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Transforming rural nutrition and food security through nutrition gardens: An empirical study

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Abstract

Malnutrition remains a critical issue affecting public health, economic stability, and social development, particularly in low- and middle-income countries. In India, undernutrition persists despite economic growth, with vulnerable groups such as children and pregnant women being the most affected. The present study assesses the impact of the Nutrition Garden Programme (NGP) implemented by Krishi Vigyan Kendras (KVKs) in the Vidarbha region of Maharashtra. A total of 330 beneficiaries who received nutrition garden training were selected using a simple random sampling method. The study evaluates the impact of nutrition gardens on dietary diversity, food consumption patterns, household income, and economic empowerment. Findings reveal a significant increase in vegetable consumption, reduction in expenditure on vegetables, and enhanced household food security. Additionally, nutrition gardens contributed to economic benefits, women's empowerment, and improved health outcomes. The study underscores the potential of nutrition-sensitive agriculture in combating malnutrition and calls for policy interventions to strengthen its sustainability and market linkages.

Keywords: Vidarbha region, malnutrition, nutrition garden programme, dietary diversity, Krishi Vigyan Kendra

Introduction

Malnutrition is a major global issue affecting health, economic stability, and social development, especially in low- and middle-income countries. It includes undernutrition, micronutrient deficiencies, and obesity, impacting children and women the most. Malnutrition in children leads to stunted growth, poor cognitive development, and higher disease risk**,** while in women, it increases pregnancy complications and affects overall well-being. Despite India's economic growth, undernutrition remains a serious problem, especially among vulnerable groups like children and pregnant women. According to the National Family Health Survey (NFHS-5) 2019-20**,** 35.5% of children under five in India are stunted, 19.3% are wasted, and 32% are underweight. Maharashtra has similarly high malnutrition rates, with anemia affecting 68.9% of children under five and 45.7% of pregnant women. One approach to tackling malnutrition is nutrition-sensitive agriculture, which focuses on increasing access to nutritious foods. Nutrition gardens, promoted by Krishi Vigyan Kendras (KVKs**)**, can help by growing a variety of nutrient-rich crops such as vegetables and fruits. These gardens provide an affordable and sustainable way to improve dietary diversity and combat micronutrient deficiencies**.** Additionally, agriculture plays a key role in food security, and strategies like biofortification, crop diversification, and improved farming techniques can enhance nutritional value. Nutrition-sensitive agriculture also supports gender equality, increases household income, and promotes nutrition education. To effectively address malnutrition, a multi-sectoral approach is needed, integrating agriculture, health, education, and social welfare. Nutrition gardens are home-based gardens that focus on growing vegetables rich in micronutrients (iron, vitamin A, and minerals) to combat malnutrition. They include green leafy vegetables, roots and tubers, and other nutrient-dense vegetables. These gardens are especially crucial in developing countries like India, where pregnant women, lactating mothers, and preschool children suffer from micronutrient deficiencies. These gardens are designed to provide high-nutritive value food by incorporating a diverse selection of vegetables, including green leafy vegetables, roots and tubers, and other nutrient-rich crops. These gardens play a crucial role in addressing micronutrient deficiencies, particularly iron and vitamin A, which are prevalent among vulnerable populations such as pregnant women, lactating mothers, and preschool children in developing countries like India. Additionally, they help in

conserving local vegetable species, reducing household food expenses, and generating income from surplus produce. Apart from economic and nutritional advantages, nutrition gardens also provide significant social benefits, including the empowerment of women, promotion of social justice and equity, and the preservation of indigenous knowledge and culture.

Krishi Vigyan Kendras (KVKs) play a crucial role in implementing nutrition garden projects, enhancing nutrition, food security, and livelihoods. These gardens promote dietary diversity by ensuring access to fresh, organic produce, reducing reliance on expensive market vegetables, and mitigating micronutrient deficiencies. They also generate income by allowing families to sell surplus produce, fostering self-sufficiency. KVKs educate communities on sustainable agriculture through training and workshops, instilling ownership and practical skills. This study analyzes the impact of nutrition gardens by assessing beneficiaries' profiles, attitudes, and program effectiveness. Findings will help policymakers and extension agencies improve nutrition-sensitive agricultural programs and health policies.

Objective of the study

To study the impact of the nutrition garden programme on the beneficiaries

Methodology

The study was conducted in the Vidarbha region of Maharashtra, which hosts 14 Krishi Vigyan Kendras (KVKs) focused on agricultural knowledge dissemination and sustainable farming. A purposive sampling technique was used to select three KVKs—Risod, Washim; Selsura, Wardha; and Jalgaon Jamod, Buldana—actively conducting nutrition garden training since 2016. Participants who maintained their nutrition gardens post-training were identified, and a simple random sampling method was used to select 110 beneficiaries from each KVK, resulting in a total sample size of 330. Data collection was carried out through structured interviews. The study assessed the program's impact on beneficiaries using six key parameters: changes in food consumption frequency, vegetable expenditure, diversity in crop cultivation, income from nutrition gardens, household recreational opportunities, and medicinal expenditure.

