Vitamin A Deficiency Status of Children Sri Lanka 1995/1996

A Survey Report

Medical Research Institute of the
Ministry of Health and Indigenous Medicine,
Sri Lanka.
1998

Vitamin A Deficiency Status of Children in Sri Lanka

1995/1996

A UNICEF assisted study

1998

Medical Research Institute
Ministry of Health and Indigenous Medicine

" The persistence of vitamin A deficiency anywhere in the world is cruel, because it exposes mothers and children to great risks; it is immoral, because it ignores basic human values; and it is unacceptable, because it is preventable."

Abraham Horwitz
Chairman, IVACG
1993 IVACG Conference

This report presents the findings of a survey to assess the vitamin A deficiency status of children in Sri Lanka, conducted in 1995/1996. The survey assessed the vitamin A deficiency in children 6 to 71 months of age using serum vitamin A levels. Prevalence of Bitot's spots, night blindness, and adequacy of consumption of vitamin A rich foods were assessed as corroborative evidence. The report also presents the status of a number of World Summit Goals for children.

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Foreword

The survey reported here is the first representative sample survey conducted in Sri Lanka to measure the serum vitamin A concentration, which is one of the best indicators of vitamin A deficiency status in children. The survey also measured prevalence of Bitot's spots, night blindness, and food intake as corroborative evidence.

This survey adds significantly to the knowledge base on vitamin A deficiency. Since overt clinical signs such as blindness are not frequently seen in Sri Lanka, vitamin A deficiency did not receive much attention in recent years. This study shows that vitamin A deficiency indeed, is a public health problem. Vitamin A deficiency, long before it manifests as clinical signs such as Bitot's spots, adversely affects the development of children.

Possible interventions include supplementation, fortification, and most desirably, dietary diversification. The last option requires that families gain knowledge of vitamin A-rich foods, and methods of food preparation that optimise the availability of vitamin A in the food. Results of this study have already been discussed and formed the basis for policy and action. It is my sincere hope that the nutritionists, health professionals, and policy makers would find the material presented here useful and stimulating in meeting the challenge of eliminating the vitamin A deficiency in young children.

I would like to thank all those who made this exercise possible. Dr. Chandrani Piyasena and staff who carried out the survey, the health staff who assisted with data collection and supervision, and very importantly, the children and their families without whose understanding and generous support this survey would never have been possible. I acknowledge with thanks, the contribution of WHO in providing the necessary equipment.

I am deeply grateful to UNICEF whose initiative, funding, and technical support enabled the undertaking and successful completion of this nationally important exercise.

Dr. S.A.P. Gnanissara
Deputy Director General
Education, Training and Research

Ministry of Health and Indigenous Medicine
Colombo 10
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Acknowledgement

This survey was conducted by the Nutrition Unit of the Medical Research Institute with technical support and funding from UNICEF, Colombo. Partial funding for equipment was provided by WHO, Colombo.

A large number of persons and several institutions contributed to the designing and implementation of this survey. While the contributions are many and varied a few must be specifically mentioned. A number of paediatricians and other health professionals assisted in developing the survey. The technical assistance provided by the Department of Census and Statistics in selecting the sample is greatly acknowledged.

Dr. Chandrani Piyasena, Head of the Nutrition Department of the Medical Research Institute headed the survey team and was responsible for the implementation of the survey.

Dr. A.M.A.S.B. Mahamithawa functioned as the assistant team leader. The Divisional Directors of Health Services acted as field co-ordinators in their respective areas.

The Public Health Inspectors and Public Health Nursing Sisters carried out data collection.

Parents and children in over 6000 households selected to the sample gave of their time and knowledge graciously.

The success of this survey is the result of their collective efforts.

Summary

This report presents the findings from a household sample survey on vitamin A deficiency and several World Summit goals for children. The sample consisted of 60 clusters of approximately 100 houses each, selected from 30 Divisional Secretariat (DS) divisions[1]. The principal means of assessing vitamin A deficiency status was by measuring the serum vitamin A concentration in blood samples of 1750 children between six months and six years of age. Prevalence of Bitot's spots and night blindness was measured as corroborative evidence of vitamin A status. The adequacy of vitamin A intake was measured using semi-quantitative food frequency methodology. In addition, information is collected on the World Summit Goals on access to safe water and sanitation, breastfeeding, access to iodised salt, prevalence of diarrhoea, and nutritional status.

Vitamin A deficiency status

Vitamin A deficiency is a severe public health problem in Sri Lanka as indicated by 36 percent (against cut off level of 20 percent) of children with serum vitamin A concentration below 20 micrograms per decilitre. Corroborative evidence for this is seen in prevalence of Bitot's spots exceeding 0.5 percent. Intake of vitamin A rich foods is on the margin of inadequacy as measured by food frequency survey.

There is no statistically significant gender or age difference in serum vitamin A concentration. Vitamin A deficiency is a public health problem in each of the provinces. The deficiency is severe except in the Western and Central provinces where it is a moderate problem. Children living in poor housing and poor environmental sanitation, having no access to safe drinking water are

[1] Divisional Secretariat division is the administrative sub division of the district.

more likely to be vitamin A deficient than others. There is no significant variation by mother's education level, which is a strong differentiator of other health and nutrition indicators.

Over 70 percent of mothers are aware of some vitamin A rich food. That dark green leaves are a source of vitamin A was known to about 70 percent of mothers. However, less than half the mothers knew of yellow fruits and vegetables, and less than one third knew of animal foods as sources of vitamin A.

Consumption of Iodised salt

Forty eight percent of households were found to have iodised salt in their kitchens at the time of the survey. This proportion is a dramatic increase compared to less than 10 percent use in early 1995. However, 18 percent of salt samples were observed to be moist or dirty in appearance.

Protein energy undernutrition:

Among children 6 to 59 months of age, 34 percent are underweight to a moderate or severe level. Eighteen percent of children are stunted and 14 percent wasted. There is no significant difference between boys and girls in levels of protein energy undernutrition. Undernutrition increases sharply with age in the first months and continues to increase although at a slower speed, as has been observed in previous national surveys. Geographically, the Uva province is the worst affected with 54 percent of children being underweight. Central and North Central provinces follow closely.

Diarrhoea:

Prevalence of diarrhoea among children under five years in the two weeks preceding the survey was 3.8 percent.

Breastfeeding:

Almost all children have been breastfed for at least a short period. Breastfeeding continued until the end of the second year for 51 percent of children. Just seventeen percent of one-year old children have been exclusively breastfed for four months.

Access to water and sanitation:

Nearly thirty percent of households have no access to a source of safe water, which is defined as piped water, tube well, or a protected well. Thirty percent of households have no access to a safe latrine.

Chapter 1

Introduction

Background

Vitamin A deficiency (VAD), is the single most important cause of childhood blindness in developing countries. Even mild VAD contributes significantly to morbidity and mortality from common childhood diseases. The global concern for eliminating preventable debilitation including blinding, misery, and death resulting from vitamin A deficiency (VAD) gathered considerable momentum since the early 1980s. Heads of State, ministers and other representatives of countries have all pledged to eliminate vitamin A deficiency and all its consequences including blindness by the year 2000 at several international fora. These include the World Summit for Children (New York, 1990), the Policy Conference on Ending Hidden Hunger (Montreal, 1991), and the International Conference on Nutrition (Rome, 1992).

The Government of Sri Lanka in its National Plan of Action (NPA), which was prepared in pursuance of the World Summit Goals for children, aims to achieve virtual elimination of vitamin A deficiency and its consequences including blindness by the year 2000. There is no recent national level data on the status of vitamin A deficiency. The only large scale assessment of vitamin A deficiency was made in 1974/75 in a survey conducted by the Ministry of Health in collaboration with the Centre for Disease Control (CDC), Atlanta (Ministry of Health 1976). This survey of 13,450 children of 6 to 71 months of age in rural areas showed that many of the provinces had a prevalence of Bitot's spots exceeding the WHO suggested cut off (0.5 percent) for a significant public health problem. However, analysis of serum vitamin A was confined to a sub-sample of 346 children and the results were inconclusive to determine vitamin A deficiency status.

The renewed efforts to eliminate vitamin A deficiency in the country had pointed to the need for an assessment of the situation. Recognising this need, the Medical Research Institute of the Ministry of Health undertook to carry out a household survey to assess VAD as part of the Micronutritent Deficiency Control Project of the UNICEF assisted Nutrition Programme of the Government of Sri Lanka. At the time the study was being designed, the need also arose for an assessment of the situation with respect to a few decade goals for children. A few of the goals for which as at 1995 an assessment was not available or needed verification were identified for measurement in this survey. The goals included access to iodised salt, reduction of undernutrition, reduction of diarrhoea, improving access to safe water and sanitation, and basic education.

Objectives of the study:

The survey was designed with two objectives.

i) to assess the prevalence of vitamin A deficiency in Sri Lanka;

ii) to assess the situation of children with respect to a number of selected World Summit Goals.

Organisation of the report

The rest of this report is organised in four chapters. Chapter 2 presents the survey methodology. Chapter 3 describes the methodology and the vitamin A deficiency status. Chapter 4 presents the results of a Helen Keller type assessment of vitamin A rich food intake carried out along with the main survey. Chapter 5 presents the situation with respect to a number of World Summit Goals.

Chapter 2

The Survey Organisation

The survey was designed and conducted by the Nutrition Department of the Medical Research Institute. Prior to designing the survey, views were sought from Divisional Directors of Health Services (DDHS), paediatricians, ophthalmologists, staff of universities, family physicians, and Health Ministry officials. Of 232 professionals contacted, 48 percent responded to the questionnaire and of them 25 percent indicated that based on their personal experiences vitamin A deficiency may be a problem in certain areas. Almost all wanted to know more about vitamin A deficiency status, strategies for reduction of VAD and technical information. At a subsequent consultative meeting, a decision was taken to carry out a sample survey to assess vitamin A deficiency status of children in Sri Lanka.

Sample design

The sample was designed primarily to obtain an estimate of the proportion of children with serum Vitamin A levels below the cut off value. Having no prior information on this proportion, it was assumed to be 40 percent for the purpose of computing the sample size. Since vitamin A deficiency is known to occur in clusters, a fairly high design effect of 4 was assumed. The sample size required to yield an estimate of population proportion within 5 percent error is 1556 children 6 to 71 months of age, as computed from the following equation.

$$N = \frac{4p(1-p)d}{e^2}, \text{ where}$$

N = sample size
p = expected proportion
d = design effect
e = sampling error

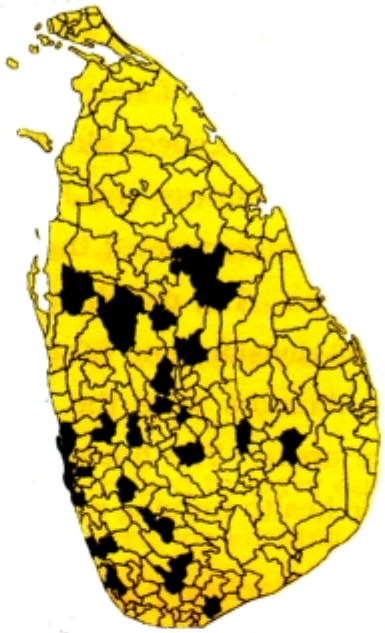
This was increased by 20 percent to 1843 to allow for any refusals to give blood samples, and more likely for loss of blood samples due to spoilage. The required number of households to yield a sample of 1800 children of the age group 6 to 71 months is 5974. The sample size was therefore fixed at 6000 households.

