



World Vegetable Center

Vegetables Go to School **NEPAL**

# School Vegetable Gardens: Linking Nutrition, Health and Communities

Project Documentation



**Project Documentation**

**Vegetables Go to School**  
**NEPAL**

*School Vegetable Gardens: Linking  
Nutrition, Health and Communities*

## PROJECT TEAM

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## ACKNOWLEDGEMENT

We thank the Swiss Agency for Development and Cooperation for supporting the research of the Vegetables Go to School Project.

### ***Suggested citation***

World Vegetable Center. 2017. Vegetables Go to School NEPAL: School Vegetable Gardens - Linking Nutrition, Health and Communities. World Vegetable Center. Publication no. 17-817. pp. 64.

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## Abbreviations

VGtS – Vegetables Go to School

WASH – Water, Sanitation and Hygiene



## **EXECUTIVE SUMMARY**

This report documents the preparation, implementation, findings, and recommendations of the Vegetables Go to School (VGtS) school garden program in Nepal.

Vegetables Go to School in Nepal is a new multidisciplinary, school-based project developed by a team from the Nepal government and international researchers from World Vegetable Center, Swiss Tropical and Public Health Institute and Freiburg University, and funded by Swiss Agency for Development and Cooperation. The project aims to address malnutrition among Nepalese children through a comprehensive school garden program.

### **Summary of School Garden Program**

The VGtS school garden program in Nepal is overseen by the County Team consisting of members from three ministries: Agriculture, Education and Health. The Country Team works with the International Research Team to design research protocols and curriculum for the pilot study. Moreover, the Country Team trained school staff on the school garden program, research protocols and monitored their progress.

The VGtS interventions increased students' knowledge about nutrition and WASH. Thirty focal teachers were trained for establishing and managing the school gardens and integration of nutrition and WASH education. Furthermore, a 23-weeks curriculum was provided and teachers received training on how to utilize it. Students were requested to simulate the vegetable garden and WASH activities at their homes and to share the lessons learnt with their family members. A crop calendar for school vegetable gardening in context of Nepal was formulated. Moreover, the establishment cost for the school garden program was calculated. Finally, the program consolidated

commitments by different organizations to work together for school gardening, nutrition and WASH integration in Nepal.

The program further impacts the lives of students' families and community through dissemination of agricultural information and technologies, and messages on nutrition and WASH. The program encourages families to start their own home gardens by modelling the school garden. Ultimately, the whole community is involved in growing nutritious and diverse vegetables for home consumption, leading to improved nutritional well-being and local agricultural and community development.

## Research Findings

Through the impact assessment conducted by the project, the VGtS school garden program significantly ( $p < 0.01$ ) increased students':

- **Awareness about fruits and vegetables**
- **Knowledge about agriculture, nutrition and WASH**
- **Preferences for eating fruits and vegetables** among 10 to 15 years old students in rural areas of Nepal

Due to the short one-year pre-post intervention assessment, the study did not find significant improvements in students' vegetable consumption or nutritional status. Changes in consumption and nutritional status through a food-based approach requires time and would be more apparent in long-term post-intervention assessments.

## Key Recommendations

- **The school garden program is an effective educational program** aimed at improving students' nutritional and health awareness and potential practice.
- **The school garden program should be modified and scaled up nationally** and incorporated into the National Curriculum.
- **Collaboration between the Ministries of Agriculture, Education and Health is key to the program's success** and should continue its cooperation in future school garden programs.
- **School staff should be given incentives** to motivate their participation in the school garden program. Focal teachers are important resource persons for training new teachers on the program during scaling up.
- **A national home garden program is a necessary complement to the school garden program to improve household nutrition.** Government support for agricultural extension and training for home gardeners is needed to sustain the program.
- **The school garden and home garden research data should be monitored and included in the National Nutrition Surveillance System** for continual monitoring and improvements on the programs.
- **To increase vegetable consumption, school gardening program and home gardening activities should be conducted simultaneously.** School vegetable gardening along with home gardening activities are necessary and should be practiced through all schools of Nepal.



## INTRODUCTION

About 27 million or 80% of the Nepalese population live in rural areas and engage in agriculture for livelihood. Agriculture contributes to 35% of the annual national gross domestic product (GDP). This is not surprising considering the country itself has an altitude of 65 to 8,848 meters, giving it diverse agro-climatic conditions suitable for growing vegetables, crops and other vegetation perennially.

