



## A Study on Impact of Demonstration of Nutrition Garden for Year-round Nutrition Security in Farm Families

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(Received 11 September 2022; Accepted 25 October 2022)

(Published by Research Trend, Website: [www.researchtrend.net](http://www.researchtrend.net))

**ABSTRACT:** India is not only the world's second largest producer of food, but also has its second largest undernourished population. Malnutrition and food insecurity has been a major concern for India for several decades. Undernutrition leads to long-term effects, including cognitive and growth deficits and reduced immunity to infections. The present study aims at understanding the importance of nutrition garden with an objective of assessing the nutritional security of farm families. Consecutively for two years, the present study was conducted in Mandalagera village, Raichur taluk and Raitanagar Camp village, Sindhanur taluk, Raichur district, Karnataka. In each village, twenty five farm families were selected in each village and three categories were made based on their family size. The total number of participants were 186, among them, 98 were males and 88 were females. Body Mass Index, of the people showed the majority of both males and females, the malnourishment has been seen most common (62.30%). Twenty-one females were found to suffer from iron deficiency causing nutritional anaemia. Few were suffering from scales in skin, mostly due to micronutrient deficiencies. Seventeen people recognized their clinical symptoms. While selecting the farm families, a proper care was taken their willingness to maintain the garden throughout the year. Those families who had sufficient area that can be spared for the study purpose were chosen. All the families were supplied with vegetable seeds, some perennial saplings of fruit crop and some speciality foods. The plan had also covered the medicinal plants in the garden. All the subjects were trained to adopt the growing of crop organically and maintain the garden with environment friendly practices. They were trained to use balanced diet with proper importance of major and micro nutrients. It was suggested based on the recommended dietary allowances (RDA). The study revealed their nutritional quality had increased in all the major nutritional parameters, viz. proteins, dietary fibre, vitamin, A, vitamin C, Iron and Calcium. The nutritional garden helped with the consumption of freshly harvested vegetables in their daily diet, contributing for the increased nutritional status of the families.

**Keywords:** Cowpea, yield, Correlation analysis, *Vigna unguiculata*.

### I. INTRODUCTION

India has attained the food security but nutritional security is still a far possibility. Even though largest quantity of food is being produced in India, there is a sizable population of malnourished children. Food security is directly correlated with nutritional status in the developing countries as per review of available literature. A study conducted by Rafael Pérez-Escamilla in 2017, [4] showed that stunting is the result of insufficient food availability at homes.

Among the countries having high population of malnourished children India is in the top most position having 46.6 million stunted children under the age of five. Followed by Nigeria having 13.9 million and Pakistan with 10.7 million children, under the age of five years. Within the countries in Asia, wasting is enormous in India. There by it is anticipated that the few future per capita income of our country is also largely affected, as per Global Nutrition Report – 2018

[2]. By and large south Asian countries are suffering from the problem of child malnutrition.

Food production in India is highest, so also the problem of malnutrition is persistent in the same magnitude. To tackle this problem of under nutrition among children and malnutrition in the general population, nutrition garden was introduced as an easily accessible solution especially in rural areas. Nutrition garden also provides a sustainable possibility to improve the nutritional status of people in the rural areas. Global Hunger Index of 2019 revealed that Indian is placed 102th position among 117 countries assessed. National Family Health Survey 4 (NFHS-4) revealed only a slight improvement of nutritional status over the years. Under nutrition during early childhood period leads to long lasting effects on mental ability, physical growth and immunity against various infections and diseases. Undernourishment is the major cause of majority of the under five deaths in our country as per the study conducted by Shoba Suri (2020) [6].

The available literature regarding malnutrition reveals a direct link with household food inadequacy. In addition to this, more than half of the women in reproductive age group (15-50 years) in India are suffering from iron deficiency anaemia. This affects their future pregnancies and leads to low birth weight babies [1]. In this connection it is highly important to assure the year-round nutrition security in farm families. With this aim a study was undertaken with an objective of improvising the nutritional status, and to create an awareness about nutritious food. So also, the efficient utilization of available resources such as water, Space and organic wastes. As per World Health Organization (WHO), imbalanced diet and inadequate food intake certainly results in stunting, wasting, excessive weight and under five deaths.

