

Nutritional Security of Farm Families through KVKs

Innovative Approaches and Interventions



ICAR-Agricultural Technology Application
Research Institute
Zone-VIII, Pune, Maharashtra





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A.K. Singh

DDG (Agricultural Extension)

Message

The policy of Food security should address Sustainable Development Goal of ending hunger, malnutrition and under nutrition. Enhancing the productivity, reducing the cost of cultivation and increasing income of small holder farmers may be the key drivers for achieving development goals. In this direction, the role of nutrition-led agriculture may be of utmost importance. ICAR has already taken steps to reduce the malnutrition by implementing Nutri-Sensitive Agricultural - Resources and Innovations (NARI) program across the country. Various working models have been developed and implemented through KVKs in the country. The KVKs have demonstrated different nutri-rich bio-fortified crops and varieties for nutri gardens which have sensitized women to analyze their food in terms of good quality vegetables and fruits for nutritional security of the family.

ICAR-ATARI, Pune has put an effort to compile various initiatives on nutrition garden, models, schemes and nutrition policies which will be helpful for other stakeholders to get acquainted with nutri sensitive approaches. I congratulate the ICAR-ATARI, Pune for this informative and exhaustive compilation.

01 August, 2021

New Delhi

(A.K. Singh)



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Vishwajeet V. Mane, IAS
Director General

Message

Prof. M.S. Swaminathan, also known as the father of Green Revolution in India, had a deep concern about malnutrition in rural India. He quoted introduction of agricultural remedies to nutritional maladies are prevailing in an area through mainstreaming nutritional criteria in the selection of the components of the farming system involving crops, farm animals and fish.

Majority of India's population continues to be dependent on agriculture for their livelihood with close to 60 percent of rural households.

The concept of farming system for nutrition envisages the introduction of location specific agricultural remedies. The Maharashtra Council of Agricultural Education and Research (MCAER) in collaboration with ICAR-ATARI, Pune, SAUs and M.S. Swaminathan Research Foundation, Chennai has been implementing the concept of Farming System for Nutrition (FSN) through KVKs in Maharashtra which is funded by UNICEF.

The efforts made by the team of KVKs under the leadership of ATARI, Pune deserve big compliments. Strategies made for demonstrating the nutrition gardens among the farm families getting its impact in a long way for the nutritional security of the rural farm families.

I congratulate the Director, ICAR-ATARI, Pune and his team for publication of this document which has national importance in replicating the concept of nutrition.

(Vishwajeet Mane)



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Dr. Lakhman Singh
Director

Preface

This publication on '*Nutritional Security of Farm Families through KVKs: Innovative Approaches and Innovations*' has been designed to provide information on different interventions initiated by the KVKs in the Zone for development of nutritional gardens and efforts for awareness about malnutrition and health. In this publication, different nutrition gardens developed by KVKs, awareness programmes, various efforts on the line of nutrition and health, many development schemes and policies have been compiled.

Various nutrition garden models developed from states of Maharashtra, Gujarat and Goa have been compiled for better establishment of Nutri-Garden according to available land. This publication contains various aspects of nutritional requirement in adult and children, Nutri-Thali approach and recommendations for healthy nutrition. Successful cases on nutri-sensitive interventions have also been documented. Different schemes of Major Schemes/National policies regarding nutrition like, National Food Security Act, Integrated Child Development Service, Public Distribution System, National Nutrition Mission and National Nutrition Policy have been listed for getting their benefits.

I express my sincere gratitude to Dr. Trilochan Mohapatra, Secretary (DARE) and DG, ICAR and Dr. A.K. Singh, DDG (Agril Extension), ICAR, New Delhi for their kind guidance, constant support for organizing different programmes and launching NARI programme across the country. Both ADGs Dr. V.P. Chahal and Dr. Randhir Singh deserve special thanks for extending whole hearted support at every moment. The help received from Principal Scientists (Dr. Keshava, Dr. P. Adhiguru and Dr. Naresh Girdhar) from Agricultural Extension Division is duly acknowledged.

Special appreciation is extended to Shri. Vishwajeet Mane, Director General, MCAER, Pune; Dr. K.M. Nagargoje, Ex IAS, Consultant UNICEF, Mumbai; Dr. V.S. Shirke, Director Extension Education, MCAER, Pune; Dr. Bhawani; Dr. R. Gopinath, MSSRF, Chennai; Dr. H.P. Sonawane, Asso. Prof., Extn. Edu., College of Agri, Pune and Dr. Kannan Chinnathambi, MCAER Pune for their whole hearted support for promoting and Execution of Farming System for Nutrition approach through KVKs in Maharashtra.

All the Heads and SMSs (Home Science) of concerned KVKs are duly acknowledged for their valuable help in compiling the information/data for bringing out this publication.

I appreciate the efforts of Dr. S.V. Sonune, Mr Prashant Shete, Dr. Ravindra Singh, Dr. C.K. Timbadia, Dr. L.R. Tambade, Dr. Rajendra Dahatonde and Shri Vilas Jadhav for their contribution. I acknowledge the contribution of Shri J. Mathew, AAO and Mr Munish Ganti, AF&AO for their sustained help.

I recognise the support provided by Mr Sainath Kharat, Dr Rashmi Bangale, Dr Anita Deshmukh, Ms Supriya Patil, Ms Aarti Patole, Mr Ganesh Chaware and Mr Vinod Jadhav in compiling the document. I hope the publication will be useful to the KVK officials and extension functionaries working in the field of nutrition and child health.

30 July, 2021
Pune



(Lakhan Singh)

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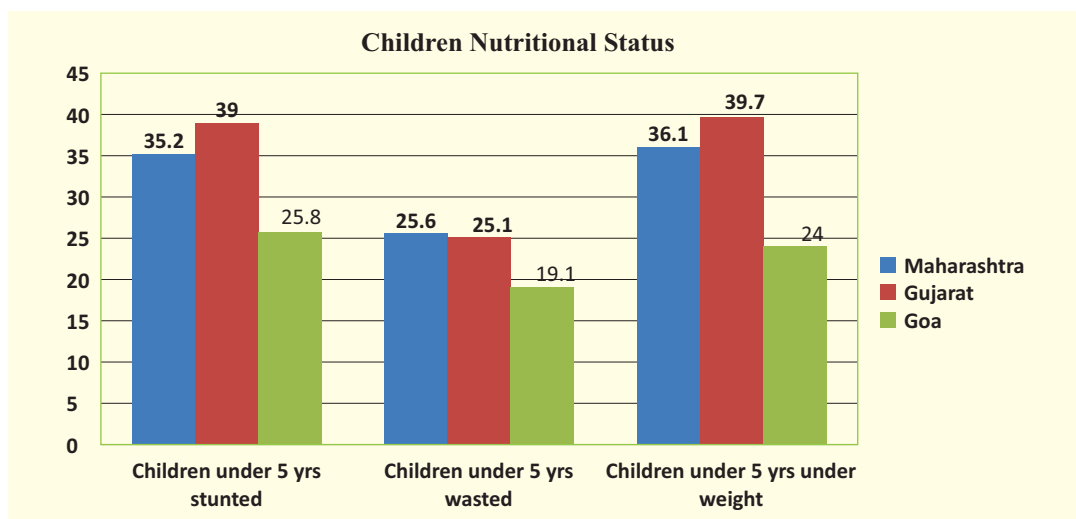
Introduction

Chapter 1

Status and Prospects of Nutrition Sensitive Agriculture

Good health depends on good nutrition. Agriculture plays a crucial role in achieving adequate nutrition, as it produces food without which nutrition security cannot be attained. Nutrition security means all people at all times, have sufficient, safe, and nutritious food for an active and healthy life. Sustainable improvements in the nutritional status of women and their children will only be possible when their diets provide all the macro- and micronutrients they need. World Health Organization has estimate that about 2 billion people are undernourished, including micronutrients deficiency. The problem of malnutrition is massive and India's performance in reducing malnutrition has not seen any significant decline according to national and international studies. According to UNICEF, India ranks 10th globally with respect to most numbers of children that are underweight and ranks 17th globally for most number of children that are stunted. Malnutrition is one of the major factors that contribute towards one third deaths of children that are under the age of five.

According to the National Family Health Survey (NFHS-5) 2019-20, 35.2%, in Maharashtra, 39.0% in Gujarat and in Goa 25.8% of children under the age of five years are stunted, or too

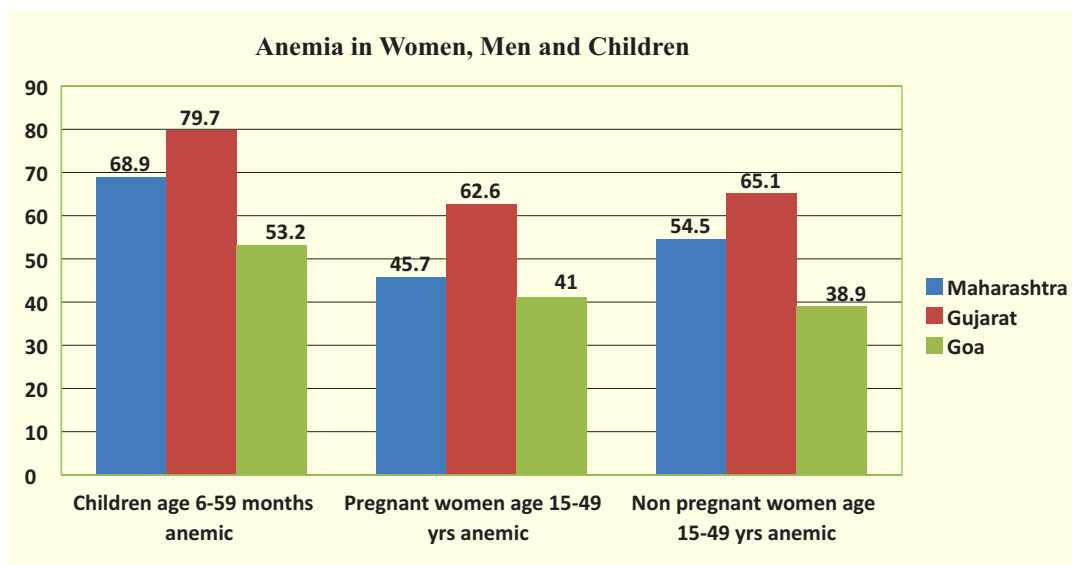


Ref: National Family Health Survey (2019-20), Ministry of Family Health Welfare, Govt. of India



short for their age, which indicates that they have been undernourished for some time whereas under the category of wasted growth 25.6% in Maharashtra, 25.1% in Gujarat and 19.1% in Goa. Wasted growth means too thin for their height, which may result from inadequate recent food intake or a recent illness causing weight loss. underweight of 36.1% which takes into account both chronic and acute under nutrition in Maharashtra while in Gujarat 39.7% and 24.0% in Goa state.

Anemia is a major health problem in Maharashtra, Gujarat and Goa especially among women and children. As per the NFHS 5 2019-20 anemia among children under the age 6-59 months 68.9% in Maharashtra, 79.7% in Gujarat and 53.2% in Goa state. As far as concern with pregnant women in the age group of 15-49 years 45.7% women are anemic in Maharashtra, 62.6% in Gujarat and 41.0% in Goa state where as non pregnant women at same age 54.5%, 65.1% and 38.9%, in respectively.



Ref: National Family Health Survey (2019-20), Ministry of Family Health Welfare, Govt. of India

In this context where a significant section of the population is malnourished and majority of the Indian population are dependent on agriculture for their livelihoods and nutritional security. Nutritional security is a global issue and remains a big challenge for developing countries. Nutritional security is multidimensional and is presumed exists when is adequate and continuous nutritious food availability, access and utilization in a sustainable manner. Several studies suggest that nutrition gardens can be an option for food and nutritional security in disaster, conflict and other post crisis situations (Galhena *et al.*, 2013). To address malnutrition,

it is therefore important to give focus on potential linkages between agriculture and nutrition. Women play a very crucial role in agricultural development and allied activities including main crop production, livestock production, horticulture, post-harvesting operations etc. Evidences are available across the globe linking farm diversification to diet diversification and better nutrition outcome as well as livelihood security. India's nutritional sensitivity problem is said to be even worse than Burkina Faso, Haiti, Bangladesh or North Korea. It is not just related to calorie intake but on India's dependence on a carbohydrate based diet with low protein and fat content. Besides inadequate sanitation, this triggers increase in infection-borne deficiencies in nutrients. There is indeed a lot of work to be done in this domain through sincere efforts in nutrition security, as well as creating infrastructure for better nutrition for children. Agricultural progress in the last decade has made India self-sufficient in major food grains. Yet under nutrition continues to be major nutritional problem especially in rural population due to dietary intake of energy and protein of rural Indian mothers are known to be low. India is home to almost half the tribal population of the world. The scheduled tribe (ST) population of the country, as per the 2011 census, was 104 million constituting 8.6% of the total population. ST constitutes about 8.2% of the total population of the country. They live in difficult circumstances in hills, forests and difficult-to-reach geographical areas with limited access to public services. According to the Census of India 2011, only 14% of the rural areas have a source of drinking water facility. Extreme poverty, cultural habits, lack of formal education, challenges of geographical conditions and natural disasters are related with poor nutrition and health of rural people. Considering these scenario, Indian Council of Agricultural Research (ICAR), New Delhi has taken initiative by involving ATARIs through KVKs for creating awareness and integrating nutri-rich crops/varieties in existing cropping systems under NARI project. It's major objective is of development of FSN / Nutrition Garden model at village level which ensure healthy and balance diet that contains adequate quantities of vitamins and macro and micro-nutrients by producing various kinds of vegetables, iron rich staple food like wheat, rice, pearl millet and sorghum and become nutritional and livelihood security. In Zone VIII, all 82 KVKs have been advised to implement the NARI project. Another project on Farming System Nutrition through KVKs in Maharashtra in collaboration with MCAER, MSSRF, ATARI and KVKs was implemented with active involvement of 19 KVKs.

KVKs in the Zone VIII

States	Host Institution						Total
	SAUs	NGOs	ICAR	DUs	OUs	SDA	
Maharashtra	20	28	01	-	01	00	50
Gujarat	18	07	02	03	-	-	30
Goa	-	-	01	-	-	01	02
Total	38	35	04	03	01	01	82



Concept of Nutrition-Sensitive Agricultural Resources and Innovations (NARI) Project

Nutrition-sensitive agriculture is a food-based approach to agricultural development that puts nutritionally rich foods, dietary diversity and food fortification at the heart of overcoming malnutrition and micronutrient deficiencies. Nutrition-sensitive agriculture is an approach that seeks to maximize agriculture's contribution to nutrition. Nutrition-sensitive agriculture also leads to targeting poor households, promoting gender equity and providing nutrition education. Agriculture has great impact on household consumption, as it is primarily associated with nutrition through food preparation, increase expenditure on nutrition-dense food and empowerment of women (Herforth and Harris, 2014). It can be possible with value addition of produce, which can meet off-season nutrition requirement, backyard poultry provide protein rich food and also generate source of income for economic empowerment of women.

Initiatives at the KVK Level

Nutrition-sensitive agriculture is an approach of production of a variety of affordable, nutritious, culturally appropriate and safe foods in adequate quantity and quality. It is vitally important to meet the dietary requirements of population in a sustainable manner. A nutrition-sensitive agriculture and food system aims at production of diverse, safe and nutrient-rich food, income generation that can facilitate access to health services. It contributes to improving health outcomes. It results in reducing contamination of water sources and through the application of labor-saving technologies. To address the nutritional sensitivity problem, a new initiative has been taken by the ICAR-ATARI, Pune through the project on NARI (Nutri Sensitive Agricultural Resources and Innovations) started in 2018-19. In total, 45 KVKs of Maharashtra, Goa and Gujarat were included under this study with focus on nutri-sensitive agriculture, nutrition, value addition and processing.

KVKs played a very crucial role in implementing the NARI (Nutri Sensitive Agricultural Resources and Innovations) project. It is more farm families centric and builds up their capacity in terms of promoting nutri-sensitive agriculture technologies and improving nutritional status of the society. Convergence with ICAR Institutes, SAUs, ICDS, ATMA, NGOs and other departments was made for reaching more and more families. KVKs mainly work on the NARI project by conducting On Farm Testing, Front Line Demonstrations, Awareness campaigns, Training Programmes, Extension activities, Field Visits, Radio talks, mobile based advisory, writing articles etc. KVKs are playing pivotal role in bringing nutritional security in the villages through appropriate technological interventions by following set principles as follows.

- Incorporate explicit nutrition objectives and indicators into their design, track and mitigate potential harms. Food Security must lead to Nutritional Security focusing on gender empowerment.
- Incorporate nutrition promotion and education - Nutrition Demonstrations and capacity development programmes are needed to promote nutrition-sensitive agriculture and gender mainstreaming.
- An intervention on Nutri sensitive family farming and agriculture is linking to nutrition. Facilitate production diversification, and increase production of nutrient-rich crops and small-scale livestock.



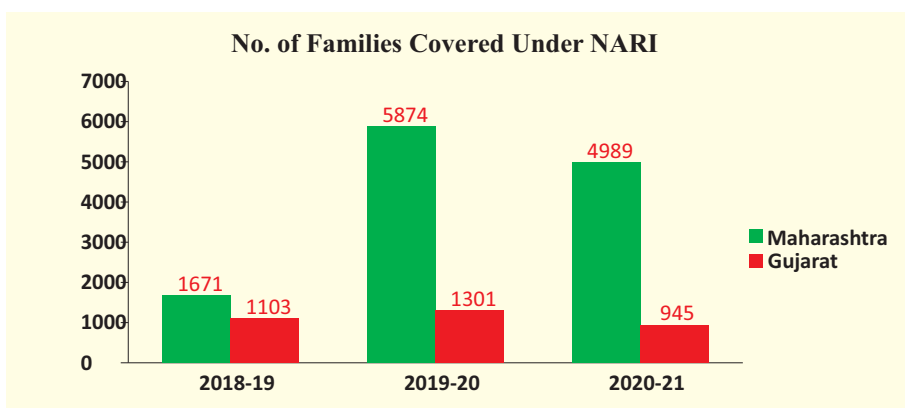
- Skill development among women and youth. Expand market access for vulnerable groups, particularly for marketing nutritious foods.
- Target the vulnerable groups and improve equity through participation, access to resources and creating employment.
- Demonstration of nutri-thali in the villages.
- Initiation of Nutrition Smart villages in every district in collaboration with other allied departments.
- Nutrition supplementation through value addition. Improve processing, storage and preservation to retain nutritional value and food safety, to reduce seasonality and post-harvest losses and to make healthy foods convenient to prepare.

In total, 45 KVKs were taken active role to supply biofortified seeds of cereals, pulses, oilseeds and horticultural crops to farming community with special focus on women empowerment. Providing various types of seeds, seedlings/saplings of fruits and vegetables such as drumstick for establishment of Nutrition Garden was ensured.

State wise Families Covered under NARI/ FSN Project

Under the jurisdiction of ATARI Pune, 382 villages were covered under NARI project. In total, 12824 families included under nutrition garden demonstrations in which 9802 families linked in Maharashtra, Gujarat 2972 families and Goa covered 50 families.

