RKVY- Success Story

1. **Title of the story:** Improving household dietary diversity through Nutrition Gardens in Koraput district under the project **"Strengthening Livelihoods and Enhancing Food and Nutrition Security of Small and Marginal Farmers in Koraput District of Odisha through a Farming System Model.**

2. **Category :** Agriculture/Horticulture
   Project Implementing Agency: M.S. Swaminathan Research Foundation
   Project Period: 2017-2019 (Extended up to-to 3 st March-2022)

3. **Background of the project: (Issues, Challenges, Gaps)**

Food insecurity and malnutrition continue to impose substantial health, economic, and social burden on a large section of people living in developing countries. Lack of resources, religious taboos, limited education and poor socioeconomic conditions are all factors that affect food and nutritional security, particularly at the household (HH) level. Well-fed and food secure households with adequate nutritional status would mean improving what people eat, in terms of quality, quantity, and diversity. This in turn requires efforts related to availability as well as economic access to food supply. In this context, home gardens of fruits and vegetables 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 household members, often on a daily basis. They are generally located in a small area near the residence with high diversity of plants. Home gardens are a time-tested local strategy that are widely adopted and practiced by local communities with limited resources and institutional support. However, depending on the food preference of the household, only one or two species of a particular food group is grown in these gardens. Even though they provide some form of nutrition, optimal utilization of land to grow vegetables that can contribute towards the requirements of a balanced diet as well as address particular nutrition maladies is not considered. The conceptualization of nutrition garden aims to address this. Nutrition gardens are nothing but home gardens of natural and bio-fortified fruits and vegetables of high nutritive value where the species selection is inclusive of the three vegetable groups' *viz.*, green leafy vegetables, roots and tubers and other vegetables with specific attention to addressing micronutrient (vitamins and minerals) deficiencies, particularly iron and vitamin A. Further in 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. Creating awareness on importance of consuming vegetables to address micronutrient deficiencies, accompanied with creating awareness on WASH practices and attention to the health of women and children in particular, is an integral component.

This success story attempts to document the impact of household nutrition garden production on

food and nutrition security of rural households.

4. Pre-Implementation Issues:

The baseline survey revealed high level of under nutrition and micronutrient deficiency. More than 40 per cent of children under age five were underweight (low weight for age), 35 per cent stunted (low height for age) and 27 per cent wasted (low weight for height); about 33 per cent suffered from vitamin A deficiency. 39 per cent adult men and 47 per cent women were undernourished; high levels of anaemia (>60%) prevails among children under five, adolescent girls and women (18- 45 years). The diet of people was largely cereal dominated with consumption of all other food groups being less than the recommended level (Table 1). The average daily consumption of all groups of vegetables and fruits of 75 per cent and more households (except in the case of roots and tubers which is at 55%) was well below the recommendeddaily intake (RDI) by the Indian Council of Medical Research (ICMR).

Table 1. Average consumption of vegetables and fruits by household (g CU/day)

Food Groups	Average consumption (g/CU/day)	% of HHs consuming <50% of RDI	*RDI
Green Leafy Vegetables	16	89	100
Root and Tubers	103	55	200
Other Vegetables	68	75	200
Fruits	2	99	100

*Recommended Daily Intake (Source: Baseline Survey 2018-19)

5. RKVY Initiative (feedback from stakeholders activity knowledge changing the practice, policy, investment through amount spent, year of intervention)

