

Preliminary Report on the Fourth National Nutrition and Health Survey July – August, 1995

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Summary

The Fourth Sri Lanka Nutrition and Health Survey (NHS4), a nationally representative survey conducted between July and August 1995, provides information on the nutrition status of Sri Lankan children between the age of 3 and 60 months at the national, provincial, and sector (urban/rural) levels. Overall, 20 percent of children were stunted, 33 percent were underweight, and 13 percent were wasted. The prevalence of stunting was significantly higher in the Central province than elsewhere. Stunting and underweight were higher in the estates than in rural areas; they were also higher in the rural areas than in urban areas. Chronic undernutrition was associated with a number of social and economic variables reflecting that children from better-off households were less likely to be undernourished. A comparison of the data for all four NHSs indicates that there has not been any change in the nutrition status of children between 1993 and 1995.

Thirty three percent of mothers and 36 percent of fathers had chronic energy deficiency and were undernourished. Undernutrition was greatest in the Central province and in the estate areas and, not unexpectedly, more prevalent among the bottom two income quartiles. These results are consistent with those from NHS3.

Data on reported nightblindness among children age two to five years suggest that clinical vitamin A deficiency is not a public health problem in Sri Lanka, with 0.5 percent cases reported. This result is also consistent with that from NHS3.

Eighty two percent of mothers had heard about iodized salt but just under one-half of these do not use iodized salt. Among the mothers that do use iodized salt, 44 percent do so to prevent goitre, a further 46 percent do so for health reasons although they do not specify goitre, and

the remainder cite other reasons. Mothers in the North Western and North Central provinces appeared to be more aware of the broader need for iodine, in that they were more likely to cite health reasons, while mothers in the other provinces were more likely to state that iodized salt prevents goitre. Clearly, a greater effort is needed to ensure that households have access to and use iodized salt.

Chronic energy deficiency (as indicated by a BMI<18.5) is highest in the estate sector (59% for mothers and 50% for fathers) and lowest in the urban areas (21% for mothers, 28% for fathers). Prevalence of energy deficiency was high in the Central, Southern and North-Central provinces, and was associated with decreasing income.

Introduction

This report presents the nutrition results of the Fourth National Nutrition and Health Survey (NHS4), which was conducted between July and August 1995. A full report of this survey will be made available once data from all four National Nutrition and Health Surveys are analyzed together.

Population and Methods

Details of the sample selection were given in the First National Nutrition and Health Survey (1). Briefly, the survey represent all provinces except the Northern and Eastern provinces, and all sectors, viz., urban, rural, and estate sectors. Data were collected on household demographics as well as the health and nutrition status of mothers, fathers and children.

Nutritional status is determined using measures of height and weight in combination with age, expressed as Z-scores (2). Three different indicators of nutritional status are used. Stunting, (HAZ<-2), a failure to grow adequately in height in relation to age, reflects

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past or chronic undernutrition; resulting from an inadequate intake of food over a period of time and/or from chronic illness. Wasting, (WHZ<-2), a failure to gain weight in relation to height, reflects recent or acute undernutrition; resulting from a recent failure to receive adequate nutrition and/or from acute illness, in particular diarrhoea. Underweight (WAZ<-2), a low weight in relation to age, can be due to either chronic or acute undernutrition.

Results

1. Levels of undernutrition in children age 3 to 59 months

The fourth NHS shows that 20 percent of Sri Lankan children age 3 to 60 months were stunted, 33 percent were underweight, and 13 percent were wasted (Table 1) which was 9, 15 and 6 times respectively, the level expected in a well nourished healthy population. (In a healthy well nourished population 2.2 percent of children are expected to be moderately undernourished and 0.1 severely so). The data also showed that 5 percent of children were severely stunted, 6 percent were severely underweight, and 1 percent were severely

wasted (i.e. below - 3 SD of the reference median) (Table 1). In a healthy, well nourished population only one in 1,000 children is expected to be severely undernourished. The data for Sri Lanka indicate that the level of severe stunting and severe underweight were extremely high at 51 and 57 times, respectively, that expected in a healthy, well nourished population while that for wasting was 9 times higher.

