

FOOD FOR THE FUTURE : NUTRITIONAL ISSUES AND CONSIDERATIONS

PRIYANI SOYSA

Director General

Natural Resources Energy & Science Authority of Sri Lanka

We are still striving to erase hunger and malnutrition. The global picture is a varied one. Estimates around the world have demonstrated the inequity of distribution of food resources between the developed and developing countries.

Although there is enough food to be shared around, one observes the mountains of butter, skimmed milk and wheat accumulating in developed countries, and cereals perhaps fed to animals, whilst millions starve in the Sahara and go hungry in Southeast Asia.

But even within Southeast Asia, the food scarcity is unevenly distributed. The rich have plenty to eat and those below the poverty line go hungry.

"Food for the Future" would not mean the same for East and West, for the underprivileged and the privileged. The rich foods emerging from industry rather than agriculture in developed countries pose innumerable problems such as obesity, atherosclerosis, coronary heart disease and diabetes. These foods do creep into the supermarkets in our region and tempt the privileged, who too would suffer the same fate of overnutrition as enumerated earlier.

But that is not what is foremost in our minds today. Since we should be considering hunger rather than overnutrition. My task on this occasion is specific to consider the nutritional issues of "Food for the Future."

In this region, in many countries such as India, Myanmar, Bhutan, Bangladesh, Nepal, Indonesia, Sri Lanka and Thailand, people have enormous nutritional disorders. We constitute a quarter of the world's population. Yet this human capital lacks its real potential. 10.5 millions of children are born with a low birth weight; almost 100 million suffer from

protein energy malnutrition; nutritional anaemias affect millions of pregnant mothers; blindness due to Vitamin A deficiency is seen in nearly 10 million children; and the mental sequelae of Iodine deficiency, seen in about 17 million people in this region, cause disability which cripple thousands of children, men and women. Their potential to be useful citizens in the countries of their birth is destroyed.

The common factor running through the developing countries in this region is poverty and poverty begets hunger and malnutrition. It is in this background, that the forecasts for the future have to be made. Food has to be produced and distributed in the required quantities which could be purchased by all those who need it.

If my brief is to consider the nutritional issues then I have to rise beyond my role as a health educationist. There was a time when malnutrition was treated solely within the walls of health institutions. Today nutrition considerations pervade a whole series of multidisciplinary approaches. And I will find time, only for a brief overview of food strategies for the future. My accent will be on food for the hungry.

Food Production

57% of the undernourished people in the world live in Asia and the Pacific. As a result of poverty they have poor access to food. It is a fact that those who produce food seldom consume it but sell it to balance their basic requirements. The poor farmer also lacks the capital for modern technology. The return that he gets for his produce is poor. Some agricultural practices have turned out to be harmful. Arable land is limited.

Sri Lankan data shows that calorie intake rises with the size of landholdings. Only 15% of households in rural

* Emeritus Professor of Paediatrics, University of Colombo.

areas are landless. Then landlessness alone cannot predict poverty and undernutrition even in rural areas.

Modern technology has rapidly improved food production. High yielding varieties of wheat and rice composed what was called 'the green revolution'. The rich farmers had access to fertilizers and pesticides. They also had the modern farming "tools" and techniques.

Nevertheless, developing countries too are expected to be sufficient for their requirements. We hear enclaves in countries of this region for self sufficiency in rice. Yet others have to find foreign exchange for food imports. Natural disasters and political instability have affected their food production from time to time.

Food Industry

Food Industry is not underestimated. In developed countries processed foods fill the market for the convenience of consumers. In developing countries, the urban populations may create a demand for food in a convenient and reliable form but at low cost. For the rural poor, their indigenous crops could be placed on a market for processing and would be income generating and even a source of employment.

Food Consumption and Food Prices

Some countries like India have adopted intensive agricultural technology. Yet they have not conquered their problem of poverty. FAO has for many years tried to build in nutritional considerations into agriculture and food production.

The Norwegian study in Sri Lanka showed that the cultivation of rice by the farmers in the river basin of Kirama Oya in southern Sri Lanka had a positive effect on improving family income. Rice is important nutritionally as well as culturally. Rice is also considered an important cash crop in the area. It can be stored easily and can mitigate seasonal fluctuations in food availability. Improved child nutritional status was associated with the higher paddy yields with the irriga-

tion scheme in the area and an increased consumption of rice.

