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Assessment of Per Capita Availability of Nutrients from Nutrition Gardens

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A B S T R A C T

India ranks among the top vegetable producers, yet rural households frequently struggle with malnutrition, particularly when it comes to vitamin deficits. The lack of knowledge, illiteracy, and access to sufficient quantities of fruits and vegetables could be the contributing factors, besides family purchasing power is also very low. According to the Recommended Dietary Allowances, a person should consume 300 g of vegetables each day, including roots and tubers, green leafy vegetables, and other vegetables. Taking into account the widespread malnutrition, particularly the lack of certain micronutrients, and the scarcity of vegetables, this study was carried out to assess the extent of nutrition security among thirty selected nuclear families, after setting up nutrition gardens in their households, along with a control garden in the College campus. The contribution of iron from vegetables cultivated in control garden was higher than in household garden. Organically set up nutrition gardens in the study could not meet the recommended dietary, hence it was realized that there is a need to scale up the area of cultivation and an increase the number of crops, which are disease resistant. The common land resources of the community could be utilized. Continuous and vigilant monitoring of the gardens would improve the productivity.

Introduction

Nutrition gardening is one of the oldest methods of food production and is practiced all over the world. Nutrition /home gardens can significantly improve food security for rural people with limited resources in developing nations (Asaduzzaman, 2011). Several studies suggest that nutrition gardens can be an alternative for food and nutritional security in times of calamity, hostilities, and other post-crisis situations (Wanasundera, 2006). Positive impacts on micronutrient intakes have also been identified in the assessment of nutrition garden programs.

Some examples of these studies include those from Bangladesh, where long-term impacts on the micronutrient supply for iron, zinc, folate, and vitamin A were identified from an integrated home

garden intervention that combined training in gardening practices with nutrition education (Baliki *et al.*, 2019).

Singh *et al.*, (2020) also observed a 100-square-metre nutrition garden that significantly enhanced the per capita availability of many nutrients such as protein, iron, calcium, beta carotene, vitamin C, and folic acid.

The percentage of RDA that increased and differed from the RDA was 3.80 for protein, 24.38 for iron, 34.03 for calcium, 37.31 for beta carotene, and 157.0 for vitamin C. Verma *et al.*, (2019) stated that the buying of vegetables reduced as the families' collective consumption of vegetables improved.

Nutritional gardening is regarded as one of people's alternate sources of income (Alam *et al.*, 2006). In addition to financial savings on household vegetable consumption, the nutrition gardening intervention has reduced malnutrition and poverty by providing additional revenue and empowering tribal women.

Materials and Methods

The study was conducted to study the effectiveness of nutrition garden in bringing about nutrient security in nuclear families.

The methodology is discussed under the following headings:

Selection of locale

The location of the study was at Vithura Panchayath of Vellanadu block in Thiruvananthapuram district.

Selection of households

Thirty nuclear families (comprising of 4 members) were selected after a base line survey to participate in the programme

Inclusion criteria for selecting families included:
Interest in involving in gardening activities

Previous experience in nutrition gardening

Possessing land /terrace with sufficient sunlight and water supply and

At least one person of the family to have free time to attend to the garden

Exclusion Criteria for selecting families included:

Lack of interest

Fresh entrants

Not possessing sufficient land with water supply and sunlight

Members having no time and energy to spare.

Selection of vegetable crops

Short term vegetables were selected for each households namely:

Tomato (Vellayani Vijay)

Amaranth (KAU Vaika)

Bitter gourd (Preethi)

Brinjal (Local)

Bush Cowpea (Anaswara)

Okra (Anjitha)

Development of Tool

A schedule to elicit information on demographic profile, resource particulars, Pre and post vegetable use frequency and monthly expenditure on vegetables was finalised and framed after a pilot study. Checklist of data for the daily diary was also finalised along with this.

Intervention on nutrition garden

A class supported with audio visual aids was conducted on Organic cultivation of the identified crops on 7/07/2022 at the Vithura Panchayath Hall for the selected household members.

The group was guided to use the mobile digital app of Kerala Agricultural University (KAU) - "Farm Extension Manager" (FEM) for further clarifications in gardening.

The Knowledge level of participants was assessed before and after the training using the finalised schedule.

Inputs supplied to each family were:

Six vegetable seed packets (of 2 -4 g each) for each family.

Neem based products for pest control (200 ml bottle per family).

Organic manures – Micronutrient mix (1kg per family).

Grow bags – (24 grow bags of size 24cm x 24cm x 40cm for each
family)

Checklist of data for their daily diary was also specified to the group.

Thirty gardens were set up in the selected family households and a model garden was also set up in the Department of Community Science.

Weekly monitoring for management of diseases and healthy growth of the plants were ensured by the investigator at the households of control garden.

Data Collection

Using the framed schedule the following parameters were elicited:

Demographic profile of respondents and their families with respect to

Age, Gender, Occupation, Educational level, Income.

Details of garden facilities

Dietary particulars (pre and post intervention) with respect to:

Frequency of use of vegetables, Source, Expenditure, Storage and methods of processing.

Intervention particulars

Cultivation practices, diseases, management and yield from the garden were noted as follows for both experimental plot of control garden.

Cultivation Practices

The initial grow bag preparation was uniformly monitored and recorded as follows.

Potting mixture for the grow bags in the ratio of 1:0.5:0.5:1 (Soil, sand, coir pith compost and FYM) was prepared and filled into the grow bags. Neem cake was added at the rate of 5% for enrichment of the medium.

Cow dung / Vermin-compost were used at the interval of 10 DAT.

Pseudomonas at the rate of 20g per litre was used as a foliar spray once in 2 weeks.

