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Nutri Garden: Approach to Enhance Food and Nutritional Security of Farm Families

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Abstract

A nutrition garden is perceived as space around the house where one can grow different herbs, vegetables and fruits for daily household use, thereby making the family self-reliant and assuring availability, accessibility and stable supply of sufficient, safe and nutritious food for their utilization. The present study was conducted in the five KVK jurisdiction areas of Northern Karnataka where nutri garden intervention was demonstrated at farmers field in adopted villages. Ten households and minimum 30 family members from each selected adopted village were taken randomly to make 50 sample households with 260 members. Results revealed that on an average each household was producing 135-200 kg vegetables during summer season out of which 90 to 160 kg was utilized for home consumption and rest 30-45 kg was sold. Also, each household was producing 213-243 kg vegetables during *kharif* season out of which 166 to 189.5 kg was utilized for home consumption and rest 46-76 kg was sold and during *rabi* season each household was producing 117-132 kg vegetables out of which 90 to 102 kg was utilized for home consumption and rest 22-41.5 kg was sold. The mean food expenditure decreased from Rs.3789.6/month/family to Rs.1484.6/month/family after the intervention. The mean health expenditure decreased from Rs.1263.2/month/family to Rs.536/month/family after the intervention. The total quantity of food consumed increased from 24.86 cups/day/family to 32.88 cups/day/family after the nutri garden intervention. The total expenditure decreased from Rs.22936/year/family to Rs.20638/year/family after the nutri garden intervention.

Keywords : Nutri garden, Farm families, Crops, Consumption pattern, Northern Karnataka

The entire world is witnessing a transition in food habits and consumption patterns. The food consumption trend exhibits a higher preference for processed and packaged foods, sweetened and carbonated beverages and foods having higher salt, sugar and fat. Thus, the current food consumption pattern is more inclined towards consuming energy-dense foods lacking in nutrient density and dietary diversity. This imposes an additional burden on the existing burden of malnutrition and micronutrient deficiencies/hidden hunger; along with attracting lifestyle disorders. Further, snacking and munching on empty-calorie foods, ready-to-eat processed snacks, canned snacks and convenience foods in between meals also elevate this burden. (Almoraie *et al.,*2021).

The intake of whole grains and cereals is decreasing while the intake of refined flours is increasing (Sukanya *et al.,* 2023). On one side the consumption of energy-dense foods is rising, but that of nutrient-dense foods like vegetables and fruits is still way below the recommended dietary allowances (RDA) (Geetha and Manjunatha, 2009). According to WHO, excluding starchy vegetables, the consumption of vegetables and fruits per day should be at least five portions; however, the average consumption is less

than three to four servings (Pem and Jeewon, 2015). For Indians according to 'My Plate for the day' suggested by the ICMR-National Institute of Nutrition (for meeting the 2000 Kcal diet), the consumption of vegetables (350g) and fruits (150g) should be 500 g/ day; but the consumption is significantly lower than the RDA. The reduced consumption of green leafy vegetables, fruits, indigenous fruits and vegetables can also be associated with decreased dietary diversity.

Dietary diversity measures the total number of food groups that are consumed by the individuals and the household in the given duration. For a household, dietary diversity indicates household accessibility for diverse food groups and for individuals, it indicates nutrient adequacy. Higher the diversity, the better is the food security of the individual and household. Food security is based on four major dimensions, 'availability, accessibility, utilization and stability' of foods. Along with food security, nutrition security is important for an individual to lead a healthy life. Nutrition security is defined as 'a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.' Thus, both food and nutritional security are important for leading an active and healthy life. Growing and maintaining a kitchen garden or nutrition garden is regarded as a step taking us closer to achieving the goal of food and nutritional security by promoting the cultivation of green leafy vegetables, fruits, microgreens, vegetables, traditional crops and many more crops in the backyard.