Results and Discussion

The findings of this study and their corresponding discussion are presented here. The data collected for the research have been categorized, tabulated, and analyzed in Table 1 based on the study's objectives. The results and their interpretations are organized under the following sections.

1. Profile of nutrition garden programme beneficiaries

Table 1: Profile of nutrition garden programme beneficiaries

Sr. No	Category	Respondents	
1	**Age**	**Frequency**	**Percent**
	Young (Up to 35 years)	139	42.13
	Middle (36 – 50 years)	164	49.69
	Old (Above 50 years)	27	08.18
	Total	330	100
2	**Education**		
	Illiterate (Cannot read and write)	09	02.72
	Primary school (1st to 4th)	39	11.82
	Middle school (5th to 7th)	60	18.18
	Secondary school (8th to 10th)	111	33.64
	Higher secondary school / Junior College (11th to 12th)	59	17.88
	Under graduate degree (12+3/ 12+4/ 12+5)	52	15.76
	Post graduate degree (UG+ 2/3)	00	00
	Total	330	100
3	**Occupation**		
	Agriculture + Labour	92	27.87
	Agriculture	152	46.07
	Agriculture + Subsidary occupation (livestock, poultry, goat farming)	54	16.36
	Agriculture + Business (grocery shop, cloth shop, daal mill, flour mill etc.)	17	05.15
	Agriculture + Services (job in govt. or private sector)	15	04.55
	Total	330	100
4	**Annual income**		
	Rs. 40000-192500	44	13.33
	Rs. 192501-345000	174	52.72
	Rs. 345001-497500	75	22.73
	Above Rs. 497500	37	11.22
	Total	330	100
5	**Income from nutrition garden**		
	No income	251	76.06
	Up to Rs. 3498	10	03.03
	Rs.3499-7692	54	16.36
	Above Rs.7692	15	04.55
	Total	330	100

6	**Training received**		
	Up to one training	330	100
	Two trainings	99	30.00
	More than two trainings	15	04.55
7	**Source of irrigation**		
	Grampanchayat pipeline	123	37.27
	Tube Well	153	46.36
	Bore well	54	16.37
	Total	330	100
8	**Experience in nutrition gardening**		
	Up to 3 years	187	56.66
	4 years	84	25.46
	5 years	59	17.88
	Total	330	100
9	**Crops grown in nutrition garden in a season**		
	Up to 11 vegetable crops	49	14.84
	12-13 vegetable crops	239	72.43
	More than 13 vegetable crops	42	12.73
	Total	330	100
10	**Time spent in nutrition garden (per day)**		
	10 to 42.50 minutes	64	19.39
	42.51-75 minutes	139	42.12
	75.10-107.50 minutes	94	28.49
	Above 107.50 minutes	33	10.00
	Total	330	100
11	**Size of nutrition garden (m^2)**		
	25 to 43.75 m^2	83	25.15
	43.76-62.50 m^2	118	35.76
	62.51-81.25 m^2	80	24.24
	Above 81.25 m^2	49	14.85
	Total	330	100

The study revealed that nearly half (49.69%) of the respondents belonged to the middle-aged category, followed by 42.13 per cent in the young age group and 8.18 per cent in the old age category. In terms of education, 33.64 per cent had completed secondary school (8th–10th standard), while a smaller proportion had primary (11.82%) or higher education, with only 2.72 per cent being illiterate. Agriculture was the predominant occupation (46.07%), followed by agriculture combined with labor (27.87%) and subsidiary activities (16.36%). Over half (52.72%) of the respondents had an annual income between ₹1,92,501–3,45,000, while 11.22 per cent earned above ₹4,97,500. The majority (76.06%) used nutrition garden produce for household consumption, with only 16.36 per cent earning a moderate income. All respondents had received at least one training session from KVKs, with 30 per cent attending two and 4.55 per cent attending three or more. Tube well water (46.36%) was the primary irrigation source, followed by grampanchayat pipelines (37.27%) and bore wells (16.37%). More than half (56.66%) of the respondents had up to three years of experience in nutrition gardening, while 72.43 per cent cultivated 12–13 crops. Regarding time allocation, 42.12 per cent spent 42.51–75 minutes daily in their gardens. The majority of gardens (35.76%) measured between 43.76–62.50 m², with 14.85 per cent exceeding 81.25 m². Additionally, 50.91 per cent of respondents scored 8–9 in nutrition knowledge, influenced by their education and training. These findings highlight the significance of nutrition gardens in enhancing food security, dietary diversity, and income generation, emphasizing the role of training and resource accessibility in improving outcomes.

1. Impact of Nutrition garden programme on the beneficiaries

Distribution of the beneficiaries according to the per cent change in the parameters considered for measuring the impact and total impact of nutrition garden programme on the beneficiaries

A preliminary examination of the Table 2 reveals that the mean scores for the frequency of food consumption pattern (68.45), diversity in growing vegetables (12.16), income from nutrition garden (1339.39), and generation of recreational activity to the household members (03.00) are higher than the mean scores of beneficiaries before participating in the nutrition garden program, which were 64.14, 05.19, 765.45, and 02.55 respectively. Conversely, the mean scores for expenditure on vegetables (142.51) and expenditure on medicinal aspects (1090) are lower than the mean scores of beneficiaries prior to participating in the nutrition garden program, which were 1120.30 and 3494.54 respectively.