Map:1 Districts of high and low prevalence of Bitot's spots, 1975

The sample was selected to be representative of the country excluding the northern and eastern provinces, using a stratified two stage cluster design. Two strata were identified as low and high prevalence of Bitot's spots as observed in the 1975 survey (map 1). The first stage selection units were Divisional Secretariat divisions, which are almost always coterminous with Divisional Director of Health Service divisions (DDHS). Thirty DS areas were selected, 15 from each stratum, with probability proportional to size. The second stage sampling unit was GN division, the administrative sub-division of the DS division. Two GN divisions were selected from each selected DS division, again with probability proportional size. Each selected GN division was demarcated into two or three clusters each containing approximately 100 housing units, using a map prepared by the interviewer of the respective area in consultation with a statistician. One segment was selected at random. The boundaries of the selected segment were agreed upon with the interviewer. The interviewer marked a starting point and a travel route within each cluster. Thus, a total of

60 clusters of approximately 100 housing units were selected from 30 DS divisions. All housing units in each selected cluster, and all children of relevant age groups were included in the sample, for the respective sections of the questionnaire.

Map 2: DS Divisions where sample clusters are located



The questionnaire consisted of the following sections.

1. Identification
2. Household listing for eligibility screening
3. Background and consumption of iodised salt
4. Food frequency (Helen Keller)
5. Breast feeding and complementary feeding
6. Illness and Vitamin A rich food intake
7. Clinical signs of vitamin A deficiency
8. Schooling
9. Mother's information
10. Anthropometry

The questionnaire was pre tested in a non-survey area, in Kolonnawa DS division, for comprehensibility, appropriateness of wording, and any problems of administration. A manual was prepared for interviewers' reference in the field.

Survey Staff

The survey staff consisted of two central teams and a peripheral team. Each central team consisted of a medical officer, one medical laboratory technologist and two measurers of heights and weights. The central team visited each sample cluster to collect blood samples, measure heights and weights, and assess night blindness and Bitot's Spots. These visits were made after the peripheral team completed the collection of household data using structured questionnaires. The peripheral team consisted of 30 area co-ordinators (one for each DS division) and 60 investigators, (a pair for each DS division). The area co-ordinators were the Divisional Directors of Health Services of the respective areas. The household interviewers were public health inspectors and public health nursing sisters.

Training

Training programmes were conducted for interviewers on administering the household questionnaires, for measurers on measuring heights and weights, and for the central team on collecting blood, examining for Bitot's spots, and eliciting history of night blindness.

The 60 interviewers were trained at the Medical Research Institute in three batches. Area co-ordinators also attended the training. Each training was of three days duration. The training commenced with an overview of the survey and its purpose. This was followed by small group exercises to gain familiarity with the questionnaire. The questionnaire and interview techniques were then explained through discussions, mock interviews, and practice interviews. Following the class room sessions the trainees interviewed, under supervision, a few households outside the sample and the problems were discussed. In the final session of the training the administrative procedures were explained, and questionnaires, instruction manual, check list of duties and other materials were given to each interviewer.

The area co-ordinators were briefed on procedures for supervision, which included scrutinising, all questionnaires for a set of basic requirements, spot checks and at least one re-interview in each cluster.

Two members from each of the two central teams were trained in measuring heights and weights of children. The measurers were evaluated for precision and accuracy of measurement. For this purpose each pair of measurers made two measurements of heights and weights of 10 children. These measurements were compared with the measurements of the trainer. The measurers who failed to reach the accepted level of accuracy were re-trained and given opportunity to further practice.

The two medical officers of the central team were trained to carry out clinical examination of Bitot's spots. The team also prepared for eliciting history of night blindness. Words and phrases to use in asking questions from mothers or caretakers about evidence of child's reduced vision at dusk were agreed upon as inability to recognise one's toys and other belongings or individuals, and tendency to knock against household goods.

The laboratory staff was trained by a senior trained medical laboratory technician who has had a training at a specialised centre abroad on the procedures of separation, fixation, transport and storage. Two lab technologists were trained to use the High Pressure Liquid Chromatograph (HPLC) to measure serum vitamin A concentration using pooled plasma.

Data Collection

Data collection was carried out in two stages. In stage one, interviewers of respective clusters collected data on the questionnaire by interviewing the mother, or in her absence, the caregiver.

Sixty interviewers were assigned, one for each of the clusters, to canvass the household questionnaire. Approximately half the interviewers were public

health nursing sisters and the rest were public health inspectors in the respective DDHS areas. Each interviewer visited households sequentially starting from one end of the cluster. The households were revisited up to a minimum of three times when it was not possible to interview the mother or any other responsible person. Area co-ordinators supervised activities of the interviewers. The central team visited a number of clusters to monitor progress early in fieldwork. The team scrutinised a sample of completed schedules, observed at least one interview being conducted by each investigator and re-interviewed at least one interviewee. The interviewers were informed of any errors or incorrect procedures.

Stage two of the data collection followed the completion of household interviews in each cluster. The central teams examined the children for Bitot's spots, elicited history of night blindness, and measured the heights and weights of children.

Data Processing

Data collected from the survey were keyed in to computer files using EPI6, a software package developed by Centre for Disease Control (CDC). Lack of computer processing capacity led to some difficulties and delay in data entry and validation. Analysis was carried out using SPSS for Windows.

The Sample Implementation

A total of 6049 households in the 60 clusters were visited by the interviewers. Of these, 5998 were successfully interviewed against the required 6000. The urban proportion was 15 percent, the same as the national urban proportion. Table 1 shows the numbers of households, and eligible respondents interviewed.

Table 1: Sample Implementation

Number of households expected	6000
Number of households visited	6049
Number of households interviewed	5998
Number of children 6 to 71 months required	1800
Number of children 6 to 71 months in the sample	2869
Number of blood samples successfully analysed	1750
Number of children under 5 years	2742

Chapter 3

Vitamin A Deficiency Status

Vitamin A deficiency (VAD) is the single most important cause of preventable childhood blindness in developing countries. Vitamin A is an essential nutrient for growth and development, vision, immune response and cell differentiation. Even marginal Vitamin A Status has been associated with increased morbidity and mortality, decreased growth rate and inefficient iron utilisation. The most serious manifestations of Vitamin A Deficiency (VAD) are seen in very young children, six months to six years of age. In these children VAD is almost invariably associated with protein energy undernutrition, a low intake of fats, gastrointestinal infections and respiratory tract infections.

The World Summit for Children therefore, included a goal on vitamin A deficiency for all ratifying states to achieve. The Government of Sri Lanka, in keeping with global criteria has, in its national plan of Action for Children, set the goal of virtual elimination of vitamin A deficiency and its consequences including blindness by the year 2000.

Measuring Vitamin A deficiency

Vitamin A Status is classified into five sequential categories: deficient, marginal, satisfactory, excessive and toxic. The extreme categories of deficient and toxic status are characterised by clinical signs, whereas the intermediate three stages are not. A deficient status is characterised primarily by xerophthalmia described in a later section. A marginal vitamin A status is not associated with overt clinical signs. It can be detected by impaired vision in dim light, reduction in goblet cell frequency, and epithelial cell abnormalities in many tissues including the conjunctiva of the eye, as well as

by abnormal increases in plasma retinol in response to a small oral dose of the vitamin A. A satisfactory status means that all physiological functions of vitamin A are being adequately met by the existent total body reserves of the vitamin. Excessive and toxic statuses result from ingestion of large quantities of vitamin A. (IVACG, 1993). Although excessive intakes of vitamin A, particularly by pregnant women have serious consequences, these categories are not investigated in the study.

Traditionally, several types of indicators of VAD have been in use. These include clinical and sub-clinical signs, biological indicators, measures of intake of the vitamin, and socio-demographic indicators which act as proxies. The choice of indicators depends on the purpose for which it is to be used and the qualities of the indicator. Indicators should be feasible in terms of acceptability by the people and data collectors, their obtainability under field conditions, and their measurability at reasonable cost. The indicators should also be sufficiently sensitive and specific to assess reliably the magnitude and the severity of the problem. Thus far, the indicators recommended by WHO are the clinical signs of xerophthalmia, night blindness, and serum vitamin A values (WHO, 1993).

Xerophthalmia (dry eye) is the most readily recognised clinical manifestation of vitamin A deficiency. It has been the most widely used definitive criterion for assessing whether VAD poses a public health problem in a population. Xerophthalmia includes all ocular manifestations of vitamin A deficiency ranging from night blindness to corneal ulceration and resultant blindness.

The major eye signs and cut-off points of public health significance as suggested by World Health Organization are given in Table 2. While these criteria are the consensus of expert groups, individual countries may wish to select more stringent criteria.

While xerophthalmia surveys are considered the primary reference standard for the assessment and determination of public health problems, the low prevalence rate of clinical disease and clustering of cases make it necessary to have very large sample size. This survey measured the prevalence of two indicators of xerophthalmia: night blindness and Bitot's spots.

Table 2: Clinical criteria for assessing the public health significance of xerophthalmia

Criterion	Minimum prevalence
Night blindness	>1.0 %
Bitot's spot	>0.5 %
Corneal Xeroxes and or ulceration	>0.01%
Xerophthalmia related corneal scars	>0.05%

Source: *A Brief Guide to Assessing Current Methods of Assessing. Vitamin A Status.* (1993) A Report of the International Vitamin A Consultative Group.

Night Blindness and Bitot's spots

Night blindness is the inability to see under low illumination such as late dusk, early dawn or in a dimly lit room. It is often the first functional manifestation of marginal vitamin A deficiency. Its prevalence has been a widely used definitive criterion for assessing whether vitamin A poses a significant public health problem

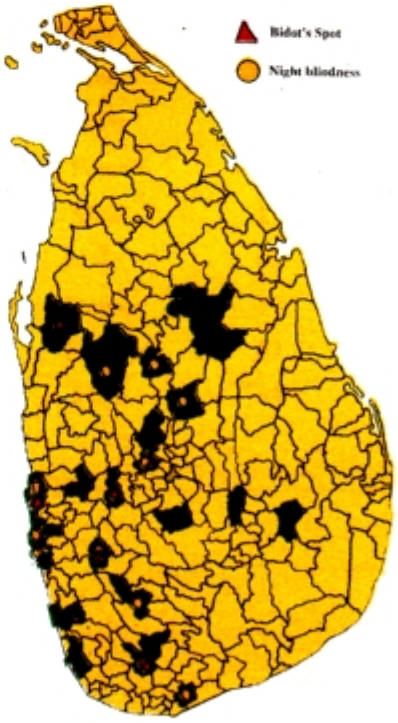
The WHO recommended interpretation of the prevalence of night blindness is that vitamin A deficiency is a "serious public health problem when at least one percent of children are night blind". The age range for computing prevalence is 24 to 71 months of age. For the very young children under 24 months of age this may not be a reliable indicator since they are not particularly mobile after dark, and therefore their night blindness may go unnoticed.

Testing every child for night blindness by measuring the ability of the eye to adapt to low levels of light is time consuming and not practical. A more practical approach is to ask the child's mother, or in her absence the caregiver, whether the child is night blind. This is particularly easy if a local

term for night blindness exists which in itself is an indication of the recognition of the problem of night blindness. Existence of such a term in a population is considered a basis for using a history of night blindness as a valid parameter for assessing vitamin A status in that population. In Sri Lanka, the term "Thamas Andiriya" meaning blurred vision in the evening is in use, but is not common. In the survey night blindness was assessed by eliciting from the mother evidence of difficulty to see at dusk such as frequent knocking against household items, inability to recognise child's belongings.

