RAPID ASSESSMENT OF NUTRITIONAL STATUS OF CHILDREN LESS THAN FIVE YEARS IN MULLATIVE DISTRICT

by

Dr. Renuka Jayatissa

&

Dr. Sybil Wijesinghe

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SUMMARY

Background: Nutritional surveys were not conducted in this district for last 25 years. Therefore it was seen as a need to carry out a rapid assessment of children less than five years to target food and nutrition programme more effectively.

Objectives: To assess the prevalence of malnutrition among children less than five years in Mullative district and to assess the geographical distribution of malnutrition for planning and implementation of nutrition related programmes.

Methods: This was a cross sectional study. All the children less than 5 years in the district were included for the assessment. Birthday, sex, birth weight, weight and height/length were recorded by the health staff in the predetermined clinic centres.

Results: A total of 12,911 children were assessed. 51.4% were boys. 18.2%, 21.6% and 36.9% were stunted, wasted and underweight, which is more than the national prevalence. Boys were more affected than girls. The prevalence of low birth weight (<2500g) was 16.1%, similar to the national figure. Health care services were as follows: 99.3% were immunised age appropriately, 92.6% have child health development charts, and 89.7% were hospital deliveries. Wasting, stunting & underweight double after 6 months and treble after one year. Children who had low birth weight, currently half are underweight, one third are wasted and one quarter are stunted.

Conclusions and recommendations: More than one fourth of the children of 1 -2 years of age and one fifth of the children of 4 -5 years of age were suffering from the wasting. Food aids should be supplied continuously at least for 6 months with full ration. Create the awareness of mother's especially on complementary feeding with locally available foods. Necessary to concentrate on adolescents or pre-pregnant women to counteract the problem of LBW and the continuous problem of underweight among them.

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INTRODUCTION

The war raged on for twenty years in the Northern Province of Sri Lanka. Regular attacks led to loss of assets, destitution and displacement for a large proportion of the population. Strategies for accessing food had declined overtime and were constrained due to insecurity and little or no access to markets or employment. Insecurity and the still active landmines in some areas prevent residents from carrying out their agricultural activities.

Peace talks were initiated in the year 2001, rehabilitation of war-affected civilians followed. At present, the majority of the civilians have returned to their homes. The Government and international organizations are focusing on providing maintenance for their rehabilitation. Most of the programmes have been funded by the Government and donors; hence there has been a relatively constant food pipeline.

Cultivation has begun by preparing the lands for farming. Various international organisation are distributing seeds and tools. The World Food Programme (WFP) has initiated the "food for work" programme to assist them.

Health services are functioning with limited manpower resources and under restricted food security. Public health services include conduction of MCH clinics; growth monitoring, immunisation, micronutrient supplements, supplementary feeding programmes (Thriposha and Corn Soya Blend) and the deworming pogramme.

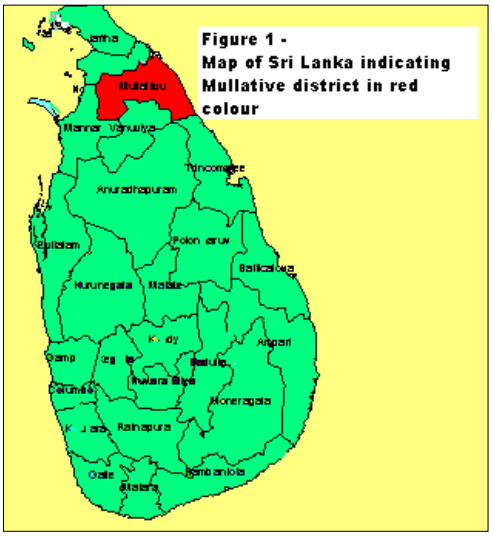
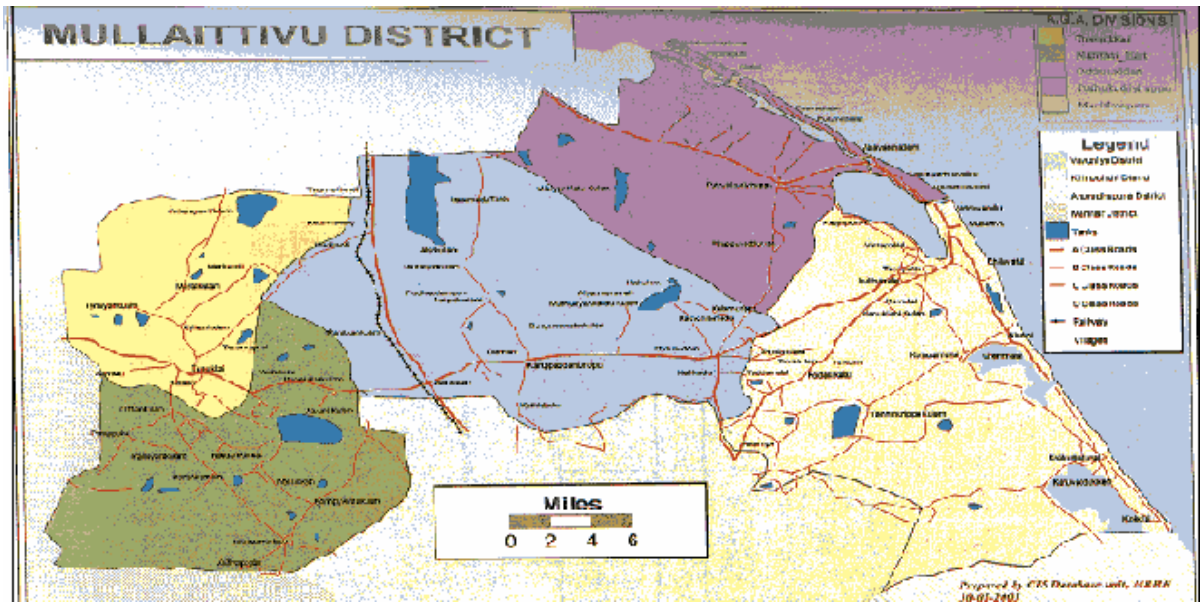