## II. MATERIAL AND METHODS

The present study was conducted between the years 2018-19 and 2019-20 in Mandalagera village of Raichur Taluk and Raitanagar Camp in Sindhanur Taluk of Raichur district in Karnataka. Twenty five families were selected in each village among which, 10 large, 16 medium and 24 were small farm families. These families were selected randomly among the whole population of the farming societies and classified into three groups based the size of the households and they were Large (6-8 members), Medium (4-6) and Small (2-4) respectively. There were 186 being the total number of participants, amongst, 98 were males and 88 were females.

The awareness program for health influenced by nutrition was conducted while the initiation of the study. A standard questionnaire was set with pre-test and used to collect the information from the subjects. The dietary habits for the population were recorded by using 24 hr diet recall method. The habits were

recorded before the implementation of nutrition garden. Later a sectional farm design was framed, based on the availability of the space for garden, water for irrigation. There was focused interest to understand the nutritional requirements of the families. The interest in willingness of farm women to maintain the garden throughout the year.

The garden kit comprised with 25 vegetable seed types having 10 green leafy vegetables, 2 species of roots and tubers and rest as other vegetables. Perennials such as Drumstick and Curry leaves, medicinal species such as Brahmi, Ashwagandha, Madhunashini, Amruthaballi, and Mint were also the part of kit. It had speciality food species like grain amaranth and chia, with fruit plants such as Papaya, Sapota, Guava, Limen, Amla, Pomegranate and Fig. It had all intended to supply Vitamins A, B, C and minerals such as Iron, Calcium, phosphorus and zinc.

An informative leaflet was developed for training purposes. It had the information on the importance of nutrition garden and the scientific layout of the nutrition garden maintaining for all the seasons. This was distributed along with the garden kits by Krishi Vigyan Kendra, Raichur.

Constant monitoring and supervision helped the selected families to cultivate the vegetables in nutrition garden. Parameters assessed were: 1) Total production of vegetables, 2) Daily utilization of Fruits & Vegetables in diet, 3) Food adequacy and nutrient supplementation, 4) Amount of money saved over the period, 5) B: C Ratio, 6) Anthropometric measurements & BMI, 7) Work Generated in terms of man days per month, 8) Health and Nutritional problems were recorded.

The collected data was analysed in terms of percentage, percent adequacy of their diets and percent increase in nutrient intake. Every year after the set programme, a field day was conducted in both the villages to create awareness on nutritional importance in daily diet and nutrition garden within their reach. It provided the support for the family health and nutrition education.

## III. RESULTS AND DISCUSSION

Important interest of the present study was to introduce the nutrition garden in farm families depending on the availability of space, water and their interest in participation. The data compiled reveals that majority of them had no experience in cultivation of nutrition garden and wished to experience the use and get benefits of nutrition garden after attending an awareness programme.

Socio demographic characteristics of respondents reveals that, 12.90 percent were elderly above 60 years. The considerable size of the population (33.33 per cent) wherein the age group of 40-59 years, next to them of 0-19 years (29.03 per cent) rest of them wherein 20-39 years age (24.73 per cent). The caste distribution of the

farm families indicated that major group of them were in general category with 65.59 per cent and the rest of 34.41 per cent formed the SC/ST category (Table 1).

