



**NATIONAL  
SCIENCE  
FOUNDATION**

## **Thematic Research Programme on Food Security**

### **Theme Paper**



**Prepared by  
National Science Foundation**

**2011**



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# National Thematic Research Programme on Food Security

## Introduction

A nation's population having physical social and economic access to sufficient, safe and nutritious food that meets their dietary needs (for adequate growth, development and maintenance) and food preferences for an active and healthy life, at any given time is considered to be food secure (FAO, 1996; FAO, 2002). Household food security is the application of this concept to the family level, with individuals within households and families as the focus of attention.

Food insecurity exists when people do not have adequate physical, social or economic access to food. Undernourishment exists when caloric intake is below the Minimum Dietary Energy Requirement (MDER). The MDER is the amount of energy needed for light activity and to maintain a minimum acceptable weight for an attained height. It varies by country and from year to year depending on the gender and age structure of the population (WFP, 2007; WFP and FAO, 2010).

## Present status

Based on the latest available data, the total number of undernourished people in the world was estimated to have reached 1,023 million in 2009 and was expected to decline by 9.6% to 925 million in 2010. Developing countries account for 98% of the world's undernourished people and have a prevalence of 16% undernourishment. This is a decline from 18% in 2009 but still well above the target set by the Millennium Development Goal (MDG) 1 (WFP, 2007; WFP, 2010 and FAO, 2010).

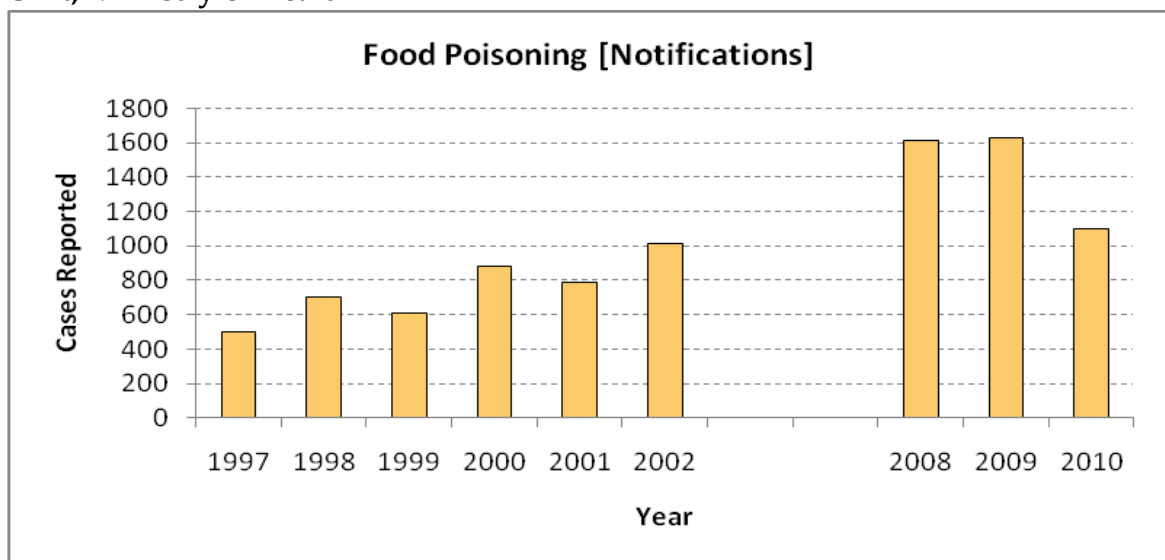
In 2004 -2006, the MDER for Sri Lanka was 1,810kcal per person per day, while the average daily per capita dietary energy requirement (ADER) for the country was 2,310kcal. The daily per capita calorie requirement for the country (caloric norm) was calculated on minimum per capita calorie requirements by age and sex obtained from medical research studies. Thus, on the basis of age and sex distribution of the population and food consumption data gathered in HIES 2002 2,030kcal was set the nutritional anchor for the official poverty line (OPL) of Sri Lanka (FAO,2010).

The total population of Sri Lanka was 20.65 million in 2010, with a 0% annual growth rate (WFP, 2009; FAO, 2010). According to the 2006-07 Household Income and Expenditure Survey (HIES) carried out by the Department of Census and Statistics, over 15% of the population lived below the poverty line in 2006 (DCS, 2007; WFP, 2009). The undernourished population of the country

was 19% in 2007 (WFP, 2009) and in 2009 this has risen to 22% (Trading Economics, 2011; FAO, 2010). The 2006-07 HIES reveals that the average poor person consumed about 1,696 kilo calories (kcal) per day, significantly below the recommended norm of 2,030kcal, in 2007, while a non-poor received 2,194 kcal. Of the total population, 50.7 % received less dietary energy than that set as the minimum level required. The urban poor were among those with the highest calorie deficits, consuming about 1,316 kcal per day, while the rural poor and the poor in the estate sector consumed about 1,686 and 1,984 kcal respectively (FAO, 2010). Even though consumption of total protein has gradually increased, which is 55.2g/person/day in 2007 (WFP,2009), there is a high incidence of malnutrition in Sri Lanka, and according to UNICEF, 29% of the children below age 05 do not have the recommended weight for age and 14% are suffering from wasting (Global Hunger Index, 2010). However, the WFP figures for 2009 are somewhat different from those of UNICEF, the percentage of children below age 05 who are underweight being 22%, stunting being 18% and wasting being 15% (WFP and FAO, 2010).

One of the reasons for significantly high incidence of malnutrition that prevails in Sri Lanka, which is three times as high as what would be expected from a country with Sri Lanka's level of infant mortality, thus considered a condition of paradox, is food borne illnesses (WFP, 2007). The notifications received by the epidemiology unit of the Ministry of Health on food poisoning cases are given in Figure 1.

**Figure 1: Reported number of cases of food poisoning to the Epidemiology Unit, Ministry of health**



Source: Epidemiology Unit, Ministry of Health

In year 2000, 700 deaths were reported due to diarrhoeal diseases in Sri Lanka (WHO, 2003). In year 2004, it was 900 (WHO, 2008) and in year 2008 the total deaths due to diarrhoea was 1,100 in the country (WHO, 2011).