Using the Waterlow classification, which is a composite measure of nutritional status, 4 percent of children were both stunted and wasted, reflecting the severest type of undernutrition, 17 percent were stunted only, 10 percent were wasted only, and 70 percent were neither stunted or wasted (Table 2). The nutrition status of children was worse in the Central region where most of the estate children live.

Undernutrition in relation to geographic characteristics

There were noticeable provincial differences in the prevalence of stunting ($p<0.001$) and underweight ($p<0.001$) but not wasting (Table 2). Stunting and underweight were highest in

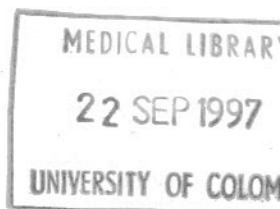
Table 1

Percentage of children age 3 to 60 months moderately and severely stunted, underweight, and wasted by province and sector

	Stunting		Underweight		Wasting		No.
	Moderate	Severe	Moderate	Severe	Moderate	Severe	
OVERALL	15.3	5.1	27.2	5.7	12.4	0.9	2782
PROVINCE							
Western	10.4	2.9	20.3	4.4	9.6	1.8	663
Central	22.1	10.7	30.3	9.9	14.4	0.9	542
Southern	15.7	2.8	28.9	3.9	11.6	0.9	216
North Western	12.5	3.4	26.2	5.2	14.2	1.0	296
North Central	11.7	4.5	26.5	3.6	12.4	0.7	309
Uva	17.0	5.5	28.5	5.8	10.2	0	365
Sabaragamuwa	17.4	3.8	33.8	5.1	15.6	0.5	391
SECTOR							
Urban	10.7	2.4	21.9	3.9	11.3	1.3	1359
Rural	15.3	4.4	28.7	5.9	14.2	0.7	991
Estate	29.9	15.3	40.6	10.9	11.9	0.2	432

Table 2
Waterlow classification of nutritional status by province and sector

	Stunted and wasted	Stunted only	Wasted only	Not Stunted or wasted	n	
OVERALL	3.8	16.6	9.6	70.0	2753	
PROVINCE						
Western	2.9	10.5	8.5	78.5	657	
Central	6.6	26.1	8.8	58.5	532	
Southern	2.8	15.9	9.8	71.5	214	
North Western	3.7	12.2	11.6	72.4	294	
North Central	2.6	13.4	10.4	73.6	307	
Uva	2.5	19.9	7.8	69.8	361	
Sabaragamuwa	4.1	17.3	12.1	66.5	388	p<0.001
SECTOR						
Urban	3.0	10.1	9.7	77.2	1343	
Rural	3.9	15.7	11.1	69.3	982	
Estate	6.1	39.3	6.1	48.6	428	p<0.001



the (Table 1), Central province where 33 and 40 percent, respectively, of the children were stunted and underweight and lowest in the Western province where 13 and 25 percent of children were stunted and underweight, respectively.

Stunting and underweight were also associated with sector, that is, whether children lived in urban, rural, or estate areas. The estates had close to 3.5 times more (45 versus 13 percent) stunted children and twice as many underweight children (51 versus 26 percent) than urban areas. Similarly, there were 33 percent more stunted (20 versus 13 percent) and 25 percent more underweight (35 versus 26 percent) children in rural areas than in urban ones (Table 1).

Undernutrition in relation to social and economic characteristics

Social and economic indicators associated with stunting, underweight, and wasting are presented in Table 3.a and 3.b Children were more likely to be chronically undernourished if they came from households that were ethnically Tamil. Most of the Tamils in the sample studied

were in the estate sector. In addition, children whose family did not live in a single house and those from homes without a flush toilet; piped water to the house, motorized transport, and a high household score* were more likely to be chronically undernourished than children from households with the above items. Chronic undernutrition was also positively associated with the child's mother having a lower level or no education; being from a household in the bottom two income quartiles; and living more than one kilometer from a health clinic.

More children from households receiving welfare (Samurdhi or Janasaviya) and receiving triposha regularly were chronically undernourished compared with other children (Table 3.b). Chronic undernutrition among children was also associated with the household consuming fewer than three meals a day; households in which dinner was the main meal of the day; and households in which milk, dried fish, or meat were not taken in the previous 7 days and eggs were eaten less than twice in the preceding week.

