

**Nutrition surveillance programme in tsunami affected areas of Sri Lanka: a review
and analysis of experience**

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Abstract

Background: Nutrition surveillance among children under five years among the tsunami affected families were established from January 2005. Second and third round of the survey was carried out in 5 months and one year and two months after the onset of tsunami to track the changes in the nutritional status of children under five years living in 12 tsunami affected districts.

Methods: This was a 30 cluster representative survey in the tsunami affected areas. There were three groups of children under five years were studied; affected living in camps, affected living in their own residencies and non affected children. Same children studied during the second round of the survey was included during the third round. Same questionnaire used in the second round of the survey was administered to the mothers / immediate care takers of the child. Height / length and weight was measured.

Results: A total of 1,127 children of tsunami affected families living in camps, living in their houses and non affected families were assessed. Of whom 50.3% were girls. The following results depict the key findings of the third round nutrition surveillance:

There was an overall reduction in the prevalence of wasting among children of tsunami affected families living in the camps, living in their own houses and children of non-affected families living in the adjacent communities. There was a significant reduction of acute under nutrition (wasting) was noted among children of displaced families living in the camps where acute under nutrition reduced from 16.8 per cent in May 2005 to 10.8 per cent in February 2006. The reduction in the rates of acute under nutrition was noted for all provinces and age groups except for the age group between 36 and 48 month among non

affected children. There was no significant change in the rates of chronic under nutrition (under weight and stunting) in all three groups;

The prevalence of diarrhoea among children in the camps which was 11.1 per cent in May 2006 had dropped to 10.2 per cent in February 2006. Similar reduction was observed among children of tsunami affected families living in their own houses. The prevalence of fever/cough increased in all the three groups. The prevalence was highest among those children living in the camp. This finding is similar to that of baseline prevalence suggesting seasonality as both surveys were conducted in January / February.

The proportion of households living in the camps depending on Government food source has decreased from 82.3 percent in May to 34.4 per cent in February 2006. The contribution of other sources (private, NGO, other organisations etc.) has also decreased from 26.2 per cent in May to 8.3 per cent February 2006.

The proportion of children over 6 months in the camps receiving Triposha (fortified supplementary food) increased from 25.4 per cent in May 2005 to 33.1 per cent in February 2006. A similar trend was observed for those affected families living in their houses;

The proportion of households living in the camps taking loans increased from 12 per cent in May 2005 to 21.3 per cent in February 2006. A similar trend was noted for the other groups as well. Although the income from fishing has continued to rise it has not yet been the major source of income for tsunami affected population. The main source of income for families living in the camps and living in their own houses is the daily paid job. This has increased for the camp households from 38.3 per cent in May 2005 to 47.5 per cent in February 2006.

Conclusions: It was recommended to continue the nutrition surveillance programme among tsunami affected families to track changes and to streamline the triposha / supplementary food programme to be beneficial for underweight children,

Introduction

The Tsunami tidal wave of 26th December 2004 was one of the worst disasters in the history of human kind that caused unprecedented loss of human life and damage to infrastructure and livelihood.

In Sri Lanka, around 30,000 people lost their lives and over 800,000 people were displaced. Impact of tsunami on housing and urban development infrastructure was immense, 35,100 houses fully damaged and 47,500 houses partially damaged. The damage to the livelihood was extensive, around 270,000 people lost their livelihood, in particular fisheries industry was affected with 15,300 boats and one million nets destroyed or damaged.

The effect of tsunami on the health infrastructure was enormous. Several major hospitals were damaged, and a large number of peripheral and smaller health units have been completely or partially destroyed. In addition, majority of the medical equipment, office equipment and a large number of vehicles in the affected areas were totally destroyed. The tsunami also caused damage to the water supply system and sanitation facilities.

With population displacement, damage to social services, loss of livelihood and inadequate safe water and sanitation, the post tsunami situation put children under increased threat for malnutrition.

In order to monitor the nutritional situation of children in tsunami affected population, the Ministry of Healthcare and Nutrition, UNICEF and WFP established nutritional surveillance system in tsunami affected coastal belt of Sri Lanka. The surveillance was carried out by the Department of Nutrition, Medical Research Institute of the Ministry of

Healthcare and Nutrition. The first survey was conducted one month after the tsunami in January 2005¹. The second round of the survey was carried out in May 2005, five months after the tsunami².

The findings and recommendations of both the first and second round surveys were presented and discussed at the national forum that brought together all stakeholders involved in nutrition work in the tsunami affected population. The survey was instrumental to inform partners how the nutritional status of children evolved over time and the measures that need to be taken to positively change the situation.

This report depicts the findings and recommendations of the third round nutrition survey conducted one year and two months after the initial disaster. The reports also compares the findings of the third round nutrition surveillance with that of the first and second rounds and gives a better understanding of how the nutritional status of children evolved over time.

Objectives

To provide trends in

- prevalence of under nutrition
- morbidity,
- child care practices
- socioeconomic characteristics;

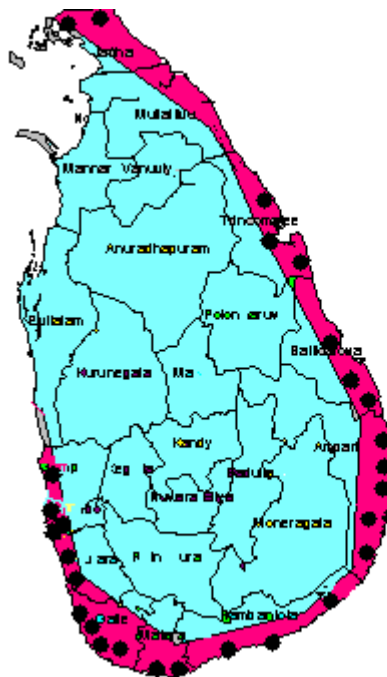
among children under five years of age in tsunami affected areas to be used for ,

- policy makers,
- planners
- funding agencies (UN organisations, non governmental organisations etc..)

at central and decentralised levels for decision-making.

