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OVERVIEW OF COUNTRY NUTRITIONAL STATUS

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ABSTRACT

The country has undergone tremendous socio-economic development since it gained Independence. Health indicators such as life expectancy at birth, and infant, toddler and maternal mortality rates have been improving steadily. Food Balance Sheet data also indicate increases in per capita availability of protein and calorie. These data show that the nutritional status of Malaysians have been improving over the years. However, due to the problem of inequity, such national data do not reflect the existence of considerable variations in the nutritional status of different communities in various parts of the country. Indeed, recent studies have indicated that considerable amount of mild to moderate malnutrition occurs in various poverty rural and urban communities, although severe protein-energy malnutrition is not frequently reported. Major nutritional deficiency problems encountered by various segments of the population will be highlighted.

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 will undoubtedly deplete 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.

For many years, various Government departments and research institutions in the country have been studying and characterising the nutritional problems of Malaysians. Health indicators such as life expectancy at birth, birthweight data, and infant, toddler and maternal mortality rates have been constantly monitored as indirect indicators of the nutritional status of Malaysians. At the same time, various communities in different parts of the country have been studied by direct assessment. These studies have provided valuable infor-

mation on the nutritional status of various communities in different parts of the country that may be utilised in intervention programmes. This paper gives an overview of the nutritional deficiency problems encountered in the country, using several indirect parameters, as well as some recent community studies. Nutritional disorders associated with overnutrition shall not be discussed in this paper.

HEALTH AND NUTRITIONAL INDICATORS

Since no comprehensive data on the nutritional status of Malaysians are available, several mortality rates have been used as indirect indicators of the overall nutrition situation in the country. Table 1, extracted from a recent UNICEF report[1] shows some of these indicators in Malaysia, in relation to several selected countries. Data presented show a general trend of improved health and nutritional status associated with higher gross national product (GNP) of the countries, as well as the improvement of health status from 1960 to 1982 in each country, as socio-economic conditions improved.

Table 1 — Economic and Health Status of Selected Countries, 1960—1982

Country	per capita GNP (US$)	Life expectancy at birth		Mortality rates per 1,000			
				Infants (below 1 yr)		Toddler (1—4 yr)	
	1982	1960	1982	1960	1982	1960	1982
Indonesia	580	41	52	150	90	23	13
Thailand	790	49	63	100	50	13	4
Philippines	820	53	64	110	50	14	4
Malaysia	1860	54	67	70	29	8	2
Rep. of Korea	1910	54	67	80	30	9	2
Mexico	2270	57	66	90	50	10	4
Singapore	5910	65	72	36	11	2	<1
Japan	10080	68	76	31	7	2	<1
Australia	11140	71	74	20	10	1	<1

Source: Grant[1]

A more detail breakdown of the decline of some of these mortality rates in Peninsular Malaysia is given in Figure 1 and Table 2, compiled from various reports of the Department of Statistics[2—7]. It can be seen that there has been a dramatic decline in these rates since the country gained Independence in 1957. Infant mortality rates have declined from 76 in 1957 to around 19 in 1982. Over the same period, toddler mortality rates dropped from 10.7 to 1.7, while maternal mortality recorded a decline from 3.20 to 0.50.

