malaysian adults is significantly correlated with their habit of food intake. Studies revealed that the persons who over estimate their dietary fat intake has significantly higher adjusted mean Body Mass Index (BMI) (25.79±0.76) than accurate estimators (24.09±0.42) or under-estimators (24.06±0.49). Moreover, the group of over-estimators has the highest proportion of overweight and obese (60%) compared to under-estimators (40.8) and accurate estimators (31.6%). The adjusted mean Waist Circumference (WC) is also comparatively higher among the persons who over estimate their dietary fat intake. It was reported that overweight and obesity are highly endemic in Malaysia. Overweight and obesity result in diabetes, hypertension and coronary heart diseases which cause premature deaths. Therefore, future research is urgently needed at both household and national level for further understanding the correlation between dietary food intake and nutritional status and consequently physical well-being of the people in the country.

Key words: Food intake, nutritional status, adults, Malaysia

INTRODUCTION

Malaysia has developed from an agriculture based economy to one that emphasizes manufacturing (Moy *et al*., 2008). The nation's health status has also improved significantly with a decreased infant mortality rate from 19.7 per 1000 live births in 1981-6.6 per 1000 live births in 2006 while the life expectancy of males and females was 71.8 and 76.3 years, respectively in 2006 (Department of Statistics, Malaysia, 2006). These improvements may be attributed to socio-economic growth of the country and better health services provided to the people (Moy *et al*., 2008). However, nutritional status of people is mainly influenced by the food they intake regularly. In other words, proper nutrition of a person depends on taking exact amount of food. On the other hand, excessive food intake results in over nutrition (such as obesity) while taking too low amount of food causes under nutrition. Nutritional status of people is also closely linked with fat intake. Dietary fat intake is complex health related behaviour as it is not only partly habitual but also influenced by many psychosocial factors (Bogers *et al*., 2004). Generally, people believe that high fat intake constitutes an unhealthy diet and is detrimental to health (Yong *et al*., 2009). However, many people do not accurately estimate their dietary fat intake and believe that their diets meet the dietary fat recommendation (O'Brien *et al*., 2000). The study also noted that people who underestimate the amount of fat in their diets were the least likely to report that they intended to change their diets. However, the people who are habituated in healthful eating may also be intended to reduce fat intake (Arredondo *et al*., 2006). Therefore, agreements with sentiments such as consuming a low fat diet makes people feel good may reflect their intention of dietary fat reduction (Yong *et al*., 2009).

Obesity is a complex condition that comes about as a result of excesses dietary and a sedentary lifestyle (Azmi *et al*., 2009). Globally 300 million adults were reported to be obese in the year 2000 (WHO, 1998a). The study also reported that another 1 billion adults were overweight. In both men and women, obesity is a major risk factor for diabetes, cardiovascular disease, hypertension and stroke and certain forms of cancer. These can result in an increased risk of premature deaths or serious chronic conditions that impair the overall quality of human life (Azmi *et al*., 2009). The problem of obesity is existed not just in developed nations; it is now prevalent all around the world (Narayan and Khan, 2007). The

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levels of obesity in some low income and transitional countries are equal though they are not higher than those reported in developed countries. Shifts in diet and activity are contributing factors to changes in the levels of obesity from one country to another (Popkin and Doak, 1998). Obesity is highly endemic in Malaysia. Overweight and obesity are now so common in the country that they are replacing the more traditional public health concerns such as under nutrition and infectious diseases which are considered as some of the most significant contributors to ill health (Narayan and Khan, 2007). Overweight and obesity result in diabetes, hypertension and coronary heart diseases which cause premature deaths (Park, 2000). It was reported that heart diseases are the second principal cause of premature deaths in Ministry of Health hospitals in Malaysia (MOH, 2004).

