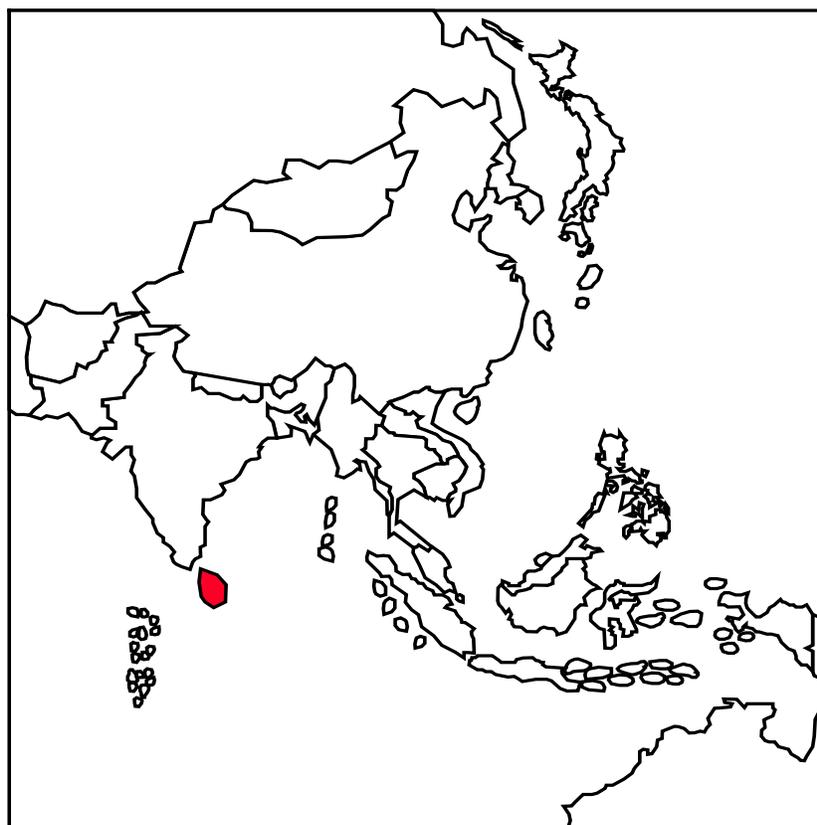


FAO - NUTRITION COUNTRY PROFILES

SRI LANKA



**FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS**

Note for the reader

The objective of the Nutrition Country Profiles (NCP) is to provide concise analytical summaries describing the food and nutrition situation in individual countries with background statistics on food-related factors. The profiles present consistent and comparable statistics in a standard format. This pre-defined format combines a set of graphics, tables and maps each supported by a short explanatory text. Information regarding the agricultural production, demography and socio-economic level of the country are also presented.

In general, data presented in the NCP are derived from national sources as well as from international databases (FAO, WHO...).

Technical notes giving detailed information on the definition and use of the indicators provided in the profile can be obtained from the Food and Nutrition Division, Assessment and Evaluation Service upon request. An information note describing the objectives of the NCP is also available.

Useful suggestions or observations to improve the quality of this product are welcome.

The data used to prepare the maps are available in Excel upon request at:

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The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers.

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Graphs, tables and maps can be visualised by clicking on the words in bold and underline, only in the “Full profile” pdf file.

SUMMARY

*In Sri Lanka, the nutritional status of children under five years of age is poor. At national level, according to the 1995 nutritional status survey, the prevalence of stunting in children under five years of age was 20%, that of wasting 13% and of underweight 33%. The nutritional status of pre-school children showed significant inter-provincial differences (**Maps 2** and **3**). In the Western Province the children under five years of age have a better nutritional status and the prevalences of stunting, wasting and underweight are the lowest compared to the other provinces. Although this province has the highest population density and is the most urbanised, it also has the best health facilities both in quality and quantity. This permits greater access to better health services. The Central province had the highest prevalence of stunting 33% but the highest prevalence of underweight (39%) and wasting (21%) were observed in the Sabaragamuwa province.*

The adult population group is also affected by undernutrition as indicated by the prevalence of chronic energy deficiency which is more than 33% in women and nearly 37% in men. The high prevalence of undernutrition in the adult population limits their work output, productivity and income-generating ability.

There exist provincial differences in the nutritional status of adults and the lowest mean BMI was observed for both sexes in the Central province.

Desegregated data show that 9% of the female population suffer from severe chronic energy deficiency (CED) with a BMI value $<16.0 \text{ kg/m}^2$, while one quarter of the women have a BMI between 16.0 and 18.5 kg/m^2 and suffer therefore from mild and moderate CED (Ramanujan and Nestel, 1997). Although the prevalence of severe CED is slightly lower in men (5%), overall 37% of men suffer from CED (BMI $<18.5 \text{ kg/m}^2$). The high percentage of CED in the population is likely to be reflected in lower labour productivity.

*Regarding micronutrient deficiencies, nearly 19% of the population was diagnosed as iodine deficient. About 45% of pre-school children, 58% of children 5 to 11 years old, 36% of adolescents and 45% of non-pregnant women suffer from anaemia. Women 18-45 years old seem to be the most affected and significant inter-provincial variations in the prevalence of anaemia were observed in this group (**Map 4**). More than 30% of pre-school children have marginal serum values of vitamin A.*

*The provision of health infrastructures have improved over time but remain inadequate particularly in rural areas. However, the country's social welfare indices are impressive. The infant mortality rate which is an important index of health and nutritional status of a community has decreased from 48 to 17 per thousand live births between 1970 and 1997, life expectancy has increased up to 73 years and literacy rate in the country exceeds 90% for both sexes. A large number of infectious diseases such as respiratory and intestinal infections remain responsible for up to 50% of deaths of children under five, with malnutrition being an aggravating factor especially in the most populated areas (**Map 1**).*