A nutrition garden is perceived as space around the house where one can grow different herbs, vegetables and fruits for daily household use, thereby making the family self-reliant and assuring availability, accessibility and stable supply of sufficient, safe and nutritious food for their utilization. It can assist in managing and reducing the incidence of malnutrition; assuring the availability of safe, nutritious and quality food; ensuring and promoting dietary diversity; dealing with micronutrient deficiencies; enhancing the involvement of members of the family in nutrition-related activities; providing additional income; managing the waste of the house and reduce the investments; keeping their environment clean and maintain sanitation by managing the household wet waste and wastewater generated from households can be recycled. Nutri garden is advanced form of kitchen garden in which fruits and vegetables are grown as a source of food and income. For small and marginal farmers, nutri gardens can contribute towards diversified family diet and provide several other benefits, particularly for women (Mamgai *et al.,* 2021). A nutri garden if planned and executed suitably and scientifically has a great economic and nutritional leverage in the life of every member of each household. A nutri garden can very effectively utilize available unutilized imputed inputs, resources including human labour and is a very easy and ideal platform for good recreation and physical exercise and thereby help greatly in obtaining sound health with a peaceful mind. Hence, nutri gardens are a simple but innovative option to bridge the gap between the available resources and its utilization in a sustainable manner. A well laid out nutri garden helps to meet the entire requirements of fruits and vegetables for a family for the entire year. It is a low cost sustainable approach for reducing malnutrition and achieving food, nutrition and economic security.

Different initiatives are taken across India to promote nutrition gardening. Nutrition gardening is promoted across the country *via.,* National Rural Livelihood Mission (NRLM) for alleviating malnutrition. Under the MGNREGS, Government of India has laid out guidelines to promote 'nutrition gardens' for enhancing the dietary diversity and income of the family. Similarly, Krishi Vigyan Kendras are promoting nutri gardens through frontline demonstrations at farmers field. Considering this, efforts have been made to study the outcome of nutri garden demonstrations at farmers field through Krishi Vigyan Kendras.

Material and Methods

The present study was conducted in North Karnataka purposively. North Karnataka has 16 Krishi Vigyan Kendras (KVKs), out of which one third KVKs (five)

i.e., Vijayapura I (V I), Gadag (G), Bidar (B), Belagavi I (B I) and Belagavi II (B II) were selected randomly in first stage. These KVKs had demonstrated nutri gardens for two years at farmers field in their adopted villages. From each adopted village, ten households were selected randomly in second stage. Minimum 30 family members from 10 randomly selected households from each selected adopted village, were taken randomly in third stage. Thus, total 50 sample households from five KVK jurisdiction areas were randomly selected accounting to 260 members altogether.

The nutri gardens were demonstrated in the farmers' fields with the area ranging from 80 to 120 sq. ft. based on their size of the family. It included all the three groups of vegetables (green leafy vegetables, roots and tubers and other vegetables) in all the three seasons (Summer, *kharif* and *rabi*). The nutri gardens were scientifically formulated layouts from nutrition point of view to get a day's wholesome nutrition to the whole family and to cut down the cost of purchase and also utilization of the savings from the nutri gardens cultivations for day to day needs (foods, health, education and others).

An overall socio-economic profile of the farm families, production, consumption and sale of vegetables under nutri garden, utilization of savings from nutri garden and impact of nutri garden on food consumption pattern were documented by using well structured interview schedule. The 24 hours dietary recall method was used to know the food consumption pattern of the farm families before and after the nutri garden intervention which included all the food groups cereals, pulses, milk and its products, fruits, vegetables, meat and its products, sugars, oils and fats. The timely nutrition education was provided for the farm families on ideal consumption of foods, health and hygiene, portion control on foods, effects of processed foods on health (Gopalan *et al.,* 2002). The suitable statistical tools like frequency, percentage, mean values, standard deviation, paired t-test, Chi square and ANOVA, F-test were used to analyze the data.

Results and Discussion

Keeping in view the objectives of the study, the results of different aspects of nutri garden interventions are discussed under the following heads:

Socio Economic Characteristics of the Farm Families

Data on age, education, family income, experience in nutri garden and purpose were collected and the percentage distribution was calculated and is given in Table 1. Majority of members of households belonged to 0-19 years age group followed by 60 and above years age group and illiterate followed by

Table 1

Socio economic characteristics of the farm families

Parameter	Frequency	%	Chi square (χ^2)
Age in years (n=260)			
0-19	86	33.07	NS
20-39	47	18.07	
40-59	58	22.30	
60 and above	69	26.53	
Education (n=260)			
Illiterate	84	32.30	NS
Primary	76	29.23	
Middle and secondary	48	18.46	
PUC and graduation	41	15.76	
Family income in Rs./annum (n=50)			
11,000-50,000	26	52	*
51,000-90,000	7	14	
91,000 and above	17	34	
Experience in nutri garden (n=50)			
More than 3 years	21	42	**
Less than 3 years	29	58	
Purpose (n=50)			
Financial benefits	20	40	*
Family health	25	50	
Social/ recreational	5	10	