According to the Government, floods and landslides across the country affected more than 2 million people and displaced close to 700,000 in January and February 2011. Extensive crop losses have been reported with critical effects on the 2011 Maha harvest (Jan-Feb) and to the April Yala planting season. Assessments have identified deteriorating food security conditions due to loss of income and devastated livelihoods and rising food prices. Humanitarian assistance is targeted to the most affected districts. FAO Hunger map estimates moderately high undernourishment levels (15-24%) in the country (FAO, 2010) and Global Hunger Index (GHI) adapted and developed by International Food Policy Research Institute (IFPRI) puts the hunger situation of Sri Lanka as serious (Global Hunger index, 2010).

Considering the above, the theme Food Security has been identified as an issue of national importance and has been incorporated into the strategic plans of Ministry of Agriculture (Ministry of Agriculture, 2010) and Ministry of Technology and Research (Ministry of Technology and Research, 2010). Furthermore, addressing different aspects of food security has been emphasised in Mahinda Chinthana-the Vision for the Future, the national development plan (Mahinda Chinthana, 2010).

## **Addressing food security**

Therefore, the National Science Foundation (NSF) has correctly identified the need of an integrated, multidisciplinary, coordinated thematic research programme on food security to find solutions to address the weaknesses in the system and strengthen the national food security system. The outcome of the programme will be essentially addressing the priority gaps that affect the national food security. The thematic research programme is expected to produce appropriate recommendations and develop tools and methods for improving food production, health and nutrition, post-harvest handling of food. Further, it will include trade and new markets, delivering healthy and nutritious food to the entire population throughout the year, improving access to information. Essentially these efforts will lead towards national food programme, which will improve the resilience of nation in relation to food and improve ability to withstand expected and unexpected challenges such as economic crisis and climatic change effects.

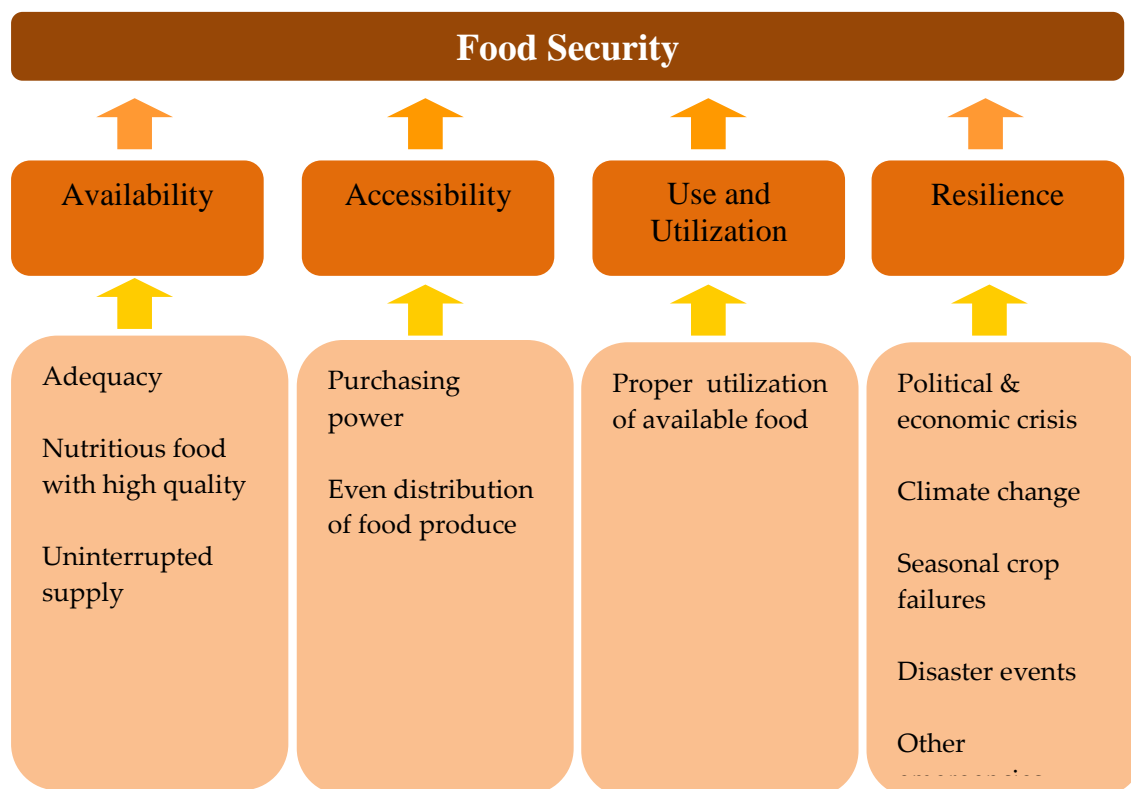
Thus, the research invested under the thematic research programme on food security are expected to address the key issues in food production (agricultural, livestock and fisheries), food safety and quality (nutrition, health issues, adulteration and contamination of food), post-harvest handling (from the point

of production up to the market), food marketing, utilisation of food and finally the resilience the nation in relation to food and nutrition.

The programme will be a collaborative effort, led by the National Science Foundation with its extensive network of public and private sector organizations, research institutions and groups as well as individual researchers, and most importantly, with an impressive record of supporting scientific research in the country for over 40 years.

### **Dimensions of food security and framework for research gap identification**

According to the most recent definitions, following framework with the four dimensions of food security were used to identify research gaps for the thematic research programme on food security.



