

# **INAUGURAL LECTURE**

**MISSION 2007 : A NUTRITION SECURE INDIA**

**M S Swaminathan**

## Mission 2007 : A Nutrition Secure India

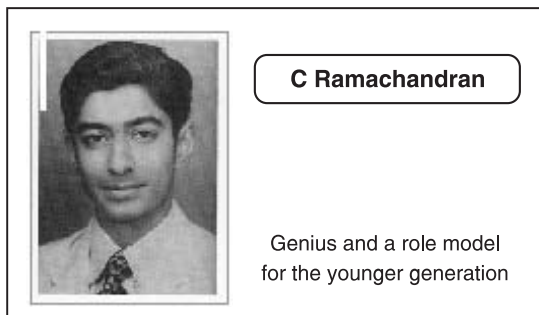
**M S Swaminathan**

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I have known Dr. Gopalan for nearly fifty years. I first met him at the Board of Biology of the Atomic Energy Department, headed by Dr. A.R. Gopal Iyengar. Dr. Gopalan's vision since then has taken shape in very significant directions. First of all, I would like to congratulate him on the 25<sup>th</sup> Anniversary of this great Institution, which he has built up brick by brick with the help of so many others as he has acknowledged in his speech. I call this Institution a Centre of Learning, a Centre of Knowledge and a Centre of Authority in areas relating to nutrition, for all times to come.

Secondly, we are also celebrating the life of a great young man, Shri C. Ramachandran. I call it a celebration because this young man achieved a lot within a short time. He was a creative genius and a role model, I would say, I can compare him with Ramanujam, who also died young, but during his short life achieved a lot. Had he lived long, he could have created wonders. Persons like him are a source of inspiration to students and scholars about what one can accomplish if one has the determination to do the very best in life.

Thirdly, I wish Dr. Gopalan a long and fulfilling life on his birthday today. I would also like to thank Mrs. Gopalan for the selfless support she has extended throughout and helped in converting Dr. Gopalan's dreams to reality.



Keeping in view the subject of the symposium tomorrow, Dr.Gopalan suggested that I speak on some aspects of "Nutrition Security". I call this "Mission 2007"- a call to make India nutritionally secure by Aug.15, 2007, which marks the 60<sup>th</sup> Anniversary of our independence. From the beginning of this Millennium, several efforts have been made to achieve this goal.

### Nutrition Security

Our aim should be to achieve relative nutrition security for every man, woman and child in this country in accordance with the vision of Mahatma Gandhi 'to provide bread to those who are hungry'. The first duty of independent India is to ensure that no one goes to bed hungry or stays malnourished. Dr. Gopalan has devoted his whole life for this purpose and his emphasis has been on a paradigm shift from food security in macro-terms to nutrition security at the individual level. There are million tonnes of food grains in our godowns, hence, Nutrition Security at the level of each individual – every man, woman and child is possible and substantial progress, is a must in years to come.

I define Nutrition Security as "physical, economic, environmental and social access to balanced diet and clean drinking water for every child, woman and man". Nutrition security would require following inputs:

- Physical: production and communication.
- Economic: purchasing power - one must have the money to buy commodities for a balanced diet, for example, fruits and vegetables.
- Environmental: Hygiene, sanitation and safe drinking water.
- Social: equity in gender terms, social factors including intra and inter family distribution of balanced diet.

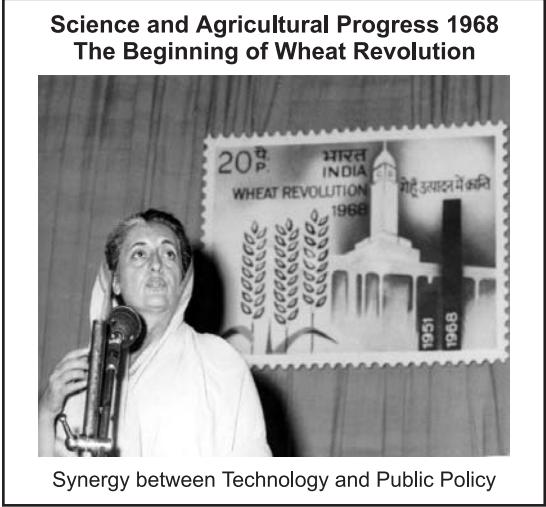


There has to be a paradigm shift from emphasis on food security at the macro level to nutrition security at the individual level. These have been the goals of Nutrition Foundation of India. I would briefly review where we are today in our journey towards a “Nutrition Secure India”.

