

Documentation of the Experiences
of Pilot projects of

Diversified Kitchen Gardens (Homestead Farming)



Documentation of the experiences of pilot projects of diversified kitchen gardens (Homestead Farming)

Acknowledgement

Fr. (Dr.) Paul Moonjely, Executive Director

Fr. (Dr.) Jolly Puthenpura, Asst. Executive Director

Thematic guidance

Mr. Aditya Mohan, Ms. Priyanka Rani and Dr Jaison, Senior Program Lead

Design & Layout

Patrick Hansda, Manager - Public Relations & Communications

© Caritas India, 2021

For further information, please contact::

Caritas India

CBCI Centre,

1 Ashok Place, New Delhi 110001

www.caritasindia.org

**Documentation of the
experiences of pilot projects of
diversified kitchen gardens
(Homestead Farming)**

TABLE OF CONTENTS

Acknowledgement	I
Introduction	01
Background	02
Methodology	02
Socio-Economic & Demographic profile	04
Understanding Nutritional Garden	05
Principles of Nutritional Gardening	05
Why Nutritional Garden/ Benefits?	05
Cropping Pattern	06
Food Habit	06
Findings	07
Best practices observed:	07
Constrains faced by the beneficiaries:	07
Stakeholders understanding about NG	08
Impact of NG on Household/Community	08
Contribution of Kitchen Garden to the Sustainable Development Goals	09
Recommendation for the Scale-up of NG at Intervention Areas	10
Recommended Models/Designs:	10
For the Landless households:	13
Case Story	14
References:	14
Photographs	15

ACKNOWLEDGEMENT

We would like to thank Caritas India for entrusting us with the responsibility of documenting diversified kitchen gardens and its good practices under CI Global Program India. This was a great learning experience for our team.

At the outset, we would place on record our heartfelt appreciations of the community members, local government representatives, and all other stakeholders, for their time, cooperation and for sharing their inputs and their valuable contributions in understanding the local scenario to generate necessary recommendations.

We must extend our gratitude and thanks to the Directors of the Partner Organizations and the project team members for their inputs and feedback and for efficiently organizing the field visits within tight deadlines. We are impressed by the efforts of project team members working at the community level in organizing the interactions with the beneficiaries and their zeal to improve the condition of the people in the intervention areas.

Our special thanks to Dr. Jaison Varghese, Mr. Aditya Mohan, Ms. Priyanka Rani, Mr. Lokesh Kumar and others from the CI Global Program for their kind cooperation and support in the process and for their effective coordination in planning the meetings, collecting information, organizing and also accompanying the visit to the project locations.

INTRODUCTION

Food security is a complex global issue and remains a major challenge for developing countries. It can be defined as when a family has access to food sources, has adequate and continuous food availability and utilizes the surplus in a sustainable manner. Several studies suggest that home gardens can be an option for food and nutritional security in disaster, conflict, and other post crisis situations (Marsh, 1998; Wanasundera, 2006; Galhena et al., 2013). India is considered a global agricultural powerhouse, with two-thirds of the population which is nearly 62%, who are directly or indirectly dependent on agriculture. It is irreplaceable for its service as a source of livelihood to a major section of the society. India's resource-rich land and supportive climatic conditions have enabled India to grow multiple horticultural crops throughout the year. These range from vegetables, fruits, spices, flowers, coffee, tea, and medicinal and aromatic plants. India accounts for a total of 21% of the worldwide vegetable production, only next to China, the largest producer globally (Jha, Suresh, Punera & Supriya, 2018). According to Food and Agricultural Organization (FAO) 2019, India is the largest producer of ginger and okra and ranks second in the production of potatoes, onions, cauliflowers, brinjal, cabbages etc. Horticulture has emerged as one of the main contributors to the growth of the economy over the years. Along with providing a wide range of options to farmers, it also employs a large section engaged in Agro-industries (Planning Commission, 2001).

Bihar is one of the major producers of vegetables and fruits in India with 9.8 and 6.7 per cent of national production respectively. It ranks third and sixth among other States in the production of vegetables and fruits respectively. The economy of Bihar is dominated by agriculture, which contributes over a quarter of the state's income and accounts for employment of about 70 per cent of the rural workforce. Hence, robust growth of the agriculture sector holds the key to the economic and social development of the state. Despite the growth of agriculture since 2000 and its contribution to the state's economy, it remains one of

India's poorest states. The lack of proper management and enforcement is said to be a significant obstacle to its enrichment. Out of the total area of Bihar, 60% is put to cultivation and has a cropping intensity of 138%. Looking into the distribution, with almost 90% of the population living in rural areas, around 91.06% are marginal holders with less than 1 hectare of land. With this being the case, the productivity of the land is marginal for living. This defines the constraints and potentialities of the development of agriculture in Bihar.

Along with food security, another major concern in India is household nutritional security, particularly among children where around 40% are currently malnourished. The habitual Indian diet is cereal based and provides around 70 percent of dietary energy, thus protein and micronutrient consumption remains low which undermines the delivery of nutrition outcomes. It has been recognized that the poor quality of food as well as lack of diversity in the habitual Indian diet imposes enormous costs on the society in terms of ill health, lives lost, reduced economic productivity and poor quality of life. Therefore, the need is to ensure cultivation and use of micronutrient rich food crops by the economically weaker sections of our society. And to help them grow, consume and sell farm products for improved food and nutrition security at the household level.

Caritas India along with its partner organizations has significantly impacted through the continuous handholding support to the marginalized communities across various states of India with the aim to prevent and treat malnutrition. The focus on community engagement and behavior change activities aiming at learning by doing, empowering the dalit or landless communities and bring a change that is not temporary but long term and sustainable; one such attempt towards achieving sustainability is - Nutrition Sensitive Farming or Nutritional Gardening or Homestead farming.

