

Nutrition Gardens: A Sustainable Model for Food Security and Diversity

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ABSTRACT India may be the world's second largest producer of food, but it has its second largest undernourished population. Further, more than half of women in India suffer from anaemia, which is one of the reasons for the high rate of low-birth weight babies. An unbalanced diet and lack of food is directly linked to high rates of stunting, excessive weight, and death in children under five years of age. The Government of India has implemented programmes for providing food security and ensuring access to adequate quantity of quality food. There is a need to look at multiple strategies to combat the issue of food security. Community and nutrition gardens can play an important role in enhancing national food security and dietary diversity to combat malnutrition.

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INTRODUCTION

India ranks 102nd out of 117 countries in the 2019 Global Hunger Index, and suffers from a serious level of hunger with a score of 30.3.¹ Indeed, the country continues to grapple with a high rate of undernutrition, and managing it continues to be a massive challenge. The stunting levels are 38.4 percent and underweight numbers are 35.8 percent as reported in the National Family Health Survey 4 (NFHS-4).² There has been only a marginal improvement over the years. Undernutrition leads to long-term effects, including cognitive and growth deficits and reduced immunity to infections. It is the underlying cause of nearly half of all deaths amongst children under five years of age in India.³

Food security continues to be a matter of grave concern for India. Despite being the second largest producer of food, India is home to the world's second largest undernourished population (195.9 million). A review of studies examining the link between food security and malnutrition in children suggests a direct association with undernutrition in children in middle-income countries.⁴ Another study concludes that undernutrition/stunting is a consequence of household food insecurity.⁵

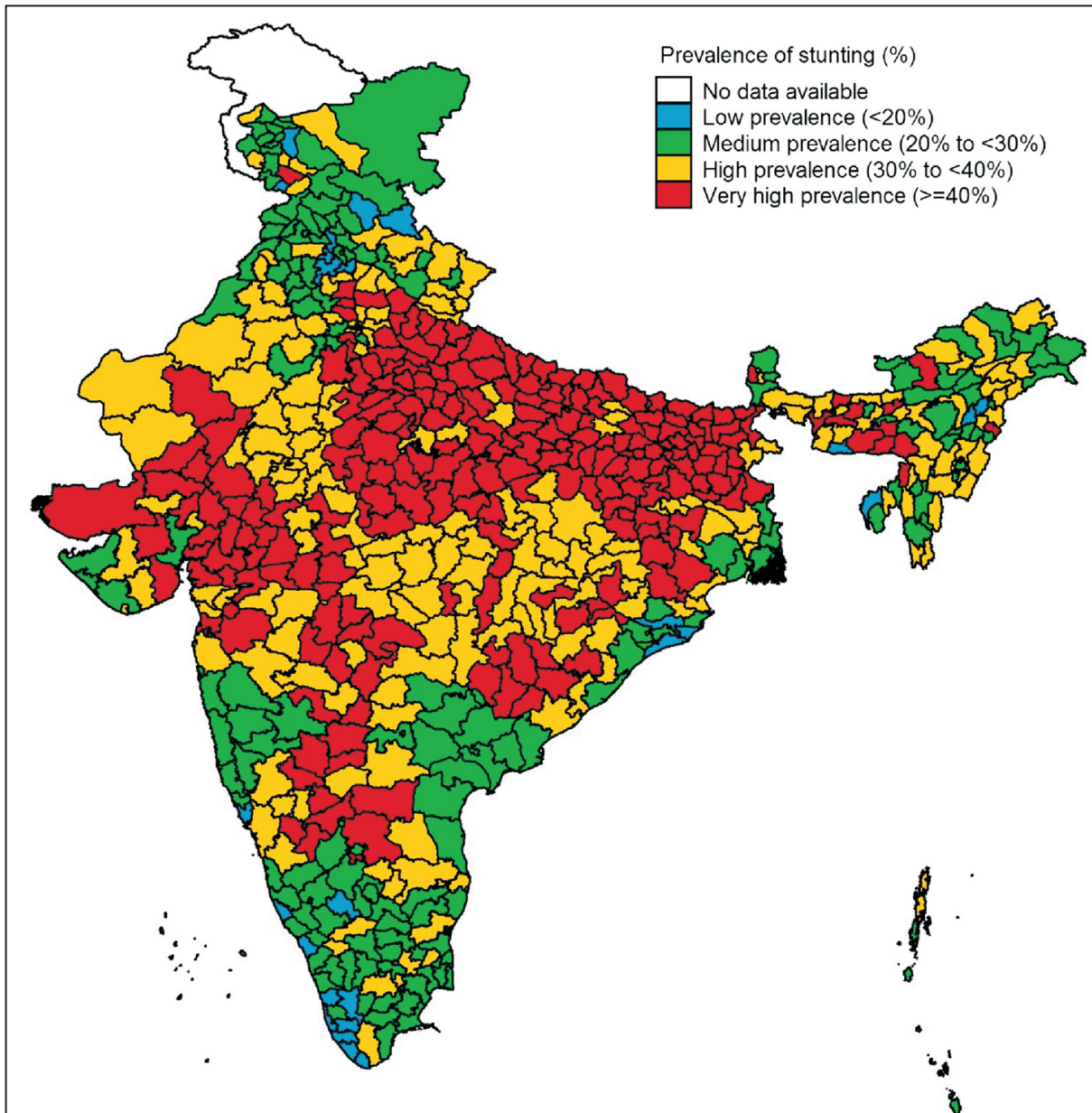
India tops the list of countries with 46.6 million stunted children under the age of five, followed by Nigeria and Pakistan at 13.9 and 10.7 million, respectively. Among Asian countries, wasting is highest in India, standing at 25.5 million.⁶ Evidence⁷ also suggests that two-thirds of India's current workforce are stunted, and because of the enormous economic costs incurred it has reduced the country's future per capita income.

