SPECIFIC NUTRIENT DEFICIENCIES IN MALAYSIA

E-Siong Tee

Division of Human Nutrition, Institute for Medical Research,
50588 Kuala Lumpur, Malaysia

ABSTRACT

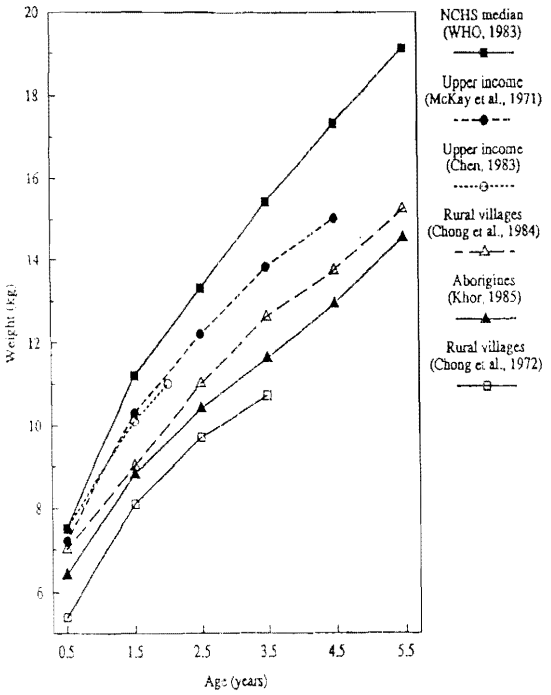
The rapid socio-economic development and parallel improved health care in Malaysia has brought about improved health and nutrition situation in the country. While the overall nutrition situation has improved, various studies carried out have shown that pockets of malnutrition exist among various rural and urban underprivileged communities. Overt nutritional deficiencies have rarely been encountered, but mild-to-moderate undernutrition affects significant proportions of the population. The major nutrient deficiencies in the country are protein and energy malnutrition, iron deficiency anemia, vitamin A deficiency and endemic goitre. Growth retardation has been reported to occur among rural preschool and school-age children. The prevalence of acute undernutrition (wasted) and severe chronic undernutrition (wasted and stunted) is low, but a considerable amount of chronic undernutrition (stunted) and underweight are known to exist. Iron Deficiency anemia remains a problem of considerable magnitude, afflicting mainly women of child-bearing age and young children. Vitamin A deficiency does not appear to pose a serious problem in the country. Goitre has been found to affect selected communities in the interior parts of Peninsular Malaysia, while the problem is known to be of a considerable magnitude in Sarawak. The persistence of these nutrient deficiencies in the country clearly indicate the need for the implementation of appropriate intervention programmes and the continuous monitoring of the nutrition situation.

1 Introduction

Concern for the nutritional status of an individual or community stems from the fact that nutritional deficiencies can result in such deleterious effects as depressed physical and mental development, reduced resistance to infections, greater risk to premature delivery, increased maternal and foetal mortality and morbidity and reduced work performance. These consequences of malnutrition waste human resources and add to the social costs of the nation. Therefore, it is imperative for nutritionists to work closely with policy makers in identifying nutritional problems that may exist so that timely intervention could be implemented.

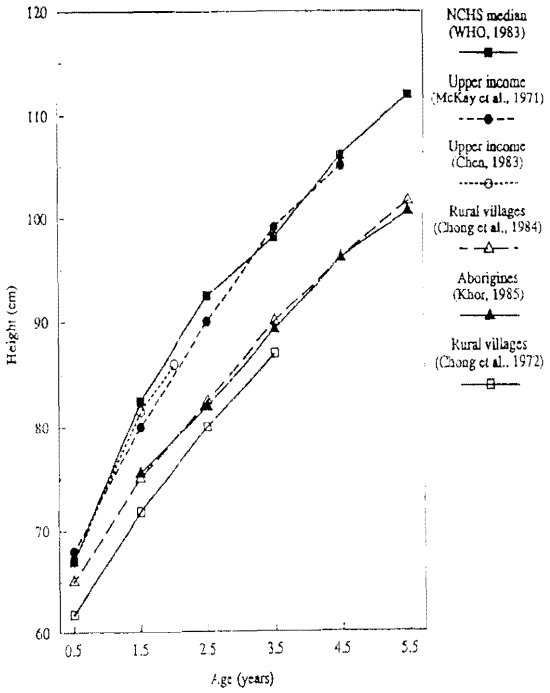
In a previous report in this Seminar, the overall nutrition situation in Malaysia has been shown to have improved steadily over the years (Tee, 1991). However, as can be expected, owing to the uneven distribution of facilities and resources, pockets of malnutrition exist in various parts of the country. This paper highlights the major nutrient deficiencies encountered by various communities, particularly the underprivileged rural and urban communities. Data cited in this paper have been derived from nutrition studies carried out by various insitutions in the country.