Acute undernutrition was associated with children from households having a low or zero

*Items owned by the household were each given a score of one. They included a radio, cassette recorder, wall clock, television set, sewing machine, electric/gas cooker, refrigerator and telephone.

Table 3.a

Percentage of children age 3 to 60 months stunted, underweight, and wasted by social and economic factors

	Stunted	Underweight	Wasted	No.
ETHNIC GROUP				
Sinhalese	15.9	30.4	14.3	1796
Tamil	39.1	46.5	12.0	535
Muslim/other	16.0	25.7	11.5	408
	p<0.001	p<0.001	ns	
TYPE OF HOUSE				
Single	16.3	30.1	13.4	2016
Other	31.9	40.7	13.5	712
	p<0.001	p<0.001	ns	
TYPE OF TOILET				
None	40.0	49.4	12.8	398
Own Flush	14.2	27.4	13.1	1650
Share Flush	22.7	33.5	14.6	260
Own Other	23.0	36.5	14.2	394
Share Other	50.0	78.9	22.2	18
	p<0.001	p<0.001	ns	
SOURCE OF DRINKING WATER				
Protected Well	19.3	34.0	13.5	855
Unprotected Well	22.5	40.8	16.8	298
Pipe	9.8	18.9	10.6	554
Public Tap	25.9	37.2	13.5	907
Other	29.8	36.0	16.8	113
	p<0.001	p<0.001	ns	
TYPE OF TRANSPORT OWN				
None	24.4	36.5	14.1	1853
Bicycle	14.2	30.8	12.2	523
Motor Bike	10.1	20.4	11.4	228
Car/Van	5.7	10.4	11.4	123
	p<0.001	p<0.001	ns	
HOUSEHOLD SCORE*				
None	41.4	53.2	16.9	372
1	27.0	39.3	14.0	392
2	24.0	39.3	17.1	598
3	16.7	29.6	11.6	422
4	10.0	22.2	9.5	328
5+	7.9	18.2	10.9	607
	p<0.001	p<0.001	p<0.002	
MOTHER'S EDUCATION				
None	41.6	46.5	10.8	114
Grade 1 - 5	37.2	42.9	13.8	396
Grade 6 - 8	17.9	34.0	12.0	403
Grade 9 - 10	16.0	29.5	15.1	495
GCE O/L	12.4	25.1	15.1	470
Higher	7.9	18.3	12.2	333
	p<0.001	p<0.001	ns	
INCOME				
Lowest quartile	26.2	43.0	16.3	711
Second quartile	26.4	39.0	15.2	673
Third quartile	20.4	29.9	11.4	673
Highest quartile	8.3	19.4	10.8	676
	p<0.001	p<0.001	p<0.005	
DISTANCE TO CLINIC				
< 1 km	15.2	30.5	14.2	665
1 - 2 km	19.1	32.3	12.7	765
> 2 km	22.3	30.6	13.1	736
	p<0.001	ns	ns	

* Items were assigned a score of one if they were owned, and included radio/cassette, wall clock, T.V., sewing machine, electric/gas cooker, refrigerator and telephone.

Table 3.b

Percentage of children age 3 to 60 months stunted, underweight, and wasted by social and economic factors

