

# Prevalence of protein-calorie malnutrition in a group of Malaysian School Children

by *S. T. Chen*

**M.B., B.S., M.P.H. (Harvard)**  
Department of Paediatrics,  
Faculty of Medicine,  
University of Malaya,  
Kuala Lumpur,  
Malaysia.

## INTRODUCTION

THE EVALUATION OF nutritional status in childhood is of major public health importance in developing countries. However very little is known regarding the prevalence of malnutrition in school children in Malaysia. The purpose of this study is to evaluate the prevalence of malnutrition among primary school children in an urban community in Malaysia, using the common anthropometric indicators of weight and height.

## MATERIAL AND METHODS

From February to April 1972, five primary schools (two Malay medium, one Chinese medium, one Tamil medium and one English medium school) in Petaling Jaya and Kuala Lumpur were surveyed. Altogether 2,340 children, aged 6 to 9.9 years, were examined.

The dates of birth of the children were obtained from birth certificates. The household income and occupations of the parents and the number of living siblings were obtained by interviewing parents or from returns of questionnaires and the school registers. Weight, height, left triceps skin-fold, left arm circumference and head circumference were all measured. However, only the results of weights and heights will be presented in this paper.

In general, the methods of measurements used were those suggested by Jelliffe (1966). Children were weighed on an Avery beam balance accurate to an ounce. Each child was lightly clad in a standard thin cotton school uniform. Measurements were

read to the last complete ounce. The height was measured by means of the Microtoise. Each child, without shoes, was positioned in the standard manner (Jelliffe 1966) below the Microtoise. The head piece was then brought to rest on top of the head and the reading taken direct at the visor hairline and to the last complete 0.1 cm.

The most commonly used method of assessment of protein-calorie malnutrition is based on deficit in weight for age. The Wellcome Trust Working Party (1970) classified those children who had no oedema and were between 60–80 per cent of the expected weight for age (which was taken as the 50th percentile of the Boston standards) as underweight. Those children who were less than 60% were classified as marasmic. Stunting indicates that undernutrition has been present over a long period while wasting indicates current undernutrition. However, since a low weight for age does not distinguish between these two states, other measurements must be utilized.

Waterlow (1972 & 1974), classified children according to the severity of stunting and wasting in each case. He distinguishes 3 grades of deficit in height for age (stunting): grade 1 = 95–90%; grade 2 = 90–85%; and grade 3 = less than 85% of standard, (the standard being the Boston 50th percentile) and distinguishes 3 grades of deficit in weight for height (wasting): grade 1 = 90–80%; grade 2 = 80–70%; and grade 3 = less than 70% of standard (Boston 50th percentile).

In this study, in order to detect a significant degree of malnutrition in the school children, the

cut off point in the case of weight for age was taken as 70% while that of height for age as 90% and weight for height as 80%. Classifying these children according to the various degrees of malnutrition was performed with the aid of a computer.

## RESULTS

The frequency distribution of children according to ethnic group, income and sex is shown in Table I.

### a) Income

Of the three ethnic groups, the Indian were the poorest, the Malays were better off while the Chinese had the highest income. 75% of the Indians, 68% of the Malays and 14% of the Chinese came from families with a total household income of less than M\$200/- per month; while 27% of the Indians, 7% of the Malays and 2% of the Chinese came from families with total household income of less than M\$100/- per month.

For purposes of comparison the children were divided into two income groups, namely, those with monthly household incomes of M\$500 and above and those with less than M\$500 per month.

### b) Sibling size

71% of the Indian children, 62% of the Malay and 46% of the Chinese children had 4 or more living siblings. These differences are statistically significant.

### c) Weight for age, height for age and weight for height

Fig. 1 shows that, on the whole, the children had more deficit in weight for age and height for age than in weight for height, the percentages being 27%, 25% and 9% respectively. However the Indians had the greatest deficit in weight for age (41%) and weight for height (16%), while the Malays

had the greatest deficit in height for age (38%). The Chinese on the other hand had the least deficit in weight for age (14%) and height for age (13%) while the rates for deficit in weight for height was essentially the same for the Malays and the Chinese. The differences in weight for age, height for age and weight for height among the three ethnic groups are statistically significant.