A Bitot's spot is a lesion or a dry, "unwettable" surface in the eye resulting from keratinisation of the surface of the conjunctiva. Readily recognisable plaques first form adjacent to the temporal limbus covered with a foamy or cheese like material. This cheesy or foamy material is easily wiped off but will re-accumulate rapidly. The presence of the foamy or cheesy material is sufficiently specific for assessment purpose only when present in children under 6 years of age. Temporal Bitot's spots in older children may represent the remains of prior vitamin A deficiency signs and are therefore less useful for population assessment and hence are not commonly covered by population based surveys.

Map 3: Location of Bitot's spots and night blindness cases



The survey sample had 13 children between 24 to 71 months

of age with night blindness and 19 children between 6 and 71 months of age with Bitot's spots. The clusters where they were located are given in Table 3 and Map 3. As weighted percentages, these translate to a prevalence of 0.8 percent night blindness which is slightly below the cut off of one percent and 0.8 percent prevalence of Bitot's spots which is well above the cut off of 0.5 percent for public health significance. Considering that night blindness is very likely to be underestimated, the survey estimate serves more as a lower bound than a precise estimate of the population value. The observed levels of prevalence of Bitot's spots and night blindness suggests that vitamin A deficiency could well be a public health problem in Sri Lanka.

Table 3: Location, age and sex of children with Bitot's spots and night blindness

District	DS Division	GN division	Sex	Age (months)	Night Blindness[1]	Bitot's Spots[2]
Colombo	Colombo	Aluthmawatha	Female	8	-	1
Colombo	Colombo	Aluthmawatha	Female	42	1	-
Colombo	Dehiwela/ Ratmalana	Katukurunduwatte	Male	70	1	1
Gampaha	Katana	Dabaduraya	Male	65	1	1
Gampaha	Katana	Dabaduraya	Male	40	1	1
Gampaha	Katana	Dabaduraya	Male	68	1	1
Gampaha	Katana	Dabaduraya	Male	65	1	1
Gampaha	Katana	Dabaduraya	Male	17	-	1
Kalutara	Matugama	Adawela	Male	45		1
Kalutara	Matugama	Adawela	Male	45		1
Matale	Naula	Hapugasdeniya	Male	62	1	-
Hambantota	Beliatta	Pahalagoda	Female	25	1	-
Kandy	Thumpane	Kandahena West	Male	25	1	1
Matara	Kotapola	Usmalagoda	Female	48	-	1
Matara	Kotapola	Usmalagoda	Female	42	-	1
Matara	Kotapola	Usmalagoda	Male	64	-	1
Kurunegala	Maho	Nedeyawa	Male	54	1	-
Puttalam	Karuwalagaswewa	Weerapura	Male	17	-	1
Anuradhapura	Palagala	Gamsaba Halmilla	Female	42	1	0
Ratnapura	Eheliyagoda	Mitipola	Male	15	-	1
Ratnapura	Eheliyagoda	Mitipola	Male	63	1	1
Ratnapura	Nivithigala	Delwala	Female	59	1	1
Ratnapura	Nivithigala	Delwala	Female	62	-	1
Kegalle	Kegalle	Deewala Medagama	Male	63	-	1
Total					13	19

Note: 1.Children 24 to 71 months
2.Children 6 to 71 months.
- zero cases

Serum Vitamin A Levels

The main focus of the survey was the measurement of vitamin A concentration in blood which is one of the best indicators of vitamin A status in children. A blood sample was taken by venipuncture from all children in the age group of six months to six years in the sample households. The serum samples were frozen in the field and transported to the Medical Research Institute in Colombo where it was analysed using a High Pressure Liquid Chromatograph. The results are presented below.

Table 4: Age and sex distribution of children whose serum vitamin A levels are analysed

Age (months)	Total		Male		Female	
	No.	Percent	No.	Percent	No.	Percent
6-23	391	22	198	21	182	22
24-47	665	40	357	36	308	38
48-71	704	38	343	42	361	40
Total	1750	100	888	100	852	100

Mean = 41.2 months

Table 5: Percentage distribution of children 6 to 71 months by sex and serum vitamin A concentration

Retinol µg/dl	Male	Female	Total
< 10	9.6	8.3	9.0
10 - 20	26.4	26.2	26.3
20 - 30	34.1	35.2	34.6
30 - 40	20.4	21.2	20.8
40 - 50	7.3	7.3	7.3
50 - 60	1.0	0.9	0.9
60 - 70	0.4	0.5	0.4
70 - 80	0.5	0.1	0.3
80 +	0.3	0.3	0.3
Total	100	100	100

The frequency distribution of serum vitamin A obtained from the study population provides a useful indicator of sub-clinical vitamin A deficiency status. The frequency of values below a cut off identifies the deficient groups. The cut off values recommended by the International Vitamin A Consultative Group (IVACG) are 20 µg/dL (0.70 µ mol/L) for low and 10 µg/L (0.35 µmol/L) for deficient. These cut off values are arbitrary. They have been established

from available cross sectional surveys where sampling techniques were not necessarily representative. Also requirements of specific age sex groups such as young children and adolescent girls are not considered. Some recent work has shown that serum vitamin A levels have a close to normal distribution with 95 percent of values greater than or equal to 30 µg/dl in two to six year old children living in deprived areas who have received a massive dose of vitamin A. Therefore, for diagnostic and program evaluation purposes, analysis of a baseline distribution against this reference (i.e. 95 percent of values greater than or equal to 30 µg /dL), provides an objective estimate of the proportion of children below the cut off and thus at risk of vitamin A insufficiency (IVACG 1993).

Table 6: Percentage of children with serum vitamin A levels below cut-off values by age and sex.

	Cut off value		
	10 µg/dl	20 µg/dl	30µg /dl
Sex			
Male	9.6	36.0	70.2
Female	8.3	34.5	69.7
Age (months)			
6 - 23	9.0	34.8	70.5
24 - 47	8.5	34.2	68.2
48 - 71	9.5	36.6	71.2
Total	9.0	35.3	69.9

The advantage of this method is that a single cross-sectional survey provides a profile of the population's current vitamin A status. When the sample is representative, the results can be extrapolated to the larger population, and measures of central tendency of the distribution (mean, median, standard deviation, percentiles) of serum vitamin A provide the size of the child population that would benefit from interventions to improve vitamin A status.

The 60 clusters had 2869 children 6 to 71 months of age. Blood samples were collected from 2612 children. It was possible to successfully analyse samples from 1750 children. The age and sex distribution of these children is given in Table 4.

Distribution of serum retinol levels in children

The distribution curve of serum vitamin A is shown in Fig.1. The curve is very nearly normal with a median of 24 µg/dl and mean of 24.7 µg/dl. The standard error of the mean is 0.26, implying that the range 23.5 to 24.5 is likely to be the true population mean (at 95% confidence) The standard deviation of the distribution is 11.2. Table 6 shows the percentage of children below cut off points discussed earlier.

Fig 1: Distribution of serum vitamin A levels

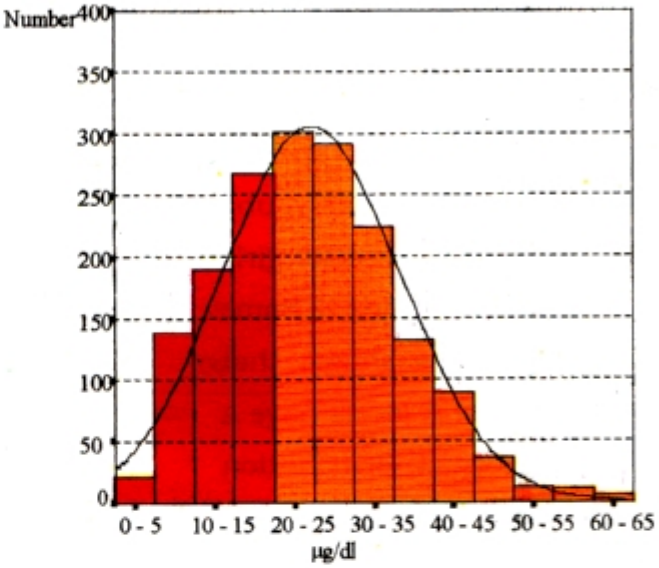


Table 7: Mean and median serum vitamin A levels by age and sex

	Male		Female		Total	
Age	Mean µg/dl	Median µg/dl	Mean µg/dl	Median µg/dl	Mean µg/dl	Median µg/dl
6 to 23	25.2	23.7	24.2	24.2	24.7	24.1
23 to 48	24.9	23.8	25.7	25.0	25.3	24.6
48 to 71	24.5	23.0	23.9	23.2	24.2	23.0
Total	24.8	23.5	24.7	24.2	24.7	24.0

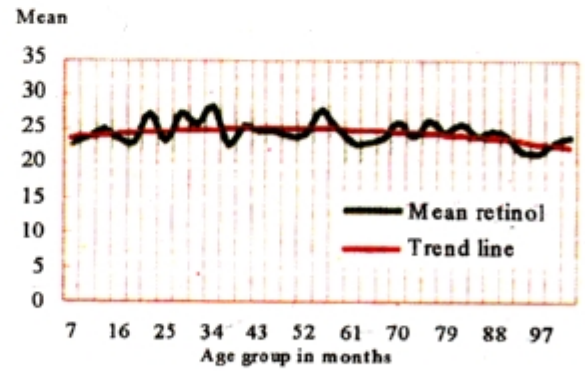
The percentage of children with serum vitamin A concentration below 20 µg/dl is 35.3, very much higher than the WHO recommended cut off of 20 percent signifying that vitamin A deficiency is a public health problem in Sri Lanka. Concentration below 10 µg/dl is considered to be a sign of severe vitamin A deficiency and 9 percent of children in the sample are in this category. Studies have shown that in populations of children who have recently received vitamin A supplements, 95 percent had serum vitamin A levels above 30 µg/dl. In the survey sample of Sri Lankan children only 30 percent was above this level.

Table 8: Serum vitamin A concentration by province: mean, median and percentage below 20 µg/dl

Province	Mean			Median			Percentage below 20µg/dl
	Total	Male	Female	Total	Male	Female	
Western	28.1	28.5	27.7	27.6	28.3	27.1	24.3
Central	23.3	24.2	22.4	22.7	23.2	21.0	22.3
Southern	29.2	28.7	29.7	28.4	27.8	29.0	42.5
North Western	21.7	22.3	20.9	20.8	21.0	20.7	46.3
North Central	17.8	17.3	18.5	18.8	18.6	18.8	57.3
Uva	23.9	23.3	24.5	23.7	22.8	24.9	35.0
Sabaragamuwa	20.9	21.0	20.7	19.5	19.9	19.2	51.3
Total	24.7	24.8	24.7	24.0	23.5	24.2	36.3

Between boys and girls there is no difference in the levels of serum vitamin A. Nor is there a significant variation with age although a marginal decline is indicated by the fitted trend line in Fig. 2, which presents three-month average of the mean serum vitamin A concentration.

Fig 2: Age pattern of mean serum vitamin A concentration



The largest percentages of children with low serum retinol (less than 20µg/dl) are in the North-Central and Sabaragamuwa provinces, where half the children have serum vitamin A below the cut off value. The smallest percentages are found in the Central province followed by Western province. The mean serum vitamin A level is as low as 18

µg/dl in the North Central province and is only 28 µg/dl even in the Western province.

What is significant is that vitamin A deficiency is a significant public health problem in all seven provinces included in the study. Further, the deficiency is severe in all provinces except in the Western and Central provinces where it is a moderate problem.