** Significant at 1%, *Significance at 5%, NS: non-significant

primary education. The distribution of respondents across different age groups indicates a diverse group of participants. The prevalence of respondents with primary education or illiteracy suggests that nutri garden practices are accessible and applicable to individuals with varying educational backgrounds. Family income of majority households ranged from Rs.11000-50000/year followed by Rs.91000 and above per year. Also, majority households were putting nutri garden for family health followed by financial benefits and were having less than three years' experience in it. Chi-square test for the association between different parameter categories revealed that they were significantly ($p<0.05$ & 0.01) associated within parameter categories such as family income, experience in nutri garden and purpose of nutri garden. The non-significant association implied that nutri garden engagement was not significantly influenced by age in this sample. The significant association with the purpose of engagement suggested that motivations for practicing nutri gardening varied among respondents. This could be valuable information for tailoring interventions or educational programs related to nutri gardening. Kumar *et al.,* 1994 had enumerated the similar results revealing the demographic characteristics of farm families in few districts of Kerala state.

Production, Consumption and Sale of Vegetables under Nutri Garden during Summer Season

Data on production, consumption and sale of vegetables under nutri garden during summer season is given in Table 2 and Fig. 1. Notable variations existed in the quantities produced, consumed and sold for each vegetable across KVK jurisdiction areas. On an average each household was producing 135-200 kg vegetables during summer season out of which 90 to 160 kg was utilized for home consumption and rest 30-45 kg was sold. Amaranth and ridge guard showed relatively high production and consumption across all KVK jurisdiction areas. Fenugreek leaves and spinach also exhibited substantial production and consumption in certain KVK jurisdiction areas. Variability in quantities sold was evident, with differences in market preferences or local demands. Significant variations were observed in chilli and brinjal sales across all KVK jurisdiction areas. F values indicated high significant differences in mean values for all vegetables. This suggested that there were notable variations in vegetable production, consumption and

Table 2

Production, consumption and sale of vegetables under nutri garden during summer season

Vegetables	Quantity produced (kg/family)					Quantity consumed (kg/family)					Quantity sold (kg/family)				
	V I	G	B	B I	B II	V I	G	B	B I	B II	V I	G	B	B I	B II
Okra	15	16	18	15.5	21	10	11	12	12	15	5	5	4	3	6
Chilli	8	16	17	19	17	3	4	2.5	3.5	3.5	5	12	14.5	15.5	13.5
Brinjal	13.5	14	26	42	39	9.5	12	20	7	35	4	2	6	5	4
Ridge gourd	16	15	19	26	31	8.5	13	12	20	20	7.5	2	7	6	11
Radish	15	7	9	11	12	10	5	8	11	12	5	2	1	0	0
Spinach	25	21	18	27	26	15	19	18	21	20	10	2	0	6	6
Amaranth	23	36	42	27	29	15	31	37	27	29	8	5	5	0	0
Fenugreek leaves	20	17	19	21	25	19	17	19	20	24	1	0	0	1	1
Total	135.5	142	168	188.5	200	90	112	128.5	151.5	158.5	45.5	30	37.5	36.5	41.5
Mean	16.9	17.75	21	23.56	25	11.25	14	16.06	15.18	19.81	5.68	3.75	4.68	4.56	5.18
SD	5.49	8.34	9.65	9.40	8.43	4.92	8.60	10.33	8.02	9.87	2.76	3.73	4.80	5.08	5.02
F value	**	**	**	**	**	**	**	**	**	**	*	*	*	*	*