The truth is, despite the rich agricultural environment, much of Nepal's population suffer from malnutrition ranging from Protein Energy Malnutrition (PEM) to micronutrient deficiencies in iron, vitamin A and iodine. The 2011 Nepal Demographic and Health Survey revealed 41% of children under five years old were stunted, 29% underweight and 11% wasted (MoHP 2011). Among children 6 to 59 months old, 46% were anemic. Moreover, 18% of women of reproductive age had low BMI (Body Mass Index) among which 35% suffered from anemia.

Over the years, the Nepalese government has created policies, strategies and programs to alleviate the country's nutritional problems. These include initiatives such as *National Nutrition Policy and Strategy* (MoHP 2004) and *National School Health and Nutrition Strategy* (MoES and MoHP 2006). In recent years, Nepal introduced the *Multi-sectorial Nutrition Planning Framework* (NPC 2012) and *Agricultural Development Strategy* (MoAD 2014) to address integrated and multidisciplinary efforts in improving national nutritional security.

Community-based strategies have tapped into schools as effective mechanisms for community development initiatives. With 34,782 schools, a total of 7,665,448 students, and 85% of the students living in rural areas prone to malnutrition, schools are prime tools for administering nutritional

strategies. However, past nutrition initiatives in schools have largely fallen short in eradicating malnutrition due to two main reasons: 1) The initiatives were scattered rather than centralized which makes obtaining empirical evidences on the effectiveness of school-based nutritional interventions difficult; and 2) the initiatives focused on temporary solutions that may not be sustainable such as micronutrients supplementation, feeding programs and deworming.

Vegetables Go to School (VGtS) is a new multidisciplinary, school-based project implemented in Bhutan, Burkina Faso, Indonesia and Nepal. VGtS in Nepal is developed by a team from the Nepal government and international researchers from World Vegetable Center, Swiss Tropical and Public Health Institute and Freiburg University, and funded by Swiss Agency for Development and Cooperation. The project aims to address malnutrition among Nepalese children through a comprehensive school garden program with emphasis on gardening, nutrition education and Water, Sanitation and Hygiene (WASH).

The first phase of the project began in 2013 with the main objectives to:

- Establish the school garden program in pilot schools
- Gather scientific evidence on the benefits and impact of the program in improving students' knowledge, attitude and behavior in healthy eating and lifestyle habits
- Understand the program's linkages with the local community
- Fine-tune the program for scaling up as a national school garden program

This report documents the preparation and implementation of the VGtS School Garden Program in Nepal, benefits and keys to success of the program and empirical results. Finally, it outlines the challenges of the program and

recommendations to move the school garden program forward nationally. The report is intended for government and non-government organizations which would like to implement a school garden program in their country or community.



## APPROACH

The school is a central part of the community as a place of learning. It also serves as a place of regular interactions between students, parents, teachers, community members and local businesses. These roles allow the school to motivate positive change in its community. Governments and non-profit organizations are leveraging on the existing school infrastructures and systems to introduce their agenda in community-based interventions. School-based health and nutrition programs are powerful strategies in improving local health situations and alleviating malnutrition.

Vegetables Go to School is an agricultural intervention aimed at promoting nutrition and health knowledge and practice in schools with a two-pronged approach: classroom curriculum and school garden.

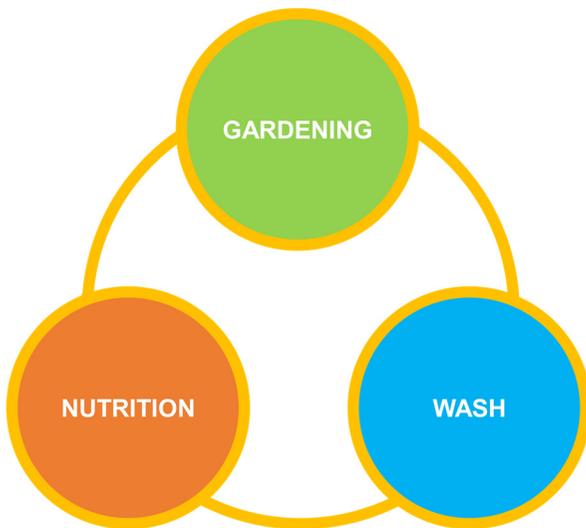
The project's school garden program could potentially increase students':

- Gardening, nutrition and WASH awareness and knowledge
- Environmental awareness
- Interaction with the community
- Practical learning and application
- Vegetable consumption

## Curriculum

The VGtS school curriculum teaches students:

- Good Gardening Practices
- Nutrition Education
- Water, Sanitation and Hygiene (WASH)



These core components provide students with a solid foundation on the importance of choosing, growing and eating nutritious and clean foods to stay active and healthy. Gardening, nutrition and WASH go hand-in-hand in addressing malnutrition.