METHODS

The sample comprised of 30 clusters identified during the second round of survey to cover all 12 affected districts by tsunami². During the design of the methodology for the second round the need for representative data from tsunami victims and to simple-to-repeat was considered. Thirty cluster areas were selected from the list of camps provided by the UNICEF by considering the camps which were included for the first round of the survey; at least one cluster was taken from each of the 12 district.



This is the map of Sri Lanka indicating the affected districts. Red coloured area represents the affected areas by the tsunami. Each black dot represents a cluster which was selected for the study from the second round of survey to represent all the districts which were affected by the tsunami.

All 30 clusters were included for the third round of survey. Three population groups were identified for the surveillance activities from the second round. They were:

- displaced population due to tsunami living in camps,
- affected population by tsunami living with the host family or temporary residence or their own residence
- non affected population by the tsunami but living in the same vicinity.

The calculated sample size within the 95% of confidence interval was 540 from each group and in each group 18 children were studied during the second round. The same children measured for height / length and weight during the second round were included in the third round.

In some of the camps, children moved out from the camps and some camps did not exist during the third round of survey. The same questionnaire was administered by the same interviewers as in the second round and the weight and height / length was measured.

Data collection was carried out between 2nd and 25th February 2006. Data was collected by the staff of the department of nutrition, MRI with the assistance of field health staff. All of them were trained to follow a similar approach in future rounds of data collection. They were supervised by the Principle investigator.

The pregnant women and lactating mothers who were in the camps and households during the data collection were also included for the anthropometric assessment to assess their nutritional status similar to the previous rounds.

Data entry and analysis

The reference population for the anthropometric data was taken in relation to the National Centre for Health Statistics/World Health Organisation (NCHS/WHO). The prevalence of under nutrition was estimated by identifying under nourished individuals using a cut-off point of $-2Z$ scores^{3,4}. Mid arm circumference was used to measure the nutritional status among pregnant women. Data entry files were designed by using *EPIINFO 6.04d* software. Data files were converted into *dBase IV* files and then transferred to *SPSS10.0* software for the analyses.

Ethical consideration

Verbal consent was obtained from each mother before being interviewed after informing the purpose the study, confidentiality of individual information. There were no invasive procedures, clinical examinations or laboratory investigations performed on children for the purpose of the study.

Permission to conduct the study was obtained from the following authorities after discussing the objectives, methodology and potential outcomes of the study; Director General of Health Services, Provincial and Deputy Directors of health and Medical Officers of Health of affected areas.

4. RESULTS

Only 27 clusters were completed during the third round because three clusters from the Mullative district had to be excluded due to logistical inaccessibility. Data was collected from 1,133 caregivers, of which 99 percent was usable in the survey.

Age and sex distribution

Table 1 show the age and sex distribution of the sample with compared to the first and second round of survey. Girls made up 50.3 percent of the children under five years old.

Table 1
Age and sex distribution of the sample compared to the first and second round of surveys

Age (months)	Affected living in camps			Affected in houses		Non affected	
	2005 Jan	2005 May	2006 Feb	2005 May	2006 Feb	2005 May	2006 Feb
<12	163 (18.6%)	124 (26.4%)	11 (3.5)	118 (22.2%)	10 (2.5)	150 (27.6%)	10 (2.4)
12 - 23.9	199 (22.7%)	109 (23.2%)	99 (31.5)	129 (24.2%)	99 (29.9)	132 (24.3%)	115 (27.6)
24 - 35.9	193 (22.0%)	97 (20.6%)	67 (21.3)	114 (21.4%)	106 (26.7)	117 (21.5%)	112 (26.9)
36 - 47.9	185 (21.0%)	69 (14.7%)	62 (19.7)	102 (19.2%)	81 (20.4)	90 (16.5%)	84 (20.2)
≥48	138 (15.7%)	71 (15.1%)	75 (23.9)	69 (13.0%)	101 (25.4)	55 (10.1%)	95 (22.8)
Sex							
Male	444 (50.5%)	246 (52.3%)	161 (51.3%)	275 (51.7%)	198 (49.9%)	259 (47.6%)	201 (48.3%)
Female	434 (49.5%)	224 (47.7%)	153 (48.7%)	257 (48.3%)	199 (50.1%)	285 (52.4%)	215 (50.7%)
Total	878 (100.0%)	470 (30.4%)	314 (27.9%)	532 (34.4%)	397 (35.2%)	544 (35.2%)	416 (36.9%)

Only 73.3 percent of the children interviewed during the second round were traceable during the third round. Hence, 1,127 children (314 from displaced families living in camps, 397 children of tsunami affected families living in their own houses and 416 children from non affected families) were measured. The percentage of children under one year was less than four.

Prevalence of under nutrition

The prevalence of under nutrition is shown in Table 2. The prevalence of wasting (percentage below the -2SD of NCHS/WHO weight-for-height reference) was 10.8 percent, 14.1 percent and 11.8 percent in children living in camps, affected but not living in camps and not affected respectively.

Table 2
Prevalence of wasting, stunting, underweight and mean Z scores of the study subjects during the third round

Population	Weight-for-height		Height-for-age		Weight-for-age	
	% below -2Z-score (Wasting) ¹	Mean Z-score (SD)	% below -2Z-score (Stunting) ²	Mean Z-score (SD)	% below -2Z-score (Underweight) ³	Mean Z-score (SD)
Affected living in camps (n=314)	10.8% 7.4-14.3*	-1.2 (0.04)	20.1% 15.6-24.5*	-1.2 (0.07)	35.4% 30.1-40.6*	-1.6 (0.05)
Affected not living in camps (n=397)	14.1% 10.7-17.5*	-1.1 (0.04)	19.9% 15.9-23.8*	-1.1 (0.05)	32.2% 27.6-36.8*	-1.6 (0.05)
Non affected by tsunami (n=416)	11.8% 8.7-14.9*	-1.0 (0.04)	13.9% 10.6-17.3*	-0.9 (0.05)	29.1% 24.7-33.5*	-1.4 (0.04)

