

## Research Article

# Food consumption among overweight and obese working Malay women in urban settings

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## ABSTRACT

**Background:** The Malaysian Dietary Guideline 2010 (MDG) helps Malaysian to objectively estimate their food consumption. This study looks into the type of food consumed in a group of overweight and obese Malays women and the influences of their socio demographic characteristics.

**Methods:** This cross-sectional study was conducted among 140 Malay women with body mass index (BMI)  $\geq 25.0$  kg/m<sup>2</sup>, working in public offices in two urban areas in Malaysia. Their food consumption was monitored using a 7-day self-administered food diary developed based on MDG 2010. The mean numbers of servings were compared to the servings recommended in the MDG 2010 for women who were not physically active, and then the association with socio demographic characteristics was tested using independent t test.

**Results:** Their food consumption compared to MDG recommendations were as follows: 79.8% for carbohydrate, 24.8% for vegetables and fruits, 112.5.0% for protein and 124.0% for milk and dairy products. The consumption of fruits and vegetables was higher in the higher education group ( $P=0.03$ ), of protein was higher in the high income group ( $P=0.02$ ) and of milk and dairy product was higher in the younger age group ( $\leq 40$  year old) ( $P=0.05$ ).

**Conclusions:** Their consumption of protein and dairy product was higher but the consumption of carbohydrate and vegetables and fruits, was lower than the recommended quantity. The type of food consumption was influenced by respondents' education level, income and age group.

**Keywords:** Type of food consume, Food diary, Overweight and obese

## INTRODUCTION

Persistent energy excess leads to overweight and obesity. One of the most common causes of this continuing energy imbalance is excessive food consumption. Since different types of food contribute to different amount of energy, advising the right type and amount would help in dieting efforts to reduce weight. Thus, many guidelines were developed for this purpose and the recent guideline developed for Malaysian was the Malaysian Dietary Guideline 2010 (MDG) by the Ministry of Health, Malaysia.<sup>1</sup> The MDG helps Malaysian to estimate the quantity of food according to food groups. This guideline

could help the public estimate their current food consumption and adjust it according to the allowable quantity appropriate for their age group and level of physical activity.

Studies have shown that the consumption of some types of food is associated with either weight gain or weight loss efforts. For example, increase in carbohydrate consumption was found to be associated with increased weight.<sup>2-4</sup> On the other hand, increased consumption of vegetables and fruit was associated with weight reduction efforts.<sup>5,6</sup> High protein diet was promoted as a weight reduction diet regime because protein was found to

induce sustained reduction in appetite.<sup>7</sup> High intake of plain milk was found to be associated with lower the risk of obesity among adult Indian.<sup>8</sup> However, the association of dairy product consumption with weight depends on the type of dairy product and the body weight. Whole milk and sour milk were found to be inversely associated with weight gain among normal weight middle age Swedish women, but no association with other type of dairy product (low fat, medium fat milk, butter and cheese) or among other underweight or overweight women.<sup>9</sup>

Studies have also shown that the trend of food consumption varied with gender, locality and social class. A nutrition survey in Malaysia showed that the consumption of protein such as chicken and egg was higher among men than women, while the consumption of full cream milk was higher among women than men.<sup>10</sup> Another Malaysian study showed that those in the rural areas consumed more vegetable than those in the urban but those in the urban consumed more fruits than those in the rural.<sup>11</sup> A systematic review of studies in Europe showed that people in low socioeconomic groups were less likely to consumed healthy food such as fresh fruits and vegetables, meat and fish, and whole grain and another study in Ireland showed that economically disadvantaged women (unemployed/low occupation social class/low formal education) tend to consumed higher fat, saturated fat and refined sugar compared to economically non-disadvantaged women.<sup>12,13</sup>

In a nutshell, those who are overweight and obese need know the sources (or types/categories) of food that had consistently caused their energy excess. This study aims to determine the trend of food consumption among a group of overweight and obese Malay women working in public sector in urban areas by using the MDG to estimate food quantity.

## METHODS

This cross sectional study was carried out in July 2011 among 140 overweight and obese Malay women working in public sector. The public offices were randomly selected from a sampling frame of 28 public offices in urban areas in two states in Malaysia. The inclusion criteria were Malay women with body mass index (BMI)  $\geq 25.0$  kg/m<sup>2</sup>, working at the selected offices. Their body weight was measured using TANITA weighing machine and their height using SECA body meter. Respondents were then briefed on the Malaysia Dietary Guideline (MDG) and were taught on how to estimate their daily food consumption.

They were then taught to note down the quantity of food that they consumed for a week in a 7-day self-administered food diary. The self-administered food diary consisted of 2 types of tables. First was a summarized table consists of a list of common Malaysian food according to food groups and explanations of how to estimate the quantity of 1 serving for each type of food.

The respondents refer to this table in order to estimate the quantity of their daily food consumption. Second are tables to note down their daily food quantity consumption (based on their estimation) for 7 consecutive days. The rows in these tables were the 4 food groups (carbohydrate, vegetables and fruits, protein; and milk and dairy products) assessed and the columns were meal times (breakfast, morning tea break, lunch, evening break, dinner and supper). The unit used was number of servings. The food diaries were collected at the end of the 7 days. It was totalled and mean per day for each group of food was calculated.