There are similar reports from other countries e.g. the integrated rural development in India where a milk cattle scheme provided monetary assistance to purchase milk cattle as an income generating asset. Family income and food supply improved there with resulting improvement of nutritional status in children.

These two examples among several other projects in the world prove the importance of income generating projects in improving food consumption among families. More food then must be equated with greater resources of materials and money available to the majority of people.

However, this is not always so. There must be an effort to obtain the correct type of food. If increased income is translated into the purchase of non-food goods, the availability of food is limited. This has happened and programmes have failed with lack of attention to such details as the purchase of the correct foods as mentioned. Among an educated population, nutrition may be a consideration in a decision on household expenditure. Among others, more expensive nutrients may be fancied sometimes. In the Sri Lankan study in Kirama Oya, it was claimed that the fair level of women's education influenced the choice of food. Thus if women have some control over household expenditure, food would be given adequate and correct consideration.

Other studies too in Sri Lanka by the Food and Nutrition Policy Planning Unit, have brought out the role of women's education in improving nutritional status. Further, women headed households showed better nutrition than others. The intrahousehold distribution of food is important as well as the awareness that individual family members are vulnerable to malnutrition such as pregnant women and children. Sometimes the wage earner gets the giant share at the expense of children. It would appear rational to them that he must be the stronger to maintain his earning capacity. This may be true enough. But the needs of growing children cannot be neglected.

Next, the effect of an increased output of food must influence the market supply so that there is a price reducing effect. This has to change food consumption patterns within households. Hence the price of food requires consideration.

FAO and the World Food Council have for many years suggested the build up of nutritional considerations in agricultural development. But in many countries, such planning is not necessarily given a thought.

Household Food Consumption Patterns

40% of Sri Lankan households do not consume the required calories. Food accounts for 74% of the total expenditure of households across the entire population. It approaches 80% for the poorest 20% of households (D. Sahn). It relates to the link up of poverty and hunger in a poor country. Sometimes, there is also a higher price paid per calorie and this reflects a shift towards more prestigious foods. This is very much the scenario in the urban area.

Next, intra household food distribution is important. In any culture, mothers serve themselves last. But it has been observed by Edirisinghe *et al.* that in Sri Lanka, although she eats last, she serves herself along with the other members of the family. This observation could not be universally applied. Perhaps, this would be obtained in an educated setting. In poor families, it may be that the preschool child is deprived, mostly because he himself makes no bid for food. He is anorexic, retiring and not aggressive. The older ones are hungry and grab more than their fair share. In Sri Lankan studies, it has been observed that across the lowest socio-economic sector, the families with educated mothers had the least manifestation of malnutrition.

To mitigate this, on site feeding is proposed for the poorest of the poor. But such programmes are often nullified because the reaction then is to refrain from eating at home. Thus it ceases to be supplementary feeding and the diet continues to be inadequate.

Whilst on the subject of food prices and food consumption, an item of recent interest has been a new

indicator providing an early warning drought monitoring system in areas of food shortages. This is of importance in the area of nutritional surveillance in view of the need for buffering of the poor to structural adjustment programmes. The market place is used as a sentinel site. A food related index which is appropriate to the vulnerable groups would be the price of staple at the local market. This approach is based on evidence that sharp increases in the price of food lead to lower food consumption by the poor and hence a worsening of the nutritional status. Personally, it strikes me as a laudable proposal advocated by the ACC/SCN.

Livestock Production

Livestock products can swell protein supplies especially eggs which not only provide income to small farmers like women but also are relatively inexpensive. However infections can cause heavy losses. Veterinary services can control disease and help in providing food for the future.

Some governments have embarked on importing cattle for breeding exotic animals that finally fail to adapt to local climatic conditions. Breeding systems are better adapted for local animals. Strategies should support the cultural requirements of the community.

Developing countries should expand their interest on this line utilizing crop residues and wastes for animal feed.

