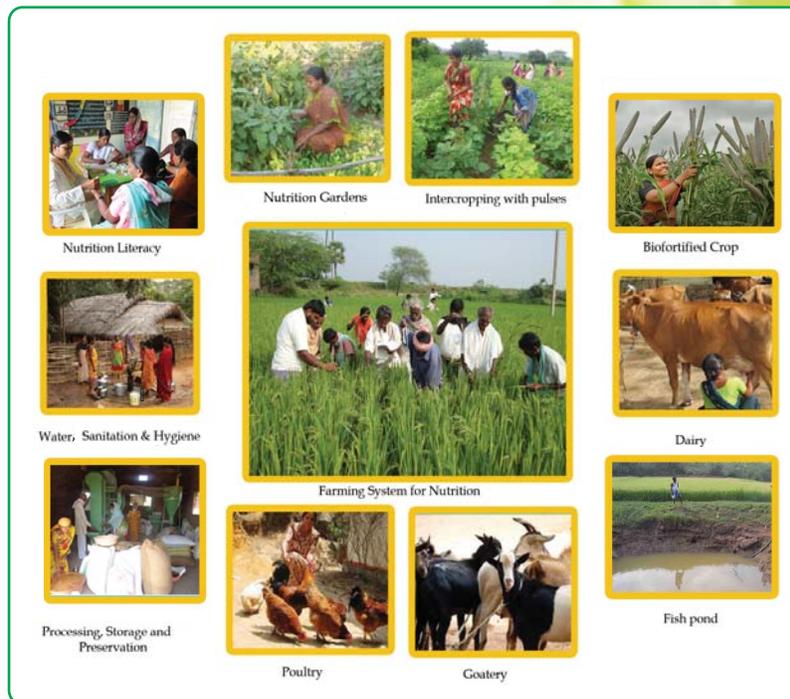


FARMING SYSTEM FOR NUTRITION: A MANUAL



**M S Swaminathan Research Foundation
Chennai**

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FOREWORD

Since our Independence in 1947 much emphasis has been placed on food security measured by the consumption of calories. Currently it is recognised that malnutrition, particularly deficiency of micronutrients is a serious problem, particularly among women and children. A majority of our rural population depend upon agriculture including crop and animal husbandry, fisheries and forestry for their livelihood. One method therefore of overcoming malnutrition is to standardise agricultural remedies for the nutritional maladies prevailing in an area. This will involve giving a nutrition dimension to the ongoing farming systems in the area. The following five areas will need particular attention.

1. Overcoming calorie deficiency through the effective use of the provisions of the National Food Security Act 2013.
2. Overcoming protein hunger through the increased production and consumption of pulses and milk and poultry products.
3. Overcoming hidden hunger caused by micro nutrient deficiency through the establishment of genetic gardens of biofortified plants and promoting a Farming System for Nutrition programme.

4. Ensuring the availability of clean drinking water, sanitation and primary health care.
5. Developing a cadre of Community Hunger Fighters who are well versed with the art and science of malnutrition eradication.

The public policy support for a nutrition sensitive agriculture has to take the form of favorable Minimum Support Price (MSP), public procurement at the announced MSP and public distribution in various programmes connected with elimination of malnutrition.

This publication provides a summary of the steps needed to develop a FSN strategy for each agroecological area. I hope it will be widely used to give a nutrition orientation to the major farming system prevailing in different agroecosystems.

M S Swaminathan

31 March 2018

FARMING SYSTEM FOR NUTRITION

A majority of India's population continue to be dependent on agriculture for their livelihoods, with close to 60 percent of the rural households in 2012-13 classified as agricultural households (Gol, 2014). The country is also home to a large population of undernourished people. As per the latest round of the National Family Health Survey (NFHS-4), in 2015-16, 38.4 per cent of India's children, below the age of five were stunted and 35.7 per cent underweight; one fifth of women in the reproductive age group, were estimated to be suffering from chronic energy deficiency while another one fifth were obese. Further, more than 50 per cent of children and women suffer from anaemia (IIPS-ICF, 2017). In a context where a significant section of the population is malnourished and are dependent on agriculture for their livelihoods; a potential pathway would be to leverage agricultural policies and practices to address household food and nutrition security.

Farming System for Nutrition (FSN) as defined by Prof. M S Swaminathan, envisages the introduction of location-specific agricultural remedies for nutritional maladies by mainstreaming nutritional criteria in the selection of farming system components involving crops, animals and wherever feasible fish (Nagarajan et al 2014). It is an interventional approach that includes a combination of sustainable

measures including advanced crop production practices, bio-fortification, promotion of nutrition gardens of fruits and vegetables, livestock and poultry development, and setting up of small-scale fisheries, combined with nutrition awareness; the objective being to address malnutrition in all its forms, viz. calorie deprivation, protein deficiency and 'hidden hunger' (i.e. micronutrient deficiencies).

