Dr Arunasalam Sivapathasundaram Memorial Lecture
Delivered at Kailasapathy Auditorium on December 03, 1993 on the "Nutritional Status of our children"

DR.ARUNASALAM SIVAPATHASUNDARAM MEMORIAL LECTURE - 03.12.1993

by
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Chairman, members of the family of Dr.Arunasalam Sivapathasundaram, distinguished invitees, colleagues, friends & students.

I sincerely thank the sponsors and the Board of the Faculty of Medicine for having invited me to deliver this oration in memory of the late Dr. Arunasalam Sivapathasundaram who was brutally killed 6 years ago by the Indian Peace Keeping Force, while on duty and within the hospital premises where he saved, the lives of thousands of children of this land.

One of the greatest legacies of any nation is the memory of great man and the inheritance of a great example. Dr. Arunasalam Sivapathasundaram was such a man and it is pleasant to pay tribute to his memory and the examples he set.

My association with Dr. Sivapathasundaram started 10 years ago when I had to take over the co-ordination of the Assistant Medical Practitioners (AMP) Training Program at Point Pedro Hospital. Dr. Sivapathasundaram was the Consultant Pediatrician there at that time. But he was doing most of the day to day Co-ordination of the training program, solving problems as and when they arose. He remained not only a teacher but also a friend and father to the AMP Students. He continued this affection towards the medical students, treating them as his own children, after his transfer to Jaffna Teaching Hospital.

Dr. Sivapathasundaram loved children, not only because his profession demanded, but because he really loved them.

My topic today is "The Nutritional status of our Children", a subject which was near and dear to the heart of Dr. Sivapathasundaram.

NUTRITONAL STATUS OF OUR CHILDREN

1. Introduction

Proper nutrition is essential for every one of us. But it is more so in infancy and childhood.

An adult's need for food can be satisfied by the person himself expect in the case of dire poverty or non availability. In the case of children they have to depend on others to fulfill their need for food. If the provider is ignorant of the child's needs or if he or she is over influenced by culture, tradition or an overpowering elderly relative the child may be starved or over fed.

2. Effects of under nutrition in infancy & early childhood.

Growth & Development are distinctive biological process of children.

Under -nutrition during intrauterine life, infancy and childhood affects the child's physical, mental and social development and results in a physically, mentally and socially handicapped individual.

Children grow and develop from the moment they are conceived, until they reach adulthood. Growth is a continuous process up to adulthood, and it does not stop for a while and start again.

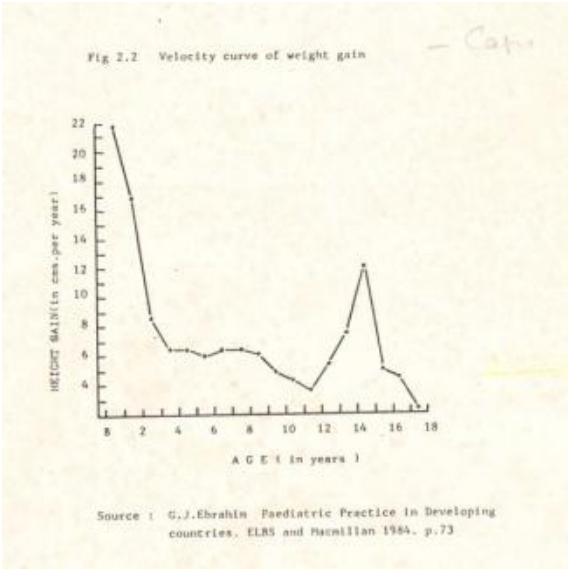
But the rate of growth varies. The first few months in the mother womb are the fastest period of growth. The first year of his life is the period of next most rapid growth.

After this, his growth rate slows down gradually until puberty. Then he starts to grow fast again until he reaches the adult size at about twenty.

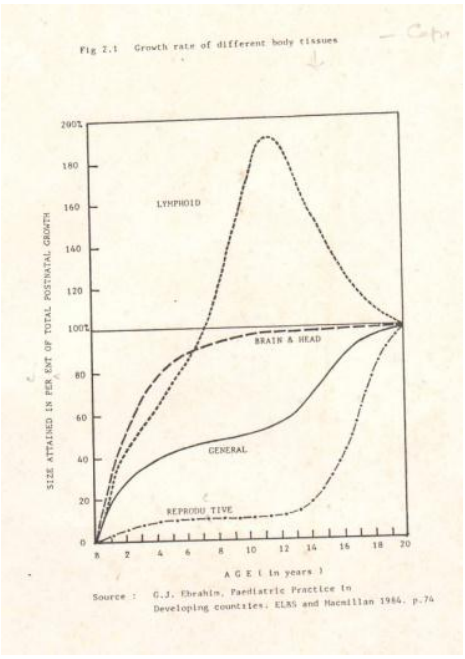
Due to the rapid growth during infancy and childhood a child needs more calories and proteins per unit weight than an adult. At the age of one year a child needs half the quantity of proteins and calories required by an adult. Most adults (including mothers) fail to realize this.

The growth rate of the different body tissues is given in Fig 2.1

Most part of the growth of the brain occurs during early childhood and reproductive development occurs during the second decade. General body growth is characterized by two phases of rapid growth - one during early childhood and the other during puberty. The two phases of growth are better appreciated if the growth in an individual is charted by increments, by unit of time (velocity curve) shown in fig 2.2



It is evident from this figure that at birth, the rate of growth in height is around 22 cm per year and this gradually comes down to around 8 cm per year after his second birthday, and remains almost static until puberty. Lack of nutrition during the first 2 years will seriously interfere with the physical and mental growth. During short periods of poor nutrition or illness this rate of growth slows down, but the child undergoes a period of 'catch up' growth and during this period (if adequately fed) the growth rate may be twice the normal for that age until the lost ground has been regained. This compensatory mechanism enables the child to overcome short periods of illness or lack of food. However if the illness or lack of food is prolonged or if it occurs during a very young age the catch up may not be total and leads to stunting.



A number of studies in developing countries have shown that the average newborn is smaller in weight and shorter compared to his counterparts in the developed countries. However, it has been shown that newborn among the upper social classes in developing countries compares well with their counterparts in the

developed countries showing that lower birth weight and stunting are more related to socio-economic status rather than due to the influence of race or nationality.

It has been found that when pregnant mothers of the lower socio economic group are provided with food supplements during pregnancy there is significant improvement in birth weight of the new born *.[1].*

It has also been observed that infants born with low birth weight continue to remain small and do not reach the average standards for the community.

All these emphasize the need for good maternal nutrition in the prevention of childhood under nutrition.