Fisheries

Fish provides an important source of animal protein. In coastal areas, fishing has been a livelihood for generations. The traditional fisher folk are poor and undernourished. Improvements in fishing technology are not available to them. Although in some countries of this region, this is most advanced as in Japan, in many countries these resources are dwindling. Thailand has effectively developed inland fisheries. However, most developing countries require the knowledge and expertise for the optimum use of these resources. Industrial effluents, fertilizers and pesti-

cides pollute not only lakes and rivers but also the seas around the coasts.

The best use of this resource has not been utilized in feeding the populations of this region.

What is the role of *food subsidies* in providing food access to people?

The example of Sri Lanka is illustrative. For many years there was a system of rice rationing which ensured a just distribution of the local staple. This has been described by well renowned nutritionists as a nutrition intervention which has been unsurpassed in Sri Lanka. However, this had terrific economic repercussions. 15% of government expenditure in Sri Lanka went to food subsidies -- on rice, wheat flour and sugar.

Thus the food stamp scheme was evolved resulting in a substantial governmental saving. About 50% of the population are beneficiaries. It is not entirely satisfactory because there are leakages viz. higher income households have benefited to around one-third of the subsidy outlay. Further, some malnourished families have not received any benefit.

Examination of the choice of foods shows that rice was the most popular. Other foods were wheat flour and bread, coconuts and sugar. Although milk foods were offered for the exchange of stamps, these were not so valued.

Another problem has been that with inflation the real value of food stamps has diminished. In summary, the impact of food stamps has been marginal, from the earlier observation of 1,364 calories to 1,540 calories among the bottom 20%.

Thus there is great scope for improvement of the design of the programme. However, this could incur political opposition.

Food subsidies could be considered as temporary though important means to ensure that the poorest of the poor can obtain their nutritional requirements. To be cost effective they must be well targeted.

In many countries, subsidized foods are available to the poor through fair price stalls. Such programmes have to go on for a while in developing countries.

Food Aid has been the subject of much discussion and was an important agenda item at the SCN in the years when I was functioning as an Adviser there. Presently it amounts to over US 2.6 billion dollars a year.

In my consideration of nutritional issues, it must be stated that food aid has a definite impact on nutrition. Food aid in cereals has declined and is perhaps at its lowest level but is marginally above the target of million tonnes set by the World Conference in 1974.

There can certainly be no controversy about emergency food aid which has flown into many countries affected by natural or manmade disasters. FAO reviews World Food Security and has proposed a moral commitment to governments, non-governmental institutions and individuals for ensuring adequate food for the future.

Food aid can reduce the market price of food for the poor. It can provide the means to market intervention programmes. Two such useful programmes are *food for work* and supplementary feeding (Kennedy and Pinstrup Anderson).

An example of this was seen in the Mahaveli Development Programme in Sri Lanka where the duration of supply of Food for Work was shown to be related to the nutritional status of the settlers. Thus a flow of Food Aid for two years was recommended to maintain a state of nutrition which was earlier found to be much lower than the national average.

There are such reports from other countries too. The Bangladesh and IFPRI study however suggests that there is need to analyze this policy although the programme definitely revealed a reduction in indebtedness during the food-for-work period.

Certainly food aid must take questions of cultural acceptability of food and leakages into the local markets as points for consideration.

Supplementary Feeding Programmes have also been reviewed by ACC/SCN with the discussion paper by Beaton and Ghasseimi. In Mexico, it had been shown that perhaps a critical increase of 100 grams in birth weight was achieved through antenatal supplementation of mothers. In India too, the birth weight of infants born to mothers supplemented in the antenatal period was higher than those of infants born to other mothers.

However, much criticism is levelled at these programmes because of leakages and poor targeting. The beneficial effect cannot then be demonstrated. Supplementary feeding programmes have to go on until an alternative can be suggested. Their withdrawal could well precipitate more serious prevalence of malnutrition.

Food Technology

In earlier years, there was the emphasis given to proteins in food. Protein deficiency was highlighted. The protein Advisory group turned its mind to single cell proteins. Industry turned its interest to producing fish protein concentrates and their like. However, work in this region, specially in India, showed that in fact, there was only a marginal calorie deficiency in the diets. By correcting the calorie deficit, malnutrition could be eliminated.