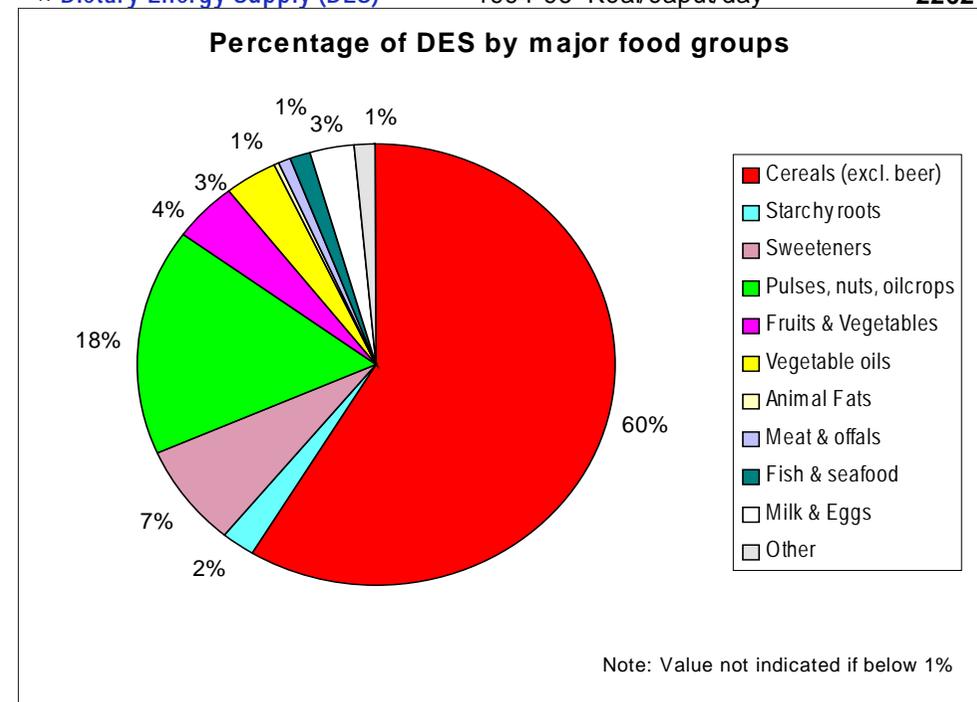
TABLE 1: GENERAL STATISTICS OF SRI LANKA

Last updated: 15/2/99

Indicator (\$)	Year	Unit of measure	
A. Land in use for agriculture			
1. Agricultural land	1995	ha per person	0.130
2. Arable and permanent crop land	1995	ha per person	0.105
B. Livestock			
1. Cattle	1994-96	thousands	1683
2. Sheep & goats	1994-96	thousands	588
3. Pigs	1994-96	thousands	89
4. Chickens	1994-96	millions	9
C. Population			
1. Total population	1998	thousands	18450
2. 0-5 years	1998	% of total pop.	10.3
3. 6-17 years	1998	% of total pop.	23.5
4. 18-59 years	1998	% of total pop.	56.9
5. >= 60 years	1998	% of total pop.	9.3
6. Rural population	1998	% of total pop.	77.0
7. Population growth rate, Total	1995-2000	% of total pop.	1.0
8. Population growth rate, Rural	1995-2000	% of rural pop.	0.5
9. Projected total population in 2025	2025	thousands	23934
10. Agricultural population	1995	% of total pop.	46.6
11. Population density	1995	pop. per sq Km	273.3
D. Level of Development			
1. GNP per capita, Atlas method	1996	current US\$	740
2. Human Development Index rating	1995	min[0] - max[1]	0.716
3. Incidence of poverty, Total	1986-87	% of population	36.1
4. Incidence of poverty, Rural	1986-87	% of population	30.7
5. Life expectancy at birth (for both sexes)	1995	years	72.5
6. Under-five mortality rate	1996	per 1,000 live births	19
E. Food Trade			
1. Food Imports (US \$)	1994-96	% of total imports	9.7
2. Food Exports (US \$)	1994-96	% of total exports	4.1
3. Cereal Food Aid (100 MT)	1994-96	% of cereals imports	14.2
F. Indices of Food Production			
1. Food Production Index	1994-96	1989-91=100	112.3
2. Food Production Index Per Capita	1994-96	1989-91=100	106.8

Indicator (\$)	Year	Unit of measure	
G. Average Food Supply			

1. **Dietary Energy Supply (DES)** 1994-96 Kcal/caput/day **2262**



2. **Proteins** 1994-96 g/caput/day **49**

% from:

3. Vegetable products 1994-96 % of total proteins 77.6

4. Animal products 1994-96 % of total proteins 22.4

% Energy from:

5. Protein 1994-96 % of total energy 8.8

6. Fat 1994-96 % of total energy 18.8

H. Food Inadequacy

1. Total population "undernourished" 1990-92 millions 4.6

2. % population "undernourished" 1990-92 % of total pop. 26.0

... no data available § see References for data sources used
See Technical Notes for definitions used.

SRI LANKA

I. OVERVIEW

1. Geography

Sri Lanka is an island located in the Indian Ocean and covers an area of 65,610 square km (6.5 million hectares). The south central part of the country is mountainous and the highest point is 2524m. The average annual temperature is 32.2°C (90°F) in the lowlands and 21.1°C (70°F) in the highlands. The country can be divided into 3 climatic zones, the dry zone, the intermediate zone and the wet zone. The dry zone covers nearly 4.12 million hectares with an average rainfall range of 890-525 mm and the intermediate zone with nearly 0.84 million hectares has an average rainfall of 1525-2285 mm. The wet zone covers about 1.52 million hectares with an annual rainfall, which ranges from 2280-5580 mm. The cultivation calendar for the annual crops follows the bi-modal rainfall pattern of the country where it experiences the Northeast monsoon (from October to February) and the Southeast monsoon (from May to September). The bimodal rainfall pattern has given rise to two cultivation seasons.

The country has a number of major rivers, some of which has been utilised in reservoirs around irrigation and settlement schemes. The crops cultivated in the country can be broadly divided on to plantation or Estate and non-plantation crops where the latter produces food mainly for domestic consumption. The plantation (Estate) sector grow tea, rubber and coconut, most of which are exported. The country which was formerly divided in to 24 administrative districts has now been merged to form nine provinces.

2. Population

In Sri Lanka the population policies of the country have had a positive effect in reducing the population growth rate to 1% (**Table 1**). Therefore while in 1977 the population was 18.6 million in 1998 it is 18.450 million and is estimated to reach 23.9 million by the year 2025 (**Table 1**). The bias towards a higher male to female ratio of 113:100 in 1946 has changed to 104:100 in 1996 and is largely an outcome of the availability of improved basic needs of the community.

The population density in the country varies widely between provinces. For instance, the western province density is 3000 persons/km² while the North central is only 100 persons/km² (**Map 1**). Nearly 60% of the population live in the wet zone of the country and over 70% in rural areas. Urbanisation has been relatively slow with less than 25% of the population living in urban areas (Central Bank, 1997).

Given the low population growth rate and fertility rate, the population structure of the country has undergone enormous changes in the last five decades. For instance, the under five-year population has reduced by 5 % during the last two decades representing only the 10.3% of the total population in 1998 (**Table 1**) (UN, 1997; Department of Census and Statistics 1998). The same period records an increase, ranging from 2-4 %, of the age groups below 20 years of age while only a modest increase in the percentage of population in the higher age groups is noted. Even though Sri Lanka is a developing country, the emergence of an 'ageing' population is apparent. The change in demographic structure will reduce the size of the active labour force in the next decades (Department of Census and Statistics, 1998).

Sri Lanka is a multi ethnic and religious society. The Sinhalese constitute the major ethnic group (74%) followed by Tamils (13%) and Moors (7%). Buddhism, which was introduced in third century BC, is the main religion (69%); others are Hinduism (15.5%), Christianity (7.6%) and Islam (7.6%) (Department of Census and Statistics 1998). The main language is Sinhala and is spoken by over 80% of population. Tamil, a south Indian language is spoken predominantly in the North and among plantation workers. There are three official languages; Sinhala, Tamil and English.

Internally displaced people

The civil conflict unravelling in the North East region during the last 14 years has resulted in loss of lives, massive displacement of population, the flight of large numbers of nationals to other countries, and widespread destruction of infrastructure.

Since the breakdown of the peace talks between the Government of Sri Lanka and the Liberation Tigers of Tamil Ealam (LTTE), which led to a new round of armed conflict, the Government has reported that internally displaced people in Jaffna Peninsula and Vanni region exceeds 700,000.