How the problem of vitamin A deficiency varies across the socio-economic groups is shown in Table 9. In general, a larger percentage of children are vitamin A deficient in the lower socio-economic groups. Vitamin A deficiency is more prevalent (and the mean vitamin A concentration lower) when housing is poor (perishable materials of construction, inadequate ventilation) than when housing is better. It is more when the environment of the houses is not clean than when it is clean. It is more when a community source such as a tube well is the source of drinking water than when living conditions are high enough to have water piped in to the house. It is more when there is no access to a safe latrine than otherwise.

Map 4: Prevalence of severe VAD in provinces

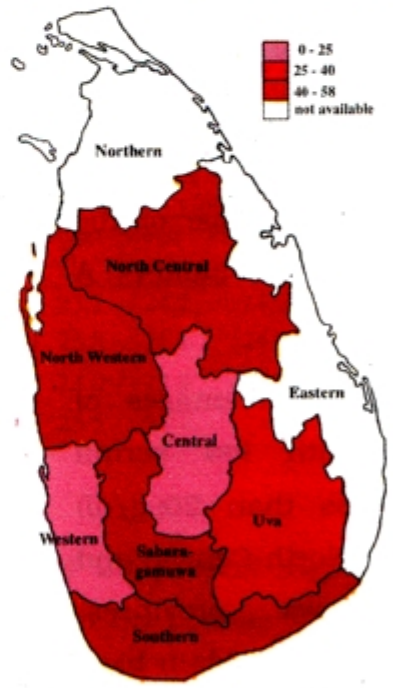


Table 9: Serum vitamin A levels by socio-economic indicators

	Mean	Median	Percentage below	
			10 µg/dl	20 µg/dl
Construction materials				
Durable material	26	26	8	31
Partly durable	23	23	10	40
All perishable	22	21	12	45
Ventilation of the house				
Adequate	26	25	8	32
Not adequate	23	22	11	41
Cleanliness of the house				
Very clean	27	26	*	28
Clean	25	25	9	34
Not clean	23	22	10	40
Access to safe drinking water				
Piped into the house	27	28	-	23
Common tap	26	25	-	33
Tube well	23	20	14	48
Protected well	25	24	9	35
Unprotected well	23	23	8	38
Other	24	23	-	38
Type of latrine				
Water seal (safe)	26	26	7	31
Pit and other type (unsafe)	23	23	11	40
No latrine	21	20	15	50
Mothers education				
Higher than secondary	27	26	8	30
Secondary	24	23	9	38
Primary	23	23	11	39
Never went to school	25	24	-	30

* - Sample size too small

However, education of the mother does not show a significant relationship. This is a remarkable exception to the strong positive effect that education of mother has shown on all other health and nutrition indicators in previous

surveys. While the extent of the problem is larger in the lower socio-economic groups, vitamin A deficiency is a significant public health problem in all groups -- urban or rural, poor or better off, educated or not.

Vitamin A deficiency is a severe public health problem in Sri Lanka. While the proportion of children with low serum vitamin A varies geographically and across social groups, it is a significant public health problem in all provinces, and in all social groups.

Chapter 4

Adequacy of Vitamin A rich food Intake

Mothers' Awareness and children's consumption of vitamin A rich foods

The survey investigated mothers' awareness of vitamin A rich foods by asking two questions.

The first question was the following.

"Have you heard that certain foods help good vision and prevent blindness?" Please name all such foods you have heard of.

Dark green leaves
Yellow fruits
Yellow vegetables
Eggs/meat/fish
Other

Table 10: Mother's awareness of foods that help good vision

	Percentage
Has heard of any food helping good vision	74
Has heard of	
Dark green leaves	68
Yellow fruits and vegetables	47
Eggs/meat, fish	30
Other	12

Over 70 percent of mothers has heard that certain foods help good vision. That dark green leaves help good vision was known to about 75 percent of mothers. However, less than half the mothers knew about yellow fruits and vegetables, and less than one third knew

Table 11: Percentage of children given vitamin A rich foods in the week prior to the survey

Food	Sex		Age (months)			Total
	Male	Female	6-23	24-47	48-71	
Dark green leaves	83	86	74	89	89	85
Yellow fruits or vegetables	85	87	84	86	88	86
Eggs/meat/fish	78	80	68	85	82	79

about animal foods as belonging to this category.

Table 12: Percentage of children given vitamin A rich foods according to mother's awareness

Type of food	Awareness		
	Aware	Not aware	Total
Dark green leaves	87	72	85
Yellow fruits and vegetable	90	80	86
Meat, fish, egg, etc.	84	75	79

The second question was whether the child was given vitamin A rich foods in the week prior to the survey. The responses given in Table 11, shows that high percentage close to or over 80 percent reported having given these foods. There is no gender difference in giving these foods. Nor is there an age bias except that leaves and animal products are given slightly less at ages under two years. This is probably because such foods are introduced later than six months for some children.

Mothers who were aware that these foods help good vision have reported giving them more than others, as seen in Table 12. The mothers were also asked whether the child was given vitamin A supplements. If so the duration for which supplements were given was asked and if the supplements were available, the investigator was asked to see if they were vitamin A capsules.

Although high proportions of mothers are reported to have given vitamin A rich food and supplements, vitamin A deficiency is widely prevalent. This implies one or more of several possibilities. Mothers may have over reported the feeding of these foods, the quantity may be inadequate, and factors such as food preparation, eating habits and general health status of children may be inhibiting the bioavaiability of the vitamin, especially dietary carotenoid.

Helen Keller Food Frequency Survey

Helen Keller Food Frequency method is designed to assess whether or not a nutritional deficiency is a public health problem in a population. It is a semi-quantitative dietary method of estimating nutrient intake through measuring frequency of consumption, not quantity consumed.

Methodology

The method essentially asks one question: "How many days in the past seven days did (child's name) eat (specific food item)"? This question is repeatedly asked by the interviewer for 28 food items (see section 4 of the questionnaire). The 28 food items already selected and tested are available and consist of following categories of food in the same order.

- A staple food, which most children consume on a daily basis.
  This item is included first to elicit a positive "seven days a week" response to put the respondent at ease
- A food that is almost never consumed such as chillies
  This item is asked second to make the respondent comfortable with saying that she never or rarely provides certain foods to the child.
- Major sources of vitamin A
  These foods contain at least 100 retinol equivalents per 100 grams of food and are therefore, likely that a normal serving provides a significant quantity of dietary vitamin A.
- Major sources of fat, oil and protein
  Adequate consumption of these foods is necessary for the absorption and utilisation of vitamin A.

The order of questioning introduces a comfortable progression for the respondent by first asking about the consumption of a staple food such as rice or bread, which elicits an 'every day' response. This is followed with a food not eaten by children or rarely eaten such as chillies, which elicits a 'never'

response. The ordering of the questions lightens the mood of the respondent as well as increases the likelihood of uninhibited responses from the mother.

Of the 28 food items some can be substituted if necessary to suit local eating habits. Certain others cannot be replaced even if they are not locally eaten or available. These food items are marked with a • in the questionnaire and are listed below.

Main staple, spicy food, dark green leafy vegetables, milk, carrots, ripe mango, dark yellow or orange pumpkin, noodles (or other staple food), peanuts (or other legume), chicken (or other fowl or legume), Amaranth (or other DGLV), Sweet Potato leaves (or other DGLV), lentils (or other legume or meat) Apricots (or other plant source rich in vitamin A), coconut oil (or other fat or oil) weaning food fortified with vitamin A (or other food fortified with vitamin A) margarine fortified with vitamin A (or other food fortified with vitamin A).

The foods included in the survey are consumed by all, but provides for inclusion of locally available vitamin A rich food sources. Often there are no replacements necessary, for the most common foods are all included on the basic survey instrument. The questionnaire used for this study included no replacement foods, but alterations for the DGLVs, which were determined based on regional availability.

Whether a surveyed community has a vitamin A deficiency problem is determined by either of the following cut off values.

Mean number of days of consumption of animal sources of vitamin A less than or equal to four.
Or
Mean number of days of total consumption of animal and plant sources of vitamin A (weighted by type of source) less than or equal to six.

The entire surveyed area is determined as having a vitamin A deficiency problem if 70 percent or 11 of the 15 surveyed communities have a vitamin A deficiency problem

Weighted total number of days = number of days animal sources consumed + 1/6 × (number of days plant sources consumed)

The weighting of plant sources is to adjust for the lowered bio-availability of vitamin A in plant sources as beta carotene and not retinol. In general, animal sources provide vitamin A in the form of retinol, absorbed directly into the body, whereas plant sources provide beta carotene, which must undergo bio-conversion into retinol before utilisation. Therefore, the total consumption of plant sources is weighted by a fraction of one sixth in calculating the mean days of consumption.

The Sample

Along with the main survey, the HKI questionnaire was canvassed at all households where there was a child between 12 and 71 months of age. In each household, information on food frequency was obtained from the mother with respect to one child 12 to 71 months of age. If a household had more than one child, one child was selected randomly. A sample of these mothers meeting the requirements of the HKI methodology was selected as follows.

The HKI method requires that in each area, for which an estimate is required, 15 communities are included in the survey and 50 mothers or care takers of children 12 through 71 months of age successfully interviewed. Two areas were identified for estimation according to the magnitude of VAD estimated from serum vitamin A concentration. These are low VAD prevalence area, consisting of the Western and Central provinces, and high prevalence area consisting of the other provinces, namely North Western, North Central, Southern, Sabaragamuwa and Uva provinces, as shown in Table 8. The communities were formed by regrouping the 60 clusters of the main survey. The clusters where the number of mothers of children 12 to 71 months of age were less than 50 were amalgamated within the same DS division. 40 clusters were amalgamated to yield 20 communities with more than 50 children.

Twelve sample clusters with a sample of over 50 were not combined into community clusters, which gave 32 clusters with more than 50 children. From each sample cluster, 50 children 12 to 71 months were randomly selected for the survey. However, it was not possible to obtain 15 clusters from each of the strata classified as less and more prevalent according to the serum vitamin A concentration. Only 14 clusters could be formed in the less prevalent stratum. Fifteen of the remaining sixteen clusters were taken from the more prevalent area.

Results

In the stratum where VAD prevalence is high, 11 of the 15 communities or 70 percent had a mean number of days of vitamin A food intake below the cut-off values. According to the HKI criteria vitamin A deficiency is likely to be a public health problem in these five provinces In the other two provinces -- western and central -- only two of the 14 clusters has a weighted mean numbers below the cut off. These areas are therefore not identified as having vitamin A deficiency as a public health problem even though, VAD is indeed a public health problem as measured by over 20 percent of children having serum vitamin A concentration below 20 µg/dl.

HKI methodology results show thate in five of the provinces, namely North Western, North Central, Southern, Uva, and Sabaragamuwa, taken as a whole, vitamin A deficiency is likely to be a public health problem.

However, in the Western and Central provinces, where prevalence of VAD is less relative to the others, the methodology does not identify vitamin A deficiency status correctly.