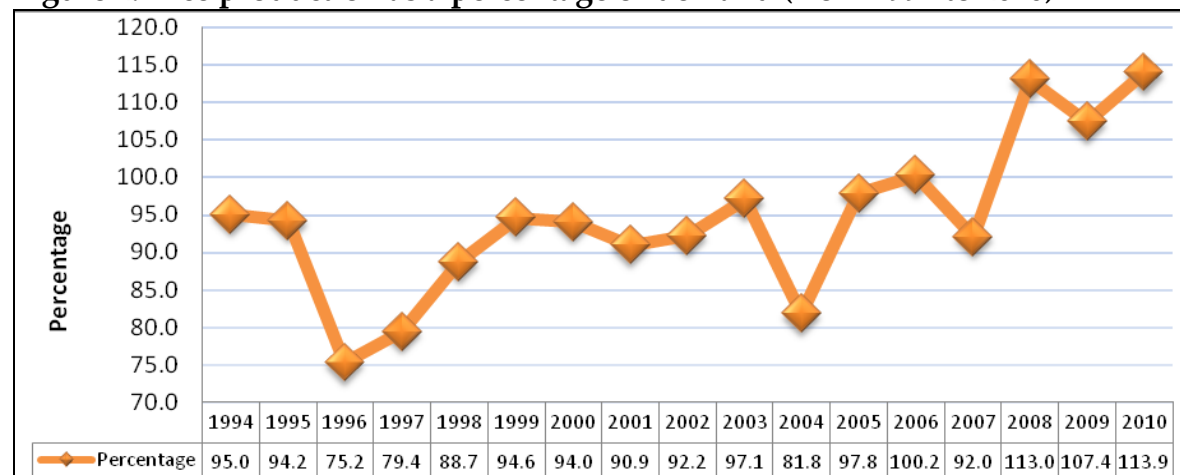
### **Attempts to address the problems related to food availability and research priorities**

#### **Attempts**



Food availability depends predominantly on rice production and marketing in Sri Lanka, rice being the staple food of the country. Since 2008, Sri Lanka is self sufficient in rice (Figure 2).

**Figure 2: Rice production as a percentage of demand (from 1994 to 2010)**



Source: Department of Census and Statistics

Sri Lanka's per capita consumption of fruits and vegetables remain far below the required average daily intake. The recommended daily per capita intake of vegetables is 200g and an average Sri Lankan consumes only 94g of vegetables per day. According to Medical Research Institute (MRI) recommendations, per capita availability of selected vegetables had to be increased to 80kg/year by 2010. The MRI recommends the daily per capita requirement of fruits to be 30 - 40g (edible portion), which is approximately equivalent to 25-40kg fresh fruit per person, annually (CCC, 2011). The Ministry of Agriculture targets a fruit production of 714,000t and vegetable production of 918,000t, by 2012 (Ministry of Agriculture, 2010).

The recommended daily per capita consumption of milk, meat, fish and eggs, the subsequent total requirement of these commodities and their availability are given in the Table 1.

**Table 1: Daily per capita recommendation, total requirement and availability of milk, meat and eggs**

Commodity	Per capita daily Recommendation	Annual Requirement	Annual Availability
Milk	100ml*	2.07Ml*	0.67Ml*
Meat	35g*	723t*	429t*

Fish	58g**	1188t**	999t**
Eggs	0.5 egg*	10.3 million eggs*	2.6 million eggs*
Vegetables	200g**	4130t**	1941t**
Fruit	30-40g**	620-826t**	Not available

Source: \* Department of Animal Production and Health (2009), \*\* Medical Research Institute (MRI)

Medical Research Institute (MRI) states that the recommended minimum annual per capita consumption of fish is 21 kg, but the total per capita fish supply for the year 2008 was 17.66 kg. Therefore, the government expects to increase the fish production up to 685,700t by 2013 to meet the demand.

When considering the above facts, it is evident that, to achieve food availability, a country should produce and import food to meet the demand of the population which grows continuously. Therefore, it is vital to project food production and population growth at any given time (demand and supply of food). New technologies, crop varieties and improved livestock including fisheries that will ensure an increase in agricultural productivity, without compromising environmental concerns, over the years should be promoted. The increase in demand for food has to be met from increases in agricultural yields, as increasing the cultivable land will have its own limitations. For this purpose an accurate estimate of the extent of underutilized land should be made. Constraints as to why those lands are not cultivated should be studied. Maximum utilization of the available land is another option to overcome the problem. New technologies to overcome those difficulties should be studied and applied. Furthermore, the production potential of underutilized food crops such as yams and legumes need to be assessed. Continuous assessment of agricultural production will ensure food availability at all times. As a result, in an ideal situation, the domestic supply will always exceed the domestic demand. The surplus could be stored for future use, especially to address disaster and emergency situations or may be exported.

Availability of food for domestic consumption depends on applying proper harvesting methods as well as post harvest technologies (handling, processing and storage), failure of which will result in food losses. At present, the approximate amount of post harvest losses is calculated to be 40% of total annual production (IPHT, 2011, *Personal communication*). New technologies to minimize food loss during handling and during storage should be developed. New methodologies of food storage that promise longer shelf-lives should be studied and promoted.

Ensuring availability of food of high quality is another important entity of food security. This includes improving the nutritive value of food as well as assuring food safety. Food safety refers to handling, preparation and storage of

food in ways that prevent food borne illnesses. Food acts as a means of transmitting disease among individuals. Most cases of food borne illnesses are caused by a variety of food borne pathogenic bacteria, viruses, or parasites that contaminate food, as food serves as a growth medium for bacteria, fungi and parasites that can cause food poisoning. Such contamination usually arises from improper handling, preparation or food storage. In addition, poisonous chemicals, or other harmful substances can cause food borne diseases if they are present in food.

Therefore, quality assurance of all food commodities should be strengthened. Cost effective tests to detect adulteration and contamination should be developed. Once these tests are established, sustainability of the monitoring system should be ensured (ensuring consumer protection).

### Research priorities

Based on the attempts to ensure food availability, following research gaps that need to be addressed are listed in the table below.