In Malaysia, the prevalence rate of obesity is 5.5% (World Health Organization (WHO), 1998b). It was also reported that more females are overweight (7.2%) as compared to males (3.8%). A study conducted in North-eastern Malaysia found that the prevalence of overweight (21.3%) was higher than that of obesity (4.5%) (Mohamad *et al*., 1996). The study also revealed that younger people were significantly more overweight as compared to the older people. Another study reported that, in Malaysia, the prevalence of obesity is higher in women than in men (Ismail *et al*., 2002). The Third National Health and Morbidity Survey (NHMS III, 2006) reported that the prevalence of obesity in Malaysia was three times higher in 2006 (14%) as compared to 1996 (4.4%), whereas the prevalence of overweight almost doubled from year 1996 (16.6%)-2006 (29.1%). The survey revealed that 29.7% men and 28.6% women were overweight while 10.2% men and 17.5% women were obese. The survey also found that the prevalence of overweight and obesity in the rural population (41.8%) did not differ much from that of the urban population (43.5%). While over overweight and obesity continue to rise, underweight (7.8%) still exists in rural communities of Malaysia though the prevalence of underweight reduced from 25.2% in 1996-8.5% in 2006 (NHMS III, 2006).

This study aims to focus on food intake and nutritional status among adults in Malaysia. The paper reviews currently available information on dietary food intake and nutritional status of Malaysian adults.

MATERIALS AND METHODS

This study reviews literatures from various sources such as journals, reports, proceedings and related documents on assessment of food intake and nutritional status among adults in Malaysia. Literatures were identified through a comprehensive search by using electronic and non-electronic databases. Several electronic databases (Science Direct, Springer Link, Blackwell and Social Science Citation Index) were searched for published literature in a systematic way using a range of key words relating to food intake, nutrition, obesity, overweight, underweight, adults and Malaysia. Internet search engines were also used to find the related documents and reports published by the organizations undertaking research in this area. References cited in the literatures were searched and important studies were collected in full text. In addition, both electronic and non-electronic searches were also supplemented by a network of colleagues who provided related literatures and documents. In the review process, only the documents written in English were considered. This study reviewed the literatures that included discussions and demonstrated data, findings and evidences related to food intake and nutritional status among adults in Malaysia.

RESULTS AND DISCUSSION

This study is based on the data, information and evidences from published literatures and documents that focus on and discuss food intake and dietary habits of the Malaysian adults. Literatures that highlight the nutritional status of adult people in the country are also included in this review.

Nutritional status among men and women in Malaysia: Yong *et al*. (2009) conducted a study to assess relation between dietary fat intake perception and nutritional status among men and women in Malaysia. Table 1 shows the distribution of respondents according to dietary fat accuracy groups by sex. It was found that the proportion of females (52.7%) to be accurate estimators of dietary fat intake was higher than that of males (41%). On the other hand, a higher proportion of males (42.8%) under estimated their dietary fat intake as compared to females (32.9%). However, there were no significant difference in the proportion of males and females who over estimated their dietary fat intake (16.1 and 14.4%, respectively).

The dietary fat intake certainly affects the nutritional status of the respondents. Table 2 shows the Body Mass Index (BMI) and Waist Circumference (WC) of the respondents resulting from dietary fat intake. It was found that the adjusted mean BMI of accurate estimators, over-estimators and under-estimators were 24.1, 25.8 and 24.1 kg/m^2, respectively. The findings suggest that the persons who over estimated their dietary fat intake had significantly higher adjusted mean BMI than accurate estimators or under-estimators ($F = 3.112$, $p<0.05$). In addition, the group of over-estimators had the highest proportion of overweight and obese

Table 1: Dietary fat accuracy by gender

Dietary fat accuracy groups	Male No. (%)	Female No. (%)
Accurate	23 41.1	77 52.7
Over-estimate	9 16.1	21 14.4
Under-estimate	24 42.8	48 32.9
Total	56 100.0	146 100.0

Source: Yong *et al*. (2009)

Table 2: Body Mass Index and waist circumference by dietary fat accuracy groups

Anthropometric measurements	Under-estimate (n = 71) n (%)	Accurate (n = 98) n (%)	Over- estimate (n = 71) n (%)	f-value
BMI (kg/m^2)				
Mean±SE	24.06±0.49	24.09±0.42	25.79±0.76	3.11*[a]
Not overweight (<24.99)	42 (59.2)	67 (68.4)	12 (40.0)	
Overweight and obese (g" 25.00)	29 (40.8)	31 (31.6)	18 (60.0)	
Waist circumference (cm)				
Mean±SE	79.83±1.17	79.46±1.00	82.79±1.81	1.33
Not overweight (<24.99)	61 (85.9)	84 (85.7)	23 (76.7)	
Overweight and obese (g" 25.00	10 (14.1)	14 (14.3)	7 (23.3)	

