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Nutritional Status and Eating Practices Among Children Aged 4-6 Years Old in Selected Urban and Rural Kindergarten in Selangor, Malaysia

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ABSTRACT

Nutritional status and eating practices varies among urban and rural area because there are differences in environment and socioeconomic status. This cross-sectional study was aimed to compare and investigate the relationship between the nutritional status and eating practices among children aged 4-6 years old in urban and rural area in Selangor, Malaysia. 142 children from urban (n = 100) and rural (n = 42) participated in this study. The nutritional status of the subjects were evaluated by assessing their anthropometry values which were weight, height and Body Mass Index (BMI) and later compared with standard growth chart. The diet intake of the subjects were obtained using 3 days diet record and later compared with Malaysian Recommended Nutrient Intake (RNI). The t-test showed, there was a significant differences for weight for age and height for age among children from urban and rural area ($p<0.05$). Prevalence of wasting was higher among rural children (31%) than urban children (22%). Two-way ANOVA test showed that there were significant differences in nutrient intake between children from urban and rural area ($p<0.05$) with calorie intake among rural children higher (23%) than RNI, higher protein intake among urban (114%) and rural (165%) than RNI, calcium intake were lowered than RNI for urban (35%) and rural (17%). There was also a positive relationship between children' BMI with fast food intake ($r = 0.274$, $p<0.05$) and eating out ($r = 0.207$, $p<0.05$). As a conclusion, rural children had higher prevalence of undernutrition compared to the urban children but the prevalence of obesity were same in both areas.

Key words: Nutritional status, eating practices, kindergarten children, urban, rural

INTRODUCTION

Nowadays, most of the children around the world are at risk of being overnourished. De Onis *et al*. (2010) stated that 43 million children from 35 developing countries were overweight or obese in 2010. This condition becomes one of the main issue to be overcomed around the world. But for underweight, the situation is likely to decrease to 17.6% in 2015 (De Onis *et al*., 2007). This situation also is occurring in Malaysia as more children are becoming obese and overweight and the prevalence of underweight has decreased. A study done by Khor *et al*. (2009) found that 3.4% from 21000 Malaysian children below than 5 years old were overweight, using the data from Third National Health Morbidity Survey (NHMS) 2006. However, from the Second NHMS in 2000,

the prevalence of overweight was only 2.4%. Unfortunately, the study did not look into the prevalence of malnutrition among the children from the urban and rural area.

Bharati *et al.* (2009) found that the urban preschool children in India had a better growth and nutritional status compared to the rural preschool children. A study done by Firestone *et al.* (2011) reported that the urban children in Thailand had higher prevalence of obesity compared to the children from the rural area. This is because the children from the urban area had better socioeconomic status, sanitation and television coverage which can influence their eating practices. Another study done by Hodgkin *et al.* (2010) concluded that the urban children in New Zealand had higher prevalence of overweight and obesity compared to the rural children.

On the other hand, the incidence of thinness among rural children in West Bengal was in chronic condition (Biswas *et al.*, 2009). The study found that the frequency of thinness becomes higher with the increase of age until the children aged 5.5 years old. A study done by Hien and Kam (2008) stated that maternal, socio-economic and environmental factors were major factors that caused malnutrition among children in rural Vietnam. This is supported by Kanjilal *et al.* (2010) that reported that the incidence of malnutrition among children in India were significantly cause by the socioeconomic factor.

Huynh *et al.* (2008) reported that the preschool children in Ho Chi Minh city consume more calories from fat and protein. As a result, a lot of the preschool children there were at risk to become obese. Another research done by Smith *et al.* (2005) stated that child eating practices is better in urban areas rather than rural areas because they have better feeding practices especially the greater diversity of complementary foods that lead to the higher energy and micronutrient intakes.

There are several factors that can influence children's eating practices. Parents are one of the factors that play an important role for the development of their children. Study done by Vereecken and Maes (2010) found that child eating practices were influence by their mothers nutritional knowledge and attitude. This is supported by a study done by Matheson *et al.* (2006) that reported that the parenting attitudes had an influence to the children's weight and dietary intake. Another study done by Khandare *et al.* (2008) discovered that health status of the mothers, dietary and socioeconomic factors can influence the nutrient intake among children.