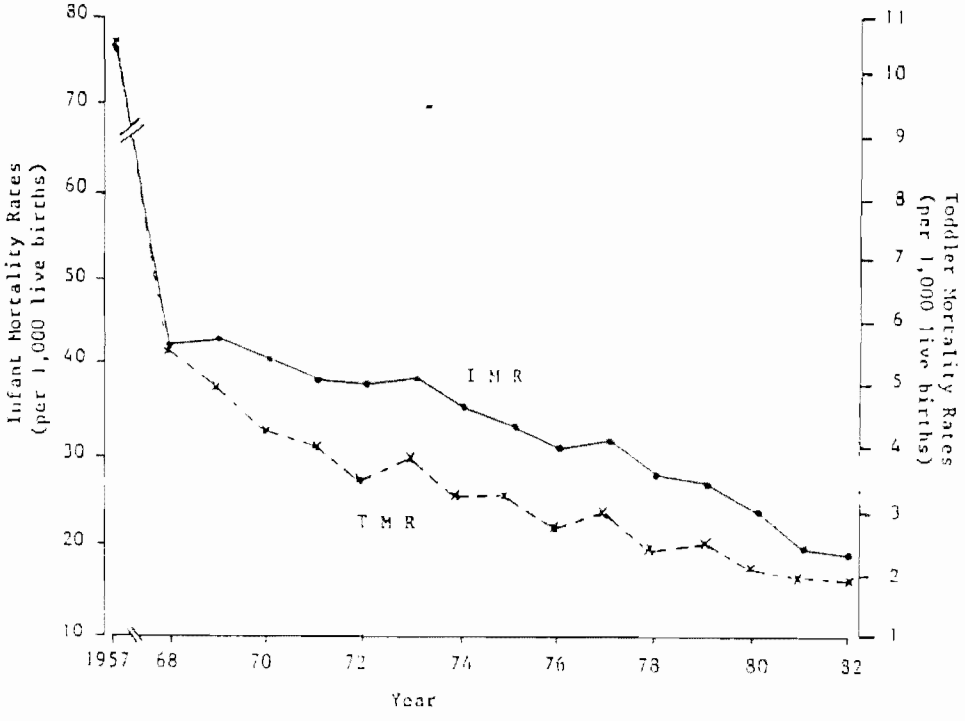

Figure 1
Infant and Toddler Mortality Rates in Peninsular Malaysia (1957—1982)

Source: Plotted using data from Department of Statistics reports[2—7]

Table 2 — Maternal Mortality Rates in Peninsular Malaysia, 1957—1982

Year	Maternal mortality rates (per 1,000 live births)
1957	3.20*
1967	1.68*
1972	1.07
1974	0.96
1976	0.78
1977	0.79*
1978	0.84
1979	0.69
1980	0.63
1981	0.59
1982	0.50

Source: *From Hamid *et al.*[4]; others from Department of Statistics.[2—7]

There is considerable variation in the health status of communities in different states of the country. As can be seen from Table 3, highest mortality rates are found in the states of Terengganu, Kelantan, Kedah, Perak and Pahang. Those states with better health status, as reflected by low mortality rates, are the Federal Territory, Selangor and Penang. These differences between the various states appear to have remained essentially the same since a decade ago, as seen from data in the table.

Table 3 — Infant, Toddler and Maternal Mortality Rates of Various States in Peninsular Malaysia, 1972 and 1982.

	Infant		Toddler		Maternal	
State	1972	1982	1972	1982	1972	1982
Terengganu	44.8	27.4	6.03	2.63	1.77	0.76
Kelantan	50.6	27.0	5.18	3.42	2.20	0.71
Kedah	42.6	22.2	4.25	2.00	1.65	0.68
Perak	36.8	21.5	3.48	1.83	1.17	0.68
Pahang	36.7	21.2	4.21	1.92	1.66	0.94
Negeri Sembilan	38.0	19.7	2.79	1.57	0.80	0.11
Johore	36.7	18.9	2.93	1.42	0.55	0.39
Perlis	34.5	18.5	2.33	2.00	0.55	0.41
Malacca	37.6	17.9	2.59	1.41	0.36	0.27
Penang	34.6	15.8	1.84	1.18	0.51	0.28
Selangor	31.1	12.2	2.31	1.15	0.61	0.39
Federal Territory	—	8.9	—	1.08	—	0.18
Peninsular Malaysia	37.9	19.2	3.37	1.77	1.07	0.50

Source: Department of Statistics.[2, 7, 9]

Within each state, there are again wide variations in mortality rates in the different districts. For example, in Kelantan and Kedah, there are a few districts with infant mortality rates about twice that of the national average. At the same time, several districts in these states have recorded death rates of infants at about the level of the national average.[7, 9]

A similar picture is seen with regards to birth-weight data, although statistics in this area is less comprehensive. As shown in Table 4, prevalence of infants born with < 2.5 kg has declined in most of the states, and there is considerable variation in this prevalence rate in different parts of the country.

It is generally accepted that although these indices do give an indication of the overall nutritional status of the country or state, they do not show the problems existing at the micro level. Thus, while the overall nutrition situation in the country has improved over the years, recent studies have indicated that pockets of malnutrition exist in various parts of the country. These will be discussed in the later part of this paper.

Table 4 — Prevalence of Low Birth-weight in various States of Peninsular Malaysia

State	% Low birth weight (< 2.5 kg)	
	1978	1982
Terengganu	14.2	11.5
Kelantan	11.0	10.8
Kedah	11.8	11.2
Perak	10.7	10.6
Pahang	9.8	10.7
Negeri Sembilan	11.2	11.0
Johore	8.9	9.2
Perlis	10.7	10.5
Malacca	9.2	8.5
Penang	11.1	9.0
Selangor	10.6	9.9
Federal Territory	10.2	8.6
Peninsular Malaysia	10.5	9.9

Source: Department of Statistics.[5, 7]

Note: reports prior to 1978 from the Department of Statistics have not included birth-weight data.

FOOD AVAILABILITY DATA

A food balance sheet provides information on the pattern and quantity of supply of various food items in a country during the specified time period. The *per capita* supply of each such food item available for human consumption is obtained by dividing the respective quantity by the appropriate data on the population. By applying the appropriate food composition factors to these quantities, data on *per capita* nutrient availability, such as calorie, protein and fat, are also obtainable. Although food balance sheet data do not represent the actual consumption of communities, they do provide information on the food situation in a country.