Figure 1 - Map of Sri Lanka indicating Mullative district in red colour

Northern Province consists of five districts, Jaffna, Mannar, Kilinochchci, Vavuniya and Mullative. "Mullative" was demarcated in the year 1979. It had an estimated population of 140,675 as at 31.12.2003. This district

has 5 administrative divisions (AGA) named Maritimepattu, Puthukkudiyiruppu, Oddusuddan, Thunukkai and Manthai East and covers 127 Grama Sevaka Niladari (GN) divisions and 632 villages. It consists of two Medical Officers of Health (MOH) areas which are Mullative and Mallavi (Anonymous 2004).

Figure 2: Map of Mullative district showing 4 AGA divisions



Mullative is one of the worst affected districts by conflict over this period. Mullative district is a non-government controlled area. A large number of agencies provided assistance under the UN umbrella.

Only three fully qualified medical doctors are working in the whole district. One of them is the Deputy Provincial Director of Health Services (DPDHS); the other is working at the Mullative district hospital and third is MOH Mallavi. Fully qualified health staff is lacking. For the whole district there are only 7 PHIs and 6 PHMS. About 25 volunteers are working under the Ministry of Health and 35 volunteers are working under the work for food programme of WFP. A large proportion of Mullative households have a family member working abroad from whom they have been receiving remittance both during the war and now.

Nutritional surveys were not conducted in this district for last 25 years. Therefore it was seen as a need to carry out a rapid assessment of children less than five years to target food and nutrition programme more effectively.

OBJECTIVES:

1. To assess the prevalence of malnutrition among children less than five years in Mullative district
2. To assess the geographical distribution of malnutrition for planning and implementation of nutrition related programmes.
3. To find out selected factors like,
    a. Birth weight
    b. Factors related to the health services,
        i. Age appropriate immunisation
        ii. Place of delivery
        iii. Availability of Child Health Development records (CHDR)
        iv. Current breast feeding pattern

METHODOLOGY

This was a cross sectional study. All the children less than 5 years in the district were included for the assessment.

Planning of the study

First meeting was held at the Medical Research Institute (MRI), Colombo for all the health staff in Mullative district on the 6th of August 2004.

WFP officials from Kilinochchi, Vavuniya and Colombo also were invited to the meeting. The survey procedure and the information which was necessary to conduct the study was explained to them. Necessary logistics were identified during that meeting; weighing scales, clinic centers, date for the training of the peripheral staff, dates for the survey, vehicles, allocation of staff and survey format etc..

As a second step, baseline information on clinic centres were collected by WFP and local health staff with the assistance of volunteers. The following background information was collected; map of the Mullative district, list of MOH areas by the population, list of the PHM areas and PHI areas by the population, list of the health institutions by each MOH area and list of the MCH clinics by each MOH are etc.. The preparation of the work plan was completed by the officials from the WFP office Kilinochchi with the assistance from the DPDHS and the local health staff.

Second meeting was conducted in the MRI and the work plan was presented by the WFP officials. The clinic centers were identified and the members were allocated to the particular clinic. The training of the health staff and the conduction of the study was fixed from the 20th – 25th September 2004.

Electronic weighing scales and height measuring boards were obtained from the MRI, Nutrition Coordinating Unit of the Ministry of Health (NCU/ MOH) and the

remaining were purchased by the WFP Colombo office to be distributed to the clinic centres.

All the people in the area were informed through the public address system and volunteers were sent for home visits to register all the children in the area. Each volunteer maintained the register and the child's name and age was taken and given a token to come to the clinic. The expected number of children in the area was 13,500, 4,000 from Mallavi MOH and the remaining from the Mullative MOH. Children were allocated to each clinic and were asked to visit the particular clinic on the allocated day. Mothers were asked to bring children and attend the pre arranged clinic centre on the given date.

Training of the health staff

Maps with boundaries of the particular MOH areas were obtained from the MOH offices and the clinic centres were marked on the map (Figure 1 & 2). The clinics were allocated to the field health officers. Each field investigator was provided with special task during the training which was conducted on the 20-21st September. All were trained for identified tasks. Only the Health staff and volunteers appointed by the DPDHS Mullative who are running routine MCH clinics were trained to take the measurements. Training was carried out by the two Consultants and the staff from the Department of Nutrition, Medical Research Institute.

Collection of other information was done by using the check list (Annexure-1) which was done by the volunteers who worked under the "food for work" programme. They had been made conversant with the procedure. During the training all the health staff and volunteers were given one day training on the filling of data format, measuring of height, weight and they were standardised.

Data collection

Clinic centres by the MOH areas were identified to carry out the assessment. There were 33 clinics from Mallavi Medical Officer of Health (MOH) division with 66

sessions and 32 from Mullative MOH area with 80 sessions. The dates were fixed to conduct the survey (from 22-24th September 2004) and Mallavi MOH to be covered within 2 days and the Mullativ to be covered within 3 days. In each MOH area each centre was allocated to a member of the health staff.

After the procedure was explained to the mother, all the children attended clinic centres were interviewed to gather the following information: Birthday, if not age, sex, birth weight, whether delivered in the hospital or home, availability of child development record (CHDR), present history of immunisation and whether the child is currently breast fed or not, childs' weight and height was measured.

Anthropometric measurements were taken by health staff who were trained and they were standardised before the study. All of them had experience of measuring children during the routine clinic activities. Length and Height was recorded to the nearest 0.1 centimetre by using height/length measuring boards or length measuring rod or height tape (microtoise) without foot ware.