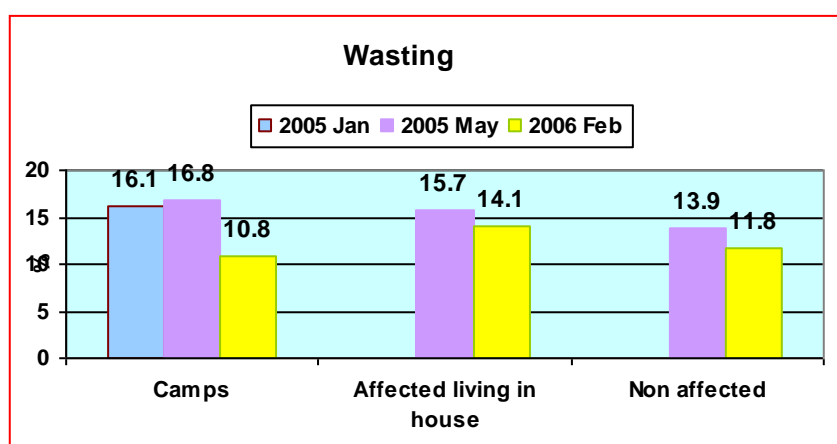
(*Confidence interval), (¹X²=1.9, P=0.4, ²X²=6.5, P=0.03, ³X²=3.3, P=0.2)

The differences of the prevalence of wasting and underweight between three groups were not statistically significant but the

difference of prevalence of stunting was statistically significant. Mean z score was also lower among the children living in camps than others.

The prevalence of wasting, stunting and underweight is shown in Figure 1, 2 and 3. There is a difference in the prevalence of under nutrition between 1st, 2nd and 3rd round of nutrition surveillance.

Figure 1
Prevalence of wasting among children under five years from
Jan 2005 - Feb 2006



The prevalence of wasting varied from 16.1 percent (1st round), 16.8 percent (2nd round) to 10.8 percent (3rd round) among children living in camps. A similar trend was observed for the prevalence of wasting among children of families living in houses (15.7 percent to 14.1 percent) and among the non-affected children (13.9 percent to 11.8 percent) when the second and third round nutrition surveillance is compared (Figure 1).

The prevalence of stunting and underweight showed no change over the period of time. There was a slight increase in the prevalence of stunting and underweight among the non affected children in the third round than the second round which was not significant.

Figure 2
Prevalence of stunting among children under five years
from Jan 2005 - Feb 2006

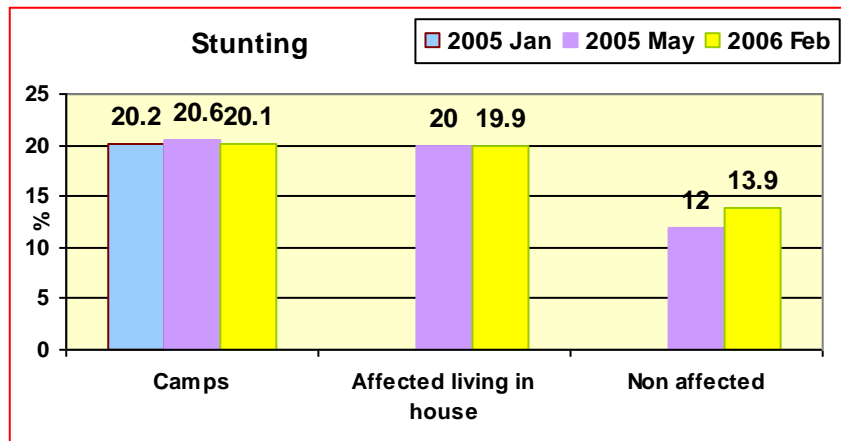
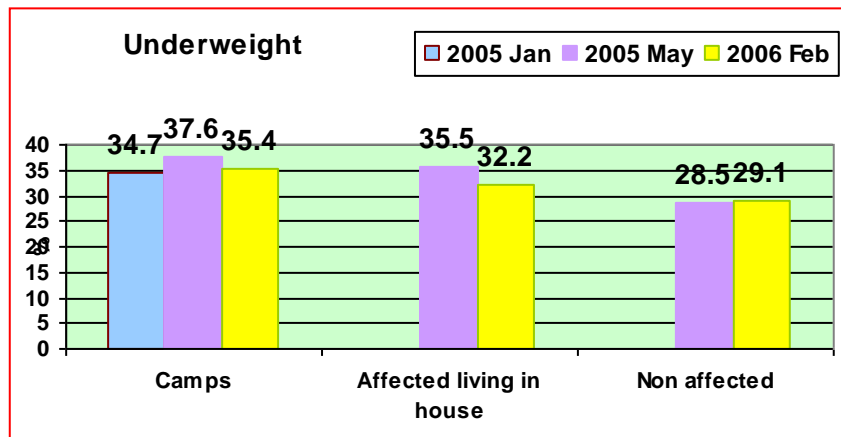


Figure 3
Prevalence of underweight among children under five years
from Jan 2005 - Feb 2006



Prevalence of under nutrition by sex

The prevalence of wasting has reduced in boys and girls in camps, affected living in houses and non affected families except among female children of affected families living in their houses where an

increase from 13.6 percent to 14.6 percent was observed among girls (Table 3).

Table 3
Prevalence of wasting, stunting and underweight among children living in camps (n=314), affected but living in houses (n=397) and not affected (n=416) by gender

Sex	Affected living in camps (%)			Affected living in houses (%)		Non affected (%)	
	2005 Jan	2005 May	2006 Feb	2005 May	2006 Feb	2005 May	2006 Feb
Wasting							
Male	17.3	18.0	12.4	14.2	13.6	13.2	12.9
Female	14.9	15.4	9.2	13.6	14.6	14.5	10.7
Stunting							
Male	22.4	20.5	18.0	20.0	21.2	11.7	15.4
Female	18.0	20.8	22.2	20.1	18.6	12.4	12.6
Underweight							
Male	36.4	36.1	35.4	34.9	32.3	27.2	32.3
Female	33.3	39.4	35.3	36.2	32.2	29.7	26.0

Prevalence of under nutrition in relation to age

Table 4 shows that the prevalence of wasting in relation to age among tsunami affected children compared to the non affected children and affected and living in their own houses.

The affected children living in the camps showed a higher prevalence of wasting between 12 - 23.9 months and over 48 months. In the third round that the children living in camps have shown a lower level of wasting than the first and second round of survey.