Most countries in this region are on cereal legume based diets. This is culturally acceptable to most of the religious communities in the region.

The combination of rice and legume provides for an adequate array of amino acids which may be lacking in either alone (for e.g. lysine which is missing in rice is available in legumes).

However, specially for children, they pose a problem of bulk. Technologies that are simple yet reducing bulk would help to feed children the quantities that will meet their deficiency.

Formulated foods have been produced at commercial, village and home level. Multimixes have been advo-

cated on simple culinary techniques. What is done at village level is the production of such mixes of ingredients by local milling as in Thailand. Even commercially, extrusion processes have produced cheap formulations within the purse of poor working women.

The International Soybean Programme (INTSOY) has popularized the extrusion cooking of beans followed by breaking down of the oil bearing tissues. The nutritional value is preserved without scorching and the antinutritional trypsin -- inhibitor factor reduced by 90%. It is also free of the beany flavour. This protein rich meal with 6% residual oil minus 90% of trypsin inhibitor can fortify wheat flour. Soya rich bread could be baked. This work has been popularized in both India and Sri Lanka.

Further, this soya meal can be mixed with maize which can be grown in Sri Lanka unlike wheat. There are proposals to make bread following several such recipes using locally grown cereals and pulses.

The accent in the past in agriculture was rice production. There is new thinking in promoting legumes and pulses.

Work in Baroda in India by John and Tara Gopaldas has been aimed at reducing bulk in gruels made for children by adding an amylase rich food (ARF). A catalytic amount of ARF, a germinating cereal flour added to a hot thick gruel was acceptable to children 6 - 24 months of age.

Calsberg Research Laboratory has produced weaning food with improved energy and nutrient density from germinated barely.

These applications of food technology have practical application in solving growth problems in infancy this region. For instance, in Sri Lanka, malnutrition commences after the sixth month in infancy due to poor infant feeding practices. Low cost weaning foods have tremendous application in this context.

The concept of a formulated or blended food was developed in order to provide the special dietary needs

of the infant over six months based largely on a mix of vegetable proteins. This was developed by the Central Agricultural Research Institute in Gannoruwa and the feasibility trials regarding use were done in our unit at the Lady Ridgeway Hospital for Children. The composition and nutritive values are as follows and a vitamin formulation was added.

Raw Material Composition(%)		Proximate Composition (%)	
Rice flour	48.8	Moisture	4.82
Soya flour	30.4	Protein (N x 6.25)	20.69
Green gram flour	10.0	Fat	8.40*
Sugar	10.0	Fibre	1.28
Vitamin mineral premix	0.8	Total Ash	2.57
		Carbohydrates	62.20
		(By difference)	
	100.00		100.00

* (2.5% Linoleic acid)

Net protein utilization was 79. This was used on basis attending our "Well Baby Clinic" (follow up afer birth) and found to be satisfactory.

Several other formulations would be available from international recipes. The initial growth failure could be stemmed with the use of such foods.

Food Fortification

Micronutrient deficiencies in this region such as iron and iodine can be swept away in one swing by food fortification.

Fortification of a carrier like salt is possible by spraying with iodine whilst in the crystallizing process. In Sri Lanka, there is a cultural practice of washing kithchen salt before use and thereby any coating of salt with iodine could be lost before use. However, it could be well incorporated into salt whilst crystallizing, and this technology has been used in a project area with endemic goitre. However, unless all salt is so prepared, it is difficult to demonstrate results even in a project area covered with an education programme. The poor who really need iodine will still choose the cheaper packet of noniodised salt.

Endemic areas of goitre in India and Nepal are also working with iodised salt to solve large problems of endemic goitre and cretinism.

However projects of iron fortification though laudable in preventing nutritional anaemia in pregnancy have not been as popular.

In Brazil, Vitamin A deficiency was solved by the fortification of sugar. However, there has been no such interest in this region, though other Vitamin A programmes such as megadoses and educative programmes on the value of dark green leaves and yellow fruits and vegetables are constantly receiving attention.

Food Contamination and Safety

Food for good health must not only be available in sufficient quantity its nutritional content must be adequate. It must be safe for consumption by safe guarding it from contamination with infection, with herbicide and pesticide residues, pollution during production, processing storage and distribution.