Area	Research priorities
Predicting food demand	Projection of food production and the population growth at any given time (demand and supply of food)
Developing technology	<p>New technologies, crop varieties and improvement of livestock and fisheries that will promise an increased in food-based agricultural productivity over the years</p> <ul style="list-style-type: none"> <li>Propagation/reproduction methods</li> <li>invention and development of new varieties / breeds</li> <li>efficient harvesting methods</li> <li>pest and disease control</li> <li>fertilizers / plant nutrition</li> <li>improvement of soil</li> <li>irrigation</li> <li>environmental effects</li> </ul>
Land productivity	<p>Accurate estimation of the extent of underutilized land (using GIS)</p> <ul style="list-style-type: none"> <li>Constraints as to why these lands are not cultivated</li> <li>New technologies and methods to overcome these difficulties</li> </ul>
Post harvest technologies	<p>Causal factors of postharvest losses and innovative technologies (tools and methods) to minimize food loss during handling, processing and during storage (Post Harvest Technologies)</p> <p>New methodologies of food storage that will promise longer shelf – life and zero or minimal contamination</p>
Monitoring	

Continuous analysis of agricultural production  
 Cost effective tests to detect adulteration and contamination  
 (ensuring pathogen-free and hazardous agents-free food for the  
 consumers)  
 Sustainability of the food safety monitoring system  
 Linking information systems  
 Trade liberalisation  
 Evaluation of underutilized tropical and traditional food crops

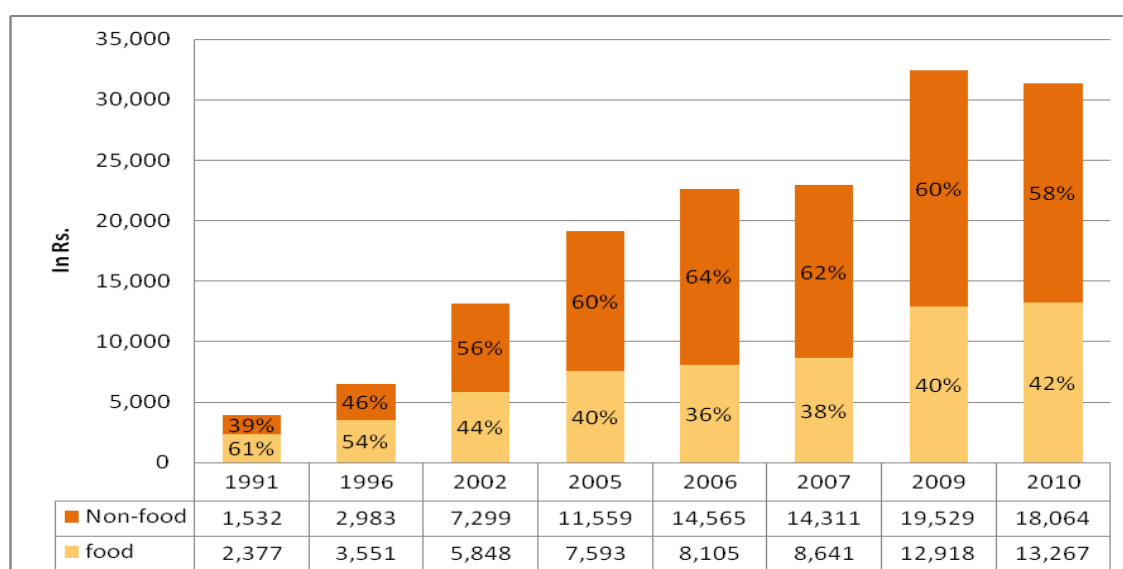
## Attempts to address the problems related to food Accessibility and research priorities

### Attempts

The physical availability of food does not guarantee access of food to everyone: the food has to be freely accessible and affordable to every member of a population. When food is accessible to all members of a household equally, the nation will have food availability, leading to food security.

In year 2009, the food share in the Sri Lankan household budget was 40%, and in the year 2010 it has increased to 42% (Figure 3).

**Figure 3: Variations of Expenditure of a Sri Lankan Household (1991 – 2010)**



Source: Department of Census and Statistics

The patterns of landholdings, income distribution and employment opportunities also affect the access of adequate food of high quality for all households. In Sri Lanka, approximately 60% of the population is engaged in farming, of whom more than two thirds are small holders with <1 ha of cultivable land, either owned or leased. These small scale farmers have limited access to water, credit, fertilizer and other resources as compared to large scale farmers.

Another factor that affects access to food is distribution. Food has to be equitably distributed among the nations, regions, households and individuals. An efficient distribution of food is as important as its production. The inefficient distribution of food commodities among different levels of a population will result in inadequate utilization and under-nourishment, even when the supply exceeds demand. Thus an efficient distribution system should be designed, cost effective and efficient food distribution programmes should be formulated, tested and implemented to ensure access to high quality food for very low income households. A continuous monitoring and analysis will ensure its sustainability.

The food that is available and accessible should essentially be nutritious in a food secured society. Consuming food with little or no nutritive values has become a food culture all over the world and has contributed immensely to the malnutrition in developing countries around the globe. Food energy intake at household level is given priority in assessing food security in many countries. However, since there is an argument as to the accuracy of taking calorie intake into account in the assessment of nutritional status, which depends on non-nutrient food attributes and health status, the non-food factors that influence biological absorption also should be considered as important for food security. It is suggested that the assessment of malnutrition should also be based on outcome measures such as anthropometric measures in addition to the input measures, since body measurements are sensitive to even minor levels of malnutrition.

The gender disparity in access to food of high quality is another problem that should be overcome in achieving food security. Gender based nutrition analyses should be carried out island-wide which will include an estimate of per capita calorie intake per day. Based on the results, intervention should be made to improve the nutrition uptake of women especially those pregnant and lactating, and be evaluated regularly.

Since the purchasing power of a family plays a vital role in food accessibility, reduction of poverty is essential to achieve food security. While appreciating the Government's efforts to combat food insecurity through welfare programmes and income transfer programmes such as Samurdhi, their

effectiveness need to be improved. Based on the evaluation carried out by the World Bank (2002), measures to overcome the drawbacks and gaps of such programmes could be implemented.

Public education programmes of high quality on food and nutrition, and the effects of malnutrition (especially those of women) for uneducated rural populations should also be considered in any food security programme. The effectiveness of these educational programmes should be evaluated and analysed to identify and address the gaps and drawbacks.

