

Poshan Vatikas



Chapter 1 – Concept of Nutri-Gardens

There are multiple pathways from which agriculture may lead to improved nutrition outcomes. One of them is through diversified crop production which may improve diet diversity and consequently nutrient intake (Dizon, Josephson, and Raju 2021). For this reason, many nutrition-sensitive agriculture approaches emphasize bolstering on-farm agrobiodiversity to promote both sustainable and diverse diets for better nutrition.

Nutri-gardens are one way to complement on-farm production year-round and expand access to diverse foods for household consumption. The potential for crop diversity to positively impact dietary diversity is a large theoretical underpinning of the Nutri-garden framework. Another pathway through which Nutri-gardens may impact diet quality is through income generation, which, when paired with nutrition behavior change communication can increase market purchasing of nutrient-dense foods (Mamgai, Nautiyal, and Jethi 2021; Aliza Pradhan et al. 2021).

Nutri-gardens are commonly implemented among rural farming households in India (Parida et al. 2018). In past cases, Nutri-gardens have been able to supply household consumption requirements and beyond; as mentioned, the surplus can generate additional income through commercial sales (Parida et al. 2018; Dizon, Josephson, and Raju 2021). It also serves as a cost-effective avenue through which important micronutrient deficiencies may be addressed such as iron, vitamin A, and zinc. It does this through the production of nutrient-dense crops that would otherwise be limited in access or affordability (Suri 2020; A. Pradhan et al. 2018).

Most nutri-gardens require few resources and technical inputs; including a small area of cultivatable land, locally viable seed kits/saplings, organic fertilizer inputs such as vermicompost or manure, and irrigation in more arid regions (Parida et al. 2018; Aliza Pradhan et al. 2021; A. Pradhan et al. 2018). Nutri-garden interventions often include a learning component that ranges from teaching women garden management to preparing meals with local crops grown in the garden. Nutrition-targeted education is also commonly integrated into interventions that encourage the consumption of crops from diverse food groups among other important messages on nutritional awareness (Akter et al. 2021; Birdi and Shah 2016; Arya et al. 2018; Aliza Pradhan et al. 2021).

Depending on the agroecological region, nutri-gardens typically are used to grow three vegetable types: green leafy vegetables, roots and tubers, and other vegetables rich in micronutrients such as iron or vitamin A (Aliza Pradhan et al. 2021). At the same time, nutri-garden horticulture is not limited to vegetables but also may include fruits, medicinal plants, and spices (Mamgai, Nautiyal, and Jethi 2021).

One additional important outcome associated with Nutri-gardens is women's empowerment (Mamgai, Nautiyal, and Jethi 2021). A previous study showed that women are often the decision-makers regarding which vegetables are grown and that women tend to be the primary caretakers of the garden. This is in direct comparison to men who traditionally make the majority of decisions regarding the management of vegetables and crops cultivated in the fields for commercial purposes (Aliza Pradhan et al. 2021)

Chapter 2 – Literature Review

Evaluations of Nutri-Garden Interventions in India

REFERENCE	SETTING	SAMPLE	TIME PERIOD	INTERVENTION	RESULTS
(Narayanan, R. & Panda, A. K. 2011)	Koraput District, Odisha	3 villages, 147 households	2008 to 2009 (1 year)	Home nutri-garden, seeds / saplings not given	Increase in dietary diversity for green vegetables
(Birdi & Shah, 2015)	Melghat, India	10 villages, 362 households	2011 to 2013 (2 years)	Home nutri-garden, given seeds / saplings	Increase in dietary diversity for all food groups other than cereals and pulses
(Murty, Rao, & Bamji, 2016)	Medak district, Telangana	8 villages, 60 households	2011-12 to 2013-14 (2 years)	Provision of seeds / saplings to women at AWCs and selling chickens to households	Increase in consumption of green leafy vegetables, increase in consumption of eggs, slight decline in percent children 2-24 months with moderate-to-severe malnutrition
(Pradhan et al., 2018)	Wardha district, Maharashtra Koraput district, Odisha	12 villages, 376 households	2013-14 to 2017 (3 years)	Home nutri-garden, given seeds / saplings	Increase in consumption of green leafy vegetables, roots and tubers, other vegetables, and fruits (g per person per month) Anthropometry and anemia collected only at baseline, not follow up
(Vijayalakshmi, Swamy, & Jyothi, 2020)	Nellore district, Andhra Pradesh	3 villages, 10 households	Years of study not reported (6 months)	Home nutri-garden, given seeds	Increase in consumption of vegetables (kg per household per month)
(Suri, 2020)	12 states	Not reported	2018-2019 (1-2 years) Unclear reporting	Reliance Nutrition Gardens	Increase in consumption of vegetables and decrease in anemia