Data analysis was carried out using IBM SPSS version 21.0. The mean number of servings per day (according to food groups) of the respondents was calculated and compared to the recommended number of servings (according to food groups) in the MDG for women who were not active physically. The respondents' socio-demographic and socioeconomic characteristics (age, having child/children, education level, employment position and household income) were categorized into 2 categories. The independent t test was used to compare the means differences of number of servings of food consumption (according to food groups) between the 2 categories.

## RESULTS

Table 1 shows the distribution of respondents according to their socio-demographic and socioeconomic characteristics. Most of the respondents were 40 years old or less (57.9%), have children (72.95%), from the low education group (formal education up to secondary school) (66.4%), held clerical positions (75.0%) and with high household income (RM 2500 or more) (60.0%).

**Table 1: The socio-demographic and socioeconomic characteristic of the respondents (N=140).**

Variable	n (%)
<b>Age</b>	
≤ 40 year old	81(57.9)
>40 year old	59(42.1)
<b>Child/children</b>	
No	38(27.1)
Yes	102(72.9)
<b>Education level</b>	
Low (≤secondary school)	93(66.4)
High (tertiary education)	47(33.6)
<b>Employment position</b>	
Clerical	105(75.0)
Officer	35(25.0)
<b>Income (RM)</b>	
Low (<RM2500)	56(40.0)
High (≥RM 2500)	84(60.0)

Table 2 show that the mean number of servings consumed by the respondents according to the food

groups. The quantity of carbohydrate, vegetable and fruits, protein and milk & dairy product consumed were 3.15 (1.02), 2.08 (1.03), 2.25 (0.97) and 1.24 (0.86) servings per day, respectively. Compared to the recommended daily servings in the Malaysian Dietary 2010 for women who were not physically active, the percentage for carbohydrate was 79.8% ( $3.15/4.00 \times 100$ ), for vegetable and fruits was 24.8% ( $1.24/5.00 \times 100$ ), for protein was 112.5.0% ( $2.25/2.00 \times 100$ ) and for milk and dairy products was 124.0% ( $1.24/1.00 \times 100$ ).

Table 3 shows that there were no significant differences in the quantity of carbohydrate consumed according to all socio-demographic and socioeconomic characteristics. However the quantity of fruits and vegetables consumed was higher in the high education group compared to low education group ( $P=0.03$ ), the protein consumed is higher in the high income group compared to low income group ( $P=0.02$ ) and the amount of milk and dairy products consumed is higher in the younger age group ( $\leq 40$  year old) compared to the older age group ( $>40$  years) although it is not statistically significant ( $P=0.05$ ).

**Table 2: The mean total number of servings for carbohydrate, vegetables & fruits, protein and milk & dairy product consumption per day and their percentages compared to the recommended number of servings in the Malaysian Dietary Guideline 2010 (MDG 2010) for women who are not physically active (N=140).**

Food groups	Mean (SD)	MDG 2010 recommendations	% from the recommendation
Carbohydrate	3.15 (1.02)	4	79.8
Vegetables & fruits	2.08 (1.03)	5	24.8
Protein	2.25 (0.97)	2	112.5
Milk & dairy product	1.24 (0.86)	1	124.0

**Table 3: Mean total number of carbohydrate, vegetables & fruits, protein and milk & dairy product consumed per day according to socio-demographic and socioeconomic characteristic. (N=140).**

Respondent's characteristics	Carbohydrate		Vegetables & fruits		Protein		Milk & dairy product	
	Mean (SD)	P <sup>a</sup>	Mean (SD)	P <sup>a</sup>	Mean (SD)	P <sup>a</sup>	Mean (SD)	P <sup>a</sup>
<b>Age</b>								
$\leq 40$	3.15(1.08)	0.98	2.02(1.03)	0.37	2.16(1.03)	0.24	1.36(0.94)	0.05
$>40$	3.16(0.93)		2.18(1.03)		2.36(0.89)		1.07(0.73)	
<b>Child/children</b>								
No	3.16(1.04)	0.95	2.15(1.10)	0.23	2.28(0.98)	0.48	1.25(0.91)	0.73
Yes	3.15(0.96)		1.91(0.78)		2.15(0.96)		1.19(0.74)	
<b>Education level</b>								
Low	3.17(0.93)	0.80	1.95(0.92)	0.03*	2.18(0.87)	0.27	1.15(0.81)	0.09
High	3.12(1.19)		2.35(1.17)		2.37(1.15)		1.41(0.95)	
<b>Employment position</b>								
Clerical	3.16(1.04)	0.92	1.99(0.95)	0.06	2.19(0.99)	0.23	1.21(0.83)	0.52
Officer	3.14(0.97)		2.37(1.19)		2.42(1.17)		1.32(0.96)	
<b>Income (RM)</b>								
Low	3.03(1.03)	0.25	1.95(0.87)	0.23	2.00(0.78)	0.02*	1.31(0.95)	0.40
High	3.23(1.01)		2.17(1.11)		2.41(1.06)		1.19(0.81)	
<sup>a</sup> Independent t test, significant $P < 0.05$								