Table 4
Comparison of prevalence of wasting, stunting and underweight in 3
studied groups in relation to the age from Jan 2005 – Feb 2006

Age in months	Affected living in camps (%)			Affected not living in camps (%)		Non affected (%)	
	2005 Jan	2005 May	2006 Feb	2005 May	2006 Feb	2005 May	2006 Feb
Wasting							
<12	8.6	6.6	0.0	2.6	0.0	2.7	10.0
12 – 23.9	22.1	23.1	12.1	20.2	16.2	16.2	11.3
24.0 – 35.9	12.4	19.8	7.5	16.8	12.3	23.1	10.7
36.0 – 47.9	15.7	20.3	9.7	21.6	12.3	12.2	15.5
≥ 48	21.7	16.9	14.7	18.8	16.8	21.8	10.5
Stunting							
<12	10.4	8.3	0.0	10.3	0.0	5.4	20.0
12 – 23.9	21.6	27.8	20.2	27.1	31.3	19.2	15.7
24.0 – 35.9	19.2	19.8	16.4	16.8	17.0	5.1	10.7
36.0 – 47.9	25.4	20.3	21.0	28.4	14.8	18.9	15.5
≥ 48	23.9	32.4	25.3	15.9	17.8	16.4	13.7
Underweight							
<12	15.3	15.7	18.2	18.1	0.0	9.5	30.0
12 – 23.9	38.2	46.3	34.3	37.2	32.3	34.6	26.1
24.0 – 35.9	36.3	44.8	40.3	38.1	33.0	40.2	29.5
36.0 – 47.9	43.2	47.8	30.6	46.1	25.9	33.3	33.3
≥ 48	39.9	42.3	38.7	42.0	39.6	32.7	28.4

An increased prevalence of wasting among the children from non affected families was observed between the age 12 and 23.9 months. There is a decreased prevalence of wasting in all age groups among children from families affected and living in their own houses in the third round compared to the second round of survey.

Prevalence of under nutrition in different provinces

All Province showed a reduction of the prevalence of wasting among children living in camps. This reduction was more marked in the

Western Province which was from 18.1 percent to 14.1 percent (Table 5).

Table 5
Prevalence of wasting in 3 studied groups by province
from Jan 2005 - Feb 2006

Province	Affected living in camps (%)			Affected living in houses (%)		Non affected (%)	
	2005 Jan	2005 May	2006 Feb	2005 May	2006 Feb	2005 May	2006 Feb
Western	18.1	26.9	14.1	16.5	14.6	12.6	11.3
Southern	12.7	17.6	9.7	14.7	17.1	14.9	12.7
Northern	19.0	15.3	-	18.8	12.2	11.5	11.1
Eastern	12.8	12.1	10.2	14.2	11.9	15.7	11.7

A similar reduction was observed among the children affected living in houses and non affected except among the children affected living in houses in the Southern Province. There was an increase of wasting among children living in houses in Southern Province from 14.7 percent to 17.1 percent in the third round.

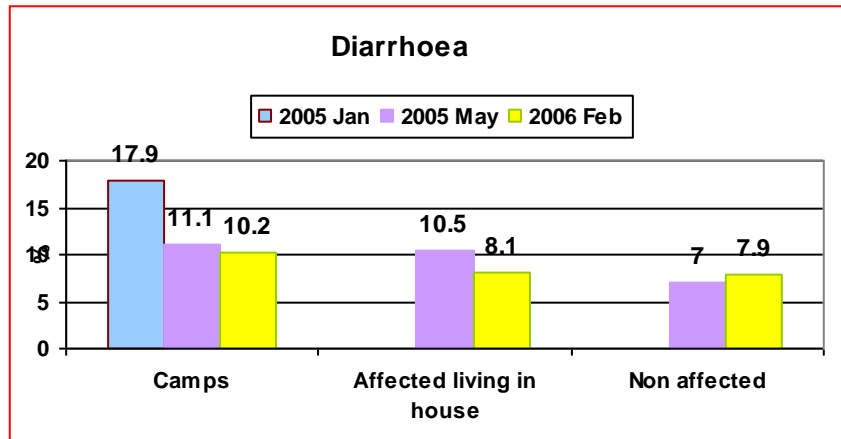
Analysis of factors associated with undernutrition

1. Disease prevalence

Diarrhoea was defined as loose stools more than 3 times per day or the increased number of stools more than normal. Respiratory Infections (RI) was defined as cough or cold with or without fever during the last 2 weeks prior to the interview. The prevalence of diarrhoea and RI, 2 weeks prior to the study was determined.

Figure 4 shows that the prevalence of diarrhoea has decreased among the children living in camps from 11.1 percent in the second round to 10.2 percent in the third round.

Figure 4
Diarrhoea prevalence 2 weeks prior to the study
from Jan 2005 - Feb 2006



Children who were affected living in houses have shown the marked reduction of diarrhoea from 10.5 percent to 8.1 percent and slight increase of prevalence was noted among non affected children from 7 percent to 7.9 percent compared to the second round. A high prevalence of diarrhoea among children living in camps compared to the other two groups was observed during the third round (Figure 4).

Figure 5
Respiratory tract infection prevalence 2 weeks prior to
the study from Jan 2005 - Feb 2006

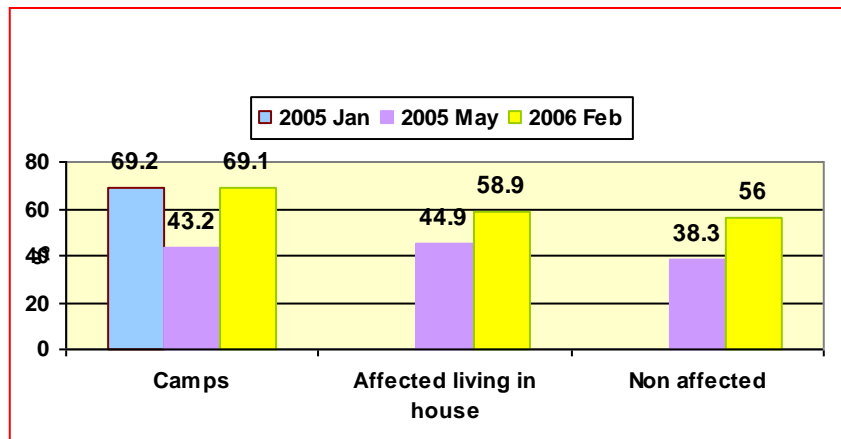


Figure 5 shows that the prevalence of RI has increased during the third round of survey compared to the second round in all 3 categories. This increase prevalence was comparative to the first survey conducted among camp children in January 2005. It indicates the possibility of seasonality as the first round and the third round of survey was conducted during a similar period of year.

