

NUTRITIONAL STATUS OF CHILDREN IN RURAL SARAWAK, MALAYSIA

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Abstract. The nutritional status of 641 children between the ages of 0 to 4 years old, from 835 households in 41 randomly selected rural villages with water supply in Sarawak were determined. Based on Waterlow's classification and the National Center for Health Statistics (NCHS) standards, 61% of the children were stunted and 44.1% were wasted. Based on Gomez's classification and the NCHS standards 81.9% of the children were malnourished. There was no sex difference in nutritional status. The percentage of malnourished children increased continuously with age while the percentage of children who were wasted increased from 6 to 36 months and then it leveled off. The percentage of stunted children also increased with age but the increase was sharpest in children who were 12 to 23 months old. It is noted that the Gomez classification overestimates the prevalence of undernutrition.

INTRODUCTION

Undernutrition is a problem among children in Sarawak and the situation is worse in the rural areas where an estimated 82.7 percent of the children reside (Anonymous, 1980). Data on nutritional status (using Jelliffe's classification and Havard Standard (Jelliffe, 1966) of children are routinely collected by the child health clinics. Based on the annual returns from the clinics in 1989, 21.8% of children between 0 to 4 years old in the rural areas had moderate malnutrition (between 60 and 80% of the median weight-for-age) and 0.32% had severe malnutrition (below 60% of median weight-for-age). The corresponding figures for the urban areas were 9.5% and 0.1% respectively.

While weight-for-age indicator is easy to obtain it does not distinguish between the effects of present and past nutrition. There are some previous reports of the nutritional status of children in Sarawak using weight-for-height and height-

for-age indicators. However, they are limited to children in a few villages (Mckay and Wade, 1970; Yap, 1985) or to only a few children in one tribe. (Chen, 1984).

The purpose of this paper is to report the prevalence and age distribution of malnutrition, wasting and stunting among children four years old and below, in the rural areas of Sarawak.

MATERIALS AND METHODS

The study population comes from 3326 villages (representing 59.4% of all rural villages) which have been provided with rural water supply systems. Forty-one of the villages, with 796 households, were randomly selected for the study. Information on child characteristics and socioeconomic variables was obtained through interviewing the mother; alternatively a woman 18 years old and above was interviewed if the mother of the child was not at home. All children below five years were weighed. Those two years old and below had their supine length measured by an infantometer while those above two years old had their heights measured. The dates of births of the children were obtained from their under-seven health cards.

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Table 1

Distribution of children by degree of malnutrition* and age group.

Age group in months and number of children	Degree of malnutrition and percent of children				All types
	Normal	First degree [†]	Second degree [‡]	Third degree [§]	
0-5 (n = 55)	58.2	29.1	9.1	3.6	100.0
6-11 (n = 49)	28.6	51.0	18.4	2.0	100.0
12-23 (n = 138)	16.7	55.8	26.8	0.7	100.0
24-35 (n = 147)	10.9	55.1	32.7	1.3	100.0
36-47 (n = 132)	13.6	57.6	28.0	0.8	100.0
48-59 (n = 120)	10.8	49.2	35.8	4.2	100.0
Total (n = 641)	18.1	52.1	27.9	1.9	100.0

* Based on Gomez' classification of malnutrition (Gomez *et al.* 1956).

† Those between 76-90% of NCHS median weight-for-age.

‡ Those between 61-75% of NCHS median weight-for-age.

§ Those 60% and below, of NCHS median weight-for-age.

Eighty-five percent of the 976 households had eligible respondents for the interview. Reasons for non-eligibility in the remainder were: no resident adult female (2.4%), house was closed (8.2%) and adult females were not in during the day of the survey (3.8%). Nearly half (46.0) of the households had no child below five years. The number of children below five years included in the survey was 641.

Data entry was done using International Questionnaire Development Program (Lee *et al.* 1988) which has anthropometric module that generated the anthropometric indicators of nutritional status used in the analysis. The anthropometric indicators were based on data assembled by the United States National Center for Health Statistics (NCHS) as recommended by the World Health Organisation (WHO, 1983).