	Stunted	Underweight	Wasted	No.
SAMURDHI/JANASAVIYA				
No	19.3	30.8	12.5	2018
Yes	23.9	38.9	16.0	689
	p<0.02	p<0.001	p<0.05	
RECEIVED TRIPOSHA				
No	17.7	29.7	12.7	1916
Regularly	35.1	46.8	14.7	268
Not Regularly	21.6	37.9	15.0	504
	p<0.001	p<0.001	ns	
NUMBER OF MEALS/DAY				
< 3	25.4	36.8	13.3	1400
3	15.1	28.8	13.3	1347
	p<0.001	p<0.001	ns	
MAIN MEAL				
Breakfast	10.2	20.8	10.4	283
Lunch	17.8	31.2	13.9	1548
Dinner	27.9	39.6	13.6	931
	p<0.001	p<0.001	ns	
NO. TIMES HH* DRANK MILK LAST WEEK				
None	29.2	42.9	14.1	619
1 – 7 times	19.8	32.0	13.6	1512
8 – 14 times	12.4	24.1	11.7	547
15 + times	15.4	32.1	17.9	78
	p<0.001	p<0.001	ns	
NO. TIMES HH ATE DRIED FISH LAST WEEK				
0	27.0	36.3	12.9	259
1	18.8	30.0	13.5	298
2	17.4	32.6	14.4	547
3	19.6	33.5	15.1	545
4	18.5	29.1	12.2	438
5 + Times	22.5	35.2	12.3	666
	p<0.02	ns	ns	
NO. TIMES HH ATE MEAT LAST WEEK				
0	25.3	39.2	14.7	1259
1	19.2	31.0	12.6	730
2	12.5	25.8	13.9	361
3	14.8	24.0	12.2	183
4	11.2	21.2	12.2	98
5 + Times	15.7	21.3	5.8	121
	p<0.001	p<0.001	ns	
NO. TIMES HH ATE EGGS LAST WEEK				
0	25.8	40.0	13.2	550
1	23.5	37.2	15.3	620
2	18.8	31.2	13.4	808
3	16.9	27.9	13.7	473
4	11.3	22.1	9.9	151
5 + Times	16.8	27.2	9.1	155
	p<0.001	p<0.001	ns	

*HH = house holders

household score, being in the bottom two income quartiles, and the household being in a welfare program.

Many of the above social and economic factors, however, not only interact with each other but also with province and sector, i.e. they reflect the same social and economic status. Items such as television sets, refrigerators, cookers would not be seen in areas without gas or electricity supply.

Undernutrition and biological factors

More boys were acutely undernourished than girls (Table 4). The reasons for this will be examined in further analyses. Children born with a low birth weight were more likely to be chronically and acutely undernourished than other children indicating that these children failed to compensate for the nutritional insult inflicted during foetal growth. The fact that a

Table 4
Percentage of children age 3 to 60 months stunted, underweight, and wasted by food and health factors

	Stunted	Underweight	Wasted	No.
SEX				
Male	18.8	31.2	15.4	1114
Female	18.3	30.5	11.9	1112
	ns	ns	p<0.02	
BIRTH WEIGHT				
Low	29.2	46.9	21.0	677
Normal	15.0	25.2	10.2	1590
Unknown	25.6	38.4	13.1	515
	p<0.001	p<0.001	p<0.001	
DIARRHOEA				
Yes	38.5	45.1	5.8	52
No	20.2	32.9	13.5	2694
	p<0.002	ns	ns	
FEVER				
Yes	28.1	37.9	13.1	493
No	18.8	32.0	13.4	2259
	p<0.001	p<0.02	ns	
ARI*				
Yes	23.3	35.9	15.2	1045
No	18.8	31.3	12.2	1711
	p<0.005	p<0.02	p<0.05	
AGE GROUP				
3 - 5 mo	3.9	3.9	2.0	152
6 - 11 mo	10.4	17.2	8.2	297
12 - 17 mo	21.4	31.6	16.0	262
18 - 23 mo	21.0	29.1	17.2	291
24 - 29 mo	22.8	40.9	11.5	298
30 - 35 mo	18.2	32.9	14.7	286
36 - 41 mo	22.4	41.7	14.0	290
42 - 47 mo	23.7	37.1	12.4	295
48 - 53 mo	27.2	39.9	13.8	327
54 - 59 mo	24.6	40.6	19.1	284
	p<0.001	p<0.001	p<0.001	

*ARI = Acute respiratory illness

similar result for chronic undernutrition was observed for children whose birth weight was unknown suggests that these children may also have been born small.

Having diarrhoea, fever, or an acute respiratory infection in the preceding two weeks was associated with chronic undernutrition, suggesting that these children may suffer from repeated illnesses. Acute Respiratory Illness (ARI) was also associated with acute undernutrition.