2. Frequency of feeding

Table 6
Feeding frequency of the study subjects from
Jan 2005 - Feb 2006

Feeding frequency	Affected living in camps (%)			Affected not living in camps (%)		Non affected (%)	
	2005 Jan	2005 May	2006 Feb	2005 May	2006 Feb	2005 May	2006 Feb
6-11 months							
Once	3.6	2.6	0.0	1.0	0.0	0.0	0.0
2 times	8.1	2.6	18.2	2.0	20.0	0.0	10.0
3 times	24.3	1.3	36.4	4.0	50.0	2.9	10.0
4 times	63.0	42.1	45.5	55.6	30.0	38.6	70.0
5 or more	1.0	51.3	0.0	37.4	0.0	58.6	10.0
12-23 months							
Once	4.5	0.9	0.0	0.0	1.0	1.4	1.7
2 times	8.0	2.6	9.1	0.9	10.1	0.7	4.3
3 times	37.2	5.2	51.5	8.0	44.4	5.6	41.2
4 times	49.2	37.9	39.4	38.4	42.4	39.4	52.2
5 or more	1.0	53.5	0.0	52.7	2.0	52.8	0.0
≥ 24 months							
Once	1.2	0.4	2.0	1.4	1.7	1.1	1.0
2 times	9.7	2.2	4.9	1.1	3.8	0.7	2.1
3 times	57.7	12.8	58.8	7.5	58.0	9.7	56.7
4 times	31.2	50.0	33.8	45.9	36.5	43.7	39.9
5 or more	0.2	34.5	0.5	44.1	0.0	40.9	0.3

The third round of survey revealed that the frequency of feeding was improved among affected children living in the camps as well as not living camps and non affected children compared to the first and second round of surveys (Table 6). But the percentage of children who were fed five or more times per day has reduced in all 3 groups. The majority of children were fed 3 or 4 times per day within the past 24 hour period of the third round of survey.

3. Type of foods

Table 7 shows the type of food consumed by the children over 6 months during 24 hours prior to the day of the interview during 3 rounds of surveys.

Table 7
24 hour food consumption of children over 6 months
from Jan 2005 - Feb 2006

Food groups	Affected living in camps (%)			Affected live in houses (%)		Not affected (%)	
	2005 Jan	2005 May	2006 Feb	2005 May	2006 Feb	2005 May	2006 Feb
Rice, Cereals, grains, wheat flour preparations							
None	13.4	7.9	2.2	8.2	1.3	7.0	1.4
Once	17.9	17.2	7.6	13.7	7.1	15.6	6.7
Twice	28.1	24.1	25.8	26.0	23.7	27.7	20.4
3 times	39.5	48.4	57.0	50.0	58.7	48.5	59.4
≥4	1.1	2.3	7.4	2.0	9.3	1.2	12.0
Yam / potatoes / starchy foods							
None	70.8	62.3	58.0	63.1	52.1	60.2	53.1
Once	24.3	29.4	34.4	28.1	39.5	33.7	37.3
Twice	4.5	6.0	7.3	7.4	7.1	5.7	8.9
3 times	0.4	1.2	0.3	0.0	1.3	0.2	0.7
≥4	0.0	1.2	0.0	1.4	0.0	0.2	0.0
Pulses / soya							
None	52.3	68.3	55.7	62.3	54.7	62.6	51.4
Once	36.7	24.3	30.9	28.1	30.7	27.7	36.1
Twice	10.0	6.0	12.7	7.4	13.6	8.2	11.3
3 times	1.0	0.5	0.6	0.8	0.8	1.2	1.2

≥4	0.0	1.0	0.0	1.4	0.3	0.2	0.0
Milk & milk products (excluding breast milk)							
None	12.7	26.0	21.7	23.4	23.7	29.0	21.9
Once	12.7	15.0	15.3	17.2	18.6	14.2	19.5
Twice	42.1	29.4	37.9	30.7	37.5	27.3	31.0
3 times	18.5	23.4	16.6	21.7	16.1	25.3	20.9
≥4	14.0	6.2	8.6	6.9	4.1	4.3	6.7
Fish/egg/ dry fish/ meat or meat products							
None	47.0	27.0	13.4	21.5	12.3	24.4	12.5
Once	34.9	40.6	39.8	37.7	39.8	40.9	39.4
Twice	16.3	23.6	40.1	30.9	44.8	27.3	43.3
3 times	1.8	5.5	6.7	6.4	2.8	5.3	4.6
≥4	0.0	3.4	0.0	3.5	0.3	2.0	0.2
Fruits							
None	36.3	29.9	31.5	34.9	30.0	85.8	31.3
Once	44.4	49.6	57.0	50.3	57.2	12.0	53.1
Twice	15.0	15.2	10.5	11.1	10.8	1.8	12.7
3 times	3.6	4.1	0.6	3.5	2.0	0.2	2.9
≥4	0.7	1.2	0.3	0.2	0.0	0.1	0.0
Vegetables							
None	58.5	49.6	41.7	44.5	42.6	49.5	37.5
Once	28.1	30.3	35.7	34.8	39.8	34.1	41.3
Twice	12.3	16.2	21.7	18.9	16.6	15.4	20.0
3 times	1.0	3.8	0.6	1.4	0.8	1.0	1.2
≥4	0.1	0.0	0.3	0.4	0.3	0.0	0.0
Green leaves							
None	94.9	73.3	65.3	67.4	68.5	67.1	59.1
Once	4.3	23.2	26.4	27.7	26.4	29.2	36.1
Twice	0.6	1.9	8.0	2.7	4.0	1.9	4.3
3 times	0.2	0.7	0.3	0.4	0.8	0.7	0.5
≥4	0.0	0.9	0.0	1.8	0.3	0.9	0.0

The overall consumption pattern has improved among all the children interviewed in all 3 groups. But the data of the third round indicates that about two thirds of the children in all 3 groups have not consumed any fruits in the last 24 hour period prior to the interview.