RESULTS

Following Gomez's (1956) classification, 52% of the children had first degree malnutrition, 27.9% had second degree malnutrition and 1.9% had third degree malnutrition. The percentages of those who were malnourished increased with age

(Table 1). The distribution was similar for both sexes.

Using Waterlow's (1973) criteria, 60.1% of children were stunted and the percentage of those stunted also increase with age, the increase being very sharp from 12 months onwards (Table 2). Again there was no sex difference in the distribution. The percentage of children who were wasted was lower (at 44.1%) than those who were malnourished or stunted, and the age distribution also differed. The percentage of children wasted was higher in the 6 to 35 months age and then it decreased (Table 3).

When malnutrition, wasting and stunting were defined as those who were below two standard deviations of weight-for-age z-score, weight-for-height z-score and height-for-age z-score respectively (Waterlow *et al.* 1977), then 45.3% of the children were malnourished, 41.2% were stunted, 10.9% were wasted and 5.1% were both wasted and stunted (Table 4).

DISCUSSION

It is noted that stunting predominates over wasting among children four years old and below

CHILD NUTRITION IN SARAWAK

Table 2
Distribution of children by degree of stunting* and age group.

Age group in months and number of children	Degree of stunting and percent of children				All types
	Normal	Grade 1 [†]	Grade 2 [‡]	Grade 3 [§]	
0-5 (n = 55)	62.3	27.3	5.4	0.0	100.0
6-11 (n = 49)	65.3	30.6	4.1	0.0	100.0
12-23 (n = 138)	34.8	44.2	18.8	2.2	100.0
24-35 (n = 147)	28.6	52.4	16.3	2.7	100.0
36-47 (n = 132)	16.7	54.5	23.5	5.3	100.0
48-59 (n = 120)	14.2	41.7	35.0	9.1	100.0
Total (n = 641)	30.9	45.2	20.0	3.9	100.0

* Based on Waterlow's classification of stunting (Waterlow, 1973).

† Those between 91-94% of NCHS median height-for-age.

‡ Those between 86-90% of NCHS median height-for-age.

§ Those 85% and below, of NCHS median height-for-age.

Table 3
Distribution of children by degree of wasting* and age group.

Age group in months and number of children	Degree of wasting and percent of children				All types
	Normal	Grade 1 [†]	Grade 2 [‡]	Grade 3 [§]	
0-5 (n = 55)	76.4	16.4	3.6	3.6	100.0
6-11 (n = 49)	57.1	32.7	8.2	2.0	100.0
12-23 (n = 138)	48.6	40.6	10.1	0.7	100.0
24-35 (n = 147)	42.9	46.9	8.8	1.4	100.0
36-47 (n = 132)	60.6	34.1	5.3	0.0	100.0
48-59 (n = 120)	65.0	31.7	2.5	0.8	100.0
Total (n = 641)	55.9	36.3	6.7	1.1	100.0

* Based on Waterlow's classification of wasting (Waterlow, 1973).

† Those between 81-90% of NCHS median weight-for-height.

‡ Those between 71-80% of NCHS median weight-for-height.

§ Those 70% and below, of NCHS median weight-for-height.

in Sarawak, and this is similar to findings from other countries (Rao and Kanade, 1988). This indicates that children in Sarawak have long-term growth deficiency; it is most probably caused by a combination of chronic food deficiencies and repeated infections.

The percentage of wasted children increased from six months to 24 months, the period when

the child starts weaning. This is the period when the child suffers from an acute nutritional deficiency as shown by wasting. This has a later detrimental effect on skeletal growth as reflected in an increase in the percentage of children aged 12 months onwards, who are stunted.

Soon the deficits in height catch up with the deficits in weight and this is reflected in the

Table 4

Percent distribution of 641 children by presence/absence of wasting* and stunting†

Nutritional status	Stunted	Not stunted	Total
Wasted	5.1	5.8	10.9
Not wasted	36.1	53.0	89.1
Total	41.2	58.8	100.0

* Wasting defined as those below 2 standard deviations of the NCHS standards of weight-for-height.