**India’s Major Achievement**

On the 50<sup>th</sup> anniversary of our Independence in 1997, our then President and also a great admirer of this Institution and Dr.Gopalan himself, Shri K.R. Narayanan, said that India had two major achievements in the last fifty years. Firstly, our ability to not only preserve, but also strengthen our democratic traditions up to the grass root level through the Panchayati Raj. The second was food self-sufficiency through the green revolution. What should be the goal for the 60<sup>th</sup> anniversary of our independence on 15<sup>th</sup> August 2007? In my view, it should be the elimination of poverty induced endemic hunger.

Let me give you another example. The NFI is a wonderful example of what can be achieved by



one individual with a small group of people in 25 years. Let us examine what the nation has achieved in 25 years - I speak of a span of 25 years starting from the Bengal Famine of 1942-43, which Amartya Sen says was an unnecessary famine, because at that time there was ample food production. But entitlements, or access to food was uneven and as a result not available to everyone.

The period from 1963-1968 was very significant in our country. In 1968, our late Prime Minister Smt. Indira Gandhi announced that we had achieved a breakthrough in agriculture production through the great Wheat Revolution. A stamp was released on that occasion. It was the first time where the science of agriculture was recognized as a principal catalyst of agricultural progress in India. Food grain production had grown four-fold in the last five decades. Per capita availability of food grains has been sustained in spite of three-fold increase in population over the same period.

**Current Challenges**

Even in the midst of progress and development in agriculture, however, we have to think seriously whether the progress is going to be sustainable over a period of time. For example Punjab and Haryana, the bread baskets of India, are today on the brink of environmental unsustainability. Studies and maps from FAO reveal that hunger persists in the midst of plenty. As seen in the map, India’s position in terms of hunger is almost the same as parts of sub-Saharan Africa and other parts of Africa. It is very unfortunate that our estimates vary. If we see the 55<sup>th</sup> round of NSS, nearly 150-160 million people are chronically undernourished. Other data show figures over 400 million. Dr.Gopalan’s paper on “Low Birth Weight babies” (LBW) in this region clearly showed that even now about a third of our babies weigh less than 2.5 kg at birth. LBW children suffer from many handicaps higher morbidity and mortality during infancy, lower growth trajectory and higher risk of non-communicable diseases in later life. These revelations are great reminders of unfinished tasks. We have no time to relax now in terms of achieving Nutrition Security for our people.

<b>Text Box 1 Towards a Food Secure India</b>	
A Call for Policies Initiatives and Public Action	
<b>Hunger</b>	<b>Food Security</b>
Chronic	Availability
Hidden	Access
Transient	Absorption
<b>Awareness - Analysis - Action</b>	

During 2000-04, along with the World Food Programme office in Delhi and its Director, Mr. Pedro Medrano in particular, we have been working on mapping the extent of food insecurity in India using 22 to 25 different parameters. The result of these efforts have been compiled and published as:

- Food Insecurity Atlas of Rural India
- Food Insecurity Atlas of Urban India
- Atlas of the Sustainability of Food Security in India

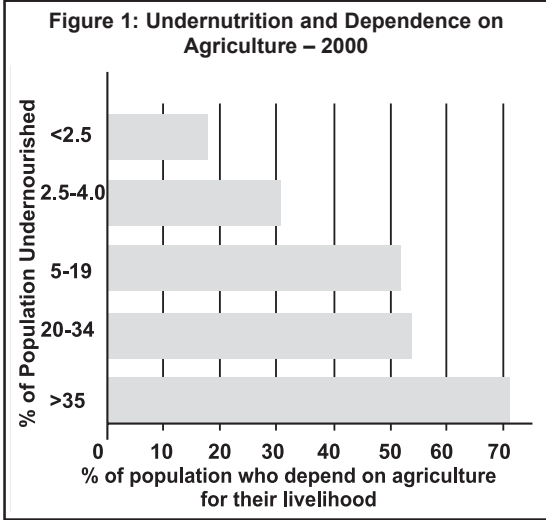
These are also available in CD ROM format. In all these atlases, we have studied and mapped hunger in all its dimensions for example chronic hunger, arising from poverty, hidden hunger caused by micronutrient deficiencies, and transient hunger resulting from natural calamities like droughts or floods (Text Box 1).