**Table 1: Socio demographic parameters\*.**

Parameters	Responding Farm Families :25+25=50	
<b>Age (years)</b>	<b>n=186</b>	<b>Percentage</b>
0-19	54	29.03
20-39	46	24.73
40 -59	62	33.33
60 and above	24	12.90
<b>Caste</b>		
SC/ST	64	34.41
General/Others	122	65.59
<b>Education of subjects (N=186)</b>		
Illiterate	62	33.33
Primary	66	35.48
Middle & Secondary	34	18.28
PUC and Above	24	12.90
<b>Family Income Per annum</b>		
10,000 – 50,000	10	20
51,000 – 75,000	38	76
76,000 and Above	2	04
	<b>Purpose of Participation</b>	
Financial benefits	6	12
Family health	42	84
Social interest	2	04

\*n=50 Families and 186 subjects

Educational level of the subjects as per table 1, shows that most of them were educated up to primary education, (35.48 percent), followed by the number of illiterates who were 33.33 per cent, followed by those have done with the middle and secondary school education that is 18.29 per cent. Only 12.90 per cent of the total population had completed PUC and higher level of education. Kumar *et al.* (1994) have reported the similar results indicating the typical demographic characteristics of families among the farms of Kerala state.

When the purpose of participation in the study was analysed, majority of them (84 per cent) focused on overall family health improvement followed by financial benefits 12 percent and 4 percent of families participated for creating an activity for recreation purpose or social activity.

Annual income of majority of the farm families (76 percent) ranged from Rs. 51,000 – 75,000/- followed by 20.0 percent of families had income of Rs. 10,000 to 50,000/-, only 4 percent of families had an income above 76,000/-.

Table 2 shows family expenditure pattern of the participants, their average monthly income was Rs. 6,000/-. The major portion of this was earned by the farm families every month from the crops harvested, and as well wages for some labour works. The family expenditure was based on their requirements.

The major expenditure was on food (27.5 per cent), followed by for the children's education (23.33 per cent). Their fruits and vegetable consumption were 5.83 per cent. Their general health expenditure was 3.33 per cent. Expenditure on education for their children occupied second major position after food. Nutrition garden was implemented to assure the nutritive diet supply for throughout the year. The yields of vegetable *viz.*, the greens such as spinach, amaranthus and fenugreek, roots and tubers such as carrots and beetroot were harvested during all the three seasons.

**Table 2: Expenditure pattern of participated families (n=50)**

Particulars	Expenditure per Month	Percentage
Food	1650	27.50
Fruits & Vegetables	350	5.83
Education	1400	23.33
Health & Medicine	200	3.33
Others (Savings, Loans etc)	1300	21.68
Miscellaneous	1100	18.33

(Average income 6,000 per month)

An average of 45.2 Kg of vegetables were produced by the farm families and used for annaul consumption. Perennials plants like curry leaves, drumstick,

chakramuni, jamoon papaya, sapota, guava, amla, pomegranate was harvested as and when they mature and ready to consume. Few interdisciplinary studies of crop production in home garden that included few varieties of fruit plants, vegetables and some annuals was made and reported to be beneficial in support of their dietary nutrition for families of farming sector [3, 5]. Anthropometric assessments were made for the set of quantitative body measurements to assess growth, development and health condition and nutritional status. Anthropometric measurements included the height and weight of individuals to helps in classifying subjects into different Body Mass Index categories as underweight, normal, overweight, obese grade I and obese grade II. Body mass index (BMI) is a measure of body fat based on the individual's height and weight. The assessment was done for all the 186 subjects before and after implementation of the nutrition garden and the results showed that majority of the individuals before the nutrition garden establishment were malnourished classification like underweight 61.29 per cent, over weight 11.83 per cent and obese grade I was 4.30 per cent.

The total of 77.42 per cent of the population were malnourished which is an indirect indication that the subjects had improper dietary pattern. Normal weight was observed in only 22.58 of subjects. Awareness about good eating habits and importance of balanced diet in day to day life might have helped to attain the good Body Mass Index. The details of the subjects indicated that the intervention has helped to improve the general health condition with some savings too. The

detail of impact is given in Table 3. The table clearly shows an improvement in BMI values.