Chang *et al.* (2010) reported that low nutritional status in childhood can affect the brain development that control the fine motor functions. This effect can be seen after several years of undernutrition. Furthermore, the poor nutritional status of the children also can become a risk for them to develop a disease in their later life. Salonen *et al.* (2009) stated that most of the obese adults that had metabolic syndrome were found to have lower weight and BMI during their childhood aged compared with those who did not develop the syndrome.

A lot of studies found that the prevalence of malnutrition were higher in the rural area compared to the urban area because of the differences in socioeconomic status. Hence, this worrying condition has lead to one of the objective of this study to investigate the prevalence of malnutrition among the urban or rural children in Selangor, Malaysia. These two settings will be compared because the environment in urban and rural area is different and it can affect the children's eating practices.

MATERIALS AND METHODS

This research is a cross-sectional study that which was carried out in selected urban and rural kindergarten in Selangor, Malaysia. Using a formula by Krejcie and Morgan (1970), 163

participants (n = 163) after 20% drop out were needed in this study. However, only 142 participants (n = 142) based on inclusion criteria were recruited and assigned into two groups which are urban (n = 100) and rural (n = 42). Inclusion criteria were day-care nursery children (from 8 am-5 pm), children in selected urban and rural kindergarten, 4 to 6 years old children and free from any medical disorder such as asthma, cleft palate/ lips, congenital heart failure, inborn error, diabetes mellitus and kidney diseases. Children were excluded in this study if they were less than 4 years old or more than 6 years old, having chronic disease such as asthma, tuberculosis, diabetes and heart problems over 3 months prior to the study, children following special diet because of medical reason, children who are not registered at the selected kindergarten and children who were sent to baby sitter.

Six kindergartens from urban area and three kindergartens from rural area were selected by using convenient sampling method while the subjects were selected by using simple random sampling. Kindergarten children were used as subjects because it is easier to get the intended participants which are children aged four to six years old as they are still developing physically and mentally during this stage. In addition, the children are able to feed themselves during these years. Besides that, the Malaysian Recommended Nutrient Intake (RNI) also have describe the suggested nutrient intake of children in this group of age and this information can be used to compare with the results obtained from this study.

The guardians of the children from both groups were given consent forms before any data collection begin which are on 13th June 2011 until 18th July 2011. All of the kindergartens were visited during this period of time for anthropometry measurements. The anthropometric measurements were taken three times and following standard protocol (Lee *et al.*, 2009). Anthropometry measurement taken were weight, height and Body Mass Index (BMI). The instruments that were used for anthropometry measurements were SECA digital weighing scale, stadiometer as well as measuring tape. WHO (2006) growth chart and CDC 2000 growth chart were used to compare the differences in the prevalence of malnutrition among the children from the urban and rural area from both growth chart.

For measuring weight, the children were asked to stand straight in the middle of the scale's platform without touching anything and the eyes are is looking at the horizontal line. Besides that, for height measurement, the subjects were asked to stand straight and look straight in a Frankfurt horizontal plane while the top of the stadiometer was lowered to the top of the head (Lee *et al.*, 2010).

A questionnaire in Malay version that was modified from several studies was used to collect the data. The questionnaire basically asked about the demographic information, knowledge of the guardian about the eating practices of the children and also the practice and attitude towards the eating practices.

There were 29 questions about the demographic information of the participants and their parents that were modified from USAID (2008), Karim and Kheng (2000), Lian *et al.* (2007) and CDC (2009). Children dietary habit questions were modified from Rosas *et al.* (2011) and Taylor *et al.* (2011). A modified version of parental feeding practices questions created by Musher-Eizenman and Holub (2007) were used to measure parental feeding practices.

The 3 days diet records of the children's food intake also were included in the questionnaire. The guardians were given a standard household measurements figure as well as example on how to record their children food intake. Two days in weekdays and 1 day in weekend were included in 3 days diet record. The researcher obtained the children's intake while they were at kindergartens

and the rest was fulfilled by their mothers. The questionnaire was collected a week after distribution.