** Significant at 1%, *Significance at 5%, NS: Non-significant, SD: Standard deviation

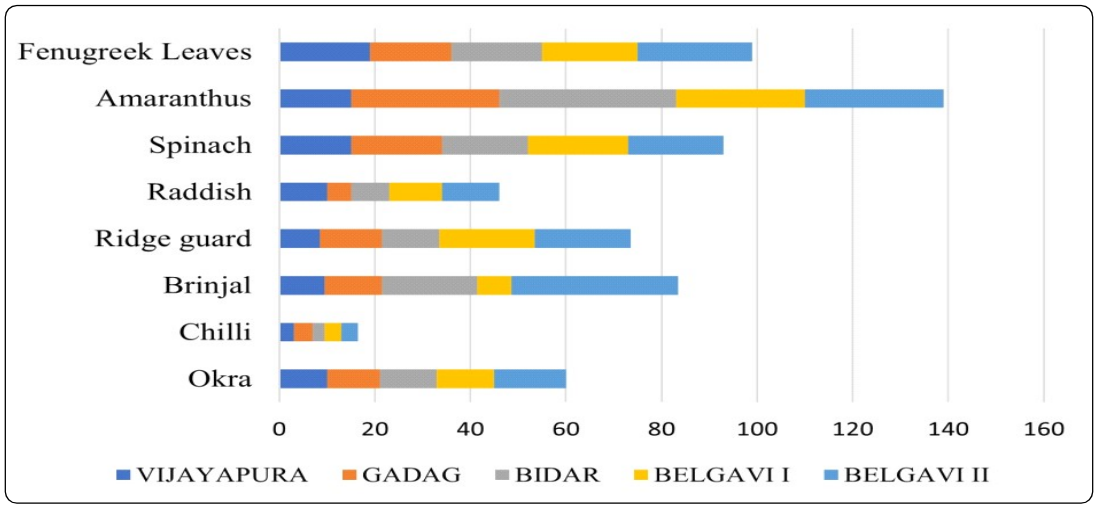

Fig. 1 : Quantity of vegetables consumed from nutri garden in summer season (kg/family)

sales among KVK jurisdiction areas. Similar findings were made by Mendez *et al.,* 2001 and Kumari *et al.,* 2019 in an interdisciplinary study of crops in home garden which included variety of fruit plants, veggies and perennials benefiting the farming families' health conditions.

Production, Consumption and Sale of Vegetables under Nutri Garden during *kharif* Season

Data on production, consumption and sale of vegetables under nutri garden during *kharif* season is given in Table 3 and Fig. 2. Notable variations existed

TABLE 3

Production, consumption and sale of vegetables under nutri garden during *kharif* season

Vegetables	Quantity produced (kg/family)					Quantity consumed (kg/family)					Quantity sold (kg/family)				
	V I	G	B	B I	B II	V I	G	B	B I	B II	V I	G	B	B I	B II
Beet root	16	14	12	17	20	11	10	9	11	15	5	4	3	6	5
Beans	9.5	11	9	12	10	9.5	9	9	10	10	0	2	0	2	0
Brinjal	15	18	17	21	26	11	17	17	20	21	4	1	0	1	5
Ridge gourd	30	27	21	25	26	25	21	21	22	23	5	6	0	3	3
Okra	21	18	17	16	22	15	11	10	9	15	6	7	7	7	7
Onion	26	21	20	24	29	20	18	15	17	20	6	3	5	7	9
Cabbage	19	16	13	10	5	10	9	7	8	5	9	7	5	2	0
Chilli	8.5	9	10	11	12	3.5	4	5	4	3.5	5	5	5	7	8.5
Tomato	18	15	16	11	10	12	15	11	11	10	6	0	5	0	0
Spinach	24	28	22	20	25	15	20	20	19	20	9	8	2	1	5
Amaranth	31	25	26	32	33	15	20	21	26	27	16	5	5	6	6
Fenugreek leaves	25	26	30	31	20	20	21	21	20	20	5	5	9	11	0
Total	243	228	213	230	238	167	175	166	177	189.5	76	53	46	53	48.5
Mean	20.25	19	17.75	19.16	19.83	13.91	14.58	13.83	14.75	15.79	6.33	4.41	3.83	4.41	4.04
SD	7.30	6.39	6.38	7.68	8.73	5.75	5.77	6.01	6.75	7.34	3.82	2.50	2.88	3.36	3.38
F value	**	**	**	**	**	**	**	**	**	**	NS	NS	NS	NS	NS

