World Vegetable Center

Bhutan | Burkina Faso | Indonesia | Nepal | Philippines

School Gardens for Nutrition and Health

A Valuable Investment for Food Security and Nutrition

Food security and nutrition are basic human rights and fundamental to a healthy and productive life, yet hunger and malnutrition persist in developing countries.

School garden programs with multiple interventions leverage on educational platforms to improve the nutritional behavior and food security of students and their families.

This policy brief advocates for investment in multi-intervention school garden programs with (1) **school garden**, (2) **agriculture, nutrition and WASH education and practices**, and (3) **community outreach** in schools with access to water and latrines.

We recommend incorporating school garden programs in national curricula to ensure program quality and sustainability.

KEY MESSAGES

Consequences of malnutrition have serious mental and health outcomes and can affect a child's entire life.

School garden programs combined with nutrition and health education teach students the necessary knowledge, attitudes and practices for a healthy life.

Nutrition and basic WASH education (Water, Sanitation and Hygiene) can be incorporated in school garden curricula and activities.

Collaboration between the ministries of agriculture, education and health is key to the success of a school garden program.

Integration of a school garden program in a national curriculum ensures sustainability of the activity.

Background

The triple burden of chronic undernutrition, micronutrient deficiencies, and obesity is rampant in lower income countries. Globally, 795 million or 1 out of every 9 people suffer from undernourishment, 98% of them living in developing countries.[1] Approximately 3.1 million children die from hunger each year. Nearly half of deaths in children under five are due to poor nutrition.[2] 66 million primary school children attend school hungry in developing countries, impeding their learning ability.[3] The United Nations calls for immediate action and commitment from decision-makers to prioritize food security and nutrition efforts to eradicate hunger.

School garden programs are multi-intervention packages incorporating agriculture, nutrition and WASH (water, sanitation and hygiene) education, and community outreach to improve community food security and nutrition.

Good nutrition relies on healthy food systems, access to health services, and clean environments. A school garden can be regarded as a small food system; a healthy garden can include the production of plant and animal food and be designed to address biodiversity, healthy diets and eco-friendly environments. These gardens can be used as platforms for environmental education, nutrition behavior change communication, and to promote community engagement.

This policy brief provides evidence-based essential components of a multi-intervention school garden program and advocates for investment in multi-intervention school garden programs to achieve food and nutrition goals.

School Garden Programs: Four Essential Components to Achieve Food and Nutrition Goals

To successfully achieve food and nutrition goals, a multi-intervention school garden program should consist of the following elements:

- A curriculum integrating agriculture, nutrition and WASH concepts and practices
- A school garden for hands-on learning
- Involvement of parents and the wider community for support and promotion

The program uses the school garden as an entry point for children to learn about food systems, including how food is produced and reaches consumers, and how it can benefit their own health as well as the health of their families and the environment. The school garden program is a hands-on learning tool that integrates agriculture, nutrition and WASH education and practices and promotes inter-generational learning and community outreach. Learning-by-doing transforms knowledge into practices. Good agricultural, food, nutrition and WASH practices at the individual and household levels are the key elements to achieve food security and nutrition.[4–6]

1. Agriculture, Nutrition and WASH Education

A school garden program is an educational tool to teach students about agriculture, nutrition and health, and to equip them with the critical and holistic thinking to face challenges as environments change. Education contributes to breaking the vicious cycle of poverty and malnutrition and brings positive social change.[7] Educating children determines the nutrition of the next generation. Parental education, especially maternal education, is directly associated with decreased child malnutrition, increased wealth, and better schooling choices for their children.[4]

Agricultural and environmental education positively increases students' knowledge, understanding, and appreciation of the environment and food production system.[8,9] It provides them with the ability to grow their own food for nutrition, and equips them for a possible career in agriculture.[10,11]

Nutrition education positively influences children's dietary behavior.[12] Nutrition knowledge is significantly linked to healthy eating, including fruit and vegetable consumption.[13] Paired with school gardening, nutrition education significantly increased students' consumption of fruit and vegetables, and vitamin A, C and fiber intake.[14]

Water, sanitation and hygiene (WASH) is a necessary component of a school garden program to reduce life-threatening illnesses due to unsanitary practices and environments. These illnesses hinder absorption of nutrients, undermining nutrition efforts, and can cause stunting and anemia in children.[15] WASH interventions, including hand washing with soap, improved water quality, and disposal of fecal matter, significantly reduce the risk of diarrhoea.[16] For instance, reducing open defecation is associated with increased child height.[17]

2. School Gardens for Hands-On Learning and Stimulating Behavior Change

The school garden is an educational tool for students to practice knowledge and skills learned in the classroom. Through hands-on activities, school garden programs stimulate learning and behavioral change. School gardens with nutrition education implemented and vigorously tested in many schools in the US and Europe significantly improved students':