The research data were being analyzed by using SPSS (Statistic Package for the Social Sciences) version 17.0. In order to compare the effect of multiple levels of two factors which are urban and rural, two way analysis of variance (ANOVA) test was conducted. A correlation test was conducted to see any relationship between BMI and eating practices. On the other hand, t test were conducted to find any significant difference among the urban and rural children in the dietary intake and anthropometry status.

RESULTS

Demographic data: Table 1 shows demographic profile of urban and rural children. In this study, 142 subjects (n = 142) completed and returned the questionnaires. It appeared that 52.8% (n = 75) of participants were male while 47.2% (n = 67) were female. 70.4% (n = 100) of the participant lived in the urban area in Selangor while 29.6% (n = 42) lived in the rural area.

Majority of the participants were Malay with 90.8% (n = 129), while 4.9% percents (n = 7) were Chinese and 4.2% (n = 6) Indian. On the other hand, most of the participants were Muslim with 91.5% (n = 130), 4.9% (n = 7) were Buddhist and only 3.5% (n = 5) were Hindu.

Table 1: Demographic profile of urban and rural children (total sample, n = 142)

Parameters	No.	Percentage
Gender		
Male	75	52.8
Female	67	47.2
Location		
Urban	100	70.4
Rural	42	29.6
Ethnics		
Malay	129	90.8
Chinese	7	4.9
Indian	6	4.2
Religion		
Muslim	130	91.5
Hindu	5	3.5
Buddhist	7	4.9
Children's age		
4 years old	21	14.8
5 years old	56	39.4
6 years old	65	45.8
Average household income		
RM500-RM1000	15	10.6
RM1001-RM2000	14	9.9
RM2001-RM3000	15	10.6
RM3001-RM4000	13	9.2
RM4001-RM5000	9	6.3
RM5001-RM6000	19	13.4
RM6001-RM7000	17	12.0
RM7001-RM8000	20	14.1
>RM8000	19	13.4

Besides that, 14.8% (n = 21) of the participants were aged 4 years old, 39.4% (n = 56) were aged 5 years old while 45.8% (n = 65) were aged 6 years old and appeared to be majority of the participants. The highest household income was RM7001-RM8000, 14.1% (n = 20) were in this category while the lowest was RM4001-RM5000 which is about 6.3% (n = 9) were in this category.

Prevalence (%) of severe underweight, underweight, overweight, obese, severe stunted, stunted, severe wasting and wasting among urban and rural children according to WHO (2006) and CDC 2000 growth chart: Table 2 shows prevalence of severely underweight, underweight, normal, overweight, obese, severe stunted, stunted, severe wasting and wasting in urban and rural area according to WHO and CDC growth charts. For weight for age, according to WHO growth chart, 33.3% children (n = 14) in rural area and 15% (n = 15) in urban area were severely underweight. Meanwhile, 26.2% (n = 11) of children in rural area and 27% (n = 27) in urban area were recorded as underweight.

For normal weight, there were not much difference in both location when WHO growth chart was used with 39% (n = 39) children from urban area and 31% (n = 13) children from rural area were in this category.

For overweight, 10% (n = 10) from the urban children and 2.4% (n = 1) of the rural children were in this category. The result also showed that 9% (n = 9) were obese children in the urban area and 7.1% (n = 3) children were obese in the rural area.

For BMI for age, higher percentage of children in urban area which are 16% (n = 16) were severely by washed compared to 7.1% (n = 3) of children from rural area when WHO chart was used. For wasting, 31% (n = 13) of the children in rural area were in this category while only 22% (n = 22) children in the urban area were in this category.

For normal BMI, when plotted against the WHO growth chart, 45% (n = 45) of children in urban and 52.4% (n = 22) of children in rural had normal BMI.