The incidence of stunting in children tends to be higher in rural areas than in urban, possibly due to the generally lower incomes in rural areas. This doubles in children born to mothers with no schooling as compared to mothers with 12 or more years of schooling. Stunting also shows a steady decline with increase in household income. There is a wide regional variation as well: states like Bihar, Uttar Pradesh and Jharkhand record rates of more than 40 percent stunting, whereas Kerala and Goa have lower rates at 20 percent. However, Chhattisgarh recorded a 15-point drop in stunting in the last decade, while Tamil Nadu has recorded the slowest progress.⁸

A study on stunting prevalence shows variation across districts (12.4–65.1 percent) with 239 of 640 districts having stunting levels above 40 percent.⁹ Uttar Pradesh tops the list, with six out of 10 districts having the highest rates of stunting (Map 1). On the other hand, there are districts with low levels of stunting from states which are otherwise high on stunting prevalence like Odisha with two of the top ten districts (Cuttack 15.3 percent and Puri 16.1 percent) with lowest prevalence.

To add to the burden of malnutrition, more than half (53.1 percent) of women (15–49 years) in India are anaemic, which has lasting effects on future pregnancies, and is also one of the causes for the high rate of low-birth weight babies.¹⁰ The situation worsens when infants are fed inadequate diets. According to the World Health Organization (WHO), an unbalanced diet and lack of food (other than mother's milk), is directly linked to high rates of stunting, excessive weight, and death in children under five years of age. It is therefore

