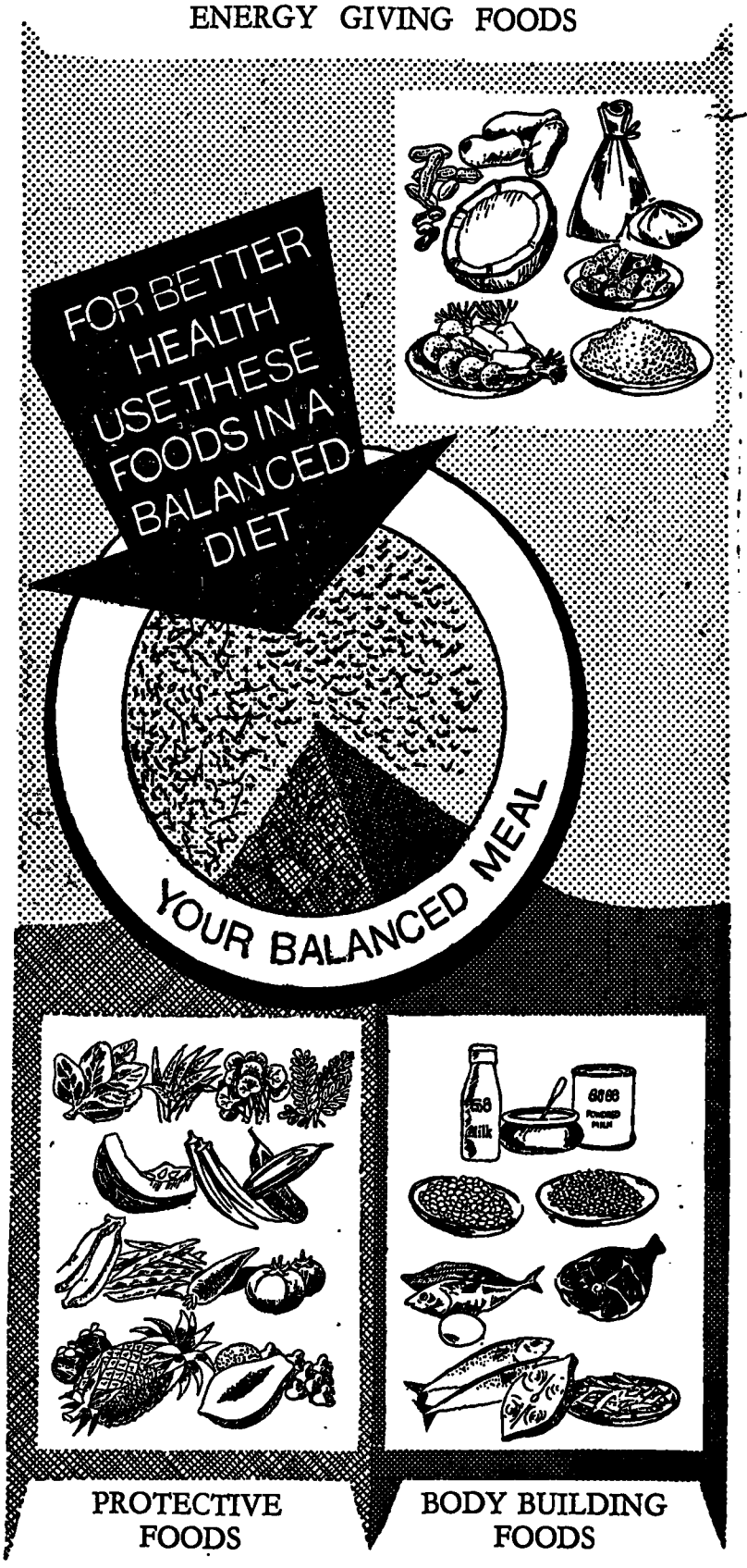
NUTRITION

The most eloquent argument for a reform in the existing world economic order has been the crisis that has arisen in world markets in recent years. The trebling of the prices of food, fertilizers and manufactures in the wake of world inflation and only a marginal change in prices of primary commodities has most severely hit the world's poorest peoples. The continuous shortfalls in supplies and steadily rising prices of food and vital nutrients has even threatened the lives of many underprivileged millions in the Third World. Yet, it is certainly not an absolute shortage. The food grains exist, but they are being eaten elsewhere by very well fed people. North American grain consumption had grown per capita by 350 pounds, since 1965, (largely in meat products) to reach 1,900 pounds by 1975. And this extra 350 pounds per capita is almost equal to an Indian's total annual consumption. This increase in American grain consumption has even been viewed as a 'super consumption' which also threatens health.

The present world food situation is not a crisis that appeared only very recently; it is a situation that has been building up due to several long-term causes that had not been clearly perceived or acted on. We now have an emergency superimposed on a chronic crisis, which is reflected in the present low world grain supplies, which in turn has serious implications for the nutrition and well-being of low-income populations in both developed and developing countries. It is tied to the unequal exchange in world trade as well as to the productive capacities of individual nations.

We are in a position today where as a result of the heavy imbalances in distribution and consumption about 60 to 70 percent of the children of the Third World are suffering from malnutrition, although the world has the resources to give adequate nutrition to all its population. What we do have is a maldistribution of the world's resources on a scale where the developed countries are consuming about twenty five times more of the resources per person than that of



The human body needs three main types of foods—Energy Giving, Body Building and Protective. See pages 10 and 11 for details. Pictured here are the three broad groups of foods and the proportions in which they should be taken as a general rule—the most important being Energy Giving Food.

the developing countries. Looking at this situation in more concrete terms, what does it mean for the people of our sub-continent—Bangladesh, India, Nepal, Pakistan and Sri Lanka—whose combined population in mid 1975 was estimated at 783 million.

South Asian foodgrain production in 1975 was expected to be of the order of 150 million tons, or 192 kg. per person. This is only about 45 per cent of the per capita global average of 347 kg. Again, grain consumption in our sub-continent is said to be 202 kg. per capita, or about 5 per cent more than production. This leaves a deficit of about 8 million tons that has to be met from imports which at current prices costs this region some $1.5 billion or £2 per capita. This is regarded as a significant drain of resources when viewed against per capita incomes that averaged around £102 in 1975.

Malnutrition and Poverty

Nobody knows for certain how big a portion of these peoples are suffering from the basic problem of chronic undernourishment—a general lack of proteins and calories. What we can be sure of, however, is that malnutrition is inescapably linked with the 'absolute' poverty of some 900 million people in the economically underdeveloped regions around the globe. The poor nutritional standard of a quarter of the earth's people is probably the most dramatic indicator of the failure of conventional development to improve the condition of life of most people in the so-called developing world.

Malnutrition in Sri Lanka is certainly not of the magnitude of that existing in certain parts of Bangladesh, India or the Sahel. The average person in this country has generally been well fed, though not always with the most essential foods. Over the last decade, for instance, the available food supply in Sri Lanka was found to be adequate for national needs, yet nutritional inadequacy in diet has persisted for those of the low income levels. Whatever the food problems that exist in this country, it is obvious that it is most acute among the lowest income groups. Evidence of inadequate nourishment among these groups has been consistently revealed by the regular and specialised dietary surveys conducted by our Medical Research Institute during the last 25 years.

Despite a growing awareness by our government of the pivotal role of nutrition in national development, the steps so far taken to increase food production and food availability are barely adequate to meet the nutritional needs of the disadvantaged groups of the population.

In the food supply sector alone, mounting difficulties exist. Unforeseen climatic disruptions such as failures of monsoon rains, as well as the lack of reliable data on food crops and their consumption, caused difficulty in projecting trends in food production and availability. The major pressure on our food supply is population increase and our inability to buy food because of falling terms of trade, and this could continue to be the case for many years even if family planning programs were to begin yielding results from now on. Water, improved seeds and more fertiliser are the three essentials for increasing overall food production. The supply of nitrogen fertilizers, which has been a limiting factor all along, is now acute. This will continue as long as petroleum is scarce or costly and as long as investment for fertilizer production facilities remains limited. Use of fertilizer stimulates the production of more grain in our country than in the developed countries, where its use already yields diminishing returns. Power and fertilizer are important not only for the productivity of high-yielding crops where they are under irrigation, but also for increased agricultural production in the dry zone. The advantages of fertilizer, combined with the fact that it costs less to transport than the food shipments that would be needed in the absence of fertilizer induced higher food yields, should stimulate import of fertilizer instead of grain in international buying programs.