Table 2: Percentage of severe underweight, underweight, overweight, obese, severe stunted, stunted, severe wasting and wasting according to WHO 2006 and CDC 2000 growth chart

	WHO		CDC	
Parameters	Urban (%)	Rural (%)	Urban (%)	Rural (%)
Weight for age				
Severe underweight	15	33.3	26	40.5
Underweight	27	26.2	23	14.3
Normal	39	31.0	35	38.1
Overweight	10	2.4	6	0.0
Obese	9	7.1	10	7.1
Height for age				
Severe stunted	10	33.3	12	26.2
Stunted	15	28.6	17	23.8
Normal	71	33.3	67	47.6
Too height for age	4	4.8	4	2.4
BMI for age				
Severe wasting	16	7.1	30	23.8
Wasting	22	31.0	18	47.6
Normal	45	52.4	35	21.4
Overweight	6	4.8	6	2.4
Obese	11	4.8	11	4.8

Table 3: Location and anthropometry indicator

	Urban		Rural		
Anthropometry measurement	N	Mean±SD	N	Mean±SD	p-value
Height for age	100	2.69±0.71	42	2.10±0.93	0.000*
Weight for age	100	2.70±1.12	42	2.24±1.16	0.025*
BMI for age	100	2.74±1.14	42	2.69±0.87	0.802

*p-value<0.05 showed statistically significant difference

There were not much cases recorded for overweight as 6% (n = 6) of children in urban and 4.8% (n = 2) among rural children were in this when using the WHO growth chart. For obese, it showed that 11% (n = 11) of the urban children were obese while in rural area, only 4.8% (n = 2) were obese.

For height for age, higher percentage of children from rural area showed severely stunted with 33.3% (n = 14) compared to urban area with only 10% (n = 10) when WHO chart was used. The result showed that rural children were prone to be stunted with 28.6% (n = 12) while only 15% (n = 15) of children in urban area were stunted.

In urban area, 71% (n = 71) had normal height while in rural only 33.3% (n = 14) of the children had normal weight by using WHO growth chart. For too height for age, 4% (n = 4) children form urban area were too height while in rural 4.8% (n = 2) were too height for age.

Location and anthropometry indicator: Table 3 shows differences between location and anthropometry indicator. An independent sample t-test was conducted to compare the anthropometry status for children from urban and rural area. There were statistically difference for urban (M = 2.69, SD = 0.71) and rural (M = 2.10, SD = 0.93; p = 0.000) for height for age. Same goes to weight for age where there were statistically difference for urban (M = 2.70, SD = 1.12) and rural (M = 2.24, SD = 0.025; p = 0.025).

Eating habits frequency among urban and rural children: Table 4 shows eating habits among urban and rural children. In this study 66% of the children in the urban and 64.3% children from rural area reported to consume fast food such as KFC, McDonald and others only once in two weeks. Most of the children in the urban and rural area in Selangor consume breakfast everyday with 63 and 57.1%, respectively. Moreover, this study found that 32% of the urban and 38.1% of the rural children consumed vegetables everyday. The result from this study showed that some of the parents in urban and rural area control the intake of junk food among their children once a week with 37 and 26.2%, respectively. On the other hand, about 23% children from urban area consume instant noodle once a week while only 14.3% children from rural area consumed it once a week. The chocolate and ice cream intake also were higher among the urban children with 30 and 22% respectively compared to the rural children with 19 and 16.7%, respectively.

Nutrient intake among urban and rural children: Table 5 shows nutrient intake among urban and rural children. By using two-way ANOVA, it had been confirmed that there was a statistically significant main effect for settings in total kcal intake (F (1, 138) = 21.237, p = 0.000); and the effect size was large (partial eta squared = 0.133). Nevertheless, the main effect for sex (F (1,138) = 1.462, p = 0.229) and the interaction effect (F (1, 138) = 0.357, p = 0.551) did not reach statistical significant.

