

Nutritional Status in a rural estate community

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SYNOPSIS

A survey was carried out to determine the status of nutrition of 518 people of all ages (i.e. 46.6% of the total population) in an Indian estate community in Selangor. The majority of the adults were rubber tappers with a per-capita income of \$53/- a month with an average of 5 children per family. Modern facilities such as piped water, pourflush latrines and electricity were provided for these people.

The survey showed only 1 child out of the 41 pre-school children examined had her weight below the 60% Harvard Standard and 20% had their weights-for-age below the 70% Harvard Standard, i.e. significantly malnourished. 13.9% of the males and 11% of the females of the school going age group were significantly malnourished having weights-for-age below the 60% Iowa Standard while 44.5% of males and 20.2% of females suffered an arbitrary 3rd level underweight of between 61-70%. The prevalence of anaemia was high among the pre-school children (47.4%), school children (47.2%) and the adult females (68.6%).

Hookworm, roundworm and whipworm infestations were common in all cases of anaemia. 79% of the mothers questioned breast-fed their infants for varying lengths of time. 40.3% of the mothers started solids for their children only at the age of 6-11 months while 35.6% started at 1 year. The acceptance of family planning service by this community was poor. Clinical examination for malnutrition showed that xeroderma, follicular hyperkeratosis, xerosis conjunctivae and angular stomatitis were common findings, indicating the

possibility of deficiencies of vitamin A and the B group of vitamins. Poor oral hygiene and dental caries were found particularly among the school children and adults. 35% of the pre-school children and 27% of the school children showed low and "at risk" levels of vitamin A. 28.7% of school children and 26.6% of adult females had low levels of serum thiamin.

It is evident from this survey that education of health and nutrition as well as encouragement for the people to accept family planning are necessary to improve the health status of this community.

INTRODUCTION

A survey aimed at studying the status of nutrition in an Indian estate community was carried out by the Division of Rural Health Research of the Institute for Medical Research during the period December 1975 - June 1976. The estate in Selangor had a population of 1,111 people consisting of 508 males and 534 females. 93.8% were Indians, 5.7% Chinese and the rest were Malays. 60.2% of the population were rubber tappers with a per-capita income of \$32/- per month. Manual workers, clerical and managerial staff constituted the rest of the working classes. 15.5% of the people were under the age of 7 years. 34.0% between 7 to 18 years and the remaining 50.5% were above 18 years. A total of 518 people (46.6% of the total population) were examined.

MATERIALS AND METHODS

Anthropometry

Weight measurements were taken on pre-school children (0-5 years) of both sexes, and children (7+ to 18 years) of both sexes. The children were

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grouped in these two age groups for the convenience of comparing the findings with accepted standards to classify malnutrition. All weight measurements were made on the Physician's Scale (Detecto Medic) based on the lever system.

Clinical Examination

An abbreviated clinical examination was done on 518 persons to look for obvious signs of protein-energy-malnutrition and vitamin deficiencies. The method used were in accordance with those described by Jelliffe (1966). The examination was done on 37.7% of the pre-school children (0-7 years), 66.4% of the school-going-age-group children (7+ to 18 years) and 36% of adult males and females (18 years and above) in the estate. School-going-age-group included those who were attending school as well as those not attending. Information was obtained from mothers regarding the current feeding habits of their infants. A brief history of the usual food consumed as well as the frequency of intake was taken from the adults during the clinical examination.

Vitamin A and Thiamin Status

Blood for determination of serum Vitamin A levels and thiamin status was collected from 33.8% of the pre-school children, 36.8% of the children of school going age, 55.8% of adult males and 55.1% of adult females, out of the total number of 518 people who were clinically examined. Vitamin A levels were determined by the microfluorometric procedure of Garry *et al.* (1970) using a silicic acid column to remove contaminating fluorescence. Transketolase activity was done according to the method of Schouten *et al.* (1964).