Increased prices of all common foods have seriously affected the nutritional status, health and well-being of the more vulnerable groups in our country, particularly infants, children and pregnant and nursing mothers. This human aspect of the problem is largely due to social inequities related to inadequate food distribution and constraints on consumption. In rich and poor countries alike this inequity is exemplified by the increased demand for animal products by the affluent, which causes shortages and increases the prices of all those products (principally grain) that are the staple foods of the poor. As countries or individuals develop and grow more wealthy the tendency is for the relative importance of the starchy staples in the diet to decline. More expensive foods can be produced and purchased; steaks, eggs, dairy products and vegetables progressively take the place of the cereals. A convenient indication of this adjustment is the starchy staple ration i.e. the proportion of total calories contributed by the starchy staples. In the United States this stood at about 70 per cent a century ago. Today as bread and potatoes no longer bulk large in the diet it stands at about 25 per cent. Similar transformations have occurred and are occurring throughout the world and are usually clearly visible across the income range in any country.

To improve nutrition, increased food production alone is insufficient; there should be distributive justice as well. Humane social strategy should parallel economic strategy in order to distribute fairly the benefits of increased production.

As for the public health aspects of nutrition, programs responding to the needs of vulnerable population groups have remained token in character. Because safe drinking water and environmental hygiene are still luxuries in most of our villages, diarrhoeal disease and intestinal parasites cause an additional burden for hundreds. Problems, such as pesticide-resistant malaria mosquitoes are increasing, especially in newly irrigated areas.

The Need for Action

Useful strategies and programs need to be undertaken for improving food production and nutritional status. These would include long and short-term programs of action based on evaluation of alternative strategies under a given set of socio-cultural and agro-ecological conditions. It is important to match every technological package with an appropriate combination of services and of public

policies. Such packages can be developed only from detailed local studies, which would involve the use of selected health, nutrition, agricultural and socio-economic indicators and simple techniques for diagnosis of malnutrition and its causes.

Nutrition in Sri Lanka

Recent work carried out by FAO/WHO experts (1973), and modified to suit the physiological needs of our population, indicate that 2200 calories and 48 gms. of protein on a per caput basis would constitute an adequate diet. Food balance sheets for the last 10 years indicate that on an islandwide basis there were just enough energy foods available (Table 1).

However, the 1969/70 Socio-Economic Survey, carried out by the Department of Census and Statistics among 9,700 households, revealed that the adequacy was only marginal in the 43% of the households that constituted those with incomes less than Rs. 200/- per month. The urban poor were the worst affected. A more detailed analysis, assessing the adequacy of intakes of each family according to its individual age/sex composition and on the basis of moderate activity, showed large scale deprivation at income levels under Rs. 200/- per month. This is especially noteworthy since it occurred at a time when food supplies were the most abundant for many years, locally and internationally.

Indirect indicators such as age and specific death rates demonstrate that the nutritional status of the most vulnerable member of the household, the young child has been affected in the country as a whole. And on estates in the districts of Nuwara Eliya, Badulla, Matale, Ratnapura and worst of all, Kandy, the infant death rate has been significantly higher than in other areas. Infant mortality is greatly influenced by malnutrition in the first year of life, particularly where weaning is early and weaning foods are inadequate. In addition, it is due to a combination of factors. Malnutrition causes a lowered resistance to infection, while frequent episodes of infectious diseases precipitate clinical malnutrition. The same factors continue to operate but with decreasing importance during the pre-school period.

The underweight baby, born of an undernourished and anaemic mother, starts life with a heavy handicap. Weak in body and with a brain possibly already stunted in growth, the child is not only susceptible to disease but in many cases mentally apathetic. The mother, because of her own undernourished condition, may have little breast milk, and if she has a large family, little time to give the care and stimulation the infant needs. The result is often a falling back on artificial milk which in the case of poor families often has unhealthy and even disastrous consequences. This situation can be avoided as the box on page 6 indicates.

Surveys of 7,000 children (pre-school) carried out by the Medical Research Institute in 1972 and 1974 in 10 health districts provide evidence that the prevalence of malnutrition among particular groups in the country calls for urgent and concerted action. *Bitots'* spots were rarely seen in pre-school children in previous surveys. A 2% prevalence indicates a deterioration in the vitamin A status of pre-school children, especially in such districts as Batticaloa, Kandy, Galle, Matara and Kalutara. A 3% prevalence of *Follicular Hyperkeratosis* is also indicative of a deteriorating Vitamin A status as studies have shown that this clinical condition is one of the first manifestations of this deficiency. Increasing prevalence of nutritional anaemias, chiefly due to a deficiency of iron, and to a lesser extent folic acid, is the chief cause of maternal death and general ill health of the mother. It also has a profound effect on the foetus. It is responsible for much of the anaemia in the infant and may contribute substantially to infant mortality. Again Kegalle, Ratnapura and Kandy have the highest rates of anaemia and maternal mortality. Anthropometrical, clinical and bio-chemical assessment also indicated that in 1974, 14% of pre-school children suffered from 3rd degree protein calorie malnutrition (PCM) and 36% from moderate PCM. The prevalence of severe PCM is highest in Kandy, then Matara, Colombo, Jaffna, Galle and Ratnapura, in descending order.

TABLE 1

PERCENTAGE OF ADEQUACY OF ENERGY & PROTEIN BY SECTORS ACCORDING TO INCOME CLASSES—ALL-ISLAND SOCIO-ECONOMIC SURVEY 1969-1970

Sectors All Island	Nutrient	INCOME CLASSES Below Rs. 100	Rs. 100-140	Rs. 150 - 199	Below 200	Rs. 200 - 399	Rs. 400 - 599	Rs. 600 - 799	Rs. 800 - 999	1000 & over	All Classes
URBAN	Energy (Calories)	78	87	92	86	94	109	106	111	113	98
	Protein ...	77	87	94	99	99	109	114	123	130	109
	Percent of population	2.9	6.6	11.5	21	37.5	17.9	8.4	5.1	8.1	100
RURAL	Energy (Calories)	89	97	100	95	106	118	118	117	131	101
	Protein ...	85	97	101	97	106	117	123	126	140	107
	Percent of population	9.2	17.5	17.7	44.4	37.9	12.0	3.7	1.1	0.9	100
ESTATE	Energy (Calories)	103	107	107	106	110	113	140	140	173	110
	Protein ...	111	117	119	118	123	125	160	164	239	128
	Percentage ...	8.8	26.8	25.8	61.4	33.5	4.0	0.8	0.1	0.2	100
ALL CLASSES	Energy (Calories)	88	96	98	94	103	111	114	115	120	103
	Protein ...	84	94	98	99	113	122	127	130	136	112
	Percent of population	8.1	16.8	17.7	42.6	37.7	12.0	4.1	1.6	2.0	100

Protein Calorie Malnutrition is a term widely used, though difficult to define and classify for several reasons. In common with other nutritional status there is no sharp dividing line between the normal and the pathological. Malnutrition is often associated with other nutritional deficiencies, the two most frequently met with are iron and/or folic acid resulting in nutritional anaemia and vitamin A deficiency, the various manifestations of which are grouped under the term *Xerophthalmia*. Further, infections may cause a marginal state of nutrition that permit survival and perhaps moderate growth to change into frank malnutrition. These factors acting either collectively or singly manifest themselves as a failure of growth which is the first sign of PCM. The manifestations of PCM vary widely according to the nature of the causative factors, the time for which they operate and the age of the child. Two severe clinical forms are recognised. Nutritional *Marasmus* and *Kwashiorkor*. Between these a wide range of variations and gradations exist. In general Kwashiorkor is a more acute condition than Marasmus. However, neither of these conditions presents such an important problem from the public health point of view as does the widespread occurrence of moderate and severe PCM in a community. Three degrees of malnutrition, originally classified by Gomes, are based on weight deficit (1st degree or mild PCM is a 10% weight deficit of the standard, 2nd degree or moderate

Recommended Infant Feeding Policies and Practices

Malnutrition in infants, young children and pregnant and lactating women is a serious problem in Sri Lanka and is an important cause of ill health and high mortality. Although many causes have been identified the ultimate pathway of action for all of them is inadequate and/or improper feeding. Unfortunately, many individuals including those with professional, social and official responsibility to care for infants and children lack correct information as to the recognized and acceptable forms of feeding, which are also nutritionally sound and economically feasible. Early discontinuance of breast-feeding by mothers in low income groups in urban areas, leading to malnutrition, illness and death among infants, has been a cause for serious concern.