Age-specific patterns of undernutrition

As with the NHS1, NHS2, and NHS3, the NHS4 shows that there was a clear age-specific pattern in the prevalence of undernutrition. Among infants age 3 to 5 months, the prevalence of stunting, underweight, and wasting was 4, 4,

and 2 percent, respectively (Table 4). After 6 months of age, the prevalence of undernutrition increased rapidly and between the age of 12 and 17 months of age, 21, 32, and 16 percent of children were stunted, underweight, and wasted, respectively, after which the prevalence of stunting levels out while that for underweight increased and levels off at around 40 percent and that for wasting declines a little. These results indicate that the critical period of nutritional vulnerability for children throughout Sri Lanka is during the first 18 months of life.

Nutrition status between 1993 and 1995

As Table 5 shows, there appears to be no change in the nutrition status of children between 3 and 60 months of age between August/September 1993 and July/August 1995.

Table 5
Prevalence of stunting, underweight, and wasting in the different NHS

DATE	Stunted	Underweight	Wasted	No.
Aug/Sep 1993	-	34.7	-	2618
Mar/Apr 1994	20.9	34.3	13.4	1959
Oct/Dec 1994	20.8	31.4	12.1	1547
Jul/Aug 1995	20.4	32.9	13.4	2782

Table 6
Mean and standard deviation height, weight, and body mass index (BMI) of mothers' by province, sector, and age group

PROVINCE	Height			Weight			BMI		
	Mean	Std Dev	n	Mean	Std Dev	n	Mean	Std Dev	n
Western	152.6	6.3	322	50.0	10.4	324	21.4	4.2	322
Central	150.3	7.4	281	43.6	7.9	283	19.3	3.0	277
Southern	152.0	4.7	124	49.8	12.6	120	21.4	4.9	120
North Western	152.6	6.1	142	48.9	9.2	142	20.9	3.6	140
North Central	153.9	6.1	108	48.9	9.2	108	20.7	3.9	108
Uva	152.0	5.4	215	47.4	9.2	217	20.4	3.7	213
Sabaragamuwa	151.3	5.0	166	45.9	8.2	164	20.0	3.1	164
	P<0.001			P<0.001			P<0.001		
SECTOR	Height			Weight			BMI		
Urban	152.6	5.8	737	50.2	10.2	737	21.5	3.9	735
Rural	152.3	5.7	417	46.1	8.7	413	19.8	3.7	411
Estate	148.7	7.4	204	40.8	5.6	208	18.5	2.5	198
	P<0.001			P<0.001			P<0.001		
OVERALL	151.9	6.2	1358	47.5	9.8	1358	20.5	3.8	1344

2. Nutritional status of adults

Table 6 shows the mean height, weight, and body mass index (BMI, wt/ht²) of non-pregnant mothers with children under the age of five years. Overall, non-pregnant mothers were 152 cm tall and weighed 47.5 kg. Mothers living in the Central province and in the estate areas tended to be shorter and, along with mothers in the Sabaragamuwa province, lighter than mothers living elsewhere.

The body mass index (BMI) is used to assess thinness or obesity in adults. A BMI below 18.5 has been defined as chronic energy deficiency and that below 16 as severe chronic energy deficiency (3). In contrast, a BMI above 25 indicates overweight and that over 30 obesity. Table 6 shows that the average BMI for mothers with children under five years is 20 and BMI tends to be lower in the Central province and in the estate areas than elsewhere.

Anthropometric data were available for 92 percent of fathers. Overall, fathers of children under the age of five years were 164 cm tall and weighed 55 kg (Table 7). As with mothers, there were both provincial and sector differences in

heights; fathers in the Central province and in the estate areas were shorter and lighter than elsewhere. Overall, BMI for fathers was similar to that for mothers.

Table 8 shows that a greater proportion of mothers were severely or moderately undernourished compared with fathers, while the opposite was true for being mildly undernourished.