Fig. 2 shows that the lower income children had significantly higher rates of deficit in weight for age, height for age and weight for height compared with the higher income children. Similar findings were seen in those children with larger family size compared with those of smaller family size. Table II shows similar effects of income and family size in respect of deficit in weight for age and height for age within each ethnic group.

## DISCUSSION

A quarter of the school children had a significant degree of deficit in weight for age (underweight) and deficit in height for age (stunting) while only 9% had a significant degree of deficit in weight for height (wasting). This indicates that the majority of these children were nutritional dwarfs who had suffered from chronic malnutrition during the preschool period but have recovered from the malnutrition. This finding is supported by previous findings that malnutrition is common among the preschool children in Malaysia (Chong 1972 & Chen 1975).

There are many causes of malnutrition during the preschool period, among which are low income, frequent pregnancies, lack of knowledge of nutritive value of local foods and lack of knowledge of the importance of breast feeding and of a transitional weaning diet for toddlers resulting in a toddler diet that is deficient in quantity and quality. Furthermore poor environmental sanitation results in worm

**Table I**  
**Frequency Distribution of School Children by Ethnic Group, Income and Sex**

Ethnic Group	Income (M\$)						Total
	Less than \$500			\$500 and above			
	Male	Female	Total	Male	Female	Total	
Malay	303	386	689	41	31	72	761
Chinese	306	310	616	221	183	404	1020
Indian	218	289	507	22	30	52	559
Total	827	985	1812	284	244	528	2340

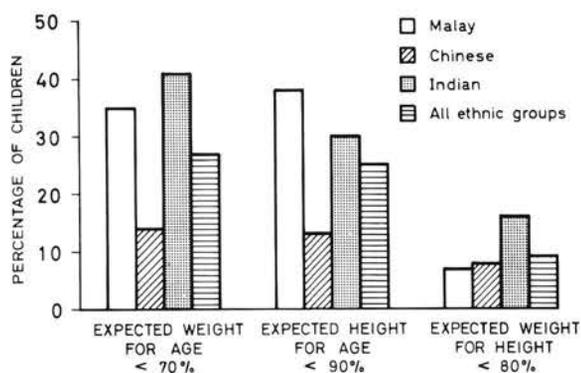


Fig. 1

Bar chart showing the distribution in percentage of the school children, according to ethnic groups and deficit in weight for age, height for age and weight for height.

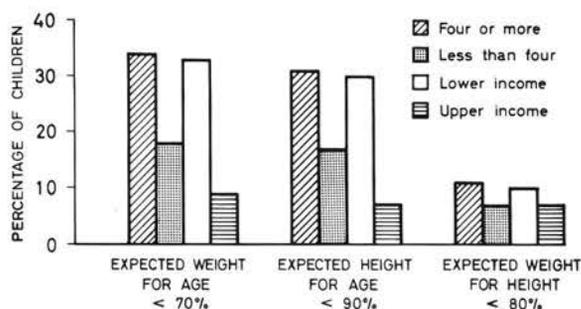


Fig. 2

Bar chart showing the distribution in percentage of the school children according to income, sibling size and deficit in weight for age, height for age and weight for height.

infestation and frequent infections which further compound the malnutrition (Chen 1974).

Unlike the Chinese and the Malays, 16% of the Indians had a significant degree of wasting i.e. they

were still suffering from acute or chronic malnutrition. This is probably due to the fact that the Indians were not only the poorest of the three ethnic groups but also had larger families. The poor families had poor nutrition, bad living conditions,

Table II

Frequency distribution of school children by ethnic group, income, number of living siblings, expected weight for age and expected height for age