Table 13: Mean frequency of consumption of vitamin A rich foods

District	DS Division	From plant sources	From animal sources	Weighted frequency	VAD a problem
Less prevalent					
Colombo	Colombo	11.8	14.4	16.4	No
	Dehiwela/Ratmalana	10.4	11.4	13.0	No
	Moratuwa	14.5	9.5	12.0	No
	Kesbewa	8.3	6.0	6.5	No
Gampaha	Biyagama	10.5	11.0	12.8	No
	Katana	8.1	5.6	6.9	No
	Meerigama	9.4	11.1	12.8	No
	Wattala	6.5	5.4	6.5	No
Kalutara	Beruwela	9.8	7.9	9.6	No
	Matugama	11.3	14.8	16.1	No
Kamdy	Kandy	6.8	3.3	4.4	Yes
	Thumpane	7.2	3.9	5.0	Yes
Matale	Naula	12.2	7.1	9.1	No
Nuwara Eliya	Kotmale	9.0	9.4	10.9	No
Total					No
More prevalent					
Galle	Ambalangoda	9.0	4.7	6.2	No
	Karandeniya	8.0	3.8	5.1	Yes
Matara	Kotapola	4.9	3.0	3.8	Yes
Hambantota	Beliatta	6.7	7.2	8.3	No
Kurunegala	Galgamuwa	6.2	2.0	3.0	Yes
	Maho	7.0	4.1	5.3	Yes
Puttalam	Karuwalagaswewa	13.1	12.6	13.8	No
Anuradhapura	Kuruluwewa	7.4	3.5	4.7	Yes
	Palagala	11.7	3.4	5.4	Yes
Polonnaruwa	Hinguragoda	6.5	4.5	5.6	Yes
Badulla	Kandaketiya	9.0	3.3	4.8	Yes
Ratnapura	Eheliyagoda	7.9	4.2	5.5	Yes
	Nivithigala	7.6	3.9	5.1	Yes
Kegalle	Kegalle	6.3	7.1	8.1	No
Monaragala	Madagama	11.0	4.5	6.0	Yes
Total					Yes

Chapter 5

Selected World Summit Goals

Access to Iodised Salt

Iodine deficiency is the single most common cause of preventable mental retardation, brain damage, and intellectual under development of children worldwide. Deficiency of iodine causes many disorders in the body. The most visible manifestation is goitre, which is a swelling in the neck. Goitre, however, is only the tip of the iceberg. Before iodine deficiency is manifested as goitre, many damaging processes occur. IDD in pregnant women causes miscarriage, stillbirth, irreversible brain damage in the foetus and infant and retarded psychomotor development in the child. Children exposed to moderate iodine deficiency as in the case of Sri Lanka can grow up stunted, apathetic and compromised in intellectual and educational performance. However, a simple doable and cost effective solution exists: salt iodisation.

The Goal

Universal Iodisation of salt for human consumption.

Current Status

In the survey, a sample of salt from each household was tested for the presence of iodine. The method of testing was to add a drop of the testing reagent, which is a stabilised starch solution, to about half a tea spoon of salt. The colour of the reagent turning blue on contact with salt indicates the presence of iodine in salt. This is only an indicative test, which shows the presence or absence of iodine

Table 14: Results of testing for iodine in salt found in households

	Percentage
Total changed colour	47
Turned dark blue	26
Turned light blue	21
No colour change	49
Not tested, no salt etc.	4
Total	100

Unweighted n= 6012

Fig. 3: Results of testing for iodine in salt.

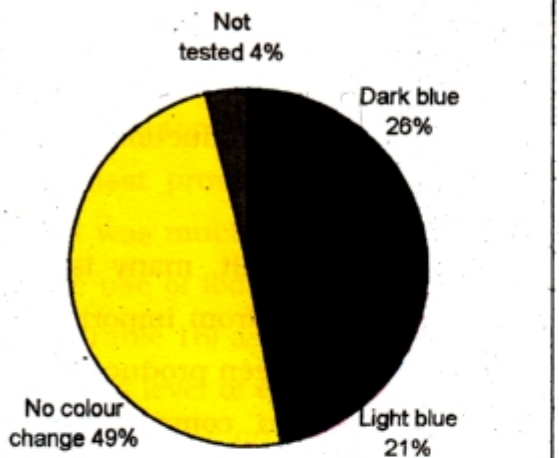
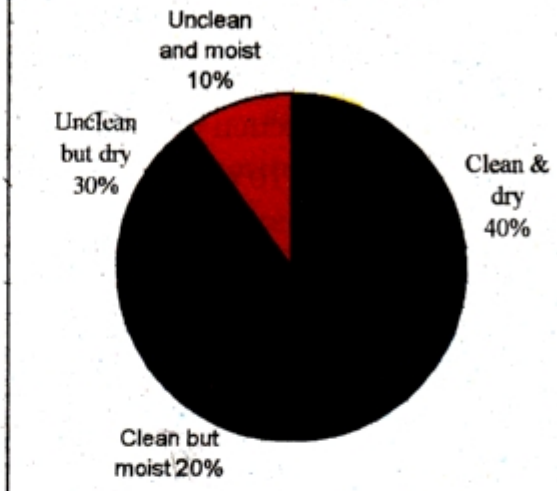


Fig. 4: Impurities and moisture in salt



in salt. It does not provide a measure of the quantity of iodine. However, if the colour is lighter than the dark blue colour, which is indicated on the container of the reagent, the iodine concentration is likely to be less than the specified concentration of about 25-30 parts per million

The results of the test are given in Table 14. Of the samples tested from 6012 households, 47 percent changed colour, indicating that the salt is iodised. This shows a rapid change in the access to iodised salt from a level below 10 percent in early 1995. This sharp increase was most likely due to

Table 15: Percentage of salt samples by iodisation status and other characteristies.

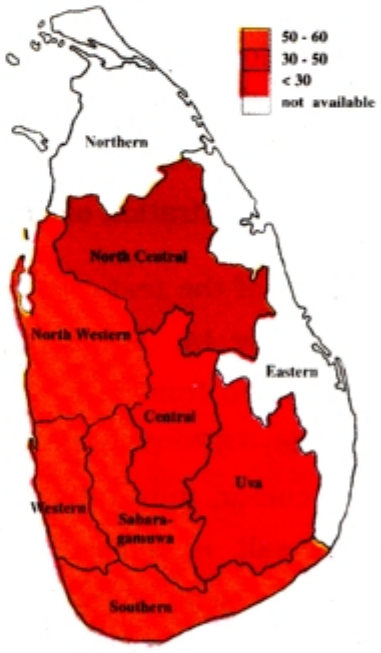
	Iodised			Not iodised	Total
	Dark blue	Light blue	Total		
Dry	95	89	93	83	86
Moist	5	11	8	17	14
Clean	92	76	85	49	66
Dirty	8	24	15	51	34
Packaged and labelled iodised	64	38	38	7	29
Packaged but not labelled as iodised	12	19	19	15	15
Not packaged	24	43	43	78	56

awareness of iodised salt created in the interim period, which resulted largely from a campaign launched on both electronic and print media.

What is remarkable is that the use of iodised salt has increased despite the lack of local production of iodised salt. In 1996 the local production of iodised salt was less than 10 percent of requirement.

While there has been a rapid change over to iodised salt, many issues of concern remain. First, the supply of salt had to come from imports rather than from local production where previously all salt has been produced locally. This is because of various difficulties encountered in commencing local production of iodised salt. Second, as seen in Table 14, half of iodised salt had less than the required concentration of iodine. Salt that contains less than the required concentration may not be effective in preventing IDD, and this is an undesirable state. Third, not all iodised salt was clean in appearance. Nearly 15 percent of iodised salt appeared to be dirty, and eight percent damp. (see Table 15) Also over 40 percent of iodised salt was not packaged and a further 20 percent packaged but not labelled. It is likely that crude salt has been iodised without purifying and sold as rock salt in large blocks.

Map 5: Use of iodized salt in provinces



Thus the quality of iodised salt in terms of adequacy of iodine content, purity and packaging need much improvement. It is therefore, necessary to improve

the quality of salt, to ensure adequate iodine content, and to step up the local production of good quality iodised salt.

Use of iodised salt is somewhat more common in the urban (54 percent) than the rural sector (46 percent). Use was fairly uniform -- about 50 percent -- across most provinces except in the southern and north central provinces where it was much less, 35 and 25 percent respectively (see map 5 and Table 16). The use of iodised salt is also more widespread in higher socio-economic groups (Table 16) as reflected in the type of housing. It is very strongly related to mother's level of education. The proportion using iodised salt rises from 44 percent to over 60 percent from households where the mother has no schooling to those where the mother has higher education.

Table 16: Percentage of households using iodised salt by socio-economic groups

	Colour change		Total	Unweighted
	Dark blue	Light blue	iodised	n
Sector				
Urban	39	15	54	892
Rural	24	22	46	5013
Province				
Western	37	19	56	1918
Central	27	16	53	801
Southern	17	18	35	813
North Western	27	26	53	790
North Central	7	18	25	605
Uva	7	41	48	376
Sabaragamuwa	36	18	54	612
Material of House				
Thatched roof and mud floor	19	22	41	875
Either thatched roof or mud floor	17	23	40	1085
Floor and roof durable	31	20	51	3938
Mother's Education				
No schooling	17	27	44	446
Primary	20	20	40	1269
Secondary	25	21	46	1771
OL/AL	32	20	52	1918
Higher	42	21	63	86
All	27	21	48	5905

Protein Energy Undernutrition

Undernutrition predisposes children to death. Not only severe undernutrition but, even mild and moderate levels of undernutrition increase many fold the risk of death from disease.

The Goal

The global goal is reduction of 1990 levels of severe and moderate undernutrition in children under five years by half or more. In Sri Lanka, this implies reducing stunting to 12 percent, wasting to 8 percent, and underweight to 19 percent.

Methodology

The methodology is the same as that adopted in Demographic and Health Surveys of 1987 and 1993. The age group of children included was 6 to 59 months. Weight was measured to the nearest 100g using a Salter spring balance. Height and length was measured using the Shorr's portable measuring board. Children under 24 months were measured lying down, and those 24 to 59 months standing up.

Three anthropometric indices are used to measure protein energy undernutrition: height for age, weight for height, and weight for age. Children who are too short for age are stunted. Their linear growth has been retarded over a long period of time, and shortness of stature is a cumulative result. They are chronically undernourished. Children whose weight is inadequate for their height are wasted. This is acute undernutrition. Children whose weight is to too low for age are underweight. Such children may be stunted, wasted, or both, or even be neither stunted nor wasted.

The proportion of children with z-score more than 2 standard deviation below the international reference population (NCHS/CDC/WHO) of whichever the indicator, is taken as the level of moderate and severe undernutrition with respect to that indicator.

The z-scores for height for age, weight for height and weight for age, were computed using EPINFO developed by the Centre for Disease Control in Atlanta.

Current Status and trends

Undernutrition among children has remained high in 1995. As shown in Table 17 of children 6 to 59 months, 34 percent were underweight to a moderate or severe level. Eighteen percent were stunted or had inadequate height for age. Fourteen percent were wasted or had inadequate weight for height. Table 18 presents the percentage of children by combinations of three indicators. The Table shows that children who

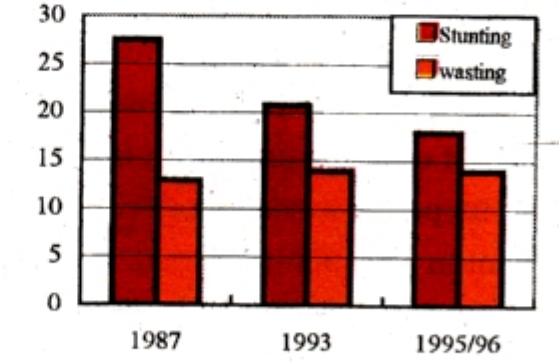
Table 17. Moderate and severe undernutrition in children 6-59 months by sex, 1995/96

	Total	Male	Female
Stunting	18	17	19
Wasting	14	15	13
Underweight	34	33	35

Table 18: Percentage of children 3 to 59 months by type of undernutrition

Age (in months)	Total	Male	Female
Only stunted	3	3	3
Only wasted	1	1	1
Only underweight	11	10	12
Only stunted and wasted	0	0	0
Only stunted and underweight	10	9	11
Only wasted and underweight	8	9	8
Stunted wasted and underweight	5	5	4
Total	38	37	39

Fig 5: Trend in stunting and wasting in children 3 to 36 months



Source: 1987 and 1993 data are from Department of Census and Statistics. Demographic and Health survey 1993.