Tables 8 and 9 show the prevalence of undernutrition, defined as BMI below 18.5, of non-pregnant mothers and fathers by province, sector and income quartiles. Undernutrition was associated with province, sector, and income quartile. The prevalence of undernutrition was higher in the Central province for both mothers and fathers, although the levels for undernourished fathers in the Southern and North Central provinces was higher than in the other provinces. The prevalence of undernutrition was higher in rural (43 percent for both mothers and fathers) than in urban ones (21 percent for mothers, 28 percent for fathers) and higher in estate areas (59 percent for mothers and 50 percent for fathers) than in rural areas for both mothers and fathers. Among both

Table 7
Mean and standard deviation height, weight, and body mass index of fathers' by province, sector, and age group

	Height			Weight			BMI		
	Mean	Std Dev	n	Mean	Std Dev	n	Mean	Std Dev	n
PROVINCE									
Western	164.9	6.8	324	58.2	13.1	324	21.3	4.7	324
Central	162.2	8.4	282	50.9	9.1	282	19.2	2.9	280
Southern	163.8	6.3	124	52.7	9.9	124	19.5	3.1	124
North Western	165.7	6.3	144	59.1	11.4	144	21.4	3.5	144
North Central	167.4	6.7	107	56.2	10.1	107	20.0	3.5	107
Uva	164.0	5.8	148	55.1	9.5	152	20.5	3.3	146
Sabaragamuwa	164.1	7.3	165	53.3	8.9	167	19.6	2.8	165
	P<0.001			P<0.001			P<0.001		
SECTOR									
Urban	165.4	6.7	669	58.3	12.0	673	21.2	4.1	669
Rural	164.4	6.2	412	53.1	9.2	414	19.6	3.0	412
Estate	160.6	8.9	213	48.4	6.6	213	18.7	2.4	209
	P<0.001			P<0.001			P<0.001		
OVERALL	164.3	7.1	1294	55.0	11.1	1300	20.3	3.7	1290

mothers and fathers, higher levels of undernutrition were, as expected, positively associated with decreasing income quartile. The big difference, however, is between the third and highest income quartile. These figures should be compared with data obtained from a group of

sportsmen and sportswomen (4). Only 53% women and 77.9% of the men could be considered normal. The value for Resting Metabolic Rate used by Ferro-Luzzi et al (3) in arriving at a cut-off point of 18.5 for BMI, may be too high for Sri Lankans (4).

Table 8

Distribution and cumulative distribution of BMI for mothers and fathers

NUTRITION STATUS	Percent	Mother		Percent	Father	
		Cumulative Percent	n		Cumulative Percent	n
Severe undernutrition	8.8	8.8	118	5.4	5.4	69
Moderate undernutrition	9.8	18.6	132	8.9	14.2	114
Mild undernutrition	14.8	33.4	199	22.0	36.2	283
Normal	53.4	85.7	703	54.0	90.2	696
Mild overnutrition	8.2	93.9	110	6.5	96.7	84
Mild overnutrition	3.4	97.3	46	1.9	98.6	24
Severe overnutrition	1.2	98.5	16	.6	99.2	8
Obese	1.5	100.0	20	.8	100.0	10
TOTAL	100.0		1344	100.0		1288

Table 9

Percentage of mothers and fathers who were undernourished, based on body mass index, by background factors

	Mothers	Undernourished		n
		n	Fathers	
PROVINCE				
Western	23.9	322	28.3	322
Central	47.3	277	46.4	280
Southern	30.0	120	43.5	124
North Western	28.6	140	22.2	144
North Central	30.6	108	44.9	107
Uva	36.6	213	35.6	146
Sabaragamuwa	32.9	164	35.8	165
	p<0.001		p<0.001	
SECTOR				
Urban	21.1	735	27.6	667
Rural	43.3	411	43.0	412
Estate	58.6	198	50.2	209
	p<0.001		p<0.001	
INCOME QUARTILE				
Lowest quartile	45.7	291	47.1	276
Second quartile	41.1	360	42.9	352
Third quartile	31.4	325	34.9	312
Highest quartile	18.2	363	21.5	344
	p<0.001		p<0.001	
OVERALL	33.4	1344	36.2	1288

Compared with NHS3, conducted in October/December 1994, there has been a negligible decline in undernutrition among mothers (33 percent versus 35 percent) and a small decline in that among fathers (36 percent versus 42 percent). It is important to note that the data for fathers in NHS3 were much more limited in that many fathers were absent; thus, futher analyses will determine whether the difference in the prevalence of undernutrition between NHS3 and NHS4 is statistically significant.