### Research priorities

Following researches have been identified as gaps in achieving improved accessibility of food in the society.

Area	Research priorities
Assuring even distribution of food	Designing of efficient distribution systems Formulation of cost effective and efficient food distribution programmes Continuous monitoring and analysis of the systems once established
Ensuring proper nutrition	Island-wide gender and age based nutrition analyses, which will include an estimate of per capita calorie intake per day Accurate estimation of the level of malnutrition taking both nutritional and non-food factors into account The extent of contribution of factors (inadequate diet, environmental factors) to malnutrition Interventions to improve the nutrition uptake of women, vulnerable groups and children, which will be evaluated regularly
Purchasing power	Application of methods to overcome the problems identified and to improve the effectiveness of welfare programmes and income transfer programmes such as Samurdhi
Educating public on food and nutrition	Designing public education programmes of high quality, on food and nutrition and the effects of malnutrition (especially those of women and children) targeted for uneducated rural populations. Determination of cultural and ethical food habits, methods of preparation to ensure the maintenance of suitable diets should also be incorporated in these

educational programmes.  
 Evaluation and analysis of the effectiveness of these educational programmes  
 Identification of gaps and drawbacks  
 Methods to overcome the problems identified

## **Attempts to address the problems related to food Utilization and research priorities**

### **Attempts**

If freely available and accessible food is underutilised, populations cannot achieve long term food security. The ultimate result will be the malnutrition of the population.

Once the problems are identified, corrective measures need to be recognised. These require a holistic approach including health and growth monitoring along with promotion of suitable feeding practices and child-care practices.

Almost all the Governments of Sri Lanka introduced various school feeding programmes as a safely net option to overcome the problem of malnutrition in children. Effectiveness of these programmes should be strongly evaluated and analysed. Furthermore, designing of supplementary feeding programmes for the poorest will help combat malnutrition among children and both pregnant and lactating women.

Development of nutritious food (such as 'rusks' and cereal mixtures) should be encouraged assuring the quality of those items. This will help in poverty reduction and will be an answer for unemployment as well.

### **Research priorities**

Social norms and common practices of the society in food utilisation lead to malnutrition in the society. Following priority research have been identified as priorities under the thematic research programme on food security.

Area	Research priorities
Social factors affecting malnutrition	Assessing the contribution of underutilisation of food to malnutrition contribution of food habits contribution of cultural factors contribution of religious factors

<p>Alternative feeding programmes to ensure nutrition</p> <p>Food technology</p>	<p>contribution of various cooking methods</p> <p>Recognition of corrective measures for the above</p> <p>Health and growth monitoring along with promotion of suitable feeding practices and child-care practices</p> <p>Evaluation and analysis of the effectiveness of various school feeding programmes</p> <p>Designing of supplementary feeding programmes for the poorest</p> <p>Development of nutritious food and transfer of technologies to rural sector</p>
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## Attempts to address the problems related to food Stability and Resilience and research priorities

### Attempts

The production of food in a nation should be shock proof at all times. These shocks include climatic, economic crises and cyclical events such as seasonal crop failures. The food, which is of high quality and nutritious and freely available and accessible by every member of the society, has to be supplied continuously for a nation to be food secure. Therefore, the ability to recover quickly from sudden shocks (political, economic or climatic crises), cyclical events (seasonal crop failures) and measures to overcome these unseen situations are integral features of a food secured system.

Development of a food that provides a balanced nutrition in one meal which has high calories, protein, vitamins and minerals, which can be distributed during emergency situations would be an efficient way of addressing such a crisis. The Emergency Food developed should be stored without refrigeration, should have a shelf-life of over six months- packaging and should be of easy handling.

The hazards and risks involving food production should also be analysed, with a view to addressing those issues, in order to stabilise the food supply. This will include vulnerabilities and capacities as well.

### Research priorities

In order to improve resilience of nation in relation to food, following priority research have been identified to address through thematic research programme on food security.

Area	Research priorities
Disaster Mitigation and Management	Hazards affecting food production Methods to predict seasonal hazards Measures to overcome the problems associated with hazards
Food backups for emergency	Means of backup supports in case of losses due to unavoidable circumstances Emergency response for most vulnerable, mitigate short-term risks (development of emergency foods)
Financial tools	Stronger credit programmes for small-scale farmers (for better access to seeds, tools, fertilisers <i>etc</i> )

Access to  
alternative  
markets

Impact from  
policies

Measures to calm the food markets (local and global)

Impact of bio-fuels policies

## **The Strategy and Implementation Framework**

The National Science Foundation having identified and considered the research gaps in the area of food security proposes to conduct prioritized research under five research programmes. All the programmes will be multidisciplinary and collaborative in nature.

Following research programmes will be implemented through institutional partnerships. Engagement of research institutions, government institutions, private sector organizations, community based organizations and different community groups will facilitate integration of information and knowledge in decision making. This will also facilitate the information and knowledge flow across different levels of the society without additional effort.

## Programme 1

### **Continuous mapping of Food and Agricultural production, marketing and supply, and identification of validated processes and strategies to ensure food security at national and provincial levels**

#### **Rationale**

Knowing the spatial distribution of food production as well as understanding the markets and supply chains is a prerequisite in the situation analysis needed for addressing issues related to food security.

To achieve food availability, a country should produce and import food to meet the demand of the population which grows continuously. Therefore, it is vital to project food production and population growth at any given time (demand and supply of food). By this means, an accurate idea of buffer stocks required can be formed.

A continuous mapping and analysis of agricultural production as well as their proper distribution will ensure availability of food throughout the island. Hence, a thorough understanding of food markets and supply chains is required to address the gaps and to find solutions to establish food security at national, provincial and household levels.

Therefore, the Programme 1 of the theme Food Security under National Thematic Research Programme (NTRP) of NSF will be focused on developing continuous mapping of food and agricultural production, marketing and supply and identifying validated processes and strategies to ensure food security at national and provincial levels.