Children were weighed with a minimum of clothing and without foot ware. An electronic balance was used and accuracy checked at the beginning of the survey by using the standard weights. The weights and heights/lengths were recorded to the nearest 0.1kg and 0.1cm. The measurers were assessed during the study by the supervisors who were from the Department of Nutrition, Medical Research Institute.

When the assessment was completed all the mothers were given a token to collect from WFP, their food parcels which contained rice and dhal.

Supervision of the study

Supervision of the centres was done by 3 teams consisting of the Supervisory Public Health Inspector (SPHI) of the area or Supervisory Public Health Midwives

(SPHM) of the area, Officer from the WFP and a staff member from the Department of Nutrition, Medical Research Institute.

Analysis of the data

Age was calculated in months from the child's birthday taken from the birth slip which was given from the hospital or the CHDR. Weight-for-age, weight-for-height and height-for-age were calculated by using anthro-software (no corrections have been made for the weight of the clothing which average 50g). The NCHS reference data was used and the children below the -2SD was taken as cut off values to estimate age and sex specific prevalence of stunting, wasting and underweight according to the recommendations made by WHO (1995). Data analyses were carried out by using SPSS software package.

Ethical consideration

Approval was obtained from the Director General of Health Services, the Mullative DPDHS and the political wing of the LTTE. Study period was August - October 2004.

RESULTS

A total of 12,911 children which was 95.6% of the estimated number of children less than five years in the district were subjected to the study. There were 51.4% boys and 48.8% girls. In the sample, 3159 (24.5%) children from Mallavi MOH area and 9752 (75.5%) children from Mullative MOH area.

Table 1 show the age and sex distribution of the sample. The children were evenly distributed from the age of 1-5 years. There were 1122 children less than 6 months of age also had attended the clinics for the assessment. Though the children less than 5 years were targeted it was observed that 646 children who had passed the age of 5 years also had been brought.

Table 1

Age and sex distribution of the study sample by MOH area

Age (months)	Mullative MOH			Mallavi MOH			Mullative district		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
<6	459 9.2%	442 9.4%	901 9.3%	115 7.1%	106 6.9%	221 7.0%	574 8.7%	548 8.8%	1122 8.7%
6 -11.9	456 9.1%	467 9.9%	923 9.5%	131 8.1%	116 7.6%	247 7.8%	587 8.9%	583 9.3%	1170 9.1%
12 - 23.9	970 19.4%	873 18.5%	1843 19.0%	272 16.9%	257 16.7%	529 16.8%	1242 18.8%	1130 18.1%	2372 18.4%
24 - 35.9	998 20.0%	978 20.7%	1976 20.3%	301 18.6%	289 18.8%	590 18.7%	1299 19.6%	1267 20.2%	2566 19.9%
36 - 47.9	991 19.8%	935 19.8%	1926 19.8%	309 19.1%	286 18.6%	595 18.9%	1300 19.7%	1221 19.5%	2521 19.6%
48 - 60	959 19.2%	859 18.2%	1818 18.7%	323 20.0%	335 21.8%	658 20.9%	1282 19.4%	1194 19.1%	2476 19.2%
>60	168 3.4%	168 3.6%	336 3.5%	163 10.1%	147 9.6%	310 9.8%	331 5.0%	315 5.0%	646 5.0%
Total	**5001** **51.4%**	**4722** **48.6%**	**9723** **75.5%**	**1614** **51.2%**	**1536** **48.8%**	**3150** **24.5%**	**6615** **51.4%**	**6258** **48.6%**	**12873*** **100.0%**

(*38 children did not have birthdays)

About 75% of children were from the Mullative MOH area which has a higher population than the Mallavi MOH area. More male children were in the sample than the female children from both MOH areas.

Table 2

Mean height, weight, mean Z scores and Body Mass Index (BMI) of the study sample in relation to the age

Age in months	Mean height (SD) in cm			Mean weight (SD) in kg			Mean BMI (SD)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
<6 (n=1120)	62.0 (5.3)	60.1 (7.9)	61.1 (8.1)	5.9 (1.8)	5.5 (1.9)	5.7 (1.9)	15.2 (2.6)	14.9 (3.5)	15.1 (3.1)
6-11.9 (n=1166)	71.1 (6.6)	69.8 (6.2)	70.5 (6.4)	8.0 (1.4)	7.5 (1.3)	7.7 (1.4)	16.0 (4.6)	15.6 (7.0)	15.8 (5.9)
12-23.9 (n=2368)	79.2 (6.7)	77.8 (6.6)	78.5 (6.7)	9.4 (1.5)	8.9 (1.4)	9.2 (1.5)	15.2 (2.6)	14.8 (2.5)	14.9 (2.6)
24-35.9 (n= 2562)	87.5 (6.5)	85.9 (6.5)	86.7 (6.5)	11.1 (1.6)	10.5 (1.5)	10.8 (1.6)	14.6 (2.3)	14.3 (2.2)	14.5 (2.3)
36-47.9 (n= 2516)	93.5 (6.8)	92.2 (7.6)	92.9 (7.2)	12.4 (1.6)	11.9 (1.6)	12.2 (1.6)	14.3 (3.6)	14.4 (6.7)	14.4 (5.3)
48-60 (n= 2468)	99.2 (6.8)	98.9 (6.9)	99.1 (6.8)	13.6 (1.9)	13.3 (1.7)	13.5 (1.8)	13.9 (1.8)	13.7 (2.1)	13.8 (1.9)
60-70 (n = 643)	104.1 (10.4)	104.4 (10.5)	104.2 (10.4)	14.3 (1.8)	14.1 (1.7)	14.2 (1.8)	13.4 (2.8)	13.2 (2.6)	13.3 (2.7)
Total (n=12,843)*	86.5 (13.8)	85.3 (14.2)	85.9 (14.0)	10.9 (2.9)	10.5 (2.9)	10.7 (2.9)	14.6 (2.9)	14.4 (4.2)	14.5 (3.7)

(*68 children did not have weight/height/length/age)

Mean height, mean weight, mean body mass index (BMI) and mean Z-scores of the subjects were shown in the Table 2. Mean height and weight was significantly increased with the increasing age (P=0.000). But the mean BMI is significantly decreased with the increasing age (P = 0.000). Boys were taller and heavier than girls.