The brain is fully developed in terms of number of neurons by about thirteenth week of pregnancy. *[2].*

Recent research in animals and humans suggest that inadequate growth during the periods before and after birth may limit intellectual development [2]. At the time of birth a child's brain is growing at the rate of a milligram a minute. This rapid growth could be achieved only if he receives adequate nutrition.

Studies *[2]* have shown that children under 6 month old and recovering from malnutrition have failed to catch up on their mental age.

All this places the responsibility on us to provide care to the pregnant mother and the child up to 2 years, if we are to expect the next generation to be physically, mentally, socially and spiritually healthy.

3. Nutritional status of the world's children

Each day 40,000 children die in this world. Hunger and malnutrition in their different forms contribute to about half of these deaths. According to the UNICEF, more than 20 million children in the world suffer from severe malnutrition, 150 million are underweight and 350 million women suffer from nutritional anemia *[3].*

At the world summit for children held at the United Nations on 30th September 1990, all countries (including ours) made a declaration on the survival, protection and development of children.

Among other commitments all countries (including ours) declared that.

1. The well being of children requires actions at the highest level. We are determined to take that action.
2. We ourselves hereby make our sole commitment to give heigh priority to the rights of the children, to their survival and to their protection and development.
3. We will work to ameliorate the plight of millions of children who live under especially difficult circumstances as victims of apartheid and foreign occupation, displaced children, and victims' of natural and manmade disasters.
4. We will work carefully to protect children from the scourge of war and to take measure to prevent further armed conflicts in order to give the children everywhere a peaceful and secure future.

It is unfortunate that most of the governments of the world (including Sri Lanka) have not honored these commitments fully.

4. Nutritional status of children in Sri Lanka

The problem of under nutrition among preschool children of Sri Lanka had been evident to those who worked with children since the 1960s.

The Famine of 1971 and the fuel crisis of 1973 precipitated an acute situation. With the rising food prices the government was forced to withdraw the Rice subsidy which was available since the second world war, from all except those earning less than Rs.500/= per month.

During this period there was much worldwide focus on malnutrition and in 1971 CARE offered a wheat soya blend (later called Thriposa) to all children who were in grade II & III Protein Calorie Malnutrition (PCM) and all pregnant and lactating mothers.

In 1975/76 the center for Disease Control (CDC) through the United States Health Education and welfare along with the Ministry of Health in Sri Lanka conducted a survey of the nutritional status of preschool children in the 14 districts of Sri Lanka *[4].* The findings are given in Table 4.1.

Table 4.1: Acutely & chronically under-nourished (in %) children under 5 years by Districts-1975/76

District	% Acutely Undernourished	% Chronically Undernourished
Ratnapura	8.8	37.3
Kandy	8.3	49.6
Batticoloa	8.4	35.5
Galle	8.2	33.3
Matale	7.2	38.9
Kegalle	7.1	39.6
Anuradhapura	6.9	30.7
Kalutara	6.2	26.8
Matara	6.0	29.7
Colombo	4.9	20.7
Vavuniya	3.8	29.6
Badulla	3.8	49.4
Kurunagela	3.7	30.4
Jaffna	3.7	28.4
Puttalam	3.1	24.4
Sri Lanka	**6.6**	**34.7**

(Source: Department of Census & Statistics .1978.Sttistical Profile of children -1977 Sri Lanka. Department of Census & Statistics. Colombo. P 37-43)

The survey of 1975/76 showed that in Sri Lanka, 6.6% of the preschool children were suffering from Acute Malnutrition and 34.7% were chronically malnourished. In the Jaffna district the percentage of preschool children suffering from acute malnutrition was 3.7% and chronic malnutrition 28.4%. It is to be noted that Jaffna was the district with very low prevalence of under

nutrition. As shown in Table 4.2, Jaffna district also boasted of the lowest Infant Mortality Rate of 21 in 1974.

Table 4.2 Infant Mortality Rate Sri Lanka- 1974

Revenue District	Infant Mortality Rate (per 1000 live births)
Nuwara Eliya	78
Badulla	73
Kandy	71
Ratnapura	66
Matale	65
Kegalle	60
Batticaloa	45
Colombo	42
Matara	40
Amparai	39
Kurunegala	38
Anurathapura	36
Hampantota	35
Mannar	34
Trincomaee	32
Moneragala	30
Puttalam	28
Polanaruwa	23

Vavuniya	22
Jaffna	21

(Source: Department of Census & Statistics .1978.Sttistical Profile of children -1977 Sri Lanka. Department of Census & Statistics. Colombo. P 37-43)

The latest Sri Lanka Demographic and Health Survey (SLDHS) was carried out in 1987.

As a part of this survey *[5]* anthropometric measurements were carried out on a sample of 2005 children 3-36 months old living in Sri Lanka. Northern & Eastern Provinces were excluded from this survey.

The prevalence of acute malnutrition (weight for height less than -2SD of NCHS/CDC/WHO reference population) in the seven zones is given in Table 4.3

Table 4.3: Distribution of Acute & Chronic Malnutrition (in %) by Zones
(Among children 3-36 months.)

Zone Number	Zone Area	Acute Malnutrition(wasting)	Chronic (Stunting)
1	Colombo metropolitan area	13.4	21.8
2	Colombo feeder areas	11.0	18.9
3	South western Coastal lowlands	12.3	22.2
4	Lower South Central Hill Country	15.5	21.9
5	South central Hill Country	9.9	42.1
6	Irrigated Dry Zone	11.9	42.1
7	Rain fed Dry zone	16.8	30.9
8	Eastern Coastal Belt	-not included in survey-	-
9	Northern Province	-not included in suvey-	-
	All children	12.9	27.5

In Sri Lanka 12.9% of the children were wasted and 27.5% were stunted.

The prevalence of acute malnutrition (wasting) varied from 18.9% to 42.1%.

27.5% of the children were stunted (-2SD or more below the median weight for age of the reference population). All these children are stunted or chronically malnourished. This study showed that between 3 months and 36 months the children become progressively more stunted.

Zone 5 where many of the estates are located had the lowest proportion of acutely malnourished children and highest proportion of chronically malnourished children. The lower proportion of acutely malnourished children is partly because of higher proportion of chronically malnourished children. Many of these stunted children will appear to have a normal relationship between body lengths when age is not considered. For example a stunted three old child will have the appearance of a healthy 2 year old child when only weight for height is considered.

Sixty percent of the children on the estates were chronically undernourished. This is more than twice that found in rural area outside the estates and about 3 times higher than those in the urban sector.[5]

5. Nutritional status of the children of Jaffna

Since the island wide nutritional survey of 1975/76 showed that the nutritional status of the children of Jaffna was very good compared to the rest of the country not much attention was directed towards under-nutrition among children.