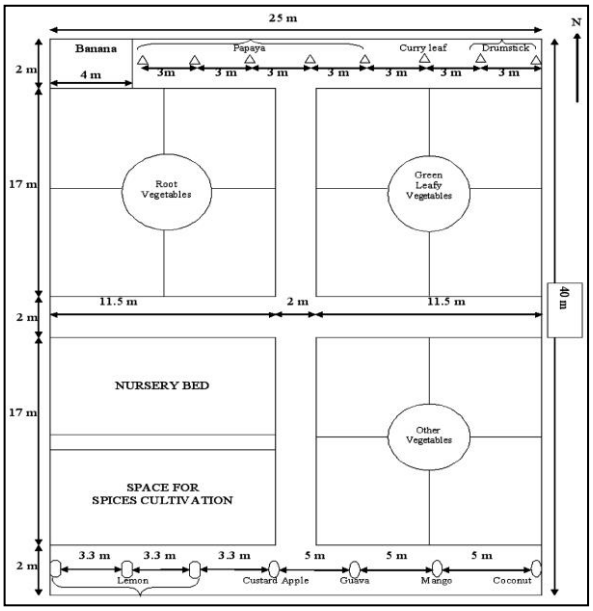
Promotion of household nutrition garden is one of the core interventions of the project "Strengthening Livelihoods and Enhancing Food and Nutrition Security of Small and Marginal Farmers in Koraput District of Odisha through a Farming System Model" implemented in Koraput, Odisha. Based on the baseline survey assessment, discussions with community members and expert advice from scientists, the introduction of nutrition gardens in interested households was started in 2018-19. A seasonal calendar of locally available vegetables was prepared and seed kits comprising seeds of location specific seasonal vegetables from all the three vegetable groups *viz.,* green leafy vegetables, roots and tubers and other vegetables along with seeds of some spices and pulses were prepared and distributed to households with backyard

area. Saplings of naturally fortified fruits and tree species (e.g. moringa, lemon, amla, papaya, guava, custard apple and banana) were also given to 1433 families during the three year. Promotion of different groups of vegetables was emphasized for their nutritional importance. Green leafy vegetables are rich in vitamins and minerals, are easy to grow and can be grown almost throughout the year. Other vegetables like beans, tomatoes and okra are rich sources of vitamin C and minerals. Beans are also rich in proteins. Papaya and ripe pumpkin are rich in carotene (pro-vitamin A) and vitamin C and guava in vitamin C. Orange flesh sweet potato (OFSP) was introduced and promoted in order to address Vitamin A deficiency in children.

6. Technology/Tools development

A balance diet calendar with pictures of all food groups and related nutrition messages was prepared and distributed to all households. Exposure visits, training on specific topics to selected groups like pregnant and lactating and adolescent girls on dietary requirements, exhibition on pulses and food groups, and cooking demonstrations showing preparation of recipes incorporating vegetables like moringa, coriander leaves, Indian spinach (poi), etc, and on hygiene and sanitation were conducted on regular basis.

Balance diet calendar for Nutrition Awareness



Lay out the Nutrition Garden

Farmers were trained on management of nutrition garden with the above mentioned garden design. Farmers were also supported with **agro-shade net** for fencing and **water can** for life saving irrigation. They were trained to practice Non-Pesticide Management by applying two eco-friendly formulations, viz: *Handikhata* (Pot Manure) and *Jibamrita* (Miracle Microbial Culture) for soil and plant health, to grow chemical free vegetables in the nutrition garden. By using

these effective and low-cost formulations, farmers can keep their crops free from pest attack and disease.

7. Outcomes/Impacts of the project.

Promotion of nutrition gardens has increased availability of and access to different groups of vegetables; most of which are being consumed by the households. Over a short period, significant increase in the quantity and frequency of consumption of fruits and vegetables and huge demand generation from households suggests a positive trend as well as well acceptance of the approach in the project area.

i. Diversity in nutrition gardens

Baseline survey reported that, less than 50 per cent of HHs practiced traditional home gardening with limited cultivation of broad bean, tomato, pumpkin, onion, amaranthus, spine, ridge and ivy gourd and brinjal. Growing of cabbage, cauliflower, field bean, bitter gourd, green chillies were done primarily for commercial purpose by few households. Majority of HHs were growing only two (32%) or one (25%) vegetable in their home gardens. However, promotion of nutrition garden coupled with nutrition awareness programmes had a positive impact on the diversity of vegetables cultivated by the HHs (Table 2). Majority of HHs (79%) were having four or more types and a mix of vegetables in 2020-21 as against 21% during baseline (2018-19)

Table 2. Comparison of number of vegetables grown in nutrition gardens during baseline and midline

Number of vegetables grown in home gardens	**Percentage of households (N=315)**	
	Baseline	**Midline**
One	25	7
Two	32	7
Three	22	7
Four or more	21	79

During the study period (2018-21), forty three varieties of plants were found in the nutrition gardens of (Table 3). Of these 17 were other vegetables, 8 were root and tuber varieties, 6 were green leafy vegetables, and 8 were fruit/tree