Figure 1. Weight-for-Age of Malay Pre-School Children, Peninsular Malaysia (sexes combined)



Source: Tee and Khor (1986)

Figure 2. Height-for-Age of Malay Pre-School Children, Peninsular Malaysia (sexes combined)



Source: Tee & Khor (1986)

2. Protein-Energy Malnutrition

Some recent data (Chen, 1983; Chong et al., 1984; Khor, 1985) on growth performance of pre-school children are shown in Figure 1. These weight-for-age data were plotted alongside some data collected in the 1970's (McKay et al. 1971; Chong et al, 1972), and the NCHS median (WHO, 1983). A general trend in growth performance of these children may be seen and some of the highlights include:

- upper income children had better weight-for-age achievement than those from rural areas;
- an apparent gain in weight-for-age among the preschoolers of poor rural communities over a decade period;
- there seemed to be less gain in weight-for-age for the upper income group (for which relatively less data are available) after more than a decade;
- the group of aborigine children studied in the mid-1980's appeared to be worse off than the rural poor Malay children.

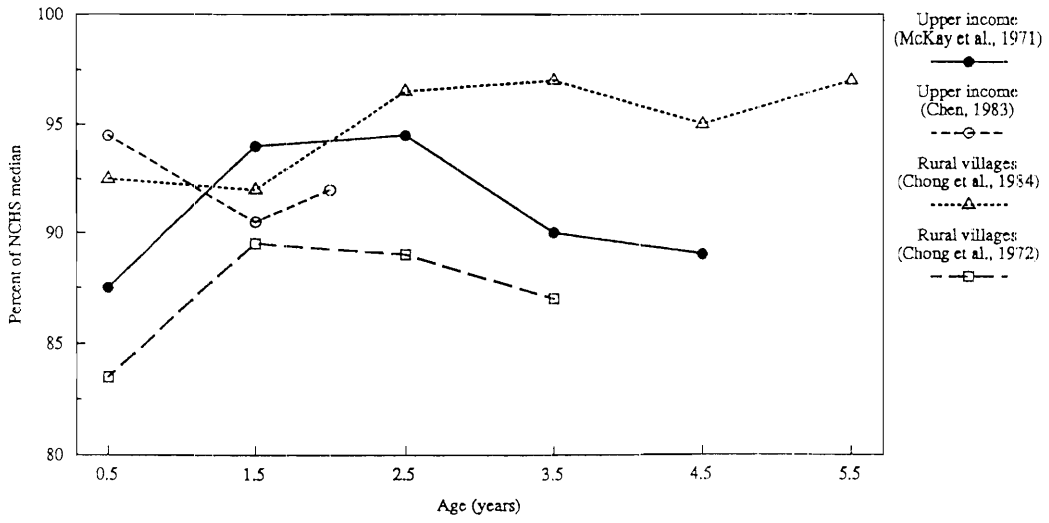
The height-for-age data of these groups of children were similarly plotted and shown in Figure 2. It can be seen that:

- height-for-age achievement of the upper income children, which seemd to approximate the NCHS median, was clearly better off than that of the rural children;
- there was a simi ar improvement in height-for-age over the last decade among the rural preschool children;

When expressed in terms of weight-for-height (Figure 3):