An authority on nutrition has recommended the following feeding policies and practices.

Young Infants-*zero to six months*

The food of choice for this age group is mother's milk; thus breast-feeding should be promoted among all mothers and should be stressed in teaching in medical, nursing and paramedical schools. Such education should also be extended to community leaders.

There is a small proportion of women who for recognized reasons are unable to breast-feed at all or can do so only inadequately. This group should be helped to obtain appropriate professional aid to correct this situation or to arrange for an alternative feeding method. Even if a mother works, she should be encouraged to breast-feed whenever possible.

Alternative feeding of young infants should be viewed as a critical risk situation regardless of the type or nature of the food substituted for mother's milk. The four basic essentials for alternative feeding are sufficient money, proper use of substitute food, adequate food hygiene and proper maternal education.

Older Infants—*six to twelve months*

Young Children—*twelve to twenty four months*. For the above age groups breast-feeding should be continued for as long as possible, but the declining supply of breast milk must be reckoned with. Therefore, breast milk although beneficial should not be considered the primary source of nourishment for infants beyond the age of 6 months. The primary role should be taken over by nourishing foods other than breast milk; they must be introduced into the diet gradually, and their selection should be in stages, based on the physical consistency of the food used.

Suitable recipes and menus are worked out by the health personnel according to the special conditions prevailing in the area. As often as possible these foods should be a part of the entire family's diet. The importance of the weaning phase serves to emphasize the great need for inexpensive nutritious foods to be developed and marketed for young children. Such food should as far as possible be prepared and blended locally in our country, using commodities available in the area. An example is THRIPOSHA. These foods should play a major nutritional role, which milk plays in more affluent populations. Towards this end, it may be necessary to diversify the infant food industry and embark with government support to produce reasonably priced, easy to prepare and calorie-dense nutritious weaning foods.

KWASHIORKOR—imbalance of diet at its worst

PCM is a 25% weight deficit and 3rd degree or severe PCM, a 40% weight deficit), which takes into account the age of the child and the severity but not the duration.

MARASMUS – balanced starvation

The Medical Research Institute of Sri Lanka has repeatedly warned of the increasing incidence of third degree protein-calorie malnutrition specially among the most sensitive age groups in the population. (See Table 2.) Apart from symptoms of emaciation and retarded growth in children, studies have drawn attention to the great danger of mental retardation that could result from this condition. Recent Research has shown that children under two years of age are particularly vulnerable to brain damage as a result of poor nutrition and that such damage is not reversible. The most sensitive age group is 0 - 6 years.

TABLE 2
SEVERITY OF PROTEIN CALORIE MALNUTRITION (%)
(Age in Months)

Age	8	12	24	36	48	60
1st degree ...	22	47	61	71	65	64
2nd degree ...	14	18	20	25	20	22
3rd degree ...	2	2	3	4	7	4
Normal range ...	62	33	16	2	8	10

Source: Nutrition Department, Medical Research Institute, Sri Lanka.

About a million children in Sri Lanka are said to be suffering from various degrees of protein-calorie malnutrition. The incidence is more acute among the urban poor. In a large number of these, the nutritional deficiencies can be traced to pregnant mothers and thereafter to lactating mothers and through to the rest of childhood.

The most severe clinical conditions of Marasmus and Kwashiorkor in Sri Lanka seem to be precipated by low income aggravated by large family size. Prevalence is 3 and 0.5 per cent respectively, the worst areas being Kandy and Ratnapura. The highest incidence of Kwashiorkor is among rural households with a family size greater than seven. Invariably once rehabilitated in hospital and sent home, the child has to be readmitted because family socio-economic conditions have not changed. The medical authorities present three-pronged approach of surveillance, nutritional supplementation and nutritional education holds out hope.

If there is enough food for a whole family the working adults usually and logically take the largest share for themselves. Their need for food seems more obvious: an undernourished bread-winner who falls sick or is too weak to work means disaster for a whole family.

The resulting retardation of child growth is not immediately apparent and in many cases may not be associated by the parent with nutritional deprivation. Though lack of food may not directly kill the child it may weaken him so that he succumbs more easily to disease.

A clear relationship between the prevalence of PCM and the income status of the households is indicated by a survey of 2060 children admitted for treatment to the Lady Ridgeway Hospital in 1974.

The malnutrition problem can therefore no longer be viewed simply as a nutritional or production problem. Maximising production will not necessarily optimise or maximise consumption of the individual household. Further, nutrition itself is in some degree both substitutable for and complementary with public health and other measures such as provision of pure drinking water etc. The tractability of the malnutrition problem therefore depends firstly on identifying who is poorly nourished and why. Secondly it depends on how far those affected can be disaggregated into small groups which are relatively homogenous with respect to the effect that a given set of policy instruments might have upon them and on devising such measures.

A detailed analysis of socio-economic survey data indicates that in 1969/70, 50% of households with incomes under Rs. 200/- p.m. had inadequate nutritional intakes. Of all households, 8.1% had incomes less than Rs. 100/- p.m. and 34.5% between Rs. 100/- and 199/- p.m. As much as 75% of this combined group were located in rural areas, 17% on estates and 8% in urban areas. The income generating capacity of these households was constrained mainly by family size and a lack of assets, both human and physical. A very much smaller than average household size and a higher dependency ratio result in there being only one income earner in three quarters of these households in urban and rural areas; in estate households it seems to be more a problem of only 2 rather than 3 income earners. Labour force participation rates are lower, particularly for estate and urban households in the under Rs. 100/- group; but unemployment rates are higher than average, suggesting that these households suffer from special disabilities. For the more substantial number of households in the Rs. 100/- to Rs. 199/- group, participation rates are generally higher and unemployment rates lower than average, particularly for rural areas. In the estate sector, labour predominates as the income source, with 56 per cent of the employed working on tea, rubber and coconut estates In the rest of agriculture, which accounts for a further 32 per cent, small cultivators of food crops (mainly paddy) outnumber wage labour almost threefold. Labour in small scale industry particularly textiles, wood products, food and tobacco processing, constitute another 10 per cent; spinners, carpenters and bricklayers 6 per cent, communication and service workers, domestic, laundry workers 5 per cent, and sales workers 4%. Educational levels are considerably lower than average, particularly for the