## DISCUSSION

The amount of carbohydrate consumed by the respondent was only 79.8% of the recommended servings for women who is not physically active (i.e. 3.15 (1.02) instead 4 servings per day). Therefore the source of surplus energy which had caused overweight and obesity among this group of respondents could be from lack of physical

activity or other main source of energy such as protein. The pattern and extend of physically activity was not studied in this study, however the amount of protein consumed by the respondents in this study was 112.5%, more than the recommended number of servings (i.e. 2.25(0.97) instead 2 servings per day). The trend of increasing protein (especially from meat and poultry products) and decreased carbohydrate consumption

(especially in cereal and grain products) is observed globally and this nutrition transition is reported in the national food balance sheet. Although this transition is not equal across the globe but significant changes were observed in many countries including in Asia, even in the low obesity prevalence country such as Korea. Food survey in Korea showed high animal food product consumption and decreasing traditional high grain diet consumption. The possible explanation for this phenomenon was the influence of western culture including food culture and also the similarity of current occupation in Korea to the occupation in the west, where the demand to be involve in long hours promotes fast food consumption or packed food which consist of mainly protein from meat and poultry product.<sup>14</sup>

This study was carried out among public servants in urban area. The low carbohydrate but high protein consumption among the respondents in this study is also consistent with the changing trend in food consumption among Malaysian especially among urban dwellers. Nutrition survey among adults showed that those in urban consumed lower carbohydrate than those in rural and in another survey show that those in urban consumed more protein than those in rural areas.<sup>10,15</sup> The difference in the trend of carbohydrate and protein consumption according to dwelling place could be influenced by other socio-demographic characteristics as well. However, further analysis of the findings of this study showed that there were no significant difference in the quantity of carbohydrate consumed according to age, having child/children, education level, employment position and income. This could be because carbohydrate such as rice and bread are staple food which is consumed by all in Malaysia regardless socio-demographic or socioeconomic background. Nevertheless, the quantity of protein consumed among this group of respondents was significantly higher among those in the higher income (RM 2500 and above) group than those in the lower income group (RM less than RM 2500). This difference according to income is consistent with findings of other studies which show strong positive relationship between the level of income and the consumption of animal protein and, in general, urbanization is one of an important drive to elevation of income and enhanced the purchasing power.<sup>16</sup>

The amount of vegetable and fruits consumed among the respondents in this study was only 24.8% of the recommended servings (i.e. 2.25 (0.97) instead of 5 servings per day). The low vegetable and fruits consumption among Malaysia was observed in a few other studies. It was reported that 50.0-85.5% Malaysian did not met the vegetable and fruits recommendations.<sup>11,17</sup> This study did not analyse the consumption of vegetables and fruits separately, however in a survey in 2002 among Malaysian adult showed that only the median of vegetable consumption did not meet WHO requirement while the median of fruits consumption did meet WHO requirement.<sup>11</sup> Nevertheless, the observed low

consumption of vegetables and fruits need to be highlighted in general and more so among overweight and obese persons as this study population. The low vegetables and fruits consumption could results from lack of knowledge or awareness of the recommended number of servings in MDG 2010. Further analysis showed that although the overall amount vegetables and fruits consumption was low but it was higher among those with high education compared to those with low education. This was also the finding of other studies and it could be contributed by a few possible reasons. First, vegetable and fruits consumption was associated with better health status and the health seeking behaviour is more pronounced among those who are more educated, thus in the context of this study, it could be the reason the consumption of vegetables and fruits are higher among those in the high education group.<sup>13,18-20</sup>

Second, indirectly those with higher education normally earned higher salary compared to those with low education and in urban settings such as in this study, the vegetables and fruits are far from the primary source (which is normally in rural), therefore the cost transportation of fruits and vegetables could have increased the price and thus became an economical barrier to those with low income.

Finally the amount of milk and dairy products consumed by the respondents was 124.0% of recommended servings (i.e 1.24 (0.86) vs 1 serving per day). This could be because the respondents in this study were women and consumption of full cream milk is higher among women.<sup>10</sup> Moreover, since the respondents were women, there could be more awareness about the encouragement to consume milk to prevent osteoporosis. Further analysis show even though not statistically significant ( $P=0.05$ ), the quantity of milk and dairy product was higher among those in age group 40 and below compared to age group above 40; and also more among those with higher education level compared to those with low education level ( $P=0.09$ ). Although milk and dairy product are not the sole sources for calcium but there is a survey about calcium intake with similar observation, the intake was highest for age group 20-29 and 30-39 years old but then reduced for age group 40-49, and also reported that increase intake was observed with higher level of education.<sup>15</sup>

## CONCLUSION

In summary, eating a variety of food was practiced but the consumption of protein and milk dairy products was in excess and the consumption of vegetables and fruits were deficient. There is a disparity between socioeconomic classes. Therefore, efforts to control overweight and obesity should include discouraging excess protein consumption and enhancing vegetable consumption. The program should be simple and affordable to ensure sustainability and effectiveness across all socioeconomic class.



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