It was only after the 'war' escalated and refugee camps were set up that our thoughts turned towards the possibilities of under-nutrition. Studies carried out in early 1992 among 360 children living in a refugee camp at Ketpali showed that 6.8% of the children were acutely malnourished *[6.7].* The medical officer of health Jaffna also reported higher prevalence of malnutrition among children attending his clinics and in the Refugee camps *[7].* He also reported that almost all the pregnant mothers were anemic.

A family health worker in the Manipay health area [8] carried out a study among children in a refugee camp and in a nearby village, and found that moderate under-nutrition was equally higher in the refugee camp and the village. Severe under nutrition was more prevalent among children in refugee

camps. Among inmates of refugee camps, the prevalence of severe malnutrition varied with the place from where they were displaced.

Everyone in the field of rehabilitation was interested in knowing the actual situation. At a meeting of NGOs and other officials held on 18th December 1992 and chaired by the Vice-chancellor of the University of Jaffna, Prof. A. Thurairajah it was decided to conduct a nutritional survey of the children in the Jaffna district.

It was a major challenge, especially at a time when the Sri Lanka Demographic Health survey could not be carried out in Jaffna by the Department of Census and Statistics. Amidst the several constraints, the challenge was taken.

It was estimated that there would be about 60,000 children aged less than 36 months living in the Jaffna district. Using multistage cluster sampling of the 155 PHMs' areas, and cluster sampling of the 188 refugee camps, 2187 children were selected. Out of them, 2045 children were examined (Response rate 93.3%)

During the past, nutritional status of the children was frequently assessed using a classification based on deficit in weight for age originally proposed by Gomez and modified by Jeliffe. This was used in the growth charts issued to our children.

Subsequently, the Eighth joint FAO/WHO Expert committee on nutrition *[9]* emphasized the importance of distinguishing between acute and chronic malnutrition or present or past under-nutrition. Following this the FAO/UNICEF/WHO expert committee on Nutritional surveillance *[10]* recommended the use of the height for age and weight for height as primary indicators of nutritional status of children.

JC Water low et al *[11]* recommended data collected by the United States National Academy of Sciences and available with the United States National

Center for Health Statistics (US NCHS) as the international reference data. This was accepted by the WHO.

Considering the above recommendations, in the above study, under-nutrition was classified as

1. Chronic under nutrition when the height for age was less than -2SD from the median of the NCHS/WHO reference population.
2. Acute under nutrition when weight for height was less than -2SD from the median of the NCHS/WHO reference population
3. Low weight for age was also estimated because this is the common criteria used in our clinics by family health workers using the growth charts.

The Jaffna District Nutrition Survey-1993[12] showed that

31.4% of the children were chronically undernourished (stunted)

18.9% of the children were acutely undernourished (or wasted)

40.05 of the children were underweight for their age

The prevalence of acute and chronic malnutrition according to the Sri Lanka Nutritional Status survey (1975/76), the Sri Lanka Demographic and health survey (1987), and the Jaffna district Nutrition survey -1993 are given in Table 5.1.

Table 5.1: Comparison of Nutritional status of children (in %) between 1975/76,1987 & 1993

	*1975/76	#1987	#1993	Percentage (increase+) (decrease-)
Chronic Malnutrition Sri Lanka	34.7	27.5	n.a	-20.7
Jaffna district	28.4	n.a	31.4	+10.6
Acute Malnutrition Sri Lanka	6.6	12.9	n.a	+92.4

Jaffna District	3.7	n.a	18.9	+410.0

**% weight for age < 75% of NAS reference population.*

#% below-2SD of the median of NCHS/WHO reference population

n.a : data not available

Source: 1975/76 data: Sri Lanka Nutritional status survey (sept.75-March 76) in Statistical profile of children 1997.Srilanka Department of Census & Statistical profile of children 1997.Srilanka Department of Census & statistics Colombo 1978:38
1987 data: Sri Lanka Demographic and health survey 1987. Ministry of plan implementation Colombo 1988.

In Jaffna During the past decade chronic malnutrition has increased by 10.6% while in the rest of the country it has decreased by 20.7%. The rise in the prevalence of Acute under nutrition is alarming it has increased by over 410.0% in Jaffna district while in the rest of Sri Lanka it has increased only by 92.4%

Table 5.2: Prevalence (in %) of Symptoms of vitamin A & B deficiency

In Jaffna District

Symptoms	***1975/76**	**1993**
Bitot spot	0.4	12.1
Night Blindness	0.6	0.6
Hyperkeratosia	n.a	1.8
Angular stomatis	n.a	9.1

(Source SriLanka Nutritional Status survey (Sept.75-March 76) in Statistical Profile of children-1977. Sri Lanka. Department of Census & Statistics Colombo 1978.& Sivarajah N. Jaffna District Nutrition Survey 1993)

n.a- Not available

Under nutrition by sex

There was no difference in the level of under-nutrition between boys and girls.

Under nutrition by age

The distribution of under-nutrition by age is given in Table 5.3. The prevalence of Acute and chronic under-nutrition is seen to increase after the 1st birthday. Among the 2 year olds half the children are stunted and a quarter of them are wasted.

Table 5.3: Prevalence of Under Nutrition (in %) by age in Jaffna District

Age(in months)	Chronic Under nutrition	Acute Under nutrition
Under 12	9.3	5.8
12-23	33.4	25.6
24-35	50.2	25.2
All group	31.4	18.9

(Source- Sivarajah N.Jaffna District Nutrition Survey 1993)

Displacement

The prevalence of under-nutrition by place of residence at the time of examination is given in Table 5.4

Table 5.4: Prevalence of under Nutrition (in %) by place of residence

Place of residency	**Chronic under nutrition**	**Acute under nutrition**
Refugee camp	44.6	22.0
Village(displaced)	27.7	16.0
Village(not displaced)	27.8	18.4
All section	31.4	18.9

(Source: Sivarajah N. Jaffna District Nutrition survey 1993)

The prevalence of chronic and acute under-nutrition is much higher among children in the refugee camps than among the children in the village. Among the children in the village there is no significant difference between the displaced and not displaced.

Table 5.5 gives the prevalence of under-nutrition by period of displacement. It is evident that the prevalence of under-nutrition increase with period of displacement.