Map 1: Stunting Prevalence Across India

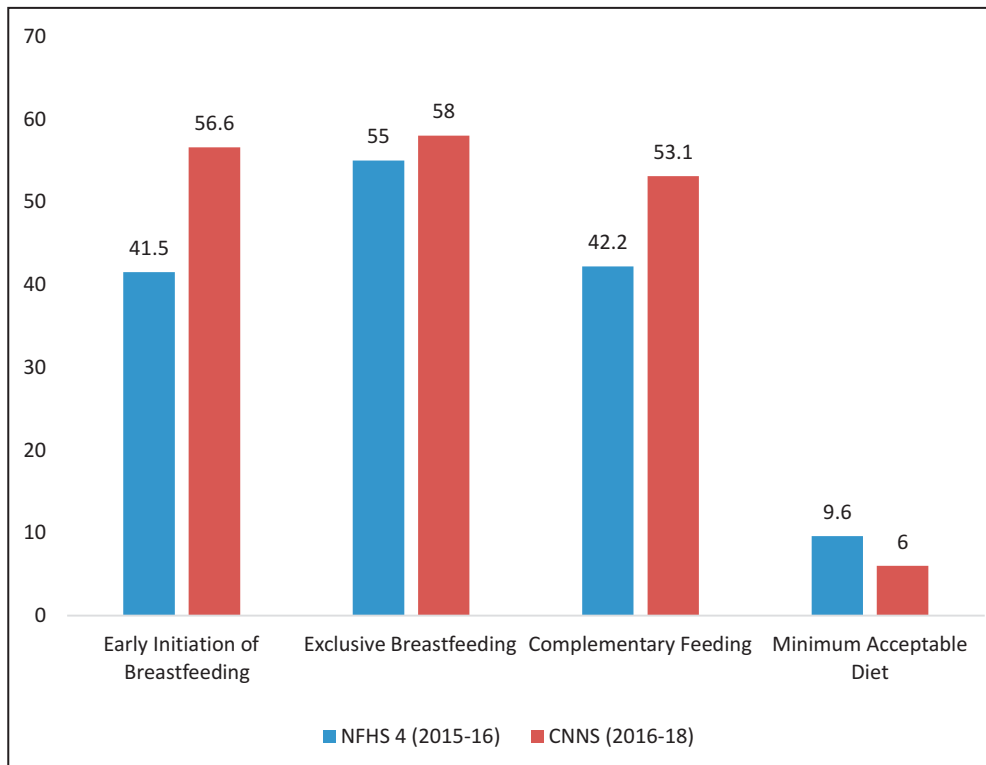


Source: International Food Policy Research Institute (IFPRI) 2017
<http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/131162/filename/131373.pdf>

important to break this intergenerational cycle of malnutrition.

The 1,000 days from conception till two years of age are crucial and provide an opportunity to prevent childhood stunting and obesity problems later in life. Exclusive breastfeeding, long considered the best form of nutrition for newborns, averages 42 percent globally, while India lags behind in terms of exclusive

breastfeeding at 54.9 percent and complementary feeding at 42.7 percent, with only 9.6 percent children receiving an adequate diet.¹¹ Figure 1 shows the rate of infant and young child feeding practices from the NFHS-4 as compared to the Comprehensive National Nutrition Survey (CNNS) (2016–18). A deterioration in minimum adequacy of diet is observed, which is a cause of concern.

Figure 1. Prevalence of Infant and Young Child Feeding Practices

Source: NFHS-4 (2015–16) and CNNS (2016–18)

The Government of India has taken significant steps for providing food security and combating malnutrition over the past four decades through the Integrated Child Development Services (ICDS) by providing supplementary food to children, pregnant and lactating women and take-home rations; the Mid-Day Meal programme; and strengthening the Public Distribution System (PDS). The National Food Security Act 2013 ensures access to adequate quantity of quality food through the government food security programmes.¹² Despite this, 195.9 million people go hungry every day.¹³

There is a need to look at multiple strategies to combat the issue of food security in the context of the ever-growing demand. Community gardens¹⁴ can play an important role in providing national food security by

supplementing rations and providing essential nutrients.¹⁵ Nutrition gardens¹⁶ enhance dietary diversity by providing micronutrients through constant supply of fruits and vegetables sufficient to meet the family's requirements. Thus, nutrition gardens can prove to be a sustainable model for providing food security and diversity to combat malnutrition at the household or community level.

SCHOOL AND HOME GARDENS FOR IMPROVED NUTRITION: REVIEW OF LITERATURE AND CASE STUDIES

Fruits and vegetables from the kitchen gardens are good source of micronutrients especially in the poor households. Rural areas have ample space and establishing a kitchen garden is far simpler as farm families are involved in agriculture.¹⁷

Studies on school gardens reveal improved nutrition and food preference in children.^{18,19} School gardens are known to increase consumption of fruits and vegetables, bring health and nutrition behaviour change, and have a positive effect on adolescent health.^{20,21,22,23} In addition, school gardens have the potential to augment physical activity and dietary intake in children.^{24,25} A research study from New York state schools has found potential in school gardens in improving physical activity and reducing sedentary behaviour.²⁶

Studies across countries suggest home gardens as an option to enhance food security and nutritional status of households.^{27,28,29} Nutrition gardens are a micro-solution and an affordable way of ensuring healthy food and balanced nutrition. A study from Lao PDR on home gardens concludes it to be an effective and sustainable means of improving nutritional standards of low-income rural families through integrated household food production.³⁰ Micro-gardening presents an innovative solution to ensure food security, employment of youth, and an alternative way to generate extra income in developing countries.³¹ Case studies from Bihar,³² the tribal and rural sector in Odisha,^{33,34} and rainfed areas in Dharmapuri, Tamil Nadu³⁵ provided not only a means of livelihood, but also improved consumption of nutritious food.