The major purpose of documenting the present situation of Kitchen Garden or Homestead Garden in the minorities, dalits and maha-dalits communities was to improve their nutrition & health status as well as bring forward the best practices to improve the diet diversities and its importance among the general masses. The specific objectives of this assessment are as follows...

- i. To capture the existing practices of homestead farming and its impact on food security, promotion of bio-diversity and protection of environment.
- ii. To draw recommendation for replication in all the districts of Bihar and in other parts of the country.

Background

Massive climate change, food and nutritional inequality, and increase in global population will have ominous consequences especially for the developing and underdeveloped countries given the food shortages and rapidly increasing malnourished populations. By 2050 global population is expected to rise over 9 billion. India is home to 46.6 million stunted children, a third of world's total as per Global Nutrition Report 2018. Indian diet is mostly cereal based lacking protein and micro-nutrient consumption which undermines the delivery of nutrition outcomes. The poor quality of daily diet incurs loss of lives, ill health, low immunity, poor quality of life and diminished economic productivity. Majority of the people in India lives below poverty line, lacking means to afford diet containing 2122 kilocalories per person per day along with other necessities. Women and children are mainly vulnerable with deficiency in Vitamin C, Iron and other minerals required for proportional growth and development of the body and for enhancing the immunity of the body. These deficiencies results in different types of medical conditions and diseases arresting physical and cognitive development of children.

Awareness of people of a balanced diet and the consumption of food which not only tastes good but

increases appetite and provides fair number of fibres is important for maintenance of good health. The fibres provide roughage which supports digestion and an improved metabolism. The less developed nations have adopted various strategies to meet the growing demand of food of its ever increasing population. One of the strategies adopted by India is to motivate and empower the rural marginalized communities to grow crops of nutritive value near or in the vicinity of their household, commonly known as homestead farming or kitchen gardening. This will not only ensure their food security but also improve the nutritional status of these families.

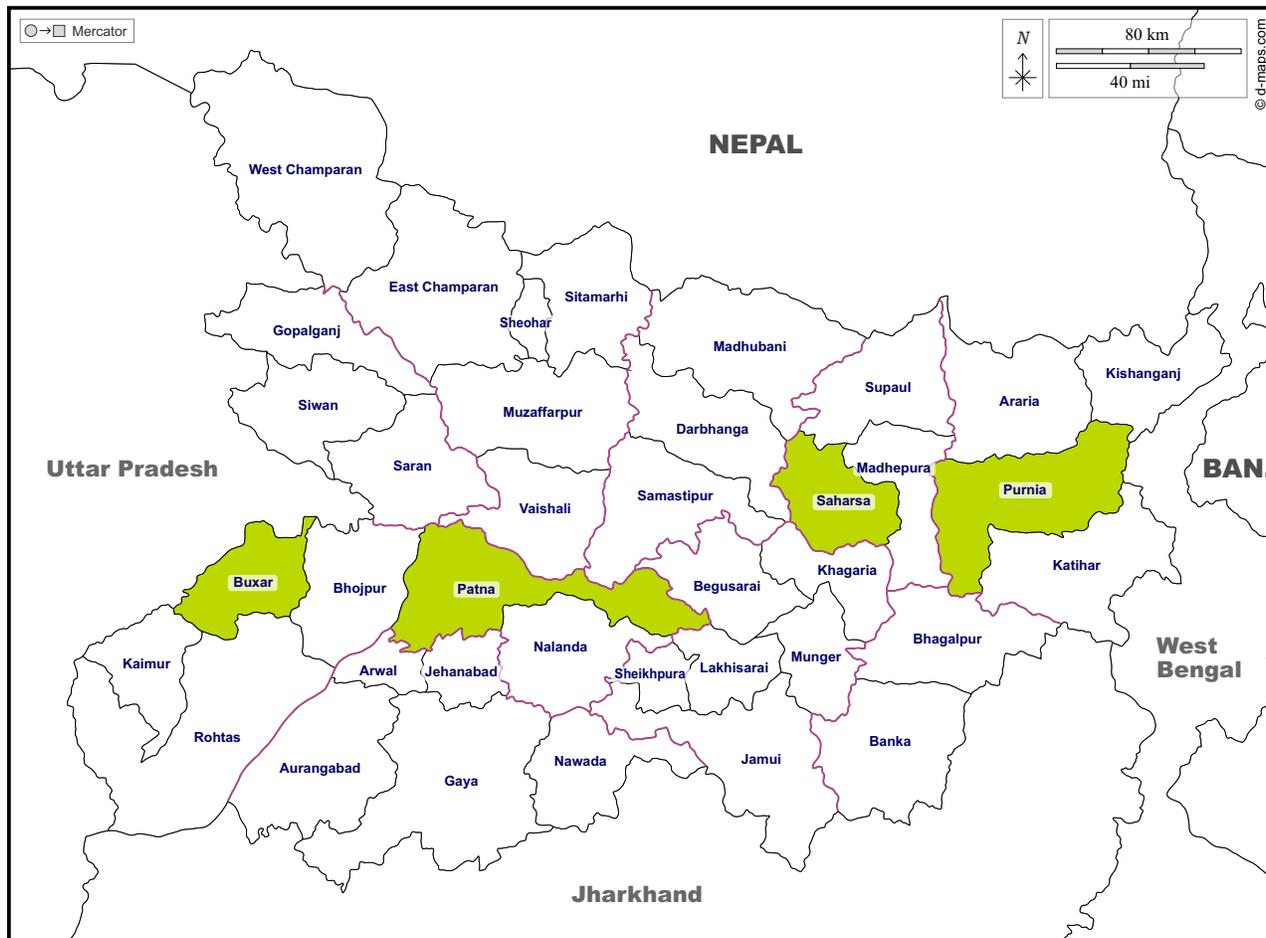
The concept of home gardens or kitchen gardens has become popular globally contributing to food and nutritional security and livelihood. Nutrition gardens are an effective method in fighting against micronutrient deficiencies as local communities consume the food that they produce. Homestead garden provides nutritional security of the rural household and, also supplement the needs of pregnant and lactating mothers and children below five years fighting off malnutrition and micro-nutrient deficiency and other health consequences. Further, it ensures nutritional value chain by means of production and also guarantees food availability.