Table 3. Diversity of crops available across seasons in nutrition gardens in Koraput (2018-21)

Groups	**Details**		
Fruit/tree species	Moringa, papaya, lemon, amla, mango, banana, guava, pomegranate		
***Seasonal vegetables**	Rainy	Winter	Summer
Leafy vegetables	Amaranthus , Indian spinach, coriander,	Amaranthus, Indian spinach, coriander,	Amaranthus, Indian spinach, coriander, spinach, leaves of

	spinach, leaves of pumpkin, barada, moringa	spinach, leaves of pumpkin, barada, moringa, leaves of cauliflower	pumpkin, leaves of cauliflower
Roots and tubers	Orange flesh sweet potato (OFSP), yam, tapioca, radish	OFSP, colocasia, onion, yam, radish, carrot	Colocasia, onion, yam, potato, radish, carrot
Other vegetables	Ridge gourd, pumpkin, snake gourd, cow pea, lady's finger, tomato , dolichos bean, french bean, cucumber, bitter gourd, spine gourd, ivy gourd, pointed gourd, brinjal	Ridge gourd, pumpkin, snake gourd, cow pea, lady's finger, tomato, dolichos bean, french bean, cucumber, cluster bean, bitter gourd, spine gourd, ivy gourd, cauliflower, cabbage, spring onion, brinjal	Ridge gourd, pumpkin, cow pea, lady's finger, tomato, dolichos bean, french bean, cluster bean, bitter gourd, spine gourd, ivy gourd, brinjal
Spices	Chilli	Chilli	Chilli,
Pulses	Pea, pigeon pea	Pea, pigeon pea	Pea

*Seasons: Rainy (June-September); Winter (October-February); Summer (March-June).Indian spinach: poi in Odia

ii) Impact of nutrition garden on household food consumption and frequency

Baseline (2018-19) monthly per capita consumption (grams (g) per person per month) of fruits and vegetables as well as their frequency (percentage of households) was compared to that of 2020-21 to see if there was any change after two years of promotion of nutrition garden in the study area (Tables 4 & 5). As frequency of all the items consumed under the food groups was different, it was decided to derive the monthly consumption and appropriate conversions were done for each household (n= 315). The monthly quantity consumed for each household was then divided by number of respective HH members and an average was taken to get the monthly per capita consumption (g per person per month). Comparison of data during start and mid of the study showed a significant improvement in the consumption quantity of fruits and vegetables ($P < 0.001$). The monthly per capita consumption of green leafy vegetables, other vegetables, roots and tubers and fruits increased from 1554g to 3352g, 3078g to 6568g, 2459g to 2900g, and 2299g to 3334g, respectively.

There was paradigm shift of household food frequency under green leafy vegetables and other vegetables from once in a week in 2018-19 to daily or twice/thrice in a week in 2020-21. Households consuming green leafy vegetables daily and twice/thrice a week increased from 0

to 4% and 17% to 46% respectively. Items under other vegetables were consumed by 50% (daily) and 48% (twice/thrice a week) of the HHs during 2020-21 as against 6% and 76% in 2013-14, respectively (Table 5).Increased availability and greater understanding of nutrition awareness programmes among the HHs might have contributed towards all these positive shifts in the food frequency pattern

Table 4. Comparison of monthly per capita consumption of fruits and vegetables (g per person per month)

Food groups	Food consumption (g per person per month)	
	(N=315)	
	2018-19	2020-21
Green leafy vegetables	1554	3352
Other vegetables	3078	6568
Roots and tubers	2459	2900
Fruits	2299	3334

Table 5. Comparison of frequency of consumption of various food groups (Percentage of households)

Food groups	**Study period**	**Daily**	**Twice/ Thrice**	**once a week**	**Fortnight**	**Once a month**	**Occasionally**	**Never**
Green leafy vegetables	2018-19	0.0	16.9	63.0	20.1			
	2020-21	3.7	45.8	37.4	13.1			
Other vegetables	2018-19	6.4	76.2	16.4	1.0			
	2020-21	49.5	47.9	1.6	1.0			
Roots and tubers	2018-19	97.4	2.1	0.0	0.5			
	2020-21	82.1	17.9	0.0				
Fruits	2018-19	0.5	27.0	43.9	28.0	0.0	0.0	0.6
	2020-21	4.7	33.7	37.4	8.4	1.1	14.7	0.0