WHAT IS MALNUTRITION?

Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. The term malnutrition covers two broad conditions.

- undernutrition' which includes stunting (low height for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals).
- overweight, obesity and diet-related non-communicable diseases (such as heart disease, stroke, diabetes and cancer).

VARIOUS FORMS OF MALNUTRITION

- 1) **Calorie Inadequacy** is linked to the availability and access to food grains, the basic staple; this may of course vary across contexts. Calorie intake is directly linked to both production and purchasing power.
- 2) **Protein Deficiency** is inadequacy of protein in the diet that leads to generally debilitating conditions like wasting in the child.
- 3) **Micronutrient Deficiency** is inadequacy of micronutrients like iron, iodine, vitamin A and zinc in the diet, often referred to as 'hidden hunger'. Some micronutrients can be derived from cereals and proteins, but they are often not adequate, leading to a host of problems including anaemia and night blindness. Micronutrient deficiencies are closely linked to dietary diversity; hence, shortfalls reflect not just a lack of access or purchasing power, but also changing dietary consumption priorities.

People often do not prioritise nutrition, even if they have the money. As long as they have enough to eat, they do not distinguish between calories, proteins and micronutrients, maybe because they do not recognise the negative long-term implications of not consuming a diversified diet for cognitive development or poor health.

Farming systems have traditionally integrated crop–livestock–fish and forest produce; such integration ensures adequate protein and micronutrient availability and intake, along with energy from cereals. Unless production and consumption are looked at holistically, and the various linkages addressed taking into account social acceptability and cultural preferences for different crop and livestock products, successfully addressing the three nutritional deficiencies is difficult.

APPROACHES TO ADDRESS MALNUTRITION

Malnutrition is a complex issue with multiple dimensions calling for a combination of both Nutrition Specific Interventions and Nutrition Sensitive Interventions. The nature and severity of the problem of malnutrition and nature of the agricultural production system will vary considerably across space; consequently, the problem of 'nutritional gap' will also vary – in its nature and extent.

WHAT ARE NUTRITION SPECIFIC AND NUTRITION SENSITIVE INTERVENTIONS?

Nutrition Specific Interventions are those that address immediate problems of malnutrition like Treatment for severe acute malnutrition and disease management (e.g. oral rehydration salts for diarrhoea); and preventive like Maternal and child micronutrient supplementation, Infant and young child feeding and Access to health services.

Nutrition Sensitive Interventions are those “whose primary objective is not nutrition, but that have the potential to improve food and nutrition security” (Samba and Chahid, 2014). Maternal care giving, access to water and sanitation, nutrition sensitive agriculture (NSA) are examples. And Farming System for Nutrition (FSN) is an example of NSA.

Underlying the concept of FSN is the premise that household food production is important to the diets of farm families, particularly small holders. In other words, a diversified food production system has the potential to diversify the household consumption basket. Household production for the household's own consumption is the most fundamental and direct pathway by which increased production translates into greater food availability, dietary diversity and food security.

The production of staple foods leads mainly to greater access to and consumption of energy. Increased production of fruits, vegetables, and animal source foods (dairy, eggs, fish, and meat) can likewise raise access to energy, protein, and fat, but can also greatly improve the quality and micronutrient content of diets.

OPERATIONALISING FSN

The following are the broad steps in developing a Farming System for Nutrition design for an area:

1) **Identify the Major Nutrition Deficiencies in the Area:**

Classify the underlying causes of the problem, namely undernutrition, protein hunger, hidden hunger caused by micronutrient deficiencies and non-food factors like drinking water and sanitation. Also get an understanding of qualitative dimensions of the issue across gender and class. [wherever a hands-on assessment is not feasible, the widely prevalent nutritional deficiencies in the state/district-protein deficiency, iron, vitamin A and iodine deficiencies-may be addressed.]

2) **Design Farming System to Address the Identified Nutrition Deficiencies:** Identified agricultural solutions should be sensitive to ecological and socio-cultural factors. For instance, the production and consumption of pulses and other protein rich foods should be promoted through cereal–legume and crop–livestock farming systems. Cereal/legume rotation in the cropping system is also beneficial for soil health as leguminous plants fix nitrogen in the soil.

- 3) **Invest in Nutrition Literacy:** An important requirement for integrating agriculture and nutrition is nutrition literacy, both amongst the farmers and farm scientists. What farmers need is an understanding of balanced diet and exposure to the various alternatives available for integrating nutrition within farming systems. For this purpose, promote knowledge of naturally nutrient rich plants like moringa, orange flesh sweet potato, lemon, papaya, agathi and amla which can help overcome hidden hunger caused by micronutrient malnutrition.