The causation of food borne diseases include mycotoxins and additives which are carcinogenic agents. Diarrhoea initiates and intensifies malnutrition. Agricultural and economic implications of food production include the development of protein rich foods based on peanuts, cotton seeds, soya and other plant sources for the alleviation of malnutrition. Basically, good harvesting, drying, handling, storage, transportation and distribution procedures prevent the formation of mycotoxins.

Food safety also includes clean food vending through migratory and street vendors, hygienic take away food parcels and mass catering ventures.

The work of Codex Alimentarius, FAO and WHO extend to food standards for industry, labelling for better information and choices, and prevention of dumping of contaminated or substandard foods.

WHO estimates that only a fraction of global food borne disease is recognized. Water certainly is incrim-

inated as the source of transmission of diarrhoea. But food is now considered as a source of diarrhoea. This aspect has been amplified with poor and unscientific deep freezing. Chicken and other poultry can harbour salmonella inside the carcase if not correctly frozen. Storage of cooked products along with raw meats can be another cause of contamination. Food habits have changed even in the developing world, resulting in food borne disease due to mistakes in handling and storage, for example of fast foods.

Contaminated animal feed can also lead to an increase in food-borne diseases.

Health education on food handling and the standards expected by consumers must be well publicized. The provision of food inspectors and legislation on food safety cannot be prioritized in poor countries. On the other hand, chemical contamination can be prevented by enforcing legal standards. In actual fact, the hazards in food are mostly the result of poor food handling rather than by chemical agents. Primary health care workers need to educate families not only on nutritional aspects but also on food hygiene.

Almost every form of food processing including chilling and deep freezing marginally reduces the content of vitamins, proteins and fats. But processing makes larger amounts of food edible. Hence finally the disadvantages are offset by the advantages. Variety in the diet ensures good nutrition. The public outcry against preservatives has introduced the risk of earlier spoilage. Good packing reduces the risks of bad food handling. However costs of better packing prevent its wider usage. Foods of this nature are widely available for the affluent but would not be relevant to those living marginally in hunger.

Women and Nutrition

Today's programme designed by FAO has been around women. Our chairperson and the women scientists have been selected to compliment the role of women. It is an opportunity too to stimulate women farmers. I have recently written about nutrition for women the specific needs through their lifespan

women are not only reproducers, they are the producers of food in all aspects and in many ways.

The resurgence of interest in traditional values such as health foods has recaptured an interest in breast feeding. Human milk is the first food for the human species and its value is unique. Thus in any discussion of food and nutrition, human milk must have pride of place. But it is the nutritive value that tends to be assailed by modern industry. This is not the occasion to enumerate all its advantages. Let its emotional and immunological value suffice if not its economical value for the whole world. Imagine for a moment if human milk did not meet the nutritive requirements of generations of infants, what a crisis would occur;

A working woman with access to enhanced economic resources could provide nutritious foods, especially the more expensive protein sources. It need not necessarily be so, if she spent her money on fine clothing and prestigious processed foods, not of nutritive value. This same economic strength could be used with advantage in decision making at home level. She could with acquisition of knowledge of nutrition spend her money wisely on better food and nutrition for the family. She could even improve her culinary skills for better storage, preservation and household processing of food for the nutritious benefit of her family.

It is the woman who often looks after the home garden and the kinds of food poor people eat. In their absence, this resource would be lacking leading to poor family nutrition. They grow tomatoes, egg plant, gourds, pumpkins, various kinds of beans, yams, green leaves. They provide a rich source of Vitamins A and C, additional amino acids and calories. Women plant cassava in Nigeria and Indonesia and this is a good source of calories to fill that gap in the average developing country diet. Cassava is the best crop for poor soils; it grows with minimum or no attention. Traditional cooking practices such as grating make cassava more protein rich than urban nutritionists realize.

Women in rural areas have also been gatherers of wild plants and fruits, which can be a most vital reserve in times of drought.

Women are engaged in fishing in rivers and streams. Women dry fish, smoke vegetable and animal produce and even trade these in open markets.

Women are primarily responsible for small animals such as chickens, ducks, goats, and even pigs. They are kept in the home compound.