Mean was adjusted for age and gender. 1= Males≤102 cm; Females≤88 cm, 2 = Males>102 cm; Females>88 cm* p<0.05.
[a]Significant difference between over-estimate and accurate groups. Source: Yong *et al*. (2009).

Table 3: Diet-related psychosocial factors by dietary fat accuracy groups

Diet-related psychosocial factors	Mean±SE Under-estimate (n =72)	Accurate (n= 100)	Over-estimate (n = 30)	f-value
Perceived risk	8.51±0.27	8.47±0.23	9.21±0.42	1.27
Intention to change	4.05±0.14	3.88±0.12	3.72±0.21	0.97
Outcome expectancies	19.72±0.46	19.09±0.39	19.08±0.72	0.59
Perceived barriers	14.77±0.41	16.21±0.35	15.20±0.64	3.67*[a]

Mean was adjusted for age, gender and BMI (*p<0.5).
[a] significant difference between under-estimate and accurate groups. Source: Yong *et al*. (2009).

Table 4: Status of sugar and salt intake by sex

Status of intake	Men (%) (n = 45)	Women (%) (n = 55)
Sugar		
High consumers	0	5.5
Moderate consumers	75.6	63.6
Low consumers	24.4	30.9
Salt		
High consumers	0	0
Moderate consumers	35.6	45.5
Low consumers	64.4	54.5

Source: Karim and Kather (2003)

Table 5: Blood parameters (mean±std dev) by sex

Blood parameters	Men (%) (n = 45)	Women (%) (n = 55)	All (n = 100)
Glucose (mmol/l)	5.04±1.60	4.86±2.10	4.94±1.88
Cholesterol (mmol/l)	5.06±1.22	4.90±1.34	4.97±1.29
Systolic (mm Hg)	127.69±13.60	127.42±17.54	127.54±15.82
Diastolic (mm Hg)	85.87±7.97	83.53±9.50	84.58±8.88

Source: Karim and Kather (2003)

(60%) compared to under-estimators (40.8) and accurate estimators (31.6%). However, there was no significant difference in adjusted mean waist circumference among the dietary fat accuracy groups.

Table 3 shows the adjusted mean differences of diet-related psychosocial factors by dietary fat accuracy groups. It was found that there were no significant differences in perceived risk, intention to change and outcome expectancies among the dietary fat accuracy groups. However, adjusted mean perceived barriers differed significantly among the dietary fat accuracy groups, with accurate estimators and under-estimators having the highest and lowest perceived barriers to reduce fat intake (F = 3.67, p<0.05), respectively.

Another study by Karim and Kather (2003) attempted to assess nutritional status and food habits of middle-aged adults in Malaysia. The study evaluated the level of sugar and salt intake by the respondents using a questionnaire. Scores were calculated and the respondents were categorized according to levels of intake i.e., either into high, medium or low consumers of sugar and salt (Table 4). The findings show that the majority of the respondents (76% of men and 64% of women) consumed sugar moderately. It was also found that a significantly lower portion (6%) of women and no men were high consumers of sugar. On the other hand, the greater portion of men and women (64 and 55%, respectively) were found to be the low consumers of salt. Approximately 36 and 45% of men and women respectively were categorized as moderate consumers of salt while none of men and women was high consumer of salt.