Table 5 gives some data extracted from food balance sheets for Malaysia. No regular national food balance sheet compilation has been carried out for the country, and the data presented were taken from reports of the Food and Agriculture Organization.[10, 11] For the three periods shown, figures available show an increase in per capita availability of calorie, fat and protein, and a higher percentage of that protein from animal sources. It should be pointed out that figures for the earlier periods (1961—70 and 1971—78) are for Peninsular Malaysia only, while the 1979—81 figures are for the whole country.

As is well known, *per capita* food availability data may only be used as a

rough indicator of the food and nutrition situation of a country. Bearing in mind the problem of inequity of food distribution, these data also do not give insight on the nutritional status of communities at the local levels. More exact consumption data would have to be obtained through direct assessment studies. These will be discussed later in this paper.

Table 5 — Protein and Calorie Availability in Malaysia

	1961—70*	1971—78*	1979—81
daily per capita supply of:			
calories	2415	2552	2518
protein	49.5	51.5	56.0
fat	44.3	46.9	51.6
% animal proteins	31.3	35.0	44.5

*Peninsular Malaysia only
Source: 1961—70 and 1971—78 data from reference 10;
1979—81 data from reference 11.

RECENT STUDIES OF COMMUNITY NUTRITIONAL STATUS

Physical Growth

Anthropometry remains an important direct indicator of nutritional status of communities. Many studies in the country use weight and height measurements as primary tools in nutrition surveys. However, one problem encountered has been the use of different growth standards by different investigators, such as the Harvard and NCHS standards.

Some recent data[11–15] on growth performance of pre-school children are shown in Figure 2. These are plotted alongside some data collected in the 1970's[12, 16], and the NCHS median[17]. Most of the data shown are for Malay children, as there are relatively much more studies on them. A general trend in growth performance of these children may be seen and some of the highlights include:

* an apparent gain in weight-for-age among the preschoolers of poor rural communities over a decade period;
* there seems 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 appear to be worse off than the rural poor Malay children.[14]

The height-for-age data of these groups of children are similarly plotted and shown in Figure 3. It can be seen that:

* there is a similar improvement in height-for-age over the last decade among the rural pre-school children;
* among the upper income children, their height-for-age seem to approximate the NCHS median;

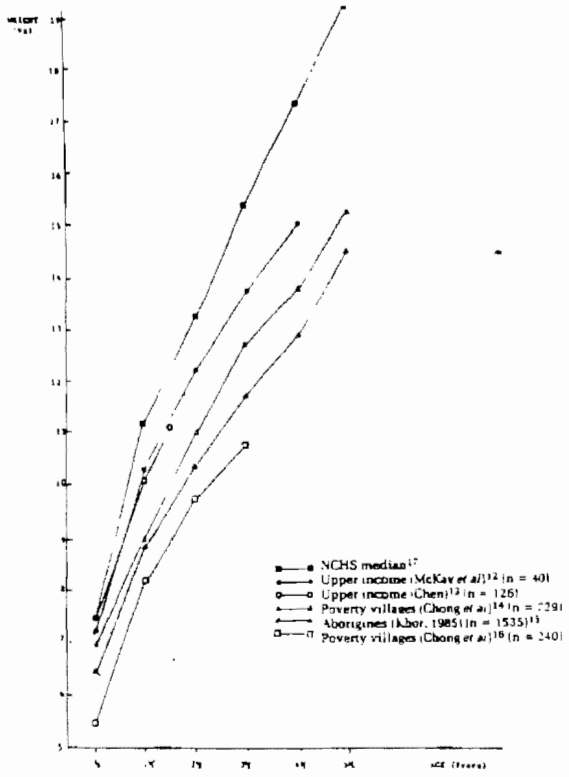

Figure 2
Weight for Age of Malay Preschool Children sexes combined)

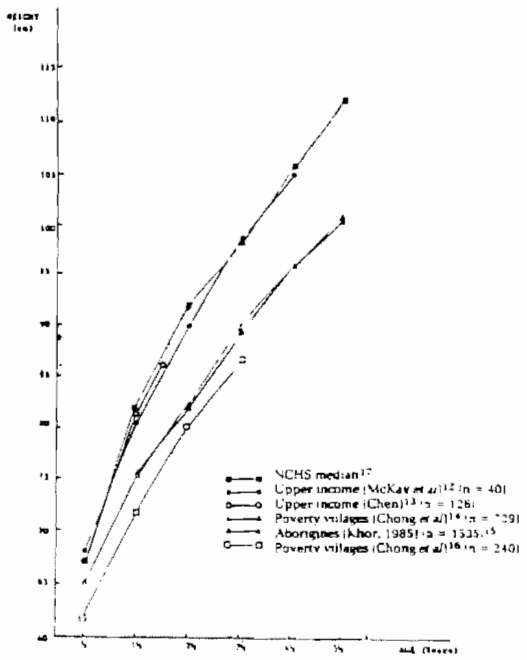

Figure 3
Height for Age of Malay Preschool Children (sexes combined)

When expressed in terms of weight-for-height (Figure 4):

* the rural preschoolers show achievements of 92—98% of the NCHS reference, compared to 83—89% a decade ago;

* there is a clear trend for the upper income children; they possess weight-for-height achievements that range between 87 to 95% of the NCHS reference.

