

## Research Article

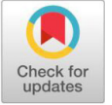
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# Enhancing Farm Family Nutrition: the Influence of Nutri-garden Implementation on Knowledge and Dietary Habits

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## ABSTRACT

Nutritional security must be addressed by ensuring the availability and accessibility of nutrient-rich foods at the household level. Nutri gardens offer a practical solution and play a significant role in providing a nutritious diet at the household level, thereby reducing nutrition insecurity and the burden of malnutrition. This study aimed to promote nutrition security and education among farm families by providing training, Nutri garden kits, and nutrition counseling. Thirty farm families from Rangareddy, Telangana state, were selected for the study. Data was collected using questionnaires and the 24-hour recall method. Nutrient adequacy was analyzed according to NIN (National Institute of Nutrition) standards. Results indicated that the implementation of kitchen gardens has led to substantial benefits for families, including improved food consumption and financial savings. There was a noticeable increase in the consumption of nutritious foods such as green leafy vegetables, fruits, and other vegetables, contributing positively to dietary diversity. Additionally, participants reported saving money by consuming homegrown foods. Furthermore, there was a significant increase in knowledge levels among farm women, suggesting that the adoption of Nutri gardens had a positive and significant impact on enhancing participants' knowledge and awareness regarding nutrition gardening practices. While some of the participants indicated that balancing household responsibilities, agricultural work, and other commitments were the challenges faced by them to dedicate to Nutri garden maintenance. These findings of the study underscore the vital role of Nutri gardens in promoting both nutritional well-being and economic resilience within households.

**Keywords:** Nutri-Gardens, Food consumption patterns, Nutrition security, Food-security, livelihoods, Nutri-sensitive agriculture and economic savings.

## INTRODUCTION

India ranks 111 out of 125 countries in the 2023 Global Hunger Index, with a score of 28.7, indicating a serious level of hunger [3]. According to the National Health Family Survey (NHFS)-5, 2019-21, 35.5 percent of children are stunted, 19.3 percent are wasted, 7.7 percent are severely wasted, and 32.1 percent are underweight. Additionally, 57.0 percent of women aged 15-49 years are anaemic, while 52.2 percent of pregnant women aged 15-49 years are anaemic [6]. The incidence of this situation tends to be higher in rural areas than in urban. Undernutrition/stunting is a consequence of household food insecurity [8]. Improving nutrition is crucial for overall health and well-being. It is well-established that diet plays a significant role in determining the health outcomes of individuals and communities [1]. One effective approach to enhancing farm families' or rural families' nutrition is through the implementation of Nutri-garden interventions [2]. These interventions focus on educating farm families about the importance of a balanced and nutritious diet, as well as providing them with the resources and knowledge to grow their

nutrient-rich foods. A Nutri-garden typically refers to a small-scale garden cultivated to produce a variety of nutrient-rich fruits, vegetables, and herbs. These gardens are often designed for household or community use and prioritize diverse crops that contribute to a balanced diet. Nutri-gardens can be established in various settings, including urban areas, schools, or rural homesteads, providing an accessible source of fresh, healthy produce. They represent the richest source of nutrition and play a major role in eradicating malnutrition. Through the implementation of nutri-garden interventions, farm families can gain knowledge and skills in growing their nutrient-rich foods. This not only improves their dietary habits but also enhances their access to fresh and healthy produce. Enhancing farm-family nutrition is crucial for the health and well-being of these communities. Community and nutrition gardens can play an important role in enhancing national food security and dietary diversity to combat malnutrition. Nutrition gardens enhance dietary diversity by ensuring a consistent supply of fruits and vegetables rich in micronutrients, fulfilling the nutritional needs of the entire family [9]. Farm families face unique challenges when it comes to nutrition, as their livelihoods often revolve around agriculture and farming. However, they may not have access to a diverse range of nutritious foods or the knowledge and resources to make informed dietary choices. Nutri-garden interventions aim to address these challenges by empowering farm families to grow their nutrient-rich foods and providing them with education on the importance of a balanced diet [1].

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These interventions not only improve the nutrition of farm families but also have the potential to enhance their food security and economic stability [2]. By promoting the cultivation of diverse crops in home gardens, Nutri-garden interventions can help farm families have a consistent supply of fresh and nutritious produce. Exploring the influence of nutri-garden interventions on knowledge and dietary habits among farm families is an important area to enhance farm family nutrition.