Methodology

While conducting the assessment on Nutritional Garden/ Homestead Farming, the information and knowledge has been captured in the dalit, maha-dalit and landless communities to understand their nutritional intake through their consumption pattern.

The research methods to be used for capturing data and information are as follows:

- a. Review of Secondary literature on practice of homestead farming in selected intervention areas



covering four districts of Bihar and the consumption pattern of the target groups in these areas.

b. Primary data to be collected through qualitative data collection methods that of-

- Transect walk which will be performed with the Bihar Caritas team and community people to observe the homestead garden / kitchen garden of selected project participants with an objective to understand the crop pattern and their daily dietary practices.
- In-depth interview [IDI] of randomly selected community members and stakeholders. In total 20 IDIs are to be performed during the assessment of Nutritional Garden.
- Focused Group Discussions to be conducted with women and men to understand their perceptions regarding homestead farming, its potential benefits for the family, sustainability and scalability patterns supporting the community by ensuring food security for the family members. Not only that but also to understand their day to day consumption patterns and improvement in nutritional intakes.
- Case Studies of families who are already practicing homestead farming to understand the impact and the factors contributing towards the success or failure of Nutritional Garden.

Sampling: Purposive sampling was used in this study with the help of Caritas India Bihar team. A complete set of 20 samples including 10 best practicing or

successful Nutritional Garden and 10 unsuccessful Nutritional Garden were studied.

Socio-Economic & Demographic profile

The study was conducted in 4 districts of Bihar, namely Patna, Buxar, Purnea and Saharsa. Most of the beneficiaries belong to the Maha-Dalit, Dalit and landless communities of Bihar.

Dalits constitute nearly 15 percent (83 million) of Bihar's population. The poorest ones were declared Maha-Dalits in Bihar. A government commission has identified 18 of the 22 Dalit sub castes, including Musahar, Bhuiyan, Dom, and Nat as Maha-Dalits.

They constitute 31 percent of the Dalit population in the state. As many as twenty-three (23) castes constituted the category of Scheduled Castes in Bihar, as per Census 2001. Prominent Scheduled Castes (SCs) in the descending order of population size are Chamar, Dusadh, Musahar, Pasi, Dhobi and Bhuiya. The six most populous SCs constitute 93.2 % of the total SC population of the State. The overall sex ratio of the SC population in Bihar is 923 per 1000 males, which is marginally higher than the sex ratio of Bihar (919).

District Wise SC Population of Mushar in Bihar (Caritas India Intervention Districts)

S. No	District Name	Population in 2011	Population in 2001
1	Buxar*	8810	7204
2	Purnea	209448	171609
3	Sharsha	154397	112846
4	Patna	118864	93062

Source: Census of India 2001 and 2011

Status of Malnutrition in Bihar

The rates of malnutrition in Bihar exceed national averages by most measures. Constituting almost 9% of the country's population, Bihar contributes significantly to the national averages and has shown a positive trend but limited change in malnutrition

between 2006 and 2015. Prevalence of Stunting has declined from 56 % to 48%, wasting declined from 27% to 21% (NFHS-3 to NFHS-4) (Figure 1). Severe wasting, also called severe acute malnutrition (SAM) declined as well from 8.3% to 7.0% (NFHS-3 to NFHS-4).

Nutrition Status of Children under the age of 5 in Bihar

State	Stunted	Wasted	Underweight	Anaemic
Bihar	48.3	20.8	43.9	63.5

Source: NFHS-4 2015-16

Malnutrition in context to Bihar

Malnutrition is now recognized as one of the most significant impediments to human development, certainly one of the most preventable ones. It typically begins in childhood and has serious short, medium and long-term consequences on health, survival, cognitive

ability and productivity extending throughout a lifetime. Malnutrition leads to wider inequities in the society making the socially and economically poorer sections even more vulnerable. In affluent sections of the population lack of proper nutrition brings about obesity, cardiovascular disease and diabetes.

Understanding Nutritional Garden

Nutritional Garden represents the universal subsistence food production components which entail small scale vegetable and fruit production unit in relatively confined spaces near the family dwelling unit for ensuring diet diversity. The kitchen garden is an In-Situ, household production system of fruits and

vegetables with use of low cost or locally available materials. It is primarily intended for the adequate supply of fresh vegetables for family use. It also plays an important role in providing balanced diet and energy rich foods for the household members.

Principles of Nutritional Gardening

The key principles required to be followed in the nutritional kitchen garden in order to obtain regular and maximum output round the year are as follows-

1. Selection of fruits and vegetables according to existing agro-ecology.
2. Growing diverse nutritious [vitamin and mineral rich] fruits and vegetables.
3. Adequate supply of fresh vegetables and fruits throughout the year.
4. Ensure the food and nutritional security of the household.
5. Economic return through sale of surplus produce.
6. Contribute to household income by reducing the expenses on other food items.
7. Better health from balanced diet and reduce the household medical expenses.
8. Effective way for engaging family members in the community.
9. Helps to cultivate organic fruits and vegetables and leads to biodiversity conservation and improves soil health.

Why Nutritional Garden/ Benefits?

Vegetables and Fruits are rich source of nutrients, vitamins, proteins and minerals like Iron and Calcium. Besides this, they are also good source of calorie rich

nutrition. The below mentioned table indicates nutrition rich vegetables and fruits recommended for Nutritional Garden.