Milk is also handled by women. They make curds, whey and cheese, and may not only engage in trading these but use them for bartering for food. This is a useful practice for poor communities because certain individuals may favour producing a particular commodity; whilst others have another preference. It is a practice that could be encouraged within a community.

Fuel is expensive but is crucial for culinary purposes. It is often the limiting factor for efficient purification of food, including that of infants of children. It cannot be overstressed that a household cannot economize on this procedure but rather reduce or combine the varieties that are cooked for a daily meal.

Alternative technology suggested for conservation include fuel efficient stoves, hay boxes, biogas, solar cookers and local adaptation of pressure cooking.

Simple culinary technology that preserves the nutrition value of foods must be a further point of importance in this area. Soaking of legumes obviates any unpleasant beany taste. It also reduces the time and fuel spent on boiling. Roasting and rolling with a 'pin' removes the husk of green gram and reduces the possibilities of indigestion. Many varieties of cassava have hydrogen cyanide which is removed by grating, drying or leaving the pan open when boiling.

Parboiling of cereals preserves certain nutrients that are otherwise lost in pounding and milling. One-sixth of the total rich rice produced in the world is parboiled. Thiamine is thus retained. Drying in the sun hardens the outer coat and makes it resistant to insects. On the other hand, if moisture is retained, aflatoxins can be produced.

Fermentation of cereals, beans, starchy roots, fruits and vegetables is common in Asia and the Pacific. These processes improve the nutritional value and digestibility. Toxins are reduced or destroyed.

Changes are coming slowly. The first Asian household nutrition appropriate technology (proceedings compiled by Ron Israel -- sponsored by Sri Lanka Government, IUNS, AID, UNICEF and INCS) brought together suggestions for technological improvement and research in the areas of family food gardens, food storage, processing, preparation, preservation and culinary technology, weaning foods and appropriate supplementation technology and food sanitation. Recommendations were developed on policies and programmes, training, information exchange and networking. On this occasion, Jelliffe and Jelliffe remarked: 'Recent years have shown increasingly that many long established practices in rural communities have benefits which have been under-appreciated. For example, the traditional rather unkempt-looking multi-dimensional gardens in many tropical areas represent not only important sources of many additional nutrients to the family but also can help with income generation, can be self-sustaining as regards soil fertilization, can supply some food for domestic animals and can help improve the attractiveness of the surroundings. They are, in fact, self-sustaining scientific systems based on hundreds of years of practical experience. Modern science and traditional science are complementary. This is the case with regard to what has been termed "household appropriate technology." That is the technology needed to improve the small-scale production of foods in home gardens, for storage, preparation, cooking and serving of foods at the family level. For example, the huge losses of cereal grains and legumes to rats and insects after harvesting can be greatly diminished by scientific, low cost improvements to small traditional home granaries -- the effects of which can then be tested scientifically.'

'In addition, domestic "task analysis" can employ the scientific methods previously used by industry and cultural anthropologists to assess a village mother's

activities, especially time and hard labour, in the complex sequence that goes into collecting, preparing and storage of appropriate food mixtures for young children in poor circumstances.' Capital intensive technology will not help them for decades. It is the community control over local resources which must be nurtured to give women self-reliance. Thus policies and programmes seeking to improve the nutrition status of the world's poor must acknowledge the significant role that is played and can be played by women at the domestic level. It is when 'Cinderella evolves from her ashes' that being freed from household drudgery, she can have better access to education, health and family planning.

The time is ripe now for third world researchers to look at their own traditional cultures that can produce innovations in a style appropriate to a non-industrial society. Community developmental models are rediscovering the potentialities of folk knowledge.

What is more opportune is to give women the training to redesign the traditional mechanical devices. Women have creative skills and they must be included in modifying these tools that will reduce their own workload. They could contribute to reduce post harvest losses through rodents, insects and moulds.

Future Strategies for Food

My thoughts have already intermingled the present with the future; continuing in the same vein and focusing first on women and nutrition considerations, one has to create awareness among women on their future role. Most of the families who need help are already living to the limit of their resources. Extension workers may have enthused and motivated them. But they need 'seed money' to provide the initial subsidy to allow the new ideas to take root in the community. This is where *poverty alleviation* programmes such as that in progress in Sri Lanka could produce income generation without creating too much dependence but stimulating local initiative and full community participation.

