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Nutrient Intake and Socio-economic Status among Children Attending a Health Exhibition in Malaysian Rural Villages

M Norhayati, MSc(PH)*
M I Noor Hayati, MPH*
P Oothuman, PhD*
M S Fatmah*
B Zainudin, MPH**
A Fatimah, PhD***

* *Department of Parasitology and Medical Entomology, Faculty of Medicine*
** *Department of Community Medicine, Faculty of Medicine,*
*** *Department of Dietetics, Faculty of Allied Health Sciences, Universiti Kebangsaan Malaysia, 50300 Kuala Lumpur*

Summary

A dietary survey was carried out in 216 children (109 males, 107 females) aged 1-7 years, living in rural villages in Selangor, Malaysia to assess their nutrient intake and to determine the association between nutrient consumption and socio-economic background. All the children studied had inadequate intakes of energy, iron and niacin according to Recommended Daily Intake (RDI). Children aged of 4-9 years showed inadequate intake of calcium, thiamine and riboflavin. However the intake of protein, vitamin A and ascorbic acid were above the recommended value. The mean percentage requirements of protein, iron and niacin were significantly related to the household income. The mean percentage requirements of riboflavin was also significantly higher in children from small families compared with children from large families. However the employment status of mothers had a significantly effect on the mean percentage requirements of niacin. The results indicate that education level of the mothers, is strongly associated with the mean percentage nutrient requirements of children and we strongly feel that this is a strategy to be adopted for improvement in nutrition of children.

Key Words: Nutrient intake, Socio-economic status, Dietary patterns

Introduction

Physical and mental growth of children is influenced by many factors such as genetic, nutrition, health and medical care given, diseases and socio-economic status. Most of these factors when analysed are related directly or indirectly to nutrition of the children[1]. Studies done in the seventies showed that mild to moderate malnutrition is common among rural and urban preschool and primary school children in Malaysia[2,3,4]. It was noted that majority of the urban primary school children had chronic malnutrition and this indicated that these children were malnourished from preschool age[2]. Primary school children in rural

areas had significantly higher prevalence of malnutrition than those in urban areas[4]. Another study showed that 37% of children aged 0-5 years in poor rural villages were underweight, 43% were stunted and 5% were wasted[5]. More recent studies among children in urban squatter settlements in Kuala Lumpur showed that malnutrition is still prevalent with 10-40% preschool and primary school children who were either underweight, stunted or wasted[6-7]. Malnutrition is due to many factors and one of it is inadequate or imbalanced food intake related to poverty, parent's education, food beliefs and culture. Dietary pattern studies have been conducted among children in Felda land schemes, urban squatter areas and rural villages and Orang Asli's (Semai)[8,9,10]. Most of the studies showed that the children had lower intake of energy and other nutrient compared to recommended value. Many of the studies did not relate the dietary patterns to the socio-economic conditions.

The purpose of this study was to estimate the dietary intake of young children aged 1-7 yeras in rural areas and to relate it to their age, household income, family size, employment status of mothers and level of mothers' education.

Materials and Methods

This study was carried out in several rural villages in Mukim Labu and Dengkil, located about 70 km from Kuala Lumpur, from January – June 1993. Most of the residents were labourers, drivers and farmers, whilst a few worked in private and government agencies as office workers and some as teachers. All two hundred and sixteen children, 109 males and 107 females, aged 1-7 years old who attended a health and worm infestation exhibition conducted by the authors were included in this study. Most of the children are Malays.