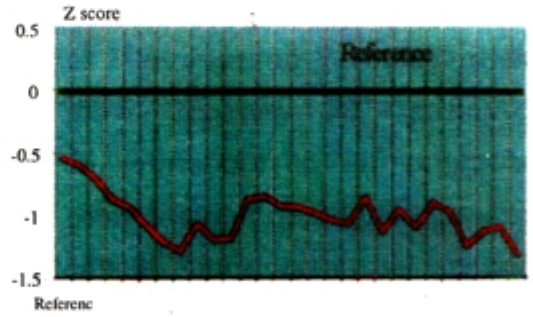
Table 19: Stunting, wasting and underweight: 1987, 1993 and 1995/96

Age	Stunting			Wasting			Underweight		
(in months)	1987	1993	1996	1987	1993	1996	1987	1993	1996
3-5	7.8	4.9	3.7	1.9	3.1	0.6	3.7	5.8	0.6
6-11	15.2	11.8	8.5	3.9	6.8	3.3	23.4	17.9	16.9
12-23	31.1	25.7	19.2	19.3	18.2	17.3	42.5	36.3	33.4
24-35	34.0	23.7	14.7	13.3	15.4	12.9	47.9	42.1	36.4
36-47		27.5	15.3		18.2	11.5		46.7	30.6
48-59		28.7	22.0		17.6	16.9		43.0	35.4
Total 3-35	27.5	20.8	14.5	12.9	13.9	11.9	38.1	32.6	29.1
Total 3-59		23.8	16.1		15.5	12.8		37.7	30.7

are either stunted or wasted are also underweight. However, 11 percent of children are neither stunted nor wasted but, they are underweight. There are five percent of children in very severe condition of being stunted, wasted and underweight.

These results indicate a declining trend in undernutrition as seen in Table 19, which gives the indicators from the 1987 and 1993 Demographic and Health surveys. For the age group 3 to 35 months, moderate and severe stunting has declined from 27.5 percent in 1987 to 14.5 in 1995/96. The annual pace of decline has increased from just over one percent in the 1987-93 period to more than two percent in the 1993-96 period.

Fig.6: Age pattern of stunting, 1995/96



For the age group 3 to 59 months, between 1993 and 1995/96 stunting declined from 23.8 percent to 16.1 percent; wasting from 15.5 to 12.8 percent and underweight from 37.7 percent to 30.7 percent. This is a substantial decrease, particularly in stunting and underweight, of over 2 percentage points a year. There is no significant difference between boys and girls in any of the three indicators of stunting, wasting or under weight. The level of undernutrition increases very sharply in the first year after birth as seen in Table 19. This rapid retardation is seen clearly in Figure 6, which shows the fall with age of the mean z-score of height for age from the mean of the reference population. A similar and a much sharper drop has been seen in the Demographic and Health Surveys of 1987 and 1993.

Table 20: Stunting, wasting, and underweight by age and sex

		Age (months)				
	Total	6-11	12-23	24-35	36-47	48-59
Stunting						
Total	18	9	20	16	16	23
Male	17	12	18	16	13	23
Female	19	7	22	17	19	22
Wasting						
Total	14	4	18	14	13	17
Male	15	4	20	14	13	17
Female	13	3	16	13	12	18
Underweight						
Total	34	18	35	39	33	36
Male	33	19	34	39	30	34
Female	35	17	35	40	37	38
Unweighted n	2304	255	532	518		504

Map 6: Prevalence of underweight in provinces 1995/96

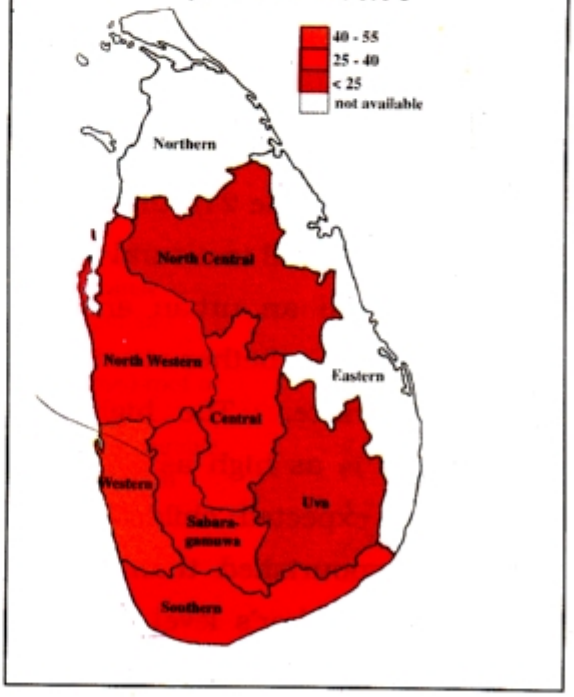


Table 21: Indicators of moderate and severe malnutrition by background characteristics

	Percentage			
	Stunting	Wasting	Underweight	Unweighted n
Sector				
Urban	11	8	20	350
Rural	19	15	36	1954
Province				
Western	12	10	24	727
Central	20	11	35	316
Southern	16	16	36	372
North Western	21	17	37	317
North Central	20	14	41	218
Uva	29	17	54	157
Sabaragamuwa	22	23	39	197
Material of House				
Thatched roof and mud floor	24	16	44	537
Either thatched roof or mud floor	24	19	46	638
Floor and roof durable	14	12	27	1928
Mother's education				
No schooling	29	22	54	162
Primary	24	16	43	647
Secondary	18	14	35	1028
OL/AL	13	13	28	1152
Higher	8	13	20	614
All	18	14	34	2304

Prevalence of undernutrition varies considerably between subgroups of the population (see Table 21). Undernutrition is considerably higher in rural areas than urban. A child in a rural area is 1.8 times more likely to be underweight than a child in an urban area. Between provinces, the lowest levels of undernutrition – whether stunting, wasting or underweight – is found in the Western province. The highest levels are in the Uva province where underweight is as high as 54 percent, stunting 29 percent and wasting 17 percent. As expected, children living in substandard housing are more likely to be undernourished than others. Children's undernutrition level rises rapidly with mother's level of education --- from 20 percent in the highest education to 54 percent in the no schooling category.

Diarrhoea Prevalence

Diarrhoea kills children from dehydration. Most of these deaths can be prevented with a simple remedy -- Oral Rehydration Therapy (ORT). Success in treating diarrhoea depends on continuously giving appropriate fluids soon after diarrhoea begins, as well as feeding the child to provide energy and help offset the nutritional damage that diarrhoea can cause. The administration of such fluids and continued feeding is called Oral Rehydration Therapy.

The Goal

Achieve 80 percent usage of ORT as part of the programme to control diarrhoeal diseases.

Current Status

In the two weeks prior to the survey 2.8 percent of children under five years had an episode of diarrhoea which lasted three or more days. The prevalence of diarrhoea ranges from a low of 1.7 percent in Sabaragamuwa province to 3.7 percent in the Uva Province. Prevalence exceeds three percent in three other provinces – North Central, North Western and Central. Prevalence is higher among children in poorer housing.

Table 22: Prevalence of diarrhoea by selected characteristics

	Prevalence of Diarrhoea	Unweighted n
Sector		
Urban	2.2	403
Rural	2.8	2256
Province		
Western	2.5	829
Central	3.1	366
Southern	2.1	434
North Western	3.1	358
North Central	3.5	246
Uva	3.7	188
Sabaragamuwa	1.7	238
Material of House		
Thatched roof and mud floor	3.3	465
Either thatched roof or mud floor	3.1	544
Floor and roof durable	2.5	1632
Mother's education		
No schooling	5.2	131
Primary	2.7	549
Secondary	2.9	876
OL/AL	2.5	996
Higher	2.9	35

The group which has the highest prevalence, exceeding five percent, is the children whose mothers had no schooling.

Estimating the use of oral rehydration therapy is difficult in this survey, because the number of children who had diarrhoea in the reference period is small, only 74. Approximately 40 percent of mothers of children who had diarrhoea stated that the children were given more fluids and 28 percent continued to feed. Those who were given both increased fluids and continued to feed was 11 percent. In other words, only 11 percent practiced oral rehydration therapy during the diarrheoa episode in the two weeks prior to the survey.

The definition of ORT is "offering more fluids and continuous feeding". This survey asked the following two questions to measure these. A key measurement here is "was the child offered more fluids". A single question "was the child given more fluids?" as was asked in this survey probably did not elicit a reliable response. Offering would be in response to the child's demand for something to drink. Whether the child was offered when she did not ask for it must be elicited through a series of appropriate questions. Also a comparison with what was given before may be difficult for the mother and the response may not be accurate. Measuring whether there was continued feeding is equally difficult based on the above single question.

Table 23: Feeding patterns during diarrhoea in children under five years of age

	Percentage given
Foods given during diarrhoea	
Breastmilk	90
Cunjee	49
ORS	37
Other suitable foods	35
Milk	25
Fluids	
Less	17
Same as before	40
More than before	40
Don't know	3
Feeding	
Less than before	70
Same as before	28
More than before	2
Increased fluids and continued feeding	
Yes	11

Children suffering from diarrhoea usually have no appetite and refuse to eat. Mothers' usual comment is that they don't eat. Was the child fed has to be determined again through a series of questions. The two questions used in this survey may not have elicited an accurate response. The survey staff feel that the particular questions and the manner they were asked were not capable of determining whether the child was offered more fluids or feeding was continued during illness.

Breastfeeding and Complementary Feeding

Breastfeeding is the best possible start a child could have towards good health and good nutrition in infancy and childhood. The World Summit for Children set out a goal for all ratifying nations to achieve.

The Goal

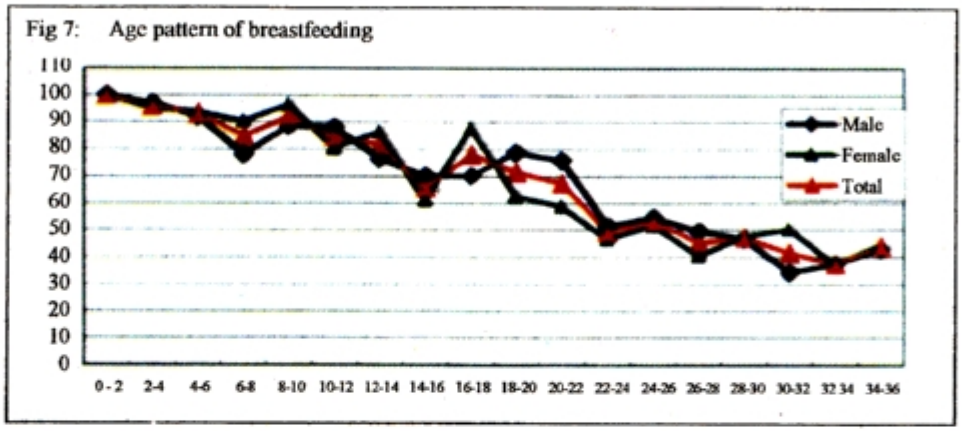
Empowerment of all women to breastfeed their children exclusively for four to six months and to continue breastfeeding, with complementary food, well into the second year.