**Food Security**

Food Security is availability of food, which is a function of production; access to food, which is a function of purchasing power or livelihood opportunities and finally absorption or utilization of food in the body, which is a function of safe drinking water, primary health care and environmental hygiene. In the post Green Revolution scenario of increased production, the questions that arise are, why are our babies low birth weight? and why are so many people in our country still hungry, and have low BMI?

**Employment Situation**

One of the reasons is that in our country, growth rate in non-farm employment is very low. The number of people getting jobs outside the routine farm operations like ploughing, weeding and harvesting has not grown over the years in villages. On the other hand, in countries like Thailand and China, non-farm employment has grown significantly. I first got an opportunity to



study the Thai experience, when I was a member of the UN Commission on Nutrition. In India, we have a large number of people dependant entirely on the primary sector of the economy, hence we have a greater degree of under-nutrition (Figure 1). Rapid progress in diversifying our employment opportunities is very necessary. As long as one remains unskilled, the maximum one can expect is a minimum wage. A shift from unskilled to skilled work is very important; a large section of our labourers, particularly women do not even get the minimum wages.

**Population Growth**

It is often asked why inspite of so many institutions and great scientists, poverty, under nutrition and hunger continue to prevail in India? Why has FAO put India in a rank amongst other poor countries, which may not have the same infrastructure in terms of technology and educational facilities as India has? Our population has grown enormously. For example, China is adopting very rigorous methods of controlling population. It is a wise decision, as the future of their country will be jeopardized if they have more population. When I chaired the National Population Committee in 1993, I recommended that we must have a clear understanding not only of drug-based approach or contraceptive – based approach, but also take into account the social dimensions and issues and generate social awareness about the population supporting capacity of the

### Text Box 2 Village Level Socio-Demographic Charter

Recommendations of the Swaminathan Committee on Population Policy, 1994

- Ecology: Population Supporting Capacity of the Ecosystem
- Food and Drinking Water Security
- Education: Universal School Education
- Health: Primary Health Care, immunisation
- Livelihoods: primary, secondary and tertiary sectors
- Gender Audit: LBW Children; sex ratio; school enrolment
- Maternity and child care code

If population policy fails, nothing else will have a chance to go right

ecosystem. We can start this right from schools. Educational tools should include the “Socio-Demographic Charter” which can be prepared by every school in the village, which looks at population supporting capacity (Text Box 2). For example, 1 tonne of wheat or rice can support 3 to 6 persons. So how much do we produce in this village? What is the population? Is there enough water for all? All these should be calculated and information charts produced.

Recently we have initiated an overall rural education programme in association with UNICEF called the “Child Friendly Villages” (Text Box 3). Such child friendly villages can have a number of parameters starting from sex ratio, to number of low birth weight children and marriage below 18 years. For a Nutrition Secure India, we need a greater understanding and awareness about the environment and also about the problem of excess population and how far our country can support excess population.

## IT Enabled Services

The Jamshedji Tata National Virtual Academy for Rural Prosperity established at the MSSRF

### Text Box 3 MSSRF - UNICEF Child Friendly Villages

- ✍ Mobilise the community to ensure that no girl gets married before the age of 18 years
- ✍ Record male/female sex ratio at the time of birth and again at the age of 5 in the village
- ✍ Promote education among adolescents – both boys and girls – on HIV / AIDS and prevention and treatment of other illness including tuberculosis, diarrhea and acute respiratory infections



in 2004 is another initiative for information empowerment of the masses. Jamshedji Tata, after whom Jamshedpur is named, was one of the great pioneers of industry during the colonial times. This Academy includes interconnected use of modern technology like internet, cable, community radio, TV and a local vernacular press in a much more effective way. For example, now fisher women of Veerampattinam, a village in Pondicherry are able to download information from the U.S oceanography website on wave heights and information regarding the condition of the sea from Hyderabad. Community radio is another remarkable example of technology today, which can empower people with correct information, and knowledge for solving problem.