Haematology

The haemoglobin level was estimated on venous blood using the cyanmethaemoglobin method on 87.6% of the pre-school children, 98.4% of the children of the school going age group, 90.6% of adult males, and 90.5% of adult females, out of the total of 518 people examined clinically. Peripheral blood films were stained with Leishman's stain.

Parasitology

Specimens of stools were collected from 81.5% of pre-school children, 66.9% of children of school-going-age-group, 84.8% of adult males and 68.9% of adult females out of the total of 518 people examined clinically. The stools were examined for intestinal helminths by the direct smear method followed by the formal ether concentration technique.

RESULTS AND DISCUSSION

Anthropometry

Pre-school-children - Anthropometric assessment on the weights of 41 pre-school children which

included the infants (0-12 months) as well as the toddlers up to the age of 60 months of both sexes, showed that only one child (2.5%) had her weight for age below the 60% Harvard Standard, indicative of 4th level under-weight as proposed by Jelliffe (1966). The child, a 16 month old female did not show any clinical evidence of protein-energy-malnutrition (PEM) except for her low weight for age, and thus could not be classified as clinical marasmus, marasmic kwashiorkor or even kwashiorkor although it may be termed as "marasmus" according to the Wellcome Trust Working Party Classification. 8 of them (20%) had weights below the 70% Harvard Standard or 3rd degree under-weight, which is the same as the findings in Kuala Trengganu, but higher than the Kuala Langat findings. These children were comparatively better off than those in Ulu Trengganu (Chong and Lim 1975). Table 1 shows the prevalence of significant malnutrition in the four areas.

Table 1

Prevalence of significant malnutrition by achievement of weight for age in four areas

	No. of Children	Percentage of children classified as "significantly malnourished" < 70% of Harvard Standard
Kuala Langat	475	10
Kuala Trengganu	278	20
Ulu Trengganu	209	32
The Study Area	41	20

It should be noted that the population sampled in the other areas were much larger. 15 children (36.6%) had weight-for-age within the 71-80% Standard or suffered 2nd level under weight while the remaining 18 children (43.9%) achieved satisfactory weight-for-age of more than 80% Standard. The Harvard Standard or "Standard" used here for all comparisons was based on the 50th percentile of the Harvard or Boston distribution plotted for the tables given by Nelson *et al.* (1969), or directly from the table by W.H.O. (1972).

School children - Of the 137 males and 109 females between the ages of 7-18 years, 13.9% and 11% of them respectively, had body weights less than 60% of the Iowa Standard. The Iowa Standard was derived by Nelson *et al.* (1969) from the 50th percentile of a distribution of weights-for-age on a study on Iowa children by the Iowa Child Welfare

Research Station, the State University of Iowa. A similar study in Ulu Jempol showed that 8% males and 7% females suffered weight deficit of less than 60% Standard whereas severe protein energy malnutrition (PEM) among school children based on less than 60% weight-for-age was not observed in the school children in Ulu Rening (to be published). An arbitrary 3rd level under-weight of between 61 – 70% of the Iowa Standard affected 44.5% males and 31.2% females in the estate, whereas there were more females (41.3%) than males (30.7%) within the 71 – 80% Standard, showing a probable 2nd level underweight. 29% males and 26% females in Ulu Jempol and 35% of children of both sexes in Ulu Rening had their weights between 61 – 70% of the Iowa Standard suggesting moderate protein-energy-malnutrition. Table 2 gives a comparison of the anthropometric findings in the three areas. It is evident from these results that the children of the estate were nutritionally worse off than those in the State Land Development Scheme of Ulu Rening or in the Mukim of Ulu Jempol.

Clinical and Biochemical Assessment

Clinical examination was done on 65 pre-school children, 251 children of the school going age group, 86 adult males and 116 adult females. Table 3 gives the various clinical signs found in the different age group.