Biodata and socio-economic data of the children were obtained using a questionnaire and the dietary information by recall. Children were weighed using a bathroom scale with intervals of 0.5 kg, heights were measured by making them stand against a

Table I
General characteristics of children aged 1-7 years in a few villages in Dengkil and Labu, Selangor, Malaysia

Age (years)	1 n=20 mean (SD)	2 n=32 mean (SD)	3 n=28 mean (SD)	4 n=29 mean (SD)	5 n=55 mean (SD)	6 n=31 mean (SD)	7 n=21 mean (SD)
Sex							
Boys (%)	14 (70)	18 (56)	13 (46)	10 (35)	19 (35)	20 (65)	15 (71)
Girls (%)	6 (30)	14 (44)	15 (54)	19 (65)	36 (65)	11 (35)	6 (29)
Weight (kg)							
Boys	8.9	10.2	12.0	15.7	15.9	14.1	16.2
	(1.6)	(1.4)	(1.0)	(2.1)	(2.7)	(5.1)	(6.8)
Girls	6.8	10.5	11.8	13.2	15.6	15.5	17.3
	(3.4)	(1.3)	(1.7)	(4.1)	(3.7)	(6.3)	(0.5)
Height (cm)							
Boys	78.4	80.3	92.4	103.4	108.7	96.1	100.9
	(4.1)	(20.5)	(5.7)	(5.9)	(4.1)	(33.8)	(41.2)
Girls	63.3	86.4	93.5	95.4	105.5	101.8	115.7
	(31.3)	(4.1)	(4.2)	(23.7)	(5.8)	(34.3)	(1.2)

vertical wall, and marking off on the wall with the aid of a clipboard. Information on food intake was collected from the children and the parents and/or guardians. This was done using nutrient intake recall for one week and then averaged to one day. Food intake data was collected by trained research assistants and the amount of food taken by children was estimated using standard household measurements, namely chinese bowl (small and big) and spoons (dessert and tea). Information was coded and analysed for nutrient composition using a computerised version of food analysis (MD Idris, 1990).

The effect of socio-economic status and age group on the food intake or mean percentage nutrient requirements were analysed using ANOVA. The analysis was carried out using the DBSTAT statistical package.

Table II
Nutrient intake among children aged 1-7 years in a few villages in Dengkil and Labu, Selangor, Malaysia according to age

Age (years)	1 n=20 mean (SD)	2 n=32 mean (SD)	3 n=28 mean (SD)	4 n=29 mean (SD)	5 n=55 mean (SD)	6 n=31 mean (SD)	7 n=21 mean (SD)
Nutrient							
Energy (kcl)	937.3 (435.7)	891.0 (420.8)	882.2 (364.6)	1037.2 (426.1)	1088.0 (369.5)	1124.7 (318.8)	1305.7 (475.5)
Protein (gm)	36.1 (20.1)	36.1 (20.9)	36.3 (19.6)	38.1 (17.1)	36.1 (13.8)	39.6 (18.9)	43.5 (16.5)
Fat (gm)	32.3 (22.0)	29.4 (20.0)	30.1 (19.9)	30.5 (15.6)	33.5 (18.6)	33.8 (14.9)	38.0 (20.9)
CHO (gm)	125.9 (68.3)	120.8 (52.6)	109.7 (41.6)	153.0 (67.0)	165.0 (61.2)	165.5 (40.1)	197.7 (69.3)
Calcium (mg)	482.2 (414.1)	440.5 (390.6)	407.3 (421.8)	267.2 (186.0)	252.5 (189.2)	262.0 (151.9)	262.1 (117.2)
Iron (gm)	3.8 (1.9)	5.3 (3.7)	5.1 (3.1)	6.7 (4.7)	6.6 (2.9)	7.8 (4.4)	9.0 (5.0)
Vit. A (ug)	391.7 (313.6)	387.2 (342.9)	371.5 (293.9)	313.7 (290.8)	330.2 (211.8)	359.3 (271.6)	404.7 (235.7)
Thiamine (mg)	0.7 (0.5)	0.7 (0.5)	0.6 (0.5)	0.5 (0.3)	0.6 (0.3)	0.5 (0.3)	0.6 (0.2)
Riboflavin (mg)	1.2	1.0	1.1	0.7	0.7	0.7	0.7
Niacin (mg)	5.4 (4.0)	5.2 (3.8)	5.3 (4.0)	4.8 (2.6)	4.8 (2.6)	4.9 (3.0)	5.4 (2.5)
Ascorbic acid (mg)	12.6 (12.8)	31.0 (26.2)	28.7 (34.6)	35.0 (80.9)	20.6 (19.5)	26.9 (55.9)	45.5 (76.8)