RECOMMENDED BALANCED DIETS FOR SRI LANKA

Edible Portion in Grams per day

FOODSTUFFS	CHILDREN				MEN								WOMEN								MOTHERS	
Age (years)	1-3	4-6	7-9	10-12	13-15	16-19	20-29	30-39	40-49	50-59	60-69	70†	13-15	16-19	20-29	30-39	40-49	50-59	60-69	70	Preg.	Lac.
Body weight (Kg.) ...	12.0	18.2	26.2	35.0	49.0	51.0	55	55	55	55	55	55	40	43.8	47	47	47	47	47	47	47	47
CEREALS																						
Rice, sorghum, maize, bread, wheat flour, or other cereals and millets (kurakkan)	213	230	284	426	446	456	456	456	398	341	298	263	400	350	300	300	270	250	200	156	350	410
NUTS AND SEEDS																						
Coconut* gingelly, soya	14	57	71	85	85	85	85	85	85	57	57	57	85	80	80	80	80	75	56	45	85	85
OILS AND FATS	5	10	10	15	15	15	15	5	5	5	5	5	10	10	10	10	10	5	5	5	10	10
YAMS	57	57	114	142	142	142	162	142	114	114	114	114	114	114	114	114	114	56	56	56	114	120
SUGARS																						
Sugar or jaggery ...	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	30	30
Total Energy Giving Foods	317	382	507	696	716	726	746	716	630	545	502	467	637	582	532	532	502	414	345	290	589	655
PULSES																						
Gram, mung, soya, cow-pea	14	14	14	14	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	28	28
ANIMAL FOODS ...	14*	14*	14*	14*	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	30	30
MILK AND MILK PRODUCTS ...	227*	142	142	142	71	28	28	28	28	28	71	71	57	57	57	57	57	57	71	71	90	90
Total Body Building Foods	255	170	170	170	120	77	77	77	77	77	120	120	106	106	106	106	106	106	106	106	148	148
VEGETABLES																						
Leaves	28	28	28	35	56	56	56	28	28	28	28	28	56	56	56	56	28	28	28	28	56	56
Fruits	57	85	85	85	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114
FRUITS																						
Ripe	30	30	30	30	30	30	30	30	30	38	30	30	30	30	30	30	30	30	30	30	40	40
Total Protective Foods	115	143	143	143	200	200	200	172	172	172	172	172	200	200	200	200	172	172	172	172	210	210
Total All Foods ...	676	695	820	1009	1036	1003	1003	965	879	794	694	659	943	888	838	838	700	692	623	568	947	1013
Daily Requirements																						
Energy (Calories) ...	1212	1656	1841	2340	2437	2500	2530	2534	2404	2074	2024	1771	2300	2200	1900	1900	1748	1656	1472	1209	†250‡	†550‡
Nutrients (Protein) ...	24	31	35	46	49	51	52	52	52	52	52	52	46	42	47	47	47	47	47	47	†15	†28

†Yams are substitutable for cereals, 3 : 1 energywise but not in protein. *Dried fish, 1 oz. is equal to 2 oz. fresh, proteinwise.

Department of Nutrition, Medical Research Institute

‡For women 20-39 years of age.

estate sector; a quarter have no formal education, half only primary schooling and a further quarter mainly middle school or above.

Among the poor—whether for countries or individuals, diets are characteristically dominated by the starchy staple foods, the cereals and starchy fruits, roots, and tubers. This is because of their relative cheapness. Whether expressed in terms of market price or production cost; as a general rule less land and less labour expenses are required to produce calories of energy value in the form of starchy staples than in the form of other foodstuffs. Rice is the premier starchy staple of monsoon Asia for obvious agronomic reasons just as wheat, maize and potatoes are for more temperate climates. But a balanced diet is not beyond the reach of even the lowest income group (See pages 10 & 11). The major handicap is fundamentally a lack of awareness of the possibilities of such diets. The Medical Research Institute has produced excellent examples of cheap but balanced diets.

While the figures published in the Socio-Economic Survey show that the under Rs. 200 income group as a whole does not appear to suffer from a shortage of proteins it is clear, from supplementary data available, that the under Rs. 100 group does have an inadequate intake of this nutrient. Moreover as the utilization of dietary protein is influenced by such factors as calorie intake, level of minerals and vitamins and the quality of the protein itself, it is demonstrable that the whole of the under Rs. 200 group suffers from a protein-calorie deficiency. (See tables 3 & 4)

Equally significant is the increase in the intake of milk, milk products, meat and fish when income rises. It is noteworthy that although more fish than meats are consumed at all income levels, at high income levels the increase in meat consumption is far greater than that of fish. It should be emphasized, however, that most of these improvements occur after the Rs. 400/- threshold is crossed; that is, among only 20 per cent of the population. One important consequence of this is that, since, calcium iron, vitamin A and riboflavin are found in their most assimilable form in these animal foods, it follows that the bulk of the population lacks these nutrients as well. Rice is very deficient in calcium and therefore insufficiency of calcium is one of the marked features of a rice-eater's diet. As milk, milk products and eggs supply nearly four times as much calcium as any other food and since low-income groups are seen to consume less of these particular food items, there is a tendency for their diets to be deficient in calcium. The gap between the recommended allowances and the per caput availability of food, as shown in table 4, illustrates this clearer.

A commentary on the Survey data by a team of specialists concluded: "on the present standard, it would appear, on the findings of the Socio-Economic Survey, that there is no startling nutritional problem in Ceylon since the marginally adequate average picture of the Food Balance Sheet does not seem to break down completely among the poorer sections of the population. Nevertheless, among the under Rs. 200 group except on the estates there is clearly

TABLE 4

DAILY PER CAPUT AVAILABILITY OF FOOD SUPPLY IN GRAMS

FOOD BALANCE SHEET (CENSUS AND STATISTICS)

CEREALS	1969	1970	1971	1972	1973	1974	*Recommended Allowances*
Rice	274.7	298.8	281.0	275.0	262.8	271.8	
Wheat	88.8	80.9	64.0	58.4	90.8	89.3	
Total including others ...	372.1	385.5	349.7	338.8	360.8	369.0	348
Coconut Kernel	61.4	84.7	84.7	102.5	84.6	85.6	85
Fats and Oils	10.0	11.5	11.0	11.0	8.0	7.0	13
Yams**	81.6	70.4	76.2	59.8	105.8	127.6	110
Sugars	62.9	61.7	58.9	57.1	45.7	18.0*	30
Total	588.0	613.8	580.5	569.2	604.9	607.2	586
Pulses	18.5	16.2	8.0	7.3	4.0	2.0	30
Meats	5.3	4.7	4.9	4.8	4.7	3 3	10
Fish	28 1	22 6	19.7	23.7	18.9	17.7	60
Milk and Milk Products ...	33.2	33.0	35.4	43.8	41.9	30.6	60
Egg	5.5	5.3	5.7	6.4	6.5	4.0	6
Total	90.6	81.8	73.7	86.0	76.0	57.6	166
Vegetables	111.8	130.1	92.9	92.9	92.9	97.2	150
Fruits	25.7	29.5	29.2	29.3	27.6	28.4	50
Total	137.5	159.6	121.1	122.2	120.5	125.6	200
TOTAL	816.1	855.2	775.3	777.4	801.4	790.4	932
Calories	222.3	2359	2209	2250	2213	2135	200
Protein—Total	50.0	50.3	44.9	45.4	45.1	44.9	45.0
Animal	10.6	9.8	9.6	10.5	8.7	7.4	12.0
Fat	45.3	55.9	52.9	60.6	50.2	48.3	

* Drop in 150 calories per head per day on imported sugar and jaggery has been included.

** To obtain the same energy value of cereals three times by weight of yams have to be eaten but the protein value is almost half.

a considerable degree of undernourishment, the worst affected being the urban poor Even in the Rs. 200 to Rs 400 group there would appear to be only a marginal adequacy. The gap between them and the higher income group is still haunting".

This situation has caused concern among various authorities from time to time. Presently the nutrition situation is being relieved by a wide variety of intervention progtammes. The largest intervention is the government subsidy on rice, wheat flour and sugar. The cost was around Rs. 900 million in 1974, when over 12 million beneficiaries received 240 calories and 4.5 gms. of protein each or 12 per cent of the calorie and 10 per cent of the protein requirements. The Ministry of Health's largest intervention is the THRIPOSHA programme within the Family Health Programme, for pregnant and lactating mothers, infants/pre-school and primary school children.

The Ministry's programme is a medically approved and carefully monitored system, whereby 175,364 seriously malnourished are being rehabilitated through 548 Health centres and 1983 clinics held monthly. A little under two thirds of the malnourished pregnant mothers and around 50% of malnourished young children are covered. However, due to the inadequacies of maternal and child welfare clinics in the rural areas, coverage is less than for the urban child, where it is around 55 per cent. The Plantation Estate Programme partly conducted through polyclinics run by the Family Health Programme reaches 40% of the malnourished through 161 estates. The School Feeding Programme covers around 850,000 primary school children, of whom the estimated 100,000 severely malnourished receive in addition a supplement of THRIPOSHA as well, through 980 schools. THRIPOSHA is a precooked fortified weaning food mainly composed of WSB supplied by CARE from US "Food for Peace" sources. Twenty five per cent of the weaning food is being produced from locally grown pulses and cereals, and processed in Sri Lanka. The development of this product, is expected to eventually evolve into a 100% indigenous weaning food. The

A SIMPLE GUIDE TO BETTER NUTRITION

Good nutrition is a state of physical, mental and social well-being in so far as it can be achieved by Proper Feeding. By proper feeding we mean a "Balanced Diet" well cooked and appetizingly presented.