Prevalence of stunting, wasting and underweight

Study findings revealed (Table 3) that the prevalence of stunting (percentage below the -2SD of NCHS/WHO height-for-age reference) was 18.2%. Because stunting is a

cumulative process, the percentage of stunted children increases with age. The highest prevalence showed around the age of 48-60 months. This observation suits the population since they went through war for last 20 years and peace was established only 2 years before.

Table 3

Mean Z scores of the study sample in relation to the age (n=12,280*)

Age in months	Height-for-age		Weight-for-age		Weight-for-height	
	% below -2Z-score (Stunting)	Mean Z-score (SD)	% below -2Z-score (Underweight)	Mean Z-score (SD)	% below -2 Z-score (Wasting)	Mean Z-score (SD)
<6 (n=1029)	4.9	0.29 (2.4)	4.5	-0.24 (1.1)	7.3	-3.0 (1.2)
6-11.9 (n=1105)	10.0	-0.44 (1.3)	20.7	-1.09 (1.1)	14.9	-8.8 (1.2)
12-23.9 (n=2256)	20.2	-0.96 (1.5)	37.2	-1.60 (1.1)	27.3	-1.35 (1.1)
24-35.9 (n= 2483)	15.3	-0.80 (1.4)	42.0	-1.74 (1.0)	23.9	-1.40 (0.9)
36-47.9 (n= 2438)	20.1	-1.19 (1.2)	413	-1.80 (0.9)	21.5	-1.35 (0.9)
48-60 (n= 2383)	25.5	-1.39 (1.2)	45.5	-1.88 (0.8)	21.8	-1.39 (0.9)
60-70 (n = 586)	24.7	-1.48 (1.2)	49.8	-1.99 (0.6)	28.2	-1.51 (0.9)
Total	18.2	-0.96 (1.4)	37.0	-1.58 (1.2)	21.6	-1.25 (1.0)

(*631 records were flagged)

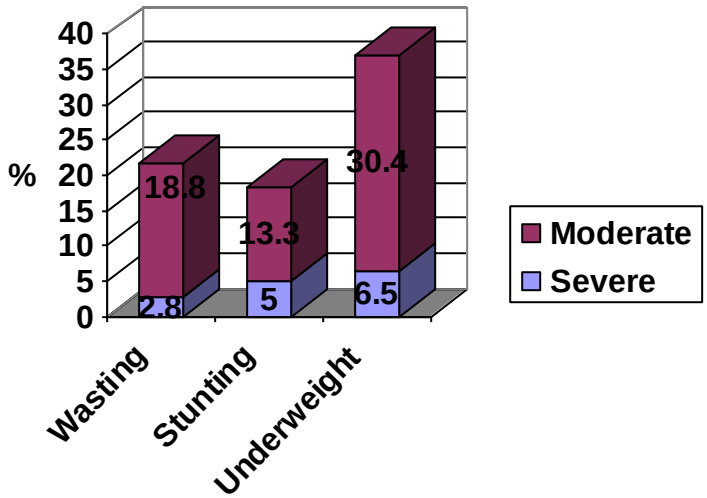
The prevalence of wasting (percentage below the -2SD of NCHS/WHO weight-for-height reference) was 21.6%. It also increases with the age and slows down after the age of 3 years. The highest prevalence showed around 1-2 years (Table 3).

The prevalence of underweight (percentage below the -2SD of NCHS/WHO weight-for-age reference) was 37%. As with stunting, the prevalence of underweight also

increases with age. In this population, the highest prevalence showed around fifth year. It is interesting to note that the prevalence of underweight is twice as much as the prevalence of stunting.

Only 2.8% were severely wasted (percentage below the -3SD of NCHS/WHO weight-for-height reference), 5% were suffering from severe stunting (percentage below the -3SD of NCHS/WHO height-for-age reference) and 6.5% were severely underweight (percentage below the -3SD of NCHS/WHO weight-for-age reference). Majority of the stunted, wasted and underweight children have fallen between the moderate and severe level (between the -2SD and -3SD of NCHS/WHO reference) as shown in the Figure 3.

Figure 3: Prevalence of wasting, stunting and underweight



It is interesting to note that boys appeared to have significantly higher prevalence of wasting than girls (22.5% in boys and 20.7% in girls; P = 0.000). Similar observation was made in Mullative and Mallavi MOH areas (Table 4). Prevalence of underweight among girls (37.4%) was higher than boys (36.5%). Similar observation was detected in the Mullative MOH area. The prevalence of underweight was almost double when compared with the prevalence of stunting in both MOH areas. Children from Mallavi MOH area have shown a significantly higher level of wasting, stunting and underweight than the children from the Mullative MOH area

Table 4

Prevalence of wasting, stunting and underweight in different MOH areas in relation to the sex (n=12,285*)

Age (months)	Mullative MOH %			Mallavi MOH %			Mullative district %		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Wasting	989 20.6%	850 18.7%	1839 19.7%	433 28.6%	386 27.0%	819 27.8%	1422 22.5%	1236 20.7%	2658 21.6%
Stunting	876 18.3%	758 16.7%	1634 17.5%	320 21.1%	287 20.0%	607 20.6%	1196 18.9%	1045 17.5%	2241 18.2%
Underweight	1658 34.5%	2236 37.4%	3315 35.5%	648 42.8%	579 40.4%	1227 41.6%	2306 36.5%	2236 37.4%	4542 37.0%

(*626 records were flagged)

Based on the proposed epidemiological criteria for assessing severity of under nutrition in population by the WHO, when the percentage of underweight is >=30 and the percentage of wasting is >=15 it indicates a very high prevalence. When the percentage of stunting is <20 it was indicated a low prevalence. This is an interesting finding to observe because this population was affected with war for the last 20 years.