## METHODOLOGY

Intensive awareness campaigns and field activities were undertaken to focus on the concept of nutri-village/nutria-food/nutria-diet/nutri-thali etc. A total of 30 farm families from Rangareddy district, Hyderabad, Telangana state were selected and a nutria garden kit was distributed to them. The Nutri-garden kit contains different types of vegetables including vegetables, green leafy vegetables, other vegetables, roots,

tubers, and seedlings of different fruits were given to the farm women. Trainings were conducted on the importance, nutritional, economic, and psychological benefits of nutri-gardens to the farm women. Data was collected using a questionnaire and 24-hour recall method. Percentage adequacy of nutrients was analyzed using NIN standards. Analysis of data was carried out using suitable statistical methods

## RESULTS & DISCUSSION

With the implementation of kitchen gardens in their backyards, a noticeable improvement in the family's food consumption levels has been observed. The savings of Rs. 4,000 to 6,000 per household annually indicate that growing their food has reduced expenses on purchasing produce from markets or grocery stores. This represents significant savings, particularly for households with limited disposable income. The money saved could be allocated to other essential needs, thereby enhancing the family's overall financial well-being.

**Table 1. Details of vegetables/greens grown in the Kitchen garden of the respondents**

Name of the crop	Number of plants grown	Duration of crops in months	No. of harvest/cuttings	Duration of crop harvesting in days	The quantity obtained in Kg	Economic value of consumption (Rs.)
Amaranth	30 - 50	2½ - 3	5 - 6	30 - 40	2 - 3	260 - 300
Spinach	30 - 50	2½ - 3	5 - 6	30 - 40	2 - 3½	270 - 310
Fenugreek	60 - 100	2½ - 3	4 - 5	30 - 40	1 - 1.5	140 - 160
Coriander	150 - 200	2 - 3	5 - 6	30 - 60	0.70 - 0.90	150 - 170
Gogu	15 - 20	1 - 1½	5 - 6	30 - 40	1 - 1.5	150 - 165
Beet root	8 - 10	2 - 2½	01	40-60	2 - 3	80 - 100
Radish	8 - 10	1½ - 2	01	40-60	2 - 3	80 - 100
Carrot	10 - 12	3 - 4	01	40-60	2 - 3	120 - 180
Bitter gourd	3 - 4	4 - 4 ½	6 - 8	55 - 60	3 - 4	150 - 200
Bottle gourd	3 - 5	4 - 5	8 - 10	60 - 70	10 - 15	400 - 650
Ridge gourd	5 - 10	3 - 4	6 - 7	45 - 50	3 - 4	200 - 300
Cucumber	5 - 10	3 - 4	8 - 10	60 - 70	10 - 13	400 - 520
Brinjal	5 - 10	5 - 6	7 - 8	100 - 120	12 - 14	300 - 380
Broad bean	5 - 6	4 - 5	5 - 6	65 - 70	5 - 6	250 - 360
Cluster bean	2 - 5	3 - 4	5 - 6	60 - 90	3 - 4	120 - 180
Bobbarlu	2 - 5	3 - 4	4 - 5	45 - 50	2 - 3	120 - 180
Ladies finger	10 - 15	4 - 5	10 - 12	50 - 60	10 - 12	450-600
Tomato	15 - 20	2 - 3	2 - 3	2- 2½	13 - 16	300 - 380
Chillies	10 - 15	5 - 6	3 - 4	65 - 70	5 - 6	280 - 350

**Table 2. Frequency of food consumption patterns of the respondents**

Food groups	Frequency of consumption (n=30)	
	Before growing a kitchen garden	After growing a kitchen garden
Cereals	Daily	Daily
Pulses	1 - 2 times a week	2 - 3 times a week
Millets	Rarely	2 - 3 times in a month
Roots and tubers	0 - 1 time in a week	1 - 2 times in a week
Green leafy vegetables	0 - 1 times in a week	2 - 3 times in a week
Other vegetables	2 - 3 times in a week	3 - 4 times in a week
Seasonal fruits	1 - 2 times in a week	2 - 3 times in the week
Milk and milk products	Daily	Daily
Nuts and oil seeds	0 - 1 time in a week	0 - 1 time in a week
Oil	Daily	Daily
Eggs	1 - 2 times in a week	2 - 3 times in a week
Non vegetarian foods	0 - 1 time in a week	1 - 2 times in a week