Before we can know what a balanced diet is and how to ensure that we get it, we must know something of what foods really are and how our well-being depends on them.

Foods are made up of various substances like carbohydrates, fats, proteins, vitamins and minerals. There are many different vitamins, A, B, C and D and the minerals include calcium, phosphorus, iron and a few others. Lastly foods have some water.

Our bodies, too, contain these same substances. For example, there is a layer of fat under our skin; there is protein in our muscles; there are calcium and phosphorus in our bones; there is iron in our blood and so on. The vitamins in our bodies are concerned with regulating the life processes going on everywhere. As for water, our bodies are really more water than anything else.

Nutrients

It will now be easy to understand that these substances found in our bodies or, shall we say of which our bodies are made, must all be derived from the food we eat. That is why these substances as found in foods are called "Nutrients". But we cannot be haphazard about our choice of food, because there is not a single article of food which can by itself give us all the nutrients in amounts adequate for our needs. One food will be rich in one nutrient and another food in some other.

Three Kinds of Foods

From our present day knowledge of nutrition we can say that the human body needs three main types of foods:—

1. Those which provide energy.
2. Those which build, maintain and repair all cells and tissues of the body.
3. Those which regulate the functions of the body.

1. Energy Giving Foods

Almost all foods give us energy in varying degrees, but of the energy giving foods, carbohydrates and fats are the most important. They provide the energy for all activity; everyday activities like sitting, standing and walking; the special activities which vary with the type of work or play and the basal activity of the body, e.g. breathing, respiration, circulation, excretion, secretion and keeping warm.

2. Body Building Foods

These foods provide, chiefly, proteins, calcium and iron besides also providing to a lesser extent energy and vitamins. Proteins are the chief body building nutrients. Proteins are vital for growth, maintenance and repair of all the tissues of the body. The minerals, calcium and phosphorus are vital for the growth of bones and teeth, iron is essential in the making of the haemoglobin in the blood which transports vital oxygen to all the tissues of the body.

3. Protective Foods

Even when provided with body building and energy giving foods human tissues cannot build or repair their living tissues or release energy in the absence of protective substances called vitamins. Their presence is essential for energy production, for normal growth and repair, for health and well-being and for general resistance to any infection. Each vitamin has additional specific protective functions:—

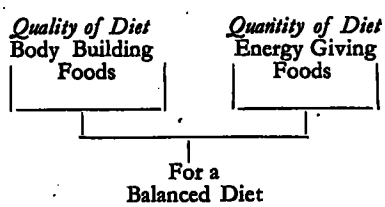
Vitamin A protects the skin, the front of the eye (cornea) and the internal linings of the digestive and respiratory tracts. It is essential for normal vision and the prevention of certain eye disorders.

Vitamin D is needed, together with calcium and phosphorus, for the proper growth of bones and teeth.

The Vitamin B complex, composed of many vitamins, helps to release energy from energy giving foods, to maintain a good appetite, a good digestion and sound nerves.

Vitamin C is specially required for good health because it is part of the material which cements the millions of cells in the body together.

A good diet must, however not only supply all these three kinds of foods thus providing all the required nutrients, but must also supply them in amounts adequate for the individual's daily needs. It is only such a diet that can be called 'Balanced'. The energy giving foods supply the QUANTITY of the diet and the body building and protective foods the QUALITY of the diet.



Consequently, in order to obtain a balanced diet, we must eat these 3 main types of foods each day at each meal. That is exactly what we do by custom, but even so the diets of many people have not got enough variety nor adequate amounts of certain foods to supply all the nutrients they need.

The amounts of these foods needed by the body each day will vary from person to person. For example, the growing child will need relatively more body building foods than an adult because his bones are getting bigger; he also needs more protein for his growing muscles.

Selection of a Diet

The question that now arises is how to select a balanced diet without bothering about exactly what nutrient and how much of each nutrient is found in each particular food. The answer is that the 3 main types

of food are found in the following food groups:—

1. **Energy Giving Food**
   Cereals, fats, nuts, seeds, sugars and yams.
2. **Body Building Food**
   Dried pulses, meat, fish, eggs, milk and milk products.
3. **Protective Food**
   Leafy vegetables, fruit, vegetables and fresh fruits.

and the Golden Rule is to see that at least ONE food from EACH of these groups appears at every meal thus ensuring that all the nutrients are present every day.

Question of Quantity

The next question is how much of each group should be consumed. A safe general rule for planning meals is to see that the BODY BUILDING foods are well represented, making sure that the PROTECTIVE foods are included and letting appetite determine how much of the ENERGY GIVING foods are to be eaten.

With regard to ENERGY GIVING food (i) two cereals or more in the daily diet are better than one. Many eat bread at one meal and rice at another and this is a good habit. Cereals such as Kurakkan, Maize and Sorghum, which are excellent, should also be used in place of rice and wheat. (ii) for fats, gingelly is a good alternative to coconut oil and margarine to butter. (iii) of the sugars, jaggeries and treacles are far more nutritious than white sugar, especially for children.

With regard to BODY BUILDING foods (i) dried pulses, cow pea and mung are grown here and they are the richest vegetable sources of protein. In addition they supply valuable vitamins of the B complex. The vegetarian should take much more of this group than the non-vegetarian. (ii) In the meat-fish-egg group (an excellent source of good quality protein) dried fish is very nutritious and sprats are especially valuable for children and mothers. Eggs or a course, are at best almost a complete food in themselves. (iii) Milk is indispensable for children of all ages and for mothers. It supplies excellent quality protein and calcium, phosphorous and nearly all the vitamins. Some people do not like milk for one reason or another, but they often like curd which is an excellent food. Moreover, curd is slightly acid, and since germs of disease cannot grow in acid, it is safe. Milk is essential for the vegetarian.

With regard to PROTECTIVE foods (i) leafy vegetables are very important for they supply many vitamins and minerals especially iron. They are cheap and can be readily grown in home gardens They should be taken daily at both main meals. (ii) Vegetables, fruits and yams are tasty and carry useful nutrient values. (iii) Of ripe fruits, the yellow-fleshed kinds are better as they have more vitamin A but all fruits have vitamin C. Plantains are always available and papaw is one of the best.