Table 5

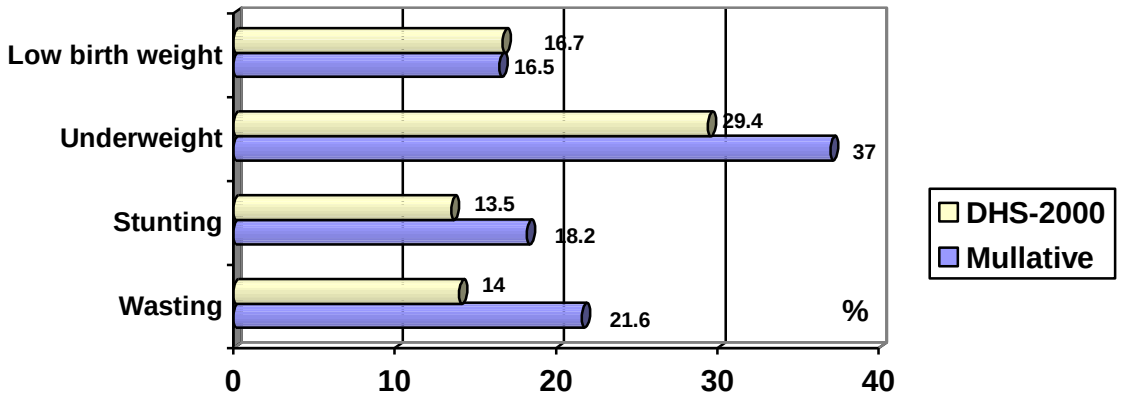
Distribution of selected characteristics in the study sample

Characteristics	Mullative MOH %	Mallavi MOH %	Mullative district %
Children with			
low birth weight (n=11,650)	15.1	16.9	16.4
hospital deliveries (n=12,896)	87.7	95.9	89.7
age appropriate immunisation (n=12,885)	99.1	99.9	99.3
availability of CHDR (n=12,886)	90.2	99.9	92.6
currently breast feeding (N=12,884)	39.5	32.1	37.6

As shown in Table 5, only 11,650 children (90.2% of the sample) had their birth weights, the prevalence of low birth weight (Birth weight less than 2.5kg) was 16.4% in the district. About 90% children were delivered in hospitals and 99.3% of them received age appropriate immunisation.

Growth monitoring and promotion is a component of the maternal and child health clinics which is a national programme. All children are issued a child health development card (CHDR) from the hospital or by the field public health midwife. This card is kept with the mother to maintain the growth of the child, immunisation etc. In the survey, it was found 92.6% of children had CHDR. It is interesting to note that the current breast feeding rate is 37.6%.

Figure 4: Comparison of Mullative data with the National data



Data from the Mullative district was compared with the National data of Demographic and Health survey (DHS) 2000. The prevalence of wasting, stunting, and underweight among children in the Mullative district is higher than the National p0revalence, but the prevalence of low birth weight is almost equal to the National level. Wasting is 7.4% more than the National level.

Figure 5: Comparison of wasting in Mullative district with DHS-2000 data in relation to the age in months

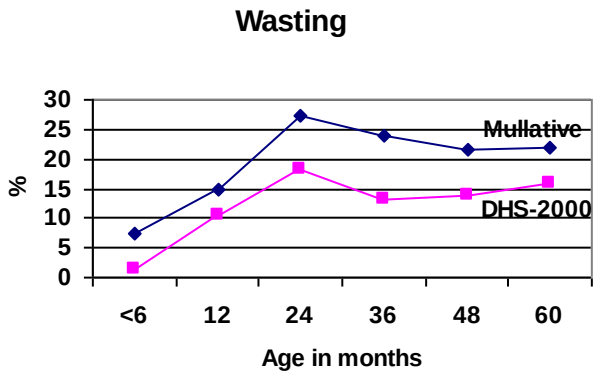


Figure 5 shows that the similar pattern to the National level. But the gap is wider between the 24 – 48 months.

Figure 6: Comparison of stunting in Mullative district with DHS-2000 data in relation to the age in months

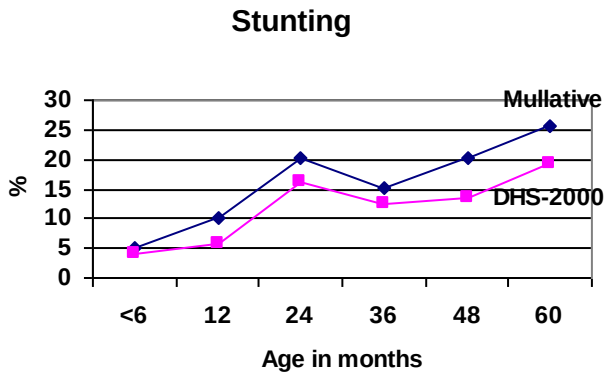


Figure 6 shows that the similar pattern as National. The stunting slows down after the age of 36 months but in Mullative district there is a steady increase after the age of 36 months giving a wide gap.

Figure 7 show that the prevalence of underweight among children in Mullative district has the similar pattern as National.