**Scope:** To record the food production patterns and various activities / agents in the supply chains for milk, pulses, eggs, livestock, fisheries, fruits and vegetables. Further, the impact of food production and supply on household consumption patterns and nutrition will be studied. Based on the studies, strategies will be developed to establish buffer stocks of food to maintain food

prices at a reasonable range and to ensure availability and equitable access throughout the island.

**Target areas** - Retail and wholesale food markets, supply chains and stocks in the different provinces and at national level

Objectives	Outputs
1. Establish a system for continuous mapping of the activities / agents (i.e. structure, conduct and performance) in the supply chain for milk, pulses, eggs, livestock, fisheries, fruits and vegetables	1. Continuous mapping of food production, imports and supply at provincial and national levels
2. Evaluate the impact of activities / agents in food supply chain on household food availability and consumption patterns	2. IT based models to forecast food requirement, supply and buffer stocks
3. Develop strategies to develop buffer stocks, and thus, maintain stability of food prices to ensure availability and equitable access on a regional basis	3. Online monitoring of food stocks, supply chains and markets at provincial and national levels
	4. Identification of policies / processes to improve the availability and accessibility of nutritious food at provincial and national levels.

This Programme will have an impact on food marketing, purchase and thus household food security, which in turn will contribute to regional and national food security. The Programme will have a direct and practical application to the food availability and accessibility of households, regions and the nation as envisaged in the Mahinda Chintanaya - the Vision for Future.

Possible duration: – 4 years

Outcome: Availability and access to nutritious food at provincial and national level

Research Group – Economists, Trade and Marketing experts, Private sector, Agriculture economists, Nutritionists, IT professionals

Extended group: farmers, distributors, importers, consumers

## Programme 2

### Development of Low cost sustainable post harvest operations for food

#### Rationale

One of the sources of food insecurity in any country is post harvest crop loss. In Sri Lanka pre and post-harvest crop losses are estimated to be approximately 40%. This is mainly because most subsistence farming communities do not have access to appropriate technologies. Climatic conditions such as floods, heavy rains, droughts and other related factors also cause considerable post harvest crop loss.

Reduction of quantitative losses is given a higher priority than qualitative losses in most countries including Sri Lanka, probably due to the fact that qualitative losses (such as loss of caloric and nutritive value, loss of acceptability by consumers, and loss of edibility) are more difficult to measure than quantitative losses of food commodities.

Some strategies that can be adopted to reduce post-harvest losses include application of current knowledge to improve the handling systems (especially packaging and cold chain maintenance) of perishables while assuring their quality and safety and overcoming the socioeconomic constraints, such as inadequacies of infrastructure, poor marketing systems, and weak R&D capacity.

Overcoming the perishability of the food commodities, enhancing nutritional value and adding economic value through processing are the main ways of establishing food security in Sri Lanka through post-harvest technologies.

Therefore, the Programme 3 of the theme Food Security under National Thematic Research Programme (NTRP) of NSF will be focused on development of low cost post harvest operations for Food Security that will contribute in ensuring food security in the country.

**Scope:** Identify the patterns of food production and occurrence of surpluses as well as the post harvest (PH) losses along the supply chain to develop community-accepted and economically-feasible systems capable of minimizing the post harvest losses at every critical point in the supply chain within the period of project. . Furthermore, identification of traditional storage and post harvest processing techniques to enhance shelf life of food commodities would be added to this. Implementation and valuation of the developed systems in relations to food security and economic aspects could facilitate replication and scaling up the interventions.

**Target areas** – Production regions and centers of sales

Objectives	Outcomes
1. Identify the critical points of post harvest losses and the nature of the problem occurring in supply chains that create a significant impact on availability and perishability of key food products. .	1. The magnitude and nature of post harvest losses to key food products along the supply chain are identified
2. Develop systems to avoid or reduce post harvest losses of the most common perishable items of food at different points of production line as well as at times of excess production	2. Systems to reduce / arrest post harvest losses developed
3. Identify traditional storage systems of farming communities to reduce post-harvest losses	3. Traditional PH systems identified and their suitability for adoption tested
4. Measure the impact on the developed systems on food availability and security in the regions	4. The suitability of systems developed in (2 and 3) evaluated in terms of agricultural, engineering, social and economic feasibility and acceptance demonstrated
5. Determine the economic feasibility and social acceptance of the developed systems	

This Programme will have a direct impact on overcoming post-harvest losses which is a significant problem in the country and address greater availability of food to the people and economic gains to the producers. This can be directly linked as a scientific basis of the Divi Neguma program. Further, this Programme will address the target objectives of 'Mahinda Chinthana –Vision for the Future' stated in pages 86 and 87 (development of post harvest technologies, reduction of post harvest losses and improvement of proper storage facilities).

Possible duration: – 4 years

Research Group – Agriculturists (Crop, livestock, aquaculture), Agricultural and food engineers, Engineers, Nutritionists, Economists and Sociologists



### **Programme 3**

#### **Development of food safety and quality standards for food security**

##### **Rationale**

Food safety is the assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use. Ensuring safe and healthy food is an important precondition of food security.

Unsafe food contains hazardous agents or contaminants that can develop illnesses in consumers either immediately or by increasing their risk of chronic disease. Such contaminants can enter food at many different points in the food production process, and can occur naturally or as the result of poor or inadequate production practices. Hazardous agents include microbial pathogens such as various bacteria and viruses, parasites, mycotoxins, antibiotic drug residues and pesticide residues. Food and water borne diseases are major public health problems worldwide and an important cause of malnutrition, in infants and young children. For the reason that food safety is the result of many different actions in the food supply chain, it may be difficult to address food safety issues separately from health, nutrition, and food production and marketing issues. The World Health Organization estimates that about 70 percent of the approximately 1.5 billion episodes of diarrhoea occurring globally each year have been caused by biologically contaminated food.

Genetically modified foods and their potential to contain allergens or toxins not found in conventional foods have begun to receive attention as well.

Food safety and quality management systems control food safety hazards and ensure safe food supplies for a well nourished and healthy nation. In addition, food safety and quality management often reduce post harvest losses and increase food availability to enhance food security.