A review of data on maternal and child undernutrition and survival from 36 countries has suggested dietary diversification, including home gardening as an effective strategy to improve nutrition.³⁶ In India, a study from villages in districts of

Odisha and Maharashtra found positive outcomes in terms of improved household diversity by promoting nutrition gardens.³⁷ Households consumed the food, and any excess was distributed to neighbours or sold. The frequency and quantity of fruit and vegetable consumption increased, which fulfilled the nutritional requirement of the families. An intervention from Bangladesh found three to four times increase in variety and quantity of fruits and vegetables among households practicing kitchen gardens.³⁸

Case Studies

A case study from Zimbabwe found that nutrition gardens have a positive impact on livelihood as they provide steady incomes³⁹ and curb diet-related diseases. Kitchen gardens provide cheap vegetables thereby reducing the daily food cost and also protect the environment.⁴⁰ Fruits and vegetables grown in home gardens play an important role in filling the gap in nutritional needs by providing access to food that is harvested, prepared and consumed by family members.^{41,42,43,44}

Another study revealed that the Mesoamerica region, which suffers from poverty and malnutrition, uses home gardens for basic food requirement as well as income generation thereby promoting food security.⁴⁵ Kitchen gardens not only improve food availability and diversity in terms of cereals, pulses and green leafy vegetables, they also improve haemoglobin levels in women.^{46,47} A study from rural Tanzania documented kitchen gardens as a promising opportunity to grow fruits and vegetables high in micronutrients and to address food insecurity and malnutrition issues.⁴⁸

An initiative started in a remote border district of Mizoram for developing edible terrace gardens in schools and anganwadi centres has improved self-sufficiency in fruits and vegetables. Children are encouraged to consume fruits and vegetables during their mid-day meals.⁴⁹

Meanwhile, in a study in Cambodia, households were found to consume more vegetables, improved on their dietary diversity, and had lower prevalence of fever among children under five years of age.⁵⁰ Similar findings from another study in Western Kenya found that access to community-based nutrition interventions like kitchen gardens with increase in food production helped in reducing prevalence of stunting in children.⁵¹ Kitchen gardens not only empower women but also address poverty alleviation and bring socioeconomic returns through reduced health costs.⁵²

The United Nations-ESCAP has recommended the promotion of sustainable home or kitchen gardening as an effective strategy for social protection, integrated with health and nutrition education.⁵³ Home gardening contributes to household food security by providing direct access to food to the family members.^{54,55} UNICEF's community-led Nutrition Gardens in Chhattisgarh sets a good example in promoting nutrition levels, livelihood and improved indicators of food security, and reduction in incidence of diseases associated with malnutrition.⁵⁶

A home garden model tested in rural households in Bangladesh has reported reduced expenses on vegetables, improved intake of fresh fruits and vegetables, and also income generation by sale of the produce.⁵⁷

A meta-analysis of 22 case studies on domestic/community gardens from around the world provides evidence of improvement in physical, psychological and social health, which has long-term impacts on wellbeing.⁵⁸ According to a study from rural Maharashtra, nutri-gardens have tremendous potential to decrease the number of cases of malnutrition in children.⁵⁹

Farmers in rural Odisha utilise backyard spaces to grow seasonal fruits and vegetables, which has led to increased participation by women, and an improvement in the economic conditions with the sale of excess produce.⁶⁰ Gujarat has also developed an effective model for backyard kitchen gardening, which aims to promote a healthier, more prosperous and sustainable life for farm women.⁶¹ In districts with high rates of malnutrition in Odisha, women are maintaining kitchen gardens to feed their families with nutritious food without incurring any additional cost.⁶²

FOCUS ON RELIANCE NUTRITION GARDENS

The Bharat India Jodo (BIJ) flagship programme of Reliance Foundation on rural transformation, aims to bridge the development gap between rural and urban India. BIJ is committed to rural transformation. It works with farmers, helps farming households and works with communities in villages across 12 states namely Andhra Pradesh, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Telangana and Uttarakhand. Under its rural transformation programme, BIJ has developed a model of 'Reliance

Nutrition Gardens⁶³ (RNG), which are cost-effective and holistic kitchen garden models aimed at providing nutritious, organic and diverse fresh vegetables to marginal rural families throughout the year. RNG aims to develop self-sufficiency in food and nutrition by promoting cultivation of nutritious food. As backyard kitchen gardens are common in rural households, the programme aims to establish best practices and improve nutritional intake through the RNG, which will produce a variety of vegetables, fruits and medicinal plants sufficient for household nutrition security. The RNGs are led by women in the households, which ensures space for women in decision-making.