- Fruit and vegetable knowledge and awareness[18–22]
- Attitudes, preferences, and willingness to eat diverse foods[18–22]
- Fruit and vegetable intake[19,22–24]
- Healthy dietary habits[24–26]
- Physical activity levels[23,27]
- Academic performance[28–31]
- Appreciation and care for the environment[9,32]
- Sense of responsibility, confidence, enhanced communication and well-being[9,33–35]

3. School Gardens as Part of a Food System

A school garden is a small food system engaged in the processes of food production, distribution and consumption. Food systems influence the quantity, quality and affordability of food, thus leading to outcomes in nutrition, health and quality of life.[36]

A school garden produces fruit and vegetables, which can be consumed by students through school meals, or by the family when fresh produce is distributed to students to bring home. School feeding programs are found to increase school attendance by 4-6 days annually and also lead to weight gain in students.[37] School feeding can benefit local agricultural development if food is procured from smallholder farmers in the community.[38] Meals and garden produce shared with the students also increases household food consumption and nutrition.[4,39,40]

Food marketing exists in the school garden program through nutrition promotions and campaigns to both students and the community. Nutrition promotions using different media can significantly improve dietary habits and increase consumption of healthy foods.[25,41]

4. School Gardens as an Entry Point for Household and Community Nutrition-Sensitive Interventions

The school is a place of learning and a central part of the community, where there are regular interactions between students, parents, teachers, and community members. The school can be used as a platform to deliver school and community interventions aimed at improving nutrition and health outcomes.

Through community outreach, teachers and students can use the garden as a demonstration site for agricultural techniques and delivering nutrition and WASH messages to parents and the wider community. Nutrition and health messages and campaigns can effectively promote healthy eating and lifestyle habits, food choices and WASH practices.[25,41–43]

School garden programs that promote home gardening by giving seed to students to grow at home have seen an increase in the number of home and community gardens for home and commercial production in the neighborhood.[44–46] For lower income areas where food security is a main concern, school garden programs must link to home gardening in the community to increase the local availability of healthy food.[47,48]

Evidence from Asia, Africa and Latin America suggests that home gardens can play a role in increased diet diversity and micronutrient intakes with benefits in family income and employment, and ecosystem services.[47,49–52] Vegetables are easy to grow and provide essential micronutrients and health-promoting phytonutrients to alleviate malnutrition in the household.[53] However, home garden programs require investment in agricultural training and nutrition education to achieve nutritional outcomes.[48]

Vegetables Go to School

Vegetables Go to School (VGtS) is a multidisciplinary school garden project piloting the use of multi-intervention school garden programs in Bhutan, Burkina Faso, Indonesia and Nepal to improve food security and nutrition.

The project was designed by the World Vegetable Center, the Swiss Tropical and Public Health Institute (Swiss TPH), and the Albert Ludwigs University of Freiburg (ALU) in partnership with Bhutan, Burkina Faso, Indonesia and Nepal governments and Xavier University in the Philippines, and funded by the Swiss Agency for Development and Cooperation (SDC).

Vegetables Go to School: School Garden Program to Achieve Food and Nutrition Goals

Vegetables Go to School (VGtS) is a research-in-development project piloting the multi-interventional school garden program described above. It aims to generate evidence using randomized control trials (RCT) and measured the program's nutritional impact on schoolchildren in developing countries.

To ensure government ownership of the program, the VGtS program is designed and overseen by a project country team with members from the ministries of agriculture, education and health. The outcome is a versatile school garden program adapted to local food and nutrition needs.

The randomized control trials collected data from school children for two years and showed that the program significantly increased students':

- Agriculture, nutrition and WASH knowledge[44,45,54,55]
- Fruit and vegetable awareness[44,45,54]
- Healthy food and snack, and fruit and vegetables preferences[44,45,54]
- Likelihood to consume vegetables[54]

Several additional benefits were observed by the country teams, including improvements in the nutritional behavior and WASH practices of students and families, and the availability and accessibility of nutritious and safe foods.

	Burkina Faso	Indonesia	Bhutan	Nepal
Awareness			Increased fruit and vegetable awareness***	Increased fruit and vegetable awareness ***
Knowledge	Increased food and agricultural knowledge*	Increased nutrition knowledge*	Increased agricultural knowledge**	Increased food and agricultural knowledge ***
Food preferences		Healthier food preferences **	Healthier food preferences*	Healthier food preferences ***
Dietary behavior			Increased vegetable consumption*	

Note: ***p<0.01, **p<0.05, * p<0.10

Bhutan[14]

In Bhutan, the national School Agriculture Programme (SAP) already was in place. VGtS partnered with SAP to enrich the curriculum and activities by incorporating nutrition and WASH principles, and involved local parents. For schools with feeding programs, the school garden provided at least 20% of the fruit and vegetables in school meals. In other schools, students brought vegetables home to supplement the family meals. Schools also participated in "Global Hand-Washing Day" and "World Food Day" activities to promote nutrition and health in the community.