Nutrients/Vitamins	Vegetables and Fruits
Calories	Potato, Sweet Potato, Colocasia, Onion, Pumpkin, Peas, Tapioca, Banana
Protein	Cowpea, Peas, Banana

Vitamin A	Carrot, Spinach, Drumstick, Tomato, Pumpkin, Papaya
Vitamin B Complex	Chilli, Peas, Broad beans, Tomato, Ladies Finger, Capcium, Beat
Vitamin C	Leafy Vegetables, Tomato, Aonla, Guava, Lemon
Calcium	Curry Leaves, Drumstick, Spinach, Curry leaves
Iron	Cowpea, Beet root, Drumstick, Banana

Cropping Pattern

The seasonal cropping patterns of the respondents from the four intervention districts [e.g. Buxar, Patna,

Saharsa and Purnea] are mentioned below in a tabular representation-

Crops	Kharif [June – Sept.]	Rabi [Oct. – Mar.]	Zaid [Mar. - June]
Vegetables	Ladies finger, Brinjal, Bottle guard, Sponge Gourd, Beans, Pumpkin	Beet Root, Cauliflower, Cabbage, Pointed Gourd	Ladies finger, Bitter Guard, Cucumber, Tomato, Ridge Gourd
Green Leafy Vegetables	Spinach, Moringa leaves	Lal Saag (Red and Green), Colocasia (Kacchu), Khesari, Bathua, Mustard Saag [Sarso Sag], Coriander, Methi	No Such
Grains	Paddy and Maize	Wheat	No Such
Oil Seeds	No Such	Mustard	No Such
Pulses	Arhar, Green Gram	Arhar, Masoor, Bengal Gram, Peas and Moong	Arhar
Fruits	Mango	Papaya, Banana, Aonla	Guava
Flowers	Sponge Gourd, Pumpkin	Moringa flowers, Banana	Ridge Gourd

From the above table it has been found almost similar cropping pattern in all the four intervention areas and the indigenous crops and vegetables grow naturally in the region but they do not cultivate those. The indigenous crops and vegetables are gradually becoming extinct and need to be preserved. Previously,

the villagers used to eat the indigenous vegetables and grains only when they faced food shortages but now food is easily available to them due to various reasons like improved irrigation, increase in production of food items, government social security schemes etc.

Food Habit

The consumption pattern / food habits of the respondents show us that their diet include vegetables, fish, pulses, rice, flour which more or less provides them sufficient amount of food but not necessarily a

balanced diet and a diverse variety of nutritious food which can be ensured by including indigenous food in their food pattern.

The consumption pattern of the respondents of the four intervention districts are mentioned below

District	Breakfast	Lunch	Dinner
Patna	Chapatti, Vegetable, Chura Dahi, Chai Biscuit, Gram Flour	Rice, Pulses and Vegetables, Meat	Chapatti and vegetable, Meat, Fish
Buxar	Chapati, vegetable, Chai Biscuit, Gram Flour	Rice, Pulses and Vegetables, Meat	Chapatti and vegetable, Meat, Fish
Purnea	Chapatti, vegetable, Chuda Dahi, Gram Flour	Rice, Pulses and Vegetables, Meat, Gram Flour, local fish	Chapatti and vegetable, Local Fish
Saharsa	Chapatti, Vegetable, Chuda Dahi, Gram Flour	Rice, Pulses and Vegetables, Meat, Gram Flour, local fish	Chapatti and vegetable, Local Fish

Findings

Following are the major findings from the study which came up through continuous interactions with the respondents and the local community-

- a. The attitude towards vegetable cultivation and its importance for better health and nutrition has developed among the community people.
- b. The active participation of women's group towards vegetable cultivation has been found in the sample studied.
- c. Water is available throughout the year which is one of the best resources to promote homestead farming or vegetable gardening.

Best practices observed

During the in-depth interview of beneficiaries, the following best practices were observed-

- a. The benefits of vegetable gardening have been understood and it comes into their daily diet.
- b. Beneficiaries were interested to grow vegetables by leasing small piece of land.
- c. Roof top farming has been found among all the beneficiaries.
- d. The vegetable produces has good demand in the local markets.
- e. The rural community prepare organic manures and use it for growing vegetables which provides quality fresh produce as well as it proves to be eco-friendly both for the human health and for the environment.

Constrains faced by the beneficiaries:

- A. Input Constrain:
 - a. Lack of adequate and suitable land for the kitchen garden.
 - b. Lack of quality planting [saplings/seeds] materials.
 - c. Poor operation and maintenance of Nutritional Garden.
- B. Technical Constrain:
 - a. Lack of knowledge about Kitchen Gardening – understanding, design, and site selection processes (based on water availability, Soil &

- land type, size of land etc.).
 - b. Lack of knowledge on crop management practices, crop protection mechanism.
 - c. Lack of knowledge about the crop selection and seasonal crop planning for the Nutritional Garden.
 - d. Lack of knowledge on crop specific critical irrigation timings, propagation and nursery management processes.
- C. Socio-Cultural Constrain:
- a. Farmers' fascination towards the traditional package of practices.
 - b. Migration of beneficiaries, community people or rural youth towards the urban areas in search of better livelihood.
- D. Post-harvest Constrain:
- a. Difficulties in selling the small amount of produce.
 - b. Lack of knowledge about the post-harvest operation of various produces.
 - c. Improper market linkages leading to minimum profit from selling.
- E. General Constrain:
- a. Domestic animals menace due to lack of fencing.
 - b. Mono-cropping within the Nutritional Garden.
 - c. Comparatively less importance of NG among other farming activities.
 - d. Crop loss due to natural calamities [flood, heavy rain].