Table 5.5: Prevalence of under nutrition (in %) by of displacement

Period of displacement (in months)	Chronic Under-nutrition	Acute Under-nutrition
Not displaced	28.0	18.6
Less than 6	27.9	9.8
6-11	26.0	19.1
12-23	46.8	24.3
24+	52.3	26.6
Total population	31.4	18.9

(Source: Sivarajah N. Jaffna District Nutrition Survey 1993)

Birth Weight

The birth weight appears to have significant effect on the later development of under-nutrition. Table 5.6 gives the prevalence of under nutrition among normal & lower birth weight

Among the low birth weight babies, 44.9% were chronically under-nourished.

Table 5.6: Prevalence of under-nutrition (in %) by birth weight

Birth weight (in grams)	Chronic Under-nutrition	Acute Under-nutrition
<2500	44.9	30.8
2500 +	23.5	15.5
Not known	45.3	20.9
All children	31.4	18.9

Among the children born in 1990, 17.9% were of low birth weight while 20.0% of the children born in 1991 and 19.1% of the children born 1992 were of low birth weight, showing a steady increase in the incidence of low birth weight.

Studies carried out in Sri Lanka on the incidence of LBW are given in Table 6.5.

Table 6.5: Incidence of low Birth Weight (LBW)

Place of study (year)	Study Population	Incidence of L.B.W. (%)
*G.H.Galle (Jan-Feb. 1989)	506 singletons	24.3
*G.H.Anuradhapura (June-Aug. 1989)	454 singletons	28.0
*G.H. Batticiloa (April-June. 1989)	487 single tons	20.5
*G.H Badulla (Oct.-Dec. 1989)	441	25.2
#G.H Jaffna (Oct-Dec. 1989)	n.a	19.0
#G>H>>Jaffna (Oct-Dec.1991)	n.a	23.0
**Jaffna District (Children born in 1990-1992)	2045	19.0

*Source: *UNICEF .children and women in Sri Lanka –A Situation analysis. Colombo 1991.p.58*

 # Sivarajah N. Nutritional status of the people of Jaffna district 1992 Council of NGOs-Jaffna 1992.

*** Sivarajah N Jaffna District Nutrition Survey 1993. (19)*

The percentage of LBW of babies born at General Hospital, Jaffna low compared to other parts of Sri Lanka but the trend is disturbing. At General Hospital, Jaffna between 1989& 1991 the percentage LBW increased by 21.1%.

The incidence of low birth weight in the Jaffna University Field project area (Kokuvil-Kondavil community Health project area) is recorded since 1981. The incidence of low birth weight is generally lower in this area but peaks are seen after the riots of 1983, operation by the Indian Peace Keeping Force (IPKF) in 1987 and a steady rise after the restriction on the transport of food into the North in 1990.

Fig 5.1: Incidence of Low Birth Weight in University Field Project area (KKCHP area). 1981 to 1992

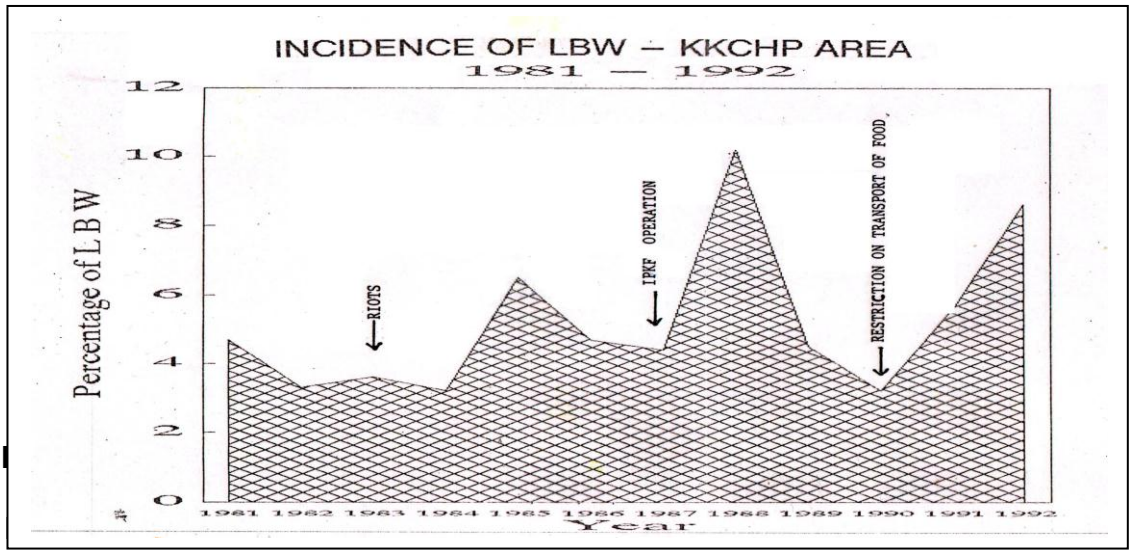


Table 5.7 Prevalence of under nutrition (in %)

By Educational level of mother

Educational level	Chronic Under nutrition	Acute Under nutrition
No schooling	41.5	28.1
1-05 year	39.7	20.7
6-11 year	25.9	17.6
12 years and over	7.0	10.0
Not known	27.3	18.2
All sections	31.4	18.9

Source: Sivarajah N Jaffna District Nutrition Survey 1993

Two out of every five children born to mothers who have had no schooling or studied up to a maximum of 5 years are stunted. One out of four children born to such mothers is wasted.

Family Income

The distribution of under nutrition by family income Is given in Table 5.8

Table 5.8: Prevalence of under-nutrition (in %) by family income

Income (in SLR)	Chronic under nutrition	Acute Under nutrition
Less than 1500	31.7	19.8
1500-2999	31.3	17.6
3000-4499	26.9	21.5
4500+	12.9	9.7
All section	31.4	18.9

Source: Sivarajah N. Jaffna District Nutrition Survey 1993

There is decrease in prevalence of chronic and acute under-nutrition with increased family income. But the decrease is evident only in those whose monthly income is Rs.4500.00 and above.

