

# THE NUTRITIONAL STATUS OF IBAN PRESCHOOL CHILDREN, SARAWAK

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## SUMMARY

*An anthropometric study and dietary investigations were conducted in an Iban community in the Sixth Division of Sarawak. 140 children aged 0 to 6 years, were assessed anthropometrically. Their mean weights and heights were much lower than those of their counterparts in Singapore. 7% of the children were nutritional dwarfs while about 68% were either wasted or wasted as well as stunted. Rice was the staple food in the community while other foods were considered unnecessary. Child feeding practices also reflected this dependancy on rice leading to a toddler diet which is mainly carbohydrate in nature. The dietary assessment showed a quantitative adequacy of energy as well as protein, a finding which does not reflect the seasonal fluctuations with periods of hunger. The predominant contribution from rice resulted in protein intakes which were qualitatively deficient.*

## INTRODUCTION

Recent estimates indicate that the world population continues to grow at a rate of 1.7%

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per annum,<sup>1</sup> while world food production shows very little increase, resulting in an ever-widening gap between population and food supplies. To make matters worse, much of the increase in population is occurring in developing countries where food production is grossly deficient. As a result, malnutrition is widespread, mainly in the form of mild or moderate protein energy malnutrition (PEM). Both the physical as well as mental growth of these children are affected.

Several nutritional surveys have been conducted on an *ad hoc* basis in various parts of Sarawak and the results showed that moderate or severe PEM affected 12% to 81% of the study populations below the age of 10 years.<sup>2</sup> The most severely affected areas were the Sixth and Seventh Divisions which included some of the more inaccessible areas of the state.

In tackling the problem of PEM, one should also consider the various ecological factors which may play a part in its aetiology. In most developing countries, poverty and insufficient food production are the main factors which are further influenced by other adverse conditions such as the high infection rates in early childhood, especially in the form of diarrhoeal diseases and respiratory infections. In this study, some of these factors will be examined to determine the roles they play.

## MATERIALS AND METHODS

The locality chosen for this study is the Entabai area in the Sixth Division of Sarawak. The study

population consists of 48 longhouses along the Entabai river which are served by a *klinik desa* (rural health centre). The population of 5,000 consists mainly of Ibans who are subsistence farmers growing *padi bukit* (hill or dry rice).

A random sample of eight longhouses were selected for nutritional assessment. There was a total of 145 *bilik* (a room which is occupied by a family) from the eight longhouses with a population of 645. About 88% of the people grew hill rice and also some cash crops such as rubber (93%) and pepper (58%). An average family with four acres of rubber and 200 pepper plants could obtain an annual income of M\$850 to M\$1780. In this area where the river is the only means of transport, most families own at least one rowing boat while 59% possessed outboard motors. Six of the longhouses obtained their water supplies from gravity-fed systems while the other two used river water. About 56% of the households had access to pour-flush latrines while 14% used pit latrines with the remaining 30% using the bush.

The yield from hill rice varied from 2 to 10 pikuls per acre (1 pikul = 60 kg) with a mean of 5 pikuls per acre. Most families do not have enough rice to last one year. For the remaining months they resorted to other staples such as maize or tapioca, or if they have enough cash, buy rice. Most families kept poultry (90%) with an average of 12 chickens per family. 60% reared pigs with an average of 3 pigs per family. The poultry and pigs were usually reserved for festivals and very few families have excess for sale, much less for home consumption. Vegetables and fruits grown in the farms or around the longhouse, provided sporadic supplies. Hunting and fishing also helped to supplement their diet, providing valuable sources of protein.

The nutritional status of the community was assessed using anthropometric measurements and dietary studies. All children below the age of seven years were included in the first part of the study. Weights were measured using a spring balance which was lighter and more portable. Younger

children were weighed while being carried by their mothers. Measurements were made to the nearest 0.1 kg. The scale was checked before each measurements and calibrated regularly. Heights were measured using a Microtoise while children below the age of two years were measured using an infantometer. Measurements were made to the last 0.5 cm.

A sample of 16 households were selected for the dietary studies. Their dietary intakes were estimated using the 24 hour recall method. Previous experience in this community indicated that the diets of the Ibans were rather monotonous with marked seasonal fluctuations. Therefore an accurate picture of their diets can only be formed by periodic surveys throughout the year, entailing too much time and manpower. In view of these limitations it was decided that a small cross-sectional study would provide us with some idea regarding their diets.

In the 24 hour recall method, each housewife was asked to name the foods consumed by the family the day before the interview and to give an estimate of the amount of food consumed by showing the investigator, utensils or measures used.