Source: Medical Research Institute

MOTHERS—WHAT YOUR RICE MEALS SHOULD BE LIKE

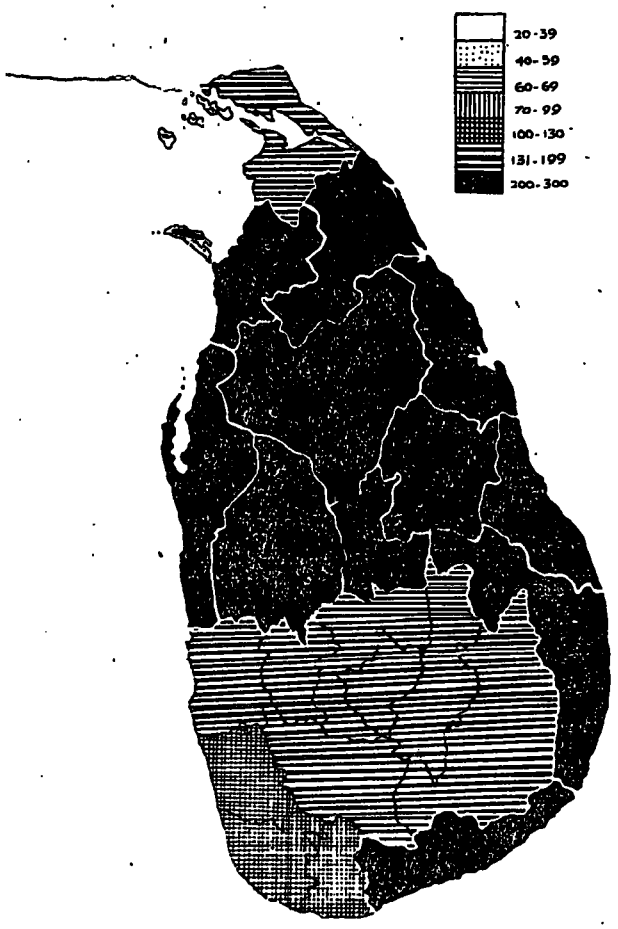
	Selection of foods before cooking	*Quantities of food*	*Quantities given in household measures when serving*
ENERGY GIVING FOODS	**RAW**		**COOKED**
	4 oz. or 1/2 chundu of rice or yams, or rice plus yams	*Either* a plate of rice preferably par boiled *or* rice plus sorghum/maize/yams as rice extenders	3 heaped c'nut spoons (approx. 16 heaped dessert spoons)
BODY BUILDING FOODS	Dried sprats, dried fish, fresh fish, beef, mutton, egg.	*Either* one oz. total helping of any of the foods listed at left. If dried fish or meat only half the quantity is required.	1 dessert spoon sprats, dried fish or small fish.
	Red dhal, yellow dhal, green gram	*Or* if only pulses two ozs. *or* if with one oz. of animal source take 1/2 oz. of pulses.	3 dessert spoons
PROTECTIVE FOODS	Katurumurunga, Kankun, Thampala, Mukunuwenna, Katuthampala, Nivithi, Gotukola, Sarana, Cabbage	One helping of leafy mallun or vegetable leaf curry made from any of those listed or any other available leaf. All those listed are very good and should be taken in quantities of 1½ ozs.	3 dessert spoons or 1 coconut spoon
	Bandakka, brinjals, beans, tomato, ash plantains, jak fruit, carrot, wattakka, breadfruit or any other vegetable fruit	Two or more helpings of fruit vegetable curries made from any of those listed or any other fruit vegetables also occasionally one curry from any yam or potato. Wattakka is very good. Total quantity of any of these —3 ozs.	2 dstspns. each of any two vegetables

first processing units are already operating, and plans call for a full- scale blended food plant by 1979. THRIPOSHA weaning food will shortly be sold commercially in government co-operatives through a system of special price subsidy for people earning below Rs. 200/- per month.

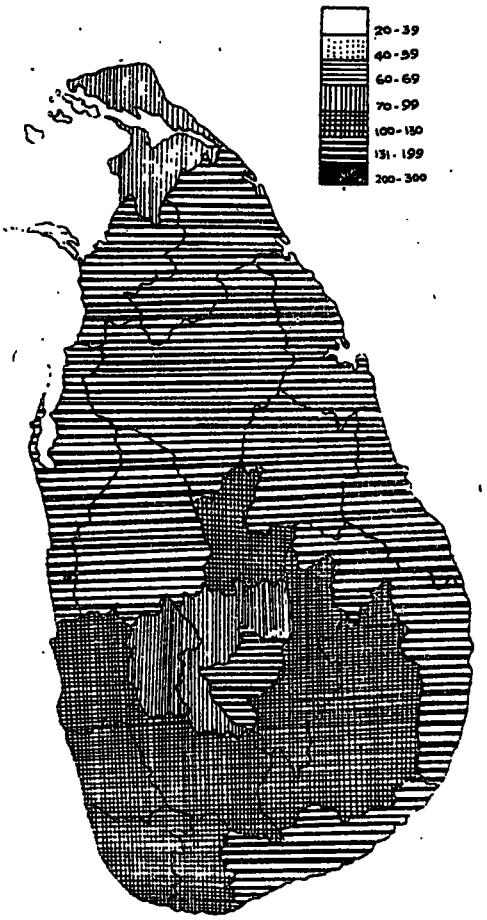
In addition, during the past few years, a WFP 'food-for-work' intervention program, reaching 165,000 families has been undertaken in the drought stricken areas. The control of nutritional anaemias in 160,000 anaemic pregnant mothers is now under way through the Family Health Programme at an annual cost of $54,000 worth of haematinics funded by UNFPA. Further, the current UNFPA population control programme of £1 million per annum though not directly concerned with providing food, is important in alleviating severe malnutrition. The control of Xerophthalmia for the prevention of blindness in children through Vitamin 'A' megadosage will commence once the recently concluded National Nutrition Survey has delineated the need.

The causes of malnutrition are highly complex and their effective control requires a series of interrelated, complementary activities which embrace aspects of health, agriculture, technology, education as well as social, economic and political aspects. Steps have been initiated by the Government to formulate a Food and Nutrition Policy for Sri Lanka. However, the various food intervention programs being mounted by the Government, with the assistance

Child Death Ratio at District Level 1931—1940

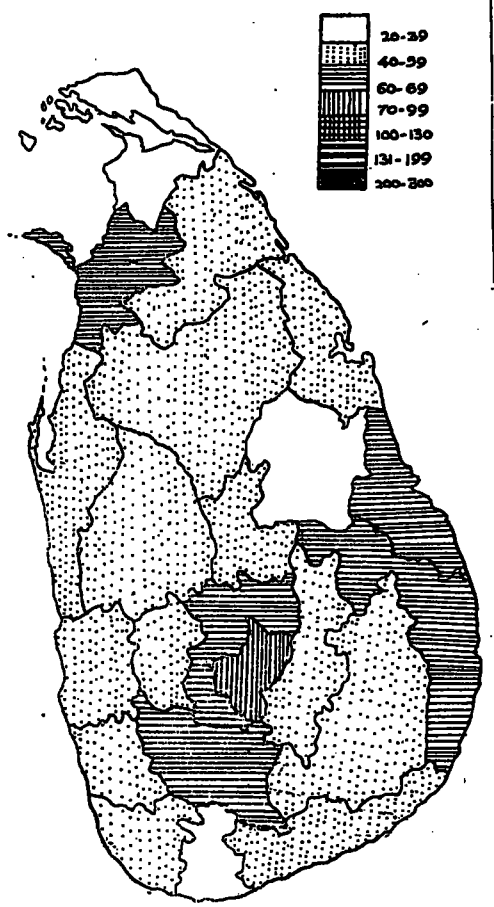


Child Death Ratio at District Level 1941—1950

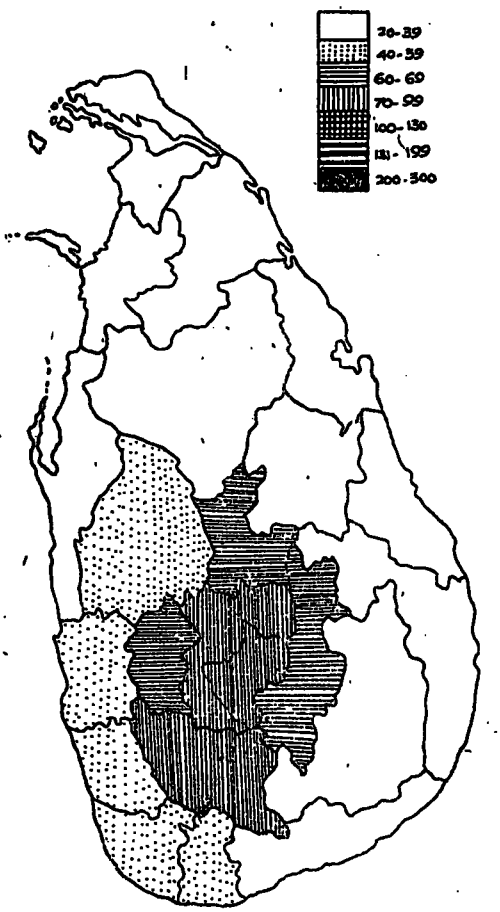


The above illustrations show very vividly the dramatic change in the health and nutrition situation over the last half century. In the 1930's infant mortality was high throughout the country. Nine districts out of 22, including the entire dry zone, were most seriously affected with death figures ranging between 200 to 300 per thousand. By 1974 the situation in these very same districts had so changed that 8 of these 9 districts are today having the lowest infant mortality rates for the country (that is, death figures of only 20-40 per 1000). The other intermediary maps illustrate the changing process. Note also how the Central regions have emerged as the most affected.