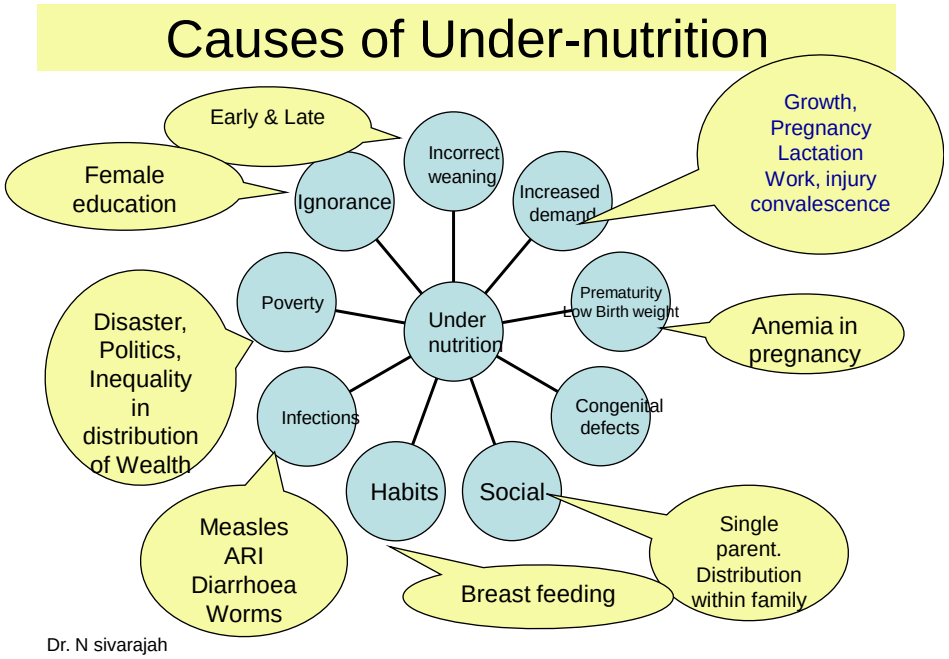
6. The Causes of Under-nutrition

The cause of under nutrition is multi-factorial.

For some parents the task of feeding their children adequately is made impossible by absolute poverty. But much of the malnutrition among children is found in families where adequate food is available. In such cases of malnutrition it is mainly due to ignorance of the special dietary needs of children, adherence to cultural beliefs and practices which are detrimental to the nutrition of the child and lactating mother, and the lack of safe water and sanitation.

The causes of under nutrition are given in figure 6.1. I will touch on only a few important causes which are more relevant to the children of Jaffna in the present situation.

Fig. 6.1: Causes of malnutrition



Poverty

Child under-nutrition due to absolute poverty was rare a few years ago. But during the past few years this category has increased. UNICEF estimated in 1991 that 45.8% of the population of the north-east Sri Lanka is displaced. In Jaffna a large proportion of the families who lived in the Island and coastal areas have been displaced. Some of them are living in refugee camps for several years. The Government estimated that Rs.459.00 worth of rations per month is necessary for an emergency maintenance level of 1800 calories per day per persons. The rations now being provided is up to a maximum of Rs.180.00 per persons per month. This would supply only 1/3 of the needs of an individual *[13].*

In addition, displaced persons have been deprived of their traditional employment and are presently unemployed or under–employed.

As a result, absolute poverty among the lower socio-economic level is on the increase and the incomes of self employed persons have dropped. If the trend is not arrested, we will have more and more cases of absolute poverty.

A recent study of the history of severely malnourished children admitted to the Nutrition Rehabilitation center (NRC) in the University Field Project area *[14]* showed that 21.7% of the fathers were incapable of supporting the family, 80% were addicted to liquor. One third of the mothers had married during their teens. Two-thirds of the families from which the children came did not have basic sanitary facilities.

Breast Feeding

Both, failure to commence breast feeding early and continuation of 'Breast milk only' after 6 month of age, leads to under-nutrition among children.

Changing social and cultural patterns, due to mixing of traditions with western life styles, have contributed towards the increasing reliance on bottle feeding. Employment of women outside home, implied limitation on their activities, fear of failure of lactation, lack of knowledge of techniques of breast feeding fear of loss of physical attractiveness due to weight gain and loss of breast tone, have all contributed towards the decrease in incidence of breast feeding

Most mothers attribute the commencement of bottle feeding to 'lack of milk' described by some workers *[15]* as 'no milk syndrome'. The lack of milk may be due to poor nutrition of the mother, ignorance or as a result of some cultural practices. Often the 'no milk syndrome ' is used by mothers to justify the introduction of powdered milk, and this often take place under the very nose of the health personnel in the medical institutions. At the commencement of bottle feeding most mothers are unaware of the economic and health hazards and the deprivation of the psychological needs of the child.

A mother starts secreting milk a few hours after delivery and it takes about one week for lactation to be established in full. The average daily secretion and composition of the milk varies with the fluid and food intake of the mother. However approximately 650ml of mil is secreted daily, which is sufficient for the baby up to 6 months.

A daily intake of at least 2000 ml of fluids is essential for adequate milk secretion and satisfies the daily requirement of the mother. But traditionally it

is believed that intakes of water after partus will cause enlargement of the abdomen, delayed involution of uterus and diarrhea.

The preliminary data collected in a study presently being conducted in the university project area of Kokuvil-Kondavil *[16]* indicates that the mean daily consumption of fluids during the post-partum period is around 900ml (range 175 ml to 3300 ml)

In fact we have noticed that the mothers (and some time the breast fed infants) develop loose motions when they take water. But the cause of this loose motion appears to be the excess “kayam” and “sarakku” which the mothers take during their post parturn period.

“kayam” is made by grinding, cumin seeds, turmeric, pepper, ginger and dry ginger and garlic.

“Sarakku“is made by grinding coriander, cumin seeds, garlic, pepper, turmeric, ginger & or dry ginger in to a paste and adding this paste into the curries taken by the mothers.

The mean quantity of each ingredient used, in a study presently in progress in the Kokuvil area, is given in tables 6.1 and 6.2.” Kayam” was used by 28 out of 38 post-partum mothers interviewed.

Table 6.1: Composition of ‘Kayam’ taken once a day y Post-partum mothers in the University Field Health project area

Ingredient	Quantity taken (in grams) mean	Range	Mean Iron content (in mg)
Cumin seeds	10.9	1.8-23.2	3.4
Garlic	13.9	3.7-48.5	0.2
Pepper	2.2	0.4-21.0	0.4
Turmeric	4.2	0.5-15.5	0.6
Ginger	3.4	0.5-12.8	0.1
Dry ginger	2.6	0.4-12.9	-
Total iron content			**4.7**

Table 6.2: Composition of 'Sarakku' taken for one meal by post-partum mothers in the University Field Project area

(Quantity taken in grams)

Ingredients	**Mean (in Grms)**	**Range**	**Iron Content (in mg)**
Coriander	14.3	2.5-36.5	2.6
Cumin seeds	13.1	2.5-29.1	4.1
Garlic	17.2	7.3 -54.8	0.2
Pepper	2.1	0.6-5.6	0.4
Turmeric	4.1	1.1-14.9	0.6
Ginger	2.0	0.6-6.6	0.1
Dry ginger	2.1	0.3-7.8	-
Total iron content			**8.0**

The medical value of 'kayam' and 'sarakku' is not clear. But the nutritional value is high – especially as regards iron content. A day's mean intake of 'Kayam' & Sarakku' supplies a third of the mother's daily requirement of iron.