State	No of villages	No. of farm families under nutrition garden	2018-19	2019-20	2020-21
Maharashtra	176	9802	1671	5874	4989
Gujarat	205	2972	1103	1301	945
Goa	1	50	15	20	15





Interventions for *Kuposhan Mukta* Villages

High prevalence of low birth weight, high morbidity and mortality in children and poor maternal nutrition of the mother continue to be major nutritional concerns in villages. Malnutrition in village is not a child specific problem. It is prevalent in every age group, and in every group it has an adverse effect through a greater susceptibility to infections, through increased morbidity and mortality, through decreased productivity and through a lesser quality of life. In villages, infectious disease diarrheal disease accounts for 43.5 deaths and tuberculosis for 34.8 deaths per lakh population. A high level of morbidity results from disease like dengue, chikangunya, filariasis and infection of intestinal worms.

To overcome above mentioned problems, KVKs from Maharashtra, Gujarat and Goa have been carried out many interventions for *Kuposhan mukta* villages. Effectively addressing the causes of malnutrition requires an integrated and coherent set of nutrition-sensitive interventions addressing all functions of the food system combined with investments in other relevant sectors (e.g. water, sanitation, health, education and social protection). NARI or FSN model is innovative approach that includes a combination of sustainable agricultural remedies involving advanced crop production practices, bio fortification for attaining higher income and better nutrition output.

Interventions

1. Household Survey

KVKs in Maharashtra conducted the household survey to collect the socio-economic status of the villagers, nutrition and health status of the families. For the survey, interview schedule was developed for data collection about nutritional and health status of the villagers.

2. Training Programmes

KVKs were conducted various need based training programmes for farmers, farm women, rural youth and extension personnel including anaganwadi workers. More emphasis was given on long duration skill oriented trainings for school dropouts & unemployed rural youth. Efforts made to empower the women technically, as they play very vital role in agricultural operations. Major attention was given on nutri-sensitive agriculture and developing Nutrition Gardens, backyard poultry, use of bio-fortified varieties, use of bio pesticides, hygiene and health.



3. Nutrition Gardens

As per the survey, KVKs observed very high problem of malnutrition and anemia among villagers. They have not enough nutritional food required for good health. To tackle this problem, the KVKs developed Nutrition Garden Model where vegetables having nutritional value, such as Brinjal, Okra, Sweet Corn, Cucurbits, Leafy Vegetables and some fruits are grown. The KVK provided training to the farmers about Nutrition Garden. The concept of Nutritional Garden helped the villagers to improve their diet at some extent.

4. Diversification of Agricultural Production

For the *Koposhan mukta* villages, KVKs gave more emphasis on nutri sensitive farming systems. Nutri gardening with emphasis on nutrient-dense varieties of cereals, millets, pulses, vegetables and fruit trees and small-scale integrated farming systems (e.g. mixed crop-livestock aquaculture systems) were demonstrated to improve diet quality and raise levels of nutrition for producing households. KVKs organised complementary activities such as beekeeping, mushroom and high-value crop farming, milk production, maintaining fish ponds included in strategy to secure nutrition and livelihoods.

5. Nutrition-sensitive Livestock and Fisheries

KVKs organized several training programmes on "Backyard poultry rearing" at different locations of the Maharashtra, Gujarat and Goa for farm women. Post exposure study tours were also conducted to gain more practical knowledge particularly on birds suitable for backyard rearing. KVKs also helped them to procure improved breeds like RIR, Kadaknath, Vanraja, Shrinidhi and Giriraj in addition to the regular supplies from KVK farm. Farm women were able to meet their family needs.

KVKs initiated nutrition-sensitive livestock-based interventions including measures to prevent and reduce risk for human health associated with livestock rearing. Food and water safety issues and environmental contamination, whereby animals kept in the house premises, next to where children play or next to water sources were taken care.

6. Biodiversity for Food and Nutrition

Biodiversity for food and nutrition, KVKs selected vegetables and fruits varieties not only on yield but also on nutrient content. KVKs conducted training courses on raising awareness of the general public and of different stakeholders on the importance of biodiverse foods for nutrition.

7. Biofortified Crops

In villagers, lack of awareness on the health benefits of biofortified crops is one of the major factors for slow adoption of biofortified varieties. KVKs conducted awareness programmes and introduced different biofortified varieties like *Bhusona* and *Bhu Krusha* of sweet potato varieties, *Kashilalima* of okra variety, GNR 4 rice variety, *Dhan laxmi*, ABH 1200 pearl millet variety, *Parbhani shakti* of sorghum variety etc. The biofortified varieties not only provided enough calories but also deliver essential micronutrients needed for adequate growth and development.

8. Post-harvest Handling, Storage and Processing

Post-harvest food loss is one of the largest contributing factors to food insecurity in villages. The highest area of food losses reported are pre-farm gate where poor harvesting, drying, processing and storage of crops occur. KVK introduced new technology to avoid post harvest losses, storage and processing. The role of women in the preservation of fruits and vegetables is of utmost significant. It was found that there was good scope to generate income by women with focus skill oriented training. Considering this in view, KVKs conducted more number of vocational training on post harvest technology.

9. Food Marketing

For the *Kuposhan mukta* village KVK helped to the villagers to sell their products with the help of Electronic media (Facebook, Whatsapp groups, Instagram etc.) exhibition, fair and through directly linkages with sellers and buyers. With these linkages villagers attained more profit and their socio economic status get increased.

10. Nutrition Education

Main intervention of KVK for the *Kuposhan mukta* village is nutrition education. Awareness Programme and other activities were organised including health and nutrition counseling during pregnancy, education on breast feeding or improved complementary feeding of children less than two years of age. Schools were promoted to give focus on nutrition education through different ways and means.

11. School Nutrition Garden

School nutrition gardens are good for learning and found highly practical towards experiential learning where children can learn how to grow nutritious food, which not only improve health but also provide opportunities for livelihood. For the *Kuposhan mukta* village, KVK developed nutrition garden at school campus so that student get more nutritious fruits and vegetables, from their nutri-gardens.



12. Clean Drinking Water

Clean drinking water is an essential step towards a safe and healthy home. KVK introduced different technologies for water purification. Villagers mostly used bio sand filter for water purification. Water from a bio sand filter is clean, has no bad odour or taste, and is even cool. Once filtered, the water must be stored in a clean closed container.

13. Smokeless *Chulha*

Cooking in rural areas is usually done over open fires in small huts. The toxic smoke produced is a leading cause of death for women and small children. KVKs teach families to build and used smokeless *chulha* require less wood to generate more heat with less smoke. The health benefits last a lifetime.

16. Medical Camp

To analysis the nutritional status of villagers health camps were organized by the KVKs with the help of primary health centres or medical department and accordingly planned and educated the farm families.

17. Use of Mass Media and Literature for Technology Dissemination

1. Radio
2. Doordarshan
3. Popular articles
4. Leaflet/Pamphlet
5. News paper coverage
6. Social Media

18. Exposure Visits

It is difficult with tribals to change their mental attitude to accept a new technology or new things. An imposed idea always ends into failure. It needs motivation. To achieve the object “seeing believes”, prior to training a small group of enthusiastic tribal farm women are taken to the farm of a progressive tribal farmers and other reputed agriculture research station. They have doubts in their mind about the expenditure incurred and infrastructure. The visiting farmers freely discuss with the owner of progressive farmers or scientists of research station and they get their doubts cleared. They themselves compared with the owner of farm and get inspired for the crop or technology. In such situation, visiting farmers take it as a challenge and have positive attitude for getting success.

19. Linkages Development

There is strong linkage within KVK and department of Child Project Development Officer, Integrated Child Development Scheme, Anganwadi workers, Supervisors, Zila Parishad, Primary Health Centers and various NGOs KVK involved these departments to identify their problems and solutions through strategies of research and extension plan. KVK scientists also involved as resource persons for training programmes of nutrition, balanced diet, health, hygiene and sanitation campaign, medical camps, breast feeding campaign etc.

Activities under NARI/FSN project conducted by KVKs of Maharashtra

S. No.	Name of activity	2018-19	2019-20	2020-21	Grant total
1	Training Programmes Conducted				
A)	Farmer and farm women	187	282	184	653
B)	No. of Aganwadi Sevika trained	2000	1736	1685	5421
C)	No. of programmes conducted in convergence mode with other department/agency	48	76	125	249
2	Extension Activities				
A)	Field Visits	227	470	200	897
B)	Quiz	6	15	26	47
C)	Nutri-thali competition	15	23	25	63
D)	Exhibition	34	40	21	95
E)	Awareness campaigns	483	97	63	643
F)	No. of persons visited nutrition garden at KVK	38619	64990	3682	107291
G)	Health check up camps	24	53	431	508
H)	No. of programmes conducted in convergence mode with other department/agency	41	100	44	185
	Others	281	72	27	380
3. A	No. of Nutri Kit distributed	1352	3862	3776	8990
3. B	No. of nutrition gardens established in villages	820	3399	4159	8378
3. C	No. of community nutrition garden / school/ aganwadi established	113	319	351	783
3. D	Development of seed bank at village level	9	12	11	32



Activities under NARI/FSN project conducted by KVKs of Gujarat

S. No.	Name of activity	2018-19	2019-20	2020-21	Grant total
1	Training Programmes Conducted				
A)	Farmer and farm women	70	36	21	127
B)	No. of Aganwadi Sevika trained	158	171	95	424
C)	No. of programmes conducted in convergence mode with other department/agency	21	13	10	44
2	Extension Activities				
A)	Field visits	241	219	145	605
B)	Quiz	8	5	1	14
C)	Nutri-thali competition	5	8	2	15
D)	Exhibition	10	8	2	20
E)	Awareness campaigns	19	363	15	397
F)	No. of persons visited nutrition garden at KVK	3796	7954	1289	13039
G)	Health check up camps	553	1	1	555
H)	No. of programmes conducted in convergence mode with other department/agency	10	17	7	34
	Others	44	56	114	214
3. A	No. of Nutri Kit distributed	966	1152	758	2876
3. B	No. of nutrition gardens established in villages	904	1185	492	2581
3. C	No. of community nutrition garden / school/ aganwadi established	105	12	15	132
3. D	Development of seed bank at village level	15	17	0	32

Activities under NARI/FSN project conducted by KVKs of Goa

S. No.	Name of activity	2018-19	2019-20	2020-21	Grant total
1	Training programmes conducted				
A)	Farmers and farm women	35	16	-	51
B)	No. of aganwadi sevika trained	80	75	-	155
C)	No. of programmes conducted in convergence mode with other department/agency	11	6	2	19

S. No.	Name of activity	2018-19	2019-20	2020-21	Grant total
2	Extension activities	1	0	2	3
A)	Field visits	1	1	0	2
B)	Quiz	0	1	1	2
C)	Nutri-thali competition	1	2	Nil	3
D)	Exhibition	3	2	1	6
E)	Awareness campaigns	4	4	2	10
F)	No. of persons visited nutrition garden at KVK	Nil	358	45	403
G)	Health check up camps	Nil	Nil	1	1
H)	No. of Programmes conducted in convergence mode with other department/agency				
	Others	11	4	0	15
	1) Agriculture Management Technology Agency (ATMA) South Goa district				
3. A	No. of Nutri Kit distributed	Nil	Nil	5	5
3. B	No. of nutrition gardens established in villages	0	0	0	0
3. C	No. of community nutrition garden /school/aganwadi established	Nil	3	5	8
3. D	Development of seed bank at village level	0	0	0	0

Activities under NARI/FSN project of Zone VIII during (2018-19 to 2020-21)

S. No.	Name of activity	Maharashtra	Gujarat	Goa	Grant total
1	Training Programmes conducted				
A)	Farmers and farm women	653	127	51	831
B)	No. of Aganwadi Sevika trained	5421	424	155	6000
C)	No. of Programmes conducted in convergence mode with other department/agency	249	44	19	312
2	Extension activities				
A)	Field visits	897	605	2	1504
B)	Quiz	47	14	2	63
C)	Nutri-thali competition	63	15	3	81



S. No.	Name of activity	Maharashtra	Gujarat	Goa	Grant total
D)	Exhibition	95	20	6	121
E)	Awareness campaigns	643	397	10	1050
F)	No. of persons visited nutrition garden at KVK	107291	13039	403	120733
G)	Health check up camps	508	555	1	1064
H)	No. of programmes conducted in convergence mode with other department/agency	185	34		219
	Others	380	214	15	609
3. A	No. of Nutri Kit distributed	8990	2876	5	11871
3. B.	No. of nutrition gardens established in villages	8378	2581	0	10959
3. C.	No. of community nutrition garden / school/aganwadi established	783	132	8	923
3. D.	Development of seed bank at village level	32	32	0	64



Promotional Activities

Concept of Nutri-Thali

For the introduction of Nutri-Thali intervention, KVKs considered the nutrients requirement of person every day for good health. The Nutri-Thali consists of all the required nutrients such as macro and micro nutrients. It includes all the Food Group and ensures that they are getting everything as our body needs through our diet. The nutrients included in diet are Carbohydrate, Protein, Fat, Vitamins and Minerals.





Nutri -Thali for children (Age 1-3 yrs)

Energy (Kcal)	Protein (g/d)	Fat (g/d)	Calcium (mg/d)	Iron (mg/d)	Vit A (Carotene) (mg/d)	Vit C (mg/d)
1060	16.7	27	600	09	3200	40

Sugar – 15 gm

Milk & Milk products - 500 ml

Oil &fat - 25 gm

Fruits - 50 gm

Vegetables - 100 gm

Pulses – 30 gm

Cereals & Millet- 60 gm



Poshan Thali for Pregnant women

Energy Kcal	Protein g/d	Fat (g/d)	Calcium (mg/d)	Iron (mg/d)	Vit A (Carotene) (mg/d)	Vit C (mg/d)	Dietary folate (mg/d)
2580	78	30	1200	35	6400	60	500

Oil &fat - 25 gm

Milk & milk products - 300ml

Vegetables - 500 gm

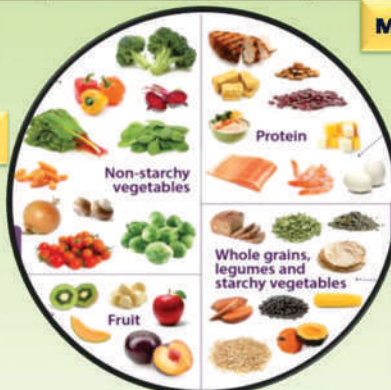
Pulses - 75 gm

Fruits - 100 gm



Cereals-330 gm

Sugar – 30 gm



Age wise requirement of food groups for introducing Balanced Diet Nutri-Thali

Population of village	Food Groups								
	Cereals and millets	Pulses	Milk and milk products	Roots and tubers	Green vegetables	Other vegetables	Fruits	Sugar	Fat
g/Portion Size	30	30	100ml	100	100	100	100	05	05
Sedentary work Man	12.5	2.5	03	02	01	02	01	04	05
Sedentary work Woman	09	02	03	02	01	02	01	04	04
Moderate work Man	15	03	03	02	01	02	01	06	06
Moderate work woman	11	2.5	03	02	01	02	01	06	05
Heavy Work Man	20	04	03	02	01	02	01	11	08
Heavy Work Woman	16	03	03	02	01	02	01	09	06
Infants 6-12 Month	0.5	0.25	4	0.5	0.25	0.25	01	02	04
1-3 years Children	2	1	5	0.5	0.5	0.5	01	3	05
4-6 years Children	4	1	5	1	0.5	01	01	4	05
7-9 years Children	6	2	5	1	1	1	1	4	6
10-12 years Girls	8	2	5	1	1	2	1	6	7
10-12 years Boys	10	2	5	1	1	2	1	6	7
13-15 years Girls	11	2	5	1	1	2	1	5	8
13-15 years Boys	14	2.5	5	1.5	1	2	1	4	9
16-18 years Girls	11	2.5	5	2	1	2	1	5	7
16- 18 years Boys	15	3	5	2	1	2	1	6	10

Source: Dietary Guidelines for Indians NIN website. pdf



As per the RDA the requirement of nutrient increases during pregnancy and lactation so they increase in need of portion size of nutrients also. Therefore, extra portions required are as follows:

Pregnant women: Fat/oil-2, Milk-2, Fruit -1, Green leafy vegetables - 1/2

Lactating women: Cereals-1, Pulses-2, Fat/oil-2, Milk-2, Fruit-1, Green leafy vegetables-1

Elderly women: Fruit -1, Reduce Cereals and millets -2

Age wise recommended daily nutrients requirement

Group	Particulars	Body Weight kg	Energy Kcal	Protein g/d	Fat g/d	Calcium mg/d	Iron mg/d	Vit A Carotene mg/d	Vit C mg/d	folate mg/d
Man	Sedentary	60	2320	60	25	600	17	4800	40	200
	Moderate		2730		30					
	Heavy		3490		40					
Woman	Sedentary	55	1900	55	20	600	21	4800	40	200
	Moderate		2230		25					
	Heavy		2850		30					
	Pregnant woman		+350	+23	30	1200	35	6400	60	500
	Lactating 0-6 month		+600	+19	30		21	7600	80	300
	Lactating 6-12month		+520	+13	30					
Infant	Infants 0-6 Month	5.4	92	1.16	-	500	46ug	-	25	25
	Infants 6-12 Month	8.4	80	1.69	19		5	2800		80
Children	1-3 years	12.9	1060	16.7	27	600	09	3200	40	100
	4 to6 years	18	1350	20.1	25		13	4800		120
	7-9 years	25.1	1690	29.5	30		16			
Boys	10-12 Years	34.3	2190	39.9	35	800	21	4800	40	140
Girls	10-12 years	35.0	2010	40.4	35	800	27		40	
Boys	13-15 years	47.6	2750	54.3	45		32		40	150
Girls	13-15 years	46.6	2330	51.9	40	800	27		40	
Boys	16-18 years	55.4	3020	61.5	50	800	28		40	200
Girls	16- 18 years	52.1	2440	55.5	35	800	26		40	

Source: Nutritive Value of Indian Foods NIN (Hyderabad)

Bio-fortified Varieties: Sustainable Way to Alleviate Malnutrition

Nutritious diet is vital for proper growth and development in humans. It helps in preventing diseases, besides maintaining the body metabolism for physical and mental well being. Food provides energy, protein, essential fats, vitamins, antioxidants and minerals to meet our daily metabolic requirement. Most of them cannot be synthesized in human body, therefore are to be supplemented through diet. Further, anti-nutritional factors present in edible parts of the food exert adverse affects on human health. Consumption of unbalanced foods affects billions of people worldwide and leads to poor health and socio-economic conditions. Nutritional supplementation is done through many modes like commercial fortification, medical supplementation, dietary diversification and biofortification. These biofortified varieties assume great significance to achieve nutritional security of the country.