Genetic gardens of naturally nutrient rich plants or those developed by Mendelian breeding may be established to serve to create this awareness and help farmers choose appropriate crops for addressing the prevailing nutritional problem. Such a garden would contain considerable genetic diversity of the crops proposed to be included in the farming system and also provide necessary planting material. The Krishi Vigyan Kendra (KVK) in each district may take the lead in this.

Agriculture and health extension workers can play an important role in facilitating community health and nutrition. A cadre of local people (men and women from the community), say, community hunger fighters or community nutrition champions can be trained to understand the malnutrition problems of the area, and the agriculture remedies keeping in mind local diets and

social and cultural practices. This should include recipe demonstrations and preparation of value-added products.

Promotion of nutrition education/literacy to school children, along with promotion of nutrition garden in schools that feed into the mid-day meals will both create greater awareness and also be a means for reaching the families through the children.

4) Attention to Processing, Preservation and Storage :

Proper drying and safe storage of foodgrain to prevent damage due to moisture and pest attack are important. Promotion of village-level processing units for nutrient dense crops, like millets and pulses will give support to the thrust on household level consumption before selling surplus in the market.

The availability of many micronutrient rich foods is seasonal. Measures for processing and preservation of many foods with proper attention to food safety will enhance availability by extending their shelf-life and serve to ensure adequate nutrition by retaining the nutritive value. Curry leaves for instance can be dried and processed into powder. With process standardization, besides availability for home consumption, it can also be an income generating activity for say women's groups. The home science wing in KVKs can take the lead in this.

- 5) **Sustainability:** Put in place mechanisms for sustainability of the FSN approach – e.g. availability of seeds through community seed banks, linkage with seed suppliers, linkage with poultry hatcheries; safe storage practices; manufacture of bio-inputs; value addition and processing units to facilitate consumption and identifying and training village level nutrition champions.
- 6) **Convergence and Synergy:** Develop institutional structures that can bring about convergence and synergy amongst the various components of leveraging agriculture for nutrition. Convergence is needed with sectors like health, education, and women and child development for planning and implementation of nutrition sensitive interventions in a holistic manner.
- 7) **Develop a Monitoring Framework** and impact assessment criteria with targets, to ensure effective implementation of interventions and bring in mid-course corrections as maybe called for.

The design of Farming System for Nutrition will vary from region to region. It is a flexible model that takes into account the nature of resource endowment, specificities in environment and nutritional problems.

CHOICE OF INTERVENTIONS IN FSN

The FSN model is a location-specific, inclusive model based on the resource endowments and specific environment that shall address the nutritional needs of families. Some examples of farming systems are as follows:

- Crop Husbandry with different nutri-rich crop combinations
- Crop Husbandry + Livestock
- Crop Husbandry + Livestock + Poultry
- Crop Husbandry + Horticulture + Sericulture
- Crop Husbandry (Rice) + Fish
- Crop Husbandry (Rice) + Fish + Mushroom
- Crop Husbandry + Fishery + Duckery + Poultry

In the design of FSN, it is important to promote

- a) Nutrient rich crops (millets, pulses)
- b) Biofortified crop varieties: Biofortification is the process by which the nutritional quality of food crops is improved through agronomic practices, conventional plant breeding or modern biotechnology. Consumption of biofortified crops facilitates increase of dietary micronutrient intake simply by substituting a micronutrient-poor staple with its micronutrient-rich counterpart.

- c) Nutrition Gardens: Promotion of fruits and all three groups of vegetables (green leafy vegetables, roots and tubers (such as orange flesh sweet potato) and other vegetables) for balanced diet as also naturally nutri-rich fortified trees/plants such as Moringa, Papaya, Amla, Agathi and Lime in the backyard gardens.
- d) Animal Husbandry: Livestock / Poultry / Fishery / Duckery as feasible / appropriate
- e) Technologies and safe practices for processing and preservation of foods: Processing and value addition will promote both consumption and exchange and help generate more income.
- f) Nutrition awareness activities across the board.

Enabling Environment is needed for the promotion and sustainability of the FSN approach. This would include:

- Nutrition focus in agriculture policies and programmes
- Agricultural policies should support the production of diverse nutrient-rich foods in alignment with national nutrition priorities and goals. Measures to improve productivity and quality of nutrient-rich crops, as well as policies for access to inputs and extension support services for their production need to be facilitated.
- Adoption of sectoral and cross-sectoral approaches – including for crops, livestock, forestry, fisheries and aquaculture needs to be facilitated for sustainable and diverse production systems.

Note: The content of this manual has been drawn largely from Rao and Swaminathan (2017).

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