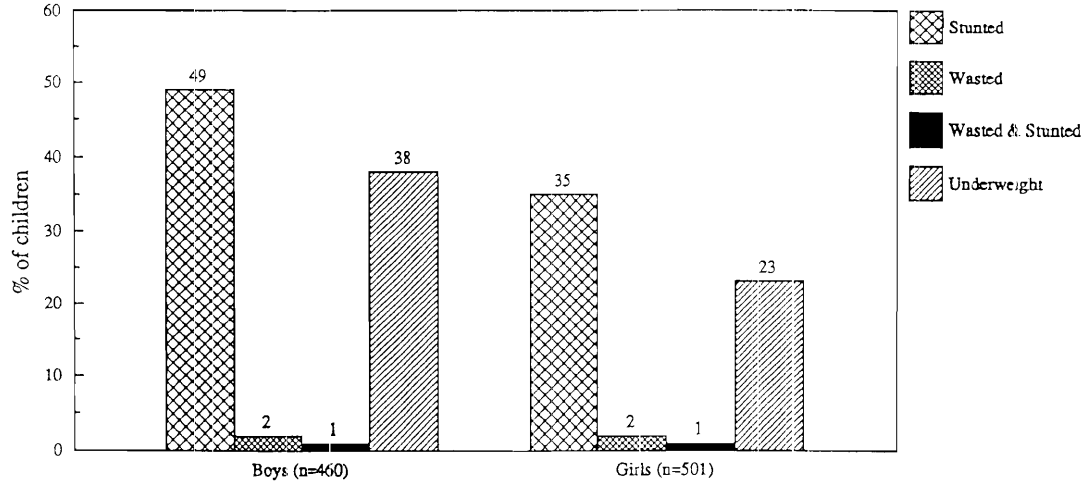
- the rural preschoolers showed achievements of 92-98% of the NCHS reference, compared to 83-89% a decade ago;
- there was a clear trend for the upper income children; they possessed weight-for-height achievements that range between 87 to 95% of the NCHS reference.

Figure 3. Weight-for-Height of Malay Pre-School Children, Peninsular Malaysia (sexes combined)



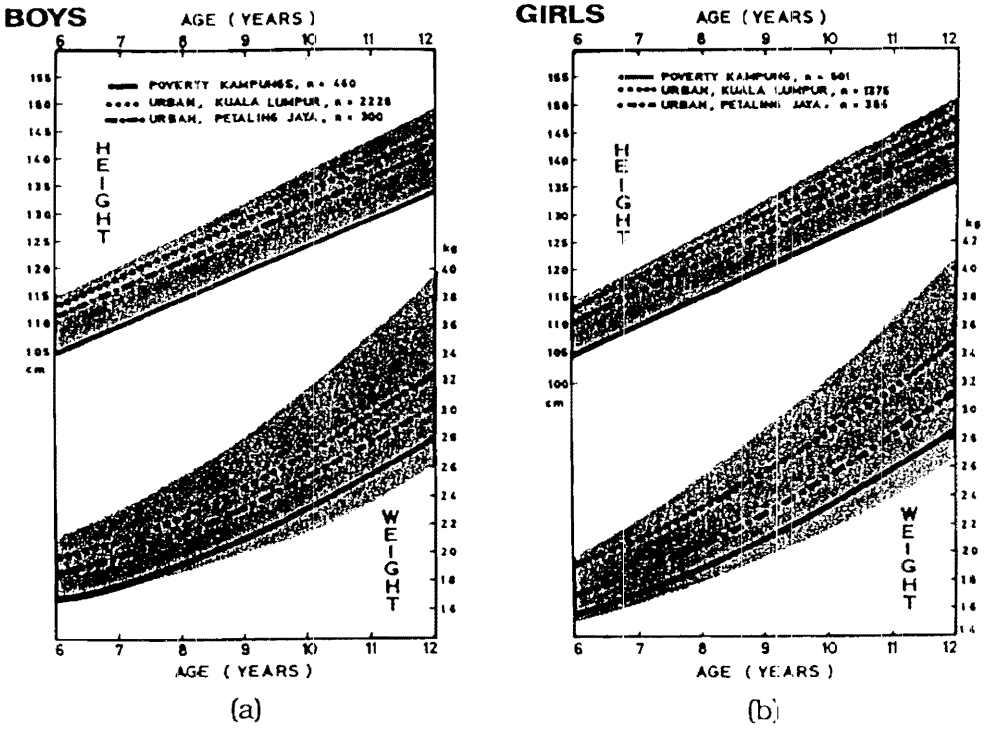
Source: Tee & Khor (1986)