Crop	Variety	Nutrient	Grain yield (q/ha)	Maturity days	Area of Adaptation	Institute Developed	Year of released
Rice	Ratnagiri -7 (Red rice)	Iron: 15.4 ppm, Zinc: 23.8 ppm	45-50 q/ha	122-125 days	Maharashtra, Karnatka, Telangana	BSKVV, Dapoli	2017
Sorghum	Parbhani Shakti	Iron: 40 to 45 mg/kg Zinc: 23 to 25 mg/kg	20-25 q/ha	115-120 days	Maharashtra	VNMKV, Parbhani	2018
Pearl millet	AHB-1200	Iron: 73 ppm	32 q/ha with 70 q/ha stover yield.	78 days	Haryana, Rajasthan, Gujarat, Punjab, Delhi, Maharashtra and Tamil Nadu	VNMKV, Parbhani in collaboration with ICRISAT	2017
Pearl millet	Dhan Shakti/ ICTP 8203 Fe	Iron: 71 ppm, Zinc: 40 ppm	20.21 q/ha	75-80 days	Maharashtra, Karnataka, Telangana, Uttar Pradesh, Haryana and Rajasthan	ICRISAT in collaboration with SAUs of Maharashtra (VNMKV & MPKV)	2014
Pearl millet	HHB 299	Iron: 73 ppm, Zinc: 41 ppm	32.7 q/ha Dry fodder yield: 73.0 q	81 days	Haryana, Rajasthan, Gujarat, Punjab, Delhi, Maharashtra and Tamil Nadu	CCS-Haryana Agricultural University, Hisar in collaboration with ICRISAT	2017



Crop	Variety	Nutrient	Grain yield (q/ha)	Maturity days	Area of Adaptation	Institute Developed	Year of released
Maize	Pusa Vivek QPM 9	Pro vitamin-A (8.15 ppm), lysine (2.67%) and tryptophan (0.74%)	55.9 q/ha (NHZ) 59.2 q/ha [Peninsular Zone (PZ)]	93 days (NHZ) and 83 days (PZ)	J&K, Himachal Pradesh, Uttarakhand (Hill region), North Eastern states, Maharashtra Karnataka, AP, Telangana and Tamil Nadu	ICAR-Indian Agricultural Research Institute, New Delhi	2017
Cauliflower	Pusa beta kesari 1	β -carotene 8.0-10.0 ppm	Curd yield: 40.0-50.0 t/ha		Nation Capital Region of Delhi	ICAR-Indian Agricultural Research Institute, New Delhi	2015
Sweet potato	Sree Kanaka (Orange flesh Sweet potato)	Beta-carotene: 250 ppm		75-85 days		ICAR-Central Tuber Crops Research Institute, Thiruvananthapuram, Kerala	2017
Orka	Kashi Lalima (VROR-157)		14-15 t/ha	-	Uttar Pradesh	ICAR-IIVR, Varanasi	
Pomegranate	Solapur Lal	Iron 5.6-6.1 mg/100g Zinc 0.64-0.69 mg/100g Vitamin C: 19.4-19.8 mg/100g	Fruit yield: 23.0-27.0 t/ha	-	Semi-arid regions of the country	ICAR-National Research Centre on Pomegranate, Pune	2017

The KVKs have given special emphasis on promotional activities in respect to overcome the nutritional deficiency among rural folks. It was a need to work with life-cycle approach in nutrition, importance of bio fortification, role of agro biodiversity in farming systems and the need to mainstream neglected and underutilized crops. The concept of 'genetic garden' of naturally fortified and bio fortified crops for awareness and planting materials was included in the project. On the basis of above concept 45 KVKs under ICAR-ATARI, Pune introduced various types of biofortified varieties of cereals, vegetables and also given focus on wild nutritious vegetables and miner millets.

Maharashtra

Under the category of cereals food group introduced Parbhani Shakti bio fortified variety of sorghum which contains 40-42 mg/kg iron and 23-25 mg /kg zinc, sorghum PKV-1200 variety which is rich in iron and zink, Red Rice Ratnagiri-7 iron (15.4 PPM) and zinc (23.8 PPM) rich were introduced in Kokan region. Bio fortified variety of wheat MACS-4028 was introduced in western region of Maharashtra. Whereas for protein fulfillment KVKs introduced the pigeon pea most popular variety BDN-711, green gram- 2003-2, black gram-AKU-15, soybean –MAUS -162, chick pea-AKASH and Phule Vikram, moth bean etc. In millet category, most of the KVKs introduced the Dhan Lakshmi, AHB-1200 (Fe and zinc rich) bio fortified varieties of pearl millet, finger millets (*Nachani*), barn yard millet (*Rajgeera*), codo millet (*Rala*), little millet (*Bhagar*) were introduced as rich in iron, zinc and fibre and also easily digestive due to gluten free. KVKs are also given emphasis to introduce biofortified varieties of vegetables in nutrition garden. Orange flesh sweet potato is also introduced as it is highly rich in Beta –Carotene which is an excellent source of Vitamin A. The deficiency of Vit-A is common among children and consumption of orange fleshed sweet potato is good solution on it. Drumstick, Rajgeera, Ambadi, Spinach, Fenugreek, Green sorrel, Amaranths have been introduced in nutrition gardens which are rich source of vitamins, such as ascorbic acid, folic acid, b-carotene, as well as minerals like iron, calcium and prosperous and also antioxidants.

In livestock enterprises deshi chicks like Shrinidhi, Vanraja, Giriraja poultry birds and fish pond of Rahu, Katla and Mrugual also introduced to the farm families as income generation activity.

South Goa

Vari rice is common crop at South Goa and KVK has introduced this crop in cereal crop. In vegetables, drumstick PKM-I was also promoted that has rich source of calcium, vitamin A and iron. In green leafy vegetables, amaranths, radish which fulfill the calcium, iron requirement and also having the antioxidants in it. Ragi one of the rich sources of iron included in nutrition garden.

Gujarat

Under millets, KVKs have incorporated finger millet-GN-8, pearl millet, little millet- GNV- 3 for the fulfillments of minerals and vitamins requirement. In livestock enterprises, *Kankraj*, Jersey and Gir cow were promoted for farm families to increase their nutrition level and also raise their income. Almost all the district introduced wheat, paddy, sorghum under cereal crops and for vegetables broccoli, sweet potato, beet, spinach, fenugreek which are rich source of Beta carotene, iron, calcium and vitamins. In pulses, green gram variety GM-4, pigeon pea BDN-2, BDN-711, soybean-NRC-37, gram variety GJG-3 were included in action plan of KVKs.

Poshan Maah Celebration

In Zone-VIII, 42361 activities were organised during 1-30 September, 2020 where awareness on nutrition gardening, malnutrition, nutri-thali, different nutrition garden models was created by the KVKs. In total, 372444 participants were oriented including 30333 anganwadi workers.



Best Nutrition Garden Models

Nutrition Garden - Best way to achieve Nutritional Security

Nutrition is a basic human need and a prerequisite to a healthy life. A proper diet is essential from the very early stages of life for proper growth, development and to remain active. Food consumption, which largely depends on production and distribution, determines the health and nutritional status of the population.

The major food issues of concern are insufficient/ imbalanced intake of foods/nutrients. The Expert Committee of the Indian Council of Medical Research recommendations for intake of fruits and vegetables is at least 400 grams per person per day (five serving of 80 g each day) or about 146 kg per person per year. Similarly, national nutrition guidelines recommends average daily consumption of 300 g for vegetables (portion size = 100 gm × no. of portions = 3) and 100 g of fruits (portion size = 100 gm × no. of portions = 1). The vegetables include (green leafy vegetables = 50 gm, other vegetables = 200 gm, roots and tubers = 50 gm). A glass of fruit juice (excluding sweetened beverages) counts towards a portion of fruit each day although whole fruit is encouraged for its fiber content in-conjunction with active life-style.

“Food Security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food”. Nutrition took last place in food security definition, but if we analyze what we require from food, it is all nutrients from it. Thus, it is clearly evident that nutrition in food we intake, needs more attention when we aspire to live a healthy life.

In order to improve nutritional status of small and marginal farmers promotion of Nutrition Gardens those are aimed for providing nutritious, organic and diverse fresh vegetables to the families throughout the year. The concept of farming and cultivation is not new to the farming communities of India. However, it has remained limited to cash crop cultivation, mono- crop system and mostly used for revenue generation. A nutri-garden ensures an inexpensive, regular and handy supply of fresh vegetables, which are basic to nutrition. Green vegetables contain vitamins and minerals, which protect us against diseases.

Nutrition gardens are nothing but the improved form of kitchen garden where selected vegetable crops are grown more or less systematically so as to meet the nutritional

requirements of the family. Thus, whereas a normal kitchen garden may have randomly selected crops chiefly based on external factors of preferences such as palatability and feasibility, a nutrition garden takes into consideration more internal preferences and needs (nutrition).

Fruits and vegetables in the nutrition garden play an important role in fulfilling dietary and nutritional needs by providing households with direct access to food that can be harvested, prepared and consumed by them on a regular basis. Fruits and vegetables groups viz., green leafy vegetables, roots and tubers and other vegetables need specific attention for addressing micronutrient (vitamins and minerals) deficiencies, particularly iron and vitamin A. Developing country like India where the diets of particularly pregnant and lactating women and preschool children are deficient in micronutrients. Nutrition gardens can supplement staple-based diets with a significant portion of proteins, vitamins and minerals, leading to an enriched and balanced diet.

Benefits of Nutrition Garden

- It is a source of fresh and nutritious vegetables for the family throughout the year.
- Nutrition Garden directly provides food and nutritional security by making access to food that can be harvested instantly, prepared and fed to family members, daily or whenever required.
- Nutrition gardens are also becoming an important source of food and income for poor households in peri-urban and urban areas.
- Working in the Nutrition garden refreshes the mind and inspires a positive attitude.
- Helps ensure a quality control in the production so as to maintain the food and nutritional safety of the products. For instance, it is easy to go for a fully organic nutrition garden.
- Availability of perennial crops like drumstick leaves can meet the requirement even at the odd hours of the day.
- It reduces time and the expenditure in buying the vegetables.
- It promotes diversity of cultivation in vegetables, fruit trees, legumes and poultry.
- It improves or maintains the whole family well nourished.
- Effective utilization of available land, kitchen waste water and kitchen waste materials
- Vegetables harvested from home garden taste better than those purchased from market.



Balanced Diet

A balanced diet is one which provides all the nutrients in required amounts and proper proportions. It can easily be achieved through a blend of the four basic food groups. The quantities of foods needed to meet the nutrient requirements vary with age, gender, physiological status and physical activity. A balanced diet should provide around 50-60% of total calories from carbohydrates, preferably from complex carbohydrates, about 10-15% from proteins and 20-30% from both visible and invisible fat. In addition, a balanced diet should provide other non-nutrients such as dietary fibre, antioxidants and phyto-chemicals which bestow positive health benefits. Antioxidants such as vitamins C and E, beta-carotene, riboflavin and selenium protect the human body from free radical damage. Other phyto-chemicals such as polyphenols, flavones, etc., also afford protection against oxidant damage. Spices like turmeric, ginger, garlic, cumin and cloves are rich in antioxidants.



IMPORTANCE OF DIET DURING DIFFERENT STAGES OF LIFE

For being physically active and healthy.

Nutrient- dense low fat foods.



For maintaining health, productivity and prevention of diet-related disease and to support pregnancy/lactation.

Nutritionally adequate diet with extra food for child bearing/rearing



For growth spurt, maturation and bone development.

Body building and protective foods.



For growth, development and to fight infections.

Energy-rich, body building and protective foods (milk, vegetables and fruits).



For growth and appropriate milestones.

Breastmilk, energy-rich foods (fats, Sugar).





Requirement of Nutrition Garden Planning

- Layout and site selection
- Soil preparation
- Water source available
- Selection of good quality seeds of vegetables
- Selection of good quality seedlings of fruits.
- Human resources to take care
- Fencing for protection
- Spare time available for its care

Types and Designs of Nutrition Garden

Vertical Garden

If there is more vertical space (such as the boundary wall or house wall) available than the horizontal space, then vertical gardens can be developed in various ways. For the hanging type, crops comfortable in that position is to be selected such as bitter melon. Raising bottle gourd and pumpkin etc. by wall-side and diverting their growth to the thatched roof is a common traditional practice in rural India that also corresponds to the concept vertical gardening.



Horizontal Gardens

Raised Bed

Raised beds are preferred to avoid soil compaction, where the area often gets waterlogged during the wet season. The preferable size is 5-6 ft X 2-3 ft with a height of 1-1.5 feet. The beds combine crops/vegetables with different root depths and light requirements. Spread of rice husk/ hull, and vermin-compost on top of the bed is advisable. Nutritionally rich and multi-

season, multi-use plants are given priority. Bricks can be used to make the structure for such beds, but timber can also do if termite is not an issue. Raised beds help in easier maintenance of the garden. The inter-bed spaces can be kept clean either through cement flooring or through gravel-spreading. Each such bed can be used either for a single crop or for multiple crops.



Circle Garden

The basic purpose of such a design is to harvest vegetables from different patches on a rotation basis. If there are seven major segments (called pathways) in the circle, and one starts from harvesting in pathway number 1, then he/she will harvest in pathway number 2 the next day, and accordingly will come back to pathway number 1 after seven days.

An ideal size for Circle Bed is 750 sq.ft. to 800 sq.ft. A circle of radius 15 ft is then drawn with a stump at the centre. The layout is marked with lime or ash. The 15 ft long radius can be divided into segments at 1 ft, 1.5 ft, 2 ft, 3.5 ft and 5.5 ft (one can decide this according to preferences) and circles are to be drawn with each radius-segment. This way each pathway has a number of patches to grow multiple crops. However, if there is less space, then the structure can be modified according to the need & feasibility. The target is to have atleast 14 beds (2 patches per pathway) in place.





Terrace Garden

There is a growing awareness among the urban dwellers about the demerits of urban living like air pollution, noise pollution, water pollution etc., which are polluting the food that we eat. Simple vegetables like beans, various kind of gourds, cucumber, tomatoes, moringa, peas, brinjal and leafy vegetables like palak, methi, coriander, lettuce, mint etc. can be easily grown at available terrace and balcony of flats in urban area. Also fruits like papaya, passion fruit can be grown. Even flowers can be grown for daily use. The different types of containers can be used for grow the different types of vegetables. This kind of garden is the excellent way to reuse discarded items e.g cement pots, damaged bowls/water tank/ buckets/ tins/ boxes/ crates/ unused water drums/damaged sink, wash basin, old plastics pots can be used for growing fruits and vegetables.



Eight Petal Model

A circle is divided in same size eight petals. Here instead of seven segments there is eight segments. It's very easy to outline eight segments than seven segments.



Selection of Vegetables According to Varieties

For better performance select a variety which is resistant or showing field tolerant to important diseases and insects. Also choose varieties according to the season in which they need to be grown based on their performance.

Sl. No.	Vegetable Name	Varieties For Nutrition Garden
1.	Amaranth	Local, <i>Arka Samraksha</i> , <i>Arka Arunima</i>
2.	Beans	<i>Kokan Bhushan</i> , <i>Phule Suruchi</i>
3.	Beetroot	
4.	Bitter Gourd	<i>Phule green gold</i> , <i>Hirakani</i>
5.	Bottle Gourd	Samrat
6.	Brinjal	<i>Manjari Gota</i> , <i>Arka Keshav</i> , <i>Arka Neelkant</i> , <i>Arka Anand</i>
7.	Broccoli	<i>Ganesh Broccoli</i>
8.	Cabbage	Golden Acre
9.	Capsicum	California Wonder, <i>Indra</i> , <i>Paledine</i>
10.	Carrot	Early Nantes, New Korda
11.	Chilli	<i>Arka Meghana</i> , <i>Arka Haritha</i> , <i>Phule Jyoti</i>
12.	Cucumber	<i>Himangi</i> , <i>Shubhangi</i> , <i>Pusa hybrid-2</i>
13.	Cauliflower	<i>Pusa Deepali</i> , <i>Pusa Shubhra</i>
14.	Dolichos	<i>Arka Sambhram</i> , <i>Arka Vistar</i> , <i>Phule Gouri</i>
14..	Lettuce	Capitata, Crispa, Aspergina
15.	Water Melon	Sugar baby, <i>Arka Manik</i> , <i>Arka Jyoti</i>
16.	Okra	<i>Arka Anamika</i> , <i>Arka Abhay</i> , <i>Arka Nikita</i>
17.	Onion	N-53, Basvant-780, <i>Bhima Red</i> , <i>Bhima Shakti</i>
18.	Peas	<i>Arkel</i> , <i>Jawahar Matar</i> , <i>Arka Ajit</i>
19.	Pumpkin	<i>Arka Suryamukhi</i> , <i>Arka Chandan</i>



Sl. No.	Vegetable Name	Varieties For Nutrition Garden
20.	Radish	<i>Pusa Deshi, Pusa Ketki, Pusa Reshmi</i>
21.	Ridge gourd	<i>Pusa Nasdar, Kokan Harita</i>
21.	Spinach	Local, <i>Arka Anupama</i>
22.	Tomato	<i>Arka Rakshak, Arka Samrat, Arka Abhed, Phule Raja</i>
23.	Turnip	Early Milon red Top, Golden Ball, Snow Ball
24	Sweet Potato	Varsha
25	Fenugreek leaves	Local, <i>Phule Kasturi, Kasuri, Pusa Early Bunching</i>
26	Coariunder leaves	Local, Co-1, Co-2
27	Shepu	Local
28	Snake gourd	PKM-1, Mdu-1
29	Ivy gourd	<i>Sulbha, Indira Kundru-5, Indira Kundru-35</i>
30	French beans	<i>Arka Komal, Arka Suvidha and Arka Anoop, Arka Arjun</i>

Vegetables growing season and yielding period

Sl. No.	Vegetable Name	Growing Season	Sowing Method	Yielding Period (Days)
1.	Amaranth	Round the year	Direct	40-50
2.	Beans	Round the year	Direct	60-70
3.	Beetroot	Aug-Nov	Direct	60-70
4.	Bitter Gourd	Nov-Dec, Dec-Jan, Jun-July	Transplant/ direct	60-70
5.	Bottle Gourd	Nov-Dec	Transplant/ direct	55-65
6.	Brinjal	Jun-July, Dec-Jan	Transplant	70-80
7.	Broccoli	Aug-Sept	Transplant	55-60
8.	Cabbage	Jun-July, Oct-Nov	Transplant	75-80
9.	Capsicum	May-Jun, Oct-Nov	Transplant	50-60

Sl. No.	Vegetable Name	Growing Season	Sowing Method	Yielding Period (Days)
10.	Carrot	Aug-Nov	Direct	60-70
11.	Chilli	June-July, Oct–Nov, Jan-Feb	Transplant	50-60
12.	Cucumber	Jun-July, Sept-Oct, Dec-Jan	Transplant	35-45
13.	Cauliflower	Jun-July, Aug-Sept	Transplant	60-65
14.	Dolichos	Round the year	Direct	60-70
14..	Lettuce	Oct-Dec	Direct/Transplant	60-70
15.	Melon	Jan-Feb, Mar-Jun, Oct-Dec	Transplant	45-50
16.	Okra	May-Jun, Oct-Dec	Direct	50-55
17.	Onion	Mar-Apr, May-Jun, Sept-Oct	Transplant	100-120
18.	Peas	Sept-Oct-Nov	Direct	50-60
19.	Pumpkin	Jun-July, Dec-Jan	Transplant	90-100
20.	Radish	Sept-Oct-Nov	Direct	35-45
21.	Ridge gourd	Jun-July	Transplant/direct	65-70
21.	Spinach	Sept-Oct-Nov	Direct	40-50
22.	Tomato	June-July, Oct- Nov, Feb-Mar	Transplant	65-70
23.	Turnip	Oct-Nov	Direct	50-55
24.	Sweet Potato	July-Oct	Stem Cutting	75-80
25.	Fenugreek leaves	Round the year	Direct	35-45
26.	Coariunder leaves	Round the year	Direct	35-45
27.	Shepu	Round the year	Direct	35-45
28.	Snake gourd	January-July	Direct	85-90
29.	IV gourd	Round the year	Stem Cutting	75-80
30.	French beans	June-July	Direct	35-45



Nutrition Garden Models Developed at KVKs

Horizontal (Annadata) Nutrition Garden Model: (KVK Aurangabad-I, Amaravati-II, Kolhapur-II, Jalna-I, Washim, Palghar develop horizontal (Annadata) Nutrition kitchen garden model)

Horizontal (Annadata) Nutrition garden model is a structured model with crop diversity suited for all the seasons at KVK campus with land holdings 0.40 ha including multiple predominant crops with high yielding and bio fortified varieties of crops.