Table 4: Percentage of children's eating practices in urban and rural area

	Percentage (%)											
	Every day		3 times a week		2 times a week		Once a week		Once in two week		Never	
Variables	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
How frequent do you do your child eat fast food (KFC, Mc Donald, Pizza)?	0	0	5	7.1	4	2.4	15	11.9	66	64.3	10	14.3
How frequent do you bring your child eat outside (food stall, restaurant, hotel)?	3	0	8	4.8	15	2.4	26	16.7	44	54.8	4	21.4
How frequent do your child eat breakfast at home?	63	57.1	9	14.3	25	19	1	2.4	0	2.4	2	4.8
How frequent do your child eat green vegetables?	32	38.1	23	21.4	15	19	13	7.1	4	2.4	13	11.9
How frequent do your child eat instant noodle?	0	0	2	4.8	1	0	23	14.3	46	52.4	28	28.6
How frequent do your child eat ice cream?	1	14.3	8	21.4	12	9.5	22	16.7	50	35.7	7	2.4
How frequent do you control your children from consuming junk food?	26	21.4	14	19	13	16.7	37	26.2	9	9.5	1	7.1
How frequent do your child eat chocolate?	2	7.1	7	21.4	14	9.5	30	19	44	42.9	3	0

Table 5: Nutrient intake among children in urban and rural area

Nutrient	Energy (kcal)	Protein (g)	Fat (g)	Carbohydrate (g)	Calcium (mg)	Iron (mg)
Urban						
Boys n = 49 (35%)	1334.14	51.29	47.10	175.71	427.76	12.61
RNI boys	1340	23	30-45		600	6
Girls n = 51 (36%)	1207.31	47.49	41.51	164.04	350.29	11.23
RNI girls	1290	23	29-43		600	6
Total n = 100 (71%)	1269.46	49.35	44.25	169.76	388.25	11.91
Rural						
Boys n = 26 (18%)	1596.08	61.65	59.81	231.61	516.25	15.71
RNI boys	1340	23	30-45		600	6
Girls n = 16 (11%)	1600.69	60.13	60.81	197.13	470.06	15.42
RNI girls	1290	23	29-43		600	6
Total n = 42 (29%)	1597.83	61.07	60.19	218.47	498.66	15.60
F-stat (df)	: 21.237 (1,138)	:15.482 (1,138)	:23.895 (1,138)	:5.432 (1,138)	:8.090(1,138)	:11.65(1,138)
p-value	0.000*	0.000*	0.000*	0.021*	0.005*	0.001*

*p-value<0.05 showed statistically significant difference

Besides that, there was a statistically significant main effect for settings in carbohydrate intake (F (1, 138) = 5.432, p = 0.021); however, the effect size was moderate (partial eta squared = 0.038). The main effect for sex (F (1, 138) = 1.462, p = 0.229) and the interaction effect (F (1, 138) = 0.357, p = 0.551) did not reach statistical significance.

In addition, there was a statistically significant main effect for settings (F (1, 138) = 15.482, p = 0.000); however, the effect size was small (partial eta squared = 0.101) while the main effect

Table 6: Relationship between children's eating practices and BMI

	BMI	
Eating practices	R	p-value
Fast food intake	0.274	0.001*
Eating out	0.207	0.013*
Ice cream intake	0.139	0.098
Chocolate intake	0.049	0.562
Breakfast intake	0.013	0.882

*p-value<0.05 showed statistically significant relationship

for sex (F (1, 138) = 0.829, p = 0.364) and the interaction effect (F (1, 138) = 0.150, p = 0.699) did not reach statistical significance. There was a statistically significant main effect for settings on the intake of Fats (F (1, 138) = 23.895, p = 0.000) and the effect size was large (partial eta squared = 0.148). However, the main effect for sex (F (1, 138) = 0.491, p = 0.485) and the interaction effect (F (1, 138) = 1.015, p = 0.315) did not reach statistical significance.

A two-way between-groups analysis of variance was conducted and found that there was a statistically significant main effect for settings on Calcium intake (F (1, 138) = 8.090, p = 0.005) and the effect size was moderate (partial eta squared = 0.055) but the main effect for sex (F (1, 138) = 2.852, p = 0.094) and the interaction effect (F (1, 138) = 0.182, p = 0.670) still did not reach statistical significance.

Moreover, for Irons, there was a statistically significant main effect for settings on iron intake illustrated by two way ANOVA (F (1, 138) = 11.651, p = 0.001) and the effect size was large (partial eta squared = 0.078). The main effect for sex (F (1,138) = 0.611, p = 0.436) and the interaction effect (F (1, 138) = 0.263, p = 0.609) did not reach statistical significance.