Table III
Nutrient intake among children aged 1-7 years in a few villages in Dengkil and Labu, Selangor, Malaysia according to percentage of the Recommended Daily Intakes

Age (years) / Nutrient	1-3 n=80 Mean (SD)	%RDI	4-6 n=115 Mean (SD)	%RDI	7-9 n=21 Mean (SD)	%RDI
Energy (kcal)	899.5 (401.3)	66.1	1085.2 (370.2)	59.3	1305.7 (475.5)	59.6
Protein (gm)	36.2 (20.1)	157.4	37.5 (16.1)	129.3	43.5 (16.5)	124.3
Calcium (mg)	439.3 (430.4)	97.6	258.8 (177.7)	57.5	262.1 (117.2)	58.2
Iron (mg)	4.9 (3.1)	49.0	7.0 (3.9)	70.0	9.0 (5.0)	90.0
Vitamin A (ug)	382.9 (315.3)	153.2	333.9 (248.4)	111.3	404.7 (235.7)	101.2
Thiamine (mg)	0.6 (0.5)	120	0.5 (0.3)	71.4	0.6 (0.2)	66.7
Riboflavin (mg)	1.04 (0.9)	130	0.7 (0.4)	63.6	0.7 (0.4)	53.8
Niacin (mg)	5.3 (3.9)	58.9	4.8 (2.7)	39.7	5.4 (2.5)	37.2
Ascorbic acid (mg)	25.6 (27.8)	128	37.3 (52.7)	186.5	45.5 (76.8)	227.5

Results

The general characteristics and mean weight and height of children according to age and sex is shown in Table I. Nutrient intake of the children according to age is shown in Table II. The results indicated that calcium and riboflavin intake were higher in younger children and the difference was statistically significant ($p < 0.05$). Statistically significant increase was also observed in carbohydrate and iron intake with age ($p < 0.001$). Intake of energy was significantly increased with age ($p < 0.05$). The energy and other nutrients intake were higher in children aged one compared with children aged two and three. There was no significant differences in other nutrients intake between the different age groups.

In children aged 1-3 years the intake of energy, iron and niacin being 66%, 49%, 59% respectively, were inadequate, while intake of protein, calcium, vitamin A, thiamine, riboflavin and ascorbic acid (Table III) were adequate or higher than the recommended daily intake (RDI) for Malaysia[11]. In children aged 4-9 years intake of energy, calcium, iron, thiamine, riboflavin and niacin were below the RDI, while intake of protein, vitamin A and ascorbic acid were higher than RDI.

Since age is a confounding factor in this study, all statistical analysis was carried out by controlling the age. The mean percentage nutrient requirements according to household income is shown in Table IV. The mean percentage requirements of protein, iron and

Table IV
Mean percentage nutrient requirements according to household income* among children aged 1-7 years in a few villages in Dengkil and Labu, Selangor, Malaysia

Nutrient	Low n=150 Mean %	(SD)	Intermediate n=49 Mean %	(SD)	Head n=17 Mean %	(SD)	Comparison of means
Energy (kcal)	57.6	(26.6)	61.7	(28.4)	62.9	(33.7)	NS
Protein (mg)	127.1	(71.4)	129.6	(81.9)	177.9	(93.3)	<0.05
Calcium (mg)	61.9	(62.3)	69.9	(61.3)	74.3	(63.5)	NS
Iron (mg)	54.8	(36.7)	70.7	(45.6)	70.3	(59.3)	<0.05
Vitamin A (ug)	106.1	(99.2)	122.4	(106.4)	147.2	(163.7)	NS
Thiamine (mg)	87.5	(72.5)	85.9	(57.0)	90.9	(64.2)	NS
Riboflavin (mg)	87.3	(85.5)	81.3	(66.4)	96.4	(79.5)	NS
Niacin (mg)	43.3	(32.0)	55.0	(51.9)	103.7	(189.3)	<0.05
Ascorbic acid (mg)	124.6	(211.1)	125.4	(132.9)	137.1	(177.4)	NS

* *Low* = *RM150 - RM750*
Intermediate = *RM751 - RM1500*
High = *RM1501 - RM3000*

niacin were significantly lower among children from families with low household income than among those from higher household income ($p < 0.05$). However, other mean percentage nutrient requirements were not significantly related with the household income.