Nutritionists who try to improve the ancient arts and sciences must not lose sight of the connection between

the various technologies. The development of a home-based weaning food is dependent on existing fuel resources and food hygiene in the home. In fact, education on all aspects of food hygiene in preparation and storage must reach all levels of society.

Addressing women farmers, the advocacy of using green leafy vegetables as a potent source of Vitamins A and C is dependent on adequate water for its bloom. Home gardening may not be easy to introduce and requires a relatively long-term investment of labour which has to be shared within the family, perhaps within the community. But it is a key intervention for food for the family and provides a basis for self-reliance, self care and is away from crisis-oriented actions. A garden of 500 square metres will contribute a significant amount of household needs in a multifaceted fashion.

Task analysis must be emphasized in making household nutrition technology as a pragmatic component of nutrition education. In some quarters there is resistance to training women in nutrition and it is looked upon as a stalemate. It is an interdisciplinary intervention combining the work of home economists and social scientists. The time and energy women spend on these food related activities must be studied in their correct perspective of the social obligations and life of the family. Some of these activities are seasonal, such as harvesting. Brandtzed reports that women spend hours on food processing, pounding and cooking. Therefore modern practical inputs into this area must compose a part of nutrition education of farmer communities.

There is an overemphasis on food taboos. Sai sums up as follows: "Although taboos and avoidances are interesting, it is not clear that they have an adverse influence on overall nutrition." Nevertheless, it is not unwise to include in nutrition education, aspects of food in pregnancy and lactation, the use of colostrum and dispel fears in the minds of mothers about aspects of infant feeding.

Women farmers toil unpaid and perhaps acknowledge only on occasions such as today -- the World Food Day 1990, FAO, Bangkok. Women farmers need the new

technology and cannot be excluded from participation in the modernization process of agriculture. As in Taiwan young women must be intergrated into rural development and agriculture. Women are less likely to siphon off income towards non-essentials and prestige enhancing goods.

Kumar states that in small-holder agriculture, programmes that recognize the importance of women's activities in agriculture, their knowledge and their decisions, productivity and gains increase. If women's roles are not recognized, women become marginal participants in the agricultural process as they are not able to increase their productivity. We therefore hail today's recognition of women farmers as a significant step FAO has taken towards the future. Agricultural planners have to organize appropriate training for women as well as support services in order to provide opportunities for productivity of food in their small way.

Scientific developments promise great strides in increasing the world food supply. Genetic engineering will revolutionize food production. But the question is whether food at that price will be available to the hungry in the developing world. Certainly a switch over to the scientific advances may be out of reach of poor countries.

Inter cropping and mixed cropping could favour nutrition. It has been stated that the most significant nutritional impact of agricultural research would be in changes in food prices and food availability rather than through the nutrient composition of grains (Swaminathan). Though international developments of high yielding varieties have produced improvements in the protein content of rice, countries like Sri Lanka lack fertilizer. Price hikes in fertilizer cannot always be matched with subsidies for poor farmers. Hence the local proposition is to think of moderate yields with moderate inputs.

Even improvements of rice straw have great possibilities for animal fodder in pastoral communities.

Swaminathan proposes the enlargement of the concept of food security into nutritional security by a three

pronged approach of higher productivity and lower price, appropriate changes in cropping and farming systems and planned nutrition interventions.

Population Demands

We have already stated that global food production is sufficient for the world's population. We are mindful of the inequity of distribution. The large population in this region have no reserves of cultivable land. Effective population policies have to keep the head count down to equalize the food requirements of the future. UNFPA forecasts however are pessimistic.

Large countries in this region like China and India with different political system have tried to avoid famine situations. India's success in self sufficiency have staved starvation but yet there is malnutrition. China has guaranteed some food to all.

Whatever the political system, governments have to be committed to a *food strategy*. The World Food Security is defined as ensuring that all people at all times have physical and economic access to the basic food they need.