† Stunting defined as those below 2 standard deviations of the NCHS standards of height-for-age.

decreasing percentage of children 48 to 59 months old who are wasted.

This study also bears out the observation by Rao and Kanade (1988) and Anderson (1979) that the Gomez classification based on weight-for-age gives an inaccurate diagnosis of current undernutrition (based on weight-for-height and height-for-age), in that it underestimates the number of normal cases. This underestimate occurs in all age groups. Anderson (1979) pointed out that this underestimate is pronounced if stunting is not accompanied by wasting, as is the case with Sarawak children where only 5.1% of the children are both wasted and stunted.

It might be argued that the high prevalence of undernutrition in the rural areas is due to an inappropriate choice of standards but studies have shown that among preschool children differences in growth associated with social class are many times those which can be attributed to ethnic factors alone (Habicht *et al*, 1974). McKay *et al* (1971) found this to be true among Malay children as well. Thus it is believed that the figures are a fair reflection of the nutritional status of the group in the present study.

This study was carried out only among villages covered by rural water supply and sanitation and it is expected that the nutritional status of children in villages without water supply and sanitation would be worse (Esrey and Habicht, 1985).

This study has shown that the problem of

wasting is worse among children in the weaning age group and this may be alleviated by better child care and health education of families on the proper preparation of weaning foods.

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REFERENCES

- Anderson MA. Comparison of anthropometric measures of nutritional status in preschool children in 5 developing countries. *Am J Clin Nutr* 1979; 32 : 2339-435.
- Chen PCY. Child nutrition among the Penans of the Upper Baram, Sarawak. *Med J Malaysia* 1984; 39 : 264-8.
- Gomez F, Galvan RR, Frenk S, Munoz JC, Chavez R, Vazquez J. Mortality in second and third degree malnutrition. *J Trop Paediatr African Child Health* 1956; 2 : 77.
- Esrey SA, Habicht JP. The impact of improved water supplies and excreta disposal facilities on diarrhoeal morbidity, growth and mortality among children Cornell *Cornell Int Monogr Ser* 1985; 15.
- Habicht JP, Martorell R, Yarborough C, Malina RM, Klein RE. Height and weight standards for preschool children. *Lancet* 1974; 611-5.
- Jelliffe DB. The assessment of the nutritional status of the community. Geneva, World Health Organisation. *WHO Monogr Ser* 1966; 53 : 63-78.
- Lee FF, Bertrand WE, Mock NB. International Questionnaire Development System. New Orleans, Louisiana: Worldwide Information System, 1988.
- Anonymous. State population report Sarawak, Part 2. Department of Statistics, Kuala Lumpur, Malaysia 1986; pp. 468-84.
- McKay DA, Wade TL. Nutrition, environment and health in the Iban longhouse. *Southeast Asian J Trop Med Public Health* 1970; 1 : 68-77.

CHILD NUTRITION IN SARAWAK

- Mckay DA, Lim RKH, Notaney KH, Dugdale AE. Nutritional assessment by comparative growth achievement of Malay children. *Bull WHO* 1971; 45 : 233-42.
- Rao S, Kanade A. Comparison of Gomez and Waterlow classifications in a follow-up study among preschool children. *Eur J Clin Nutr* 1988; 42 : 863-9.
- Waterlow JC. Note on the assessment and classification of protein energy malnutrition in children. *Lancet* 1973; 2 : 87-9.
- Waterlow JC, Buzina R, Keller W, Lane JM, Nichaman MZ, Tanner JM. The presentation and use of height and weight data for comparing the nutritional status of groups of children under the age of 10 years. *Bull WHO* 1977; 55 : 489.
- WHO. Measuring change in nutritional status. World Health Organisation, Geneva, 1983.
- Yap SB. The nutritional status of Iban preschool children, Sarawak. *Med J Malaysia* 1985; 40 : 185-90.
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