Therefore, the Programme 2 of the theme Food Security under National Thematic Research Programme (NTRP) of NSF will be focused on development of food safety and quality standards that will contribute in ensuring food security in the country.

**Scope:** Identification of issues related to food safety and quality to provide an assessment on the current status in relation to food security is the initial step. Based on the study, food safety and quality standards and regulations need to be developed. In order to ensure the food safety, a risk assessment framework coupled with an appropriate monitoring mechanism should also be established. This should include cost effective methods to detect food contamination and adulteration of food commodities, highlighted in the risk assessment process.

**Target areas** – Urban and rural areas of Sri Lanka in each province

Objectives	Outcomes
<ol style="list-style-type: none"> <li>1. Determine the current status of food safety and quality in the country in terms of contamination, adulterants, microbiology and nutritive values in relation to food security</li> <li>2. Develop food risk assessment framework based on the above findings</li> <li>3. Development of food safety and quality standards for commonly used foods based on nutritive values, storage and food availability</li> <li>4. Devise methods to monitor and adopt mechanisms to control, adulteration and contamination to ensure food quality and also to maintain food safety standards in the country</li> </ol>	<ol style="list-style-type: none"> <li>1. The current status of food safety and quality in SL is identified</li> <li>2. A food risk assessment framework as indicated by the current status is developed</li> <li>3. Safety and quality standards for important commodities of food are formulated</li> <li>4. Simple (cost effective) methods to monitor food adulteration of important commodities are developed</li> </ol>

This Programme will have a direct impact in terms of providing quality food for the people and help enhance health and nutrition of people – as envisaged in state policy.

Possible duration: – 3 – 4 years

Research Group – Food scientists, Nutritionists, Chemists, Medical personnel, Microbiologists Agriculturists and Economists

**NATIONAL THEMATIC RESEARCH PROGRAMME - NSF**

## **Programme 4**

**Assessment of internal and external trade policies and practices affecting food security in Sri Lanka and identify areas for improvement**

### **Rationale**

Three main factors contribute to fulfill the domestic demand for food products. They are domestic production, imports and trade policies. Increased domestic production and imports play a very important role in meeting increased demand. Markets and trade ensure that food is efficiently distributed.

Markets are necessary to boost productivity and availability. Improved access to input markets is crucial for productivity growth. Moreover, farmers will only increase production if they have access to viable markets for their agricultural outputs.

Markets and trade also play a crucial role in achieving food security by increasing access to food. At the simplest level, trade allows food to flow from areas of surplus to areas of deficit—in local, regional, and global markets. Well-functioning markets transmit price signals, which allow changes in demand to be met by supply. When demand is greater than supply, producers increase production in response to price signals, and this increased production, in turn, helps to stabilize prices. By transmitting information in this way, markets help to reduce price volatility.

Therefore, a clear understanding of internal and external trade policies of the country and their impact on food security is identified as a major necessity of the theme Food Security under National Thematic Research Programme (NTRP) of NSF and the Programme 4 is dedicated for the subject.

**Scope:** The trade policies and their impact on food supply, availability and food production in the country will be studied under this programme, including the impact of trade policies and food price on the household consumption patterns in urban and rural areas. Based on the studies, trade policies, regulations to ensure year-round food supply and availability and to maintain food prices at an affordable range will be developed so that acceptable levels of nutrition is maintained at a household level.

**Target areas** – Urban and rural households and the most vulnerable sectors of the populations in terms of poverty and malnutrition

Objectives	Outcomes
1. Categorize trade policies of the nation in relation to food supply and availability at a regional level	1. Current trade policies and their impact in relation to food commodities are identified
2. Determine the impact of trade and food prices on food purchase patterns of rural and urban household	2. Relationships between trade policies and food security are determined
3. Develop relationships between local food production and domestic trade policies	3. Trade policies to stabilise prices of food commodities are recommended
4. Formulation of appropriate trade policies to overcome the repercussions of excessive price escalations and thus the food consumption patterns of urban and rural households	4. The structure of suitable institutions or modalities of regulating food prices identified
5. Assess the impact of trade policies on household food and nutrition security in the selected regions	

This Programme will have a direct impact on food markets and reducing post harvest losses due to marketing issues which is a serious problem in the country. It will also address greater availability of food to the people and economic gains to the producers. The Programme will thereby have a direct and practical application to the food availability of households.

Possible duration: – 4 years

Research Group – Economists, Food scientists, Nutritionists, Agriculturists

## NATIONAL THEMATIC RESEARCH PROGRAMME - NSF

### **Programme 5**

#### **Development of an integrated food production system to enhance household food security in resettlement and poverty stricken areas**

#### **Rationale**

Family food production systems, which serve as a source of food security, are found in most regions of most countries worldwide, which are known as home, mixed, backyard, kitchen, farmyard, compound or homestead gardens. The dynamic role of home gardening in family nutrition and household welfare must be assessed in the context of the wider farming system and household economy. Usually, the functions and output of the home garden complement field agriculture. Whereas field crops provide the bulk of energy needed by the household, the garden supplements the diet with vitamin-rich vegetables and fruits, energy-rich vegetable staples, animal sources of protein and herbs and condiments. These gardens have an established tradition and offer great potential for improving household food security and alleviating micronutrient deficiencies. Gardening can enhance food security in several ways, most importantly through: 1) direct access to a diversity of nutritionally-rich foods, 2) increased purchasing power from savings on food bills and income from sales of garden products, and 3) fall-back food provision during seasonal lean periods.

Even though criticism prevails that gardening is only feasible for households with access to land, water and technical assistance, leaving out many of the

food insecure, even very poor, landless or near landless people practice gardening on small patches of homestead land, vacant lots, roadsides or edges of a field, or in containers. Gardening may be done with virtually no economic resources, using locally available planting materials, green manures, “live” fencing and indigenous methods of pest control. Thus, home gardening at some level is a production system that the poor can easily enter. Thus, home gardening contributes to household food security by providing direct access to food that can be harvested, prepared and fed to family members, often on a daily basis.