The improved dietary diversity has the potential to help improve nutrition outcomes in the area and other neighbouring areas. It will also help in conserving crop diversity including some indigenous species as well as strengthen family relationships through sharing of nutrition garden produce with neighbours and relatives. It was evident from the study that provision of seeds and technical advice and nutrition awareness increased the production and consumption of both traditional and non-traditional micronutrient rich vegetables. The combination of horticultural training with nutrition awareness programmes provides knowledge on the importance of food and nutrition, as well as practical guidance on how to grow and prepare nutritious foods. To summarize, nutrition gardens are proving to be a cost effective approach to make micronutrient rich foods accessible to the entire household and contribute to improve the quality of diets. However, for scale up and sustainability, support by way of seed kits and horticultural advice from government extension officers is required.

8. Citation of 3-4 sentences from 4 to 5 beneficiaries that bring a change (Beneficiaries details to be mentioned)

"It was difficult to find vegetables for home consumption earlier and we had to fully depend upon market. The market price is not favour to us because of its high price. We used to consume mixed vegetables once or twice in a week if vegetables have been purchased from weekly market; otherwise we included only tomatoes and rice in our diet. Now after establishing nutrition garden with the support of M.S. Swaminathan Research Foundation we are able to access and intake variety of vegetables in our daily diet."

Kousalya Khillo
Musapadar

"Earlier we usually grown very few vegetable either tomato or brinjal in our home harden. Our family is comprised with 8 members and we used to include only the above two vegetables in our diet. Our financial condition did not permit us to purchase vegetables from market. I am thankful to M.S. Swaminathan Research Foundation for supporting us in establishing nutrition garden. Now, the garden help us to access many vegetables and fruits including okra, brinjal, amaranthus, palak, coriander, spinach, bitter gourd, tomato, radish, ridge gourd, chilly, banana and papaya. After mitigating the household requirement, the surplus vegetables are sold in the market."

Champa Murjia
Similiguda

"In our perception nutrition garden requires more water and our village is lagging it. Henceforth, we had not prioritized nutrition garden as essential. As a result we used to intake very less vegetables than recommendation. In the later stage whenever we had provided with capacity building training on nutrition garden by M.S. Swaminathan Research Foundation, it boost our morale to establish nutrition garden in the backyard area. The vegetable seeds kit, watercan, mud pot for bio-inputs, shade net for fencing being provided by the organization motivated us for continuing the garden throughout the year. The household waste water is being used in my garden. Now from this garden we are getting all kinds of root, leafy and other vegetables in everyday for household consumption and some portion of it share with our relatives too."

Ghase Pangi
Musapadar

"In our backyard patch we used to grow only single crop either tomato or brinjal and these two vegetables were being included in our diet. We are living only two persons me and my husband and we do not a good income source. Hence, we are not affordable to buy vegetables from the market because of its high rate and low quality. We never thought that in a small piece of land many vegetables can be grown. When we got the capacity building training from the organization, at that time we came to know in the same land we can grow varieties of vegetables for round the year and mitigate our household vegetable requirement. In the present scenario the nutrition garden provides us roots, green leafy vegetables and other vegetables in everyday and we procure only spices items from market. We need not to spend extra expenditure towards vegetables and ultimately our money has saved and because of this we are leading a happy life."

Kuni Bagdaria
Ladkaguda

"We are very happy for the support being provided by the project such as vegetable seeds, watercan, shade net along with regular technical guidance and capacity building training. All these have motivated us to establish an ideal nutrition garden in our backyard where we are growing all kinds of vegetables, which earlier was kept fallow. The garden not only provides us different vegetables but also reduces our expenditure on vegetable purchase. We are growing these vegetables organically, expected it will reduce our morbidity."

Pita Majhi
Khadkiaguda

This success story is a part of the project titled: "Strengthening Livelihoods and Enhancing Food and Nutrition Security of Small and Marginal Farmers in Koraput District of Odisha through a Farming System Model in Koraput district of Odisha".

Acknowledgement

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