Safe **gardening** practices give students the knowledge and ability to grow their own foods. Students learn how to establish gardens, make beds, install irrigation, sow and transplant seedlings, make compost, and how to protect their vegetables from insects and pests.

**Nutrition** principles teach students the basis of balanced diets and how to make healthy food choices including choosing nutritious and diverse vegetables to plant in their gardens, and how to properly harvest, store, cook and eat vegetables. Students learn about the health benefits of vegetables and are encouraged to eat more vegetables daily.

Lessons on **WASH** teach students proper sanitation and hygiene practices. Poor WASH practices can lead to life-threatening illnesses caused by bacteria and pathogens. Ensuring a clean environment and washing hands after gardening activities and before handling food reduces the chances of infections. Diarrheal diseases and worms could further reduce nutrition absorption in the body and cause stunting and underweight.

## School Garden

The VGtS school garden program incorporates hands-on gardening activities and demonstrations to enhance the learning experience for students. Each school establishes and maintains an on-site school garden growing diverse vegetables during the school year.

The garden is a live teaching tool for students to apply their classroom knowledge, gain experience in gardening, and eat the fruits of their labor. Apart from gardening activities, students also learn how to prepare nutritious

foods and practice proper WASH techniques. In the process, students increase their vegetable consumption, learn gardening skills and are informed to make better nutrition and health choices in life. Students become connected to the environment, appreciate nature, and are physically active. Moreover, through taking care of the garden, students gain a sense of responsibility and confidence in their achievements.

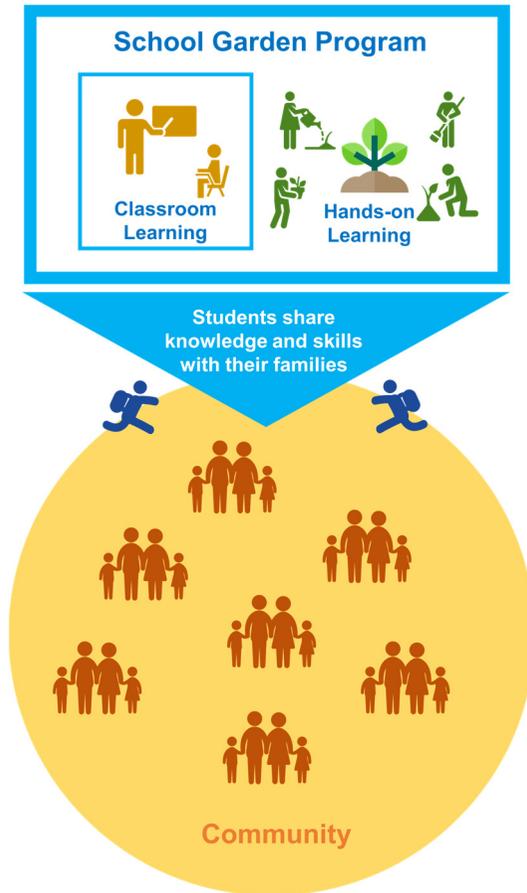
## **Beyond the School**

The school garden program can further impact the lives of students outside the school. The school is an avenue to disseminate agricultural information and technologies, and messages on nutrition and WASH to the community.

The lessons learned in school are easily brought home as the students share their knowledge and skills with the family. This exchange of know-how becomes a valued experience for the family. It motivates the family to start their own garden at home by modelling the school garden. Moreover, schools invite parents and community members regularly for garden demonstrations and training, and provide technical support and monitoring for families who start home gardens. Thus, as more students engage in the practice and take home their learning, more families in the community see the benefits and viability of gardening, leading to widespread home gardening.