Table 2: Distribution of the beneficiaries according to the per cent change in the parameters considered for measuring the impact and total impact of nutrition garden programme on the beneficiaries.

Sr. No.	Impact Parameters	Total Mean Score			% Change	'z' value
		Before	After	Difference		
1	Frequency of food consumption pattern	64.14	68.45	04.31	06.71	25.14
2	Expenditure on vegetables (Rs./month)	1120.30	142.51	-977.80 (decrease)	87.27	31.00
3	Diversity in growing vegetables (number of variety of vegetables grown in a year)	05.19	12.16	06.97	134.29	83.16
4	Income from nutrition garden (Rs./year)	765.45	1339.39	573.94	74.98	03.44
5	Generation of recreational activity to the household members	02.55	03.00	0.45	17.64	05.35
6	Expenditure on medicinal aspects (Rs./year)	3494.54	1090	-2405.00 (decrease)	68.80	19.10
	Total (Average)				64.95	

The study revealed changes in several areas, including food consumption frequency (6.71%), expenditure on vegetables (87.27%), vegetable diversity (134.29%), income from the garden (74.98%), employment generation (17.64%), and medicinal expenses (68.80%) after beneficiaries participated in the nutrition garden program. The overall impact of the program was 64.95%, indicating a positive effect across all these areas. To assess the variability in mean scores before and after the programme, a 'z' test was applied. The results showed significant differences ($p<0.01$) in all six parameters: food consumption frequency (25.14), expenditure on vegetables (31.00), vegetable diversity (83.16), income (3.44), employment generation (5.35), and medicinal expenses (19.10). This confirms the significant impact of the nutrition garden programme on beneficiaries.

Impact of NGP on average production of vegetables of farm families

Nutrition garden programme was implemented all-round the year and yield of vegetables which were considered of green leafy vegetables, roots and tubers and other vegetables were obtained in all three seasons. From the present study, the analysis of the data in Table 35 reveals that average production of vegetables of farm families.

Table 4: Average production of vegetables of farm families in a year

Sr. no.	Name of the vegetable	Vegetable production (kgs)	Average number of plants
Green Leafy Vegetables (kgs)			
1	Fenugreek	29.00	
2	Spinach	35.00	
3	Coriander	49.00	
4	Others	21.00	
	Total	134.00	
Roots and Tubers			
5	Onion	34.00	
6	Radish	09.00	
7	Others	08.00	
	Total	51.00	
Other vegetables			
8	Chilli	12.00	15
9	Brinjal	48.00	19
10	Okra	10.00	20
11	Tomato	63.00	21
12	Cluster bean	07.00	12
13	Bittergourd	33.00	06
14	Cow pea	16.00	30
15	Others	79.00	
	Total	265	
	Overall Total (Green leafy vegetables + roots and tubers + other vegetables)	453	

Table 5: Change occurrence due to the implementation of nutrition garden

Particulars	Production (kgs)	Purchase (kgs)	Consumption (kgs)
Before nutrition garden	76.00	404.00	480.00
After nutrition garden	453.00	123.00	576.00
Change	377.00	-281.00	96.00
Per cent change	49.60 (increase)	-65.55 (decrease)	20.00

The nutrition garden was maintained year-round, ensuring a continuous supply of green leafy vegetables, roots and tubers, and other vegetables. Based on the recommended dietary allowance, a family of five requires 540 kg of vegetables annually. The study revealed an average production of 134 kg of leafy vegetables, 51 kg of roots and tubers, and 265 kg of other vegetables per year. The nutrition garden enhances household nutrition by providing diverse vegetables using minimal resources, organic practices, and locally available inputs. The impact

assessment indicated a significant improvement in vegetable availability. Before implementing the nutrition garden, households produced 76 kg, purchased 404 kg, and consumed 480 kg of vegetables annually. Post-implementation, production increased to 453 kg, while purchases dropped to 123 kg, with consumption rising to 576 kg. This reflects a 49.60 per cent increase in production, a 20.00 per cent rise in consumption, and a 65.55 per cent reduction in market dependency, highlighting the garden's role in improving food security and dietary diversity.

Conclusion

The study highlighted the significant impact of the Nutrition Garden Programme (NGP) in enhancing food security, dietary diversity, and economic well-being among beneficiaries in the Vidarbha region of Maharashtra. The findings reveal that nutrition gardens have led to an increase in vegetable consumption frequency, diversity in vegetable cultivation, and household income from gardening. At the same time, there has been a substantial reduction in expenditure on vegetables and medicinal costs, indicating improved health outcomes.

The program has played a crucial role in reducing dependence on market-purchased vegetables by providing households with direct access to fresh, nutrient-rich produce. The support from Krishi Vigyan Kendras (KVKs) has been instrumental in promoting sustainable agricultural practices and encouraging self-sufficiency among farmers. Additionally, the active involvement of women in nutrition gardening has contributed to their economic independence and social empowerment.

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