Figure 7: Comparison of underweight in Mullative district with DHS-2000 data in relation to the age in months

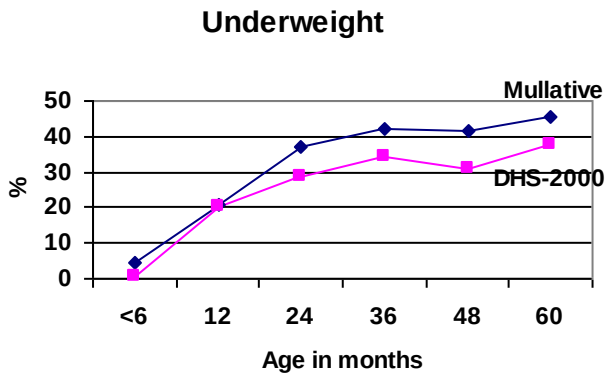
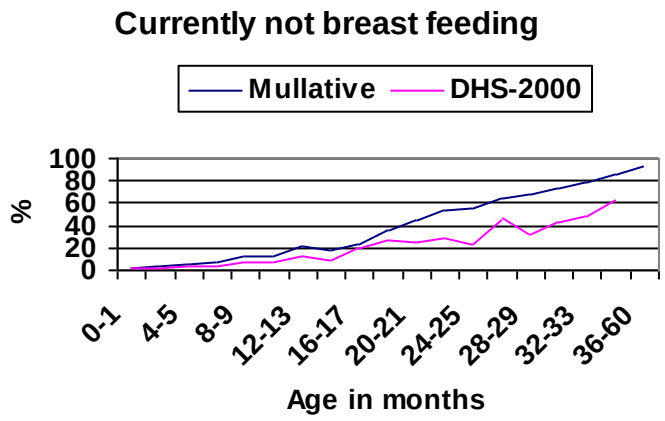


Figure 8 shows the current not breast feeding pattern among children in Mullative district in comparison with the DHS-2000 data. Mullative district shows a higher rate than the National level. After the age of one year the breast feeding was not practising by more mothers in Mulative district than the national. It was observed about 5-10% of children even at the age of 5 years are given beast milk in Mullative district.

Figure 8: Comparison of the current not breast feeding pattern among children in Mullative district with DHS-2000 data



Geographical distribution of under nutrition

Table 6 shows the prevalence of wasting, stunting and underweight in the 5 AGA divisions in the district. The prevalence of stunting among AGA divisions varied from 16.8 – 21.2%. It showed that the lowest prevalence was in AGA division Puthukkudiyiruppu where the majority of people live and which has the maximum resources. The highest prevalence was in AGA division Thunukkai which has very limited resources.

Table 6

Prevalence (%) of under nutrition in different AGA divisions

AGA Divisions	Wasting*	Stunting**	Underweight***
Puthukkudiyiruppu (N=4,905)	17.2	17.2	33.2
Oddusuddan (N=1,907)	23.1	19.4	40.1
Maritimepattu (N=3,088)	20.5	16.8	36.4
Thunukkai (N=1,059)	30.3	21.2	44.4
Manthai East (N=1,326)	25.7	20.1	39.4
Total (N=12,285)	**21.6**	**18.2**	**37.0**

(*X^2= 91.4, P=0.000, **X^2= 21.3, P=0.000, ***X^2= 81.5, P=0.000)

When the prevalence of wasting is compared among AGA divisions, highest prevalence was in Thunukkai (30.3%). In Thunukkai AGA division, 50% of the population comprise of displaced people of other areas, 50% are having temporary houses and 80% of families do not have latrines (Anonymous 2004). Lowest prevalence was observed in Puthukkudiyiruppu (17.5%) like the prevalence of stunting and underweight.

Table 7 shows that the prevalence of wasting, stunting and underweight among children in different public health midwives areas (PHM). Mullative district is divided into 2 MOH areas and each MOH area is divided into number of PHM areas. Each PHM serves about 3000 population.

Table 7

Prevalence (%) of under nutrition in different PHM areas

AGA Divisions / PHM areas	Wasting*	Stunting**	Underweight***
Puthukkudiyiruppu			
Manthwvil (N=439)	16.6	15.3	31.0
Ward 10 (N=247)	16.2	19.4	36.0
Ward 7 (N=304)	11.2	13.5	22.7
Iranaipalai (N=236)	16.5	19.9	31.8
Ananadapuram (N=179)	15.6	17.9	40.8
PTK West (N=354)	11.6	16.7	25.4
Veravil (N=345)	16.8	16.8	31.3
Kaively (N=310)	20.6	17.4	37.1
Deripuram colony (N=229)	18.3	17.9	29.7
Deripuram part A (N=97)	23.7	20.6	48.5
Vallipuram (N=213)	16.0	19.2	34.3
Suthanthirapuram (N=273)	24.2	20.1	37.0
Udaiyarkaddu North (N=283)	20.8	20.5	40.3
Udaiyarkaddu South (N=358)	19.3	16.2	31.8
Visvamadu East (N=407)	17.4	20.4	39.8
Visvamadu West (N=292)	21.2	9.2	26.4
Nachikudu (N=136)	29.4	14.7	38.2
Oddusuddan			
Karipattamurippu (N=226)	28.3	26.5	46.0
Murigandy (N=239)	13.8	21.3	39.7
Thonduran (N=132)	19.7	20.5	34.8
Karuvelangandal (N=146)	14.4	19.2	31.5
Mongulam (N=171)	17.0	21.1	42.1
Oddusudan (N=164)	15.2	29.3	45.7
Right band (N=196)	17.3	16.3	30.6
Left band (N=265)	23.4	18.9	38.1
Katsilaimadu (228)	21.1	33.8	47.8
Maritimepattu			
Mullaitivu (N=323)	18.9	14.6	34.4
Silavathai (N=268)	20.1	19.0	37.7
Mullivaikkal (N=157)	19.1	11.5	32.5
Mamoolai (N=380)	22.6	16.3	34.7