Figure 4. Prevalence of Growth Retardation in Primary School Children of Rural Villages, Peninsular Malaysia



Source: Chong et al. (1984)

Figure 5. Comparative Growth Achievement of (a) Primary School Boys, and (b) Primary School Girls in Selected Rural Villages and Urban Areas Source:Chong et al. (1984)



Growth performance of primary school children have also been given considerable attention by investigators. Some recent data from rural children in Peninsular Malaysia (Chong et al., 1984) are given in Figure 4. The prevalence of acute malnutrition (wasted) and severe chronic undernutrition (wasted and stunted) were minimal, but considerable amount of chronic undernutrition (stunted) and underweight were seen. Compared to their urban counterparts, the median weight and height curves of these children were clearly inferior to their urban counterparts in Kuala Lumpur and Petaling Jaya (Figure 5). Such differences in growth achievement of rural and urban school children have also been reported earlier (Rampal, 1977).

Several studies have been undertaken to quantitate food consumption of communities, emphasising particularly protein and energy intake. Examples of recent large scale studies include the household food consumption of 14 rural villages in Peninsular Malaysia (Chong et al., 1984) and studies on five communities in Sabah (Chen et al., 1981). In the former study, the investigators reported that 66% of the households were not able to meet their requirement for calorie and 34% of households their requirement for protein. Similarly for the Sabah study, there was a wide range of nutrient consumption, and for 3 of the communities, some 75% of the households had a median calorie intake that were below their requirements. In the case of protein, it was found that 10-30% of the households did not meet requirement.

Several recent studies on food consumption by individual household members have been reviewed by Tee and Khor (1986). In general, protein intake by adolescents and preschool children appeared to be adequate. As has been found for household food consumption data, adequacy for calorie had been observed to be a greater problem than protein.

Table 1. Prevalence of Anemia Amongst Children of Various Communities[1]

	<1yr	1-6yrs	7-12yrs
Peninsular Malaysia			
a. rural villages	-	33%	39%
number of children	-	512	910
(Chong et al., 1984)			
Sarawak			
a. riverine Iban	44%	26%	-
number of children	107	1082	-
(Anderson, 1976,1977,1978a)			
b. inland Penan		45%	
number of children		123 (6mths - 8yrs)	
(Anderson, 1978b)			
Sabah			
a. Interior, West Coast & Kudat	-	20-31 %	16-31 %
number of children	-	(total n = 3672)	
(Chen et al., 1981)			
b. Bengkoka Peninsula	-	44% (0-72mths)	
number of children	-	(tota n = 90)	
(Kandiah et al., 1984)			

[1]based on the following haemoglobin concentration cut-off levels:
<6 years : <11 g/dl
6-12 years : <12 g/dl

3. Anemia

Besides poor growth achievement, another major nutritional problem in Malaysia is iron deficiency anemia, which has been investigated for some years in the country (Tee, 1985). Some selected data (Chong et al., 1984; Anderson, 1976, 1977, 1978a, 1978b; Chen et al., 1981; Kandiah et al., 1984) amongst children of various population groups studied in the late 1970's and early 80's are shown in Table 1. It can be seen that the problem is of a considerable magnitude, including amongst children in the Peninsula, with prevalence rates ranging from 16 to 45%.

The anemia problem amongst pregnant women has also received particular attention. Like the growing children, these women are at particular risk to the development of anemia due to increased requirements. In a recent study (Tee et al., 1984) concluded at the Maternity Hospital, Kuala Lumpur, a moderately high prevalence of anemia amongst a group of pregnant women of lower socio-economic status was reported (Table 2). Anemia in the study population was said to be related mostly to iron and, to a lesser extent, folate deficiency.