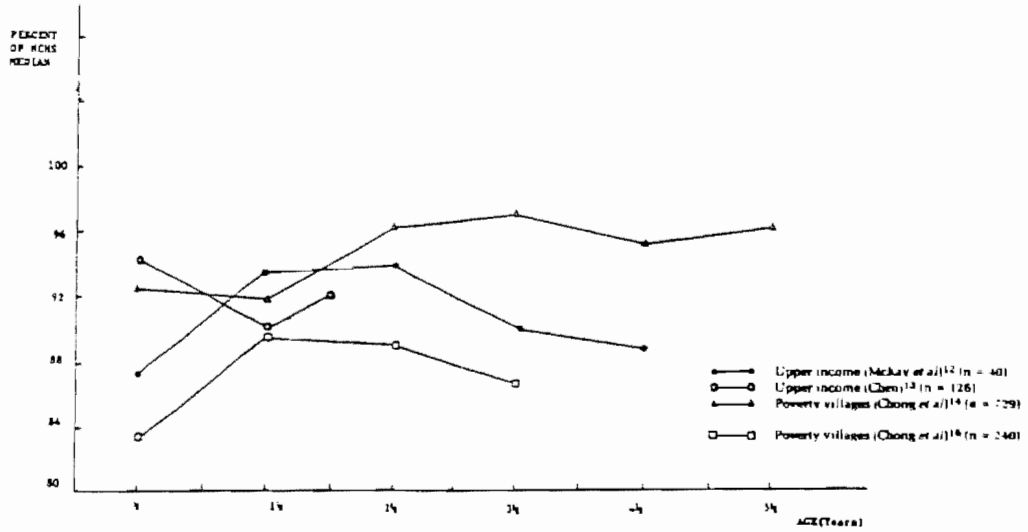

Figure 4
Weight for Height of Malay Preschool Children (sexes combined)

Growth performance of primary school children have also been given considerable attention by investigators. Some recent data from rural children in Peninsular Malaysia[14] are given in Table 6. The prevalence of acute malnutrition and severe chronic undernutrition was minimal, but considerable amount of chronic undernutrition and underweight was seen. Compared to their urban counterparts, the median weight and height curves of these children are 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

Table 6 — Prevalence of Growth Retardation in Primary School Children of Rural Villages, Peninsular Malaysia

	Kota Bharu	Mersing	Baling	Perak Tengah	All
Boys:					
% "Stunted"	54	41	57	41	49
% "Wasted"	0	3	4	1	2
% "Wasted & Stunted"	0	1	3	0	1
% "Underweight"	42	33	46	28	38
n	81	76	158	145	460
Girls:					
% "Stunted"	34	33	42	28	35
% "Wasted"	1	3	1	3	2
% "Wasted & Stunted"	1	0	1	3	1
% "Underweight"	18	34	25	18	23
n	100	90	159	152	501

Source: Chong *et al.*[14]

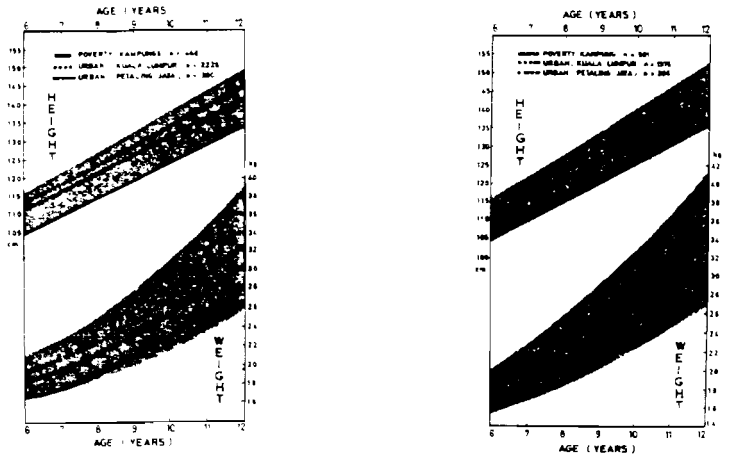

Figure 5

Comparative Growth Achievement of (a) Primary School Boys and (b) Primary School Girls in Selected Rural Villages and Urban Areas.

(Shaded areas represent weight and height achievements between median and median — 2SD of the NCHS reference).