- Cereals : Sorghum, Pearl millet
- Oil seed : Sesamum, Niger seed
- Pluses : Pigeon pea, Moth beans, black gram, green gram
- Vegetables : Spinach, Shepu, Coriander, Fenugreek, *Ambat chukka*, *Ambari*, Curry leaves
- Beet root, Carrot, Radish, Turmeric, Onion, Brinjal, Chilli, Cluster bean, Cow pea, Bottle gourd, Smooth gourd, Okra, Tomato, Ridge gourd, Bitter gourd, Drumstick
- Fruit : Custard apple, Lemon, Mango, Aonla
- Unit : Goat unit, NADEP unit
- In the border and fences creepers like bitter gourd, snake gourd, bottle gourd etc. are cultivated.
- Papaya, drumstick, custard apple, guava, lemon are few perennials which grown along the border
- Water tank and fish
- Poultry unit

Sustainable technology an added advantages such as

- Use farmyard manure, vermicompost, kitchen waste compost during last ploughing instead of inorganic fertilizer.
- For the management of pest and disease as well as better growth, prophylactic application of botanical preparation made from local recourses (neem and pongamia mixed with cowdung and cow urine) neem



ark, dashparni ark, vermiwash etc. These local organic bio inputs act as a repellents, anti feedants and plant growth promoters.

- For water management of nutrition garden low cost technology (Foggier system)/drips are used. It helps to save water as well as manpower.

Eight Petals Circle Model of Nutrition Garden: (KVK Pune-II)

KVK has developed 8 petal circle model of Nutritional Garden at the instructional farm on area of 200 sq.m. In this model, 28 types of different vegetables are grown. The model also consists of NADEP, Vermicompost, Poultry, Goat rearing. The model looks pleasant to eyes. The by-passers are attracted from long distance. Thus, it has increased the aesthetic value of the farm. The model is easy for making layout. It accommodates more types vegetables in less area. It gives more diversified vegetables. The model of Nutritional garden is able to fulfill dietary requirement of family of 5 persons. All food groups have been covered in this model.

Importance of Model: Vegetable are selected according to nutrients

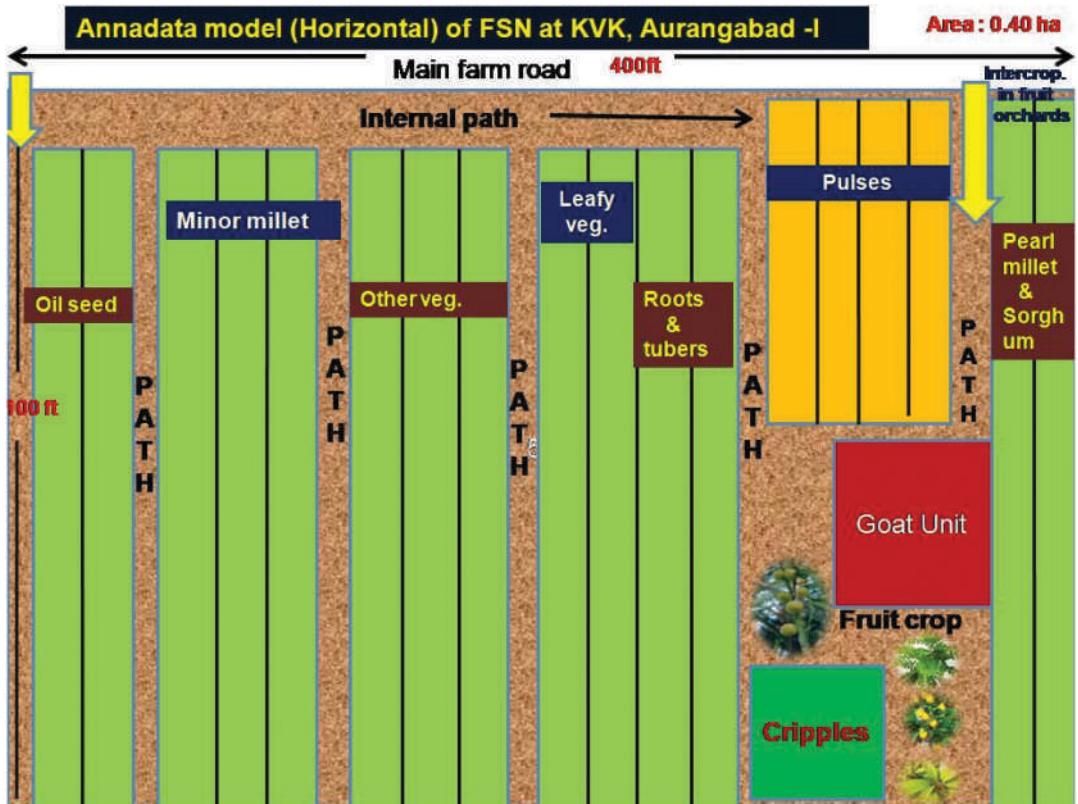
S. No.	Major food group	Sub-Component	Pulses/ Cereals/Vegetables/ Fruits
1	Carbohydrate	-	Sweet potato, Beet root., Double beans, Mango, Banana
2	Protein	-	Broccoli, Spinach, Cauliflower, Beans, Guava, flax Seed, Chana, Red gram
3	Vitamins	Vitamin A	Papaya, Mango, Carrot, Lettuce, Spinach, Sweet potato, fenugreek, Pumpkin, Cabbage, Tomato
		Vitamin B	Carrot, Cabbage, Green leafy vegetables, Meat, Eggs, Poultry, Fish
		Vitamin C	Dark leafy vegetables, Fenugreek, Spinach, Cabbage, Bitter gourd, Drumstick, Lemon
		Vitamin D	Poultry, Green vegetables
		Vitamin E	Cabbage, Mango, Spinach, Flax seed, Pumpkin
	Vitamin K	Broccoli, Cabbage, Green Beans, Okra, Spinach	
4	Minerals	Calcium	Green Vegetables, Beans, Carrot, Tomato, Animal foods, Okra
		Iron	Large white beans, Spinach, Amaranths, Tomato, Chavali, Cabbage
		Phosphorus	Spinach, Fenugreek, Ghevada, Tomato, Pumpkin, Carrot
		Zinc	Spinach, Okra, Broccoli, Beet greens, Beans, Green peas, Guava

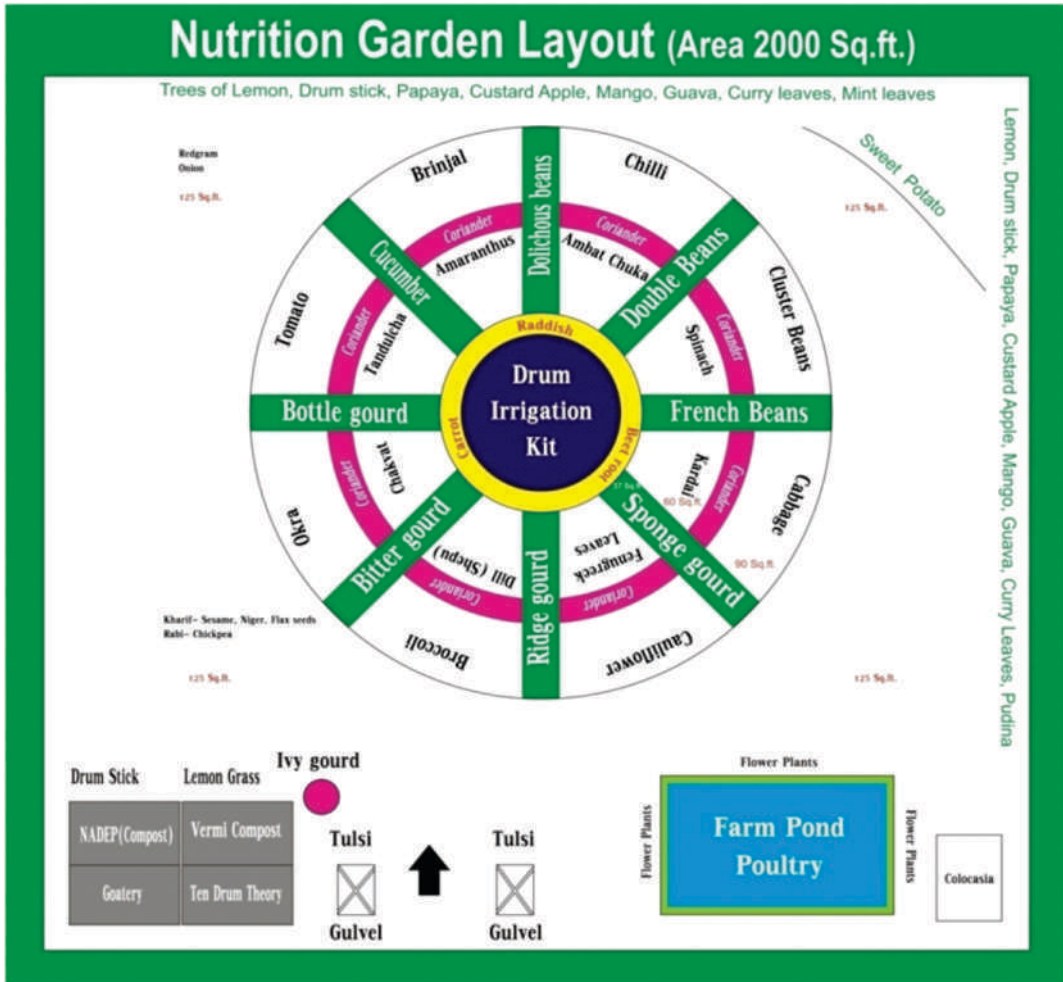


Director, ATARI, Pune visited the Annadata model of nutrition garden at KVK, Washim



QRT team visited Annadata model of nutrition garden at KVK, Aurangabad-I





Name of Model- 8 Petal Nutrition Garden model



DDG (Agril Extension), ICAR visited 8 petals nutrition garden model at KVK, Pune II

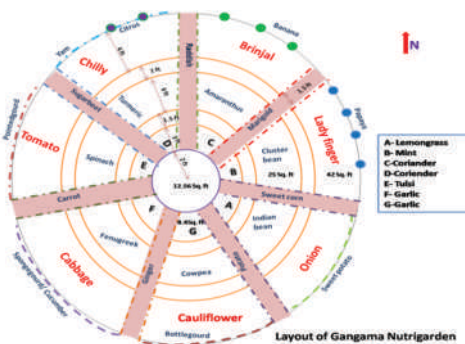


Gangama Nutritional Garden Model: KVK Akola, Bhavnagar, Valsad, Jalna II, Osmanabad and Solapur- II

The design is named after a girl who tries it on her farm. A *mandala* is a sacred geometrical diagram representing the cosmos, used in meditation and yoga. This *mandala* is a circular garden 30 feet in diameter, covering less than 800 sq. ft area. There are four circles. The diameter of outer circle is 42 sq. ft. The radius of two inner circles is 4 ft. and inner most circles, having radius of 2 ft. The whole circle is divided in to seven equal parts by 1.5 ft pathway. Each circle has approximately 30 cm width useful for observation of each portion and carryout various operations without disturbing adjacent plot/plants. The plants are grown in a circular beds arranged in the centre as well as on both the sides of the path way. Fruit plants like banana or papaya may be planted in the centre or on the outer periphery. The nutritional garden is a proper combination of short and long duration vegetables including vine crops and herbal medicinal plants such as Ginger, Turmeric, Tulsi, Lemon grass, Mint etc. It was grown in a manner that each portion gave fresh vegetables in a required quantity to small family of five persons. On the border of outer most circle vine crops like yam, sweet potato, bottle gourd and fruit crops like papaya, banana etc. are grown. Due care was taken while growing different crops so that each crop can harvest proper sunlight at different stages of growth. Plants with less height are grown in E-W direction. It is very flexible design can be change in accordance with the soil types, season, availability of land etc.

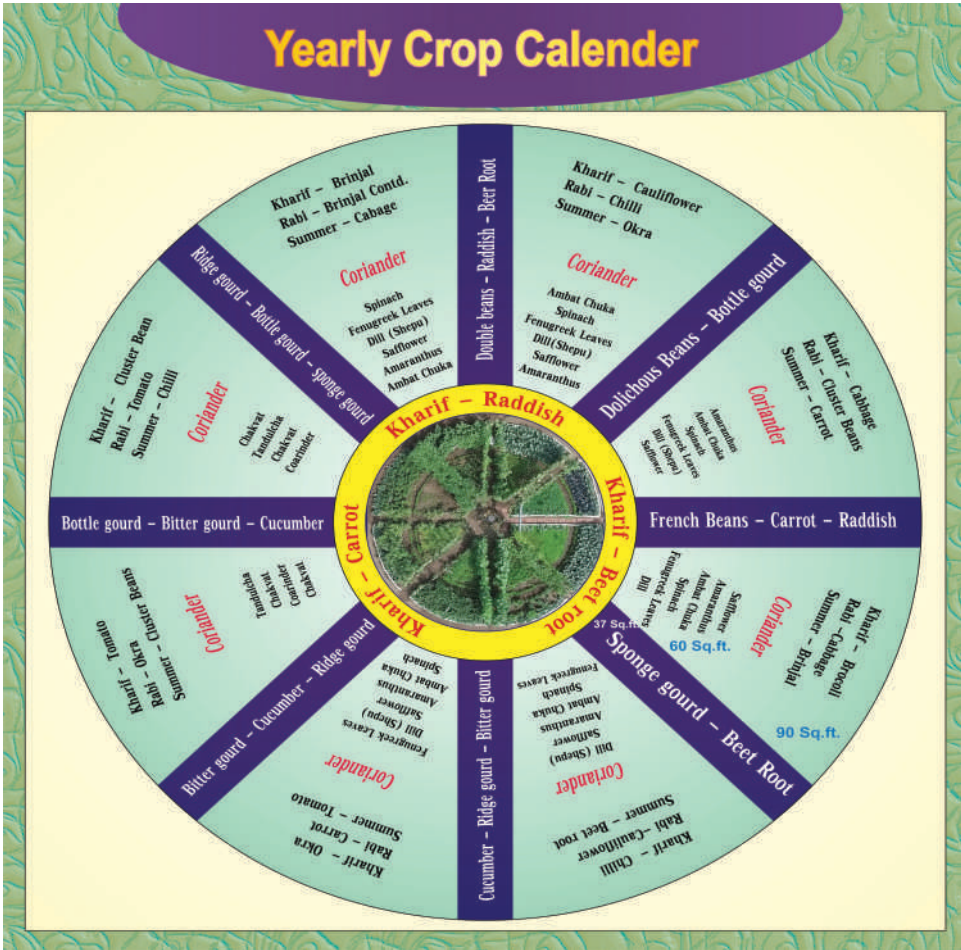


Farmers and Farm women visited to *Gangama* Model at KVK, Solapur II



Field View of Gangama Model

Yearly Crop sequence of Nutrition Garden



Ideal Model of Nutrition Garden at KVK Palghar

Palghar district is a tribal dominated district, which are dependent on agriculture for their livelihood. Malnutrition and associated child mortality rate recorded amongst the tribal communities is often a cause of serious concern. It retards children growth, increases the risk and duration of illness, reduces work output, and slows social and mental development. Malnutrition among women of reproductive age increases the risk of mortality during labor and delivery and puts their newly born children at risk of long-term deficiencies.

Due to unavailability of fruits and vegetables on daily basis, there is less diversity in their diet. Besides having backyard space, only small numbers of the villagers practice home gardening



traditionally. The per capita availability of vegetables is still less from the recommended dietary allowances as the production of vegetable is high at National level. To ensure daily supply of vegetables, a fruit in their daily diet, nutrition garden is the only way which can be established at household. Keeping this in view, KVK has developed a unique model at their instructional farm with following objectives.

- To create large awareness among the farming community of Palghar district regarding nutrition garden.
- To help in addressing malnutrition and micronutrient deficiencies by consumption of nutrient dense fruits and vegetables throughout the year.
- To enhance the knowledge of various clients like farmers, farm women, rural youth, school children, extension functionaries regarding nutritional aspects of fruits and vegetables.

Nutrition garden developed as vitamins, minerals wise section:

KVK developed a unique model of nutrition in which all the vegetables and fruits are arranged vitamin, mineral wise and they are cultivated in an acre of land. The nutrition garden also consists a section of wild vegetables.

Sr. No.	Vitamin/ Minerals	Particulars	Source of Vitamins/ minerals through vegetables and fruits
1	Vit A	Vitamin A is important for normal vision, the immune system and reproduction. Vitamin A also helps the heart, lungs, kidneys and other organs work properly.	Spinach, amaranthus, bitter gourd, pumpkin, bottle gourd, cow pea, okra, sweet potato, cucumber, chili, etc. Fruits: mango, pineapple, guava, papaya, banana, etc.
2	Vit B	Vit B converts food into energy. Create new blood cells and maintain healthy skin cells, brain cells and other body tissues	Spinach, amaranthus, sponge gourd, Bitter gourd, pumpkin, bottle gourd, cow pea, maize, sweet potato, okra, brinjal, etc. Fruits: banana, mango, Pineapple, guava, cashew nut etc.
3	Vit C	Vitamin C also known as ascorbic acid, which helps to development and repair of all body tissues. It's involved in many body functions, including formation of collagen, absorption of iron, the proper functioning of the immune system, wound healing and the maintenance of cartilage, bones and teeth.	Fenugreek, amaranthus, bitter gourd, pumpkin, bottle gourd, cow pea, maize, cluster bean, sweet potato, radish, etc. Fruits: Lemon, kiwi, aonla, guava, papaya, etc.

Sr. No.	Vitamin/ Minerals	Particulars	Source of Vitamins/ minerals through vegetables and fruits
4.	Vit E	Vitamin E may prevent coronary heart disease, support immune function, prevent inflammation, promote eye health, and lower the risk of cancer	Spinach, pumpkin, maize, sunflower, etc. Fruits: papaya, kiwi, mango, guava, etc
5	Vit K	Vitamin K needs for blood clotting, helping wounds to heal.	Spinach, amaranthus, fenugreek, sponge gourd, Bitter gourd, pumpkin, bottle gourd, cow pea, maize, sweet potato, okra, brinjal, etc. Fruits : jack fruit, mango, kiwi, mango, cashew nut etc.
6	Minerals	Minerals are helps to keeping your bones, muscles, heart and brain working properly. Minerals are also importance for making enzymes and hormones.	Drumstick, spinach, pumpkin, amaranthus, maize, fenugreek, cow pea, sweet potato, okra, brinjal, chili, etc. Fruits : pomegranate, sapota, cashew nut, Jamun, avocado, etc.