In reducing malnutrition the following need attention:

- i) efficient marketing and distribution systems in relation to food consumption and nutrition.
- ii) reduction of post harvest losses.
- iii) infrastructural needs for food storage, transport and distribution.
- iv) stabilization of consumer prices.
- v) market information system for farmers and consumers.
- vi) food consumption programmes like "food for work", home gardens.
- vii) food subsidy alternatives.
- viii) nutrition education and training.

- ix) integrated nutrition health packages.
- x) food fortification programmes.

It was the World Food Conference in 1974 that highlighted the nutritional considerations in agricultural development. Until then the malnourished were left in the care of paediatricians like me. Now a host of disciplines have combined through the United Nations to save the hungry. Through the annual FAO World Conference campaigning against hunger and poverty, the world community responds to famine situations. But the chronically undernourished remain within our region and my shores.

The problems of the present command so much of our time, our patience, our efforts, that we might appear to be unprepared for future developments. There are many challenges many of us in this region will have to face. It is only by joining hands across the oceans that countries can resolve the questions for the future. It requires more than moral commitment. The hopes of the World Food Conference may then come true.

References

1. Sahn, David, Food consumption Patterns and Parameters in Sri Lanka: The Causes and Control of Malnutrition, International Food Policy Research Institute, Washington D.C., November 1984.
2. Holmboe-Ottesen, G., Wandel, M., and Os-
haug, A., Nutritional Evaluation of an Agricultural Development Project in Southern Sri Lanka, Food and Nutrition Bulletin, Vol. 11, No. 3, 1989, The United Nations University.
3. Ahluwali, N., Wadhwa, A., and Sharma, S., The Effect of Income Generation through the Integrated Rural Development Programme on the Nutritional Status of Children under Six years Old in India, Food and Nutrition Bulletin, Vol. 11, No.2, 1989, The United Nations University.
4. Edirisinghe, N., The Food Stamp Programme in Sri Lanka: Costs Benefits and Policy Options, International Food Policy Research Institute, Washington D.C., December 1985.
5. Suggested Approaches for Nutritional Surveillance for the Inter Agency Food and Nutritional Surveillance Programme SCN Report, Food and Nutrition Bulletin, Vol.11 No. 2, 1989, The United Nations University.
6. Kennedy, E.T., and Pinstrom Anderson, P., Nutrition Related policies and programmes and Research Needs, IFPRI 1983.
7. Beaton, G.H., and Ghasseimi, H., Supplementary Feeding Programmes, UN/ACC/SCN, 1981
8. Naik, Gopal and Gleason, Jane, E., An Improved Soy processing Technology to Help Alleviate Protein Malnutrition in India, Food and Nutrition Bulletin, Vol. 10, No. 4, 1988, The United Nations University.
9. Pederson, B., Hansen, M., Munch, L., and Eggam, B.O., Weaning Foods With Improved Energy and Nutrient Density prepared from Germinated Cereals, and Nutritional Evaluation of Gruels Based on Barley. Food and Nutrition Bulletin, Vol. 11, No. 2, 1989, The United Nations University.
10. John, C., and Gopaldas, T., Reduction in the Dietary Bulk of Soya Fortified Bulgur Wheat Gruels with Wheat Based Amylase-rich Food, Food and Nutrition Bulletin, Vol. 10, No. 4, 1988. The United Nations University.
11. Barna, D., and Kaferstein, F.K. The Role of Food in the Epidemicology of Acute Enteric Infections and Intoxications, Report of WHO Meeting, 1983.
12. Soysa, Priyani, Women and Nutrition, World Review of Nutrition and Dietetics, Vol. 52, Editor G.H. Bourne, Publisher Karger, 1987.
13. Jelliffe, D.B., and Jelliffe, P., Proceedings, First Asian Household Nutrition Appropriate Tech-

Contd. on Page 17

nology and Conference edited by Ron Israel
USAID, Washington D.C., 1981.

14. Brandtzed, B., Women and Post-harvest Food Conservation, Food and Nutrition Bulletin, Vol. 4, 1982, The United Nations University.
15. Kumar, S., Analysis by Gender: A Context for Planners, Horizon, 4(1985).
16. Swaminathan, M.S., Nutrition and Agricultural Development New Frontiers, Food and Nutrition Bulletin, Vol. 10, No.1, 1984, The United Nations University.