Source: Chong *et al.*[14]

have also been reported earlier.[18] Weight and height data of the boys from this study are given in Figure 6. Data for the girls are said to show similar trends.

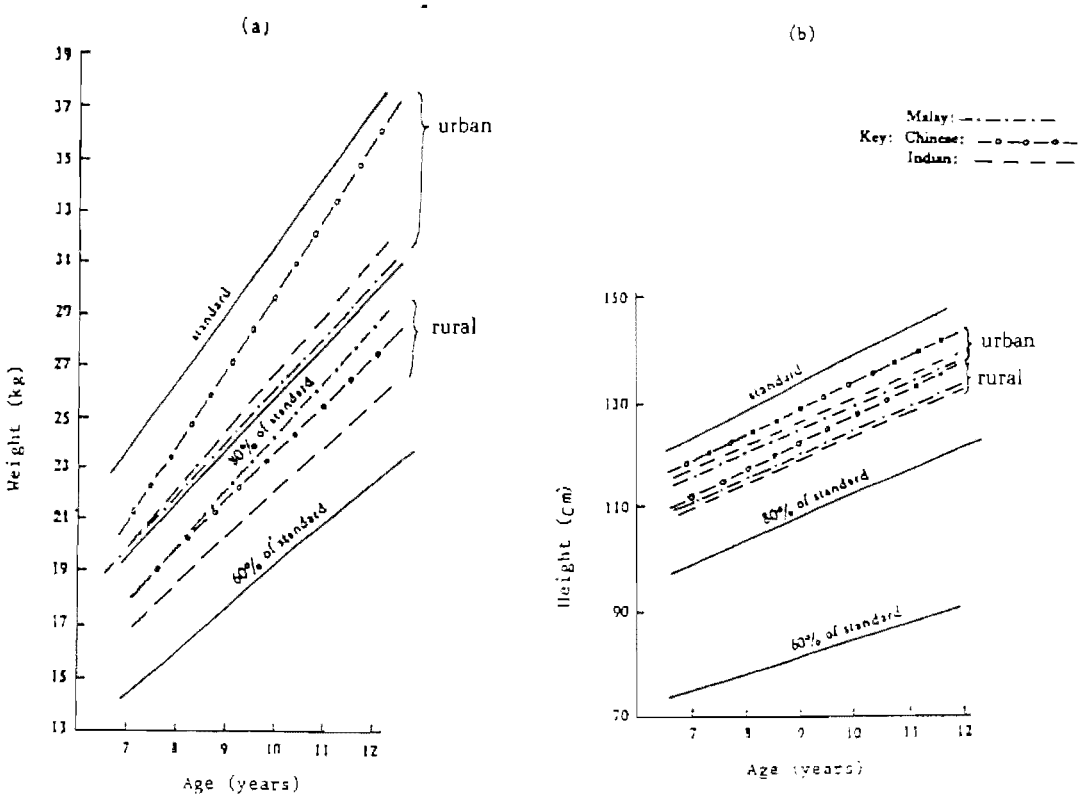

Figure 6
Weight and Height Trends of Primary School Boys in Urban Areas of Kuala Lumpur and Rural Areas of Klang District.

Source: Rampal[18]

Anaemia

Besides poor growth achievement, another major nutritional problem in the country is iron deficiency anaemia. In this area, haemoglobin determination has been the commonly used tool. Other biochemical parameters such as serum iron and ferritin are relatively infrequently reported due to the difficulty of analysis and collection of sufficient blood sample. The anaemia problem has been investigated for some years in the country.[19]

Some selected data[14, 20–25] on nutritional anaemia amongst children of various population groups are shown in Table 7. It can be seen that the problem is of a considerable magnitude, with prevalence rates ranging from 16 to 45%.

Table 7 — Prevalence of Anaemia Amongst Children of Various Communities*

		< 1 yr	1—6 yrs	7—12 yrs
Peninsular Malaysia				
a.	rural villages	—	33%	39%
	n		512	910
	[Chong *et al.*[14]]			
Sarawak				
a.	riverine Iban	44%	26%	—
	n	107	1082	
	[Anderson[20—22]]			
b.	inland Penan	45%		
	n	123		(6 mths—8 yrs)
	[Anderson[23]]			
Sabah				
a.	Interior, West Coast & Kudat Divisions		20—31%	16—31%
	n		(total n = 3672)	
	[Chen *et al.*[24]]			
b.	Bengkoka Peninsula		44% (0—72 mths)	
	n		(total n = 90)	
	[Kandiah *et al.*[25]]			

*based on the following haemoglobin concentration cut-off levels:
< 6 years < 11 g/dl; 6—12 years : < 12 g/dl

The anaemia problem amongst pregnant women has also received much attention. Like the growing children, these women are at particular risk to the development of anaemia due to increased iron requirements. In a recent study[26] concluded at the Maternity Hospital, Kuala Lumpur, a moderately high prevalence of anaemia amongst 309 pregnant women was reported (Table 8). Anaemia in the study population was said to be related mostly to iron and, to a lesser extent, folate deficiency.