Through the new programme of the Indian Space Research Organisation (ISRO) and the new education satellite which our Prime Minister recently launched; best medical facilities or help can be made available even to the remotest of the villages. Reaching the ‘unreached’ and the poorest need not be just slogans any more. These are ‘doable’ at affordable cost.

## Widening Food Baskets

On the production front, we need to widen the food basket because the global food basket is very narrow. Three or four crops dominate food security. If one looks at the book ‘Lost crops of Incas’, one realizes that a few centuries ago people were dependant on 200-300 crops for their health and food security. For example, millets, and red gram (pigeon pea) give excellent yield and enrich soil fertility. They improve the physical properties and chemistry of the soil. Even today, in Tamilnadu (in the Eastern Ghats region) 190 plants are used for health and security, which also includes some medicinal plants. Many of them are disappearing because of low economic value. We must generate an economic stake in conservation by linking “orphan crops” with markets.

## Role of Community

One of the important mechanisms to address this problem is “Community managed gene, seed, water and food security system”, which

has got all the facilities of gene bank, seed bank, water bank and grain bank. Recently Ms. Komala Pujari, a representative of the tribal community in the Jeypore tract of Orissa, went to receive the “Equator Initiative Award” from the United Nations for the most outstanding community food security system developed by the Tribal community in Koraput, Orissa, a Center for diversity of rice. Such examples show the pathway to sustainable food security.

### Micronutrient Deficiencies

One of the main problems today is of micronutrient deficiencies, from which plants suffer. Micronutrient deficiencies in the soil like sulphur, zinc, and boron are quite common in semi-arid areas. If we give macronutrients along with micronutrients – yield is improved considerably.

### Genetically Modified Foods and Organic Forms

Coming to Genetically Modified foods, I went through a chocolate wrapper, which says, “this milk chocolate contains no genetically engineered ingredients”. Genetically modified foods and organic foods are being pitched against one another in industrialized country. Uttaranchal promotes organic farming and wants to be declared as an ‘organic farming state’. Organic farming is a good idea as long as it maintains soil fertility and promotes plant health. Successful organic farming needs intensive scientific research. But scientific organic farming itself requires a lot of help from biotechnology. For example bio fertilizers, stem modulating green manure, and bioremediation. In West Bengal and Bangladesh, bioremediation is the best method of removing the arsenic and some other heavy metals from ground water.

Modern genetic analysis has become a very valuable research tool. For example, Synteny, which is arrangement of genes in different crops like Oats, Maize, and Barley, is characteristic of many plant genomes. Recently we have started “Human Genome Clubs” in economically under privileged corporation schools, to introduce children to the meaning of the human and rice genomes.

We are entering the age of genomics and proteomics and nanotechnology. International Rice Genome Sequencing Initiative is a multi-country initiative for mapping Rice Genome. In a country like ours, with diverse cultures, people should invest in genomics. Fortunately, we have both public and private sector also funds research in this area. The Public Sector programme, funds the Rice Genome Project. The best thing is public and private participation. We should not be discarding Mendelian genetics or only worshipping the molecular genetics. We should combine Mendelian and molecular genetics in an integrated way. There are many examples of what our research workers have achieved in term of modification.

In Delhi, Ashish Dutta and his group at Jawaharlal Nehru University have transferred genes from *amaranthus* into potatoes. The Golden Rice, is another example. Originally the Vit. A levels were less but now it is 60 micrograms of Vit. A per gram. Variability occurs among varieties in the content of zinc and iron. We should screen different crops for their micronutrient content. A food-based approach is the best method of promoting dietary diversity and improving nutritional status.