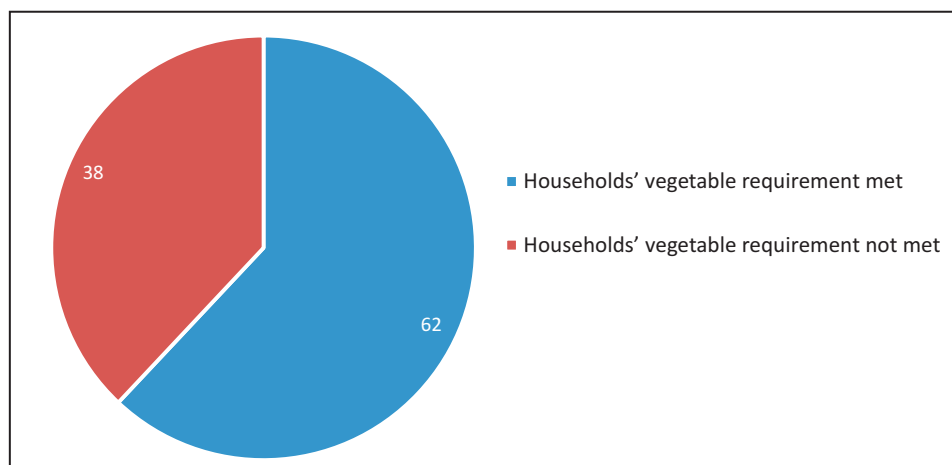
An assessment of the RNG⁶⁴ in 2019 found a positive impact on nutrition sufficiency at the household level. The findings revealed that RNGs helped in growing a variety of quality vegetables and improving the affordability for beneficiaries. It also improved the knowledge base on nutritive value of vegetables and their impact on health. The RNG households registered a 22-percent increase of vegetable consumption for all meals. This helped them

save money while buying vegetables, milk, and milk products. At the same time, however, challenges were observed in terms of water supply, and lack of understanding on how to sustain the production beyond their own consumption.

A 2018 evaluation of the BIJ programme,⁶⁵ where the households with RNG were compared to those with nutrition gardens, found a marked improvement in nutritional intake in households with RNGs. The findings showed that 62 percent of the vegetable requirements of the rural households was met by RNG products (See Figure 2). There was also an increase in the incomes of RNG households from the sale of fruits and vegetables. A reduction in expenditure for food was also reported both in the RNG and comparison area with nutrition gardens.

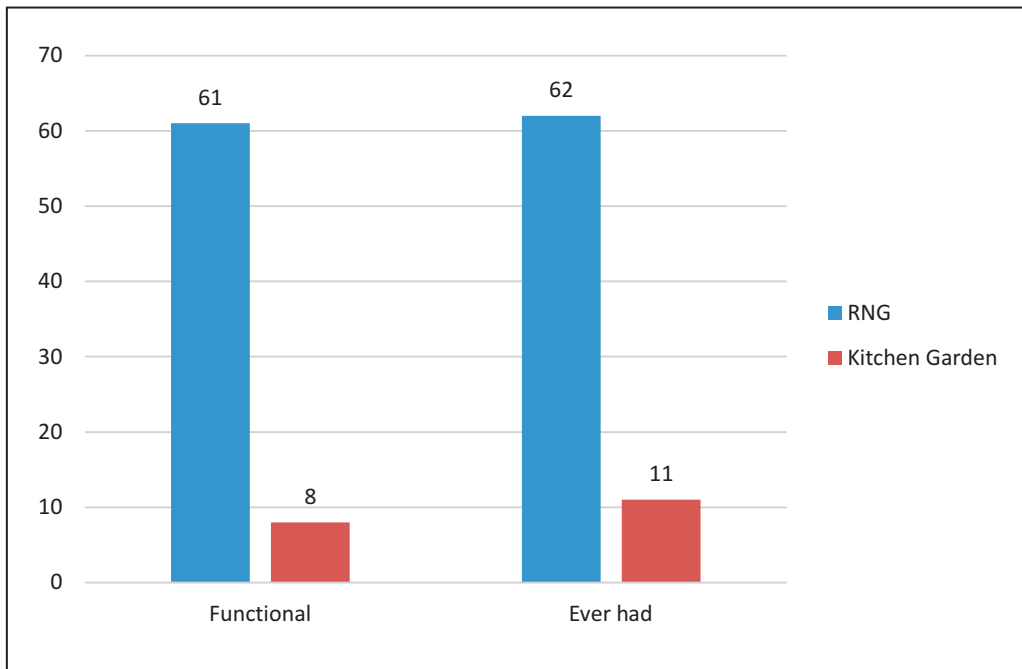
It was observed that more households had functional RNGs as compared to the households with nutrition gardens (See Figure 3). This could be due to the sustainability of RNGs in the long term, as compared to nutrition gardens (See Annexure 1).