Blood cholesterol, glucose level and blood pressure: The study by Karim and Kather (2003) also measured the blood cholesterol, glucose level and blood pressure of the respondents. The mean blood cholesterol, glucose and blood pressure of the respondents are shown in Table 5. The findings show that the mean glucose levels of men and women were 5.04±1.60 and 4.86±2.10 mmol/l, respectively and no significant difference was found between sexes. The mean cholesterol levels of men and women were 5.06±1.22 and 4.90±1.34 mmol/l, respectively. It was also found that mean Systolic Blood Pressure (SBP) was 127.54±15.82 and Diastolic Blood Pressure (DBP) 84.58±8.88 for the entire cohorts. However, mean SBP

Table 6: Blood parameters (mean±std dev) by age and sex

Blood parameters	Men	Women
Glucose (mmol/l)		
40-49 years	5.29±1.09	4.49±1.77
50-59 years	4.82±1.68	5.08±3.02
>60 years	4.55±3.17	5.69±1.23
Cholesterol (mmol/l)		
40-49 years	5.92±1.17	4.72±1.22
50-59 years	5.21±1.32	4.35±1.21
>60 years	5.25±1.39	4.80±1.82
Systolic (mm Hg)		
40-49 years	126.00±10.80	119.23±11.85
50-59 years	127.73±14.16	136.30±18.30
>60 years	136.00±23.02	136.20±19.49
Diastolic (mm Hg)		
40-49 years	86.24±7.90	80.71±9.00
50-59 years	83.87±7.90	88.07±6.75
>60 years	90.00±7.07	86.00±11

Source: Karim and Kather (2003)

of both men and women was almost similar (127.69±13.60 for men, 127.42±17.54 for women) while mean DBP was higher for men (85.87±7.97) than for women (83.53±9.50). Lam and Khor (1997) also found almost similar findings among the cardiovascular patients in Kuala Lumpur, Malaysia. However, in line with these studies (Suzana *et al*., 1993) revealed that the mean blood cholesterol, glucose and blood pressure were comparatively higher among the elderly people in Tg karang, Malaysia.

Table 6 shows the mean blood cholesterol, glucose and blood pressure of the respondents according to age of the respondents. The analysis showed that there was an increase in mean glucose levels with age among the women. However, the opposite scenario was observed among the men. Analysis of blood pressure according to age groups demonstrated an increasing systolic blood pressure with age for both male and female cohorts. However, no specific trend was observed for the diastolic blood pressure in either male or female cohort. The pattern of increasing blood pressure with age was also observed among the rural community in Raub, Malaysia (Norimah *et al*., 2001). The study also found that prevalence of hypertension tended to increase with higher BMI and WHR. However, the study revealed a significant but weak correlation between BMI and systolic ($r = 0.39$, $p<0.05$) and diastolic ($r = 0.20$, $p<0.05$) blood pressure. Individual systolic and diastolic blood pressures of the respondents indicated that the majority of them, whether men or women, had normal diastolic blood pressure for all age groups in the entire cohort. However, there were more men (40%) who had high systolic pressure in the age group of 60-years old as compared to women (20%) in the same age group.

Conclusion: Studies demonstrate that proper nutrition of a person depends on taking exact amount of food. In other words, there is an intimate relationship between food intake and nutritional status of the people. Taking improper amount of food is the principal cause of mal-nutrition which ultimately results in ill-health. In this case, excessive food intake causes overweight and obesity while taking too low amount of food results in under nutrition. Studies found that the persons who over estimate their dietary fat intake has significantly higher adjusted mean BMI (25.79±0.76) than accurate estimators (24.09±0.42) or under-estimators (24.06±0.49). Moreover, the group of over-estimators has the highest proportion of overweight and obese (60%) compared to under-estimators (40.8) and accurate estimators (31.6%). It was also found that prevalence of hypertension tends to increase with higher BMI. The adjusted mean waist circumference (WC) is also comparatively higher among the persons who over estimate their dietary fat intake. Studies also revealed that the mean blood cholesterol, glucose level and blood pressure are comparatively higher among the elderly people in Malaysia. These findings suggest that dietary food intake affects nutritional status and consequently physical well-being of the people. Therefore, future research is very much needed at both household and national level for further understanding the relationship between dietary food intake and nutritional status of the people in the country.

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REFERENCES

Arredondo, E.M., J.P. Elder, G.X. Ayala, D. Slymen and N.R. Campbell, 2006. Association of a traditional vs shared meal decision making and preparation style with eating behaviour of go Hispanic women in San Diego Country. J. Am. Dietetic Assoc., 106: 38-45.