Stakeholders understanding about NG

While studying the awareness level of nutritional garden among the stakeholders of the program, it has been observed that concepts and technical (seed to seed) know-how has to be capacitated amongst the stakeholders. They have basic knowledge about kitchen garden especially when it comes to technical practices, operational processes, kitchen garden models and gardening designs suitable for varied demography and topography. Few major observations in this regard are mentioned below-

- Knowledge about the shape and size of nutritional garden.
- Different types of kitchen gardening or homestead gardening.
- Proper nutrition based crop cycle management.
- Understanding about the package of practices.

Impact of NG on Household/Community

There is immense impact of nutritional gardens but in the study areas it could be seen or measured as much. Following are the major impacts of having a kitchen garden in a homestead -

- **Impact on Health & Nutrition:** The nutritional garden has a direct impact on health and nutrition of beneficiaries. The crops grown in the kitchen garden has higher nutritive value. Regular intake of vegetables from the kitchen garden improves health and nutritional status of household members. It also helps in physical and cognitive developmental of children and reduces the anaemia among women and children.
- **Impact on Economy:** The nutritional garden has larger contribution to the economic situation of the household. The intake of vegetables produce helps in better health and nutrition of the family members which also reduces the medical expenses. Similarly, after selling the excess produce the household earns additional income out of their nutrition garden.
- **Impact on Soil Micro-environment/ Biodiversity:** Mostly the kitchen garden utilizes the locally available household made organic manures and composts which helps in enhancing the productivity as well as maintain the soil fertility by

promoting microbial activities in soil. On the other side, kitchen garden produces fresh organic vegetables which are good for health and environment.

- **Impact on Women Empowerment:** Kitchen gardens not only provide nutritional and economic returns to the household (mostly women) but also help to promote entrepreneurship among the rural women which bring confidence, motivation and self-dependence.

- **Impact on Education:** The nutritional garden has greater impact on education. It has been proved that proper nutrition helps in healthy brain development along with physical growth for children which is one of the most important factors for enhanced learning capabilities of young children. Similarly, the excess produce (after consumption) could be a source of income that helps in availing educational facilities for children.

Contribution of Kitchen Garden to the Sustainable Development Goals

Keeping the diverse benefit of kitchen garden, the below mentioned table indicates correlative benefits of

nutritional garden and its contribution to various SDGs.

SDGs	Goal	Role of Kitchen Garden
1	No Poverty	Generate small but continuous source of income, especially for women.
2	Zero Hunger	Constant and cheapest source of nutritious food.
3	Good Health & Wellbeing	Ensure good health of whole family and source of balanced diet for women of reproductive age and young children.
4	Quality Education	Provides nutrition rich vegetables, which improves brain development at younger age and supplements family income, which also help to get quality education for children.
5	Gender Equality	Selling surplus produce from the nutrition garden generate source of income for the women.
8	Decent Work & Economic Growth	Provide opportunity for entrepreneurship development in rural areas especially for women.
11	Sustainable Cities & Communities	Contributing in greening rural and urban spaces and helps in enhancing resilience from climate and health emergencies
12	Sustainable Consumption & Production	Nutritional garden helps in providing continuous supply of vegetables to households and helps to complete the nutrient cycle.
13	Climate Action	Strengthen family level resilience and adaptive capacity to climate-related risks and natural calamities.

Recommendation for the Scale-up of NG at Intervention Areas

To improve the present situation of nutritional garden at the intervention areas, it is necessary to focus more on the qualitative aspects e.g. develop a proper model, a complete year round cropping plan, complete handholding support to the identified beneficiaries, bring the POP in practice etc.

For the households having land or leased land:

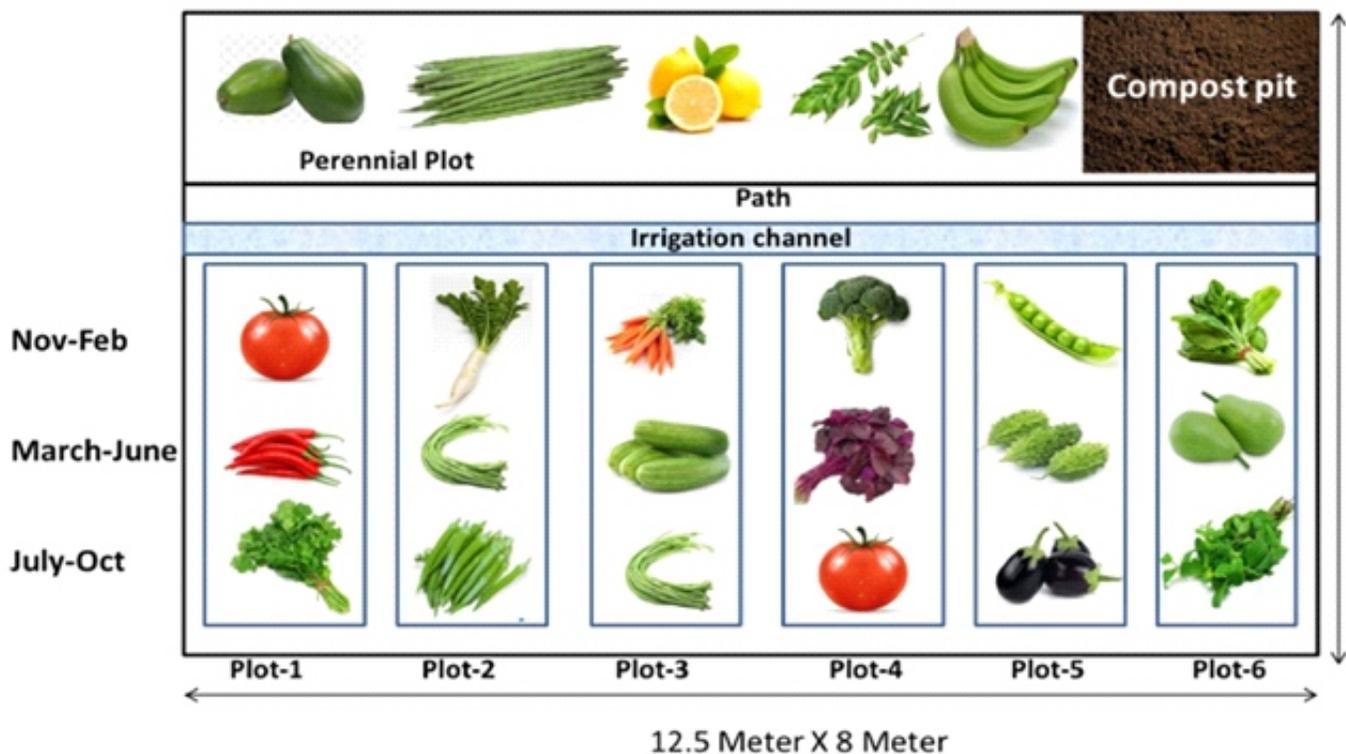
The household having land or leased land, they can go for the following successful models for cultivating