Table 2. Nutritional Anemia Amongst Pregnant Women in the Maternal Hospital, Kuala Lumpur

Parameters	Ethnic groups			
	Chinese	Malays	Indians	Combined
Hemoglobin				
n	104	109	63	276
mean ± SD (g/dl)	11.48 ± 1.80	11.15 ± 1.51	10.51 ± 1.68	11.13 ± 1.70
% < 11 g/dl	30.8	47.7	58.7	43.8
Packed Cell Volume				
n	104	109	63	276
mean ± SD (%)	36.03 ± 4.58	34.75 ± 4.50	33.67 ± 4.42	34.99 ± 4.60
% < 33%	24.0	31.2	47.6	32.2
Serum Iron				
n	117	121	71	309
mean ± SD (%)	60.18 ± 35.07	48.45 ± 33.53	47.38 ± 38.88	52.65 ± 35.89
% < 50 μg/dl	45.3	60.3	69.0	56.6
Transferrin Saturation				
n	117	121	71	309
mean ± SD (%)	19.45 ± 9.91	15.87 ± 8.44	15.23 ± 8.39	17.08 ± 9.21
% < 15%	38.5	51.2	54.9	47.2
Ferritin				
n	110	103	67	280
mean ± SD (%)	21.86 ± 25.34	11.09 ± 8.80	12.61 ± 15.32	15.69 ± 19.02
% < 12 ng/dl	40.9	61.2	62.7	53.6
Serum Folate				
n	104	101	66	271
mean ± SD (%)	4.70 ± 5.06	3.30 ± 3.83	2.47 ± 2.44	3.64 ± 4.19
median	3.15	2.40	1.60	2.40
% < 3 ng/dl	45.2	66.3	77.3	60.9
Serum Protein				
n	117	121	71	309
mean ± SD (%)	6.03 ± 0.35	6.21 ± 0.43	6.13 ± 0.36	6.12 ± 0.39
% < 6 g/dl	36.5	23.1	25.4	28.8
Serum Albumin				
n	117	121	71	309
mean ± SD (%)	3.24 ± 0.24	3.11 ± 0.32	2.99 ± 0.30	3.13 ± 0.30
% < 3 g/dl	11.1	25.6	46.5	24.9

Source: Tee et al. (1984)

4. Vitamin A Deficiency

Studies carried out in several poverty villages in Peninsular Malaysia have indicated that vitamin A deficiency does not appear to pose a serious problem in the communities studied (Chong et al., 1984). Clinical signs of xerophthalmia were rarely encountered. Eye signs that could be associated with vitamin A deficiency were dryness and wrinkling of the conjunctiva, observed in some 10% of the school children. Data on serum vitamin A status obtained for a small number of children showed that there was a low prevalence of low levels of the vitamin (Table 3). There was a problem of obtaining sufficient blood from the children for biochemical analysis. Among the adults (16-45 years), from whom it was possible to obtain enough blood from a larger number of subjects, the results indicated with more certainty that vitamin A deficiency did not appear to constitute a serious problem in the communities studied.

In a recent thorough review of the literature Tee (1988) reported that the vitamin A deficiency problem appeared to be confined to certain groups, mainly in the rural areas, and did not pose a major health hazard nationwide. The problem also appeared to have lessened over the years. It was however noted that there are many remote areas in the country where the vitamin A status is not known, including among urban squatter areas. It was pointed that the lack of comprehensive data should not be taken as indicative of absence of the problem. Extensive mapping of the vitamin A status of children in the country remains an important task.