Signs of Vitamin A deficiency such as xerosis conjunctivae, xeroderma and follicular hyperkeratosis were commonly seen especially among the children of the school going age group. Bitot's spots were seen only in a few cases. 49% of the children of the school going age group, 17.8% adults and 4.6% pre-school children examined had one or more signs of vitamin A deficiency. The frequency of occurrence of the signs of Vitamin A deficiency in children is

much less when compared to the findings in Kuala Trengganu (Chen, 1972).

Serum Vitamin A determination showed that 32% of pre-school children and 27% of school children examined had serum vitamin A levels of less than 20 µg/dl. None of the pre-school children had serum vitamin A levels of less than 10 µg/dl, but 3.7% had serum vitamin A levels of 10 µg/dl. 4.2% of the adult males and 9.4% of the females had levels of less than 20 µg/dl. Vitamin A deficiency may be considered a serious nutritional problem in any population group when 15% or more of the subjects surveyed, have serum Vitamin A levels of less than 20 µg/dl as shown by Chopra (1970). Thus we see that this is a serious problem among the children in this estate.

Classical dry or wet beri-beri was not seen, but 2 male children displayed some features which could be indicative of early thiamin deficiency. These were malaise associated with anorexia, sensation of pins and needles over legs, besides general weakness and numbness of both the lower extremities. One of the children complained of pain in calf muscles after exertion.

Laboratory determination of TPP effect revealed a much higher percentage of thiamin deficiency. 13.6% of the pre-school children, 28.7% of school children, 16.6% adult males and 26.6% adult females had TPP effects of greater than 25%. Brin *et al.* (1965) have proposed that a TPP effect of greater than 25% indicates severe thiamin deficiency. The adult females and the school children were affected to a greater extent, compared to the pre-school children and adult males.

Angular stomatitis in children of school-going-age group and adults, as well as increased vascularity of the eyes with photophobia and excessive lacry-

Table 2

Anthropometric assessment of the nutritional status of children (7 – 18 years) according to their weight for age achievements in 3 different areas

Survey Areas	<60% Iowa Std.		61 – 70% Iowa Std.		71 – 80% Iowa Std.		<80% Iowa Std.	
	% Males	% Females	% Males	% Females	% Males	% Females	% Males	% Females
The Study Area (x = 137, y = 109)	13.9	11.0	44.5	31.2	30.7	41.3	10.9	16.5
Ulu Jempol (x = 265, y = 243)	8	7	29	26	39	32	24	35
Ulu Rening (z = 74)	0		35		46		19	

Where x = No. of males examined.
y = No. of females examined.
z = No. of males and females examined.

Table 3

Clinical evaluation indicating probable vitamin deficiencies among various age-groups in the study area

	0 - 7 yrs. n = 65		7+ - 18 yrs. n = 251		18+ yrs. n = 202	
	No. of toddlers with various clinical signs	% toddlers with one or more clinical signs	No. of children with various clinical signs	% of children with one or more clinical signs	No. of adults with various clinical signs	% adults with one or more clinical signs
Vitamin A deficiency						
Xerosis conjunctivae	1		25		5	
Bitot's spots	-		2		6	
Night blindness	-	4.6	-	49	5	17.8
Xeroderma	-		51		1	
Follicular hyperkeratosis	2		45		19	
Riboflavine deficiency						
Increased vascularity of eyes	-		2		14	
Photophobia and excessive lachrymation	-		7		14	
Angular Stomatitis	6	12.3	24	15.1	17	25.2
Cheilosis	1		2		2	
Glossitis	1		2		4	
Vitamin C deficiency						
Scorbutic gingivitis	-	-	7	2.8	1	0.5
Vitamin D deficiency						
Rickety Rosaries	2		-		-	
Bow legs	3	7.7	1	0.4	3	1.5

n = Total number of people examined.

mation among adults were commonly seen than glossitis and cheilosis, suggestive of riboflavin deficiency. 25.2% of adults, 15.1% of children of school age and 12.3% of pre-school children had one or more signs suggestive of riboflavin deficiency. Characteristic scorbutic gingivitis cyanotic in appearance, with or without "scorbutic buds" and the tendency to bleed was found in 2.8% of the children of school age, and 0.5% of the adults.