Children from small size families had significantly higher ($p < 0.05$) mean percentage requirements of riboflavin as compared to children from large size families (Table V). Mean percentage niacin requirements in children of non-working and working mothers differ significantly (see Table VI). The mean percentage nutrient requirements according to educational status of mothers is shown in Table VII. Children whose mothers' education level was higher had significantly higher mean percentage requirements of protein, iron, vitamin A and niacin ($p < 0.05$), compared to children whose mothers had lower education level.

Discussion

Our study showed that the amount of energy intake per day as compared to RDI among children aged 1-7 years were low. The results are comparable with those found in four studies carried out in four different

areas namely traditional villages[5], new settlement villages (Felda land schemes)[8], urban squatters[9] and Orang Asli villages[10]. However the daily intake of protein was above the RDI and this finding also agreed with previous studies[5,8,9]. Studies done in rural estate showed that 32% of preschool children in rural estate had serum vitamin A levels less than 20 ug/dl; and 12.3% had one or more signs suggestive of riboflavin deficiency[4]. Vitamin A intake in Orang Asli's preschool children were below the recommended value[10]. However, study done in poor rural villages showed that vitamin A deficiency was not a problem among preschool and school going children[5]. Our study showed that daily intake of vitamin A and ascorbic acid were above the RDI. Previous studies have shown that the intake of other nutrients such as calcium, iron, niacin, riboflavin and thiamine were below the RDI[8,9]. Our results agreed with their finding except in children age 1-3 years. In this group of children their daily intake of calcium, thiamine and riboflavin were above the RDI. There was a significant difference between the amount of daily intake of calcium and riboflavin in this group as compared to other aged group. The probable reason for this was that children in this age group were given powdered milk as part of their daily diet and most of the commercially available powdered milk are rich in calcium and vitamins. Of the nutrients analysed, carbohydrate and iron intake showed a significant increase with age. This is probably due to an increase in the consumption of rice becoming a

Table V
Mean percentage nutrient requirements according to family size among children aged 1-7 years in a few villages in Dengkil and Labu, Selangor, Malaysia

Nutrient	1-5 n=83 Mean %	(SD)	6-9 n=108 Mean %	(SD)	>=10 n=16 Mean %	(SD)	Comparison of means
Energy (kcal)	62.3	(29.1)	55.9	(27.7)	60.8	(13.9)	NS
Protein (gm)	138.4	(81.5)	125.8	(76.8)	133.2	(33.2)	NS
Calcium (mg)	75.1	(71.4)	59.4	(55.7)	40.8	(24.6)	NS
Iron (mg)	62.0	(39.4)	57.6	(44.9)	60.0	(25.5)	NS
Vitamin A (ug)	131.5	(119.5)	99.9	(99.6)	94.3	(57.8)	NS
Thiamine (mg)	98.3	(79.3)	80.5	(61.4)	71.8	(25.1)	NS
Riboflavin (mg)	104.6	(93.8)	74.3	(70.8)	67.4	(32.7)	<0.05
Niacin (mg)	52.4	(45.2)	51.3	(82.1)	36.3	(9.6)	NS
Ascorbic acid (mg)	121.1	(113.4)	127.5	(247.5)	140.9	(132.2)	NS

Table VI
Mean percentage nutrient requirements according to employment status of mother among children aged 1-7 years in a few villages in Dengkil and Labu, Selangor, Malaysia