Relationship between eating practices and BMI: Table 6 shows the relationship between eating practices and BMI that were conducted using Pearson product moment correlation coefficient. In this case, WHO BMI for age chart will be used. There is a significant ($p<0.005$), positive correlation ($r = 0.274$) between the fast food intake and children's BMI. Moreover, there is a significant ($p<0.05$) positive correlation ($r = 0.207$) between eating out and children's BMI.

DISCUSSION

Prevalence (%) of severe underweight, underweight, overweight, obese, severe stunted, stunted, severe wasting and wasting among urban and rural children according to WHO (2006) and CDC 2000 growth chart: For weight for age, WHO growth chart gives higher percentage of children who are in the category of underweight in both urban and rural area compared to CDC growth chart. This finding is same with a study done by De Onis *et al.* (2007) that found that the prevalence of underweight will be higher among children when applying the WHO growth chart than CDC growth chart.

On the other hand, the result in this study suggested that children from urban area were underweight rather than overweight. A study done by Maddah *et al.* (2010) showed that most of the children in the urban area in Zahedan, Iran were underweight for both boys and girls. A different study done by Stenhammar *et al.* (2010) found that most of the children in the urban area in Sweden were overweight. Gonzalez-Suarez *et al.* (2009) also found that most of the urban

children in Filipina were overweight and obese. It is supported by a study done by Opara *et al.* (2010) that found that most of the urban children in Nigeria had higher prevalence of underweight and obesity. The difference result between these studies maybe due to the difference in culture, genetics as well as geographical condition.

Besides that, this study also found that the incidence of underweight is quite similar among the rural and urban children. This is in contrast with the study done by Bharati *et al.* (2010) that stated that the prevalence of underweight children in India is high in rural areas among Muslim families with uneducated parents and low standard of living. A study by Avan and Kirkwood (2010) also found that prevalence of underweight is higher among the rural children in Pakistan due to the economic status. According to Rayhan and Khan (2006), the factors that can cause underweight problem among children were birth interval, size at birth, mother's body mass index at birth as well as parents educational level. The result in this study is different from those studies maybe because of these factors that occurred among urban parents in Selangor. Moreover, findings from Bharati *et al.* (2009) also found that the children in urban area are heavier and taller compared to the rural children. This is maybe because of the socioeconomic status and the knowledge of the mother's that provide adequate food to their children. On the other hand, a study done by Ramzan *et al.* (2010) found that boys in Pakistan were two times at risk to become overweight compared to girls.

For BMI for age, the results from this study also suggested that the prevalence of obesity was a little bit higher among the urban children compared to the rural children. This condition is different from a study done by Davis *et al.* (2010) that discovered that the rural children had higher prevalence of obesity. The study also found that, the rural children do not engage in physical activity as much as the urban children. A study done by Mirhosseini *et al.* (2011) found that lower level of physical activity among girls in Iran had higher anthropometric indices, fat mass, fat free mass and metabolic abnormalities compared to girls who involve in physical activity.

For height for age, the incidence of stunting exists among the urban children. This is supported by a study done by Chowdhury *et al.* (2010) that revealed that the incidence of moderate stunting among children in the city of Dhaka is about 38%. The study suggested that the incidence of stunting, wasting and underweight is cause by the habit of the father who smokes around the family members Another research done by Matthew *et al.* (2009) found that 31.7% of children in western Nigeria were severely waster. Based on this study, there is also a lot of stunted condition among the rural children in Selangor. There are maybe several factors that make this condition to appear such as socioeconomic status, environment and others. According to Sereebutra *et al.* (2006), 34.4% of rural children in Guatemala were stunted and the reason that they found that cause this condition were caregiver educational status as well as household size. A different study done by Lee *et al.* (2010) found that stunting among children in Guatemala were associated with poverty as well as maternal short stature. Pourhashemi *et al.* (2007) reported that there is no relationship between the macronutrient intake and stunting.