The Government of Sri Lanka is facing the enormous task of providing urgently needed relief to the affected population, mainly farmers and fishermen, and assisting the refugees to resume normal economic activities, as well as rehabilitating the different economic sectors in the areas where security permits it.

3. Level of development: poverty, education and health

In 1996, it was estimated that the Gross National Product of Sri Lanka was 740\$/capita/year and the percentage of households in poverty was 30.4% in 1991 (**Table 1**). The cut-off point used to identify the poor is those who do not consume 1900 kcal/capita/day. The incidence of poverty, however, varies widely within provinces with the lowest recorded being 20% for Western province and highest of 39% for North Central province. The highest poverty level in three sectors, namely, urban, rural and Estates, is 34% and is among the rural population (Department of Census and Statistics, 1993).

Even with large state expenses on household transfers, over the last four decades, the income accrued to the bottom 30% of the population has remained to be less than 10% of the total income of income receivers in the country (Central Bank, Annual Report, 1996). The issue of targeting resources to the poorest remains a the major problem and a challenge to policy makers in the country.

Sri Lanka has a Human Development Index (HDI) of 0.716 on a 0-1 scale indicating substantial achievements in development (**Table 1**). The country recorded a high Physical Quality of Life Index (PQLI) in the 1970's (Morris 1979). The PQLI index assessed country's per capita income against life expectancy, literacy and infant mortality rate; the country recorded a high PQLI value for a low income country. The high value is due to the emphasis placed, since independence, on state funded social welfare programmes in the country. Even at present, the state provides universally free health and education; free education from first grade to university degree level.

Under the social welfare policies and programmes the state has implemented a series of programmes aimed reducing poverty by providing income and price support to the poor in particular. Although the targeting procedures have changed over time, the programmes implemented are mainly food stamps, supplementary feeding programmes for undernourished pre-schoolers and pregnant women, food price support and subsidised credit. The state

expenditure on households transfers accounts for over 30% of current government expenditure (Central Bank, Annual Report, 1996).

The country has achieved significant gains in the health sector. Infant Mortality Rate has been reduced from 48 to 17‰ between 1970 and 1997, neonatal mortality was reduced by 50% and was of 16‰ live births in 1996; and life expectancy has increased to 73 years (**Table 1**). According to WHO criteria, the average low birth weight (below 2.5 kg) is 17.9 per 1000 live births; however, the range within districts vary from 6.4 to 21.2 per 1000 live births. Reasons for district variation in all health indices are related to the quality and quantity of health facilities in each district; both curative and preventive. Therefore further improvements in the health sector are required.

Health infrastructure has improved over the last three decades and the number of hospitals in the country has increased by 26% (Department of Census and Statistics, 1998). Among the leading causes of infant mortality are Pneumonia, Bronchitis, and other respiratory diseases and intestinal infections. The country has reached universal coverage for immunisation of infants. The country is also facing health problems related to degenerative diseases which records the highest number of adult deaths in the country. Ischaemic heart diseases and cerebrovascular diseases have accounted for nearly 20% of total adult deaths.

In 1997, the literacy rate in the country exceeded 90% for both sexes and the school enrolment rate was also of 90%. In 1996, it was observed that the student to teacher ratios have improved over the last two decades but vary from 22:1 to 46:1 according to the school. The universities produce nearly 6000 graduates a year but the provincial differences in facilities exist in the education system as well (Central Bank, Annual Report, 1997).

4. Agricultural production, land use and food security

Sri Lanka has an essentially agriculture-based economy. Although industrial sector has expanded in the country in the last two decades, agriculture remains a main source of employment providing employment to 37% of the active labour force and contributing to one fifth of GDP in 1997 (Central Bank, Annual Report, 1997).

The country has 6.5 million ha of land that is suitable for agriculture. The highest percentage of land under cultivation is under the export oriented, plantation crops (40%) namely tea, rubber and coconut. However, paddy remains the crop most extensively cultivated (28%) due to the efforts made by successive governments since the 1930s to make the country less dependent on imported staple of the country. With crop diversification policies, production and land under other food crops (mainly for domestic consumption) has increased over the last three decades (Department of Census and Statistics, 1998). In 1998, the production of tea and rubber reached respectively 271 and 106 thousand tons and that of coconut, 2 million tons (FAOSTAT).

With investments in irrigation and new technology including the high rates of adoption of high yielding varieties, paddy production has increased by over three fold so that, on average over 75% of rice consumed is produced locally. In Sri Lanka rice production reached more than 2 million tons in 1998 (FAOSTAT). Most of the crops show an increase in production over the last two decades where the overall volume index of agriculture production indicate an increase from 108 to 137 between 1981 to 1996. However, the average landholding size has decreased by 30% from 1964-66 to 1994-96 (FAOSTAT).

As a result of policies aimed at enhancing agricultural production, food available at the national level has increased and has been adequate to ensure national food security for the last three decades. However, since the household level food security is determined by changes in prices and income, the low income households remain insecure in relation to food and nutrition. The food ratio (food expenditure to total household expenditure) has remained over 55% for the average rural household over the last decade. Furthermore, the poor households are recorded to spend over 75% of their income on food and not still not securing adequate energy and nutrients to meet their daily requirements (Department of Census and Statistics, 1988, 1993). Therefore, food insecurity of resource poor households remain a problem in the country.

5. Economy

Sri Lanka is classified as a low-income country based on the GNP value (World Bank, 1997). The country has achieved a number of economic goals in the last three decades since adopting structural adjustment policies in 1977 (Department of Census and Statistics, 1994). For instance, the average annual growth rate has been maintained at over 4%; per capita GNP increased to US\$ 740 and unemployment rate declined to 10.4%. Effective fiscal discipline has reduced the budget deficit by nearly 2% of GDP during 1997-1998 (Central Bank, Annual Report, 1997). A major move in the state sector since 1977 has been to reduce public expenditure in order to reallocate resources to economically efficient sectors of the economy. State privatisation programme is one of the main mechanisms through which resources are mobilised for effective reallocation.

At the time of independence, the economy of the country was agriculture driven and was the single major source of export earnings until two decades ago. At present agriculture contributes 18% to GDP of the country therefore indicating that the relative importance of the agriculture in the economy of Sri Lanka has declined. For the last decade, the average growth rate of agriculture was of 2.4% whereas that of manufacturing and services have increased to 4.8% and 5.5%, respectively. With diversification of the economy the unemployment rate has declined and was 10.4% in 1997 (Central Bank, Annual Report, 1997).

However, although economic gains are apparent since adopting structural adjustment policies, the country has yet to achieve sustainable economic growth as indicated by a number of key economic indicators such as increase in ratio of imports to exports, budget deficit and savings, and investments as a percentage of GDP.