Ambalaran Pokkanai (N=124)	12.1	15.3	35.5
Vatrapalai (N=302)	16.9	14.9	35.1
Mulliyaralai West (N=282)	22.0	17.7	39.0
Mulliyaralai East (N=194)	15.5	16.5	34.0
Thanneerootru (N=261)	21.5	15.7	34.5
Kumulamunai (N=214)	16.8	17.3	35.5
Semmalai (N=139)	23.0	21.6	36.7
Alampil (N=226)	32.7	22.6	46.9
Thunukkai			
Yogapuram West (N=78)	35.9	16.7	35.9
Varanagar (N=62)	16.1	19.4	25.8
Yogapuram centre (N=218)	35.3	21.6	43.6
Aningiyankulam (N=76)	15.8	26.3	42.1
Alankulam (N=75)	20.0	12.0	30.7
Kunukkai (N=166)	21.1	23.5	50.0
Kalvillan (N=90)	23.3	23.3	45.6
Ambalappermankulam (N=100)	46.0	21.0	46.0
Ambalaperumal (N=50)	22.0	36.0	40.0
Arokkiyapuram (N=102)	37.3	33.3	56.9
Nerangkandal (N=168)	27.4	18.5	47.0
Padeiyadukandi (N=133)	45.9	10.5	48.1
Manthai East			
Parthinagar (N=203)	22.2	17.2	31.0
Aningiyankulam part 1 (N=163)	20.2	35.6	42.9
Kollavilankulam (N=349)	33.0	15.8	41.8
Palingar (N=264)	18.2	19.3	33.3
Kollavilankulam (N=12)	16.7	33.3	3.3
Pandiankulam (N=292)	24.3	20.5	39.4
Naddangkandal (N=177)	35.6	15.3	44.1
Pangkamum (N=33)	18.2	21.2	39.4
Virangapuram (N=78)	26.9	25.6	51.3
Poovarasankulam (N=57)	26.3	19.3	43.9

It is important to note that children of all ages who are wasted and stunted are likely to respond positively towards interventions. There fore it is important to

identify the population at public health midwife level to allocate resources and to priorities the allocations.

The prevalence of wasting varied from 11.2% in PTK West to 46.0% in Ambalappermankulam PHM area in the Mallavi MOH area. The prevalence of stunting varied from 9.2% to 35.6% and the underweight ranged 31% - 56.9%.

Comparison of indicators of under nutrition with other indicators

It was found that there was a strange association between wasting, underweight, stunting and low birth weight (Table 8).

Table 8

Association between anthropometric indices

Characteristics	Wasting	Stunting	Underweight	Low birth weight
Wasting	-	534[1] 20.1%	2127[2] 80.0%	543[7] 23.1%
Stunting	534[3] 23.8%	-	1802[4] 80.4%	482[8] 25.2%
Underweight	2127[5] 46.8%	1802[6] 39.7%	-	941[9] 23.9%

([1]χ^2=7.6, P=.005, [2]χ^2=2695.3, P=.000, [3]χ^2=7.6, P=.005, [4]χ^2=2217.2, P=.000, [5]χ^2=2219.5, P=.000, [6]χ^2=2695.3, P=.000, [7]χ^2=99.8, P=.000, [8]χ^2=132.3, P=.000, [9]χ^2=253.3, P=.000)

About 80% of wasted children were underweight. It shows that 23.1% of wasted children were of low birth weight. This observation is strongly associated. It clearly shows that it is important to increase the birth weight in order to reduce wasting, stunting and underweight.

Table 9 shows that 30%, 26.6% and 52% of low birth weight children are wasted, stunted and underweight respectively. The prevalence of wasting, stunting and underweight is significantly decreased with the increase of birth weight.

Table 9

Prevalence of under nutrition in relation to the birth weight in Kg

	<2.5 (n=)	**2.5-2.75 (n=)**	**2.76-3.0 (n=)**	**3.01-3.5 (n=)**	**>3.5 (n=)**
Wasting (%)	30.0	24.3	20.0	16.8	11.7
Stunting (%0	26.6	20.6	15.1	12.3	10.6
Underweight (%)	52.0	42.2	33.5	26.3	18.2

Focus group discussions with mothers

When the mothers brought children to the clinic center 5-6 mothers were grouped together and the following questions were forwarded to them and discussions were made. They were asked about the source of income, agricultural production, the feeding pattern among children after the age of 6 months and during illnesss and the housing and sanitation.

They stated that agriculture production has not yet got established and that they are preparing the fields for planting. They have very poor status of environmental sanitation with unprotected wells and no latrines for each household. They live in temporary houses. But the plus point is that at least one member from a family is working abroad mainly in European countries. Parents who have money like to feed their children with the ready made food rather than with home made food. The mothers felt that children were getting ill quite frequently mainly cold, cough and fever.

Conclusions and Recommendations

The prevalence of under nutrition among children less than 5 years in Mullative district is higher than the national prevalence. The prevalence of wasting, stunting and underweight among them was 21.6%, 18.2% and 37.0% respectively. Wasting is higher than stunting. More than one fourth of the children of 1 -2 years of age and one fifth of the children of 4 -5 years of age were suffering from wasting. Under nutrition was more prominent in the Mallavi MOH area than the Mullative MOH area. About 16% of children were born with the birth weight of less than 2.5kg indicating the low birth weight. There was a wide variation of wasting in different Public Health Midwives areas, i.e. 11.0 – 46.0%.

It is recommended to:

- Initiate programmes immediately in the areas of high prevalence of wasting.
- Determine the causes of high wasting like micronutrient deficiencies, infections etc..
- Supply the food aid continuously in full ration minimally for 6 months.
- Carry out in service training programmes on nutrition for health workers and volunteers in the districts especially on complementary feeding.
- Educate parents on the complementary feeding practices with locally available foods.
- Promote the psycho-social development of children by initiating the ECCD programme in the district.
- Concentrate on adolescents or pre pregnant women to counteract the problem of LBW and the continuous problem of underweight among them.