Figure 2. Percentage of Households' Vegetable Requirement Met from RNG



Source: Evaluation of Bharat India Jodo Programme. Sambodhi Research and Communications Private Limited 2018 (unpublished).

Figure 3. Percentage of Households with Functional RNG as Compared to Households with Kitchen Garden

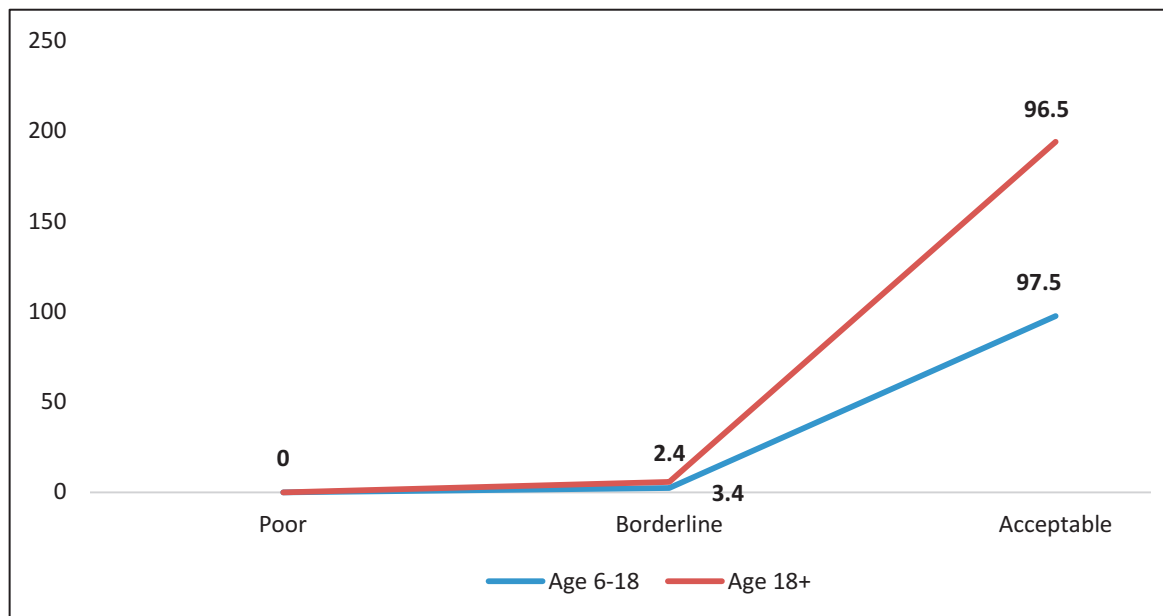


Source: Evaluation of Bharat India Jodo Programme. Sambodhi Research and Communications Private Limited 2018 (unpublished).

The impact of RNG on food security was calculated based on the WHO’s Food Consumption Score (FCS).^a The FCS was in the acceptable range for more than 96 percent of

children (See Figure 4) across 6–18 and above 18 years of age (See Annexure 2). This shows an improvement in terms of food security and diversity.

Figure 4. The Food Consumption Score of Households with RNG



Source: Evaluation of Bharat India Jodo Programme. Sambodhi Research and Communications Private Limited 2018 (unpublished).