All women with children aged zero to six years were interviewed with regard to their infant and toddler feeding practices.

## RESULTS

### Anthropometry

A total of 140 children aged zero to six years were included in this study with 59 boys and 81 girls. The distribution of the children according to mean weight for age is shown in Fig. 1. Their mean weights were very much below those of their counterparts in Singapore,<sup>3</sup> widening from the age of one onwards. The mean heights of the study population were also lower than those of the reference population (Fig. 2), although the difference is much less than that seen in the case of mean weights.

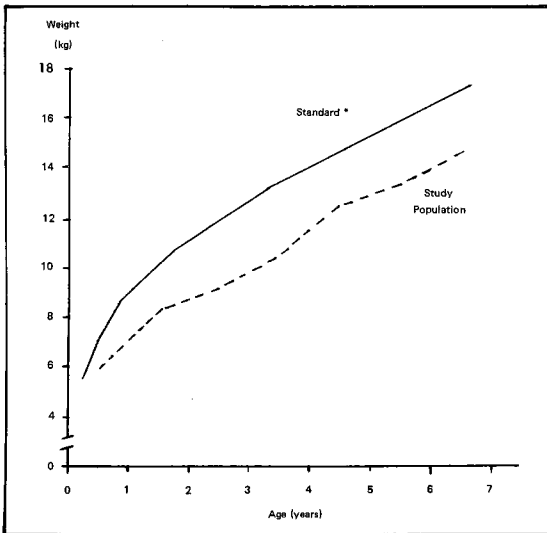


Fig. 1 Distribution of children according to mean weight for age.<sup>3</sup>

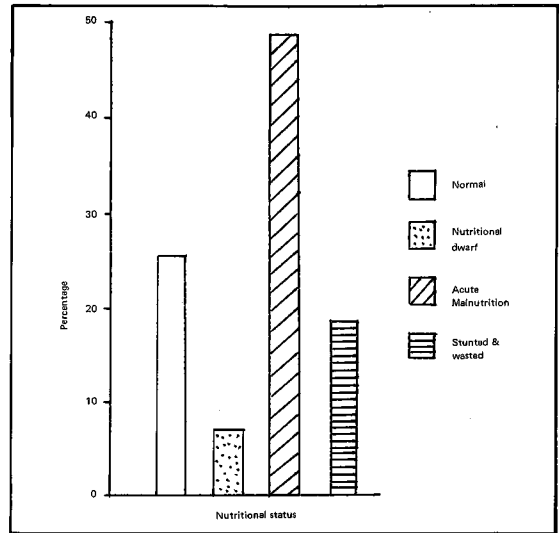


Fig. 3 Percentage distribution of children according to nutritional status.

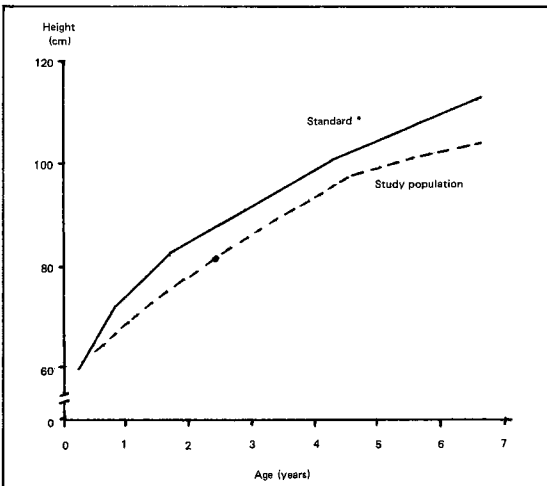


Fig. 2 Distribution of children according to mean height for age.<sup>3</sup>

The nutritional status of the children were determined using Waterlow's classification<sup>4</sup> where two indicators (height for age which reflects 'stunting' and weight for height which reflects 'wasting') were cross-tabulated. About 25% of the children were normal with no stunting or wasting (Fig. 3) while 7% were nutritional

dwarfs (stunted but not wasted). 50% of the children showed signs of current malnutrition, i.e. wasted but not stunted. The remaining 18% showed signs of stunting as well as wasting.

### Dietary Studies

Most of the families interviewed take three meals a day, usually with the same food for all three meals. Their mainstay is unpolished rice which they consume in large quantities, with or without a vegetable or some jungle shoots (Table I). Tapioca shoots and the shoots of sago palm are commonly consumed. Fish is sometimes caught from the river while the jungle provides wild animals such as hedgehog, anteaters and sometimes wild boar. The vegetables and meat are usually cooked in a little water with salt added. Sometimes the meat is roasted. Oil is seldom used and very little seasoning is added to their food which is rather bland.