The assessment of nutritional status in humans is done by various methods like anthropometric, dietary habits, biochemical and through vital statistics, where the morbidity conditions assessed and in mild conditions can be well treated through healthy dietary management. Table 4 indicates the morbidity status of the selected total 50 farm families having 186 subjects. Morbidity prevalent in the subjects were recorded before and after intervention.

General fatigue prevalent in 11.82 percent of subjects before intervention was reduced to 7.52 percent after intervention. Headache which was prevalent in 16.13 percent of the subjects was found to reduce to 6.45 percent. After the introduction of nutrition garden all the morbidity parameters were found to decrease indicating a general improvement in their health and nutritional status.

Adoption of nutrition garden has been a great intervention tool for the farming families of these two selected villages. They were happy to share the excess vegetables with their neighbours. They also opined that during the study period that they felt very happy to consume fresh vegetables free of cost and share them too. it has been a great benefit with a fresh vegetables and good nutrition in their daily diet. On the other hand, they could grow some vegetables which were not grown and not even consumed regularly as they had monotype cropping practices in their farms as well back yards. Now with the intervention they were introduced to many types of greens, vegetables and fruits.

**Table 3: Anthropometric Assessment of Farm Families.**

BMI	Category	Before Nutrition Garden		After Nutrition Garden	
		n=186	Percentage	n=186	Percentage
<18.5	Underweight	114	61.29	70	37.63
18.5 -22.9	Normal	42	22.58	82	44.09
23.0 24.9	Over weight	22	11.83	22	11.83
25.0 -29.9	Obese Gr I	8	04.30	12	06.45
>29.9	Obese Gr II	0	0.00	0	0.00

**Table 4: Assessment of morbidity status in the farm families.**

Parameters	Before intervention		After Intervention	
	n=186	Percentage	n=186	Percentage
Gen. Fatigue	22	11.82	14	7.52
Head ache	30	16.13	12	6.45
Giddiness	9	4.84	8	4.30
Body ache	14	7.52	13	6.99
Back ache	13	6.99	11	5.91
Cold	10	5.37	8	4.30
Cough	10	5.37	9	4.84
Fever	11	5.91	7	3.76
Acidity	13	6.99	9	4.84
Respiratory Problem	8	4.30	5	2.69

Sunwar *et al.* (2006) [8] describe that many significant challenges and appropriate opportunities were made to create awareness among rural people on importance of proportionate consumption of food groups in day to day life, this study made by him holds similar results as in the present study. In the study made by Vijayalakshmi *et al.* (2012) [9] suggest that the impact of nutrition garden helps in empowerment of women to a large extent. The nutrients consumed has a drastic change when compared to before nutrition garden to the after-nutrition garden demonstration. The dietary nutrition intervention in farm families through nutrition garden has increased the bulk of important nutrients intake like protein, fibre, Iron and Vitamins. This increase in nutrient intake is the clear indicator of the improvement in nutritional status of the farm families. Nutrition garden and nutrition education has also reduced the junk food and street foods intake by the subjects. An important study made by Sumner *et al.* (2010)[7] reported that the local/native food diversity gained tremendous health benefits and helped in healing some of the minor health issues in the farming community. The results of the present study are also in line with them.

## CONCLUSION

For any family nutrition garden in their backyard or available space is important as a handy source of fresh vegetables as well the plants that are useful and have medicinal properties. However, the recent days their significance is seen to be increasing in the context of the efforts to combat the major as well the micro nutrient deficiencies. These deficiencies are generally prevalent in areas where the normal diet of the population has less diversity and particularly in the areas who dependent on a type of staple food such as cereal based diets. Nutrition garden provides easily accessible diversified fresh vegetables with lot of nutritional benefits. In this connection the present study has demonstrated the worth of nutrition garden for the

year-round nutrition security. Follow up visits to these two villages showed they have continued maintaining the nutrition garden.

**Acknowledgements.** The authors express their gratitude to Faculty, Department of Microbiology, UAS, Raichur, Karnataka for constructive guidance for smooth conduct of the research work.

**Conflict of Interest.** None.

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