Data on iron and zinc content of different rice varieties are shown in Table 1. The importance of choosing varieties with high iron and zinc content is obvious. A useful gene donor is the Mangrove species *Aveccinia marina*, where genes for ferritin have been isolated to detect the seawater tolerance. The mangrove gene(s) carrying rice lines are undergoing field trials, in accordance with bio-safety regulations.

Recently, Department of Biotechnology has initiated a new programme- Harvest Plus. The major thrust of the programme is to develop

**Table 1: Iron and zinc contents of brown (unmilled) rice of selected varieties**  
(from Gregorio et al. 2000) (Mean values with their standard errors)

	Iron (mg/Kg)		Zinc (mg/Kg)	
Jalmagna	22.0	1.4	31.8	7.7
Zuchen	20.2	1.8	34.2	5.0
Xuz Bue Nuo	18.8	0.8	24.3	0.7
Madhukar	14.4	0.5	34.7	2.8
IR64	11.8	0.5	23.2	1.4
IR36	11.8	0.9	20.9	1.4

six staple food crops with high iron, zinc and provitamin A content first through conventional breeding and later if necessary through genetic modification.

National Programmes under the Department of Biotechnology, Government of India, currently headed by Dr. M.K. Bhan, for micronutrient studies has initiated studies on rice for iron enrichment by gremplasm screening, wheat for zinc by marker assisted selection and maize for low phytase by transgenics and introgression to locally adapted genotypes. Bioavailability and bioefficiency work have been allocated to the National Institute of Nutrition, Hyderabad. NFI could be the hub of many such exercises.

The new genetics and organic farming should not be put against each other for benefit of humanity. When we want the way ahead we should combine the wisdom of traditional technologies with modern science and technology.

Another neglected area is the farm animal population. Nutrition is important not only for ourselves but also for our companions, our animal population which comprises 25% of world's farm population like buffaloes, cattle, sheep, goat and poultry. We can use the entire biomass like rice bran, husk and also rice stalk as animal food.

Now CFTRI has developed the brown rice technology. Mahatma Gandhi always advocated hand-pounded rice to preserve the most nutritious layer, the aleurone layer. New technologies have been developed where we will not lose this nutritious layer. We must popularize them in a big way. It must be used efficiently with modern science and technology.

### **Food for Work Programs**

India has a large food for work programme mainly developed for rural infrastructure development such as rural roads, watershed development and rural building. It is recommended that this programme must have a gender dimension. As far as women are concerned, they should not restrict themselves to food for work in construction activities but also for all-round human development, running

crèches, and support services including running nutritious mid-day meal services. The concept of food for human development should be popularized.

### **Nutrition Security for Patients with HIV/TB infection**

Nutrition security should be available for patients suffering from HIV-AIDS and TB, the two pandemic diseases. Nutrition in terms of health, in terms of control of diseases, also recovery from diseases should be the priority area for attention. In 1981, when Smt. Indira Gandhi asked me to chair a committee on the eradication of leprosy by 2000, I suggested that we must have nutrition support for leprosy patients in addition to access to multi-drug therapy. Data from Tuberculosis Research Centre, Chennai (TRC), has shown that prevalence of undernutrition is higher in patients with TB and HIV/AIDS. Mortality rate in tuberculosis patients shows an inverse correlation with body weight.

### **Way Forward**

In my view seven basic steps, which are both affordable and 'doable' if implemented in mission mode will enable India to achieve nutrition security by 2007.

There are many nutrition safety net programmes in the country. Every government initiates programmes operated by different ministries and departments. What we need is the horizontal integration of the numerous vertically structured programmes and a delivery mechanism on the basis of a whole life cycle, starting from pregnant women and going up to old persons. There has to be nutrition security at the individual level. Self Help Groups of women can be harnessed and trained to assist in the delivery of the various programmes. If women, or self help groups of women do transaction, the cost will be low and the delivery system of such schemes will be more effective, transparent and corruption free. There are many gaps in our nutrition safety net programmes. One important area needing attention is maternal under-nutrition. Appropriate steps should be taken for adolescent girls and pregnant women to improve their health and

nutritional status. Another important gap is infants and young children in the 6-24 months age group.