Vitamin A Deficiency

Studies of other nutrient deficiencies through biochemical procedures are scarce. Most of these analyses require adequate laboratory support, which is not available to many investigators. Furthermore, the amount of blood collected do not permit these determinations to be carried out. However, some data for vitamin A determination are available. Table 9 shows data extracted from a study of rural communities in Peninsular Malaysia.[14] There appears to be a low prevalence of low serum vitamin A among the children studied, although the number of children examined was small. Among the adults (18—46 years), where it was

possible to obtain larger sample sizes, the results indicated with more certainty that vitamin A deficiency did not appear to pose a problem in the communities studied.

Table 8 — Nutritional Anaemia Amongst Pregnant Women: Recent Data from Maternity Hospital, Kuala Lumpur

Parameters	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 ± 4.30	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 (ug/dl)	60.18 ± 35.07	48.45 ± 33.53	47.38 ± 38.88	52.65 ± 35.89
% < 50 ug/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 (ng/ml)	21.86 ± 25.34	11.09 ± 8.80	12.16 ± 15.32	15.69 ± 19.02
median	13.5	9.0	8.5	11.0
% < 12 ng/ml	40.9	61.2	62.7	53.6
Serum Folate				
n	104	101	66	271
mean ± SD (ng/ml)	4.70 ± 5.06	3.30 ± 3.33	2.47 ± 2.44	3.64 ± 4.19
median	3.15	2.40	1.60	2.40
% < 3 ng/ml	45.2	66.3	77.3	60.9
Serum protein				
n	117	121	71	309
mean ± SD (g/dl)	6.03 ± 0.35	6.21 ± 0.43	6.14 ± 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 (g/dl)	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.*[26]

Endemic Goitre

Endemic goitre 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[27] 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 10). 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.

Table 9 — Serum Vitamin A Levels in Rural Villages, Peninsular Malaysia

	Mean & S.D. ug per 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
Males, 18—45.9 years		
n = 152	46 ± 19	7
Females, 18—45.9 years		
n = 353	47 ± 24	12
Males, 46 years and above		
n = 14	54 ± 33	0
Females, 46 years and above		
n = 14	42 ± 17	7

Source: Chong *et al.*[14]

FOOD CONSUMPTION

Several recent studies have been undertaken to quantitate food consumption of communities. Such studies have met with various difficulties, including the methodology, the tediousness of the procedure, and interpretation of the results. Nevertheless, studies in this area are continuing and better data should become available.

Household food consumption of rural villages in Peninsular Malaysia[14] are given in Table 11, and data collected from five communities in Sabah[28] are shown in Table 12. Presented as mean intake and percentage of recommended requirements, the households do not appear to be very low in calorie consumption; all communities were able to meet at least 80% of the requirement. Mean protein intake in all communities appear to be above the requirements.

Table 10 — Summary of Goitre Studies in Sarawak

Location	Ethnic groups	Respondents		Prevalence of goitre (%)
		Age (years)	Total number	
First division	Chinese, Malay,	10-14 (female)	273	49.8
	Bidayuh	≥ 15 (female)	157	52.2
Second division	Iban, Malay,	10-14 (female)	147	38.8
	Chinese	≥ 15 (female)	161	80.7
Third, sixth and	Iban, Chinese,	10-14 (female)	252	34.5
seventh 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	≥ 15 (female)	1750	50
		≥ 15 (female)	1058	58
Third division Rejang River (interior)	Iban	All ages (both sexes)	608	8 (male) .33 (female)
Second division Lubok Antu (interior)	Iban	< 11 (both sexes)	167	99.5
Ruba (coastal)	Iban	< 11 (both sexes)	38	74.1
Baiong (coastal)	Iban	< 11 (both sexes)	122	3.0
Second division	Iban	5—8 (both sexes)	388	76.5
Lemanak River (interior)		Mothers only	116	90.5
Fourth division	Kayan/Kenyah	< 7 (both sexes)	556	30.4
Middle Baram (intermediate)	4-8 (both sexes)	372	55.1	
		Mothers only	142	50.0
Mulu area (interior)	Punan (nomadic tribe)	All ages (both sexes)	334	59.3
Seventh division	Iban	< 7 (both sexes)	414	7
Sut/Mujong River (interior)		Mothers only	106	30.2
Second division	Iban	< 15 (female)	75	93.3
Upper Lemanak River (interior)		8-12 (both sexes)	152	21.7
Third division Kanowit District (Rejang River interior)	Iban	≥ 15 (female)	137	38.7
Kanowit Town	Iban, Chinese	8-12 (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[27]