Child Death Ratio at District Level 1968



Child Death Ratio at District Level 1974



of international agencies, are helping to meet the minimum national food requirements in the short term emergency situation.

It is necessary to emphasise however, that malnutrition results not only from poor diets but also from poor environment. Malnourished populations are most susceptible to various infections, and such infections further aggravate malnutrition. Poor communities are often caught up in this vicious circle. In such situations, control of infections and improvement of environmental sanitation can often bring about as great an impact if not an even greater one, on the nutritional status of a population as ad hoc feeding programmes operating in isolation.

THE INDIAN SITUATION

The nutritional problems which confront India today are in many respects similar in nature, if not in magnitude, to those confronting many developing countries of the world. The three major factors that generally determine the nutritional situation of any country are population growth, food production and the distribution of food. The population of India, which stood at 361 million in 1951, rose to 547 million in 1971. According to current projections, India's population, even allowing for the most optimistic estimates of the impact of family planning programmes, will touch the 900 million mark by the turn of the century. Apart from the vastness of its population, the age structure of India's population and consequently the dependency ratio are also unfavourable from the nutritional and economic standpoints. Children below 12 constituted 38 per cent of the total population in 1971, as against just under 20 per cent in the technologically advanced affluent countries. It would seem unlikely that the situation will be materially different by the turn of this century.

Food Gap, Not Protein Gap

Extensive surveys among different groups of people go to show that in Indian diets, the major bottleneck is calories and not proteins. Though Indian diets are predominantly cereal-based if these are taken in amounts sufficient to meet the daily calorie needs, the minimum protein requirements will also be usually met. But unfortunately, among the poor communities, even cereals are not taken in quantities sufficient to meet minimum calorie needs. In such a situation, protein in the diets tends to be used by the body in such a way that it is diverted for purposes of providing energy and not for building of body tissues. In effect, then, what India is dealing with primarily is not a "protein gap" as is often made out, but really a "food gap".

Surveys carried out among poor children have shown that 90 per cent of them have calorie intakes well below their minimum requirements, the deficiency being of the order of 300—400 calories daily. The calorie intakes in these children provide roughly only two-thirds to three-quarters of minimum requirements. Thirty-five per cent of the children in poor communities have been found to have a protein intake below the requirement. But, the protein requirement in these children could be met to a great extent if the diets on which they are now subsisting were taken in quantities sufficient to meet their total calorie needs.

Such gross inadequacies in diets are naturally reflected in a high incidence of nutritional deficiency diseases. Using the widely accepted criterion of growth retardation, it has been computed that nearly 65 per cent of toddlers in poor communities in India suffer from moderate malnutrition and 18 per cent from severe malnutrition. The incidence of nutritional deficiency diseases in school children of some poor communities has been found to be as high as 22 per cent.

Malnutrition among pregnant women of poor communities is also widespread. A large proportion of these women suffer from anaemias in the last term of their pregnancy. Such malnutrition has now been shown to be responsible for low birth-weights of infants (small-for-date babies) and to result in a high degree of pregnancy wastage, nearly 30 per cent.

Apart from the immediate effects, the long term effects of malnutrition are now being appreciated. According to some estimates the "quality" of a very high proportion of human resources in India is being undermined because of widespread malnutrition.

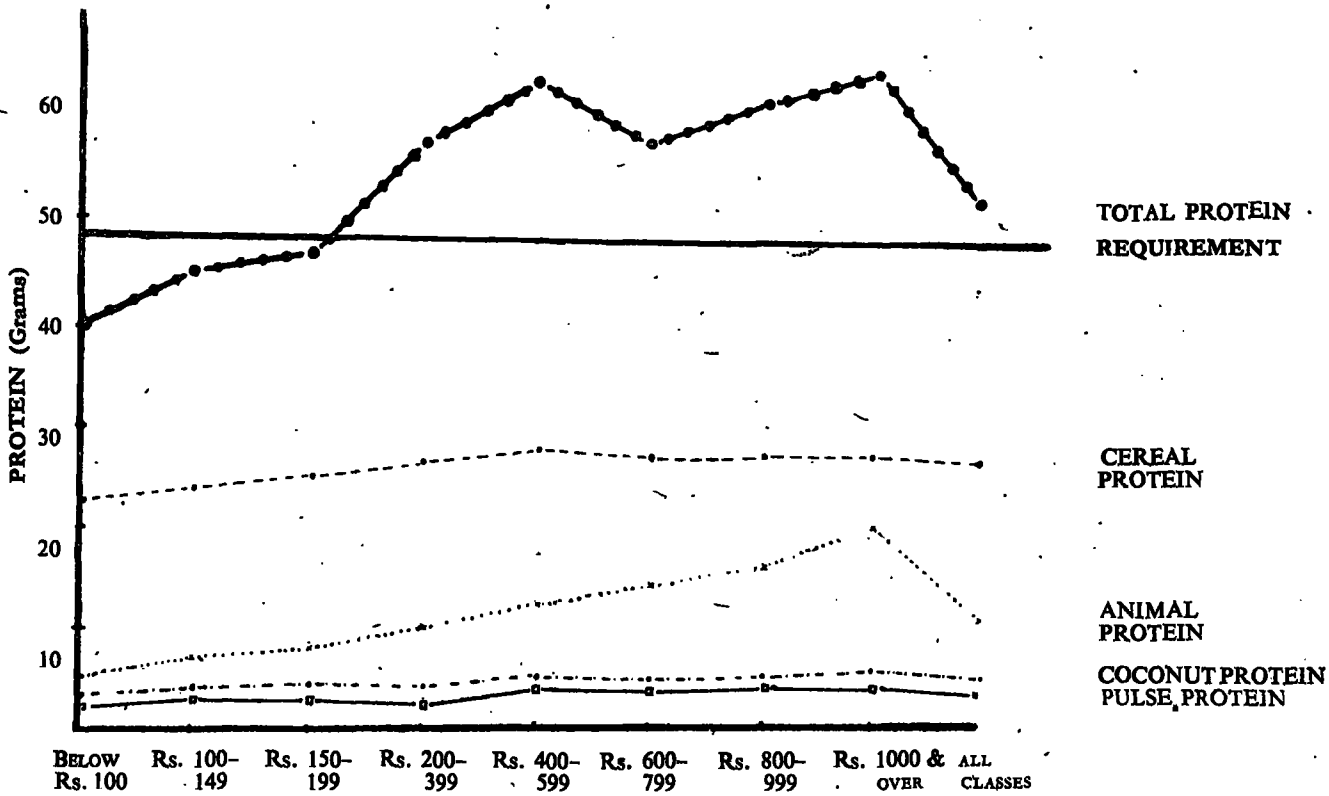
Protein Calorie Malnutrition

The major nutritional problem which has attracted global attention is so-called "protein-calorie malnutrition" in children. The fact which has emerged is that in the current diets of pre-school children in India, the major bottleneck is calories and not proteins. Asian diets, unlike African ones, are largely cereal-legume-based, and cereals and legumes provide a fair concentration of protein. The basic strategy in combating this problem in India is to bridge the "food gap", using the existing diets with marginal improvements in their quality.