Rickety rosary and bow legs were seen in 7.7% of pre-school children, 0.4% school children and 1.5% adults. It was not established whether these cases were nutritional or renal in origin. Gingivitis apart from the recognized scorbutic gingivitis was seen in 31.5% of school children and 47.5% of the adults. Ingestion of soft foods rich in carbohydrates aggravated by poor dental hygiene may enhance the chances of gingivitis and gum infection especially among those already on a low vitamin C intake.

23.0% of the pre-school children, 37.1% children of the school-going-age-group and 40.6% adults had dental caries (one or more decayed, missed or filled teeth). The incidence of dental caries and nonspecific gingivitis in the school going age group was lower than those found among the Indian school children in West Malaysia. (Ministry of Health, 1972).

Obvious signs of kwashiorkor or marasmus were not seen. The incidence of malnutrition in this community for all age groups was slightly higher than the findings of the ICNND survey (1962).

Feeding Habits

A majority (42.1%) of the 64 mothers interviewed in this study said that solid foods were introduced only between the ages of 6 to 11 months. Table 4 shows the age at which solid food was started.

Table 4

Age at which solid feeding was started

Age in months	No. of infants	Percentage
3 - 5 mths.	9	14.0
6 - 11 mths.	27	42.1
1 yr.	24	37.5
1% yrs.	1	1.6
2 yrs.	1	1.6
3 yrs.	2	3.2

The child was fed entirely on a milk diet before this period. This findings was very similar to the findings of Selinus (1972). 79% of the mothers had given the infants rice porridge with or without eggs, fish or vegetables, depending on the family budget. as the first solid food. 70% of the mothers interviewed breast fed their infants, but the duration of breast feeding was not obtained. The breast feeding rate is midway between the rates of Malay and Chinese mothers in Perlis as found by Teoh (1972). The powdered milk usually given was Dutch Baby (26%), Dumex (26%), condensed milk (14.9%) while the rest gave various other brands of milk powder.

64.2% of the mothers interviewed admitted that they were not influenced by others on their feeding habits of their infants. 16.4% of them were advised by their own mothers. Mothers-in-law, bidans, health nurses, grandmothers, creche staff and others exerted little influence on their choice of feeding.

Family Planning

The average number of children per family in this estate was 5, with a range of 1 – 11 children per family. Discussions with the Family Planning Board staff who visited the estate once a week revealed that the response for acceptance of contraception was very poor. The number of females between the ages 15+ to 44 years in this community was 284. The number of known acceptors of contraception was only 17.

Haematology

47.4% of 57 pre-school children, 37.2% of 247 children of the school going age group, 25.6% of 78 adult males, and 68.6% of 105 adult females were

classified as anaemic according to the criteria of the World Health Organisation (WHO 1968). On examination of the peripheral blood films, the majority of the anaemic persons appeared to have iron deficiency anaemia, but it was not possible to substantiate this observation as no further investigations were done. Prevalence of anaemia in pre-school children in this area was high when compared to army children as shown by the Interdepartmental Committee on Nutrition for National Defence (1962) and children in the SLDA Scheme of Ulu Rening (to be published), but this prevalence was somewhat similar to the rates found in the Mukim of Ulu Jempol (in press) and Sungai Selisek (IMR Annual Report 1971). Anaemias in school children and mothers were very much higher than those found in Ulu Jempol and Ulu Rening.

Parasitology

A total of 374 stool specimens collected from 53 pre-school children, 168 children of school going age, 73 adult males, and 80 adult females were examined for intestinal helminths. Prevalence of infection is summarised in Table 5.