Night Blindness

Mothers were questioned about nightblindness in their children. Among children over the age of two years 0.5 percent were nightblind, suggesting that clinical vitamin A deficiency is not a public health problem on the island. Nightblindness was also very low in NHS 3 (October/December 1994).

Iodized salt

Eighteen percent of mothers in Sri Lanka did not know about iodized salt, 39 percent knew but

Table 10
Percentage distribution of knowledge and use of iodized salt by households according to province and sector

PROVINCE	Iodized Salt			Total	n	
	Don't know don't use	Know but don't use	Know and use			
Western	16.3	33.7	49.9	100.0	569	
Central	24.4	34.5	41.2	100.0	476	
Southern	8.5	27.5	64.0	100.0	189	
North Western	12.2	48.6	39.2	100.0	288	
North Central	27.9	41.9	30.2	100.0	265	
Uva	15.7	42.0	42.3	100.0	281	
Sabaragamuwa	14.6	47.1	38.3	100.0	329	p<0.001
SECTOR						
Urban	12.8	38.1	49.2	100.0	1184	
Rural	16.5	39.4	44.0	100.0	865	
Estate	37.9	40.2	21.8	100.0	348	p<0.001
OVERALL	17.8	38.9	43.3	100.0	2397	

Table 11
Percentage distribution of knowledge and use of iodized salt by households according to province and sector

PROVINCE	Avoid Goitre	Good for health	Other	Total	n	
Central	63.9	30.4	5.7	100.0	194	
Southern	45.8	43.2	11.0	100.0	118	
North Western	10.6	73.5	15.9	100.0	113	
North Central	6.1	76.8	17.1	100.0	82	
Uva	58.0	36.1	5.9	100.0	119	
Sabaragamuwa	54.8	31.7	13.5	100.0	126	p<0.001
SECTOR						
Urban	41.8	50.1	8.1	100.0	581	
Rural	48.6	38.8	12.6	100.0	381	
Estate	40.8	50.0	9.2	100.0	76	p<0.001
OVERALL	44.2	46.0	9.8	100.0	1038	

did not use iodized salt, and 43 percent both knew and used iodized salt (Table 10). Fewer mothers in the Central and North Central provinces and in estate areas knew about

would be maintained. Despite this, over one-half of households using iodized salt in the North Central Province continue to wash the salt before using it, which means that much of

Table 12
Percentage distribution of form in which salt is used according to province and sector

	Wash first	Use as it is	Total	n
PROVINCE				
Western	14.4	85.6	100.0	285
Central	11.3	88.7	100.0	195
Southern	15.7	84.3	100.0	121
North Western	0	100.0	100.0	113
North Central	53.7	46.3	100.0	82
Uva	7.6	92.4	100.0	119
Sabaragamuwa	13.2	86.8	100.0	121
SECTOR				
Urban	12.8	87.2	100.0	579
Rural	13.1	86.9	100.0	381
Estate	35.5	64.5	100.0	76
OVERALL	14.6	85.4	100.0	1036

iodized salt, while more mothers in the Southern province and in urban areas knew and used iodized salt.

Among the mothers who used iodized salt, 44 percent did so to prevent goitre, a further 46 percent did so for health reasons although they did not specify goitre, and the remainder cited other reasons (Table 11). In NHS3 (October/December 1994) 50 percent cited to prevent goitre, 38 percent stated iodized salt is good for health, and 12 percent gave other reasons. The difference in the results maybe reflecting that mothers are becoming more aware of the more widespread benefits of iodized salt besides prevention of goitre.

Mothers in the North Western and North Central provinces appear to be more aware of the broader need for iodine, in that they were more likely to cite health reasons, while mothers in the other provinces were more likely to state that iodized salt prevent goitre.

Table 12 shows that the majority of households (85 percent) did not wash salt before using it; thus, ensuring the beneficial effects of the salt

the iodine maybe lost. These households were likely to be those on the estates.

Further analyses

There are a wealth of data on factors associated with the nutrition and health of children that have not been presented in the NHS preliminary reports. The data from all four surveys will be merged and in depth analyses done to identify some of the critical factors predisposing Sri Lankan infants and young children to undernutrition so early in life. The results of these analyses will enable recommendations to be put forward for policy decisions.

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