Burkina Faso[15]

Students who participated in the VGtS program used their knowledge and skills in vegetable production to start vegetable gardens in their villages. They are now growing onions, eggplants, local beans and sorrel to supplement family meals. Students and parents sold surplus produce to buy school supplies. WASH training taught students and parents to manufacture liquid soap for handwashing. Parents now make soap for their own use and to sell, and have trained other people in the community to produce soap.

Indonesia

Since the start of VGtS program, students have been eager to come to school, even after school hours, to take care of the school garden. The program developed the "Healthy School Canteen" to prepare nutritious snacks and juices for the students from the school garden's fruit and vegetables. Students learned to make delicious meals using the school garden produce. VGtS promoted nutrition and WASH through local drawing competitions and the "Healthy School Festival." In Indonesia, the school garden program linked with a home garden initiative of women's groups to improve household food security and nutrition.

Nepal[11,16]

On harvest days, parents come to the school to harvest vegetables with their children. Together, they learn about gardening techniques, nutrition and health, bring back vegetables for supper, and seeds to use in their own home gardens. The project estimated 60% of students' families have started home gardens in the community due to the program's community outreach activities. The program also influenced local agricultural production, as staple and cash crop farmers were motivated by their children's school garden success to begin cultivating vegetables.

Keys to Success

- Government support and ownership of the program
- Coordination and cooperation of multiple government ministries
- International partnership with research institutes for technical and research support
- Comprehensive teaching curriculum together with training and support for teachers
- Garden demonstrations and promotions, which fostered regular communication with school principals, teachers, parents and children
- Motivated school principals, teachers, students, and supportive parents and community groups
- Incentives for schools and teachers

Costs and Potential Impact

A school garden program with agriculture, nutrition and WASH education, and community outreach is a short-term investment with long-term benefits for the education, food security, nutrition and health of students and their families.

Country	Cost per school over 3 years
Bhutan	**US$ 5,900**
Burkina Faso	**US$ 2,952**
Indonesia	**US$ 1,950**
Nepal	**US$ 1,350**

Note: Amounts are based on the actual local cost of implementing the VGtS school garden program in each country together with estimates of required costs for scaling school garden programs in the country. Costs include program administration, training of teachers, development of teaching and promotional materials and setting up, maintaining, and monitoring the school garden program.

Example: Nepal's Scaling Strategy

VGtS Nepal plans to establish **300** school garden programs in the country over the next three years.

- Cost per school: **US$ 1,350**
- Cost of 300 programs: **US$ 405,000** over three years

Recommendations

Invest in a multi-intervention school garden program to improve student and household food security and nutrition in the developing world.

- Develop country-specific school garden program education tools:
  - *A school garden for hands-on learning*
  - *A school garden curriculum integrating agriculture, nutrition and WASH education and practice*
  - *School garden events for inter-generational learning and community outreach that can be linked with other food, nutrition and health initiatives*
- Incorporate a multi-intervention school garden program in the national curriculum to ensure the quality and sustainability of the program

To successfully implement a school garden program, we recommend the following action points:

National Government

- Increase financial and technical support to implement school garden programs in schools with access to water and latrines, for monitoring and evaluation, training of teachers, teacher incentives, program materials, and promotional activities.
- Collaborate with ministries of agriculture, education and health in implementing and supervising the program to ensure government ownership and pulling resources from different ministries for the school garden program.

School Garden Program Implementation

- Incorporate agriculture, nutrition and WASH education, inter-generational learning and community outreach in school garden programs to effectively achieve food and nutrition goals.
- Link school garden programs with home and community garden or food production programs to improve household food security and nutrition. Government support for agricultural extension and training for home gardeners is needed.
- Combine the school garden program with a school-feeding program to more effectively increase students' intake of nutritious fruit and vegetables and balanced meals.
- Give incentives to school staff to motivate their participation in the school garden program. Teachers in the school garden program are important resource persons for training other teachers and parents on agriculture, nutrition and WASH.
- Provide quality seeds, stable water sources or water-saving technologies to ensure school garden operation.

The Value of Investing in School Garden Programs

Establish **300** **School Garden Programs**

Impact the lives of **30,000** **Students enrolled in the school garden program**

Establish **18,000** **Home Gardens**

Reach **75,000** **Community members through community outreach**

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