The consumption of 'sarakku' should be encouraged, since most of the mothers are anemic, but the danger is that of taking in excess. 'Sarakku' may lead to loose motion when water is consumed. A minimum amount of 'sarakku' with plenty of water should be encouraged.

Another practice which interferes with breast feeding is the introduction of the feeding bottle immediately after delivery to give water (and sometimes powered milk). Suckling of the breast by the infant initiates an important reflex which leads to secretion and 'let down' of milk. When the bottle is introduced there is decreased suckling leading to diminished secretion of milk and eventually milk secretion dries up. Further, the mechanism involved in suckling from the breast is different to that of taking milk through a rubber teat. Alternate breast feeds and bottle feeds confuse the baby and will make the baby to cry when put on the breast, and gulp the milk when put on the bottle - there by creating an impression in the mother that she has 'no milk '

Today it has become fashionable to include feeding bottle in the itinerary of things to be taken to hospital by a pregnant mother. This creates a feeling in the mother that ‘feeding bottle’ is superior to the breast. In fact most mothers feel that a feeding bottle is as important as a baby shirt or nappies.

Some medical personal have been guilty of promoting bottle feeding by prescribing artificial milk too readily on a flimsy assumption of ‘lactation failure’

We have had mothers who have been humiliated by health personal in maternity wards for not having brought a feeding bottle and milk powder. To avoid abuse of the health staff, some mothers take the bottle and milk powder to hospital when they go for delivery.

A case of severely malnourished child of a laborer who was on a very expensive brand of milk powder (SMA) reported to our clinic. The milk was prescribed by a doctor. A month supply of this brand of milk powder would cost the father one-third to half of his monthly income. The mother could not afford this. So she was giving one tin of the milk powder for 3 months. Normally this tin would have lasted for 4 days. The doctor probably, in good faith, prescribed the best available milk powder but failed to check whether the mother could afford it.

I am not trying to make a case to prove that all these health personnel are ‘bribed’ by the multinational companies to promote their products. I am only trying to impress on you that there is something going wrong and we must endeavor to correct it.

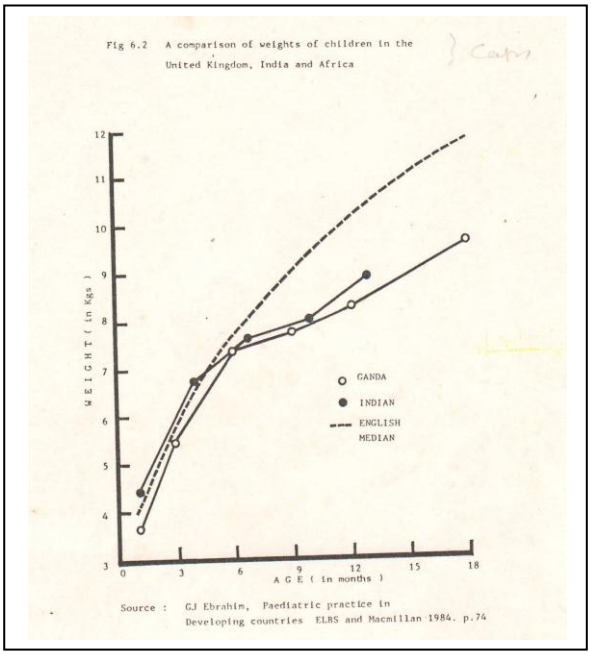
On the other side of the scale we have mothers, usually from the upper or middle class families who over feed their babies by bottle feeding, which results in obesity- this too is malnutrition. Higher concentrations (than what is prescribed) are given by some mothers in the hope that is better for the child. The hypertonic milk will cause thirst and the child would cry and when this occurs the mother will give more and more hypertonic milk which would eventually lead to obesity and its sequelae

Weaning

Breast milk or any infant milk powder could provide nutrition only up to 6 months of age. Beyond this period the child has to take additional food for the continuation of its normal growth.

In our society although traditionally a child is introduced to rice at 6 or 7 months, regular feeding with rice takes several months to be established. Other weaning foods are not given until rice is given on a regular basic. As a result weaning is delayed.

A comparison of weights of children in the United Kingdom, India and Africa are given in Figure 6.2.



The velocity of growth of Indian & African Children remains identical to the children in UK, until around six months. Then the velocity of growth deviates. Towards the end of the 2nd year and during the 3rd year, the growth rate is again the same as in the affluent counties.

But the lost ground is never recovered so that the child remains stunted and much below the expected weight for his age. [1].

This trend which is commonly seen is Jaffna, is attributable to the practice of late weaning.

Worm infestation

Infestation which hookworm, round worm, thread worm and whip worm is common among children. Table 6.3 shows the prevalence of worm infestation among children in several studies.

Table 6.3: Prevalence of Intestinal Parasitic Infestation of children in Jaffna & Colombo

Study area	% children infested
Jaffna municipality	50 %
Kokuvil-Kondavil University Health Project area	64.2 %
Colombo (University Health Project area)	50.2 %

Over 50%of the children are infested with one or more types of intestinal helminthes.

Studies carried out in Kokuvil-Kondavil [17] showed that even after complete treatment 38.7% of children are re-infested at two months and 75.8% at 5 months.

Infectious diseases

It has been shown that in addition to worm infestation, infection of the gastrointestinal intestinal tract and respiratory tract are associated with severe malnutrition.

Infectious diseases of childhood, like neonatal Tetanus, Tuberculosis, Diphtheria, Whooping Cough and Poliomyelitis have been brought under control by immunization. However measles, which is a major disease contributing towards the prevalence of under-nutrition has not been brought under control to the same extent as other EPI diseases

Ignorance

The literacy rate of the people of Jaffna is comparatively high and female education is good. Among the lower socioeconomic class, it is seen that female have had more years of schooling than males. However the adherence to health related practices is poor. There is an overpowering influence of culture and tradition, which suppresses the influence of education and prevents attitudinal changes.

Mothers are aware that milk is the best food for infants and restriction of water reduces milk secretion. But they are unable to break away from tradition and drink extra fluids.

Low Birth Weight

The recent study in Jaffna *[12]* (Nutritional survevy'93) showed that 30.8% of the children born with a weight of less than 2500 grams were acutely malnourished (wasted) and 44.9% were chronically malnourished (stunted).