The households were classified into three groups according to the adequacy of their diets. Dietary intakes were considered 'acceptable' if they met more than 66% of the requirements, 'marginal' if intakes were between 50% and 60%

**TABLE I**  
**FOOD ITEMS CONSUMED FOR THE THREE MEALS**  
**BY THE 16 IBAN HOUSEHOLDS INTERVIEWED**

Food group	Food item	No. of households
Cereals	Rice (unpolished)	16
	Cream crackers	1
Fish	River fish	5
	Salted fish	1
	Canned fish with Black beans	1
Meat	Deer meat	2
	Pork	1
	Anteater	1
Vegetables	Tapioca shoots	7
	Sago palm shoots	4
	Cekur manis*	3
	Cucumber	2
	Shoots of wild plants	2
	Cucumber leaves	1
	Eggplant	1
Kangkong**	1	
Others	Coffee	2

\**Sauropus androgynus*; \*\**Ipomea aquatica*.

and 'low' when less than 50% of the requirements are met. All the households had acceptable intakes of protein and thiamine (Table II). In the case of niacin, only one of the households had low intakes. Caloric intake was found to be acceptable in 75% of the households while the others had marginal intakes. About 63% had acceptable intakes of vitamin A and C, with most of the remaining households having low intakes. Iron intake was acceptable in 56.3% of the households with 37.5% having marginal intakes and one household with low intake. In the case of riboflavin and calcium, less than one third of the households had acceptable intakes, while 12.5% had marginal intakes. About 56% of the households had low intakes of these two nutrients. Thus of the various nutrients studied, calcium and riboflavin intakes were found to be low in more than half the households studied. Vitamin A and C intakes were also inadequate in about one third of the households.

Table III shows the sources of energy and protein in the diets of the community. Rice is the

main contributor of energy as well as proteins, with a mean of 90% (range: 62.5 – 97.2%) in the case of energy. Animal sources accounted for less than 3% of the total energy intake. The same pattern can be seen in the case of proteins where rice provided a mean of 71.4% (range: 40.2 – 93.9%) while animal sources accounted for only 13%. The remaining 14.4% was derived from other plant sources.

94 housewives were interviewed with regard to infant-feeding practices, with reference to their

**TABLE II**  
**DISTRIBUTION OF HOUSEHOLDS ACCORDING TO**  
**PERCENTAGE NUTRIENT REQUIREMENTS MET**

Nutrient	Acceptable	Intake*	
		Marginal	Low (%)
Calorie	12 ( 75.0%)	4 (25.0%)	0
Protein	16 (100.0%)	0	0
Calcium	5 ( 31.3%)	2 (12.5%)	9 (56.3)
Iron	9 ( 56.3%)	6 (37.5%)	1 ( 6.3)
Vitamin A	10 ( 62.5%)	0	6 (37.5)
Thiamine	16 (100.0%)	0	0
Riboflavine	5 ( 31.3%)	2 (12.5%)	9 (56.3)
Niacin	15 ( 93.8%)	0	1 ( 6.3)
Vitamin C	10 ( 62.5)	1 ( 6.3%)	5 (31.3)

\* 'Acceptable' intake : more than 60% of the requirements met.  
'Marginal' intake : between 50% to 66% of the requirements met.  
'Low' intake : less than 50% of the requirements met.

**TABLE III**  
**SOURCES OF CALORIES AND PROTEINS IN**  
**THE DIETS OF 16 HOUSEHOLDS ACCORDING**  
**TO MEAN PERCENTAGE CONTRIBUTION AND**  
**RANGE**

Nutrient	Source	Percentage Contribution	
		Mean (%)	Range (%)
Calorie	Cereal (rice)	90.0	62.5 – 97.2
	Animal	2.8	0 – 9.4
	Other plant sources	7.1	0 – 46.7
Protein	Cereal (rice)	71.4	40.2 – 93.9
	Animal	13.2	0 – 46.1
	Other plant sources	15.4	0 – 46.7

youngest child. 45.7% of the women breast-fed their children for periods varying from a few months to five years, with the majority favouring a prolonged period unless another pregnancy intervenes. 41.5% combined breast milk with milk powder or sweetened condensed milk (18.1% and 23.4% respectively). Only 12.7% of the mothers did not breastfeed their children, with 7.4% using sweetened condensed milk and 5.3% using milk powder.