It was observed that their staple diet consisted of rice daily, with them consuming it 2 to 3 times daily. The cultivation of vegetables through kitchen gardens improved the intake of green leafy vegetables and other regular vegetables such as ladies' fingers, brinjal, tomatoes, beans, gourds, roots, and tubers, among others. By cultivating their fruits and vegetables, families are becoming more self-sufficient in meeting their dietary needs. This reduces dependency on external food sources, which can be particularly important in areas where access to fresh produce is limited or where food prices are volatile.

**Table 3. Food consumption pattern of the individuals before and after the adoption of nutri-garden**

Food Groups	Percent adequacy Before	Percent adequacy After	Percent Increase
Cereals (330 g)	66.1	69.9	3.8
Pulses (75 g)	66.89	76	9.11
Roots and Tubers (200 g)	54.34	56.08	1.74
Green Leafy vegetables (100 g)	60.64	90.69	30.05
Other vegetables (200 g)	42.09	56	13.91
Milk and Milk products (300 ml)	75.08	81.21	6.13
Fruits (100 g)	32.38	52.83	20.45
Sugars (30 g)	305.7	293.5	-12.2
Fat (25 g)	366	359.8	-6.2

There has been an increase in the consumption of green leafy vegetables by 30.05 percent, fruits by 20.45 percent, other vegetables by 13.91 percent, and pulses by 9.1 percent. Additionally, a reduction in the consumption of sugars by 12.2 percent and fat by 6.2 percent has been observed. By cultivating nutri gardens in their backyards, families have easier access to fresh produce. This likely means they are incorporating more fruits, vegetables, and herbs into their diets. Fresh produce tends to be more nutritious than store-bought alternatives, leading to an overall improvement in the family's food consumption levels. This could translate to better health outcomes and a more balanced diet. It is concluded that the consumption of vegetables increased after the establishment of Nutri gardens, which also enhanced the health and nutrient intake of the family members. A study indicated that there was an increase in consumption after the adoption of nutri gardens by rural women [7].

**Table 4. Average consumption of nutrients and percentage adequacy before and after adoption of Nutri garden**

Nutrients	According to RDA (Heavy worker)	Percentage adequacy		Percent Increase
		Before	After	
Energy	2695 Kcal	73.37	83.9	10.5
Protein	45.65 g	58.05	62.65	4.6
Fat	25 g	115.5	104.5	-11
Fiber	40 g	54.75	63.25	8.5
Iron	26 mg	33.1	38.44	5.34
Calcium	1000 mg	46.12	49.6	3.5
Vitamin C	65 mg	35.4	38.9	3.5

It has been observed that there has been an increase in the consumption of fiber by 8.5%, followed by Fe by 5.34%, Kcal by 10.5%, Protein by 4.6%, and calcium and vitamin C by 3.5%. It was also found that reduction in fat by 11%. The consumption level of vegetables increased and also ensured access to increased economic value and healthy diet at the step after the implementation of the Kitchen garden.

**Table 5. Knowledge gain of the farm - women regarding Nutri-garden**

Statements	Pre	Post	Mean diff	Std. dev	t-test
	mean	mean			
Aware of the nutrition of gardening	1.3000	2.0000	.70000	.46609	8.226**
Nutrition garden requires less place	1.3333	2.0000	.66667	.47946	7.616**
Following any nutrition garden model	1.2333	1.7333	.50000	.50855	5.385**
Aware of the nutrition garden growing tools/kit	1.2333	2.0000	.76667	.43018	9.761**
Awareness of the utilization of kitchen waste/vermicomposting	1.3667	2.0000	.63333	.49013	7.077**
Do you believe that the consumption of home-grown cultivated vegetables is healthy for you and your family	1.2000	1.8000	.60000	.49827	6.595**
Nutrition garden improves a variety of food consumption	1.2000	1.9000	.70000	.53498	7.167**
Nutrition Garden aims to reduce malnutrition	1.1000	1.8333	.73333	.44978	8.930**
Aware of Integrated farming systems	1.1000	1.9000	.80000	.40684	10.770**
Usage of organic fertilizers for nutrition garden	1.1667	1.7667	.60000	.67466	4.871**
Nutrition garden improves economic status	1.3333	1.8000	.46667	.50742	5.037**

The data presented in the table illustrates the pre and postscores mean scores for various statements related to nutrition gardening. The mean difference, standard deviation, and t-test results were also provided to gauge the significance of the changes observed.