Table 24: Percentage of children ever breastfed by sex

Age (months)	Male	Female	Total
Less than 4	99	100	100
4 – 5	100	100	100
6 – 7	98	100	99
8 – 11	98	99	99
12 – 23	98	98	98
24 – 35	98	98	98
Total 0-35	98	98	98

Current status

Of all children under 5 years, 98 percent has been breastfed for some duration. This proportion remains unchanged across provinces, and other social groups including mothers' education.



Percentage of children breastfed up to 23 to 24 months is another indicator of proper breastfeeding practices. Of 564 children who were two years old (between 12 to 23 months) (51 percent) were breastfed for two years. There is no difference in continued breastfeeding between girls and boys, the respective percentages being 52 and 50 percent.

Table 25. Percentage of children ever breastfed by background characteristics.

	Ever breastfed
Sector	
Urban	97.7
Rural	98.9
Province	
Western	98.3
Central	98.8
Southern	99.3
North Western	99.3
North Central	99.2
Uva	98.7
Sabaragamuwa	97.5
Construction Material of House	
Thatched roof and mud floor	99.6
Either thatched roof or mud floor	97.5
Floor and roof durable	98.8
Mother's Education	
No schooling	100.0
Primary	97.4
Secondary	99.8
OL/AL	98.4
Higher	100.0
All	98.7

Children must be exclusively breastfed at least in the first four months. Of 421 one-year old children 17 percent has been exclusively breastfed for four months. Nearly two thirds of children under two years are given water before the end of the fourth month. Other foods commonly given before the end of fourth month are fruit juice (44 percent), rice cunjee (30 percent), and milk (23 percent). Less than 10 percent of children are given other foods such as vegetables, rice, biscuits, fish in the first four months. (See table 26)

Table 26: Age at introduction of fluids and mushy foods

Food	Less than 4 months	4 to 6 months	6to 8 months	8 months and over
Water	65.2	25.6	1.8	1.9
Fruit juice	43.7	39.8	6.9	4.3
Cunjee	29.5	49.5	9	6.8
Milk	22.8	16.8	16	39.2
Biscuit	8	41.2	30.3	15.3
Vegetable	9.2	33.8	28.6	23.4
Rice/Potatoes	6.1	24.3	31.8	32.8
Egg	5.8	16.1	27.8	44.8
Fruit	6.9	14.3	25.5	47.7
Fish	6.8	10.1	21.6	56.1
Meat	15.6	2.8	6.7	67.9
Thriposha/cereal	13.2	29.1	31.1	21
Soup	14.3	33.7	21	24.8

Access to Water and Sanitation

It is a basic right of all human beings to have access to clean water and sanitation. Access to safe water and sanitation has a large impact on nutrition and health. Convenient access to safe water also has socio-economic benefits, particularly for women.

Goal

The decade goals for access to water and sanitation are as follows.

- Increase water supply to narrow the gap between the 1990 levels and universal access by one-fourth.
- Increase sanitation to narrow the gap between the 1990 levels and universal access by one-tenth.

Methodology

Measuring access to water has a number of difficulties. The key issues are the operational definitions of safe water, safe sanitation, and access. What the national data collection systems have collected in the population and housing censuses and large scale surveys are the source of water and type of latrine. Their classifications vary widely. Source of water is commonly classified as tap, protected well, unprotected well, river, stream

Table 27: Source of Drinking Water and type of Latrines

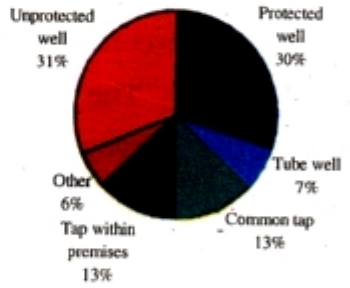
	Percentage	
	1993	1995/96
Source of drinking Water		
Protected well	34	43
Tap inside premises	17[1]	13
Common Tap		13
Tube well	5	7
Unprotected well	39	19
Other (including not stated)	5	5
Total safe	**61**	**60[2]**
Type of latrine		
Water seal		68
Pit		21
Other unsafe		2
None		9

Note: 1/ All pipe borne water systems including common tap.
2/ Computed as sum of percentages of tube well and estimated proportions of protected well and pipe borne water.

etc. A common classification of type of latrine is as water sealed, pit, and bucket. A measure of access is not available for either drinking water or sanitation. Often information on whether the latrine is for exclusive use or sharing is available. Sometimes the distance to the latrine or the water source is available, but data on distance seem questionable.

The National Water Supply and Drainage Board in collaboration with UNICEF has set up a water and sanitation related information system in 1992. Here access to safe drinking water is defined as having a source of safe water, which is treated piped water, protected well or tube well. A protected well is one, which has a wall at least 2 ft high, with a covered net, a proper drainage basin and a separate rope and bucket. Unprotected well, untreated pipe systems, streams, rivers streams etc. are unsafe sources. Access to safe sanitation is defined as having a safe latrine for either shared or exclusive use of the household. A safe latrine is one that is water sealed. Pit and bucket latrines are considered unsafe.

Fig 8: Source of drinking water



Note: Proportion of protected and unprotected wells is estimated by prorating the total wells in the ratio of .51 and 49.

The National Water Supply and Drainage Board (NWSDB) through the network of Public Health Inspectors collected information about the source of water and sanitation for all households, schools and institutions and published the information for 1992. The information was updated for 1993 and is published. The data from this system provide estimates of access to safe drinking water as 61 percent and to safe sanitation as 60 percent in 1993.

National Statistical system has not adopted the definitions of the NWSDB yet. Household surveys carried out even in recent years have not distinguished between protected and unprotected wells using the definitions of the NWSDB. Practical difficulties of applying the definition of heights of parapet walls etc., ascertaining whether piped water is treated, and absence of a national consensus are the reasons for this.

The present survey collected data on the type of source of water, type of latrine, distance to the latrine, and whether it is for exclusive use or shared use. However a protected well was taken as one with a wall around it irrespective of its height, or the presence or absence of an apron, which is the practice in national surveys by the Department of Census and Statistics. Pipe borne water was not classified as treated or untreated.

Estimate of access to safe drinking water therefore, is not consistent with those of NWSDB. The main difference lies in the proportion of households taking water from a protected well. Due to the narrower definition of the protected well and consequently of safe water, NWSDB estimate of access is very much lower. The difference is that a fraction of wells classified as protected in the survey are unprotected by the definition adopted by the NWSDB.

Table 28: Source of Water and type of latrine by selected background characteristics

	Source of drinking water							
	Piped to the house	Common tap	Tube well	Protected well	Un-protected well	Other	Safe latrine	Unweighted n
Sector								
Urban	62	28	0.2	9	0.3	0.7	93	922
Rural	5	10	8	49	22	6	65	5074
Province								
Western	26	16	3	46	8	2	89	1956
Central	27	24	16	14	15	4	78	814
Southern	0.2	9	3	51	27	9	71	815
North Western	4	1	13	59	22	1	52	808
North Central	0	7	20	56	17	.2	46	613
Uva	1	9	.6	33	37	19	37	378
Sabaragamuwa	4	17	.5	32	32	15	58	612
Material of House								
Thatched roof and mud floor	3	9	14	47	25	4	31	886
Either thatched roof or mud floor	3	13	9	36	30	9	42	1098
Floor and roof durable	18	14	5	44	14	5	85	4002
Mother's education								
No schooling	5.3	11	7	43	26	9	48	448
Primary	6	14	8	42	24	7	57	1284
Secondary	9.9	16	8	43	19	4	68	1797
OL/AL	22	9	6	44	14	4	83	1943
Higher	40	8	4	39	6	3	95	87
All	13	13	7	43	19	5	69	5996

Therefore, to estimate the protected wells, the total wells is prorated by the proportion of protected wells reported in the 1993 data by the NWSDB, which is 51 percent. Similarly the proportion of households obtaining water from a tap is adjusted by a factor of 0.98 percent which is the proportion of treated pipe-borne water in the NWSDB estimates. The adjusted estimate of access to a source of safe drinking water is therefore 65 percent.

Table 29: Type of availability and distance to safe latrine

Distance	Percentage
In the house	16
Within 50m	78
More than 50m	5
Don't know	<1
Availability	
Exclusive	84
Shared	16

Overall, access to a safe latrine is 67 percent. Lowest access is in the Uva province where only about one third of the households have a safe latrine. North Central, and North Western provinces are the next in rank. For households with access to a safe latrine, it is within the house for 16 percent and within 50 m. for 78 percent. Nearly 85 percent of the households that have access to a latrine have it for exclusive use.

NATIONAL SURVEY ON VITAMIN A DEFICIENCY & CHILD DEVELOPMENT
SRI LANKA

1. District ☐☐ **5. Segment No** ☐

2. Divisional Secretariat ☐ **6. Housing Unit No.** ☐☐☐

3. Grama Niladari Divison ☐ **7. Household No** ☐

4. Sector ☐
Urban 1
Rural 2
Estate 3

INTERVIEWER VISITS

	1	2	3	FINAL VISIT
Date				Month ☐☐ Date ☐☐
Interviewer's Name & Code				☐☐
Results (*)				☐
Next visit Date Time				Total No of visits ☐

* Result code
1 Completed
2 No competent respondent at home
3 Postponed
4 Refused
5 Other

MODULE 2 - HOUSEHOLD INFORMATION

Enter names of all persons who live here (de facto)

Identification ☐☐ ☐ ☐ ☐ ☐ ☐☐☐ ☐

Line No 01	NAME HHH's name first, then spouse's name followed by names of children from youngest to eldest. Then the names of others 02	Relationship to HHH 03	Sex M 1 F 2 04	Year & month of birth 05	Eligibility 1. 0-71 months 2. 5-14 years 3. Married women 15-49 yrs 4. Not eligible 06
		1 2 3 4 5	1 2	☐☐ ☐☐	1 2 3 4
		1 2 3 4 5	1 2	☐☐ ☐☐	1 2 3 4
		1 2 3 4 5	1 2	☐☐ ☐☐	1 2 3 4
		1 2 3 4 5	1 2	☐☐ ☐☐	1 2 3 4
		1 2 3 4 5	1 2	☐☐ ☐☐	1 2 3 4
		1 2 3 4 5	1 2	☐☐ ☐☐	1 2 3 4
		1 2 3 4 5	1 2	☐☐ ☐☐	1 2 3 4
		1 2 3 4 5	1 2	☐☐ ☐☐	1 2 3 4
		1 2 3 4 5	1 2	☐☐ ☐☐	1 2 3 4
		1 2 3 4 5	1 2	☐☐ ☐☐	1 2 3 4

Answer column 03 above with a circle

1. Chief Occupant
2. Wife/Husband
3. Mother/Father
4. Others

Total No of Inmates ☐☐

No of Infants within 0-71 months (Infants born in or after August 1989) ☐☐

Total women (Married) within 15 - 49 years ☐☐

Total children within 5-14 years (Children born between 1981 Aug. & 1990 Aug) ☐☐

MODULE - 3 BACKGROUND

Identification ☐☐ ☐ ☐ ☐ ☐ ☐☐☐ ☐

Respondent's Name.....	Line No.		