** Significant at 1%, *Significance at 5%, NS: Non-significant, SD: Standard deviation

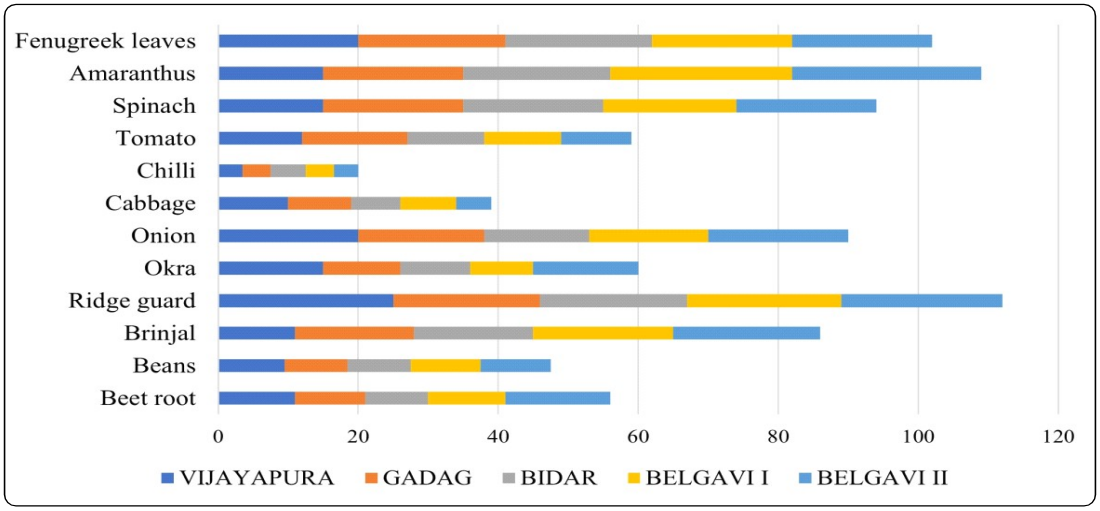

Fig. 2 : Quantity of vegetables consumed from nutri garden in *kharif* season (kg/family)

in the quantities produced, consumed and sold for each vegetable across KVK jurisdiction areas. On an average each household was producing 213-243 kg vegetables during *kharif* season out of which 166 to 189.5 kg was utilized for home consumption and rest 46-76 kg was sold. Amaranth, fenugreek leaves and ridge guard show relatively high production and consumption across all KVK jurisdiction areas. Significant variations existed in the production and consumption of onion and spinach. Variability in quantities sold was observed, with differences in market preferences or local demands. Significant variations were found in the sale of cabbage and tomato across all KVK jurisdiction areas. High standard deviations implied more variability, reflecting diverse cultivation and consumption patterns. The table provides valuable insights into the dynamics of nutri garden cultivation during the *kharif* season in KVK jurisdiction areas. Significant differences in production, consumption, and sales emphasized the need for region-specific approaches in agricultural planning and market strategies. F values indicated high significant differences in mean values for all vegetables produced and consumed but not for the quantity sold. This suggests that there were notable variations in vegetable production and consumption among KVK jurisdiction areas. Similar findings were reported by Masashi *et al.,* 2017.

Production, Consumption and Sale of Vegetables under Nutri Garden during *Rabi* Season

Data on production, consumption and sale of vegetables under nutri garden during *rabi* season is given in Table 4 and Fig. 3. Notable variations existed in the quantities produced, consumed and sold for each vegetable across KVK jurisdiction areas. On an average each household was producing 117-132 kg vegetables during *rabi* season out of which 90 to 102 kg was utilized for home consumption and rest 22-41.5 kg was sold. Beans, bottle guard and spinach exhibited relatively high production and consumption across all KVK jurisdiction areas. Variations were observed in the production and consumption of other vegetables, indicating diverse preferences. Variability in quantities sold was observed, suggesting differences in market preferences or local demands. Significant variations were found in the sale of chilli, brinjal and bitter gourd across KVK jurisdiction areas. F values indicated high significant differences in mean values for all vegetables produced and consumed but not for the quantity sold. High standard deviations implied more variability, reflecting diverse cultivation and consumption patterns. The table provides valuable insights into the dynamics of nutri garden cultivation during the *rabi* season in different districts. Significant differences in production, consumption and sales underscore the need for region-specific approaches

TABLE 4

Production, consumption and sale of vegetables under nutri garden during *rabi* season

Vegetables	Quantity produced (kg/family)					Quantity consumed (kg/family)					Quantity sold (kg/family)				
	V I	G	B	B I	B II	V I	G	B	B I	B II	V I	G	B	B I	B II
Beans	16	18	16	14	11	11	12	16	10	11	5	6	0	4	0
Chilli	8.5	10	8	8	7	3	4	4	3	3	5.5	6	4	5	4
Bottle gourd	12	8	7	8	7	8	8	7	6	5	4	0	0	2	2
Brinjal	10	9	17	21	26	10	9	14	17	16	0	0	3	4	10
Onion	13	14	12	10	11	9	10	10	8	11	4	4	2	2	0
Bitter gourd	19	10	7	11	6	10	4	7	7	6	9	6	0	4	0
Okra	9.5	10	11	10	9	9.5	8	7	6	7	0	2	4	4	2
Spinach	24	20	26	21	24	15	17	20	17	20	9	3	6	4	4
Amaranth	20	21	20	18	16	15	20	17	16	16	5	1	3	2	0
Total	132	120	124	121	117	90.5	92	102	90	95	41.5	28	22	31	22
Mean	14.66	13.33	13.77	13.44	13.00	10.05	10.22	11.33	10.00	10.55	4.61	3.11	2.44	3.44	2.44
SD	5.39	5.07	6.51	5.29	7.44	3.62	5.40	5.56	5.33	5.81	3.21	2.522	2.12	1.13	3.28
F value	**	**	**	**	**	**	**	**	**	**	NS	NS	NS	NS	NS