Disease and management

The details regarding pest attacks and curative measures were recorded by the respondents in their daily diary. The investigator recorded the particulars of the control garden separately.

Yield particulars

The crop wise yield from the household as well as from the control garden for (3months) was recorded

Results and Discussion

Demographic profile of respondents

Majority (60%) of the respondents were in the age group of forty to fifty years, while thirty-three per cent of the respondents fell in the age group of thirty –forty years. Educational status of the respondents

surveyed revealed that most (56.66%) of the respondents had studied up to High school and forty-three per cent had attended College. Sixty per cent of the respondents were home makers, without an income of their own; twenty per cent of the respondents were government employees and 20 per cent were daily wageworkers. Analysis of monthly income of the respondents revealed that 70 per cent of the respondents earned an income upto Rs.5000 per month, sixteen per cent of the respondents earned an income between Rs.10,001 -20,000 and the ten per cent of the respondent earned an income of above Rs.20,000 per month.

Availability of natural resources

Land and water being the major requisites for gardening. Many of them (50%) were gardening in less than 1 cent of land, while thirty-three percent of them were gardening in 1-2 cents. Majority of the respondents (93%) cultivated in up to 25% of their available land, Many (50%) of the respondents depended on electric pumps for irrigation, while twenty three per cent depended the public water system.

Evaluation of yield of vegetables from nutrition garden

The yield of vegetables from each garden was recorded for a period of 3 months. The per capita availability of all vegetables was seen to be significantly higher in control garden t value 2.01, p value 0.03). The difference was more conspicuous for okra, amaranth and tomato. From the data on per capita availability of vegetables the corresponding availability of nutrients from each vegetable was worked out based on Indian food composition tables (Longvah *et al.*, 2017) The availability of calcium from amaranth was higher from the control garden which formed 12.7 % of RDA. Similarly, availability of calcium was higher from cowpea harvested from control garden, there was a difference of 124 mg in the two groups. Per capita availability of okra was also seen to be very much higher in the control garden compared to household, the difference was seen to be 21.6 mg.

The contribution of beta carotene from amaranth of control garden formed 19.14% of the RDA, while that from household garden forms only 6.12 % of the RDA. In the case of tomato cultivated in control garden the contribution of beta carotene was 3.14 % of RDA, while that from household garden formed only 0.89% of RDA. There was difference in the contribution of this nutrient with regard to bitter gourd also. The difference was found to be 10.43mcg

The contribution of vitamin c from vegetables cultivated in control garden was higher than in household garden. The difference was 381.3 mg for amaranth; 108.3 mg for tomato, 70.95 mg for okra, 3.07 mg for bitter gourd. The main difference in availability is not seen in the case of brinjal. Vitamin C was found only in negligible amount in cowpea.

The contribution of fibre from amaranth of control garden formed 284% of the RDA, while that from household garden forms only 91% of the RDA.

Table.1 Percapita availability of calcium (mg)

Vegetables	Household garden	Control garden
Amaranth	40.91	**127.8**
Tomato	1.22	**4.28**
Okra	13.60	**35.2**
Brinjal	4.34	**4.50**
Bittergourd	1.48	**1.8**
Bushcowpea	**13.05**	**137.5**

Table.2 Percapita availability of beta carotene (mcg)

Vegetables	Household garden	Control garden
Amaranth	294.16	**919.6**
Tomato	43.3	**151.6**
Okra	2.27	**5.89**
Brinjal	24.6	**34.79**
Bittergourd	11.46	**21.89**
Bushcowpea	**0.22**	**0.34**

Table.3 Percapita availability of Vitamin C(mg)

Vegetables	Household garden	Control garden
Amaranth	179.93	**561.23**
Tomato	43.5	**151.8**
Okra	44.3	**115.25**
Brinjal	3.87	**4.12**
Bittergourd	**57.86**	**60.63**

Table.4 Percapita availability of fibre (g)

Vegetables	Household gardens	Control gardens
Amaranth	27.3	**85.3**
Tomato	72.6	**78.7**
Okra	21.46	**55.6**
Brinjal	23.3	**26.7**
Bittergourd	11.93	**12.5**
Bushcowpea	**60.45**	**71.2**

Table.5 Percapita availability of Iron(mg)

Vegetables	Household garden	Control garden
Amaranth	1.21	**199.1**
Tomato	1.57	**5.52**
Okra	0.132	**17.8**
Brinjal	0.096	**3.84**
Bittergourd	0.098	**6.26**
Bushcowpea	**41.1**	**54.7**

In the case of tomato cultivated in control garden the contribution of beta carotene was 262 % of RDA, while that from household garden formed only 242% of RDA. There was high difference in the contribution of this nutrient with regard to okra also. The difference was found to be 34.14 g. The contribution of iron from vegetables cultivated in control garden was higher than in household garden. The difference was 197.89 mg for amaranth; 17.6 mg for okra, 13.6mg for cowpea; 6.16mg for bitter

gourd. Difference in availability among the two groups for brinjal (3.74mg) and tomato (3.95mg) was also observed.

In Maharashtra, the nutrition gardens created by KVKs and managed by ATARI could provide 75% of the RDA for food (cereals, pulses, and vegetables) (Lakhan *et al.*, 2021). This study was far from meeting the RDA of the families, 73% of families could meet less than 10 percentage of requirement of other vegetables; 26 per cent of them could meet only 10—20% of RDA, climate was not favourable and also the management of pests were not satisfactory, during the brief study period.

The study calls for scaling up the nutrition gardens with respect to area/grow bags and also planting materials. More intensive monitoring with a team of volunteers could address the day to day problems of the garden. The support of the Community in all respects will enhance the productivity of such enterprises.

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