Practices followed in nutrition garden

- 1. Layout of garden:** Properly fenced available rectangular shape of land divided in eight sections. Vitamins and mineral wise six sections while remaining for wild vegetables and multiplication of biofortified vegetables plants. It is easy to layout the said nutrition garden. Prepared attractive pathways. Northern side of each section is utilized fruits crops.
- 2. Selection of varieties:** Pests and diseases resistance improved varieties of vegetables were selected for nutrition garden. Biofortified seeds of vegetables also cultivated in garden. Wild vegetables like kartoli, kurdu, ambadi, various tubers etc. were planted.
- 3. Raising of seedling in pro tray:** Protrays were used for raising vegetable seedlings like chilli, tomato, brinjal, cauliflower, cabbage etc. KVK used media like cocopit, bio fertilizers for filling of trays.
- 4. Crop cultivation:** KVK followed organic method of crop cultivation in nutrition garden. The sources were FYM, compost, vermi compost, jeevamrut, neemark etc.
- 5. Organic pest and disease management:** Integrated practices were followed in nutrition garden. It includes resistant varieties, seed treatment with trichoderma, crop rotations, manual weeding to keep weed free crop, irrigated at early morning, use of crop cover, nursery beds also covered by 50 mesh insect net to prevent insect vector which transmit viral diseases. KVK also introduced low cost family net compost vessel technology for preparation of vermicompost which used in nutrition garden.



- 6. Interpretation centre:** KVK established interpretation centre to disseminate knowledge about nutritional aspect to the visitors. KVK displayed various information related on nutrition, source of vitamins, minerals, nutritional deficiencies and their remedies through consumption of fruits and vegetables.
- 7. Small scale mushroom unit:** A small scale mushroom unit also established which produced 20 to 25 kg mushroom per month during the winter season.

Success Stories: Maharashtra, Gujarat and Goa

1) KVK, Jalna-I: Nutrition Garden –A Boon for Family

A small village named Kachrewadi, taluka Jalna is adopted in 2018 under NARI project of ICAR. Initially we conducted a village baseline survey to know the basic information about the nutritional condition of farm families. The total population of village is 428 and 110 households, among them 7 families are landless. Major crops are soybean, green gram, black gram, bengal gram, sorghum and wheat. The vegetable area is almost nil in the village. Self Help Groups are running under UMED Abhiyan. In June 2018, an orientation programme was conducted in the village for creating awareness about the importance of nutrition and its benefits for the family. After attending the programme most of the families rejected to establish the nutrition garden due to unavailability of land and water. Do not get time to cultivate the vegetables for the family. The continuous follow up and awareness programme around 10 families were ready to adopt the nutrition gardens. After that one by one family gave their consent for the same for sparing the ½ guntha of land for the vegetables, fruits, other millets and oilseeds. In July one health camp was organized for the adolescent girls as well as farm women for whole village. Around 40-50% of women and girls found anemic. After those vegetables, oilseeds, millets and miner millet seeds and seedlings of fruit crops included bio fortified varieties which is rich in vitamins and minerals were distributed among the selected farm women. The kit includes like:

Fruits and other Seedlings

Mango - Keshar, Custard apple - Balanagar, Guava - Lucknow 49, Curry leaves - Local, Lime - Sai Sarbati, Drumstick - PKM-1

Millets and others: Pearl millet (Bajra) – AHB 1200 Fe, Finger Millets (Nachani) – local, Niger Seeds (Karal) – Local, Sesame (Teel) – Local, Moth Bean – (Mataki) Local, Flax Seed- (Jawas) – Local, Barn yard Millet (Rajgeera) – Local

Fruit Vegetable-Brinjal –Panchganga, Tomato- US -140 and Arka Samrat, Chili – Tejaswini and Teja – 4, Cauliflower –Hy-Sungro, Cabbage – Hy-Mahyco

Beans – Cluster bean –PNB, Cowpea – Local



Creepers – Bitter gourd – OP, Ridge gourd – OP, Sponge gourd – OP, Bottle gourd – OP, Cucumber – OP

Roots and Tubers – Onion – Fursangi, Radish – OP, Beetroot – OP

The farm women sowed all the seeds and seedlings at their farms and harvested very good yield of all the varieties. The family members consumed the good amount as well as varieties of vegetables and fruits. During lockdown period the whole village got the benefit of these nutrition gardens. Presently, majority of the families got aware about the daily use and importance of fruits and vegetable in their diets. The surplus vegetables were sold at the village level during lockdown period and earned about Rs 1500 to Rs 2000 for their family. After 6 month of period again health check up camp was organized and the results showed that average increase in hemoglobin by 1.5 gm among farm women as well as adolescent girls. This nutrition garden not only increases the health of women but also it reduces the expenditure on hospitals. Now this village is role model for others.



Nutrition Garden at KVK



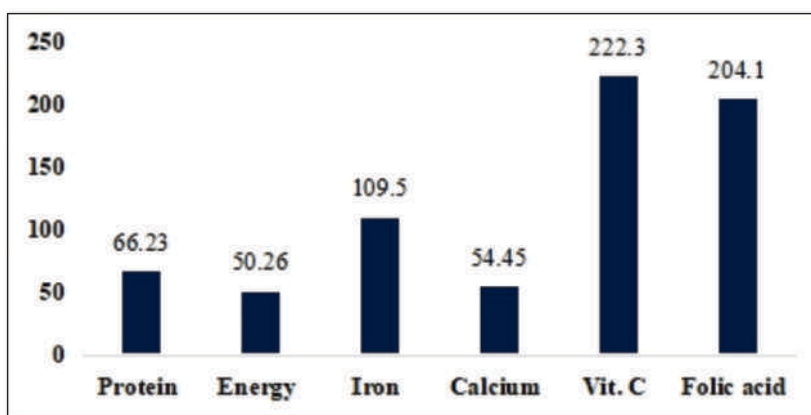
Nutrition garden at Kachrewadi village

2) KVK Aurangabad-I: Nutritional and Livelihood Security of Lakhegaon Village

In Aurangabad district 21.5 per cent of women below normal BMI, 43.6 per cent children under the age 6-59 months they are anemic and 47.4 per cent of women are anemic. To address malnutrition, it is therefore important to give focus on potential linkage between agriculture and nutrition. KVK took initiative to bridge the gap between nutrition and agriculture through NARI project with the objective of increase the nutritional availability and also secure the

livelihood of farm women. NARI project was implemented by Krishi Vigyan Kendra, Aurangabad-I at farmers' fields of *Lakhegaon* village taluka Paithan of district Aurangabad during 2018-2019. Before implementation the project, one health camp was conducted for farm women and it was observed that 37.5 per cent women were anemic. Various programmes like nutrition awareness camp, wild vegetables competition, training programmes, exhibitions, drama, nutri-thali, mahila mela, importance of nutrition garden etc. were conducted and next year 100 farm families were willingly ready to develop nutri-sensitive agricultural farming on area of 0.10 to 0.20 ha each.

KVK, Aurangabad-I had demonstrated 16 types of vegetables, 2 types of bio fortified varieties of pear millet and sorghum, 3 types of minor millets, drumstick, lemon, curry leaves, sapota etc. to each farm family. In the category of pulses farm families were grown by own seed. All farm families were cultivated crops very effectively and among that 30 farm families constituted a group to sold surplus produces in pandemic corona situation. Among these total annual production of cereals (pearl millet, rabi sorghum and wheat) on an area of 10 R was 800 kg among which 400 kg they kept for their family consumption and 400 kg were sold and earned Rs 11000 from cereals. Under the category of vegetables, they produced 16 types of vegetables which are having vitamins and minerals rich. Total production of vegetables was 2427 kg out of that 490 kg vegetables consumed while 1987 kg were sold in market and earned Rs 81810. They harvested 75 kg pulses in kharif season out of that 55 kg kept for family consumption and 20 kg sold and earned Rs 1400. Finally it was recorded that average economic gain of 30 farm families was Rs 94210 with fulfillment of per capita daily requirement of cereals (81.3%), pulses (54.7%) and vegetables (89.7%). Nutrition availability of per day per capita through cereals, pulses and vegetables is depicted in following figure.



Per day per capita calculated nutritional availability from FSN model

Source: Nutritive Value of Indian Foods (2011) NIN, Hyderabad



Nutri sensitive farming system model is the easiest way to fulfill the nutritional daily requirement with economical security to rural household. Finally, it was recommended that replication of this model on large scale at village level may overcome the nutritional deficiency and also improve the livelihood security.



Collection of vegetables and direct marketing to customer



NARI project Lakhangaon

3) KVK Pune II: Nutrition Garden - A Sustainable Model to Develop Food and Nutritional Security

According to the national family health survey-2015-16 in rural Pune district, iron deficiency anemia is widely prevalent among 53.8% of children (6-59 months) and 49.3% of women in the age group of 15-49 years. Most of farmers in Junnar and Ambegaon tehsils are small and marginal farmers having mono cropping system. So they depend on weekly bazaar, away from villages for their family's needs of vegetables. Due to unavailability of fruits and vegetables on daily basis, there is less diversity in their diet. Some households have kitchen gardens growing only 2 to 3 types of vegetables. Nutrition garden can be established at household or community level in order to ensure the daily supply of fresh vegetables in their diets.

KVK Narayangaon, Pune II took initiative to organize farmers seminar on Nutrition Garden and demonstrated preparation of nutrition garden. About 150 *Aganwadi Sevikas* were trained for management of nutrition gardens in their villages. After training in 2019-20, KVK prepared Nutrition Garden seed kit containing 25 types of vegetables and 4 types of fruit saplings under FSN and NARI Project through ATARI and MCAER Pune. In total, 670 households in 6 villages were trained and inputs were provided to 250 families under NARI project and 190 families from other projects. The model of Nutrition Garden was also developed at the KVK Farm and women farmers trips arranged to see nutrition garden.

Technology Details and Model at KVK Demonstration Farm

The layout is given according to space available at backyard for Nutritional Garden at villages. KVK formed its own 8 petal circle model at KVK Farm (200 sq. m) in which 25 types of vegetables grown in 100 sq. m area and NADEP, Vermicompost, Poultry, Goatery in 100 sq. m. area. Along with KVK model, Gangama model and small horizontal raised bed square model were also demonstrated in the villages so that according to size/area availability, farm women could choose the model and developed nutrition garden in their backyards. The women are trained for residue free production of vegetables using organic inputs such as 10 drum theory in which 5 drums for soil as a fertilizer and five for spray as pesticide. Schedule was given to farm women for its adoption.



FSN Model Developed at Demonstration farm of KVK

During 2019-20, about 250 farm women developed Small Horizontal Raised Bed Square Model, 100 women KVK 8 petal model and 90 *Aganwadi Sevika* reliance *Gangama* model of nutrition garden. So, 440 nutrition gardens were established in 6 villages. After seeing the result of nutrition garden, different *Gram panchayats* in Junnar tehsil started promoting nutrition garden concept in their villages with technical guidance by KVK.



Information about nutrition garden developed

Sr. No	Type of Nutrition Garden	No. of Trainings	No. of Participants	No. of Nutrition Gardens established (2019-20)
1	Backyard Nutrition Garden	08	370	250
2	Eight Petals Round Nutrition Garden	03	150	100
3	Gangama Nutrition Garden	03	150	90



Backyard Horizontal Nutrition Garden



Gangama Nutrition Garden model

Impact in Terms of Nutritional Security

Due to nutrition garden, as numbers of vegetables such as leafy vegetables, fruit vegetables, root and tubers, fruits are grown in every season and the families started getting fruits and vegetables throughout year. Average per capita availability of vegetables increased from 173 gm/day to 280 gm/day after initiating nutrition garden concept in selected families. The average per capita consumption of vegetables is increased by 59.6%. Before establishing nutrition gardens, average per capita availability and consumption of vegetables was 57.6% of recommended dietary allowances which was increased up to 93.32%.

Case Study of Nutrition Garden Success at Village Level

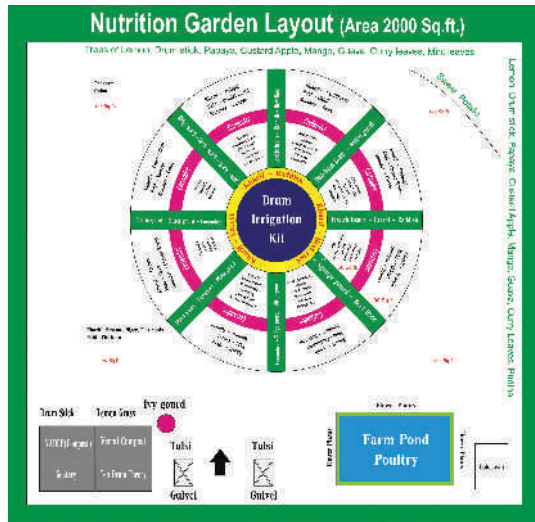
Mrs Anjali Waman, a 44 years old and graduate farm woman belongs to *Kalwadi* village of *Junnar* tehsil in Pune district. She is having 5 acres land and grows papaya and banana. She is socially recognized lady.

In *Kalwadi* village mono-cropping system exists. Mostly farmers are growing tomato and Papaya. So at the farm, they use lot of chemical fertilizers and pesticides. For daily consumption farm families have to go to market which is 13 km away from the village. So, many farm families consume very less amount of green leafy vegetables and other vegetables. Mrs Anjali Waman established backyard nutrition garden (200 sq. m) as per space available as she knew the effect of chemicals on human beings. She got training on organic farming and started

vegetables production. She managed KVK prepared 10 drum for organic production of vegetables, 5 drum for soil as a fertilizer and drum as spray for plant protection e.g. garlic chili, *Dashparni* effective microbe's solution.

She motivated 100 women in her village to form SHGs and promoted to start their own Nutrition Gardens. In total, 100 farm women started to make Nutrition Gardens totally organically. When anybody comes instead of tea they serve soups of vegetables and fruits. She reduced production cost almost half after using 10 drum theories. She has made a schedule for Kitchen Garden for minimizing pest and diseases. After fulfilling the requirement of own family, she started to sale the vegetables by making weekly basket to nearer city places. It gave her extra income. After getting higher demand, she has expanded the area for nutrition garden on 2000 sq. m. She told that after starting Nutrition Garden, no one got ill, it may be due to improving household nutrition. By seeing success of Kalwadi village, other villages are being motivated to nutrition garden concept.

In Covid 19 lockdown situation, she sold the vegetables of Rs 1.10 lakh in a period of three months with net profit of Rs 70000.



Layout and cropping sequence of Nutritional Garden Pune II



Eight Petals Round Nutrition Garden

4) KVK Palghar: Backyard Nutritional Kitchen Gardening

Jamshet village 15 km away from Dahanu, district Palghar is located in the forest area. Most of the tribal families work as labourers. Due to poor transportation facilities and infrastructure, residents lack access to basic amenities and are almost cut off from the mainstream. Suffering from malnourishment and poverty, the people of Jamshet ate vegetables only during monsoon. Green vegetables and fruits, otherwise, never became part of their daily diet, leading to an insufficient nutritional intake. They purchase vegetables for household purpose from the local market the poor farmer has an obvious habit of purchasing the cheap vegetables irrespective of their nutritive value.



This practice deprived them of a combination of nutritive vegetables from their menu especially due to higher price. The issue was addressed by adopting Farming System for Nutrition Approach through backyard nutrition gardening. The farmers were encouraged to go for cultivation of diverse vegetables and fruits primarily for house consumption.

Adding nutrition and diversity to the diet

To introduce dietary diversity, the first step was taken to ensure availability of vegetables in the village. Krishi Vigyan Kendra, Palghar introduced the concept of nutrition gardening in the village and also encouraged them to cultivate vegetables and fruits. After household survey of the residents, KVK experts identified 110 families that needed support in establishing nutrition gardens.

Each family was given five plants of fruits and seeds of seven varieties of vegetables. These include bottle gourd, ridged gourd, pumpkin, bitter gourd, okra, spinach and sweet corn, cowpea, cluster bean, cucumber, snake gourd, drumstick etc. KVK provided saplings of fruit crops like papaya, banana, guava, mango etc. Red rice was also promoted in the village. Besides, the families were given continuous technological support for regularly nurturing the gardens. The hard work ultimately paid off. All the families were able to turn the neglected spaces of their houses to flourishing gardens. The vegetables grew well. The families not only consumed the vegetables grown at home but also distributed them among their relatives and neighbors. Convinced by the importance of having a vegetable garden at home, that too cost-effectively and eating diverse diet daily, 60 families grew vegetables in their gardens again this year. Inspired by them 15 more families showed interest in having a kitchen garden of their own. Today, out of 110, 82 families in Jamshet have developed Nutri Gardens. The vegetables have been grown in abundance this year including bottle gourd and pumpkin.

Sr. No	Croup	Varieties	Vegetables harvested by families (in kg)
01	RedRice	GNR4	120
Vegetables			
02	Radish	<i>Mahy 22</i>	25
03	Okra	Local	29
04	Cluster bean	<i>Nilam 61</i>	32
05	Maiza	<i>Rashi 4212</i>	28
06	Pumpkin	<i>Ankur Bhim</i>	25
07	Bitter gourd	Local	32
08	Bottle gourd	Local	22
09	Snake gourd	Local	26

Production at a glance

Vegetable seeds were sown in the month of July and the vegetables were ready by the end of September. Following are the figures from the ground:

Smt Kamu Rijad is uneducated and did not have any prior knowledge of nutrition gardening. She came in contact of the KVK and adopted the technology. Now she is happy to increase the nutritional afford ability for her family and earned an additional income from sale of surplus produce.

Farmers' feedback

“I have grown ten types of different vegetables in kitchen garden in last season and existing Kharif season under guidance of the KVK. I feel very happy from their results said Kamu Rajid, who resides at Jamshet village. I was very excited to saw such a large number of pumpkins and bottle gourds and ridged gourds in my garden. My family members eat these vegetables regularly and we have also shared to other villagers/friends. These vegetables are also being used in the food given to children at Aanganwadi centres.” Different types of vegetables were regularly used in our daily diets for 2-3 months. This garden helped to save about Rs. 1100 per month as cost of vegetables.



Kamu Rijad showing the produce in nutrition garden



Red rice in nutrition garden

6) KVK Kolhapur-II: Nutritional Requirement Fulfilled by Family

Name	Mr. Vinayak Jaijairam Shinde
Address	Shendur, Tal. Kagal, Dist. Kolhapur
Area under Nutrition Garden	0.025 acre
Number of Family Members	05
Mobile No.	9420008770



Background

Shendur village of Kagal tehsil of Kolhapur district is predominantly a sugarcane belt. Having more than 5000 villagers, the major kharif crops are rice, soybean and groundnut and in *rabi* crop jowar, gram and wheat. They grow vegetables mainly brinjal, tomato, chilli and dill. Shri Vinayak Jajairam Shinde has developed a nutrition garden and fulfilled his family's daily requirement. All the villagers were motivated to establish nutrition garden for improving their health.