Azmi, M.Y., R. Junidah, A. Siti Mariam, M.Y. Safiah, S. Fatimah, A.K. Norimah, B.K. Poh, M. Kandiah, M.S. Zalilah, W.M. Wan Abdul Manan, M.D. Siti Haslinda and A. Tahir, 2009. Body Masss Index (BMI) of Adults: Findings of the Malaysian Adult Nutrition Survey (MANS). Malaysian J. Nutr., 15: 97-119.

Bogers, R.P., J. Brug, P. Van Assema and P.C. Dagnelia, 2004. Explaining fruit and vegetable consumption: the theory of planned behaviour and misconception of personal intake levels. Appetite, 42: 157-166.

Department of Statistics, Malaysia, 2006. Available at: http://www.statistics.gov.my/English/frameset_keystats.php

Ismail, M.N., S.S. Chee, H. Nawawi, K. Yusoff, T.O. Lim and W.P.T. James, 2002. Obesity in Malaysia. Obesity Rev., 3: 203-208.

Karim, N.A. and H.M.M. Kather, 2003. Nutritional Status and Food Habits of Middle-aged Adults in Selected Areas of Selangor. Malaysian J. Nutr., 9: 125-136.

Lam, Y.L. and G.L. Khor, 1997. Faktor risiko di kalangan pesakit jantung koronari di Institut Jantung Negara, Kuala Lumpur. Malaysian J. Nutr., 3: 103-106.

Ministry of Health, Malaysia (MOH), 2004. Ministry of Health, Malaysia Annual Report, 2004, Pages: 5.

Mohamad, W.B., N. Mokhtar, M. Mafauzy, B.E. Mustaffa and M. Musalmah, 1996. Prevalence of obesity and over-weight in North eastern Peninsular Malaysia and their relationship with cardiovascular risk factors. Trop. Med. Public Health, 27: 339-342.

Moy, F.M., Atiya Ab Sallam and M.L. Wong, 2008. Framingham Risk Scores and Anthr opometric Measurements in Predicting Cardiovascular Risks among Malay Men. Malaysian J. Nutr., 14: 57-63.

Narayan, K.A. and Khan Abdul Rashid, 2007. Body mass index and nutritional status adults in two rural village in Northern Malaysia. Malaysian J. Nutr., 13: 9-17.

Norimah, A.K., A. Fatimah, M.N. Ismail, H. Nawawi, R. Khan, M.N. Idris, M.S. Nurzakiah and K. Yusoff, 2001. Risk factors associated with hypertension among among Malays in Malaysia. Book of Abstract. 2nd Congress of Asian-Pacific of Hypertension, Puttaya Thailand, Pages: 54.

O'Brien, A., E. Fries and D. Bowen, 2000. The effect of accuracy of perceptions of dietary-fat intake on perceived risk and intentions to change. J. Behav. Med., 23: 465-473.

Park, K., 2000. Parks Textbook of Preventive and Social Medicine. 16th Edn., M/S Banarsidas Bhanot Publishers, India.

Popkin, B.M. and C.M. Doak, 1998. The Obesity epidemic is a worldwide phenomenon. Nutr. Rev., 56: 106-114.

Suzana, S., A. Fatimah and M.N. Idris, 1993. Energy intake and diet composition in relation to body weight in adults at low-cost housing estate area in sub district of Tg. Karang, Selangor. Proc. Nutr. Soc. Malaysia, 8: 119-124.

The Third National Health and Morbidity Survey (NHMS III), 2006. Ministry of Health Malaysia.

World Health Organization (WHO), 1998a. Obesity: Preventing and Managing the Global Epidemic. Report of a WHO Consultation on Obesity. Geneva.

World Health Organization (WHO), 1998b. World Health Organization Global Database on BMI. Available at: http://www.who.int/nutrition/database/en/;access10/03/2013.

Yong, H.Y., M.S. Zalilah and L.D. Yap, 2009. Relation of Dietary Fat Intake Perception to Nutritional Status and Psychosocial Factors. Malaysian J. Nutr., 15: 195-204.