Nutrient	Housewife n=152 Mean %	(SD)	Working n=64 Mean %	(SD)	Comparison of means
Energy (kcal)	59.8	(27.5)	58.6	(27.3)	NS
Protein (mg)	131.1	(75.3)	133.2	(80.1)	NS
Calcium (mg)	61.2	(58.7)	72.9	(69.1)	NS
Iron (mg)	62.9	(42.5)	51.8	(37.8)	NS
Vitamin A (mg)	109.6	(105.7)	121.1	(111.1)	NS
Thiamine (mg)	85.9	(67.5)	91.1	(70.7)	NS
Riboflavin (mg)	81.1	(73.5)	99.8	(95.5)	NS
Niacin (mg)	44.1	(33.5)	66.3	(197.1)	<0.05
Ascorbic acid (mg)	134.9	(219.4)	103.9	(103.8)	NS

staple food as they grew older and also other sources of iron (meat, fish). The consumption of calcium, thiamine, riboflavin (for children between 4-9 years), iron, and niacin were below the RDI.

The association of parent's socio-economic status to the mean nutrient requirements was very significant in our study. We found that mean percentage requirements of protein, iron and niacin among children from high household income was significantly higher compared to children in the other groups. Similar finding was reported in a study carried out in poor rural villages[5]. The association between the mean percentage nutrient requirements and family size showed that only mean percentage requirements of riboflavin was significantly higher in children with small families. Study in Kuala Terla however stated that the energy intake of toddlers and household intake of protein and thiamine were significantly related to the family size[12]. Study done among urban children aged 4-6 years, showed that their energy intake were significantly related to mothers' occupation – working and non-working[13]. However our study only showed the difference in mean percentage requirements of niacin between children with working and non-working mothers.

Mother's education level is a very important factor in determining the types of food prepared for the children. It is generally accepted that educated mothers are more knowledgeble, show more concern and are easily motivated to care for the health and nutrition of their children and this is reflected in the results of this study. Household intake of protein and vitamin A were significantly related to the educational level of the household heads[12]. Our study showed that the mean percentage nutrient requirements of protein, iron, vitamin A and niacin were significantly dependent on the mothers' educational status. Children with educated mothers have significantly higher mean percentage nutrient requirements.

This study showed that although the protein intake was above the recommended values, energy and other micronutrients intake was low. It appears that the health workers need to emphasis more health education about nutrition and importance of food that can provide energy and other micronutrients for the growth of children.

Table VII
Mean percentage nutrient requirements according to mother's education among children aged 1-7 years in a few villages in Dengkil and Labu, Selangor, Malaysia

Nutrient	Not schooling n=28 Mean % (SD)	Std 1-6 n=75 Mean % (SD)	Form 1-5 n=88 Mean % (SD)	Form 6 & College n=25 Mean % (SD)	Comparison of means
Energy (kcal)	51.6 (28.4)	57.8 (23.8)	61.1 (28.6)	63.5 (32.9)	NS
Protein (mg)	107.1 (48.2)	122.6 (63.5)	136.2 (81.9)	170.6 (102.4)	<0.05
Calcium (mg)	51.9 (36.9)	58.6 (59.7)	72.1 (69.9)	71.4 (60.8)	NS
Iron (mg)	54.9 (50.3)	52.3 (33.7)	61.8 (35.4)	79.3 (61.8)	<0.05
Vitamin A (ug)	74.8 (60.3)	97.4 (77.2)	126.3 (116.4)	155.4 (162.3)	<0.05
Thiamine (mg)	73.5 (59.6)	82.9 (59.1)	96.6 (79.3)	84.5 (60.8)	NS
Riboflavin (mg)	65.9 (40.6)	80.9 (78.2)	98.4 (92.7)	85.8 (72.7)	NS
Niacin (mg)	39.4 (20.9)	40.7 (29.6)	48.9 (35.1)	99.3 (165.1)	<0.05
Ascorbic acid (mg)	102.5 (88.2)	88.5 (95.7)	155.8 (262.9)	158.3 (190.2)	NS

Conclusion

This study showed that the intake of nutrients were significantly related to the socio-economic background of families with household income and mothers' education status playing an important role in the food consumption of their children. Any targetted change desired, through whatever method should be aimed at the mothers and by improving the family income.

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