4. Supplementary foods

Figure 6 showed there was an improvement on the distribution of supplementary foods like Triposha or Corn Soya Blend (CSB) among the children living in camps during the third round compared to the second round of survey. But only 33.1 percent of the affected children living in camps receive any supplementary foods.

Figure 6

Percentage of children received supplementary foods

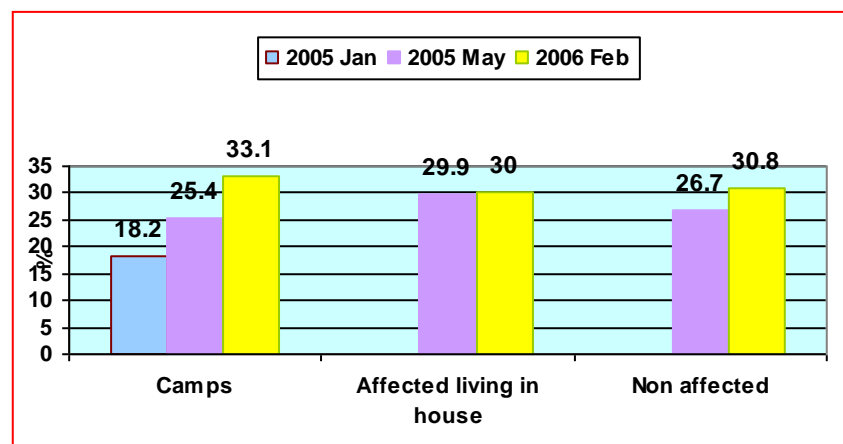
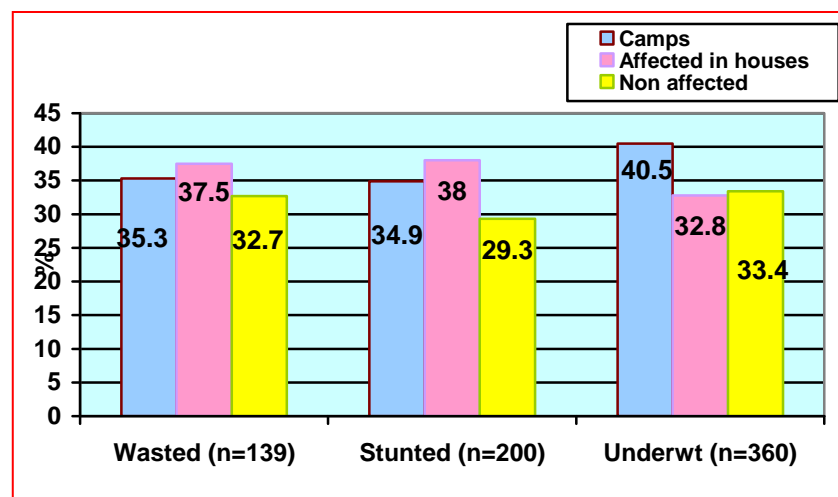


Figure 7

Distribution of Supplementary foods among wasted, stunted & under weight children



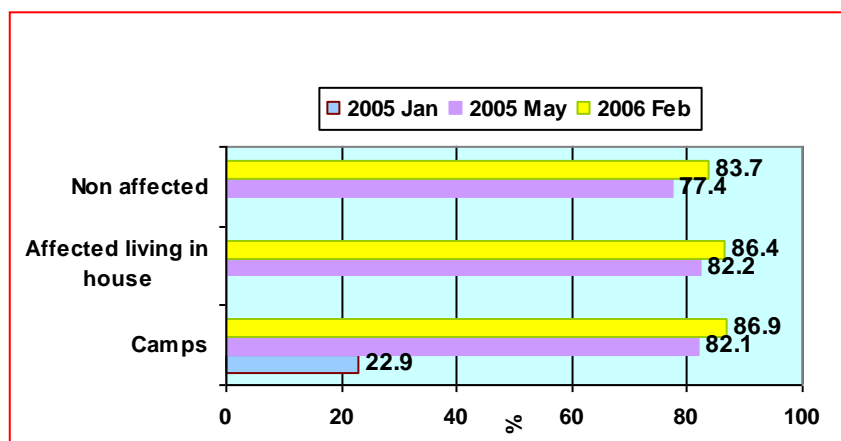
The figures were similar among the non affected children. Triposha was distributed by the Ministry of Health through maternal and child health clinics for underweight children after the weight was measured by the Public Health Midwife. Figure 7 shows the percentage of underweight children who received Triposha in 3 groups.

It was observed that about one third of underweight, wasted and stunted children have received Triposha from the normal health system indicating the need of streamlining the distribution of Triopsha among under weight children.

5. Vitamin A mega dose supplementation

This study revealed that vitamin A supplementation coverage has increased in the third round of survey from 82.1 percent to 86.9 percent among children living in camps, from 82.2 percent to 86.4 percent among affected children living in houses and from 77.4 percent to 83.7 percent among non affected children.

Figure 8
Percentage of children over 6 months received
Vitamin A mega dose during the past 6 months



This is a remarkable achievement among the camp children compared to the first round survey data (Figure 8).

6. Access to food

As indicated in Table 8, in the second round of survey 62.3 percent of the Tsunami Victims living in camps consumed food provided by the government or by aid agencies but during the third round of survey quite contrastingly 78.3 percent of the victims in camps have gone back to consuming food purchased with their own funds. Similar observation was made among the affected families living in houses. It is interesting to note that only 2.2% of non affected families depend on their own production.