** Significant at 1%, *Significance at 5%, NS: Non-significant, SD: Standard deviation

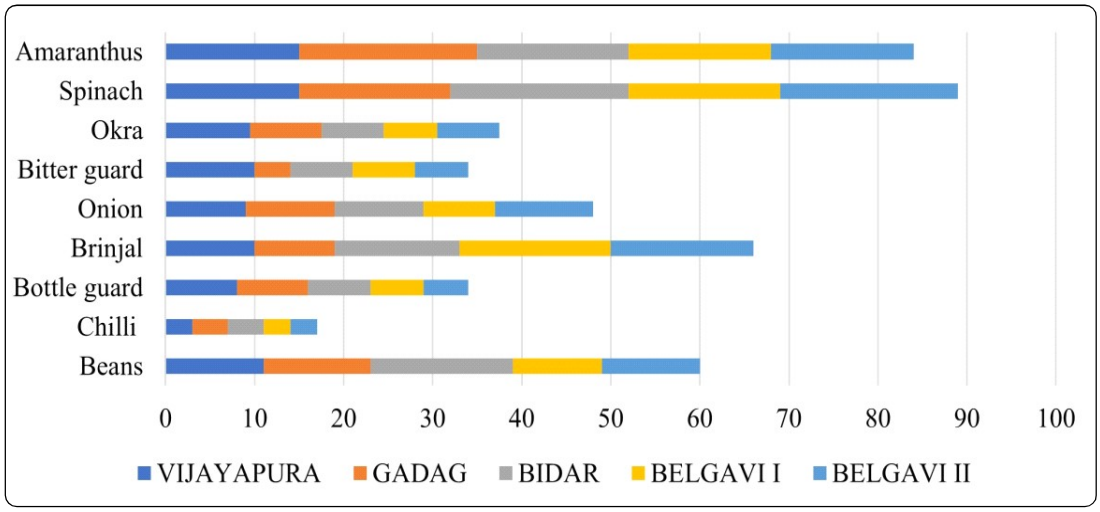

Fig. 3 : Quantity of vegetables consumed from nutri garden in *rabi* season (kg/family)

in agricultural planning and market strategies. Further studies could delve into specific factors influencing these variations and guide targeted interventions for sustainable and market-responsive nutri garden cultivation during the *rabi* season.

Expenditure from Savings After Nutri-Garden

Data on expenditure from savings after nutri garden across KVK jurisdiction areas is given in Table 5 with a focus on various aspects such as food, health, education and other financial considerations (loans, debts, etc.) before and after the intervention. The mean food expenditure decreased from Rs.3789.6/month/family to Rs.1484.6/month/family after the intervention. The t-value was 3.3, indicating a significant increase at the one per cent level. The mean health expenditure decreased from Rs.1263.2/month/family to Rs.536/month/family after the intervention.

TABLE 5

Expenditure from savings after nutri garden

KVK jurisdiction area	Expenditure from savings after nutri garden (Rs. /Month/family)							
	Food		Health		Education		Others (loans, debts etc.)	
	Before	After	Before	After	Before	After	Before	After
Vijayapura I	4150	1125	2750	555	3800	3928	2000	1222
Gadag	6600	1900	1450	570	5370	5300	1250	956
Bidar	2750	1800	825	480	2583	2690	2208	570
Belgavi I	2688	1500	427	515	2333	2315	1266	680
Belgavi II	2760	1098	864	560	1212	1020	1088	887
Mean	3789.6	1484.6	1263.2	536	3059.6	3050	1562.4	863
SD	1686.9	371.16	907	37	1585.5	1629.7	1562.4	863
t value	3.3	*	1.8	NS	0.153	NS	2.37	*
S/NS	0.03		0.14		0.886		0.05	

** Significant at 1%, *Significance at 5%, NS: Non-significant, SD: Standard deviation

The t-value was 1.8, which was statistically non-significant (NS). The mean education expenditure remained relatively stable, with a slight decrease from Rs.3059.6/month/family to Rs.3050/month/family after the intervention. The t-value was 0.153, indicating non-significance (NS). The mean savings in other expenditure decreased from Rs.1562.4/month/family to Rs.863/month/family after the intervention. The t-value is 2.37, indicating a significant increase at the 5 per cent level. The significant increase in savings allocated to food suggests that the nutri garden intervention positively impacted the households. This could result in improved dietary habits and overall health. Although there was an increase in health-related savings, it was not statistically significant.