Major crops and impact

Sr. No.	Food Groups	Crop	Yield (kg) January to May 2020	Market Price (Rs.)	Money Saved (Rs.)
1	Leafy Vegetables	Spinach	23.5 (94 Judi)	40	940
2		Fenugreek	26.5 (106 Judi)	40	1060
3		Shepu	15 (60 Judi)	40	600
4		Ambadi	24 (96 Judi)	40	960
5		Colocasia	13.5 (54 Judi)	30	405
6		Curry leaves	6	70	420
7		Ambat Chukka	11	30	330
8		Cabbage	8.3	35	290
9		Drumstick leaves	7.5	20	150
10	Other Vegetables	Tomato	37.5	20	750
11		Brinjal	41.5	30	1245
12		Chili	8	40	320
13		Cauliflower	30	30	900
14		Okra	28.5	30	855

Sr. No.	Food Groups	Crop	Yield (kg)January to May 2020	Market Price (Rs.)	Money Saved (Rs.)
15		Bitter gourd	15	40	600
16		Drumstick	7	60	420
17		Ridge gourd	13.5	40	540
18		Cluster bean	7	40	280
19		Knolkhol	7.5	50	375
20		Pumpkin	16	20	320
21	Roots and Tubers	Onion	11	20	220
22		Radish	33.5	25	837
23		Carrot	8	40	320
24		Beetroot	22.5	40	900
			Total		14037

Under guidance of KVK, Kolhapur-II, Shri Vinayak Shinde has developed the nutrition garden and raised different leafy vegetables (Spinach, Fenugreek, Shepu, Ambadi, Colocasia, Curry leaves, Cabbage etc.), major vegetables (Tomato, Brinjal, Chili, Cauliflower, Okra, Bitter gourd, Ridge gourd, Knolkhol) and Roots and Tubers crops (Onion, Radish, Carrot and Beetroot). He has saved Rs 14037 from nutrition garden.



7) KVK Latur: Nutritional Security of the Family

Name: Mrs. Anjana Sharad Sabale
Village: Bhoisamudraga Taluka Latur
Landholding: 68R
Family Background: Nuclear family with four members.

Problems Faced: Mrs Anjana and her husband working in the farm. Due to small landholding and less production she always faces financial problems for meeting the daily requirements. Her children frequently fall sick due to various infections and her daughter admitted hospital for two times due to lower white blood cells than normal.



KVK Intervention: From last two years Mrs Anjana established nutrition garden covering one acre area by adopting organic farming. Fruits and vegetables, nutri- cereals such as bajra, sorghum, ragi, rajgira, rala were cultivated. Now she used to fulfill her family's requirement in a year.

Outcome: Due to nutrition garden, frequency of consumption of fruits and vegetables, nutri cereals have been increased. These dietary changes bring health and nutrition improvement and have a positive effect on health of family members especially on children's health. From last two years the expenditure on hospital was stopped due to improvement in health and boost immunity.

Mrs Anjana prepared all fertilizers and insecticides at her farm so cost of cultivation is reduced. Her family realized additional annual net gain of Rs 7500 from 1 acre as compared existing practice. She also got annual net income of Rs 7400 from backyard poultry, Rs 6400 from vermiculture and vermicompost.

8) KVK Osmanabad: Nutrition Model for Nutritional and Income Security

Name – Smt Shailaja Shrikant Narwade

Village – Masla

Taluka – Tuljapur

District – Osmanabad

State – Maharashtra

Contact – 8888950858

Education – 12th pass

Landholding – 2.5 acre



Salient Features: Awareness was created on Farming System for Nutrition model. Establishment of Farming System for Nutrition model in Kharif season (Crops + Horticulture + Animal husbandry + Vermicompost + Azolla production + Bio fertilizers production) was done under guidance of KVK Osmanabad for nutritional and income security.

She is cultivating maximum agricultural crops with vegetables and fruit plants (34 varieties) with the use of organic manure. Goat farming was started as a agriculture allied enterprise. She is rearing milch animals for milk production at household level as well as for business purpose. She is also producing Vermicompost and Vermiwash for production of organic crops and vegetables and developed this as a business. She produced Azolla for feeding of milch animals to increase milk production and also scale Azolla culture at Rs. 100 per kg. Awareness was created through various programmes on Farming System for Nutrition. Distribution of seed kit of FSN model from KVK was done with technical guidance.

Economic Analysis (Kharif season)

Cost of Cultivation (Rs./ha)	Rs. 20,700/-
Production (q)	19.75
Gross return (Rs.)	Rs. 77,500/-
Net return (Rs.)	56,800/-
BC ratio	3.74

Practical Utility

1. Consumption of maximum types of food grains, vegetables and fruits in daily diet due to availability of maximum crops cultivated at own farm
2. Saves money on purchasing of food grains, vegetables and fruits at household level
3. Income security through excess produce sale.
4. Nutritional and income security at household level

9) KVK Washim: Nutrition Garden at Village *Karda*

There was lack of awareness on balance diet, importance of fruits and vegetables in daily consumption among the women's SHGs in Washim district. Under FLD and training programme, KVK created awareness on balanced diet, importance of fruits and vegetables in daily consumption among women/children. Women SHG member Sau Puspa Govind Deshmukh from village Karda belongs to a (5 family members) poor rural marginal farmer's 'family was under financial crisis to meet the needs of household food. Meanwhile Sau Puspa Govind Deshmukh got inspiration to develop the Nutrition garden at her backyard with technical guidance of KVK. The KVK provided her kitchen garden kit and saplings of fruit plants. Sau. Puspa Deshmukh developed nutrition garden at her 200 sq meter backyard. In this IPM technology like yellow stick trap, Niboli ark, etc. along with organic farming was adopted to protect their crops and attain higher yield.

Before developing nutrition garden, Deshmukh family was used to spent Rs 500 per month on purchasing vegetables from local market. On an average Deshmukh family brought 250 gm vegetables from local market to fulfill their daily needs of vegetables but it was insufficient as per the recommendation of ICMR. As per recommendation, each person needs 300 gm vegetables and 100 gm fruits in their daily diet to stay fit. The family did not fulfill their daily needs as per the recommendation. After developing nutrition garden at her backyard the Deshmukh family got 2 to 2.5 kg seasonal vegetables and 1 to 1.5 kg seasonal fruits. They saved Rs 6000/per year which was spent on purchasing vegetables and fruits. It helped them to fulfill their daily needs of seasonal fresh vegetables and fruits.



10) KVK Beed: Grow Healthy and Eat Healthy

Smt Sunita Ghadage is possessed 2 acre land, resides in village Kumbephal, taluka Kej of district Beed. She is 40 years old and educated up to higher secondary. She was undergone in orientation training on nutrition garden in 2018.

Earlier, Smt Sunita was used to grow one or two vegetable crops of local variety in traditional way. She was not aware about health and nutrition related problems/issues. She was not able to purchase fruits and vegetables from market for their daily dietary need due to poor condition. Poor health and imbalance nutritional status was observed during survey.

During training, she got scientific knowledge and seed packets containing seeds of seasonal fruits, roots and leafy vegetables.

Nutri garden was established on 600 sq. m area and started cultivating okra, bitter gourd, ridge gourd, cow pea, cluster bean, cucumber, bottle gourd, snake gourd, spinach, coriander, chuka, shepu, fenugreek, tomato, chilli, drumstick, medicinal plants like turmeric, alovera, green tea. She also planted fruit crops like guava, lemon, sapota and banana.



Season wise crop yield harvested in nutrition garden

Season	Crop	Yield (kg)	Season	Crop	Yield (kg)
Kharif	Okra	21	Rabi	Okra	23
Kharif	Tomato	18	Rabi	Tomato	12
Kharif	Brinjal	23	Rabi	Brinjal	22
Kharif	Cluster Bean	8	Rabi	Cabbage	8
Kharif	Chilli	10	Rabi	Cauliflower	10
Kharif	Cow-pea	8	Rabi	Chilli	12
Kharif	Bottle Gourd	15	Rabi	Bottle Gourd	18
Kharif	Bitter Gourd	11	Rabi	Bitter Gourd	15
Kharif	Ridge Gourd	14	Rabi	Ridge Gourd	13
Kharif	Spinach	6	Rabi	Spinach	8
Kharif	Fenugreek	9	Rabi	Fenugreek	9
Kharif	Coriander	5	Rabi	Coriander	5

Harvesting of organic and fresh vegetables was done. During interaction, she expressed about getting sufficient vegetables to enrich their food and also distributed extra vegetables to other villagers. She saved of Rs. 1000 per month. Vermi compost and waste decomposed organic matter was prepared and used in the nutrition garden helped her for getting healthy food.

11) KVK, Parbhani: Securing Good Health with Nutrition Garden

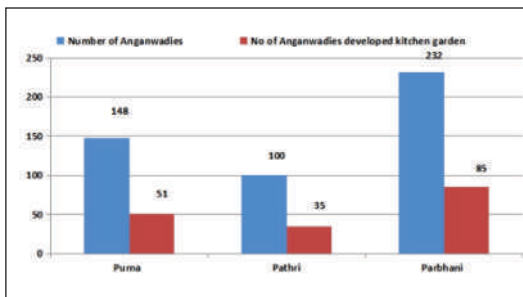
Malnutrition is a major health problem among rural children. In this view Indian government started anganwadi centers in the year 1975 as a part of ICDS programme to combat child hunger and malnutrition. It provides protein and energy rich supplements to pre-school children. But diet was deficient in vitamin and minerals requirements. To address problem of malnutrition in women and children, Government decided to attach kitchen garden to the anganwadi centres where fresh fruits and vegetables will be grown and children will get nutri-rich diet.

Krishi Vigyan Kendra, Parbhani focused on kitchen garden activity in the year 2016-17 and developed a kitchen garden model to eradicate malnutrition from 0-6 year children. Conducted various training programmes, demonstrations and field visits for farmers, farm women, youth and extension functionaries.

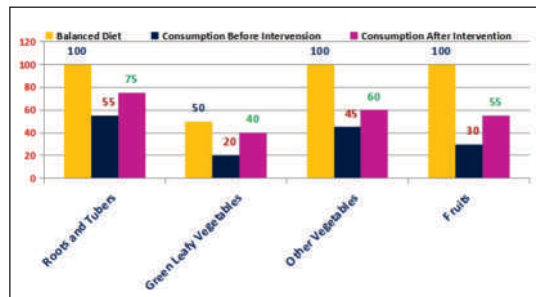
Special features of kitchen Garden Model

Area	710 sq. ft.
Compost pit	1 No.
Total Vegetables	14-15 No. (includes green leafy vegetables, roots and tubers, other vegetables)
Fruits	1 or 2 No. (Banana, Papaya, etc.)
Other Crops	Drumstick, Curry leaves Tree and Lemon Tree

Output



Number of kitchen garden developed by anganwadi centers under the guidance of KVK, Parbhani



Change in consumption of fruits and vegetables in daily diet of anganwadi children



Impact

Most of the anganwadi centers have adopted the kitchen garden models in the district. Rural population understood the benefits of kitchen garden and they established on their own farms. The farmers were encouraged to go for cultivation of vegetables and fruits primarily for household consumption. Approximately 700 farm families improved consumption of fruits and vegetables and got nutritional security at household level due to establishment of kitchen garden at Anganwadi centers and farm.



12) KVK Raigad: Nutrition Garden for Family

KVK started awareness campaigns and exposure visits towards orienting the farm women in the villages. They motivated them to grow diverse vegetables and fruits primarily for own family members. Seed packets having selected vegetables and fruits related seeds were provided to cultivate in their nutrition gardens covering adopted villages in the district.

Mrs. Sugandha Jangam, wife of Shri Avinash Jangam is a successful backyard kitchen gardener from Sanegaon village of Roha cluster of Raigad district. She was lacked in scientific knowledge of nutrition gardening. She got vegetable seed kit from KVK Raigad. She followed

technology as suggested by the KVK experts that resulted harvesting of 900 kg vegetables. Out of which 650 kg was consumed by her family members and 250 kg was sold in local market to earn about Rs 12000 in a year. She expressed her happiness and ensured availability of vegetables as required for her family members.

13. KVK Nandurbar: Promoted Nutrition Garden Concept in Nandurbar

The Journey from Kuposhan to 'Suposhan Vatika' in Nandurbar is given as under:

- KVK, Nandurbar made an effort to establish Backyard Nutrition Garden (BNG) called 'Suposhan Vatika' and enabling tribal people. Under NARI program, women centric and nutri-sensitive activities were promoted. Rural farm families were sensitized, seed and drip irrigation kits were provided.
- A large sized circular BNG model which can accommodate daily requirement of large families along with domestic composting facility was created at the centre.
- In total 1131 BNG models were developed in 100 villages covering 3 blocks (Akkalkuwa Dhadgaon and Navapur) of the district.
- The demonstrations benefitted 325 highly vulnerable members of the society including pregnant and malnourished children.



Dr. Hedgewar *Seva Samiti*

Demonstrations on Nutritional Garden

Sr. no.	Year	Season	No. of Demonstration	Total Area (ha)	No. of Villages	Villages
1	2019	Kharif	430	3.60	10	Kakarda, Mandvi, Khamla, Ghatli, Talavipada, Asalipada, Zamtwad, Sharvani, Niboni, Palipada
2		Rabi	500	4.20	10	Kakarda, Mandvi, Khamla, Ghatli, Talavipad, Asalipada, Zamtwad, Sharvani, Niboni, Palipada



Sr. no.	Year	Season	No. of Demonstration	Total Area (ha)	No. of Villages	Villages
3	2020	Kharif	500	4.20	13	Talavipad, Asalipada, Zamtwad, Sharvani, Niboni, Palipada, Molgi, Katri, Bhagdari, Bijaripati, Junmohida, Bhambod, Ravalapani
4		Rabi	645	5.40	20	Talavipad, Asalipada, Zamtwad, Sharvani, Niboni, Palipada, Savrat, Bilipada, Molgi, Katri, Bhagdari, Bijaripati, Junmohida, Bhambod, Sari, Ravalapni, Bhulane, Debarmal, Kanjala, Palaskhobra
5	2021	Kharif	595	4.97	21	Talavipad, Asalipada, Zamtwad, Sharvani, Niboni, Palipada, Savrat, Bilipada, Molgi, Katri, Bhagdari, Bijaripati, Junmohida, Bhambod, Sari, Ravalapni, Bhulane, Debarmal, Kanjala, Palaskhobra, Junwani

Demonstration area per family (30*30 ft, Gangamma model)

Demonstration area per family (20 m², Drum irrigation for Nutrition Garden)

14. Urban Terrace Garden project of KVK Kolhapur-II

KVK Kolhapur-II has started development of urban terrace garden in November, 2020. In this project 100 interested urban families were selected. Initially KVK team visited all the terrace gardens and advised to incorporate the necessary changes for quality terrace gardens. KVK team has given advised on management of crops in pots and tray on terraces. They have been provided with different inputs such as plant saplings, organic inputs such jeevamrit, go krupaamrutam, vermi compost and different ready to use media.



15. KVK Solapur-I: JIJAI NANO Kitchen Garden: Grow your own vegetables organically.

The model of Mini Kitchen Garden named "JIJAI NANO KITCHEN GARDEN" developed by KVK, Solapur-I with idea of *grow your own vegetables organically*, because avoiding consumption of pesticides loaded vegetables, which leads to severe problems (cancer/liver dysfunction/kidney malfunction/enzyme inhibition/nervous system problems etc.) of health. Hence for growing own vegetables organically concept generated this unit. Through this model you don't need a lot of space to grow fresh and organic vegetables. The size of Jijai Nano kitchen garden unit is 3.75 x 6.20 feet with 70% shade net cover and precisely designed bed with specific organic media. Cost of this model comes about Rs 7000 to Rs 9000.

The climbers are trained on the shade net pillar for examples Dolichos bean/ Ridge gourd and Bitter gourd. The three Solana's crop like tomato, chilli and brinjal were planted on beds two lines each. Also cabbage planted at lower side of brinjal. Two leafy vegetables like spinach and coriander were sown in mini tray compartment of main bed.

This model is better for backyard space no require large patches of land nor any specialized tools. Even if you are living in an apartment, you can install it in balcony/terrace with least care. The irrigation is applied through specially designed half circle sprinkler. The media used for growing vegetables are prepared from vermi-compost, sand, soil and coco pit by considering the nutritional need of said vegetables.





Many citizens are using this unit and getting tomato every 4-5 days, chillies at every days, brinjal two times in a week, spinach at every week and coriander every day. I harvested dolichos bean and bitter gourd weekly. In totality this unit will produce 1.2 to 1.5 kg fresh and organic 8-9 vegetables in a week with least management. Also makes you, spend your spare time in a productive way and brings you happiness of consuming your own produced organic vegetables and saving of money. In total 25-30 families have adopted this model. KVK has created awareness among >500 people through different extension activities and social media. One small video clipping was developed and shared for creating interest among people towards adopting such kitchen garden model and living healthy life.



JIJAI NANO KITCHEN GARDEN

DEVELOPED BY : DR. L.R. TAMBADE
Sr. Scientist & Head, KVK, Solapur (MH)
email : lrtambade@gmail.com



Success Stories of Gujarat

KVK Navsari: Focussed on Nutri-Sensitive Interventions in Navsari

Shri Arujbhai J Patel lives in Karadi village with his family of four members. They do not have land for agriculture, so he was earning their livelihood through dairy farming (two cows and two buffalo) and fish catch from sea creeks and rivers as a 'Pagadiya' fisherman (just using small hand nets). Once in a week definitely he was visiting KVK for technical support. So looking to his interest, KVK, Navsari encouraged and trained with various demonstrations on technological methods and applications for nutrition gardening on vegetables, fruits and fish farming along with dairy farming and poultry. Today, Arunbhai and his wife Smt Varshaben constantly engaged with dairy farming (two cows), kitchen gardening of vegetables, nutritious fruits, poultry (30-40 birds) and fish farming (Major carps, Pacu, Prawns) in courtyard earthen water harvesting tank (108 sq.m) in the available land of 880 sq.m around his house. Last year he earned income of about Rs 30000 from fish pond only. He was not only providing healthy nutritious foods (milk, eggs, fish, prawns, fruits and vegetables) to his family but also earning livelihood by local selling of such nutritious food exclusively free from poisonous chemicals and pollutants. Thus, such multi components kitchen gardening model could have potential to provide nutritious feed and be mainstay for thousands of families in Nation.



Improving nutritional status through terrace gardening-KVK Surat

Before starting concept of the terrace garden, KVK, Surat participated in Horticulture Fair-2015. In that, it was suggested to arrange terrace garden training especially for the urban people. More than 750 people did registrations who were interested for the training on terrace garden. One MoU was signed with other NGO/Institute and named it as SAUAR (Surat Alliance for Urban Agriculture Resilience). Nine trainings were conducted on terrace gardening where 60-70 people participated in each training course. Whatsapp group of trainees was created for making frequent interaction and knowledge sharing.



In Surat city, mainly urban people do not have own spare space in and around the house. To solve the problem of land, proper utilization of terrace space for gardening was initiated. Keeping their interest, KVK Surat started organizing special training for urban people with specific objective to promote terrace garden and getting fresh vegetables for increasing nutritional status. It helps to utilize the recycled household waste efficiently for cultivation of crop through composting.

On terrace garden people grown more than 60 different types of horticultural crops on their terraces and utilizes those fresh vegetables for their daily diets. Now > 900 urban people are practicing terrace gardening and harvesting fresh, organic and nutritious food in the family. Their time is also utilized in better way. They are applying biofertilizers and biopesticides.