Table 8

Factors associated with access to food from Jan 2005 - Feb 2006

	Affected living in camps (%)		Affected living in houses (%)		Non affected (%)	
	2005 May	2006 Feb	2005 May	2006 Feb	2005 May	2006 Feb
Major source of food						
Food aid	62.3	19.4	50.9	16.6	6.1	0.7
Own production	5.5	1.9	2.1	1.3	2.8	2.2
Purchase	30.5	78.3	34.0	81.6	88.1	96.9
No answer	1.7	0.3	0.4	0.5	3.1	0.2
Source of food aid						
Government	82.3	34.4	79.1	31.2	15.3	6.5
Other organisations	26.2	8.3	15.0	1.5	0.6	0.2
Use of food aid						
Ate	77.5	95.1	74.3	92.0	42.4	66.7
Sold	3.4	0.0	6.5	3.0	15.2	0.0
Other (no answer)	19.1	4.9	19.2	4.5	42.4	33.3

7. Income

Distribution of respondents by occupation indicated that 46.2 percent of tsunami affected people living in camps were engaged in jobs related to field of prior to tsunami (Table 9). During the first round of the survey all of them were without the employment and lived in camps. It had increased to 22 percent during the second round and currently only 28.7 percent are engaged in fishing related jobs indicating that normal livelihoods have not yet been established even after one year and two months after the disaster. Victims living in houses had rebuilt their fishing industry related livelihoods back to 24.7 percent by the third round of survey which is a slightly lower percentage compared to the families living in camps. No difference was observed in the non-affected families.

Table 9

Major source of income in the household

	Affected living in camps (%)			Affected living in houses (%)			Non affected (%)		
	Before tsunami	2005 May	2006 Feb	Before tsunami	2005 May	2006 Feb	Before tsunami	2005 May	2006 Feb
Agriculture	4.9	1.7	3.2	2.6	2.2	2.8	9.4	9.7	7.2
Fishery	46.2	22.0	28.7	33.6	17.4	24.7	11.2	10.1	10.8
Business	8.7	6.1	7.6	12.0	10.6	12.1	11.4	10.8	10.3
Monthly paid job	9.4	8.3	6.7	18.8	17.2	19.6	32.5	32.0	33.9
Daily paid job	27.2	38.3	47.5	30.1	39.3	37.8	31.8	32.4	35.8
Remittance from others	2.1	11.9	2.9	2.6	6.7	2.3	1.3	0.4	1.7
No answer	1.5	11.7	3.5	0.2	6.7	0.8	2.4	4.6	0.2

It is observed that 6.4% of families living in camps were not engaged with any income generating activities even during the third round of survey. Similar groups were less among affected families living in houses (3.1%) and among non affected families (1.9%).

By the 3rd round of survey, the cash assistance provided to the victims by the government had drastically been reduced from 62.7 percent to 10.2 percent among the families living in camps, and there was almost no aid provided to victims by other aid giving organizations. Ironically, rather than rebuilding their livelihoods, the victims have resorted to pawning of possessions; and the percentage of lending money has increased to 21.3. Quite interestingly the same phenomenon was noted among non affected families. This clearly shows the notable prevalence of poverty within the region.

Table 10
Factors associated with income of the household
from Jan 2005 - Feb 2006

	Affected living in camps (%)		Affected living in houses (%)		Non affected (%)	
	2005 May	2006 Feb	2005 May	2006 Feb	2005 May	2006 Feb
Cash assistance						
Cash assistance during last 3 months						
Government	62.7	10.2	60.9	17.6	13.1	6.0
Other organisations	6.2	0.0	4.0	0.8	0.2	0.7
Other cash sources during last 3 months						
Pawning of possessions	31.3	52.9	36.1	45.6	21.7	40.9
Lending money	16.6	21.3	21.4	22.9	11.9	20.2

8. Sanitation

While the place of defecation of victims was deferred from the sea due to the fear caused by the tsunami, it was noted that it had returned to its norm (especially among the victims living in camps) by the 3rd round of survey (Table 11). This shows that the fear of the sea caused in peoples minds have now receded.

Table 11

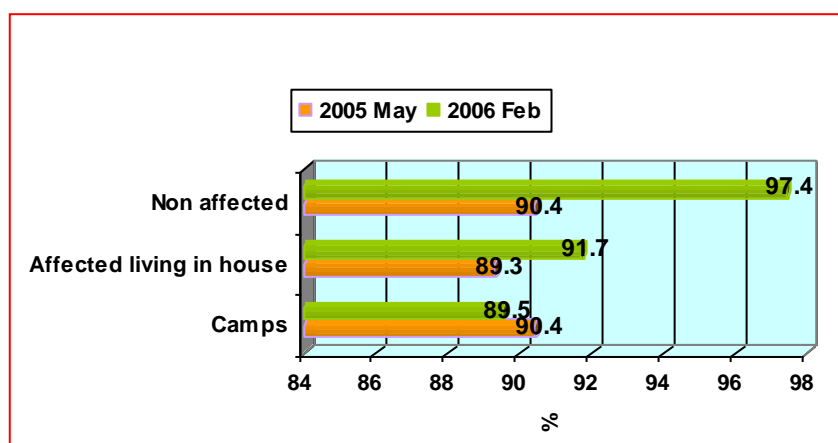
Factors associated with sanitation from Jan 2005 - Feb 2006

Sanitation	Affected living in camps (%)			Affected not living in camps (%)		Non affected (%)	
	2005 Jan	2005 May	2006 Feb	2005 May	2006 Feb	2005 May	2006 Feb
Type of the toilet available							
Water sealed	70.4	73.2	91.7	81.2	92.7	90.4	86.3
Pit	4.8	7.9	1.9	7.1	1.5	3.2	3.1
Other	24.8	0.0	0.6	3.0	1.3	10.1	7.2
No answer	-	8.8	5.7	8.5	4.5	6.4	3.4
Place of defecation							
Toilet	-	93.2	91.7	84.8	91.4	80.1	89.2
Bush	-	2.8	2.2	6.8	2.8	5.7	5.3
Sea	-	2.8	4.1	3.4	2.3	1.5	0.5
Other	-	1.1	1.9	4.7	3.3	11.9	4.8
No answer	-	0.2	0.0	0.4	0.3	0.7	0.2

9. Drinking water

Figure 9

Percentage of households with availability of adequate quantity of drinking water from Jan 2005 - Feb 2006



The victims living in houses had increased their access to an adequate quantity of water from 89.3 percent to 91.7 percent. The non affected families have also benefited from the intervention of providing drinking water (Figure 9).