various seasonal vegetables. The details of the model and designs has been mentioned below-

Recommended Models/Designs:

Three proven successful models for implementing at different socio-economic, demographic, climatic and geographic situation of intervention areas are suggested below in a diagrammatic representation-

Model 1: Recommended Size – 12.5 m * 8m [Kumari, S. et. al., 2020]



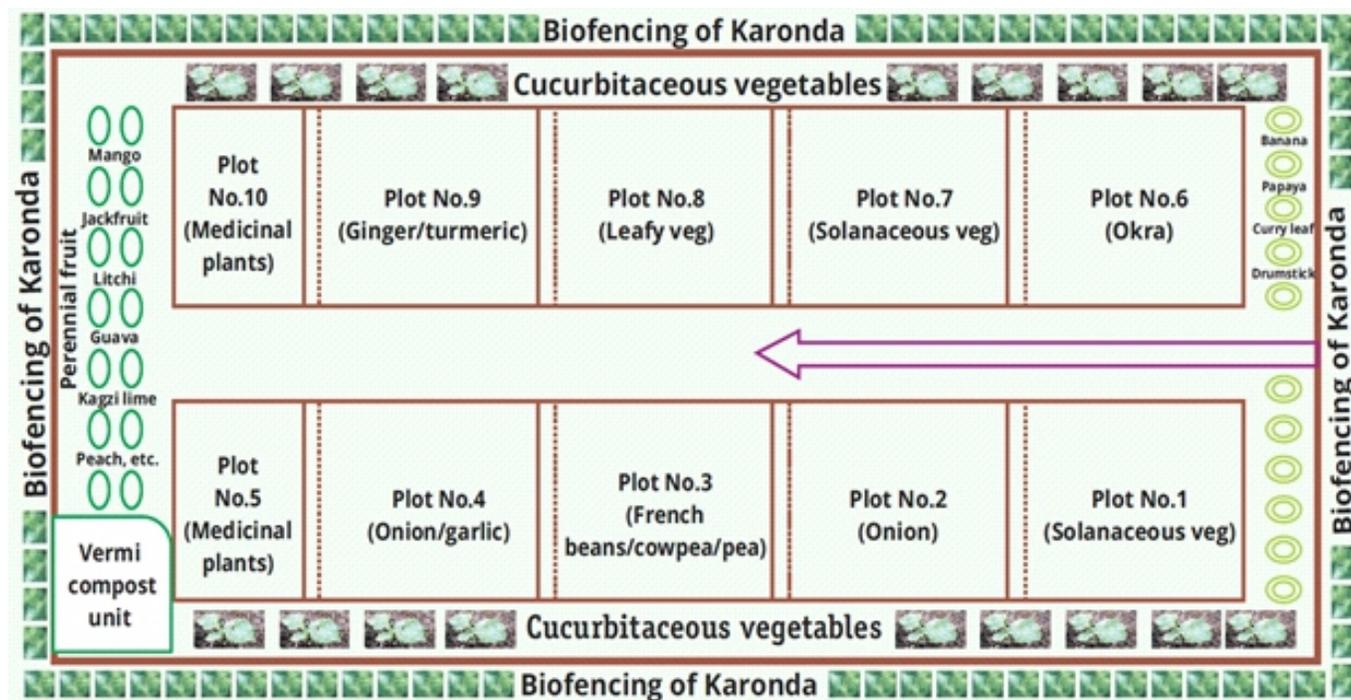
This larger model of nutritional garden has been recommended to promote the year round vegetable cultivation within the community or a group of farmers or beneficiaries. This model could be suitable for at least 6-10 households. It has been found that the farmers have less cultivable land or leased some particular land for vegetable cultivation or Nutritional Gardening. Keeping such similar context in view, the

above mentioned model could be very useful for those group of farmers to produce nutritious vegetables thorough out different seasons. The total design will be practiced in 100 square meter area with six different sub-plots [with a particular size of 4m*2m], an irrigation channel and path (mainly for various intercultural operation) of 1m width, along with a perennial crop (Papaya, Drumstick, Banana, Lemon,

Curry Leaf etc.) field including one compost pit size of 4m*2m. A bio-fencing could be very effective to protect the crops from various domestic or wild animals menace. The small compost pit will be an additional source of manures for crops as well as a good place to manage the household bio-degradable wastes, crop residues etc. Ideally it is recommended to use a thick layer beneath the compost pit and release some vermi-worm and cow-dung or any cattle dung to enhance the decomposition rate. The maximum

expenditure could be INR 10,000 – 15,000 per year [excluding the labour cost for field preparation, fencing and other activities, assuming that the communities/ beneficiaries participate for all such activities collectively, which will also help to enhance the ownership among the community people on developed Nutritional Garden]. It is also recommended to cultivate the perennial plants in south and northern side of the nutritional garden.