A low birth weight child (weighing less than 2500 grams at birth) faces an uphill battle for survival form the time of its birth. It arrives without adequate resistance to infection, in to a hostile environment full of disease producing bacteria. In addition the mother is poorly educated and herself malnourished. There is usually failure of lactation resulting in diminished prospects of acquiring immunity through Breast milk and increased chances of infection. They develop severe malnutrition and often die having succumbed to diarrhea or acute respiratory infections.

The commonest cause of low birth weight is maternal under-nutrition

Traditional Healers

For thousands of years mankind has employed a variety of ways of dealing with ill-health. In all societies there have been remedies and people to advise and carry out these remedies. In contrast to "western" medicine the traditional healer involves the family and the parent's circle of friends and relations in both treatment of disease and responsibility. They treat the body, mind and social relation as an indivisible unit. The advice of traditional healers is valued because they are offered in terms that patients can understand and in the context of cultural values and practices that are shared by the patients and healers alike.

In the treatment of malnutrition the traditional healers play a vital role. Most parents of malnourished children do not agree that the condition of their child is due to poor nutrition. They place more belief in the traditional healers explanations of the condition as due to bad planetary position in the horoscope, a toad having jumped over the mother during pregnancy or over the infant and treatment such as tying talisman around the neck, waist or wrist, or "Thongal parthal" are usually prescribed and carried out, according to the particular type of healer to whom the child is taken. These types of healers usually delay the nutritional rehabilitation of the child.

A study of 60 mothers and children admitted to the Nutrition Rehabilitation Center (NRC) at Kokuvil [13] showed that 90% of mothers believe in at least one of the traditional healing procedures for under-nutrition and in fact 81% of them had practiced one or more of these methods before being admitted.

7. Prevention and Management of Malnutrition among Children

The target of the WHO has been to reduce malnutrition by 50% and reduce LBW to 10%. To achieve anything nearer this target we have to act fast and with determination.

The most important aspect of the management of the problem of malnutrition is prevention. Prevention will involve the analysis of the root causes of malnutrition and its eradication.

General measures in the prevention of malnutrition will necessitate a political commitment and determination by those in authority.

A food and nutrition policy has to be established where priorities should be given to cultivation, manufacture, transport, and distribution of food, with high protein and energy value, and food with high Vitamin A, and iron content – the lack of which is the major cause leading to malnutrition among our children.

More emphasis and assistance should be given to the cultivation and manufacture of food made of gingerly or ground nut, which have been a culturally acceptable food and now replaced with toffees and sweets. Cultivation of soya, which is a high protein legume, should be encourage and assisted. Since soya has not been part of our “menu”, the acceptability we have to bring in the modern processing technologies together with mass education.

Fundamental nutrition education is also an important weapon in combating malnutrition. Applied and practical nutrition should be in the school curriculum from the primary school upwards. Nutrition education should be part and parcel of education – especially female education.

Malnutrition is commoner among the less privileged groups in our society. Hence socio -economic measures should be directed towards these groups.

Other general measures to combat malnutrition should be raising the age of marriage for girls, spacing births, encouraging increased participation (especially married middle aged women) in health and welfare programmes and improvement of environmental sanitation.

It is through such broad - based multipronged attack on malnutrition, rather than isolated feeding programs can sustainable improvements to the nutritional status be achieved. This is not to argue against all supplementary feeding programmes which under certain circumstances - like the one we are in at present - are life saving.

In order to carry out most of the programs to combat malnutrition among mothers and children, grass root level health workers are an absolute necessity. In our country this category of health worker is the Public Health Midwife (or Family Health Worker) and she is in short supply - not because there aren't anyone to do the job but because of lack of recruitment and training. The number of field PHMs needed for the Jaffna district is 333. Only 25% of the numbers are available. Another 7.2% of the vacancies are filled by workers with training for 3 months and paid by an NGO.

160 PHMs have been trained in Jaffna since 1988. Those trained are barely sufficient to replace those who retire or leave the services. At the present rate of training it will take 10 years to fill the vacancies in Jaffna alone.

Specific measures in the prevention of malnutrition could be dealt under

- Health Promotion
- Health Protection
- Treatment and Rehabilitation

1. ***Health Promotional Activities :***

   1.1 Antenatal and Postnatal Care: As seen in the Jaffna District Nutritional Survey - 1993, a child with low birth weight runs twice the risk of developing under nutrition than a child of normal birth weight.

A major factor which contributes to birth of low birth weight babies is anaemia of the mother during pregnancy. All anemic mothers should be detected early in pregnancy and actively corrected. Depending on oral iron therapy and Health Education alone cannot be expected to improve the nutritional state of the fetus although health education has a very important role to play in preventing anemia.

Provision of supplementary, food to pregnant mothers in the form of 'Thriposha' or other locally manufactured high protein mixes will also help. The supply of 'Thriposha' to Jaffna has been very irregular during the past few years. According to reports from the Regional Director of Health Services, Jaffna, barely 10% of the annual requirement of Thriposha reaches Jaffna.

***1.2 Promotion of Breast Feeding*:** There has been a decline in breast feeding worldwide including Jaffna, and bottle feeding has contributed to much of the infant mortality and under nutrition

Breast Feeding should be actively promoted and use of the bottle totally discouraged. All health educational programs should carry this message

Education should also be directed towards increase intake of water after partus, as restriction of water after partus is an important cause of the 'No milk syndrome'

***1.3 Re Introduction of traditional weaning food*:** We have several low cost weaning foods which had been used by our mothers. These have been pushed to the rear with the arrival of important weaning food like 'Nestum', Farlene, and 'Farex'. Advertisement and attractive containers have lured the mothers (including professionals) into abandoning the traditional weaning food. Some common mixes of cereals, pulses and oils used are 'muttai maa' (made of rice flour, black gram, egg,& gingerly oil) 'Ulutham Kali' (made rice flour, black gram, coconut & sugar or jaggery) have high proportion of proteins and vitamins.

1.4 Birth spacing: It has been noted [14] that in Sri Lanka after the 3rd Pregnancy the maternal resources are depleted and the problem of low birth weight increases. To avoid this, birth spacing between pregnancies is essential giving the body time to replenish the depleted resources.

2. Health Protection:

2.1 Age appropriate immunization of all children against common diseases of children, like TB, whooping cough, Diphtheria, Poliomyelitis, and especially Measles will help in the prevention of malnutrition. Measles is a crippling disease as far as malnutrition in concerned. In most cases it precedes Marasmus or Kwashiorkor . When measles affects a child animal protein becomes a taboo to the entire family. Usually measles affects several children in the household and this results in the household including the convalescing child being deprived of animal protein for several weeks.