Whipworm infestation seemed to be the commonest infection in the community. The school children had the highest percentage of roundworms (43.45%) and whipworms (45.83%). The adult females had the highest prevalence of hookworm infestation (21.5%), and this may contribute to the high prevalence of anaemias in the adult females. The prevalence of intestinal helminthiasis appeared to be lower than that found in Ampang and Bernam by Lie *et al.* (1971) but is higher than the rates found in Ulu Jempol. It was seen that worm infestation was common in all cases of anaemia where stools were examined for ova as shown in Table 6.

Table 5

Anaemias and worm infestation found in the different age-groups in the Study Area

	No. of cases done	Anaemias	Total No. with ova (%)	No. with Ascaris (%)	No. with Hook-worm (%)	No. with Trichuris (%)
Pre-School Children 0 – 7 yrs.	57	27	9 (33.3)	5 (18.5)	3 (11.1)	4 (14.8)
Children of school going age 7+ to 18 yrs.	247	92	38 (41.3)	26 (28.3)	7 (7.6)	28 (30.4)
Adult Males <18 yrs.	78	20	3 (15)	2 (10)	2 (10)	–
Adult Females	105	72	24 (33.3)	10 (13.9)	15 (20.8)	12 (16.6)

Infestation with worms was common in all cases of anaemias where stools were examined for ova.

Table 6
Worm Infestation

	No. Examined	Ascaris		Hookworm		Trichuris	
		n	(%)	n	(%)	n	(%)
Pre-school children	53	12	(22.64)	6	(11.32)	15	(28.3)
School children	168	73	(43.45)	23	(13.69)	79	(47.02)
Adult males	73	2	(2.73)	7	(9.58)	5	(6.84)
Adult Females	80	9	(11.25)	17	(21.2)	19	(23.75)
Total:	374	96	(25.66)	53	(14.17)	116	(31.01)

n = Number of positive cases.

Housing

The living quarters of the labour force were in the form of labour blocks made of plank and zinc each consisting of an average of 6 units per block. 60% of the units are two-roomed, 30% single-roomed and the others had either 3 or 4 rooms. The average number of persons living per unit was 5 which could be classified as over-crowding especially in the single and two-roomed units. There were a total of 8 common latrines of the pourflush type which consisted of 120 individual private sections for both sexes. This means that 9 people shared one latrine which was a reasonably good facility. Piped water was available to all the labour fronts, but the taps were all located at the back of the houses for common use. Electricity was available to all.

SUMMARY AND CONCLUSIONS

From this study it was seen that a variety of nutritional deficiencies exist in this estate population. Protein-energy-malnutrition was common among the children of the school-going age group and pre-school children. Vitamin A deficiency was a common disorder in this community where the intake of dairy products, fish, liver etc. were practically nil, and where dahl was eaten more often than green leafy vegetables. It is not surprising that since meat, milk, eggs and other expensive items were beyond the means of a large family with low income, riboflavine and thiamin deficiencies were also seen in this community. The intake of fresh fruits were also very limited and infrequent, and with the already low intake of fresh green vegetables, vitamin C deficiency was also another common nutritional problem. Gingivitis due to gum infection and ascorbic acid deficiency, or the synergistic effect of both was not infrequent. Dental health was also poor resulting in either caries or missing teeth. Anaemias were high in the pre-school and school going age groups and mothers. Worm infestation was commonly seen in all cases of anaemias. Majority

of the people are in the low income group. Thus poverty with the other contributory factors, such as lack of education, large families, lack of knowledge regarding preventive medicine and nutrition, and the lack of motivation seem to be responsible for the prevalence of nutritional disorders. In spite of the modern facilities provided, such as piped water and pourflush latrines, people allowed their children to use the open drains for sanitary purposes. Their indifferent attitude towards family planning needs to be changed through intensive education. Our observation seemed to suggest that some of the residents spent the little money they earned on 'samsu' and entertainment rather than on food and clothing. The objective of the health authorities should be to help the people to help themselves in the prevention of malnutrition through public action and individual responsibility.

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