Respondent: - Mother 1
If not Mother 2

No	Question	Response	
301	Type of housing (Observe and record)	Thatched roof and mud floor Tile/Asb. roof and mud floor Thatched roof & cement floor Tile/Asb. roof & cement floor	1 2 3 4
302	Ventilation	Adequate Not adequate	1 2
303	Cleanliness in and around the dwelling	Very clean Clean Not clean	1 2 3
304	What is the source of drinking water for members of your household	Piped - in dwelling/premises Public tap Tube well Protected dug well Unprotected dug well Others (specify)	1 2 3 4 5 6
305	What kind of toilet facility does your household use?	Water sealed Pit latrine Bucket latrine None	1 2 3 4
306	Is this facility for exclusive use of your family or common	Exclusive Common	1 2
307	How far is the toilet from your dwelling?	In dwelling Less than 50m more than 50m Do not know	1 2 3 4
308	Highest grade the mother has passed?	No schooling Primary (year 1 - 5) Secondary (year 6 - 10) GCE OL/AL Higher	1 2 3 4 5
309	Main occupation of the husband	.....	

SALT IODISATION

Line No. | | |

No	Question	Response	
310	Result of the test	Dark blue	1
		Light blue	2
		No colour change	3
		No salt in the household	4
		Not tested	5
311	Is this salt dry	Yes	1
		No	2
312	Is this salt clean	Yes	1
		No	2
		(If discoloured or visibly contaminated., circle 2)	
313	Record type of salt	In a bag labelled as iodised	1
		In a bag not labelled as iodised	2
		Rock salt	3
		Others (specify).....	4
		Not known	9

MODULE 4 - DIETARY SURVEY

Identification ☐☐ ☐ ☐ ☐ ☐ ☐☐☐ ☐

Fill in for <u>one child</u> between 12 - 71 months selected from the household.
How many days, in the past seven days did.....(name) eat following?

Line No. of selected child ☐

			No. of days eaten per week
01	Staple food (rice, bread) select only one	3	
02	Hot spices (eg. Chillies)	3	
03	Dark green leaves	1	
04	Milk (excluding breast milk)	3	
05	Carrots	1	
06	Ripe mango	1	
07	Dark yellow or orange pumpkin	1	
08	• Spinach	3	
09	Ripe Papaya	1	
10	• Noodles	3	
11	Eggs with yolk	2	
12	Small fish (liver intact)	2	
13	• Peanuts (or other legumes)	3	
14	Yellow sweet potatoes	1	
15	• Chicken or other fowl (or other meat or legume)	3	
16	• Gotukola (or other GLV)	3	
17	Any kind of liver	2	
18	• Kathurumurunga leaves	3	
19	Beef, Pork, Mutton or other meat	3	
20	Butter	2	
21	• Dhal (other legume or meat)	3	
22	Red palm oil	1	
23	Cod liver oil	1	
24	Fried food	3	
25	• Passion fruit	1	
26	• Coconut (other oils)	3	
27	• Complementary food - vitamin A added (or other vitamin added food)	2	
28	• Margarine - vitamin A added	2	

MODULE 5 - FEEDING

Identification ☐☐ ☐ ☐ ☐ ☐ ☐☐☐ ☐

	Questions	Sr No. Youngest child's name Line No ☐☐	Sr No. Next child's name Line No. ☐	Sr No. Next child's name Line No ☐
501	Date of birth	Day ☐☐ Month ☐☐ Year ☐☐	Day ☐☐ Month ☐☐ Year ☐☐	Day ☐☐ Month ☐☐ Year ☐☐
502	Sex	Male 1 Female 2	Male 1 Female 2	Male 1 Female 2
503	Birth wt gain Don't know	☐☐☐☐ 99	☐☐☐☐ 99	☐☐☐☐ 99
504	Did you breast feed? (Name) ..... Yes 1 No 2	1 2	1 2	1 2
505	How many mths was ...(name) breast fed	☐☐ currently breast fed - 88	☐☐	☐☐
506	How many times..... (Name) breast fed last 24 hrs	day ☐☐ night ☐☐		
507	Did..... (name) get any other food or drink during this time ? Yes 1 No 2	Yes 1 No 2	Yes 1 No 2	Yes 1 No 2

	Questions	Serial No ☐☐ Youngest child 's Name..... Line No ☐☐		Serial No ☐☐ Next child 's Name..... Line No ☐☐	
508	How many months old was (name)..... when you introduced the following foods	Complete 508 for all children under 24 months introduced during 1st month 00 never introduced 96 don't know 99			
		months	No of times Yesterday	months	No of times Yesterday
	Water infusions (tea, corriander ,water) rice conjee powdered or fresh milk bread / biscuits vegetables rice / potatoes eggs Dark green leafy vegetables fish / dry fish / sprats meat thriposha / cerelac soup others (specify)				

MODULE 6 - MORBIDITY

Identification ☐☐ ☐ ☐ ☐ ☐ ☐☐☐☐ ☐

	Questions	Sr No ☐☐ Youngest child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐
601	Has..... (name) had diarrhoea in the last 2 weeks Yes 1(if yes how many days) No 2 DK 9			
602	Has.....(name) had diarrhoea in the last 2 weeks Yes 1 (if yes how many days) No 2 DK 9	1 2 9	1 2 9	1 2 9
602	During the episode of diarrhoea did name..... A Breast milk B Rice conjee C Locally defined home fluids .....(specify) D ORS E Powdered/fresh milk F Water with meals G Water only H None	Yes No DK 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9	Yes No DK 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9	Yes No DK 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9 1 2 9
603	During this episode of diarrhoea did she/he drink - Much less or none About the same More DK	1 2 3 9	1 2 3 9	1 2 3 9

Identification ☐☐ ☐ ☐ ☐ ☐ ☐☐☐ ☐

	Questions	Sr No ☐☐ Youngest child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐
604	During bout of diarrhoea did..... (name) take less, about the same or more food None 1 Much less 2 Some what less 3 About the same 4 More than usual 5 DK 9	1 2 3 4 5 9	1 2 3 4 5 9	1 2 3 4 5 9
605	Did.....(name) have cough or colds in the last 4 weeks Cold 1 Cough 2 Cold & cough 3 How many days?	1 2 3	1 2 3	1 2 3
606	Did.....(name) have measles Yes 1 No 2	1 2	1 2	1 2
607	When did...(name) have measles Within last month 1 1 - 3 " 2 3 - 6 " 3 More than 6 months 4	1 2 3 4	1 2 3 4	1 2 3 4
608	Is this child given Vitamin A capsules Yes (seen) 1 Yes (not seen) 2 No 3 INTERVIEWER: see the capsules	1 2 3	1 2 3	1 2 3

Identification ☐☐ ☐ ☐ ☐ ☐ ☐☐☐ ☐

	Questions	Sr No ☐☐ Youngest child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐	Sr No ☐☐ Next child's Name..... .... Line No ☐☐
609	How long has..... (name) been given Vitamin A - Weeks (less than I month) Months	☐ weeks ☐☐ months	☐ weeks ☐☐ months	☐ weeks ☐☐ months
610	Have you heard any messages which promote certain foods that are important for sight and help prevent blindness? Yes 1 No 2 If response is 2 or 9 go to module 7 Don't know 9			
611	Can you tell me all such foods? (circle code if mentioned. Do not prompt). A Dark green leaves 1 Yes 2 No B Yellow fruits 1 2 C Dark yellow vegetables 1 2 D Egg/Meat/ Fish 1 2 E Others.....Specify 1 2			
612	During last week, did .....(name) Take DG leaves	1 yes 2 No 9 DK	1 yes 2 No 9 DK	1 yes 2 No 9 DK
613	During last week, did .....(name) take yellow fruits or vegetables	1 yes 2 No 9 DK	1 yes 2 No 9 DK	1 yes 2 No 9 DK
614	During last week did .....(name) take eggs or meat	1 yes 2 No 9 DK	1 yes 2 No 9 DK	1 yes 2 No 9 DK

MODULE 7 - CLINICAL OBSERVATIONS

Identification ☐☐ ☐ ☐ ☐ ☐ ☐☐☐ ☐

	Questions	Sr No ☐☐ Youngest child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐
701	Night Blindness Yes 1 No 2	1 2	1 2	1 2
702	Bitot's spots Yes 1 No 2	1 2	1 2	1 2
703	Blood sample taken Yes 1 No 2 If not reason	1 2 ..... ☐	1 2 ..... ☐	1 2 ..... ☐
704	Retinol µg/dl	☐☐ ☐	☐☐ ☐	☐☐ ☐

MODULE 8 - SCHOOLING (for children between 5 - 14 years)

Identification

	Questions	Sr No ☐☐ Youngest child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐
801	Has.....(name) ever Attended school	year.....	1 yes 2 no 3 DK	1 yes 2 no 3 DK
802	Is.....(name) Schooling now?	1 yes 2 no 3 DK	1 yes 2 no 3 DK	1 yes 2 no 3 DK
803	(Name).....is in year.....	year.....	year.....	year.....
804	Did.....(name) go to school last year	1 yes 2 no 3 DK	1 yes 2 no 3 DK	1 yes 2 no 3 DK
805	In what year did (name).....study last year	year.....	year.....	year.....

MODULE 9 - PARTICULARS OF MOTHER

Identification ☐☐ ☐ ☐ ☐ ☐ ☐☐☐ ☐

Mother's Name..... Line No. ☐☐

901	Mother's date of birth. (If not known enter the estimated year in the year cage & 99 in the day cage.	☐☐ Day ☐☐ Month ☐☐ Year
902	Last date of menstruation of mother. (If not Known enter 99 in day cage. If she is in Immediate post partum enter 98).	☐☐ ☐☐ ☐☐
903	Are you expecting a baby	1 yes 2 no 3 DK
904	Are you nursing (with breast milk)	1 yeas 2 no
905	Do you have a card or other document with your own immunisation listed	1 yes (seen) 2 yes (not seen) 3 no 9 DK
906	When you were pregnant with your last child did you receive any injection to prevent tetanus	1 yeas 2 no 3 DK
907	If yes, how many times	☐☐ times
908	Did you receive any TT injections at any time Before your last pregnancy either during a Pregnancy or in between - If yes, No of times	1 yes 2 no 3 DK ☐
909	When was the last dose received If month or year not known , how long ago you last received a dose.	Month ☐☐ Year ☐☐ Before ☐ years
910	Total No of doses (907+908)	☐
911	Mother's Height	☐☐☐.☐ cm

912	Mother's Weight				.		kg
913	Mother's MUAC				.		cm
914	Sample of the breast milk taken	1 Yes		2 No			
915	Vitamin A level in breast milk						
	If not taken enter 99.9				.		
916	Mother's Hb % g/dl						
	If not taken enter 99.9				.		

MODULE 10 - ANTHROPOMETRY

Identification

	Questions	Sr No ☐☐ Youngest child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐	Sr No ☐☐ Next child's name..... Line No ☐☐
1001	Date of Birth	D ☐☐ M ☐☐ Y ☐☐	D ☐☐ M ☐☐ Y ☐☐	D ☐☐ M ☐☐ Y ☐☐
1002	Weight (kg)	☐☐.☐	☐☐.☐	☐☐.☐
1003	Height/ length (cm)	☐☐☐.☐	☐☐☐.☐	☐☐☐.☐
1004	MUAC (cm)	☐☐.☐	☐☐.☐	☐☐.☐
1005	Measurer's Code	☐	☐	☐
1006	Date of Measurement:	D ☐☐ M ☐☐ Y ☐☐	D ☐☐ M ☐☐ Y ☐☐	D ☐☐ M ☐☐ Y ☐☐

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