3. Treatment & Rehabilitation

3.1 Surveillance of population at risk and treatment of infections and intestinal worm infestations. Since it has been shown that respiratory infections, worm infestation, and gastroenteritis are associated with serve forms of malnutrition it is essential that the age appropriate immunization program is carried out without interruption and children at risk are kept under surveillance and appropriate action taken when evidence of malnutrition occurs. Growth monitoring using the growth chart should be effectively carried out.

It is questionable whether regular de worming of children is advisable. But certainly, treatment of worm infestation when confirmed or suspected is mandatory.

3.2 Programmes for early rehydration of children with diarrhoea: Diarrhea is a common illness among children and one of the major causes of death among them. Death and disability is essentially due to dehydration. Diarrhea sets in motion a vicious cycle which leads to under nutrition. Prevention of diarrhea will result only with improvements in general sanitation and personal hygiene. But until such time, prevention of dehydration of

children with diarrhea will go a long way in the prevention of under-nutrition. One well tested and effective method is the use oral Rehydration Salt (ORS) solution. Marketing of ORS should be effectively carried out, so that, it is available for sale at reasonable price in every small boutique which sells 'Panadol'.

3.3 Supplementary Feeding Programmes: for moderately malnourished children is a useful method of preventing the children getting into severe malnutrition. This is an important tool especially during famine, disaster and war.

Such programmes should be organized in such a way that the supplementary food reaches the malnourished child and not shared by all the family members

Some supplementary feeding programmes carried out in Jaffna in the recent past by NGOs have failed to achieve their objective because although they were supposed to be supplementary feeding programmes , in fact instead of being a supplementary meal it only replaced the child's breakfast or lunch or sometimes both. When supplying supplementary food to target groups, the criteria for selection should not be, solely the nutrition value of the food stuff. The acceptance of the target group should be considered. The supply of Gingerly seed balls or Ground nut cakes may be more acceptable to school children and contain more of the deficient nutrients than the buns which were supplied.

3.4 Nutrition Rehabilitation Center (NRC): The concept of Nutrition Rehabilitation Centers was first introduced in Mexico by Bengoa, where severely malnourished children were admitted and provided with intensive therapeutic feeding. The NRC coordinated with the Pediatric Hospital and child welfare clinics. The mothers were trained in the process of preparation and feeding of children and prevention of cross infection at low cost.

Several studies have shown that severely malnourished children followed up after treatment in hospitals for malnutrition, do not fare well. A study in

Colombo [14] showed that out of 100 severely malnourished children followed up at clinics only 50% showed improvement after 14 months.

In situations where acute malnutrition is prevalent (as in ours) it is essential that active feeding is carried out and such feeding is possible only in a residential feeding center. During a one year period in an NRC established within the University Field Project Area, 140 children were provided therapeutic feeding. An evaluation of its effectiveness [18] showed that 58.8% of children showed considerable improvement in their nutritional status.

The median duration of stay was 19.5 days (Mean 27.5 days. Range 2-108 days). The average cost of child was Rs. 2,000.00

The study also showed that the NRC was more effective in the management of acute malnutrition where there was a deficit of weight for height

Since there are at least 4000 children in Jaffna in this category who need therapeutic feeding more NRCs should be opened up in Jaffna. However it is necessary to caution that NRC should only be a temporary measure to tide over the present crisis. The more important measures are the preventive measures.

This memorial lecture will not be complete without quoting the words of Gabriella Mistral, the noble prize winner from Chile, who has summarized what I have said in the following words.

HIS NAME IS TODAY

We are guilty of many errors and faults
But our worst crime
Is abandoning the children
Neglecting the fountain of life
Many of the things we need
Can wait
The child cannot

Right now is the time

His bones are being formed

His blood is being made

And his senses are being developed

To him we cannot answer 'tomorrow'

His name is **TODAY**

- Gabriella Mistral

Winner of the Nobel Prize for the Poetry

8. Acknowledgment

I wish to thank the medical students who assisted me in collecting and compiling the data and Malathy Thiagarajah for typing the script.

I must also thank my wife Aracy for patiently preparing the transparencies and projecting them for me today.

References

1. Ebrahim G.J. Paediatric Practice in Developing countries. ELBS.1984.75-76.
2. David Morely, Marhared Woodland. See how they grow.ELBS.Macmillan.1991.7-71
3. UNICEF. State of the World's Children. Oxford University Press. Oxfordshire 1991. p64
4. Department of Census and Statistics. Statistical Profile of children – 1977 Sri Lanka. Department of Census and Statistics Colombo. 1978. 37 -43
5. Department of Census and Statistics. Sri Lanka Demographic and Health Survey.1987. Ministry of Plan Implementation. Colombo 1988
6. Rebecca MacNair-SCF (UK) Personal Communication
7. Sivarajah N. Nutritional Status of the people of Jaffna District. 1992. Jaffna Council of NGOS 1992

8. Sarojini Kandasamy (1989/WEP/24) Nutrition status of children of Chnakanai. Project submitted for Certificate in Workers Education. University of Jaffna 1991
9. Joint FAO/WHO Expert Committee on Nutrition (English Report). Technical Report Series 477. World Health Organization Geneva 1971
10. World Health Organization. Methodology of Nutritional Surveillance. Technical Report Series 593. WHO Geneva. 1976
11. JC Waterlow et al. The presentation and use of height and weight data for comparing the nutritional status of groups of children under age of 10 years.
12. Bulletin of World Health Organization 1977. 55 (4). 489-98
13. UNICEF. Children & Women in Sri Lanka – A Situation Analysis Govt. of Sri Lanka – UNICEF Colombo 1991. 94-96
14. Gnanasuthan N J. A study of relationship between malnutrition and social aspects of children at a Nutrition Rehabilitation Center. Research Project submitted aa a requirement in Community Medicine at the 3rd MBBS Examination (December 1993), University of Jaffna
15. Priyani Soysa. Rethinking Infant Nutrition Policies under Socio-economic conditions – Sri Lankan study. Sri Lanka federation of University Women. Colombo 1982.
16. Sugirtha Shanmuganathan & Kirubananthani Thambipillai. Study of the effect of 'Sarakku' on breast feeding. Research Project to be submitted as a requirement in Community Medicine at the 3rd MBBS Examination. Unpublished data.
17. Nageswaran C, Sivarajah N. Reinfestation of Intestinal Nematodes in a periurban population, Jaffna Medical Journal. 1989.24- 31-84
18. Sivarajah N. Effectiveness of a Nutrition Rehabilitation Center. Paper presented at the Ninth Annual Scientific Session of the Jaffna Medical Association 27 – 29, August 1993.
19. Sivarajah N (1993) Jaffna District Nutrition Survey – 1993. Department of Community medicine, University of Jaffna.