### Knowledge and Awareness of Nutrition Gardening

The results showed a significant improvement in participants' knowledge and awareness about nutrition gardening after the intervention. For instance, statements like "aware of the nutrition gardening," "nutrition garden requires less place," and "aware of nutrition garden growing tools/kit" have seen considerable mean differences of 0.7, 0.67, and 0.77 respectively. These differences are statistically significant with t-test values of 8.226\*\*, 7.616\*\*, and 9.761\*\* respectively.

### Adoption and Practice of Nutrition Gardening

The participants' inclination towards adopting nutrition gardening practices also witnessed a positive shift. Statements like "Do you follow any nutrition garden model," "Awareness on the utilization of kitchen waste/vermicomposting," and "Using organic fertilizers for nutrition garden" showed mean differences of 0.5, 0.63, and 0.6 respectively, all of which were statistically significant.

### Perceived Benefits of Nutrition Gardening

Participants' beliefs about the benefits of nutrition gardening were also positively impacted by the intervention. Statements like "Do you believe that consumption of home-grown cultivated vegetables is healthy for you and your family," "Nutrition garden improves the variety of food consumption," and "Nutrition garden aims to reduce malnutrition" displayed mean differences of 0.6, 0.7, and 0.73 respectively, all with significant t-test values.

### Economic and Integrated Approaches

Interestingly, the intervention also led to an improved understanding of the economic and integrated aspects of nutrition gardening. Statements like "nutrition garden improves economic status" and "aware of Integrated farming systems" showed mean differences of 0.47 and 0.8 respectively, both of which were statistically significant.

**Table 6. Significance difference between pre- & post test scores**

	Mean score	Mean diff	Stddev	t value
Pre-test	1.2361	.65833	.24793	14.544**
Post-test	1.8944			

\*\*Significant at 1% level

It has been observed that there was a significant increase in knowledge levels among farm women, as verified by scores in both pre and post-tests. The findings suggest that the intervention had a positive and significant impact on enhancing participants' knowledge, awareness, and adoption of nutrition gardening practices. This improvement can potentially contribute to addressing malnutrition, promoting healthy

eating habits, and enhancing economic status through the cultivation of home-grown vegetables.

Further interventions and educational programs focusing on nutrition gardening could be beneficial in fostering sustainable and healthy food practices among communities. Nutritional Kitchen Garden played a crucial role and consumption of vegetables increased after the implementation of the nutriagarden and also enhanced the health and nutrients of the family members [5].

### CONCLUSION

The implementation of kitchen gardens has yielded significant benefits for families, both in terms of improved food consumption and financial savings. The increased intake of green leafy vegetables, fruits, and a variety of other nutritious foods highlights the positive impact of this intervention on dietary diversity. Moreover, the observed reductions in sugar and fat consumption, alongside increases in fiber, essential nutrients, and vitamins, underscore the overall health benefits of incorporating homegrown produce into daily diets. These findings suggest that nutrition gardening practices not only enhance individuals' knowledge and awareness but also foster positive dietary habits, contributing to improved health outcomes within communities.

### FUTURE SCOPE OF THE STUDY

The success of Nutrition gardens in improving dietary diversity and health outcomes underscores the potential for further expansion and refinement of nutrition gardening practices. Future initiatives should focus on scaling up these interventions to reach more families, particularly in underserved communities, while also integrating innovative approaches such as technology-driven solutions and market linkages. Additionally, efforts should be directed towards promoting the cultivation of indigenous crops, strengthening community empowerment, and advocating for supportive policies to create an enabling environment for sustainable nutrition interventions. By addressing these key areas, it can maximize the impact of nutrition gardening on improving food security, nutrition, and overall well-being within the communities.

### CONFLICT OF INTEREST

All the authors declare that they have no conflicts of interest.

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