Further investigation may be needed to understand why the impact on health-related expenses was not as pronounced as in other areas. The non-significant change in education-related savings indicates that the nutri garden intervention might not have directly influenced spending on education. This could be due to various factors, such as pre-existing commitments or limitations in the scope of the intervention. The significant increase in savings for other purposes, including loans and debts, suggests that the intervention may have contributed to overall financial well-being. This could have positive implications for the economic stability of the households involved.

Impact of Nutri Garden on Food Consumption Pattern of the Respondents

Data on Impact of nutri garden on food consumption pattern of the households is given in Table 6. The mean quantity of green leafy vegetables cooked increased from 1.48 cups/day/family before nutrigarden to 2.21 cups/day/family after nutrigarden. The mean quantity of roots and tubers cooked increased from 2.87 cups / day/family before nutrigarden to 4.56 cups/day/family after nutri garden. The mean quantity of other vegetables cooked increased from 3.27 cups/day/family before nutri garden to 5.62 cups/day/family after nutri garden. The mean quantity of fruits, milk and milk products, meat, eggs, fish and sea foods, oils/fats, nuts/seeds and any others all showed increase after the nutri garden intervention. The mean expenditure on green leafy vegetables decreased from Rs.1583/year/family before nutri garden to Rs.608/

TABLE 6

Impact of nutri garden on food consumption pattern of the respondents

Food Group	Quantity cooked (cup/day/family)		Expenditure (Rs./year/family)	
	Before nutrigarden	After nutrigarden	Before nutrigarden	After nutrigarden
Cereals and millets	5.56	5.78	3800	3960
Pulses	2.62	3.54	5370	6750
Green leafy vegetables	1.48	2.21	1583	608
Roots and Tubers	2.87	4.56	1333	366
Other vegetables	3.27	5.62	1212	230
Fruits	1.25	2.68	1150	715
Milk and milk products	1.26	2.09	1600	2100
Meat	1.05	0.92	1750	760
Eggs	1.11	2.06	688	1080
Fish and sea foods	0.12	0.16	760	1098
Oils/ fats	1.15	1.15	800	800
Nuts/ seeds	1.36	1.57	890	97113
Any others (processed foods and bakery items)	1.76	0.54	2000	1200
Total	24.86	32.88	22936	20638
Mean	1.91	2.52	1764.3	1331.3
SD	1.38	1.84	1353.71	1624.16
t value	2.4	*	2.85	**
S/NS	0.03		0.01	

** Significant at 1%, *Significance at 5%, NS: Non-significant, SD: Standard deviation

year/family after nutri garden. Vijayalakshmi and Abarna Thooyavathy, 2012 in their study reported similar findings.

The mean expenditure on pulses increased from Rs.5370/year/family before nutrigarden to Rs.6750/year/family after nutri garden. The mean expenditure on roots and tubers, other vegetables, fruits, milk and milk products, meat, eggs, fish and sea foods, oils/fats, nuts/seeds and any others all showed variations in expenditure after the nutri garden intervention. The total quantity of food consumed increased from 24.86 cups/day/family to 32.88 cups/day/family after the nutri garden intervention. The total expenditure decreased from Rs.22936/year/family to Rs.20638/year/family after the nutrigarden intervention.

The increase in the quantity of various food groups, such as pulses, green leafy vegetables, roots and tubers and others, indicates a positive impact of the nutri garden intervention on the diversity and nutritional content of meals. The changes in expenditure on different food groups suggest shifts in spending patterns. While there was an increase in spending on pulses, there were reductions in the expenditure on cereals and millets. This could be due to a more balanced and nutritious diet facilitated by the nutri garden. The overall increase in the total quantity of food consumed indicates improved food security and

dietary diversity among respondents after the nutri garden intervention. The decrease in total expenditure might suggest that the nutrigarden intervention contributed to cost-effective and sustainable practices in food production, thereby positively impacting household budgets. An adjoining study made by Sumner *et al.,* 2010, indicated that the local food diversity gained tremendous health benefits and healed many of the minor health issues of the farming community.