Table 3. Serum Vitamin A Levels in Rural Villages, Peninsular Malaysia

Age groups	Mean ± SD (μg/dl)	% with "low" vitamin A
Pre-school		
n = 25	31 ± 9.5	12
Primary school		
n = 40	33 ± 12.5	10
Boys, 12-17.9 years		
n = 32	44 ± 22	16
Girls, 12-17.9 years		
n = 61	55 ± 19	3
Men, 18-45.9 years		
n = 152	46 ± 19	7
Women, 18-45.9 years		
n = 353	47 ± 24	12
Men, 46 years and above		
n = 14	54 ± 33	0
Women, 46 years and above		
n = 14	42 ± 17	7

Source: Chong et al. (1984)

5. Iodine Deficiency

Endemic goitre too does not appear to be a major nutritional problem in Peninsular Malaysia, except for a few studies which have indicated high prevalence rates in isolated parts of the Peninsula. The problem is however, much more extensive in Sarawak. A recent review (Tan 1982) indicated that 12 of the State's 25 districts have been identified as goitrous, with varying rates of prevalence and occurring mainly in the inland areas (Table 4) . It has been estimated that there were at least 20, 000 cases of endemic goitre in Sarawak, representing about 1.5% of its total population. The problem is said to be caused primarily by iodine deficiency in the diet, and goitrogens probably play a small and unimportant role in most of Sarawak (Chen, 1981).

Table 4. Summary of Goitre Studies in Sarawak

Location	Ethnic groups	Age (years)	Total number	Prevalence (%)
First division	Chinese, Malay	10-14 (female)	273	49.8
	Biduyah	> 15 (female)	157	52.2
Second division	Iban, Malay	10-14 (female)	147	38.8
	Chinese	> 15 (female)	161	80.7
Third, sixth and seventh	Iban, Chinese	10-14 (female)	252	34.5
divisions	Malay, Kejaman	> 15 (female)	589	55.2
Fifth division	Malay, Chinese	10-14 (female)	20	45.0
	Iban	> 15 (female)	151	45.0
	Total	> 10 (female)	1750	50.0
		>15 (female)	1058	58.0
Third division	Iban	All ages	608	8 (male)
Rejang River (interior)		(both sexes)		33(female)
Second division	Iban	> 11 (both sexes)	167	99.5
Lubuk Antu (interior)				
Ruba (coastal)	Iban	> 11 (both sexes)	38	74.1
Bajong (coastal)	Iban	> 11 (both sexes)	122	3.0
Second division	Iban	5-8 (both sexes)	388	76.5
Lemanak River (interior)		mothers only	166	90.5
Fourth division	Kayan/Kenyah	< 7 (both sexes)	556	30.4
Middle Bayam		4-8 (both sexes)	372	55.1
(intermediate)		mothers only	142	50.0
Muda area (interior)	Punan	All ages		
	(nomadic tribe)	(both sexes)	334	59.3
Seventh division	Iban	< 7 (both sexes)	414	7.0
Sut/Mujong River		mothers only	106	30.2
(interior)				
Second division	Iban	> 15 (female)	75	93.3
Upper Lemanak River		8 -12 (both sexes)	152	21.7
(interior)				
Third division	Iban	> 15 (female)	137	38.7
Kanowit District				
(Rejang River interior)				
Kanowit Town	Iban, Chinese	7-12 (both sexes)	542	0.7
Fourth division	Kayan, Kenyah	10-14 (female)	110	78.0
Tinjar River	Iban	> 15 (female)	157	77.7
		10-14 (female)	114	78.6

Source: Tan (1982)

6. Conclusions

Available data show that nutritional status of Malaysians has been improving over the years. Frank nutritional deficiencies are rarely encountered. Nevertheless, mild to moderate malnutrition exists amongst various population groups, especially the vulnerable groups in socio-economically disadvantaged communities. Growth retardation and anemia are the major problems encountered, while vitamin A deficiency and iodine deficiency goitre are prevalent among selected population groups. A variety of intervention programmes have been implemented to ameliorate these problems, and would need further intensification to achieve the targeted objectives.

ACKNOWLEDGEMENT

I thank Dr M. Jegathesan, Director of the Institute for Medical Research, for supporting my participation in this Seminar, and the Ministry of Health Malaysia for granting me permission to present this paper and attend the Seminar.