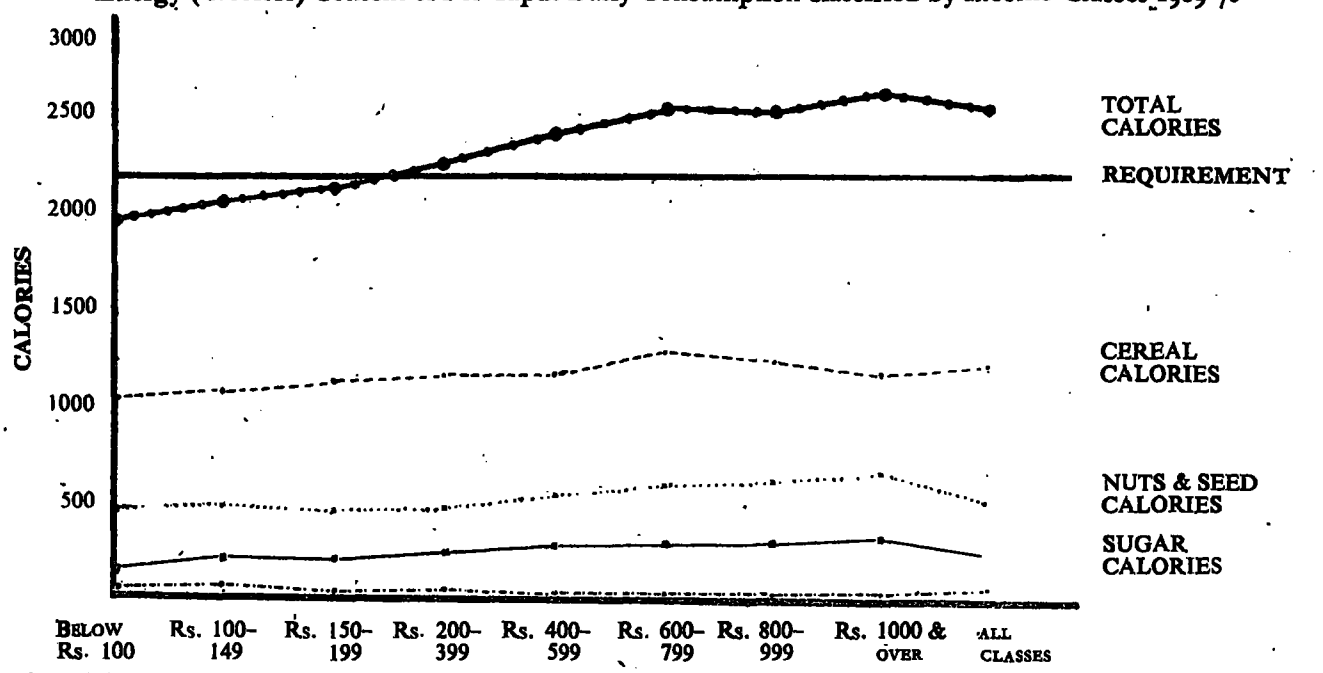
It has been found that in most villages in India, there is no problem of protein calorie malnutrition in these villages which cannot be solved with inexpensive foods available within a radius of 10 miles of the villages. The solution is said to be inexpensive—locally available foods in proper combinations. Several recipes based on such foods, which the housewife can prepare in her home to feed her children, have been set out by the Indian Council of Medical Research.

The Government of India has now started a massive decentralised programme of supplementary feeding of children at risk in poor communities. The supplements are based entirely on inexpensive, locally available foods and efforts are being made to ensure local community participation in the programme. The supplements are designed so as to bridge the calorie gap, using conventional food ingredients.

Protein Content of Per Caput Daily Food Consumption classified by Income Classes 1969-70



Energy (Calories) Content of Per Caput Daily Consumption classified by Income Classes 1969-70



Several studies have also indicated an inverse relationship between family size and nutritional status. In India nearly 70 per cent of all cases of malnutrition are to be seen in children of the birth order of four and above.

On the other hand, it has been found that improvements in nutrition affect the process of family formation in two ways: they alter the size of the family, as well as the quality of the stock of children. Improved nutrition reduces the rate of infant and child mortality; with a lower risk of child loss, the families would be inclined to reduce the number of births. A higher rate of survival also affects the spacing of children. The uncertainty induced by high child mortality rates results in women being forced to bear children through most of their fertile period. But when mortality declines, family formation can be concentrated in an

earlier stage of family life. However, a quick building of the necessary stock of children is possible only when mothers receive an adequate amount of nutrition. Reducing the space between births without increasing nutrition for the mother is likely to increase infant mortality.

In formal terms, better nutrition can be viewed as an outward shift of the family production function, leading to more surviving children. Once the family becomes aware of this shift, there is also considerable probability of a fall in the number of children desired by the family.

A Nutrition Plan

The planning capacity in the field of food, nutrition and agricultural policy in Sri Lanka has not hitherto had a regular mechanism for inter-ministerial co-ordination in policy development. Nearly three years ago there were moves initiated for the development of a Nutrition Plan. These moves, were however, abandoned when the unexpectedly severe food shortages focussed government attention on the problems arising from this emergency situation. More recently, towards early 1975, a National Committee was set up comprising of Secretaries of the relevant ministries to formulate a Food and Nutrition Programme for Sri Lanka. In August last year an FAO assisted mission drew up proposals to initiate the creation of a more effective and integrated programme for food and nutrition policy formulation. This mission observed from the reports it received and from its field visits that there is probably a small core of critically malnourished, but a substantial number (possibly greater than 30%) whose nutritional status is minimally adequate and who are vulnerable to adverse changes in their circumstances — especially employment, harvests, prices, or the level of the ration.

Within this large 'at risk' population there is a range of categories of subsistence. At one extreme, those living in high density areas of the highlands for whom subdivision of limited paddy lands has resulted in effective holdings of 1/4 acre or less, supplemented by cash cropping such as tea, and for whom employment opportunities exist but are increasingly scarce. These families are affected critically by changes in the ration and by inflation. At the other extreme, families living in the dry zone, settled on 2 or 3 acres of unirrigated land, but able to practice "chena" cultivation, to fish and hunt to a limited extent, as well as to obtain occasional employment. For some such people, even the free component of the ration may be of less significance, pawning of ration books sometimes serving as an easy form of temporary credit: prolonged drought conditions being the major cause of hardship.

There is reason to be concerned for the way in which the number of people in these different conditions are evolving and an important task of analysis will be to assess both this and the differential effects of such measures as food rationing and relief schemes upon various categories of people.

> "A well nourished, healthy population reduces the burden on the health services, brings down the spread of disease, raises living standards, improves the care of the young and increases the return of educational and other public welfare investment".

The position is complex, and policy measures are highly inter-dependent in their effects on each other and on nutrition. Yet policy making gives the impression of responding to successive pressures from foreign exchange stringencies and monsoon failures with these responses governed by an extremely sensitive, and no doubt realistic, concern for the political hazards of unpopular policies. The constraints on policy choices are perceived as being severe, yet the need to explore and prepare alternative policies is also felt as is the need to co-ordinate both short run decisions with long run strategies and the programmes of the different ministries.

It is generally agreed that in the long run while increased output is a necessary condition of remedying low food intakes, the strategy pursued must include measures to increase purchasing power, productive capacity and improve the disease resistance and environmental conditions of the malnourished. Since these groups are disproportionately located in rural areas and given their socio-economic characteristics, the scale of the problem, and the limited capacity of other sectors to expand productive employment, the strategy must rely in large part on raising productivity and income within the agricultural sector and within self employment. However, the effectiveness of general support schemes and the provision of complementary public assets e.g. infrastructure, may prove ineffective if the incidence of their benefits is skewed in favour of middle and upper income groups.

Today more people are beginning to realise that there is a deeper and more permanent problem than that of general food scarcities. This is the problem of getting food not merely in adequate quantities but food of correct nutritional value. It is a problem which concerns many millions of individuals who for generation after generation have lived in the midst of the most abject poverty without the means to buy or produce enough food for an adequate level of nutrition, and has continued to suffer all the damaging effects that this has on their health, intellectual development and capacity for work. Particularly pathetic are the large numbers of deprived children among them who suffer from poor diets which affect their growth and learning capacity, leaving them tired, hungry and frequently ill.

It is an accepted fact that the health of a country's economy is tied very closely to the health of its people. The development of human resources is complementary to the development of natural resources; and the productive capacity of the country's people depends upon them both. The energy of an entire nation and its will to work can be at a lower ebb if a larger part of its people are malnourished and suffer from ill health; greater attention to its health services, particularly nutritional aspects, can lift the morale of people and induce higher output in their work. Economic advancement cannot therefore side-track social development and welfare services such as health: the two must advance simultaneously.