The second important point is a concerted effort to promote widening of the “Food Security Basket”. Instead of just depending on rice or wheat under the public distribution system, can we not revive our old food grains like various millets, pulses, oilseeds and tuber crops, which were life saving crops in the past? Even today they are life saving crops or part of the traditional cropping mechanisms adopted to avoid acute hunger. We must promote more number of crops in the food basket involving millets and also vegetables, especially green leafy vegetables. This can be done through decentralized storage and management of food at the community level through community food banks and community grain banks. In tribal areas of Orissa where such banks are in operation, the community stores the locally cultivated grain – *ragi* and its cultivation and consumption have received a boost.

Thirdly, the present Government is committed to implementing an Employment Guarantee Scheme (EGS). Our Prime Minister recently inaugurated the “National Food for Work Programme” in Andhra Pradesh in some of the areas of extreme distress, which witnessed farmers’ suicide. I think a time has come for us to combine the ‘Food for Work Programme’ and the ‘Employment Guarantee Scheme’ and evolve a “National Food Guarantee Scheme”. A National Food Guarantee Scheme according to some calculations will mean providing just another 15 million tonnes of food grains a year, a very affordable and manageable amount in our country. We are now at a stage where agriculture has become a gamble in the market; formerly, it was a gamble in the monsoon. For example, this year the cotton production is good. Farmers are asking how much cotton the Government can buy otherwise there is danger of the price crashing. This means that our consumption must grow and for that purchasing power has to grow. We have an advantage and opportunity of using food as cash and as currency in the country. Greater consumption and demand will stimulate farm families to produce more.

Fourthly, there has to be a thrust on self-employment for livelihood security. The growing Self Help Group movement is indicative of this. But this is largely concentrated in the Southern States. In these States, women in particular are organizing themselves into ‘self help groups’ and financial institutions are willing to give them loans not on the basis of collateral, but on the basis of viability of self help groups. If the government is going to increase rural credit, there has to be viability in utilization. We have developed detailed methods of converting self-help groups to sustainable self-help groups through backward linkages with technology and credit and forward linkages with market and management. All the available opportunities should be utilized.

Next is increasing productivity-based production or improving major farming system in crops, livestock, fish, poultry, agro-processing and agro-forestry. Enhancing the productivity of small farms will make a major contribution to the elimination of hunger and poverty.

It is important that there be a promotion of a food-based approach to nutrition security – through widespread cultivation and consumption of vegetables and fruits; nutritious use of underutilized food crops like millets and pulses is also important – a fact always emphasized by Dr. Gopalan.

Lastly, access to clean drinking water and maintaining environmental hygiene, are prerequisites for good health and absorption of nutrition by the body.

## Conclusion

I want to conclude with a tribute to Dr. Gopalan’s late son and also to Dr. Gopalan’s contributions to institution building – both of NIN, which he has built to a world-class institution and as Director General, ICMR. At NIN, he organized the first Asian Congress of Nutrition where he brought all the Asian countries together on a common platform for the first time. Another very successful event was the IX<sup>th</sup> Asian Congress of Nutrition held in New Delhi. He has always been a visionary leader. He was the earliest to point out under-nutrition due to inadequate consumption is the nutritional problem of India.

Dr. Gopalan has been a fearless fighter throughout his life and has the courage of scientific conviction, which everyone should admire and follow. He has never diverted from what he thought to be true and never gave technical recommendations in order to please somebody- a mark of scientific integrity of the highest order. After retirement from positions in Government, he has devoted his energies to build up Nutrition Foundation of India and bringing the best in Nutrition Research and Nutrition Science to solve practical problems.

I hope we will all work together to reach the goal of Mission 2007: "A hunger-free India". In a

political system, which responds to public opinion, we must go on pressing or putting emphasis on nutrition security as our first priority. Any country, which, undervalues its human resources and over values material resources, will always remains poor. Let us value the wealth of human resource in our country and develop our country on the basis of the economics of human dignity.

On the occasion of Dr.Gopalan's birthday and on the occasion of 25<sup>th</sup> birthday of his institution, Nutrition Foundation of India, I request all of you to join me and give a standing ovation to Dr. Gopalan.