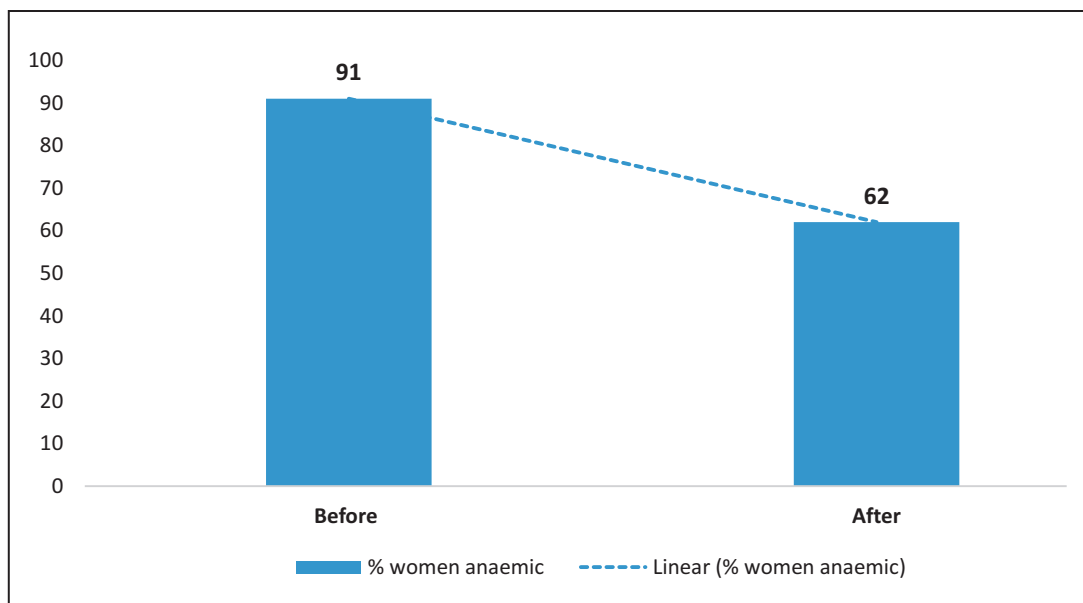
a The score signifies the daily intake of cereals, pulses and vegetables by children, adolescents and adults alike.

Shortage of food was reported by eight percent of the households with RNG in the past 12 months, despite government schemes around food security like mid-day meals, ICDS and the PDS. An analysis of the Coping Strategy Index^b revealed that eight percent of households faced food shortage, and the strategies adopted in descending order relied on less preferred and less expensive food, borrowed food or help from relatives or friends, restricted consumption by adults in order for children to eat, limited portion size at meals, and reduced number of meals consumed in a day. The households with RNGs have started growing vegetables based on availability of seeds and according to the requirements of the family. The use of organic manure is being practiced in the RNGs. The evaluation suggests strengthening the RNG implementation strategy to improve its functionality and awareness on growing nutritious food for an adequate impact on food and nutrition security.

The RNG households have been found to improve the health status of women. An impact assessment on consumption of vegetables produced in the RNGs has shown a marked decrease in the prevalence of anaemia amongst women. There was a 32 percent (91 to 62 percent) decrease in anaemia cases in women over a span of 24 months (See Figure 5). The women were tested for anaemia before and after the establishment of RNGs in their household and followed up every six months.⁶⁶ The decrease varied depending on the period of consumption; there were more anaemia-free cases over a period of 1–2 years. There was also a marked improvement in haemoglobin levels of children aged six months to two years (See Annexure 3).

Overall, though RNGs have improved nutritional intake, there is a need to strengthen their efficiency. Other strategies like capacity-building, awareness and sensitisation of women on anaemia through community and health workers should be adopted.

Figure 5. Impact of Consumption of Vegetables on Anaemia Status in Women



Source: Impact of Reliance Nutrition Gardens in improving the health status of women across the programme areas of RFBIIJ (unpublished data).

^b This index measures the strategies a family adopts in case of food shortage.

STATE INITIATIVES TO PROMOTE KITCHEN GARDENS

- Odisha Livelihood Mission,⁶⁷ under the Panchayati Raj and Drinking Water department, as part of the farm livelihood/promotion of Nutrition-sensitive Agriculture is promoting kitchen gardens. The expansion plan of kitchen garden includes capacity-building of the *Krishimitras*⁶⁸ on nutrition garden/backyard kitchen garden.
- The Karnataka Horticulture department with funds from MGNREGA is developing kitchen gardens called 'Akshara Kaitoota' in government schools to promote consumption of vegetables and fruits.⁶⁹ This is in addition to the vegetable gardens already existing in many schools.
- Chhattisgarh's Krishi Vigyan Kendra or Agriculture Science Centre has developed the concept of 'nutrition garden' in schools to provide a balanced diet to students in the mid-day meal.⁷⁰
- In Chhattisgarh, there is convergence of MGNREGA with the Panchayat and Rural development departments, to secure livelihood for rural households by promoting kitchen gardens.⁷¹
- Jharkhand Poshan Vari initiative provides for backyard kitchen gardens where women grow cereals, pulses and vegetables to tackle poor nutrition and also for earning income.⁷²
- Tamil Nadu Horticulture Department has tied up with the School Education Department to establish roof gardens in

schools to create awareness on importance of vegetables and fruits.⁷³ The produce from the gardens is used in school kitchens serving nutritious noon meal scheme.