II. THE FOOD AND NUTRITION SITUATION

1. Trends in energy requirements and energy supplies

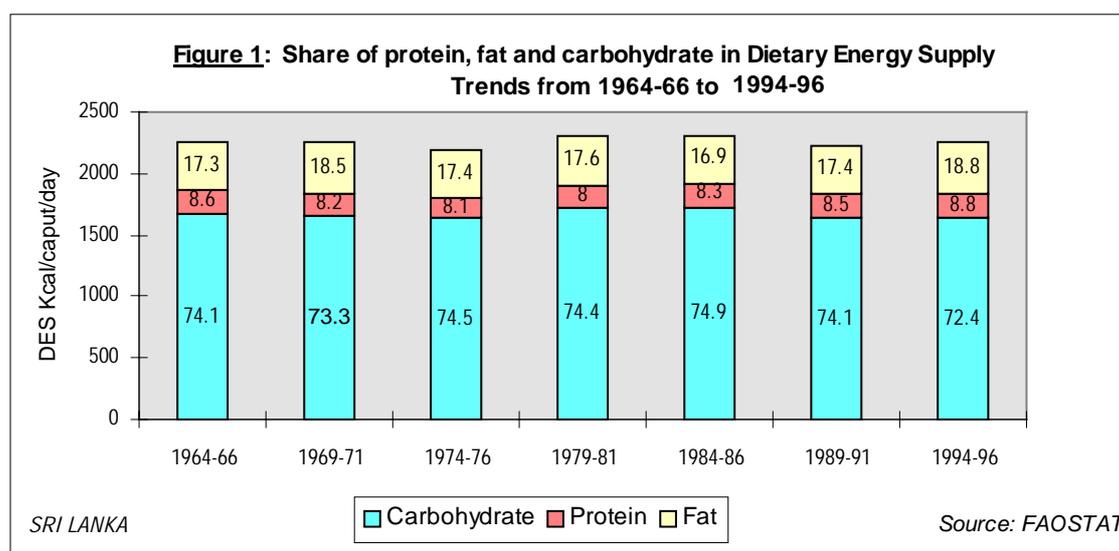
Between 1965 and 1995, the population has increased by 61% and is projected to increase again by 34% by 2025 (**Table 2**). Between 1995 and 2025, the average daily per caput energy requirements are projected to undergo a slight reduction due to the increase in the urbanisation rate from 22 to 39% (and therefore due to the lower physical activity). The energy requirements of the urban population increased by 84% over 1965-1995 and are projected to increase by 140% by 2025. The rural population has increased at a lower rate. Its requirements have increased by 62% between 1965 and 1995, and are projected to experience only a 6% increase by 2025.

Table 2: Total population, urbanisation, energy requirements and dietary energy supplies (DES) per person and per day in 1965, 1995 and 2025

Year	1965	1995	2025
Total population (<i>thousands</i>)	11164	17928	23934
Percentage urban (%)	19.9	22.1	38.6
Per caput energy requirements (<i>kcal/day</i>)	2117	2193	2190
Per caput DES (<i>kcal/day</i>) *	2261	2262	—

* Three-year average calculated for 1964-66 and 1994-96 (*Source: FAOSTAT*)

Over the last three decades, the average daily per caput energy supply did not undergo significant change (**Figure 1**). Successive governments in the country have maintained almost constant food supply either through increased production and/or imports.

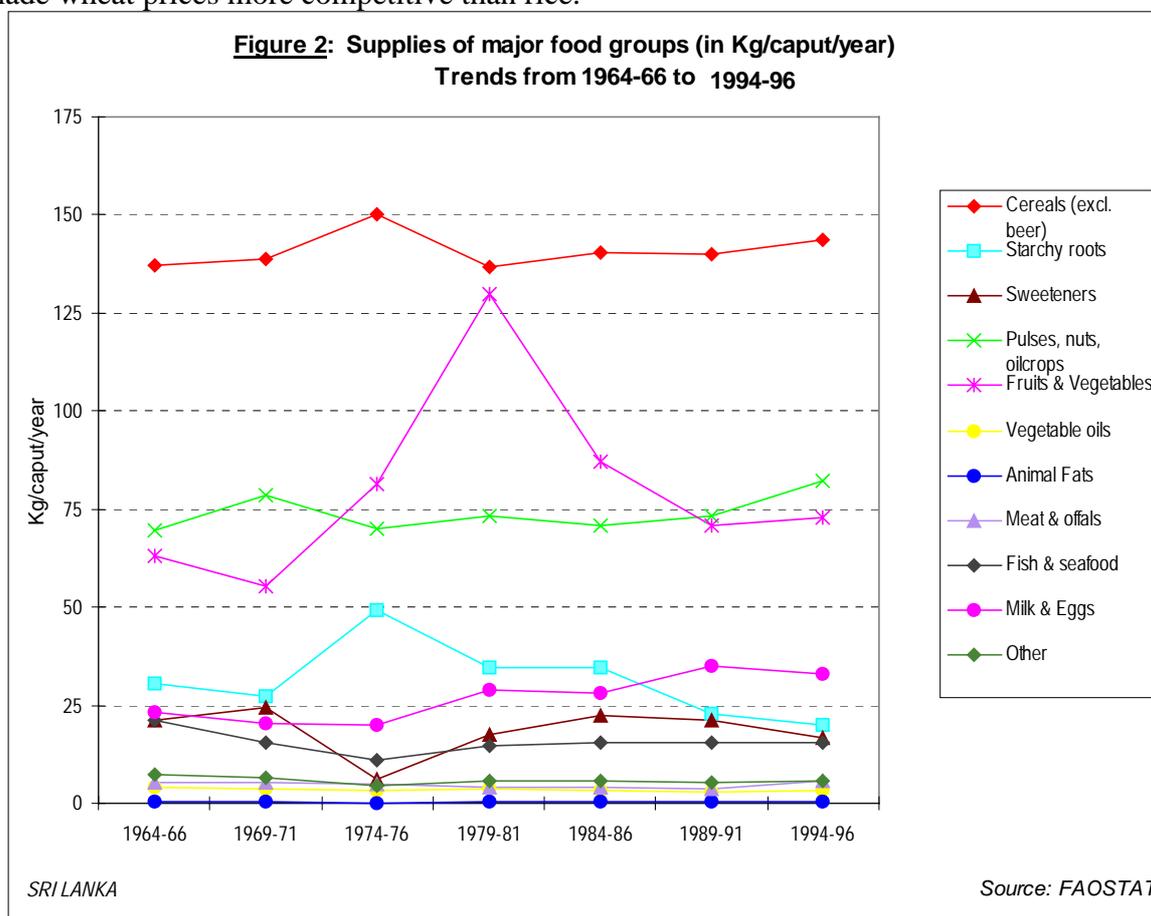


FAO Sixth World Food Survey estimated that the DES did not cover the requirements of 26% of the population in 1990-92, compared to 21% in 1969-71, therefore indicating that the proportion of the population which is “undernourished” in terms of food inadequacy has increased (FAO/WFS, 1996).

Over the last three decades, no significant change in the contribution of energy by the different sources of food was observed (**Figure 1**). About three fourths of energy supply is provided by carbohydrates with fats providing 17% of total DES. The relatively low percentage of energy from protein sources (9%) is characteristic of developing economies where consumption of animal protein remain prohibitive due to its high market price. It should be noted that greater variation in energy supply is apparent on a seasonal basis rather than on an annual basis giving rise to intra-annual fluctuations in food supply.