REFERENCES

1. World Health Organisation (WHO) 1995, Physical status: the use and interpretation of anthropometry, No. 854;Geneva.
2. Annonymus 2004, Statistical hand book 2004 Mullativu district. Statistical branch, Kachcheri.
3. Demographic and Health survey (DHS) 2000, Department of census and statistics, Sri Lanka.

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ANNEXURE – 1

INSTRUCTIONS FOR INTERVIEWERS

General Instructions for Interviewers

1. Start from the first child.
2. Explain the procedure to the mother / guardian.
3. Fill the format first.
4. Weigh the child according to the instructions and mark on the appropriate column immediately.
5. At the end of the work, thank the mother/guardian.

Steps to be followed in measuring weight

1. Place the scale on a hard flat surface.
2. Make sure it is stable.
3. Check the scale everyday with standard weight to calibrate.
4. Balance the scale to zero.
5. Ask to remove the shoes.
6. Ask child to stand on flat surface of the scale and set the feet.
7. The readings are taken to the nearest 100g.
8. Immediately record the measurement on the cage.

ANNEXURE – 2

RAPID ASSESSMENT OF NUTRITIONAL STATUS OF CHILDREN LESS THAN FIVE YEARS IN MULLATIVE DISTRICT

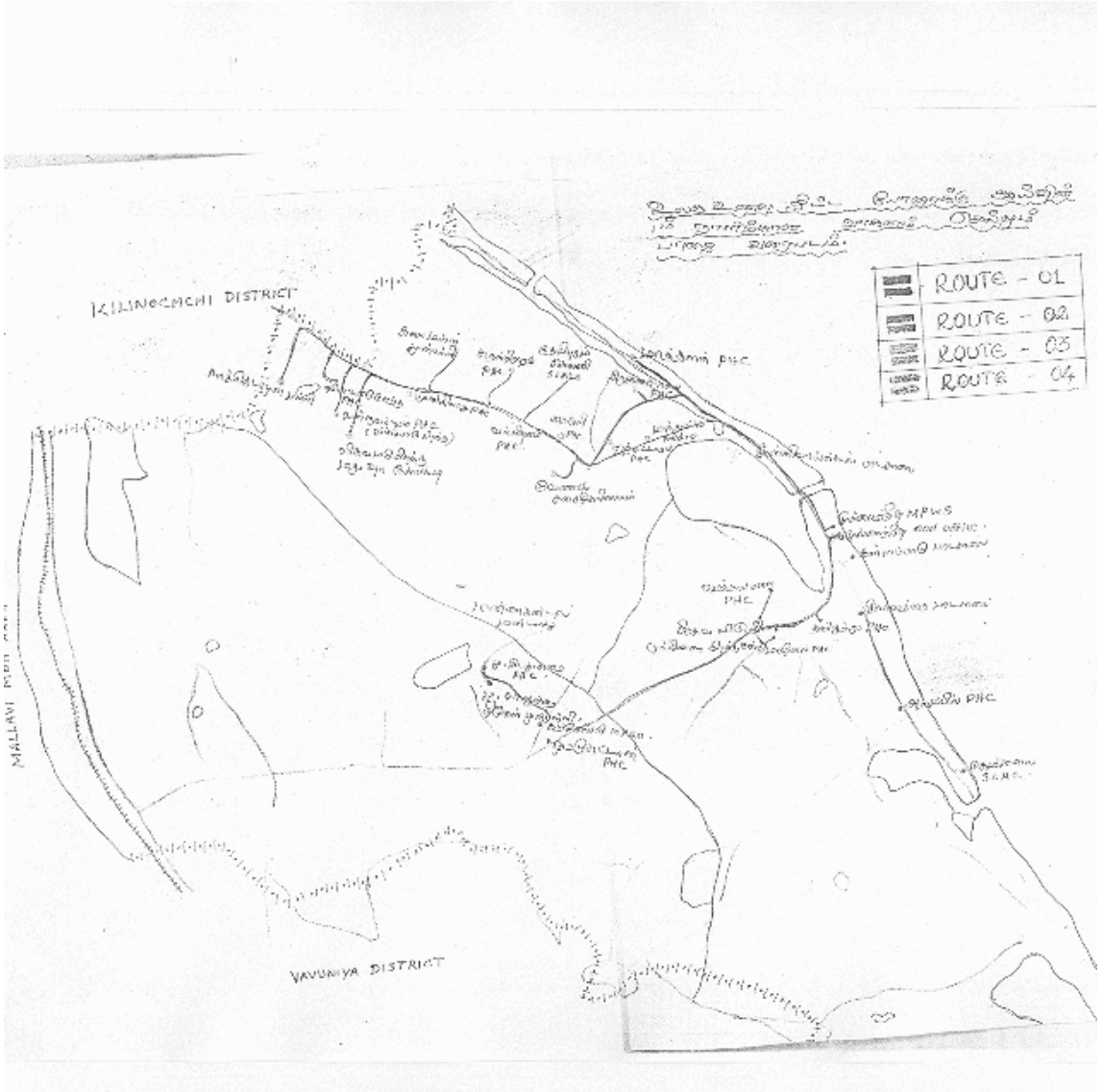
MOH area: ..... PHM Area:..... Clinic center:.....GN division.....Date:...../...../2004 Interviewer:..... Measurer:.....

Supervisor.....

SNO	Child's Name	Sex M=1 F=2	Birth weight (kg)	Delivery at Hospital =1 home=2	Birthday	Breast feeding Yes(1) No(2)	Availability of CHDR Yes=1 No=2	Age appropriate immunisation (Yes=1 No=2/NK=3)	Mothers education (year)	Weight (Kg)	Height (cm)
					--/--/----						

Annexure – 3

Map of the Mullative MOH area with clinic centres



Annexure – 4

Map of the Mallavi MOH area with clinic centres