Most of the women interviewed started to wean their children from the age of six months to 1½ years, with 92% using pounded rice which had been made into a gruel. 4% of the women used a commercially prepared cereal (Nestum) while another 4% gave their children cooked rice (as in the adult diet). All the toddler diets were based on rice with 87.5% of the mothers given their children an adult diet consisting of rice supplemented with vegetables and fish or meat according to availability. Most of the time only vegetables are given. About 32% of the mothers supplemented the diets with milk. Only 12.5% gave their children rice alone, sometimes with sugar or milk.

## DISCUSSION

The anthropometric findings showed that the Iban children had mean weights and heights which are much lower than those of their counterparts in Singapore. The results from two other studies in East Malaysia<sup>5,6</sup> are compared with the present study (Table IV). The Penan children in the Sarawak study showed the highest prevalence of nutrition (86%), followed by the Iban children with 75%. The group from Sabah which included children from different ethnic groups had the lowest prevalence with 38.5% among the toddlers while the older children had slightly higher rates (65%). In the present study, most of malnourished children showed signs of on-going malnutrition. The same pattern can be seen in the toddler age group from Sabah. On the other hand, the Penan group which included older children and their counterparts from Sabah were mainly nutritional dwarfs, indicating that these children had managed to make up for past malnutrition

TABLE IV  
COMPARISON OF ANTHROPOMETRIC FINDINGS  
FROM THREE STUDIES IN EAST MALAYSIA

Nutritional status	Sabah <sup>5</sup>		Sarawak <sup>6</sup>	Present study
	0 - 4	5 - 12	0 - 12	0 - 6
Normal	61.5	35.3	14.0	25.0
Nutritional dwarf	9.1	44.8	40.0	7.0
Acute malnutrition	21.8	9.9	11.0	50.0
Stunted & wasted	7.7	9.9	35.0	18.0

in terms of weight, albeit stunted in height. These findings indicate that all three groups suffered the same problem of nutritional deficiencies during the toddler age group.

In the present study, much of the malnutrition seen in this age group can be attributed to the common practice of prolonged periods of breast-feeding which is supplemented by a diet consisting mainly of carbohydrates. The dietary studies also indicate that rice is considered a cultural 'superfood' by the community as they consider other foods as non-essential items in their diet. This is further reflected by their tradition of feeding their newborn with a gruel made from pounded rice purely as a symbolic gesture on the first day. Rice is thus the main source of protein as well as energy. The toddlers are unable to consume enough rice to meet their nutrient requirements. Furthermore it has been estimated<sup>7</sup> that only one-quarter of the population grew sufficient rice to last one year while half have enough to last about eight months. The remaining one-quarter of the population had only rice for about four months. There are thus varying periods when maize or tapioca serve as their staple. This further compounds the nutritional problems faced by the toddler.

The dietary investigations indicated that protein and energy intake in the community appeared to be adequate. This should be interpreted with caution in view of the seasonal fluctuations mentioned above. Furthermore protein intake may be inadequate qualitatively

since much of it is derived from rice which contains incomplete proteins (lysine is the limiting amino acid). The large amounts of rice consumed ensured adequate intake of vitamin B complex with the exception of riboflavin. Deficiencies in other nutrients such as calcium, vitamins A and C are probably due to a diet which is lacking in variety, especially in terms of vegetables and meat.

From the above discussion it appears that inadequate food production is one of the important factors involved in the causation of PEM in this community. This is further complicated by socio-cultural factors such as food beliefs and poor environmental sanitation. Some of the following measures may be helpful in alleviating the problem of malnutrition in this community.

High yield rice strains which can thrive under the dry, unfavourable conditions associated with the cultivation of hill rice, should be introduced. The new strains should also possess better quality proteins in higher concentrations. The addition of other vegetables such as legumes will make up for the amino acid deficiencies in rice protein. One fast growing and nutritious legume suitable for the area would be the four-angled bean (*kacang botol; Psophocarpus tetragonolobus*) and another would be string beans (*Vigna sinensis*).

Mothers should be encouraged to add supplements to the toddlers' diet, using available

vegetables or shoots of wild plants. Meat, fish or eggs should also be included whenever possible. Measures to improve the environmental sanitation of some of the longhouses would help to reduce the incidence of infections, especially diarrhoeal diseases in children. Breast-feeding should be actively encouraged to offset the encroaching influence of infant milk formulas and commercially-prepared weaning foods.

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