Facilitators and Barriers of Nutri-Gardens in India

Facilitators	Barriers
<p>Physical Inputs</p> <ul style="list-style-type: none"> • Distribution of plants(Birdi and Shah 2016) • New crop types generated interest(Birdi and Shah 2016) • Provision of seed kits(Kadam et al. 2020) • Community seed banks to ensure seeds for upcoming seasons(Aliza Pradhan et al. 2021) <p>Socioeconomic Status</p> <ul style="list-style-type: none"> • KG adopted by women with more education in Bangladesh(Akter et al. 2021) • Farm size as proxy for wealth associated with greater adoption rates(Akter et al. 2021) 	<p>Physical Inputs</p> <ul style="list-style-type: none"> •Lack of time/ no additional labour(Birdi and Shah 2016) •Lower income farmers were engaged in other income generating activities which affected KG yields due to labor input(Ferdous et al. 2016)
<p>Environmental Factors:</p> <ul style="list-style-type: none"> • Irrigation(Akter et al. 2021; Ferdous et al. 2016) • Roof top kitchen garden had highest yields in Bangladesh(Ferdous et al. 2016) • Design according to agroecological region(Ferdous et al. 2016) • Local bioinputs as pest repellents and fertilizer(Parida et al. 2018) 	<p>Environmental Factors:</p> <ul style="list-style-type: none"> • Water Scarcity (Ferdous et al. 2016; Aliza Pradhan et al. 2021; Akter et al. 2021) • Unavailability of land(Birdi and Shah 2016) • Lack of fencing; destruction by livestock and heavy rain(Birdi and Shah 2016) • Pests • Soil fertility status(Kadam et al. 2020)
<p>Knowledge and Training:</p> <ul style="list-style-type: none"> • Promoting knowledge of farming techniques (planting of saplings and methods of vegetative propagation) • Educating women: women who received training improved planting bed systems, new crops, quality seed, improved fencing, relay cropping, irrigation pruning, and organic fertilizers. Associated with eating more leafy greens and harvesting more vegetables(Akter et al. 2021; Schreinemachers, Patalagsa, and Uddin 2016) including improved nutrition status of children(Murty, Rao, and Bamji 2016) • Education on nutrition and eating behaviors(Arya et al. 2018) • Recipe demonstrations with intervention plants with women and children(Birdi and Shah 2016) • Provision of booklets with recipes of plants, drying of leaves, and methods of water conservation in summer(Birdi and Shah 2016) 	<p>Knowledge and Training:</p> <ul style="list-style-type: none"> • Lack of knowledge on planting (e.g. overharvesting) (Birdi and Shah 2016) • Lack of knowledge pest and disease management(Kadam et al. 2020)

Chapter 3 – Homestead vs. Community Gardens

Homestead gardening is a traditional land use system used to cultivate nutrient-dense crops intended for household use (Bushamuka et al. 2005; Roy, Rahman, and Fardusi 2013). Homestead gardens are essentially Nutri-gardens managed at the household level and have been widely implemented in Bangladesh (Roy, Rahman, and Fardusi 2013). Like nutri-gardens, homestead gardens are primarily managed by women (Bushamuka et al. 2005). Part of homestead gardening's widespread use in Bangladesh is due to promotion by Helen Keller International to address vitamin A deficiencies starting in the 1990s (Haselow, Stormer, and Pries 2016; Talukder et al. 2000).

Homestead gardening has been associated with lower anemia among children and mothers as well as a lower prevalence of underweight among mothers in an unblinded cluster-randomized controlled trial in rural Nepal (Osei et al. 2017). Homestead gardening has also been linked to improved women's empowerment in Bangladesh (Bushamuka et al. 2005). In a qualitative assessment, homestead gardening was described as an essential factor facilitating the pathway from agriculture to women's empowerment (Dupuis et al. 2022).