Therefore, Programme 1 of the theme Food Security under National Thematic Research Programme (NTRP) of NSF will be focused on developing integrated food production systems, which aims enhancing food security in resettlement and poverty stricken areas.

**Scope:** Identify and assess all aspects of household nutrition related to home gardens in order to develop the most productive, replicable and sustainable model to be adopted in resettlement and poverty stricken areas. Methods to improve sustainability of the model should also be identified and addressed. The tested home garden, once implemented in resettlement areas and poverty stricken areas should be evaluated to identify its contribution to enhanced nutrition of the respective household and region.

**Target areas** – Re-settlement areas after the conflict and / or pockets of poverty stricken populations in other regions

Objectives	Outcomes
<ol style="list-style-type: none"> <li>1. Determine the characteristics of, and household food supply from home gardens and hinterlands including underutilized species in the selected regions and develop correlations between the supply of food and household nutrition</li> <li>2. Develop models of home gardens integrating crop and livestock/aquaculture (including underutilized spp.) to enhance household food supply</li> <li>3. Evaluate the developed and established systems in terms of</li> </ol>	<ol style="list-style-type: none"> <li>1. The characteristics and present status of home gardens in relation to food supply, food quality and quantity, and food security are identified in resettlement areas and poverty pockets</li> <li>2. Models of home gardens/farming systems with integrated crops and species are developed in the relevant areas</li> <li>3. Impact of the developed farming systems is determined based on agricultural, economic and sociological basis</li> </ol>

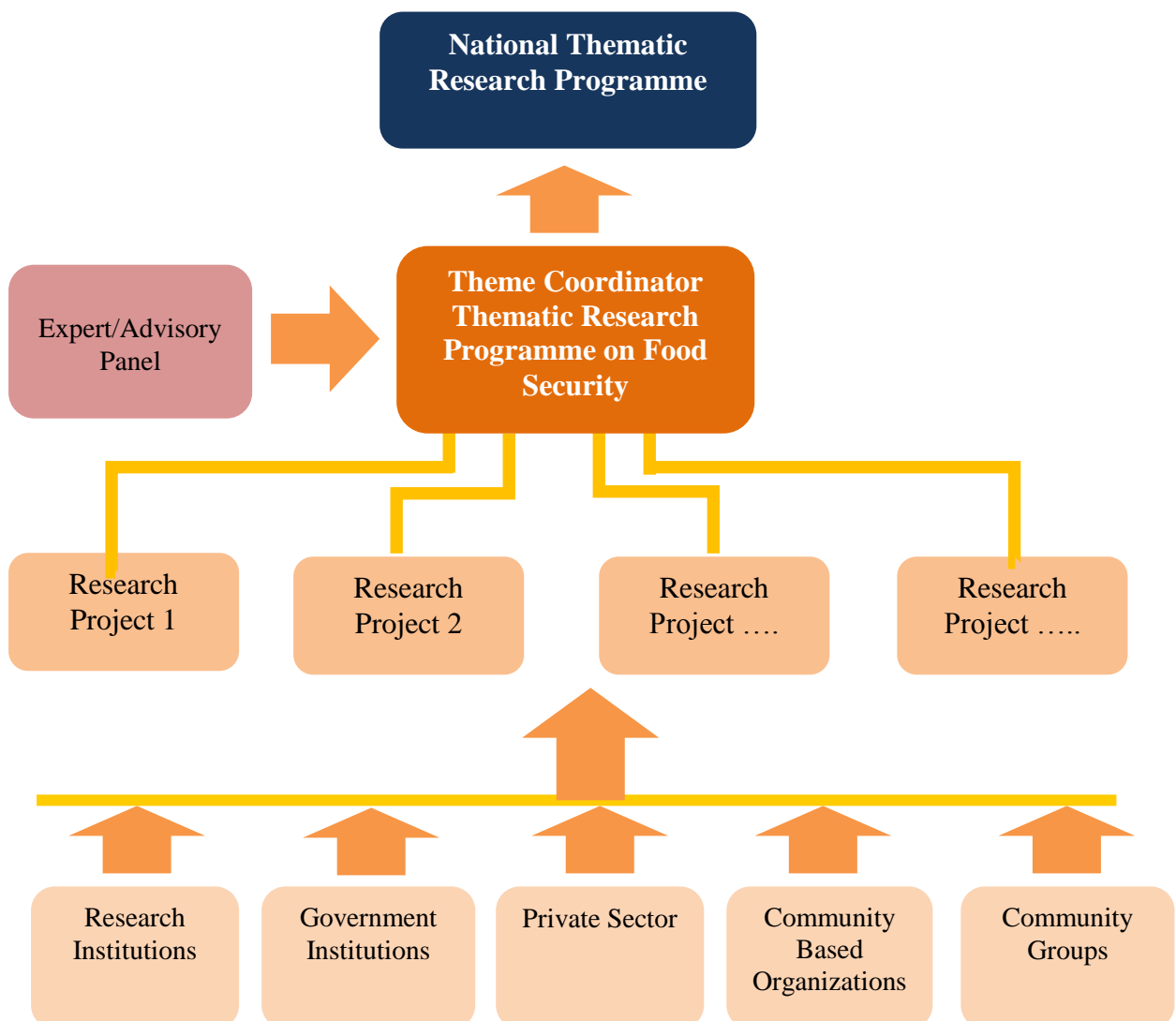
productivity, soil fertility, sustainability and food supply and household nutrition on an economic and sociological basis	4. The models developed in (2) are promoted for enhancing household food security in the areas indicated in (1)
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This Programme will have a direct impact on promoting this system to the selected and similar regions – and serve as models for extension and training/development projects. This can be directly linked to the Divi Neguma program of the government, and be presented as a scientific validation of the concept. Further, this Programme can be linked up with the ‘Home gardens development and management programme’ of the Ministry of Agriculture, as planned in its corporate plan.

Possible duration: – 5 years

Research Group: – Agriculturists (Crop, livestock and soils), Nutritionists, Economists and Sociologists

### Coordination Mechanism



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