Association between risk factors and wasting

Table 12 shows that there was no significant association between wasting and sex, diarrhoea, RI and age groups except with the children living in camps and not having respiratory infections.

Table 12
Association between wasting and selected associated factors

Characteristics	Number of children with wasting (%)					
	Affected living in camps		Affected living in houses		Non affected	
	Yes	No	Yes	No	Yes	No
Sex						
Male	20 (12.4)	141 (87.6)	27 (13.6)	172 (86.4)	26 (12.9)	175 (87.1)
Female	14 (9.1)	140 (90.9)	29 (14.6)	170 (85.4)	23 (10.6)	193 (89.4)
	X ² =0.34, P=0.4 ¹ OR= 1.4, ² (CI= 0.7-2.6)		X ² =0.77 P=0.89 ¹ OR=0.9 ² (CI=0.6-1.5)		X ² =0.57 P=0.5 ¹ OR=1.2 ² (CI=0.7-2.1)	
Diarrhoea						
Yes	1 (3.0)	32 (97.0)	4 (12.5)	28 (87.5)	6 (18.2)	27 (81.8)
No	33(11.7)	249 (88.3)	52 (14.2)	314 (85.8)	43 (11.2)	341 (88.8)
	X ² =0.22, P=0.2 ¹ OR= 0.26, ² (CI= 0.4-1.8)		X ² =0.0 P=0.9 ¹ OR=0.9 ² (CI=0.3-2.2)		X ² =0.8 P=0.4 ¹ OR=1.6 ² (CI=0.7-3.5)	
RI						
Yes	18(8.3)	200 (91.7)	37 (15.8)	197 (84.2)	32 (13.7)	202 (86.3)
No	16 (16.5)	81(83.5)	19 (11.6)	145 (88.4)	17 (9.3)	166 (90.7)
	X²=3.9, P=0.04 ¹ OR=0.5 ² (CI=0.3-0.9)		X ² = 1.1 P= 0.3 ¹ OR=1.4 ² (CI=0.8-2.3)		X ² = 1.5 P= 0.2 ¹ OR=1.5 ² (CI=0.8-2.6)	
Age group (months)						
<12	-	11 (100.0)	-	10 (100.0)	1 (10.0)	9 (90.0)
12-23.9	12 (12.1)	87 (87.9)	16 (16.2)	83 (83.8)	13 (11.3)	102 (88.7)
24-35.9	5 (7.5)	62 (92.5)	13 (12.3)	93 (87.7)	12 (10.7)	100 (89.3)
36-47.9	6 (9.7)	56 (90.3)	10 (12.3)	71 (87.7)	13 (15.5)	71 (84.5)
≥48	11 (14.5)	65 (85.5)	17 (16.7)	85 (83.3)	10 (10.4)	86 (89.6)
	X ² =0.34, P=0.4		X ² = 3.0 P= 0.6		X ² = 1.5 P= 0.8	

(¹OR=Odds Ratio, ²CI = 95% Confidence Interval)

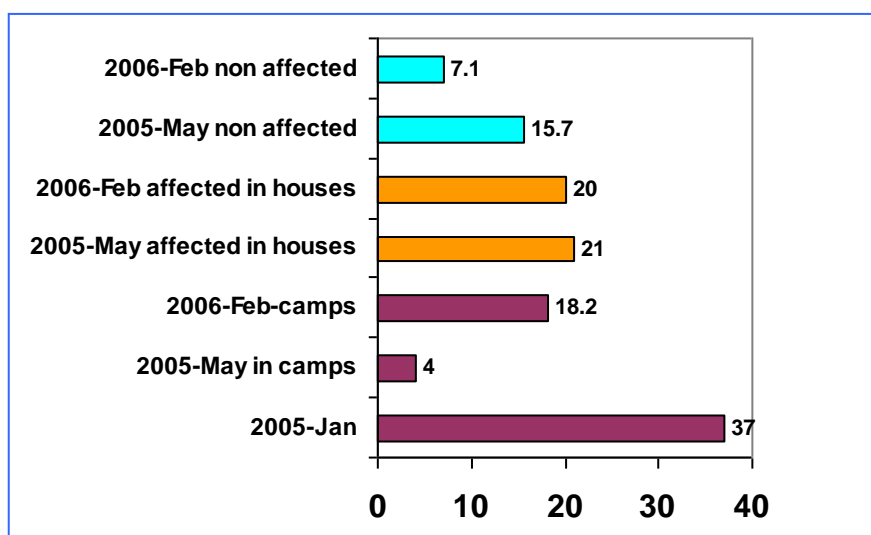
Nutritional status of pregnant women

During the survey the nutritional status of 35 pregnant women were assessed in the visited households or camps. They were assessed by measuring the mid upper arm circumference (MUAC)⁴. Figure 8 shows that 18.2 percent of pregnant women living camps were undernourished during the third round but even so it was less than the first round (37 percent).

The prevalence was more among pregnant women affected and living in houses (20 percent). The prevalence was similar to the second round. Nearly 7 percent of pregnant women from the non affected population were also suffering from under nutrition which was lower than the prevalence in the second round.

Figure 10

Distribution of the mid arm circumference of pregnant women



There were no infants under 6 months found in the sample. Therefore the lactating women within 6 months of delivery were not in the sample to assess for the nutritional status for comparison.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, by the 3rd round of survey a marked reduction of the prevalence of wasting among children living in camps (from 16.1% to 10.8%) was observed showing that targeted interventions can make a drastic difference in the process of annihilating wasting. Hence this can be taken as an example for the whole country.

- Although the prevalence of diarrhoeal diseases is low, the prevalence of ARI is still not acceptable. It is important to maintain active social mobilisation for both the control of diarrhoeal diseases and respiratory tract infections.
- The current source of income for tsunami affected people mainly comes from construction and other work, going on in camps thus the income is likely to diminish once the construction work is over. In order to generate a sustainable income, accelerated efforts are required to restore people's livelihood in particular to the fishing.
- Maintaining of intense promotion of infant and young child feeding – exclusive breast feeding and complementary feeding.
- Continue with periodic nutrition assessments to track changes in the situation of children and women.
- Maintain high level of coverage for vitamin A supplementation.
- Strengthen the Thriposha / supplementary food programme for underweight children.

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