Surat: Case study: 1

Mr. Yogesh Patel from Surat started growing vegetables like brinjal, chilli, okra, tomato and ornamental plants on terraces. He is using fresh vegetables for daily consumption and getting healthy and organic food.



Case study: 2

Mrs. Rekha Mistry from Surat city is involved in utilizing space of gallery and terraces for the cultivation of vegetables like, brinjal, tomato, chilly, fenugreek, coriander, garlic, curry leaf. Medicinal plants like, tulsi, mint, aloevera, lili cha, arduci, long piper were also grown. She is only applying bio-fertilizers/botanical pesticides. Recycled household waste is being efficiently used in the terrace gardening. Mrs. Rekha is a role model to others in the city.

Case study: 3

Dr. Pravin Soni belongs to Surat has also started using terraces for growing vegetables namely brinjal, tomato, chilli, cucumber and gourds for their daily use. Presently, he is growing the vegetables like, brinjal, tomato, okra, chilli and cucurbits in different containers. He is also

growing the cucurbits on the trellis with support of the sticks. In fruit crops, mainly apple ber, guava and star apple are growing on terrace. He also made home based pesticides and applied on plants to manage different diseases and pest as mentioned during training. He also created automatic home made drip irrigation system to water the plants. He is sharing the photographs of his activity of the terrace gardening. Fresh vegetables used for the daily consumption and take the healthy and organic food.





KVK Junagadh: Vegetables for Home Consumption

Mrs. Gitaben H. Vala lives in village-Gangetha, taluka Sutrapada of district Gir Somnath. Her family depends mostly on farming for their livelihood. She is active member of SHG. She also attended the training organized on nutritional garden. In her backyard, she started growing vegetables and also planted few fruit trees covering 800 sq.m area. Vegetable seed kits were arranged by the KVK scientists. She is realizing saving of about Rs 35000 in a year. KVK scientists visited her nutrition garden regularly. Now Mrs. Geetaben is successful backyard kitchen gardener.



KVK Narmada: Kitchen Garden to Fight against Malnutrition

Narmada district is located on the eastern corner of Gujarat state. Tribal families are residing here from centuries and had intimate interactions with the forest, deriving most of their basic requirements such as food, fodder, fuel and fiber from the forest. Agriculture is the major occupation and collection of forest produce is another means of their livelihood. They have also dependent on variety of food from the forest. These foods include roots and tubers, greens and fruits. They live in unique physical, socio-economic and cultural environment. Majority of farm women have lack of knowledge about health and nutrition, dietary pattern of pregnant and supplementary feeding for children. Due to poor economic condition they are unable to purchase fruits and vegetable from market for their daily dietary need. It resulted in poor health and imbalance nutritional status of farm women and children leads to malnutrition. The farm women of this area are growing one or two vegetable crops of local variety like brinjal, tomato, amaranths, bottle gourd in their backyard in traditional way and their daily intake of green vegetables in the diet is about 100-150 gm per day. Availability of the vegetables according to RDA is very less.



Homestead production of fruits and vegetables provides the poor people the direct access to important nutrients that may not be readily available or within their economic reach. Hence kitchen gardening is an important strategy to improve household nutritional security. In total, 100 tribal farm women were trained on organic cultivation vegetable crops under nutrition garden in villages Guldacham and Bedchha of Narmada. Different activities like 25 trainings, 12 group meetings, 10 method



Training



Field visits to Kitchen Garden

demonstrations, 25 field visits and 10 field days were conducted for promoting nutrition related interventions and awareness creations in the villages.

Mrs. Deepika's kitchen garden is placed next to the area where the family washes dishes. Waste-water and other resources were used in the kitchen garden. One Guntha area was covered under vegetables crops namely okra, tomato, brinjal, cabbage, cauliflower, chilli, bitter gourd, bottle gourd, ridge gourd, palak. 50 farm households started kitchen gardening in rabi 2017 and on average 120 kg vegetables were harvested by each family. Demand of vegetables was fulfilled for about 70-80 days and saved Rs 60 per day by each family. On an average Rs 3000 per family was saved and organically grown vegetables were consumed by the family members.



Future Plan

A second batch of seeds for seasonal additions to the kitchen garden will be disbursed among SHG members. Mrs Deepika also encouraged exchanging seeds with other farm women village. Seed exchange and proper maintenance of the kitchen garden will sustain the movement in the village. Tribal farm women of other villages started demand of vegetable seeds.

3) KVK Navsari: Organic Kitchen Gardening

Name: Arshaben Arunbhai Patel

Village: Karadi

Tal: Jalalpore

Dist: Navsari

Mobile No: 972586741

Age: 40 Yrs

Education: Secondary Education

Land Holding-Farming Experience: 21 Years

Crops Grown: 22

Livestock: 8



Earlier she was growing vegetables in her backyard for family consumption and earned about Rs 700 from kitchen gardening.

After KVK Guidance Adoption of technology:

- Organic kitchen gardening NAU model
- Biological and mechanical control of pest
- Prepared compost from livestock
- Rainwater harvesting system



Result

- Residual free vegetables
- Better utilization of rain water
- Utilization of spare time
- To get fresh vegetables
- Additional income

Kitchen Income in Rs.			
Crops	2015-16	2016-17	2017-18
Vegetables	2102	2210	7500
Fruits	4000	6000	3800
Others	2001	3000	3000
Total	8104	11210	14300

Horizontal spread About 90 families in the villages have adopted.

KVK Valsad: Nutritional Garden Model for Tribal Families

Valsad district belongs to south eastern parts of Gujarat characterized by the heavy rainfall, undulating topography, poor fertility of soils and pre dominant tribal area. Majority of the farmers are small and marginal resource poor tribals growing rice under rainfed condition. Large population of women and children is suffering from the sickle cell anemia. Nutritional deficiency is found to be the most important cause of the problem. It is well known fact that inclusion of fruits and vegetables in the daily diet play significant role in nutritional security.

The kitchen garden offer great potential for improving household food security and alleviating micronutrient deficiencies supplying most of the non-staple foods that a family needs every day of the year, including roots and tubers, vegetables, legumes, herbs and spices. Roots and tubers are rich in energy and legumes are important sources of protein, fat, iron and vitamins. Green leafy vegetables provide essential vitamins and minerals, thus are a vital component of a healthy diet and should be eaten as part of every meal.

With a view to address the nutritional problems of resource poor tribal families, the Krishi Vigyan Kendra undertook many extension activities including Front Line Demonstration on kitchen gardening. It was observed that the ex-beneficiaries of FLD gave up the idea to continue with kitchen gardening in the next season. This is mainly due to repetition of the same crops. Non adoption of the technology has compelled the scientist to re-design the garden in such a way that it enabled to accommodate more number of vegetables (as per the farmers choice) in smaller area, which gave regular production at regular intervals and that too satisfy the nutritional needs of the family.

Gangama model enables the villagers to produce large number of vegetables with limited resources like land, water, labour etc. This model envisages use of organic materials such as vermi compost, neem oil, liquid bio fertilizer (LBF), compost etc. This nutritional garden aims to provide nutritional security to a family of five persons.

The design

The design is named after a girl who tries it on her farm. A Gangama model was developed by the Malpani Trust of Devas (MP). It is a sacred geometrical diagram representing the cosmos, used in meditation and yoga. This model is a circular garden 30 feet in diameter, covering less than 800 square feet area. There are four circles. The diameter of outer circle is 30 ft. The radius of two inner circles is 5 ft. and 4 ft, respectively. The inner most circle is having radius of 2 ft. The whole circle is divided into seven equal parts by 1.5 ft pathway. Each circle has approximately 1 foot width useful for observation of each portion and carry out various operations without disturbing adjacent plot/plants. The plants are grown in a circular beds



arrayed in the centre as well as on both the sides of the path way. Fruit plants like banana or papaya may be planted in the centre or on the outer periphery. The nutritional garden is a proper combination of short and long duration vegetables including vine crops and herbal medicinal plants such as ginger, turmeric, tulsi, lemon grass, mint etc. It was grown in a manner that each portion gave fresh vegetables in a required quantity to small family of five persons. On the border of outer most circle vine crops like yam, sweet potato, bottle gourd and fruit crops like papaya, banana are grown. Due care was taken while growing different crops so that each crop can harvest proper sunlight at different stages of growth. Plants with less height are grown in E-W direction. It is very flexible design and can be changed in accordance with the soil types, season, availability of land etc.

Intervention of KVK

Initially 25 farm women from 02 villages were trained on establishing Gangama nutritional gardens using eco-friendly inputs. For the first instance the demonstrations were laid out involving five families of Kaparada block. Based on the primary success, twenty five demonstrations were laid down in three blocks during Rabi season. The average plot size of demonstration was 800-900 sq.ft. Since the soils are poor in organic carbon content, well rotten FYM/Vermi compost @ 40 kg + Neem cake @ 5 kg was applied at the time of preparation of soil to avoid mortality of seeds and seedlings caused by soil born diseases. The seedlings of the brinjal, tomato, cabbage, cauliflower, marigold etc. were dipped in to the bacterial culture solution (1 lit water + 100 gm jaggery + liquid biofertiliser 100 ml each of PSB, azotobactor and potash mobilizing bacteria) for about 12-15 minutes before being transplanted in to the field. The seeds /seedlings of garlic, coriander, fenugreek, Indian bean, bottle gourd, okra, cluster bean, cow pea, turmeric, ginger, lemongrass, carrot, radish, beet root, etc treated with liquid bio fertilizer strains were also provided.

As many as 32 crops which include 3 fruit crops and 5 herbal medicinal crops were accommodated in the 800 sq. ft. area. Two sprays of neem kernel extract were applied in the initial stage of the crop growth as precaution measure against attack of sucking pests. The total cost of each demonstration unit including all inputs and labour charges gone up to Rs 1200. The production data of the each crop was maintained by the farmer in the separate sheet provided to them.

Capacity Building

- About 21 training programmes on nutritional garden were organized benefiting 852 farm women.
- Demonstrations on nutritional garden conducted in backyard of more than 182 farm families.

- Field days were organized at farmers' fields. This has created awareness amongst tribal farmers about improved variety of sweet potato.
- Three days training programmes for creating awareness amongst teachers as well as officials of Integrated Child Development Schemes (ICDS) was also organized in which 245 teachers and 352 ICDS officials were participated.
- As many as 133 units of nutri gardens were developed in the schools with active involvement of the students and teachers through District Institute of Training and Education (DIET, Valsad).

Harvesting Nutrition

Each family with nutritional garden could harvest 11-12 kg of brinjal; 7-10 kg of bottle gourd; 9-11 kg of tomato; 4-6 kg of pointed gourd, 4-6 kg of chilli, 8-10 kg of ladies finger, 3-4 kg cluster bean in addition to coriander, garlic, ginger, mint, fenugreek, palak, turmeric, onion, elephant foot yam in their backyards. The total average vegetable production of Gangama model with as many as 25 vegetable crops was 229 kg valued Rs 6940 with growing access to vegetables on a daily basis. These families no longer have to buy vegetables from the market. In this way, they saved around Rs 1200 every month. Many of the families reused the kitchen waste water. There is a visible change in food consumption pattern as the families included variety of vegetables in their daily diet. Many of them have sold about 30 per cent of their produce received an income of Rs 600-700.





Farming System for Nutrition: An Innovative Approach Implemented through KVKs in Maharashtra

Farming System for Nutrition (FSN) works on the premise that household food production is important to diets of farm families, particularly small holders. In India, a considerable section of the population, continue to suffer from food and nutrition insecurity and nearly 15 per cent of India's population in 2015-17 are estimated to be undernourished (SOFI, 2018). Majority of the country's population continue to be dependent on agriculture for their livelihoods with close to 60 per cent of the rural households in 2012-13, classified as agricultural households (Government of India, 2014).

In a context, where a significant section of the population is malnourished and dependent on agriculture, a pathway for addressing food and nutrition insecurity through a farming systems approach would have great potential.

Importance of FSN

Production of food by farm families for their own consumption is one of the important diet sources for the farm families (in particular small holders). Prof. M. S. Swaminathan defined this farmer led strategy as: “The introduction of agricultural remedies to the nutritional maladies prevailing in an area through mainstreaming nutritional criteria in the selection of the components of a farming system involving crops, farm animals and wherever feasible, fish”.

Considering the concept of FSN, it was decided to propose such innovative and effective project to curb malnutrition in Maharashtra with following objectives:

FSN Project Objectives

- To introduce the concept of Farming System for Nutrition (FSN) approach through the KVKs in selected villages of Maharashtra.
- Demonstrate feasibility of Farming System for Nutrition approach among small and marginal farmers in Maharashtra.
- Setting up Farm Schools to demonstrate Farming System for Nutrition for addressing the malnutrition.

FSN Approach and Focus Areas

- Developing and demonstrating location specific model farming system for nutrition through KVKs.
- Establishing a Grid of Garden of nutri-rich plants in KVKs.
- Creating a cadre of Community Hunger Fighters in the focused locations
- Communicating to stakeholders through various media for awareness and behavioural changes
- Policy advocacy with the evidences from the above research / models

The idea of the project was inculcated in the farm families by KVKs through conducting orientation trainings about farming system for nutrition and how it would help the farm families to fight malnutrition.

Stakeholders of the FSN project

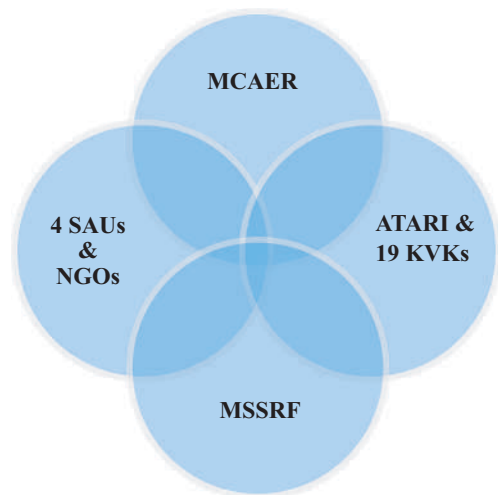
MCAER: Maharashtra Council of Agriculture Education and Research, Pune

SAUs and NGOs: State Agriculture University and Non-Government Organisation, Maharashtra

ICAR-ATARI, Pune

MSSRF: M.S. Swaminathan Research Foundation, Chennai

KVK: Total 19 Krishi Vigyan Kendras from the state of Maharashtra



Concept of FSN

The FSN concept involves various methods to adopt measures such as crop production, introduction of biofortified varieties of crops, promoting poultry, goatery and fishery unit, promotion of nutrition gardens of fruits and vegetables, recipe preparation of nutritive vegetables, awareness of wild vegetables nutritive value, promotion of biofertilizers and biopesticides.

The concept of the project Farming System for Nutrition-approach for addressing food and nutritional security through KVKs in Maharashtra is being implemented by MCAER, Pune since January 2019 which aims at curbing malnutrition in Maharashtra with the help of 19



KVKs of Maharashtra; ICAR-ATARI and technical guidance provided by MSSRF, Chennai. This project covered nearly 2525 farm families (Kharif season) and will cover 3055 farm families (in Rabi season) of Maharashtra.

The main objective is to promote farming system which comprises of arable farming, horticulture, backyard poultry and animal farming to improve the household availability of balanced diets of the farm families in a sustainable manner. In developing a design for the farming system, feasible agricultural interventions to address the nutritional deficiencies of the household/community/location would have to be incorporated.

Activities of Farming System for Nutrition

- Two training workshop were conducted for KVK staff in February and April 2019 to orient them on the relevance and need of the FSN approach, They were then asked to develop location specific FSN farm and nutrition garden models in their area of operation. Following this, farm men and women were sensitized on the FSN approach through orientation trainings by KVK staff; how practice of the approach would help them improve diet diversity and fight malnutrition, was highlighted

Orientation and Action Plan Workshop organized on 15th April 2019 at MCAER, Pune

The orientation and action plan workshop was organized to create awareness of FSN and its importance and how it can be implemented at KVK level and village level.



Activities of Farming System for Nutrition conducted at KVK level and at village level - Kharif season

A. Activities conducted at KVK level

1. Orientation training on FSN concept for the farm families
2. Organization of Farmers Meet (Pre - Kharif)
3. Awareness programme on importance of balanced diet (Celebration of World Food Day)
4. Training and demonstration “Concept of nutrition garden and layout model of nutrition garden”
5. Distribution of FSN Kit: Seeds, saplings and poultry chicks to the farm families
6. Arranged farming system for nutrition and method demonstration on nutritional kitchen gardening

7. Celebration of Nutrition Week (01-07 Sept 2019)
8. Health check-up camp
9. Arranged field visit of farm women to KVK demo plots
10. Recipe preparation of wild vegetables competition for women
11. Organization of seminar on biofortified pearl millet and pulses cultivation
12. Organization of exhibition on Wild Vegetables (*Ranbhajya*): An Innovative Approach
13. Training on preparation of supplementary recipes for preschool, school going children and pregnant and lactating mothers
14. Conducting sample benchmark survey of farm families on nutritional aspects

B. Activities conducted at village level

1. Awareness programme on importance of balanced diet
2. Inauguration and distribution of FSN Kit and demonstration of nutritional kitchen gardening
3. Development of nutrition garden at village level on the farmer's field
4. Training on care and management of nutritional kitchen garden
5. Nutrition awareness programmes
6. Anthropometry analysis
7. Swachhata Pakhawada

C. Awareness and Training Programmes at KVK level

1. Different types of FSN models and their importance
2. Improved cropping system and importance of nutritional garden
3. Nutritional deficiencies in rural areas and remedies
4. Importance of health and sanitation
5. Processing and value addition

D. Demonstrations conducted at village level

1. Cultivation of improved variety of wheat at tribal area
2. Oyster mushroom
3. Soya enriched products
4. Fortification of protein in the diet of tribal women and children through Soyapaneer
5. Fortification of protein in the diet of tribal preschool children through Soyanut
6. Fortification of micronutrient in the diet of tribal families through mushroom cultivation
7. Cultivation of nutri-rich red rice and finger millet
8. Preparation of Bajra *Nankatai*– method demonstration
9. Cultivation of nutri-rich varieties of cereals and millets



List of KVKs and beneficiaries covered under FSN Project

Name of KVK	Number of villages covered in Kharif season	Number of beneficiaries - farm families-covered in Kharif season	Number of beneficiaries - farm families-covered in Rabi season	Villages covered in Kharif season
MPKV Rahuri				
KVK Dhule	4	200	200	Pimpalpada, Kewadipada Borpada and Shendwad
KVK Mohol	3	100	100	Pokharapur, Vadval and Papari
KVK Nashik	5	100	100	Ghanshet, Vadpada, Satpada, Bhatti and Khobala
KVK Kolhapur	1	200	100	Shendur
KVK Narayangaon	5	200	200	VadgoanPir, Valunjnagar, kanhurvasti, Khairnagarand Pimparipendhar
KVK Baramati	3	Activities undertaken in Rabi season	200	Malad, Wanwadi and Nira Waghass
PDKV Akola				
KVK Buldhana	3	75	125	Nandrakoli, Sagwanand, Ajispur
KVK Chandrapur	2	150	200	Nandgoan and Delanwadi
KVK Amravati-II	3	200	200	Nirsana, Khirsana and Timtala
KVK Akola	1	200	200	Sukali
KVK Amravati-I	4	Activities undertaken in Rabi season	200	Kara, Nanduri, Kesharpur and Kotha
VNMKV Parbhani				
KVK Aurangabad	1	100	100	Lakhegaon
KVK Osmanabad	3	200	100	Andur, Chivali and Masla
KVK Latur	2	200	200	Katgaon and Bhuisamudraga
KVK Jalna-I	2	100	200	Kachrewadiand, Wanadgaon

Name of KVK	Number of villages covered in Kharif season	Number of beneficiaries - farm families- covered in Kharif season	Number of beneficiaries - farm families- covered in Rabi season	Villages covered in Kharif season
DBSKKV Dapoli				
KVK Raigad	5	Activities undertaken in Rabi season	200	Yashwantkhar, Sanegaon, Wavepotage, Shenwai and Koshimbale
KVK Ratnagiri	1	100	130	Talawade
KVK Palghar	3	200	100	Vasantpada, Ughanipada and Saturli
KVK Sindhudurg	3	200	200	Vadpada, Kahandolpada and Khobala
Total	54	2525	3055	54

Highlighting Activities / Glimpses of KVKs

- Orientation workshop, Training, Seed and Sapling distribution, Media coverage.