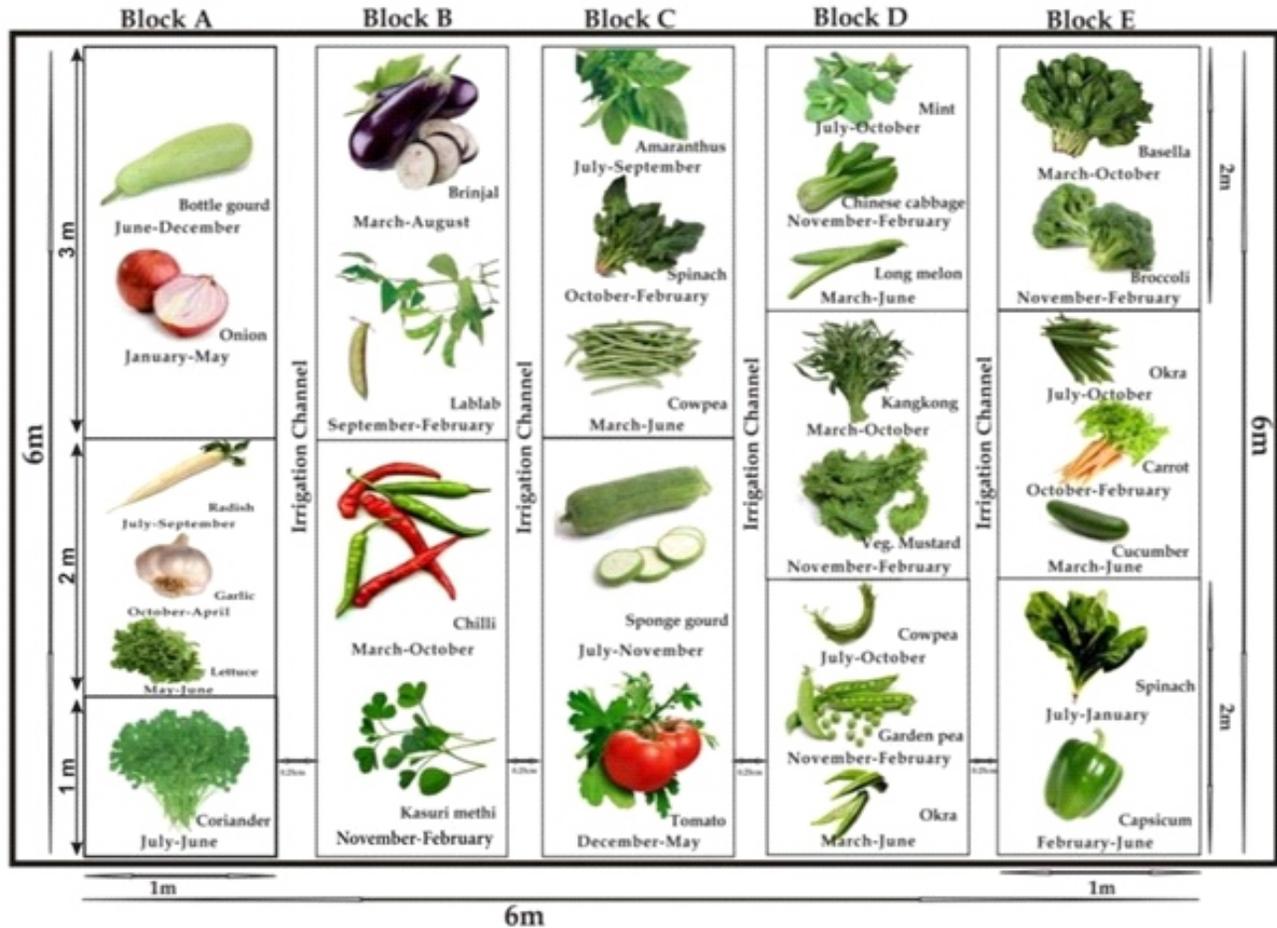
Model 2: Recommended Size – 10m * 6m [Kadam, D.M. et. al. 2020]



This model is also a successful model mostly replicated in various parts of India. This model is suitable for a large family or 3-5 nuclear families. The model contains 10 different plots [where 8 plot size: 2m*1.5m and 2 plot size: 1m*1.5m] for vegetable cultivation and also have some locally suitable fruit crops in one side which will continuously supply the nutrients rich fruits to the families. This model shows a unique pattern of creepers [e.g. Cucumber, Bottle Gourd, Ridge Gourd, Bitter Gourd, Snake Gourd, Sponge Gourd, Cowpea etc.] in two different sides of the nutrition garden area through-out the year. The Drumstick could also be planted in one side of the design. This could support

the families in year round supply of nutritious leaves, flower and fruits of drumstick. The Papaya, Lemon, Guava etc. can also be promoted through such model nutritional garden. The compost pit is also recommended here for in-situ manure/compost production to produce the vegetables organically and conserve the soil nutrients. The maximum expenditure could be INR 6,000 – 10,000 per year [excluding the labour cost for field preparation, fencing and other activities, assuming that the communities/ beneficiaries participate for all such activities collectively, which will also help to enhance the ownership among the community people on developed Nutritional Garden].

Model 3: Recommended Size – 6m * 6m [Dhaliwal, M. 2017]



The model 3 is the widely adopted model and highly recommended in the context of Bihar. This model has been widely replicated by Jeevika [Bihar Rural Livelihood Mission] in different part of Bihar to develop nutritional garden. It is also known as 20-20 model and a very successful model among all other due to its adjustable size and very minimum input cost or cost of establishment. It has been found that a

minimum INR 5,000 to 6,000 is required to practically implement such model through-out the year. This model is having 13 plots [5 plots of size 3m*1m, 7 plots of 2m*1m and one plot of 1m*1m] for cultivating seasonal vegetables through-out the year. The crop grown in different season for model 3 are listed in the below table.