2. Trends in food supplies

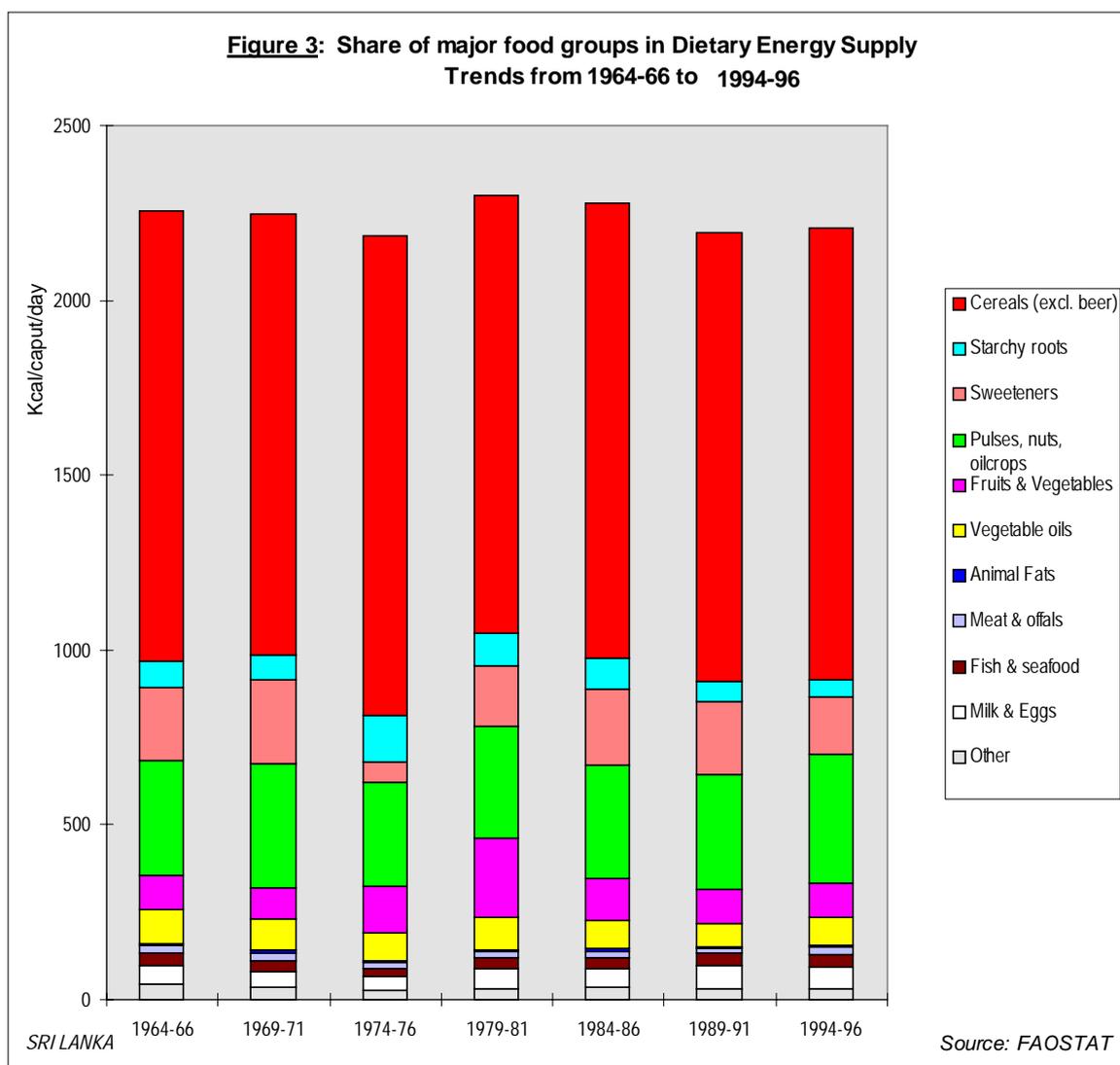
Quantity: Food availability depends on the food produced, imported and that taken away for seeds and processing losses, particularly important for cereals. The main cereal consumed in the country is rice of which over 75% is locally produced. The second most important cereal is wheat (flour) which is entirely imported. Between 1979-81 and 1994-96 there has been an increase in the availability of cereals (mainly wheat) from 137 to 144 k/caput/year (**Figure 2**). This increase is due to the increase in wheat imports and is the result of state subsidy which made wheat prices more competitive than rice.



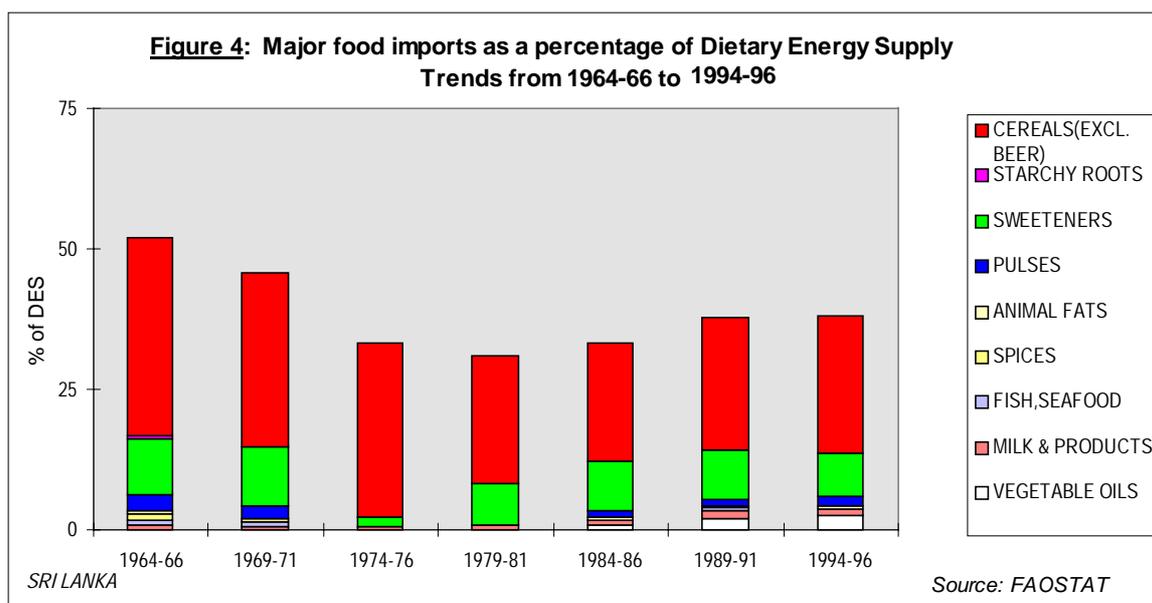
In the same period, there has been a reduction in the availability of starchy roots (from 34 kg to 20 kg/caput/year), fruits and vegetables (from 130 kg to 73 kg/caput/year), and vegetable oils (from 4 kg to 3 kg/caput/year) (**Figure 2**).

In the last thirty years the supply of milk and eggs have increased from 23 to 33 kg/caput/year. This is largely due to increased imports with liberalisation of the economy as well as diversification of milk products for the domestic market, by the local manufacturers, to face the increasing demand (**Figure 2**).