The t-values of 2.4 and 2.85 for quantity cooked and expenditure, respectively were both significant at the 5 per cent level. This suggests that the observed changes in food consumption patterns and expenditure were statistically significant. As per similar study conducted by Mamgai *et al.,* 2021, nutri gardens provided rich source of nutrients. The results indicated that the nutri garden intervention had a positive impact on the food consumption patterns and expenditures of the respondents, promoting a more diverse and nutritious diet while potentially reducing overall food costs. These findings support the potential effectiveness of nutri gardens in improving household nutrition and economic well-being.

The nutri garden intervention in KVK jurisdiction areas of North Karnataka had a positive impact on the food consumption patterns and expenditures of the respondents, promoting a more diverse and nutritious diet while potentially reducing overall food costs which was necessary for improving household nutrition and economic well-being. For setting up a nutrition garden in any area, various layouts can be adapted depending on the availability of space and land. The institutions like KVK, Agriculture Universities, Horticulture Universities and NGOs in every state can train, fund and focus on developing and maintaining kitchen gardens. One can encourage nutrition gardening in all the areas feasible (home, backyard, school, community, market) in order to reduce the intensity of malnutrition. Schools can promote gardening to motivate students to eat fresh and healthy. Benefits from different governmental programmes can be harnessed by becoming aware of them, which can help in funding/training/setting up a nutrition garden/kitchen garden. Nutrition gardens can be a source of generating some additional income with the surplus produce, along with promoting dietary diversity and in turn taking a step closer towards food and nutrition security.

References

Almoraie, N. M., Saqaan, R., Alharthi, R., Alamoudi, A., Badh, L. and Shatwan, I. M., 2021, Snacking patterns throughout the life span: Potential implications on health. *Nutrition Research,* **91** : 81 - 94.

Geetha K. and Manjunatha, B. N.,2009, Nutritional status of school children (9-15years) from Bangalore Rural and Urban districts. *The Mysore J. Agric. Sci.,* **43** (02) : 309 - 316.

Gopalan, C., Ramashastri, B. V. and Balasubramaniam, S. C., 2002, Nutritive value of Indian foods. National Institute of Nutrition, ICMR, Hyderabad.

Kumar, B. M., George, S. J. and Chinnamani, S., 1994, Diversity in the homegardens of Kerala in Peninsular India. *Agroforestry Systems,* **25** (2) : 243 - 262.

Kumari, P., Mustaf, M., Somvanshi, S. P. S., Singh, C., Kumar, P. and Shalini, 2019, Nutri garden for sustainable food security and nutritional diversity in Hamirpur district of Bundelkhand region. *Indian Journal of Extension Education,* **55** (4) : 107 - 113.

Mamgai, P., Nautiyal, P. and Jethi, R., 2021, Nutri gardens: A rich source of nutrition for farm women. *Gujarat Journal of Extension Education,* **28** (1) : 18 - 21.

Masashi, S., Kevin, J. G. and Yuichi, Y., 2017, Gardening is beneficial for health: A meta-analysis. *Preventive Medicine,* **5** : 92 - 99.

Mendez, V. E., Kok, L. and Somarriba, E., 2001, Interdisciplinary analysis of home gardens in Nicaragua: Micro-zonation, plant use and socio-economic importance. *Agroforestry Systems,* **51** (21) : 85 - 96.

Pem, D. and Jeewon, R., 2015, Fruit and vegetable intake: Benefits and progress of nutrition education interventions - Narrative review article. *Iranian journal of public health,* **44** (10) : 1309 - 1321.

SUKANYA,T. S., AJAY, K., SATHYA, K., CHAITHRA, C., NARAYANAN, A. L., ANAND, M. R., KAUSHAL, K., MANISHA, S. AND NARENDRA, K. N., 2023, Nutri cereals role in Indian agriculture, food and nutritional security:A review. *The Mysore J. Agric. Sci.,* **57** (2) : 1 - 10.

SUMNER, J., MAIR, H. AND NELSON, E., 2010, Putting the culture back into agriculture: Civic engagement, community, and the celebration of local food. *International Journal of Agricultural Sustainability,* **8** (2) : 54 - 61.

VIJAYALAKSHMI, K. AND ABARNATHOOYAVATHY, R., 2012, Nutritional and health security through integrated gardens for women's empowerment: The CIKS experience. *Universitars Forum,* **13** (1) : 1 - 11.