Ethnic group	Income and sibling		Expected weight for age (% of standard)			Expected height for age (% of standard)		
			Less than 70			Less than 90		
			Number	Percent	"p"	Number	Percent	"p"
Malay	Income	Lower	252	37	<.001	281	41	<.001
		Upper	11	15		8	11	
	Sibling	Less than 4	85	29	.02 < P < .05	95	33	.02 < P < .05
		4 and above	178	38		194	41	
Chinese	Income	Lower	112	18	<.001	100	16	<.001
		Upper	32	8		29	7	
	Sibling	Less than 4	51	9	<.001	50	9	<.001
		4 and above	93	20		79	17	
Indian	Income	Lower	226	45	<.001	170	34	<.001
		Upper	2	4		0	0	
	Sibling	Less than 4	42	26	<.001	26	16	<.001
		4 and above	186	32		144	36	
All	Income	Lower	590	33	<.001	551	30	<.001
		Upper	45	9		37	7	
	Sibling	Less than 4	178	18	<.001	171	17	<.001
		4 and above	457	34		417	31	

poor hygiene and health care and suffered from poor health. Chen (1972), in a survey of school children in three of the schools included in this study, found that the Indian children suffered from more ill health than the Malays while the Chinese were the healthiest of the three.

What action should be taken at the community level? Since most of the underweight children were nutritional dwarfs action should be taken to improve the nutritional status of preschool children. This can be achieved by improving the general economic level of the poor, raising the general educational level of the people, educating the public on infant and toddler feeding, recognizing the importance of family planning, immunisation and hygiene and providing better environmental sanitation to the people.

However for those children who are wasted, in addition to the community actions mentioned above, school meals should be provided to supplement their poor diet at home and a school health service should be provided.

### SUMMARY

The weights and heights of 2,340 Malaysian primary school children aged 6 – 9.9 years, belonging to various ethnic groups in Petaling Jaya and Kuala Lumpur, Malaysia, were measured.

27% of the children showed significant deficit in weight for age (underweight) and 25% in height for age (stunting) while only 9% showed significant deficit in weight for height (wasting). This indicates that most of these children were nutritional dwarfs who had suffered from protein-calorie malnutrition during the preschool age period. The prevalence of a significant degree of underweight was highest in the Indians (41%) and lowest in the Chinese (14%) while the prevalence rate for the Malays was 35%. The Malays however had the highest prevalence of stunting when compared with the Indians and the Chinese, this being 38%, 30% and 13% respectively. 16% of the Indians had a significant degree of wasting when compared with the Malays (7%) and the Chinese (8%). This indicates that a

higher proportion of the Indian children were still suffering from acute or chronic malnutrition compared with the Malays and the Chinese. This is probably due to the fact that the Indians were the poorest among the three ethnic groups. Further the Indians came from larger families and suffered from more ill health.

Since most of the underweight children were nutritional dwarfs, community action should be directed predominantly at preschool children. However efforts should, in addition, be directed at improving the nutritional status of those school children who are currently wasted.

### ACKNOWLEDGEMENT

I would like to thank the Director of Education, Selangor Education Department for allowing me to examine the children in the schools, Professor M.J. Robinson, Head, Department of Paediatrics, for advice, the staff of the schools for their co-operation, the Department of Medical Illustration, and Mrs. L.L. Mah, Miss M.M. Choong and Mr. K.P. Tan for technical assistance.

### REFERENCES

- Chen, S.T. & Dugdale, A.E. (1972). Morbidity pattern amongst some primary school entrants in Malaysia. *Trop. geogr. Med.*, **24**: 269–274.
- Chen, S.T. (1974). Protein-calorie malnutrition: A major health problem of multiple causation in Malaysia. *Southeast Asia J. Trop. Med. Publ. Hlth.*, **5**: 85–89.
- Chen, S.T. (1975). Pneumonia and diarrhoeas: killers of toddlers in developing countries. *Trop. geogr. Med.*, **27**: 103–108.
- Chong, Y.H., McKay, D.A. & Lim, R.K.H. (1972). Some results of recent nutrition surveys in West Malaysia. *Bull. Publ. Hlth. Soc.*, **6**: 55–61.
- Jelliffe, D.B. (1966). The assessment of the nutritional status of the community. Geneva, World Health Organisation (Wld. Hlth. Org. Monogr. Ser., No. 53) p. 62.
- Wellcome Working Party (1970). Classification of infantile malnutrition, *Lancet*, **2**: 302.
- Waterlow, J.C. (1972). Classification and definition of protein-calorie malnutrition. *Brit. Med. J.*, **3**: 566–568.
- Waterlow, J.C. (1974). Some aspects of childhood malnutrition as a public health problem, *Brit. Med. J.* **4**: 88–90.