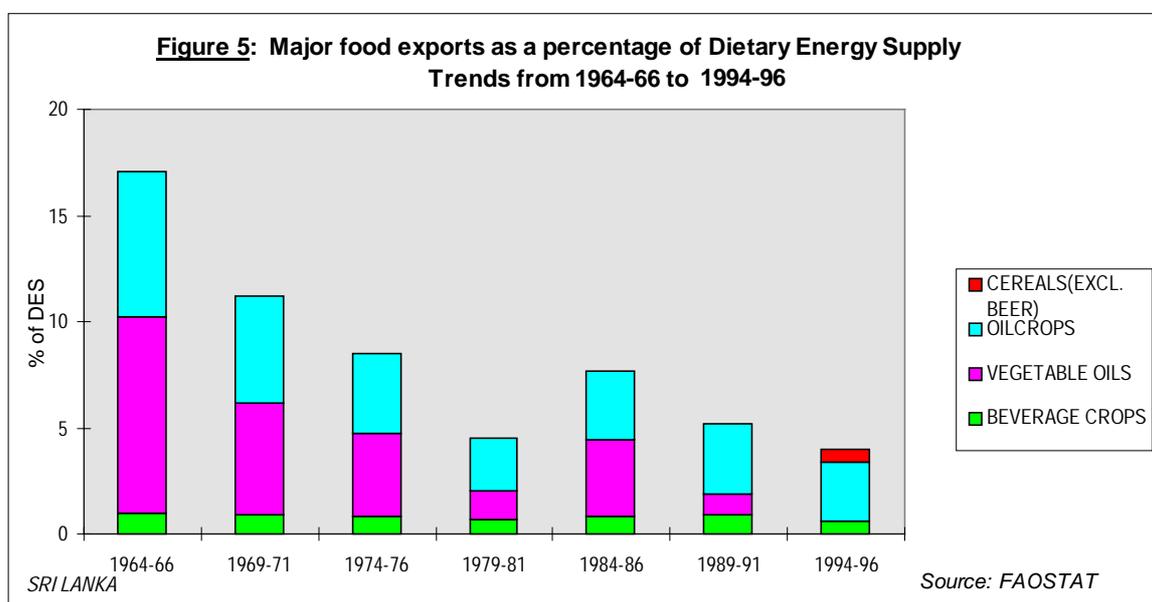
Energy: In the last thirty years, there has been no significant change in the share of cereals in the DES, which still represent the main source of energy in the SriLankan diet, providing 1,294 kcal/caput/day, equivalent to 57% of the total energy (**Figure 3**). The share of animal products in DES is less than 6% therefore indicating that the diet in SriLanka is mainly based on vegetable products which provide respectively, 95%, 78% and 86% of total energy, protein and fat supplies (**Figure 3**).



Major food imports and exports: In the last three decades, food imports were mainly represented by cereals but the energy contribution from imported cereals has decreased from 35% to 25% (**Figure 4**). In this period investment in paddy led to increased rice production in the country thus requiring less imports to meet the cereal demand. However, a slight increase in cereal imports, mainly wheat, was observed due to the adverse weather conditions. The increase in the imports of pulses is due to reduction in domestic pulse production because of the low economic incentives compared to earlier agricultural policy. Imported sweeteners still account for about 8% of energy supply in the country (**Figure 4**). Imports of vegetable oils and milk products have increased over the last decade since liberalisation of the market became effective.



Sri Lanka has been less competitive in the world food markets where the country has steadily been losing its position as a food exporter. In the last three decades, the exports of oil crops decreased from 7 to 3% of DES (**Figure 5**). The same trend was observed in the exports of vegetable oils which have decreased from 9 to 0% due to the lower world prices. Although contributing only 1% of the energy supply of the country, the beverage crops are the only crops that have maintained a steady market. Overall, with liberalisation of world markets some Sri Lankan food crops have become less competitive thus losing the small share of its world market.



3. Food consumption

Sri Lanka does not conduct food consumption surveys due to their prohibitive cost but the Department of Census and Statistics conducts national household expenditure surveys every five years. The data on household food expenditure and purchases are analysed by sectors (urban, rural and Estate) and by income groups.

Over the last three decades, although there are fluctuations on the budget share household expenditure on different food groups has not changed. Household expenditure on rice is maintained at 25% of food budget. On average other cereals account for 10% of the food budget. The budget share of the remaining food are: meat 3%, fish 10%, vegetables 15%, spices 10%, milk products and eggs 5%, oils and fats 2%, fruit 1% and other foods account for 20% (Department of Census and Statistics, 1993). The relatively high budget share on other foods should be noted as this group contains mostly of processed foods and take away foods, thus indicating changes in dietary patterns. These are mainly due to time constraints resulting from changing lifestyles such as employment of both parents.

Cereals, mainly rice and wheat, constitute the highest amount of food consumed (141 kg/caput/year) (**Table 3**). The rice intake has decreased by 2% from 1980/81 to 1990/91 and a 13% decrease was observed in 1995/96¹ (Department of Census and Statistics, 1983, 1993 and 1998a). The decreasing trend in rice consumption is compensated by increasing intake of wheat based food. For instance, consumption of bread has increased by 41% from 1.6 to 2.7 kg/capita/month between 1980/81 and 1995/96. These changes in dietary patterns are mainly due to the lower price of wheat flour.

Vegetables and fruits constitute the next largest volume of food consumed (43 kg/caput/year). Consumption of at least two vegetables a day is common. The type of vegetables consumed varies with prices and availability. Sri Lanka is a tropical country where the climate is conducive for cultivation of many fruits.

In Sri Lanka the intake of fish is higher than that of meat which is partly due to costs and to cultural values. Chicken consumption has increased from 0.3 to 2.3 kg/caput/year between 1980/81 1995/96 (Department of Census and Statistics, 1983, 1987 and 1998a).

A decline in the consumption of liquid milk in favour of milk powder was observed over the last two decades. From 1980/81 to 1995/96 milk consumption has decreased by 73% from while powder milk has increased by 85% (Department of Census and Statistics, 1983 and 1998a). The two reasons for this substitution are liberalisation of imports and reduction in local milk availability as more purchased by companies to produce diversified milk products. *The share of major foods as a percentage of total energy intake:* Cereals represent the main source of energy in the Sri Lankan diet, providing 61% of total energy intake (**Table 3**). Roots&tubers and pulses provided less than 2% and 3% of total energy, respectively. Animal products and oils&fats provided each less than 5% of total energy (**Table 3**). Among vegetables&fruits, a large proportion of energy was provided by coconuts. In the Sri Lankan diet the intake of sweeteners was relatively high contributing 7% to total energy.

The percentage of energy provided by protein was only 9% and proteins were predominantly of vegetable origin. The proteins of animal origin play a minor role in the Sri Lankan diet (only 16% of the protein derive from animal products) due to their cost (**Table 3**).

The percentage of energy provided by fat is 19% and the intake of fats and oils seems to increase with the increasing income of the household. Fats and oils are generally used in the Sri Lankan diet for seasoning purposes along with condiments and spices.

¹ This is based on the preliminary results of the household expenditure survey of 1995/96. The final report is expected in early 1999.