The prevalence of stunting among the rural children is higher than the urban children. This is supported by Kamal (2011) that found that most of the rural children in Bangladesh were stunted. A different research by Ferreira *et al.* (2008) stated that stunting is associated with wasting among the children in Brazil. This research also found the same condition where the rural children had higher prevalence of stunting and wasting with 28.6 and 31%, respectively compared to the urban children. So, maybe there is relationship between these conditions and further

research should be done to investigate this possible relationship. The condition of stunting among the urban poor and rural children is almost similar as stated by Van de Poel *et al.* (2007). The study found that the condition can become worse because the urban poor have income constraints, price barriers and short of health insurance may limit their accessibility to the health care centre.

Location and anthropometry indicator: From this result, it shows that the children from urban and rural area had different weight and height. This is supported by a study done by Davis *et al.* (2008) that revealed that the rural children were more prone to be overweight while urban children were more often at the category of at risk of overweight. The study discovered that there were maybe environmental and behavioral factors that prevent the children from urban area from becoming overweight. For height for age, Maiti *et al.* (2011) reported that there were differences in height status among school girls in West Bengal, India. The study found that the rural children had lower means of height compared to the urban children. The differences of weight and height among the children from urban and rural area occurred mainly due to their eating practices were different between these two location. Furthermore, research done by Folake Samuel *et al.* (2008) found that environmental factors were associated with the prevalence of undernutrition among the urban children. A different study done by Veghari (2007) found that the girls from the rural area in Gorgan, Iran had a better growth compared to the boys because the girls had a better eating practice.

Frequent eating habits among urban and rural children: In this study, most of the children in the urban and rural area reported to consume fast food such as KFC, McDonald and others only once in two weeks. According to Taveras *et al.* (2006), most of the pre-school children in Boston consume fast food once a week. But, the result is contraindicated with this study mainly because in this study, the urban and rural area had low availability of the fast food outlets. A study done by Jennings *et al.* (2011), found that most of the children in United Kingdom who have fast food outlets in their neighbourhoods were likely to have higher BMI, waist circumference and percentage of body fat compared to children who did not have fast food outlets in their neighbourhood. But a study done by Richardson *et al.* (2011) found that fast food availability was not related with weekly frequency of fast food consumption in rural or low-or high-density urban areas. This is supported by Timperio *et al.* (2008) that stated that access to fast food outlets did not predict the frequency of fast food consumption among children.

On the other hand, most of the children in the urban and rural area in Selangor consumed breakfast everyday. A study done by Wilson *et al.* (2006) found that 84% of the children in New Zealand consumed breakfast everyday and the daily nutrient intake of the children who had breakfast is better compared to does who did not had breakfast. From this study, most of the children in the urban and rural area have a normal BMI according to WHO growth chart. This can be mainly due to consumption of daily breakfast among these children is linked to a healthy body weight because of constant distribution of energy intake across meals in a day (Dubois *et al.*, 2008). A same result also is obtain from the study done by Utter *et al.* (2007) that found that skipping breakfast among the New Zealand children resulted in higher BMI and they are less likely to achieve the minimum consumption of fruit and vegetables.

Moreover, in this study, the children from urban area were likely to consume instant noodles more than the children from rural area in Selangor. This is maybe because most of the mothers of the children in urban area were working and they provided the instant noodle for their children

to eat. Study done by Lee *et al.* (2009) found that the intake of instant noodles among the Korean children can cause excessive intake of sodium and fat. These can cause major health problem the children later in life.

Vegetables intake is important to provide adequate vitamins and mineral. This study found that most of the urban and rural children consume vegetables everyday (Robinson-O'Brien *et al.*, 2009) stated that intake of vegetables and fruits among children increase because of the availability of fruits and vegetables in their house, parent's encouragement and family meal frequency that influence them to eat fruits and vegetables. So, these factors may influence the children in Selangor to consume the vegetables everyday. Another study done by Faber *et al.* (2007) found that children in rural of KwaZulu-Natal who consume dark green leafy vegetables will have adequate vitamin A and iron when they increase their frequency as well as portion.