FSN activity at KVK Kolhapur





FSN activity at KVK Jalna



महिलांनी घेतले पोषणमूल्य शेती पद्धती प्रकल्पावर प्रशिक्षण

जिल्हा पोषण आयोगाच्या अखत्यारीत असलेल्या जिल्हा पोषण अधिकारी यांच्या मार्गदर्शात जिल्हा पोषण आयोगाच्या अखत्यारीत असलेल्या जिल्हा पोषण अधिकारी यांच्या मार्गदर्शात जिल्हा पोषण आयोगाच्या अखत्यारीत असलेल्या जिल्हा पोषण अधिकारी यांच्या मार्गदर्शात...



FSN activity at KVK Aurangabad



KVK Aurangabad

शभर कुटुंबांत परसबाग, पोषणमूल्य आघारित शेती

जुनी विधान सभेच्या तालुक्यात शेतकरी शेतकऱ्यांना विद्यालयांचे वाटप

जिल्हा पोषण आयोगाच्या अखत्यारीत असलेल्या जिल्हा पोषण अधिकारी यांच्या मार्गदर्शात जिल्हा पोषण आयोगाच्या अखत्यारीत असलेल्या जिल्हा पोषण अधिकारी यांच्या मार्गदर्शात...



Farming System for Nutrition - Field Activities of the Kharif season

FSN concept implemented in four regions of Maharashtra state viz. Konkan, Western Maharashtra, Marathwada and Vidharbha

Development of demonstration plot on KVK farm and nutrition garden on the Farmer's fields

A. FSN activities conducted in Konkan region

KVK Kosbad Hill demo plot



Crops grown: Spinach, Amaranthus, Sponge gourd, Pumpkin, Bottle gourd, Cowpea, Dolichus bean, Maize, Sweet potato and Okra

Nutrition Garden at village Jamshet



Crops grown: Radish, Sponge gourd, pumpkin, Bottle gourd, cowpea, Cluster bean, Maize Coconut and Okra.

Nutrition Garden at village Telekhol – KVK Sindhudurg



Crops grown: Taro, Lesser yam, Elephant foot yam, Turmeric, Snap melon, Ginger, Papaya and Banana

Highlights of the FSN activities in the Konkan Region

1. KVK Palghar

- i. KVK Palghar is one the oldest KVKs in Maharashtra



- ii. Demonstration plots of KVK Palghar was well organized and labelled, despite of heavy rainfall in that region
- iii. One of the interesting observations was that the demonstration plot of KVK had classified the crops according to the vitamins and minerals.
- iv. The KVK farm plot area approx 1 acre which included all kinds of nutri-rich crops
- v. KVK Palghar had adopted few villages in the FSN project where they had also demonstrated the nutrition garden which included many crops viz., Moringa, Red Rice, Cluster beans, Okra, Bitter gourd, Snake gourd, Bottle gourd, Millets and other Fruit crops

2. KVK Sindhudurg

1. KVK Sindhudurg is located in the south Konkan region of Maharashtra
2. Demonstration plots of KVK Sindhudurg was well organized
3. There was a fruit orchard, which had all kind of fruits crops viz., Aonla, Dragon Fruit, Coconut, Banana, Sapota, Kokum, Jackfruit and Cashewnut.

B. FSN activities conducted in Western Maharashtra region

KVK Kolhapur-II demo plot



Crops grown: Turmeric, Ginger, Carrot and Coleus forskohli (Mine mula)

Nutrition Garden at vill.Ghanshet – KVK Nashik



Crops grown: Brinjal, Chilli, Spinach, Papaya and Banana

Nutrition Garden at village Vadpada – KVK Nashik



Crops grown: Brinjal, Fenugreek, Spinach, Papaya and Mango

Highlights of the FSN activities in Western Maharashtra

1. KVK Kolhapur-II

- i. Demonstration plot of KVK Kolhapur managed well and developed at proper site.
- ii. Oyster mushroom cultivation unit developed at the KVK.
- iii. They also had sun drying unit, which was used to process and consume leafy vegetables in dried form i.e. Moringa, Fenugreek, Chick pea etc.

2. KVK Nashik

- i. KVK Nashik included villages that comprised tribal community as beneficiary under the project
- ii. Demonstration plots of KVK Nashik were observed in good condition

3. KVK Solapur-II

- i. KVK Solapur is located in the western Maharashtra region
- ii. Demonstration plots developed in scientific way consider long dry spell in the region.
- iii. KVK adopted a village and promoted FSN model.

4. KVK Narayangaon

- i. Nutrition Garden model developed at the centre
- ii. Adopted villages and popularised the concept of farming system for nutrition
- iii. Womens were more enthusiastically participating in cultivation of various nutri-rich crops.
- iv. KVK Narayangaon organised training to Anganwadi workers for adoption of nutrition garden at school campus and also motivated the womens for kitchen garden to fulfill their daily demand for fresh vegetables.

5. KVK Dhule

- i. KVK Dhule maintained nutrition garden model in better way
- ii. KVK included Poshan Vatika concept for improving nutrition of farm families.
- iii. Villages adopted by the KVK comprised of tribal community as beneficiaries for FSN project.



C. FSN activities conducted in Marathwada region

KVK Aurangabad demo plot



Crops grown: Radish, Beet root, Brinjal, Sponge gourd, Bitter gourd, Spinach and Cluster bean

Nutrition Garden at vill.Lakhegaon - KVK Aurangabad



Crops grown: Brinjal, Fenugreek, Bottle gourd, Sponge gourd, Bitter gourd, Spinach and Sowa

Nutrition Garden at village Katgaon KVK Latur



Crops grown: Spinach and Shepu, Okra and Fenugreek

Nutrition Garden at village Bhuisamudraga KVK Latur



Crops grown: Pigeon pea, Brinjal, Fenugreek, Bottle gourd, Sponge gourd and Cluster bean

Highlights of the FSN activities in Marathwada Region

1. KVK Aurangabad

- i. Demonstration plots of KVK organized well with focus on vegetables and fruits.
- ii. KVK organized a series of awareness programmes.

2. KVK Osmanabad

- i. Water scarcity situation was kept in mind while planned the farming system for nutrition model.
- ii. Prepared a folder on importance of FSN concept for clearing awareness on nutri-rich crops.

iii. Demonstrated the backyard poultry, vermicomposting and mini dal cum pulveriser unit at village level.

3. KVK Jalna-I

- i. Demonstration plots were organized well considering long dry spell in the region.
- ii. KVK prepared a FSN seed kit for addressing the nutrition among the farm families in adopted village.
- iii. The farm families of adopted villages were most actively participated to adopt FSN concept on their farm.

4. KVK Latur

- i. KVK had a well labelled and well organized demonstration plot.
- ii. Demonstration plots were used for the visit of farm women and extension functionaries towards creating interest on adopting nutri-rich crops and varieties.

D. FSN activities conducted in Vidharbha region

a. Highlights of the FSN activities in Vidharbha Region

1. KVK Chandrapur

- i. Demonstration plot of KVK was well organized and well labelled which consisted of most of the nutri-rich crops, as rice is the major crop of this region.
- ii. KVK used demonstration plots for the visit of school children and other visitors.

2. KVK Akola

- i. Nutrition model developed at the crete
- ii. This region is known for cultivation of cotton and soybean despite that KVK Akola grown various nutri-rich crops at KVK demo plot and also at village level.
- iii. There was also a cultivation of biofortified sorghum variety Parbhani Shakti with significantly higher iron and zinc content than the regular sorghum and biofortified Bajra variety Dhanshakti with significantly higher zinc.

3. KVK Amravati-II

- i. Demonstration plots of KVK was well organized and well labelled.
- ii. Various nutri rich crop varieties taken on KVK demo plot i.e. Sorghum variety PVK 1200 developed by VNMKV, Parbhani.
- iii. Villages covered under the project were motivated to adopt FSN approach



4. KVK Amravati-I

- i. KVK conducted a training for soybean seeds processing for preparation of soyapaneer and soyanut for improving the nutritional status of women and children of adopted village.
- ii. KVK also arranged training for tribal women on mushroom cultivation which have high nutritive value.

Review Workshop of the FSN activities at KVK level and Village level at MCAER, Pune

Review Workshop of the FSN activities was organized at MCAER, Pune on 13 December 2019 in presence of Dr. Kailash Mote DG, MCAER, Ms Rajlaxmi Nair, Nutrition Specialist, UNICEF, Maharashtra, Dr. K M Nagargoje, State Consultant, UNICEF, Mumbai, Dr. Lakhan Singh, Director, ICAR-ATARI, Pune, Dr. H. Kausadikar, Director, Edu., MCAER, Pune, Dr. R. Gopinath, Principal Scientist, MSSRF, Chennai, and Dr. V.S. Shirke (Principal Investigator, FSN Project), MCAER, Pune.



Technical session of the review workshop on the FSN activities



Welcoming of Ms. Rajlaxmi Nair, Nutrition Specialist, UNICEF, Maharashtra

Outcome and Reflections

- NARI (Nutri Sensitive Agricultural Resources and Innovations) program has positive impact on beneficiaries and nutrition-related outcomes.
- There is a visible change in food consumption pattern as the families included variety of vegetables in their daily diet. In most of families the average per capita consumption of vegetables is increased by 59.6% to 75%. One impact study was conducted in Aurangabad district of nutri sensitive agriculture with 30 rural households on an area of 0.20 ha each at village Lakhegaon and revealed that 518.1 gm food stuff (cereals, pulses, vegetables) available per capita per day against RDA recommendation 625 gm (75.16%).
- KVKs incorporate evidence-based recommendations in new or modified designs for nutrition sensitive agriculture. District and region specific Farming System for Nutrition and nutrition garden models were established for faster adoption.
- Success stories/ cases developed and utilized such progressive and innovative farmers as resource persons in the area for supporting field extension system found very effective.
- So many examples were observed where farm families increase their Hb level by 1 to 2 g/dl.
- Some examples were seen where farmers earned money through marketing of excess vegetables. One farm woman from Kalwadi village of Pune district developed nutrition garden of 20R and sold vegetables of Rs 1.10 lakh in three months during lockdown with net profit of Rs 70,000 and one farmer from Aurangabad district earned Rs 94210 from surplus vegetables, food grain and pulses after keeping for family consumption. Marketing was done through direct farmers to consumers in a group.
- Average per capita vegetable availability increased from 173 gm/day to 280 gm/day after initiating nutrition garden concept in selected families.
- Beneficiaries saved monthly expenditure of Rs 1000 to 2000 as no need to buy vegetables from market as well as sold extra vegetables in market and some distributed to neighbours freely.
- This project helped to improve the nutrition status of pregnant and lactating women and also helped in recovering anemic conditions of farm women, rural adolescent girls and pre-school children.



- Imparts cultivation of indigenous local vegetables like red amaranthus, green amaranthus, *colocasia* and also promoted organic cultivation of vegetables for home purpose.
- Household food security was obtained through nutrition garden. Increased awareness among people regarding importance of fruits and vegetables. Women were found to be more interested in adoption of the nutrition garden models.

Reflections

1. Nutrition has emerged as contemporary area of investment and research criteria affecting every section of population.
2. Various nutrition garden models have been developed under NARI and UNICEF funded project through KVKs for nutritional security of farm families.
3. Integration of nutri-rich crops/minor millets is needed in existing cropping systems.
4. At KVK level various nutritional garden models have been developed according to agro ecological situation and available land area.
5. Different types of kits having seeds/saplings of fruits were provided to the villagers, promoted them to establish nutrition gardens.
6. Several extension activities were organised like quiz competition, nutri-thali competition, exhibitions, awareness campaigns for educating farm women, school children, anganwadi workers and other village people.
7. Special attention was given on raising biofortified crops and varieties for having nutri-rich foods.
8. In urban areas the role of terrace garden and a small kitchen garden has gained popularity and importance.
9. There is also a need to establish organic nutrition garden to avoid any type of chemical residue for family in food. Organic input should also be provided at village level.
10. Capacity building of villagers farm women and anganwadi worker was done through KVKs showed positive impact.
11. Farmers should be educated about the development of Seed Bank at villages level.
12. Various efforts at national, state and district level have been taken to prioritise the core sector of nutritional farming especially in villages.

Major Schemes/National Policies

National Schemes	Year	Major Aims /Objectives
National Food Security Act (2013)	5 July 2013	<p>To provide for food and nutritional security by guaranteeing access to adequate quantity of quality food at affordable prices for people to live a life with dignity.</p> <p>The NFSA gives special attention to the nutritional support offered to women and children. Every pregnant and lactating woman is entitled to a meal at free of cost through the local Anganwadi. This will apply to women during pregnancy and will last up until 6 months after childbirth. Additionally, the Central Government has prescribed to offer Rs 6,000 and more as maternity benefits through installments to such women.</p> <p>The NFSA also ensures that every child up to the age of 14 years is covered under the Act. The following are prescribed by the NFSA to fulfill the nutritional needs of a child:</p> <ul style="list-style-type: none"> · Children of ages between 6 months to 6 years are entitled to receive age-appropriate meals from their local Anganwadi. · Children between 6 years to 14 years of age are entitled to receive one mid-day meal from the Government or Government schools.
Integrated Child Development Service	2 October, 1975	<p>To improve the nutritional and health status of children in the age-group 0-6 years;</p> <p>To lay the foundation for proper psychological, physical and social development of the child;</p> <p>To reduce the incidence of mortality, morbidity, malnutrition and school dropout;</p> <p>To achieve effective co-ordination of policy and implementation amongst the various departments to promote child development; and</p> <p>To enhance the capability of the mother to look after the normal health and nutritional needs of the child through proper nutrition and health education.</p>



National Schemes	Year	Major Aims /Objectives
Antodaya Anna Yojana (AAY)	December, 2000	AAY involved identification of one crore poorest of the poor families from BPL families covered under Targetted Public Distribution System within the States and providing them food grains at a highly subsidized rate of Rs 2 per kg for wheat and Rs 3 per kg for rice. The States/UTs were required to bear the distribution cost including margin to dealers and retailers as well as the transportation cost. Thus the entire food subsidy was passed on to the consumers under the scheme.
Public Distribution System	2015	<p>To protect the low income groups by guaranteeing the supply of certain minimum quantities of food grains at affordable price.</p> <ul style="list-style-type: none">▪ It helps in ensuring food and nutritional security of the nation.▪ It has helped in stabilising food prices and making food available to the poor at affordable prices.▪ It maintains the buffer stock of food grains in the warehouse so that flow of food remain active even during the period of less agricultural food production.▪ It has helped in redistribution of grains by supplying food from surplus regions of the country to deficient regions.▪ The system of minimum support price and procurement has contributed to the increase in food grain production.
Mid-day Meal Scheme	28 November 2001	<p>To serve freshly-cooked lunch to children in government and government-aided schools in India.</p> <p>Mid-day meal (MDM) is a wholesome freshly-cooked lunch served to children in government and government-aided schools in India. On 28 November 2001, the Supreme Court of India passed a mandate stating, <i>"We direct the State Governments/ Union Territories to implement the Mid Day Meal Scheme by providing every child in every Government and Government assisted Primary School with a prepared mid day meal."</i></p> <p>Mid-Day Meal Scheme aims to:</p> <ul style="list-style-type: none">· avoid classroom hunger· increase school enrollment· increase school attendance· improve socialisation among castes· address malnutrition· empower women through employment

National Schemes	Year	Major Aims /Objectives
National Nutrition Mission (NNM)	2017-18	The goals of NNM are to achieve improvement in nutritional status of children from 0-6 years, adolescent girls, pregnant women and lactating mothers in a time bound manner during the next three years beginning 2017-18. The NNM is a comprehensive approach towards raising nutrition level in the country on a war footing. It will comprise mapping of various schemes contributing towards addressing malnutrition, including a very robust convergence mechanism, ICT based Real Time Monitoring system, incentivizing States/UTs for meeting the targets, incentivizing Anganwadi Workers (AWWs) for using IT based tools, eliminating registers used by AWWs, introducing measurement of height of children at the Anganwadi Centres (AWCs), Social Audits, setting-up Nutrition Resource Centres, involving masses through Jan Andolan for their participation on nutrition through various activities among others.
National Nutrition Policy (NNP)	1993	The National Nutrition Policy (NNP) identified key action in various areas having impact on nutrition such as agriculture, food production, food supply, education, information, health care, social justice, tribal welfare, urban development, rural development, labour, women and child development, people with special needs, monitoring and surveillance.
National Mission for Empowerment of Women (NMEW)	13 October 2020	National Mission for Empowerment of Women (NMEW) aims to achieve the holistic empowerment of women through convergence of schemes/programmes of different Ministries/ Department of Government of India as well as State Governments. Under the National Mission for Empowerment of Women scheme, technical support is being provided by domain experts to the Ministry of Women and Child Development.
Pradhan Mantri Maatritva Vandana Yojana (PMMVY)	2017	The objective of the Pradhan Mantri Maatritva Vandana Yojana (PMMVY) is to give partial compensation to pregnant women and lactating mothers who were working and had to experience a wage-loss due to the pregnancy. The period of pregnancy requires a woman to take additional nutrition to sustain the pregnancy and deliver a healthy child. The cash incentive provided with the help of three installments can be used to meet at least the daily requirement of nourishment solely for the use of pregnant women. Under PMMVY, a cash incentive of Rs 5000 would be provided directly in the account of Pregnant Women and Lactating Mothers, (PW&LM) for first living child of the family subject to their fulfilling specific conditions relating to Maternal and Child Health. Helpline No. for the Scheme: 011-23382393



National Schemes	Year	Major Aims /Objectives
eSamvad Portal	January 2018	<p>eSamvad is an initiative of the Ministry of Women and Child Development to provide a platform for NGOs and civil society to interact with the Ministry on relevant subjects.</p> <p>Through e-Samvad Portal, NGOs and civil society can provide their feedback, suggestions, put up grievances, share best practices etc. Senior Officers within MWCD will be able to view the inputs/suggestions received for their concerned subject areas and appropriately respond to NGOs. This will help in formulation of effective policies and measures for welfare of women and children.</p>