S. No.	Name of Vegetable	Cropping span	Harvesting period	Plot size (m ²)	Spacing (cm)	Plants per plot
1	Bottle gourd	Jun-Dec	Oct-Dec	3 × 1	80 × 45	12
2	Onion	Jan-May	May	3 × 1	15 × 7.5	267
3	Radish	July-Sept	Aug-Sept	2 × 1	45 × 7.5	60
4	Garlic	Sep-Apr	April	2 × 1	15 × 7.5	267
5	Lettuce	May-Jun	June	2 × 1	45 × 30	15
6	Coriander	July-Jun	Oct-Jun	1 × 1	15 × 10	67
7	Brinjal	Mar-Aug	Jun-Aug	3 × 1	80 × 30	20
8	Lab lab	Sept-Feb	Nov-Feb	3 × 1	45 × 30	22
9	Chilli	Mar-Oct	May-Oct	3 × 1	60 × 45	12
10	Methi	Nov-Feb	Dec-Feb	3 × 1	15 × 10	200
11	Amaranthus	July-Sept	Aug-Sept	3 × 1	45 × 30	22
12	Palak	Oct-Feb	Dec-Feb	3 × 1	15 × 5	400
13	Cowpea	Mar-Jun	May-Jun	3 × 1	30 × 15	67
14	Sponge gourd	July-Nov	Sept-Nov	3 × 1	80 × 45	12
15	Tomato	Dec-May	Apr-May	3 × 1	80 × 30	20
16	Mint	July-Oct	Sept-Oct	2 × 1	15 × 15	88
17	Chinese cabbage	Nov-Feb	Dec-Feb	2 × 1	30 × 20	33
18	Long melon	Mar-Jun	May-Jun	2 × 1	80 × 30	12
19	Kang kong	Mar-Oct	May-Oct	2 × 1	20 × 20	50
20	Vegetable mustard	Nov-Feb	Jan-Feb	2 × 1	15 × 10	133
21	Cowpea	July-Oct	Sept-Oct	2 × 1	30 × 7.5	44
22	Pea	Nov-Feb	Dec-Feb	2 × 1	45 × 15	88
23	Okra	Mar-Jun	Apr-Jun	2 × 1	20 × 20	30
24	Basella	Mar-Oct	May-Oct	2 × 1	45 × 30	50
25	Broccoli	Nov-Feb	Jan-Feb	2 × 1	45 × 7.5	15
26	Okra	July-Oct	Sept-Oct	2 × 1	80 × 30	30
27	Carrot	Oct-Feb	Jan-Feb	2 × 1	60 × 30	60
28	Cucumber	Mar-Jun	May-Jun	2 × 1	80 × 30	12
29	Palak	July-Jan	Oct-Jan	2 × 1	15 × 15	267
30	Capsicum	Feb-Jun	Apr-Jun	2 × 1	30 × 20	12

For the Landless households:

Households having no land can go for the following techniques for growing various seasonal vegetables and fruits-

- Sack cultivation.
- Bucket/ Pot farming.
- Roof top farming.

The above mentioned farming practices is mostly recommended for the household having very less or no

land for cultivation. The household basically recommended to arrange some used bags or plastic buckets or the unused earthen pots to cultivate some creepers or vegetables crops besides house or any suitable place. In some studied place, it has been observed that the families are doing roof top farming (mostly the creepers) by using earthen pots, sack bags, discarded plastic buckets and drums. These are very low cost farming techniques and can produces different crops in different seasons which can easily fulfil the vegetable requirement of the family.

Case Story

Story I

A positive collaborative work on vegetable cultivation has observed at Menha village of Sattar Gram Panchayat comes under Saharsa district of Bihar. Where, a group of women from four Self-Help Group [namely Komal SHG, Saibaba SHG, Sadvi SHG and Koski SHG] has found practicing an amazing roof-top farming with different seasonal creepers. Mostly they consume their produces and the excess sells in local market



Story II

The Dinesh Prasad, from Jujharour village of Akhini panchayat in Buxar district, has demonstrated a best kitchen garden cultivating cereals, pulses, vegetables and leafy vegetables in his garden. Not only that he has cultivated various fruit crops such as papaya, guava, pomegranate etc. along with a proper fencing with locally available resources



References:

- Galhena D.H., Freed R., and Maredia K.M., 2013, Home gardens: a promising approach to enhance household food security and wellbeing, *Agric Food Security*, 2: 8
- Marsh R., 1998, Building on traditional gardening to improve household food security, *Food Nutr. Agric.*, 22: 4-14
- Wanasundera L., 2006, Rural women in Sri Lanka's post-conflict rural economy, Colombo, Sri Lanka: International Labor Office, RAP Publication, 13

Studied Successful NG Beneficiary Details

Sl. No.	Name of Beneficiary	Village/Panchayat	District
1	Malti Devi	Sotachawk, Sakraicha	Patna
2	Ganesh Manjhi	Palang, Dhibra	Patna
3	Sumitra Devi	Sotachawk, Sakraicha	Patna
4	Jamuna Ram	Nuaon	Buxar
5	Shitamanuiya Devi	Mukhraon (Ward No. 11)	Buxar
6	Dinesh Prasad	Jujharpur, Akhini	Buxar
7	Nirmala Devi	Menha, Sattar	Saharsa
8	Saraswati Devi	Menha, Sattar	Saharsa
9	Ranjan Devi	Menha, Sattar	Saharsa
10	Phool Kumari Devi	Guski	Purnea
11	Urmila Devi	Khakobari	Purnea
12	Munny Devi	Uchitpur	Purnea

Photographs



Notes

Notes



CBCI Centre, 1 Ashok Place
New Delhi 110001

Email: director@caritasindia.org

Website: www.caritasindia.org/GlobalProgramIndia