Although adequate food energy is available at the national level, inadequacies are evident at the household level. There are large differences in energy intake among the different sectors and income groups (Department of Census and Statistics, 1993). The energy intake is lowest in the urban sector at all levels of income and highest in the Estate sector, mainly due to subsidies provided on certain food and non-food as part of facilities given for Estate labour (**Table 3**). In the Estate sector, the non-food subsidies permit a higher proportion of the budget to be spent for food compared to rural sector, where most of the energy intake is provided by the consumption of own cultivated rice.

In all sectors the households with the lowest income are the most affected with an average daily energy intake of only 1650 kcal. An analysis of the 1980/81 survey indicated that the most "at-risk" groups were the landless, marginal land holders, rainfed farmers and fishermen (Sahn, 1984). Seasonal variation in food consumption among the poor rural population was observed and in low-rainfall seasons energy intake covers only 60% of energy requirement (Tudawe, 1993).

Table 3: Food consumption surveys

Source/ Year of survey	Location	Sample Number households	Average food intake									
			Major Food Groups (kg/caput/year)									
			Cereals	Roots/ Tubers	Pulses	Fruits/ Vegetables	Oils/Fats	Meat	Fish	Milk products	Sweeteners	Other
Department of Census and Statistics, 1993 1990-91	National	25000	140.9	13.7	6.6	43.3	1.7	3.3	9.4	8.9	14.5	17.7
			Nutrient Intake (person/day)									
			Energy (kcal)	% Protein	% Fat	Protein (g)	% from Animal products	Fat (g)	% from Animal products			
Department of Census and Statistics, 1993 1990-91	National	25000	2136	9.4	19.0	50.3	16.4	45.0	14.4			
	Urban	9380	2425	...	...	...	...	...	...
	Rural	14380	2576	...	...	...	...	...	...
	Estate	1320	3067	...	...	...	...	...	...
High income households	Urban	938	3056	...	...	...	...	...	...
"	Rural	143	3717	...	...	...	...	...	...
"	Estate	132	4519	...	...	...	...	...	...
Middle income households	Urban	938	2226	...	...	...	...	...	...
"	Rural	143	2669	...	...	...	...	...	...
"	Estate	132	2895	...	...	...	...	...	...
Low income households	Urban	938	1345	...	...	...	...	...	...
"	Rural	143	1690	...	...	...	...	...	...
"	Estate	132	1807	...	...	...	...	...	...
			Share of major food groups in total energy intake (%)									
			Cereals	Roots/ Tubers	Pulses	Fruits/ Vegetables	Oils/Fats	Meat	Fish	Milk products	Sweeteners	Other
Department of Census and Statistics, 1993 1990-91	National	25000	61.4	1.2	2.9	11.9	4.5	0.7	1.4	2.2	7.3	6.4

Notes: ... data not available

4. Anthropometric data

The 1995 National Health Survey assessed the nutritional status of children between 3-59 months using three indices: weight-for-height (wasting) which reflects acute growth disturbances, height-for-age (stunting) which reflects long-term growth faltering and weight-for-age (underweight) which is a composite indicator of both long and short term effects. Weights and heights of children are compared with the reference standards and the prevalence of anthropometric deficits is usually expressed as the percentage of children below a specific cut-off point such as minus 2 standard deviations from the median value of the international reference data (NCHS/CDC/WHO). The data presented are at the national, provincial and sectoral levels but the Eastern and the Northern regions were not covered because of the prevailing civil disturbances in these areas (Ramanujan and Nestel, 1997).

According to the 1995 survey conducted by Ramanujan and Nestel the prevalence of stunting in children under five years of age was 20%, that of wasting was 13% and one third of them were underweight (**Table 4a**; Ramanujan and Nestel, 1997).

The nutritional status of pre-school children showed significant inter-provincial differences. The children under five years of age in the Western Province had a better nutritional status as indicated by the prevalences of the stunting, wasting and underweight which were the lowest compared to the other provinces. Although this province has the highest population density and is the most urbanised of provinces, it also has the best health facilities both in quality and quantity which permits greater access to better health services.

The Central province had the highest prevalence of stunting 33% but the highest prevalence of underweight (39%) and wasting (21%) were observed in the Sabaragamuwa province (**Table 4a**). According to the WHO classification of malnutrition, a prevalence of wasting above 15% in children under five years of age reflects a critical public health problem (WHO, 1995)

Sectorally, the pre-school children of the Estate sector showed the highest prevalence for both stunting (45%) and underweight (51%) while the rural areas recorded the highest prevalence of wasting (15%) (**Table 4a**; **Maps 2** and **3**). Although the Estate sector had the highest average daily energy intake it also had the largest number of pre-school children suffering from malnutrition (**Table 3** and **Table 4a**).

The nutritional status of children was better between 3-5 months but after it worsened with age. The prevalence of underweight, stunting and wasting which was less than 4% between 3-5 months reached respectively 41%, 24% and 19%, between 54 and 60 months (**Table 4a**). Poor complimentary feeding, weaning practices, poor health and sanitary practices were among the causes of the worsening of the nutritional status with age.

On the other hand the nutritional status of pre-school children improved with mothers education, household income, better water and sanitary facilities (Ramanujan and Nestel, 1997).

Table 4a: Anthropometric data of children

Source/ Year of survey	Location	Sample			Percentage of malnutrition								
		Size Number	Sex	Age Years	Underweight % Weight/Age		Stunting % Height/Age		Wasting % Weight/Height		Overweight % Weight/Height		
					< -3SD	< -2SD	< -3SD	< -2SD	< -3SD	< -2SD	> +2SD		
				Mnths									
Ramanujan & Nestel, 1997	National	2782	M/F	3-59	5.7	32.9	5.1	20.4	0.9	13.3	...		
1995													
	<u>Provinces:</u>			Mnths									
	Western	663	M/F	3-59	4.4	24.7	2.9	13.3	1.8	11.4	...		
	Central	542	"	"	9.9	40.2	10.7	32.8	0.9	15.3	...		
	Southern	216	"	"	3.9	32.8	2.8	18.5	0.9	12.5	...		
	NorthWest	296	"	"	5.2	31.4	3.4	15.9	1.0	15.2	...		
	Northcentral	309	"	"	3.6	30.1	4.5	16.2	0.7	13.1	...		
	Uva	365	"	"	5.8	34.3	5.5	22.5	0.0	10.2	...		
	Sabaragamuwa	391	"	"	5.1	38.9	3.8	21.2	0.5	16.1	...		
				Mnths									
Ramanujan & Nestel, 1997	Urban	1359	M/F	3-59	3.9	25.8	2.4	13.1	1.3	12.6	...		
1995	Rural	991	"	"	5.9	34.6	4.4	19.7	0.7	14.9	...		
	Estate	432	"	"	10.9	51.5	15.3	45.2	0.2	12.1	...		
				Mnths									
Ramanujan & Nestel, 1997	National	152	M/F	3-5	...	3.9	...	3.9	...	2.0	...		
1995	"	297	"	6-11	...	17.2	...	10.4	...	8.2	...		
	"	262	"	12-17	...	31.6	...	21.4	...	16.0	...		
	"	291	"	18-23	...	29.1	...	21.0	...	17.2	...		
	"	298	"	24-29	...	40.9	...	22.8	...	11.5	...		
	"	286	"	30-35	...	32.9	...	18.2	...	14.7	...		
	"	290	"	36-41	...	41.7	...	22.4	...	14.0	...		
	"	295	"	42-47	...	37.1	...	23.7	...	12.4	...		
	"	327	"	48-53	...	39.9	...	27.2	...	13.8	...		
	"	294	"	54-59	...	40.6	...	24.3	...	19.1	...		