In addition, from this study, some of the parents in urban and rural area control the intake of junk food among their children everyday and some are only allow once a week. This happened maybe due to the different attitude of the parents because some of them do not care as long as their children are satisfied when eating junk food. A study done by Garemo *et al.* (2007) discovered that the Swedish pre-school children ate a lot of junk food as well as sucrose. These cause the children to become obese and overweight because of higher energy intake when they eat junk food. A different result were obtain by Khader *et al.* (2009) that stated that consuming junk food did not associated with overweight and obese among the children. This different result maybe due to the portion as well as the type of the junk food that can cause overweight in these different country.

Ice cream and chocolate is type of food that is sweetened and full of fat. The frequency of children from urban area of Selangor to consume them is higher compared to the children from rural area. It is mainly because the availability of these foods at the urban area was higher compared to the rural area. A study done by Cartwright and Stritzke (2007) found that most of the children in Western Australia were consuming chocolate at school.

Nutrient intake among urban and rural children: In general, the urban children had a better energy intake that is closest to the Malaysian Recommended Nutrient Intake (RNI) compared to the rural children. Compared with a study done among the urban children in Ho Chi Minh City in Vietnam, Huynh *et al.* (2008) found that the boys in urban area had higher energy intake compared to the girls. In this study, the carbohydrate intake among urban children were almost same with the RNI but the protein and fat intake exceeded the RNI. A study done by Gharib and Rasheed (2011) found a similar result with this study which is the carbohydrate consumption among children in Bahrain was close to the Estimated Average Requirements but the protein and fat were exceeding.

A different study by Davis *et al.* (2008) found that the rural and urban children consumed quite similar total calories and fat but in this study, rural children consume more energy, protein, fat and carbohydrate. Furthermore, the intake of fat among rural children were higher than the RNI. This is maybe due to the parents did not control on the children's diet. Besides that, the intake of Protein also was higher than RNI for both locations. Maybe these children consume a lot of meat and fish as their main meal. A study done by Khor *et al.* (2009) revealed that the protein intake among preschool children in Flemish were adequate. A different research conducted by Khan Khattak and Ali (2010) found that the Pakistani female students had imbalance macronutrient intake and this can become the cause of malnutrition.

The micronutrient intakes such as Calcium were higher among the rural children compared to the urban but it still does not meet the Malaysian RNI. When this condition is compared to the children in Mexico, Flores *et al.* (2009) found that the rural children have much lower intake of Calcium compared to the urban children. It is different from this study because the children in urban of Selangor were more likely to consume more sweetened beverages compared to milk. Keller *et al.* (2007) stated that milk and calcium intake among children aged three to seven years old decrease as they consume more sweetened beverage.

The iron intake among the children is Selangor is exceeding the RNI. This is maybe due to higher consumption of meat and poultry among the children as their main dishes. Flores *et al.* (2009) also found that iron intake among Mexican children is not a problem as all of them meet the requirement. Compared with a study done by Brotanek *et al.* (2008), the study found that the prevalence of iron deficiency among US children were still not change from years 1976 until 2002. A different study done by Porniammongkol *et al.* (2011) found that the hill-tribe children in Thailand were at higher risk to had anemia because of low iron intake.

Relationship between eating practices and BMI: This study suggested that fast food and eating out can affect the children's BMI. The higher the frequency of eating out and fast food intake, the higher the children's BMI. Fast food and eating out maybe can contribute to higher BMI because the restaurant will serve food that is high in calorie content compared to self cooking. A study done by Serrano and Jedda (2009) found that non-fast food restaurant give higher calories content from fat compared to the fast food restaurant. So, this can make the children to easily become obese when they consume a lot of this type of food.

CONCLUSION

This study found that there is a difference between anthropometry status of children lived in urban and rural area. The prevalence of severe stunted, severe wasted and severe underweight were higher among the children lived in the rural area compared to the children that lived in the urban area. The prevalence of overweight and obesity were quite similar among the children in the urban and rural area. Besides that, there were significant difference between the urban and rural area with the weight and height of the children. On the other hand, this study revealed that the nutrients intake among the children from urban and rural area were different. Lastly, there were relationships between fast food intake with BMI as well as eating out with BMI.

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