References

1. Anderson, A.J.U.
   Nutrition of Iban children of middle Mukah River. Report of the Sarawak Medical Services:1976

2. Anderson, A.J.U.
   Nutrition of Iban children of the Sarawak River Delta. Report of the Sarawak Medical Services:1977

3. Anderson, A.J.U.
   Nutrition of Iban children of the Sut and Mujong Rivers. Report of the Sarawak Medical Services:1978a

4. Anderson, A.J.U.
   Subsistence of the Penan in the Mulu area of Sarawak. Report of the Sarawak Medical Services:1978b

5. Chen, P.C.Y.
   A preventable and yet highly prevalent disease in Sarawak. Endemic goitre: 36:67-69,1981

6. Chen, P.C.Y., Chan, M.K.C., Teoh, S.T., Bent, B., Yap, S.B., Fong, T., Ong, F.P.T., Lee, M.C.C.
   A nutrition study of the Interior, West coast and Kudat Divisions of Sabah:1981

7. Chen, S.T.
   The assessment of physical growth and development from birth to 2 years of age in a selected group of Malay children from higher income families. M,D. Thesis:1983

8. Chong, Y.H., McKay, D.A., Lim, R.K.H.
   Some results of recent nutrition surveys in West Malaysia (with emphasis on nutritional anthropometry and biochemistry). Bull. Publ. Hlth Soc., :6:55-61,1972

9. Chong, Y.H., Tee, E.S., Ng, T.K.W., Kandiah, M., R. Hanis Hussein, Teo, P.H., Siti, M. Shahid
   Status of community nutrition in poverty kampungs. Bulletin no. 22:1984

10. Kandiah, M., Lee, M., Ng, T.K.W., Chong, Y.H.
    Malnutrition in malaria endemic villages of Bengkoka Peninsula. J. Trop. Paed., :30:23-29,1984

11. Khor, G.L.
    A study on the nutritional status of the Semai. Ph.D.Thesis:1985

12. McKay, D.A., Lim, R.K.H., Notaney, K.H., Dugdale, A.E.
    Nutritional assessment by comparative growth achievement in Malay children below school age. Bull. World Hlth.:45:233-242, 1971

13. Rampal, L.
    Nutritional status of primary school children: a comparative rural and urban study. Med.J.Malaysia, :32(1):6-16,1977

14. Ravi, T.
Assessment of nutritional status of children in an estate by means of anthropometry and dietary study. B.S. (Human Development) Dissertation: 1984

15. Tan, Y.K.
Endemic goitre in the State of Sarawak, Malaysia. In: Proceedings of the Workshop on Cassava Toxicity and Thyroid. Research and Public Health Issues, 31 May - 2 June: 66-68, 1982

16. Tee, E.S.
Spectrum and Perspectives with Relevance to Malaysia. National Population and Family Development Board. Nutritional Anemias: 1985

17. Tee, E.S.
Carotenoids and Retinoids in Human Nutrition. Institute for Medical Research: 1988

18. Tee, E.S.
Nutrition in a rapidly-developing economy - Malaysia. Paper presented at the Seminar on Nutrition in Health and Disease, 16-18 October :1991

19. Tee, E.S., Kandiah, M., Jaafar, Ali., Kandiah, V. Mohd. Rusli Zahari, Kuladevan, R. Zulkafli Hamzah.
Nutritional anaemia in pregnancy: a study at the Maternity Hospital, Malaysian J. Reprod. Hlth.,: 2(1):32-50.1984

20. Tee, ES., Khor, GL.
Overview of country nutritional status. Proceedings of the 1st Scientific Conference of the Nutrition Society of Malaysia. : 7-24, 1986

21. WHO
Measuring change in nutritional status. World Health Organization: 1983

INTERNATIONAL SEMINAR ON NUTRITION IN HEALTH AND DISEASE

Edited by

Lucila B. Rabuco
Kazuo Chihara
Masato Kawabata

October 16-18, 1991
University Of The Philippines Manila
Manila, Philippines

INTERNATIONAL SEMINAR ON NUTRITION IN HEALTH AND DISEASE

1996

INTERNATIONAL CENTER FOR MEDICAL RESEARCH, KOBE UNIVERSITY SCHOOL OF MEDICINE

COLLEGE OF PUBLIC HEALTH, UNIVERSITY OF THE PHILIPPINES MANILA