Notes: ... no data available.

Each index is expressed in terms of the number of standard deviation (SD) units from the median of the NCHS/CDC/WHO international reference population.

-2 SD includes children who are below -3 SD.

The anthropometric data used to assess the nutritional status of adults were obtained from the 1995 National Health Survey (Ramanujan and Nestel, 1997). The nutritional status of adults is usually assessed using the Body Mass Index (BMI) calculated as weight (kg) over height squared (m^2). For classifying individuals according to their nutritional status, cut-off levels of BMI have been proposed. Adults with a BMI less than 18.5 kg/m^2 are considered to suffer from chronic energy deficiency. A BMI of over 25.0 kg/m^2 indicates overweight.

The national mean BMI value for both men 20.3 kg/m^2 and women 20.5 kg/m^2 fell within the normal range ($18.5\text{-}25.0 \text{ kg/m}^2$), although the Standard Deviation indicated that a certain percentage was energy deficient (**Table 4b**).

The adult population group was also affected by undernutrition as indicated by the prevalence of chronic energy deficiency which is more than 33% in women and nearly 37% in men. The high prevalence of undernutrition in the adult population limits their work output, productivity and income-generating ability.

Provincial differences in the nutritional status of adults were also observed and the lowest mean BMI was observed for both sexes in the Central province. The Estate sector had the lowest mean BMI value for both men (18.7 kg/m^2) and women (18.5 kg/m^2) and was followed by the rural sector (**Table 4b**).

5. Micronutrient deficiencies

Iodine Deficiency Disorders (IDD) are a public health problem in Sri Lanka. Major consequences of IDD include thyroid enlargement (goitre), impaired mental functioning, increased rates of still birth, perinatal and maternal mortality, infertility and cretinism. The most common cause of IDD is inadequate dietary intake of iodine. The government has a national programme to iodise salt to combat iodine deficiency. The last national survey conducted in 1987 showed that the total goitre rate in individuals 5 to 19 years old was 19% (Fernando et al., 1989) (**Table 5**). A new national survey on the prevalence of iodine deficiency is presently being conducted.

Vitamin A is an essential micronutrient required for normal health and survival. It is involved in several critical functions in the body including vision, immune system, reproduction, growth and development. Children under five years are most susceptible to vitamin A deficiency (VAD). The consequences of VAD are tragic and include night blindness, irreversible blindness, growth retardation and increased susceptibility to infections. Pregnant women are also prone to VAD and their children are likely to become deficient.

Although at present there are no intervention programmes for vitamin A deficiency, a survey conducted in 1997 showed high prevalences throughout the country (Medical Research Institute, 1998). More than one third of pre-school population suffer from vitamin A deficiency (36%). In some provinces (North Central and Sabaragamuwa) over 50% of children have marginal serum values of vitamin A (WHO, 1995a). At present the Ministry of health is considering strategies to combat the problem of vitamin A deficiency.

World-wide it is estimated that up to half of all anaemia is caused by dietary iron deficiency anaemia (FAO/ILSI, 1997). The groups most affected by anaemia are pre-school-age children, women of child bearing age and adolescent girls. Anaemia in infants and children is associated with intellectual and physical growth retardation and reduced resistance to infections. In adults anaemia causes fatigue and reduced work capacity (FAO/ILSI, 1997). Free iron supplements have been given to pregnant women for the last three decades by the government because it was observed that over 30% of them were anaemic. According to the national anaemia survey conducted in 1995 using heamatocrit to measure heamoglobin concentration, anaemia was found to be a problem in all age groups (**Table 5**) (Mudalige and Nestel, 1996). Nearly half the under five children, 58% of children 5-11 years, 36% of adolescents (11-18 years) and 45% of non-pregnant women suffered from anaemia (Mudalige and Nestel, 1996) (**Map 4**).

The poor absorption of iron from the diet and therefore the low bioavailability of iron is one of the possible causes of this deficiency. In Sri Lanka the dietary intake of iron is mainly provided by vegetable products which contain a number of iron inhibitors. A number of strategies are being considered by the government including provision of iron/folate/vitamin C supplements to non-pregnant women and school children, enhancing present supplements for pregnant women and increase the fortification of wheat flour with iron. A comprehensive nutrition education programme is also being launched to improve and/or correct dietary habits to ensure adequate energy and nutrient intake from the diet since the final responsibility for good nutrition lies within the household.

Table 5: Surveys on micronutrient deficiencies

Source/ Year of survey	Deficiency	Location	Sample			Percentage
			Size Number	Sex	Age Years	
Iodine						
Fernando et al., 1989						
1987	Grade I	National	...	M/F	5-19	13.9
	Grade II	"	...	"	"	4.9
	TGR	"	...	"	"	18.8
Iron						
Mudalige&Nestel, 1996					Mnths	
1995	Hb<11g/dl	National	1995	M/F	3-59	44.8
		<u>Provinces:</u>				
	"	Western	368	"	"	47.3
	"	Central	403	"	"	36.2
	"	Southern	296	"	"	47.6
	"	NorthWest	233	"	"	56.7
	"	Northcentral	183	"	"	54.6
	"	Uva	274	"	"	36.1
	"	Sabaragamuwa	238	"	"	42.9
	Hb<12g/dl	National	652	M/F	5-10	58.4
		<u>Provinces:</u>				
	"	Western	99	"	"	55.6
	"	Central	170	"	"	55.8
	"	Southern	99	"	"	61.6
	"	NorthWest	85	"	"	71.8
	"	Northcentral	50	"	"	60.0
	"	Uva	84	"	"	50.0
	"	Sabaragamuwa	65	"	"	56.9
	Hb<12g/dl	National	708	M/F	11-18	36.0
		<u>Provinces:</u>				
	"	Western	109	"	"	53.2
	"	Central	136	"	"	31.6
	"	Southern	129	"	"	27.9
	"	NorthWest	78	"	"	52.6
	"	Northcentral	47	"	"	44.7
	"	Uva	116	"	"	36.3
	"	Sabaragamuwa	93	"	"	31.2
	Hb<12g/dl	National	708	F	18-45	44.6
		<u>Provinces:</u>				
	"	Western	260	"	"	47.3
	"	Central	233	"	"	48.9
	"	Southern	199	"	"	49.2
	"	NorthWest	140	"	"	47.9
	"	Northcentral	109	"	"	46.8
	"	Uva	173	"	"	31.2
	"	Sabaragamuwa	152	"	"	38.1

Notes: ... data not available

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Source:

Indicator:

FAOSTAT. 1997

A.1-2, B, C.10-11, E.1-3, F, G

UN. 1996/1997

C.1-9, D.5

World Bank. 1997.

D.1

UNDP. 1997.

D.2

Tabatabai H. 1996.

D.3-4

UNICEF. 1997.

D.6

FAO/WFS. 1996.

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