Community gardens, on the other hand, are gardens that also are intended to produce nutrient-dense crops but are managed by the community and not solely a household or family (Saxena 2016; Sthapit et al. 2015; The Better India 2021). They are often installed in a variety of public settings, including rural and urban. There are several community garden projects in India, but few have been evaluated. For example, the Food and Nutrition Security, Enhanced Resilience Project, is assisting women-led Self Help Groups (SHGs) in Madhya Pradesh to establish and manage Community Nutrition Gardens that are used as a source of nutrition and income (GIZ 2021). Community gardens can offer a greater diversity of crops year-round compared to nutri-gardens and are maintained by women in the community. Moreover, participants cited being able to distribute the workload compared to nutri-gardens where time constraints and other obligations limited their ability to maintain it (GIZ 2021). Revenue generated through the community garden is also used to maintain the gardens. While community gardens are in use in India, additional coverage and studies on their benefits and impacts are needed.

Chapter 4 – PoshanVatikas, Ministry of Women and Child Development

Poshan Vatikas is a project aimed at addressing malnutrition in rural areas throughout India being implemented by the Ministry of Women and Child Development in partnership with Anganwadi centers (AWCs)(Press Information Bureau 2021). The aim of the project is to improve nutritional outcomes among women of reproductive age and children through increasing dietary diversity and consumption of nutrient-dense foods(The Indian Express 2021). This effort is part of a larger push to promote sustainable food systems that enhance local self-sufficiency through household-level agricultural production while simultaneously targeting nutrition and environmental sustainability goals.

The Ministry has collaborated with 3,000 AWCsto carry out the Poshan Vatikas campaign. Viable crops to be promoted through the campaign include moringa, guava, banana, and tulsi given their high nutrient content (Press Information Bureau 2021). Complementary, parallel activities such as backyard poultry or fishponds may also be implemented where appropriate to enhance access to animal-sourced foods (ICDS Final Guidelines 2021). Other educational activities include training on gardening and nutrition sensitization for both mothers and children. Children will have early exposure to gardening from a young age. Mothers will receive training from Anganwadi workers on garden management, the importance of crop diversity and their role in addressing micronutrient deficiencies, and general nutrition knowledge for both themselves and their children.

State-specific guidelines will be set for the management and distribution of nutri-garden materials and supplies. A district-level Implementation and Monitoring Committee will be enacted to monitor and ensure the proper execution of the nutri-gardens. At the village level, stakeholders such as Anganwadi Management Committees, nutrition forestry support from the Campa Fund, the village community, mother's groups, and Poshan Panchayats will be involved in project execution to ensure community investment in the project (ICDS Final Guidelines 2021). Land for cultivation such as at AWCs, panchayat areas, vacant lands in villages, and government property such as schools or local community land can be used for nutri-garden activities.

Chapter 5 –Gaps and Need to Evaluate Impact on Health Outcomes

A recent systematic review looked at the literature published from 2012 to 2017 on interventions in South Asia focusing on the agriculture to nutrition pathway (Bird et al. 2019). Of the five intervention studies that included nutri-gardens, a majority measured dietary impacts while only two measured anthropometric measures and biochemical measurements were only taken in one study (Osei et al. 2017). While the impact of dietary diversity was quite consistent across these studies, very few have evaluated the impacts on nutritional outcomes (Bird, Pradhan, Bhavani, & Dangour, 2019). And among those that did, only two found effects of the intervention on the nutritional status of women and children (Murty, Rao, and Bamji 2016; Osei et al. 2017). A handful of studies that have evaluated nutritional outcomes have found inconsistent effects. This likely relates to the short period of follow-up (most studies are <2 years), small sample size, lack of control group, and the multiple non-nutritive determinants of maternal and child undernutrition.

While dietary diversity is used as a predictor of adequate nutrient intake and a proxy for diet quality, interventions that improve dietary diversity have not consistently shown impacts on nutritional status – and if so, the impact has been very small or only among certain sub-groups of the population (Kadiyala et al. 2021; Chegere and Stage 2020; Nithya and Bhavani 2018). Therefore, there is a need to further evaluate nutri-gardens to understand whether they do in fact have an impact on nutritional status and health outcomes as conceptualized through the dietary diversity pathway.

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