- A joint initiative by Department of Women and Child Development, Maharashtra under its Rajmata Jijau Nutrition Mission and Reliance Foundation has developed kitchen gardens at anganwadi centres to grow variety of fruits and vegetables to improve diet.⁷⁴

CONCLUSION AND RECOMMENDATIONS

The literature summarised in an earlier section of this brief supports the promotion of nutrition gardens as a sustainable practice to improve nutrition and food security by contributing significantly to dietary diversity. This is true for India as well. Kitchen gardens can help strengthen food security and improve income generation and livelihoods.

The Government of India launched the National Nutrition Mission or POSHAN Abhiyaan with the objective of a multi-ministerial convergence mission to ensure attainment of a malnutrition-free India by 2022. It calls for creating synergy and linking the schemes of other key departments through convergence mechanism to achieve a common goal. The National Rural Livelihood Mission⁷⁵ is promoting kitchen gardens as part of farm livelihood intervention strategy for National Nutrition Mission, to combat malnutrition by promoting healthy eating and improving agro-ecological practices. Households are encouraged to develop vegetable gardens, and data shows increase in

consumption of vegetables, improved dietary diversity and generation of income.


Mizoram has begun developing school spaces for kitchen gardens called ‘Kan Sikul, Kan Huan’ or My School, My Farm,⁷⁶ to improve the nutritional content of meals served to children. Chhattisgarh’s district with highest prevalence of malnutrition, Bijapur, has developed kitchen gardens⁷⁷ in anganwadi centres in remote areas. Government schools in Chandigarh are developing mini farms to provide for their mid-day meals.⁷⁸

The Ministry of Human Resource Development has developed guidelines for school nutrition (kitchen) gardens⁷⁹ in government and aided schools under the mid-day meal scheme. There are proven initiatives across states, which can learn from each other’s experience and replicate best practices.

This brief makes the following recommendations for promoting community gardens.

- Scale up the practice of kitchen gardens to promote increased consumption of

diverse and nutrient-rich foods through convergence under the National Nutrition Mission or POSHAN Abhiyaan.

- Capacity-building on kitchen gardens can be incorporated as part of training curriculum of community health workers/anganwadi workers under the Ministry of Women and Child Development’s flagship programme of ICDS. This will enhance their knowledge on benefits of nutrition gardens and raise awareness in the community.
- The Village Health and Nutrition Day, a Government of India initiative to improve access to health and nutrition services, can be utilised to raise awareness on nutrition gardens, and also demonstrate how the food grown can be introduced in the daily diet.
- An alignment with Ministry of Rural Development initiative of Deen Dayal Upadhyaya Grameen Kaushalya Yojana to promote rural livelihood can help build skills on developing kitchen gardens for better economic opportunities and income generation. 

ABOUT THE AUTHOR

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ANNEXURES**Annexure 1: Percentage of Households with Functional RNG and Kitchen Gardens**

	Functional RNG	Functional Kitchen Garden
% Households with Functional RNG/Nutrition Garden	62	11
% Households who ever had RNG/Nutrition Garden	61	8

Source: Evaluation of Bharat India Jodo Programme. Sambodhi Research and Communications Private Limited 2018 (unpublished)

Annexure 2: Food Consumption Score across Age 6–18 and above by RNG

Age (in years)	Poor	Borderline	Acceptable
6-18	0	2.4	97.5
18+	0	3.4	96.5

Source: Evaluation of Bharat India Jodo Programme. Sambodhi Research and Communications Private Limited 2018 (unpublished)

Annexure 3: Percentage of Anaemia Cases in Women Pre- and Post-consumption of Vegetables from RNG

Consumption of vegetables from RNG	%
Before	91
After	62
Difference	32

Source: Impact of Reliance Nutrition Gardens in improving the health status of women across the programme areas of RFBII. (unpublished data)

ENDNOTES

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