Table 11 — Calorie, Protein and Fat Intake (per capita daily) in Rural Villages, Peninsular Malaysia

Nutrients	Kelantan *(87)	Mersing (110)	Baling (144)	Perak Tengah (160)	Combined kampungs (503)
Calorie	1648	2106	1729	2016	1874
**Recommended calorie intake	2080	2156	2062	2004	2075
Calorie as % of recommended intake	79	98	84	101	90
Protein, g	52	55	49	59	53
**Recommended protein intake	48	42	45	42	44
Protein as % of recommended intake	110	131	109	140	120
Fat, g	28	46	32	40	37

* figures in parentheses refer to the number of households.
** based on the age and sex composition of the households studied.
Source: Chong *et al.*[14]

Table 12 — Median (and Range) Percentage Nutrient Requirements Met in the Dietary Intakes of Five Communities in Sabah

	Muruts	Rungus Dusun	Coastal Plains Kadazan	Upland Kadazan	Chinese
Calories	153.0 (71.3—263.0)	96.6 (52.7—144.7)	102.7 (74.5—152.0)	86.1 (47.0—158.5)	82.8 (42.4—98.0)
Protein	261.0 (93.4—714.0)	139.7 (79.7—206.7)	161.9 (112.0—756.5)	131.6 (76.9—210.4)	129.5 (45.0—208.0)

note: ranges given within brackets.
Source: Chen *et al* [24]

Such mean or median values do not show the food distribution within the communities. Upon further analysis of the data, Chong *et al*[14] reported that 66% of the households were not able to meet their requirement for calorie (Figure 7) and 34% of households their requirement for protein (Figure 8). Similarly for the Sabah study of Chen *et al*[24], there was a wide range of nutrient consumption, and except for the Murut and Coastal Plains Kadazan, some 75% of the households of the other 3 communities had a median calorie intake that were below their requirements (figure 9). In the case of protein, it was found that 10—30% of the households did not meet requirement.

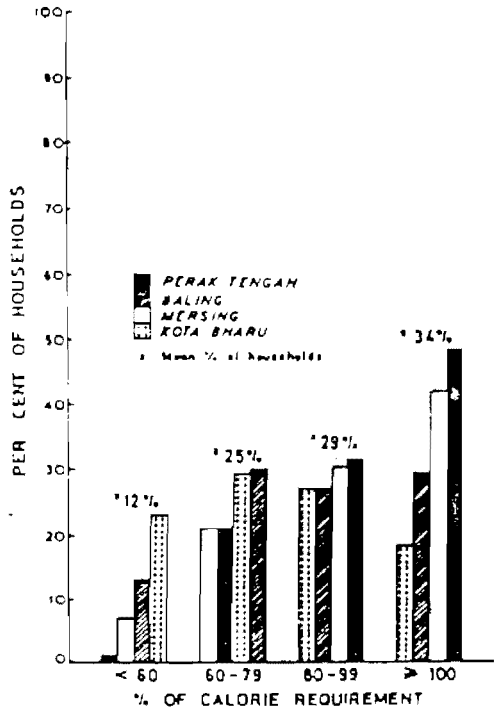

Figure 7
Distribution of Calories in Rural Households, Peninsular Malaysia.

Source: Chong *et al*.[14]

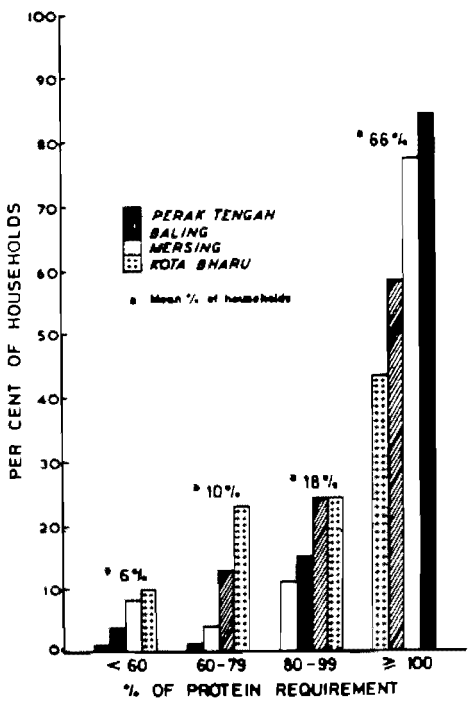

Figure 8
Distribution of Protein in Rural Households, Peninsular Malaysia.

Source: Chong *et al*.[14]

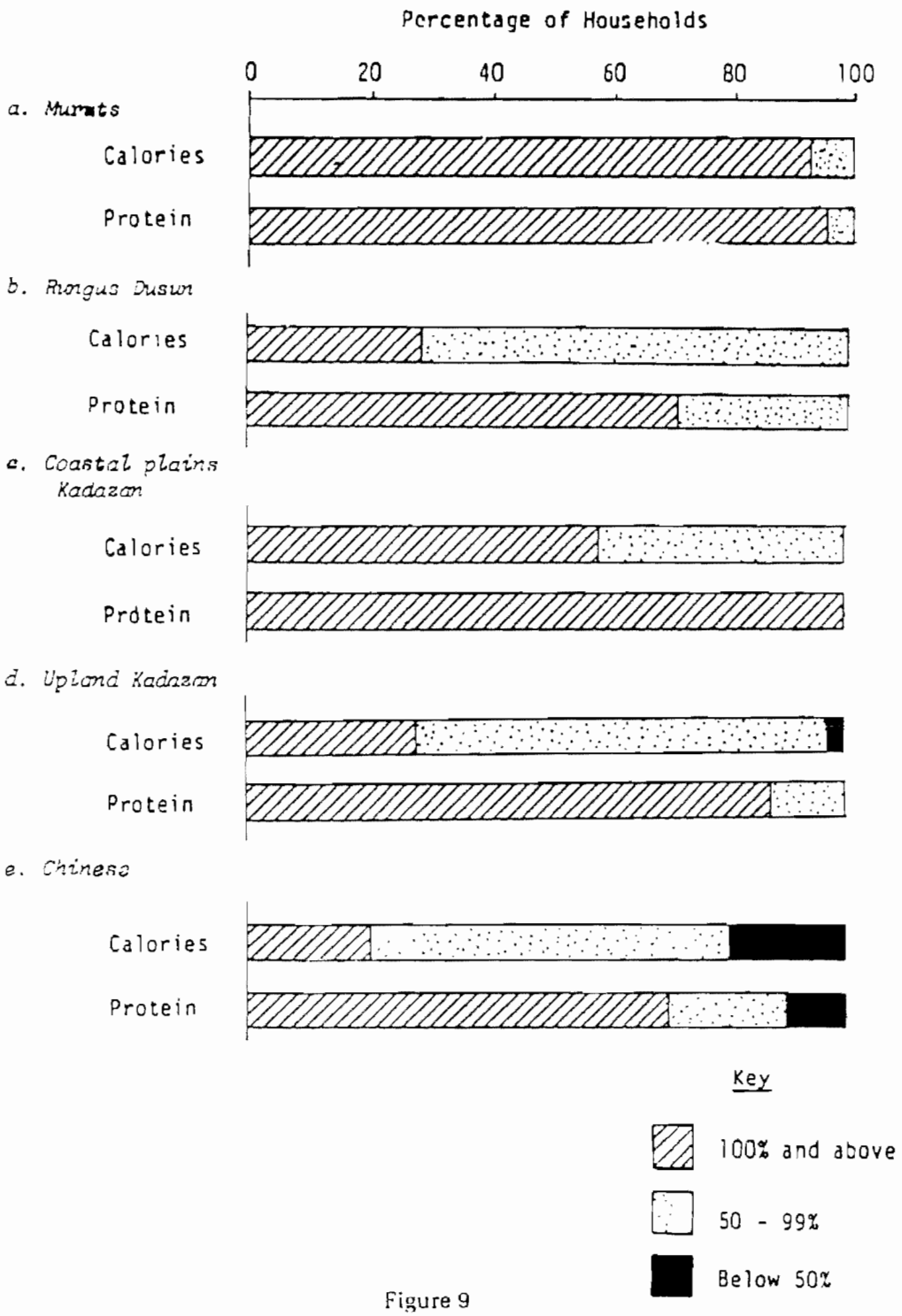

Figure 9
Households by percentage nutrient requirements met, various communities, Sabah

Source: Chen *et al.*[24]

Household food consumption studies do not reveal distribution of food within the families, and the adequacy of consumption by individual household members. For this information, some recent studies on the food consumption of specific age groups have been reported[28—31] (Table 13). In general, protein intake by adolescents and preschool children seem to be adequate. However, their calorie intake fall below the recommended levels for Malaysians.[32] This trend is also true for household food consumption data, where adequacy for calorie has been found to be a greater problem than protein.

Table 13 — Results of Some Food Consumption Studies of Specific Age Groups

	Calorie (per cap/day)	Calorie as % recommended intake*	Protein (g/cap/day)	Protein as % recommended intake*
1. Adolescents, rural villages n = 169				
male	1892	75	54	101
female	1777	82	49	111
2. Preschoolers, rural community n = 100 (both sexes)	1467	92	34	129
3. Preschoolers, FELDA scheme n = 108 (both sexes)	1111	62	51	174

Sources: 1. Aminah *et al.*[28]
2. Ravi[29] and Nik Rohayati[30]
3. Zawiah *et al.*[31]

*Recommended intake for Malaysians (Teoh[32])

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