Home food production allows families to produce and consume a variety of foods at affordable cost. The seeds and materials could usually be found or bought locally at low or no cost. Other non-monetary costs are manual labor for preparing the land and maintaining the garden. The home garden could feed the family without spending money on purchasing vegetables at the market. Surpluses from the garden could be sold to supplement household income.

Ultimately, the whole community is involved in growing nutritious and diverse vegetables for home consumption, leading to improved nutritional well-being and local agricultural and community development.



## **New Model for Nutrition Security in Nepal**

In Nepal, the VGtS Country Team has developed a new model to improve national nutrition security through two mechanisms: home gardens and school gardens. This involves working with teachers, agriculture extension workers and scientists to establish school gardens and home gardens in the community.

School gardens, technically supported by teachers are demonstration hubs for students, their families and other community members in exchanging agricultural technologies and nutrition and WASH messages. Students learn from the school and encourages parents to engage with school teachers to start their own home gardens.

Through the other route, home gardens are set up by community members with the technical support of agricultural extension workers.

Scientists continue to research and develop effective methods of gardening, livestock raising and promote high-yielding vegetable or crop varieties. Scientists disseminate new information and technologies, and train teachers and extension workers on an on-going basis.

By setting up both types of gardens, food production and consumption increases in the community.



## WHO IS INVOLVED?

<b>Who Is Involved?</b>	<b>Main Roles</b>
Country Team	Oversee all aspects of the project in the country.
International Research Team	Provide technical assistance and works with Country Team on research protocols.
School Team	<p>Head teacher is the main authority for the school garden program.</p> <p>Focal teacher oversees all aspects of the school garden program in the school.</p> <p>Students are the main and direct beneficiaries of the program.</p>
Field Staff and Extension Workers	<p>Field staff was hired by VGtS to monitor school garden program in the schools and provide technical assistance.</p> <p>Government extension workers provide technical assistance to the focal teacher.</p>
Community	<p>Community leaders are the main authority of community initiatives.</p> <p>Parents and community members interact with school garden program through students and focal teacher. They are the indirect beneficiaries of the program.</p>

## Nepal Country Team

The core group of the VGtS project and moving the school garden program forward in Nepal is the Country Team. The Nepal Country Team consists of a Country Manager and one focal member from each of the government ministries:

- **Ministry of Education**
- **Ministry of Agriculture**
- **Ministry of Health**

This three to four-member team work together under the direction of the Department of Agriculture. The team is involved project implementation and pulling together the country's resources and rallying government support for the school garden program. In addition to these key tasks, they are responsible over multi-sector activities including developing the country action plan, preparing school garden curriculum and teaching materials, implementing the project across the country, training teachers, overseeing field staff, monitoring the project's progress and holding regular meetings on project-related activities.

The Country Team coordinates at a multi-sectoral level because school gardens and food security spans multiple ministries and disciplines. Furthermore, they work closely with teachers involved in the project who reported to the Country Team on their activities and progress. Likewise, the Country Team report their progress back to their respective government departments to discuss the project's goals and directions, determine relevant training support and resources from the different departments and approve hiring of staff.

## International Research Team

The function of the International Research Team is to work closely with the Country Team in research-related activities of the project. The research team trained the Country Team on developing the initial country action plan for the school garden program. The one-month training was organized prior to the start of the project in Nepal and was led by the World Vegetable Center in Shanhua, Taiwan. The research team works with the country team to develop study protocols and analyze data for technical and scientific publishing. Furthermore, the team provided curriculum materials, nutrition and WASH teaching materials, and community strategies for the promotion of school and home gardens.

The international research team consists of scientists from the following organizations:

- **Swiss Tropical and Public Health Institute**
- **University of Freiburg**
- **World Vegetable Center**

## School Team

### **Head Teacher**

The head teacher is the school's authority and supporter for the school garden program. He or She decides on the school's land use, staffing, class scheduling and the school's activities. Activities relevant to the VgTS school garden program were approved by the head teacher, including nominating the focal teacher for teaching and maintaining school garden activities.

### **Focal Teacher**

Each school appoints a focal teacher to oversee the school garden program.

The appointed teacher is usually the Health and Population teacher or the soft skill teacher such as Agriculture Teacher. The focal teacher is in charge of establishing the school garden, teaching the school garden curriculum, leading students in gardening activities, promoting health and nutrition messages and providing technical assistance to parents with their home gardens. The focal teachers were trained by the Country Team through a series of trainings on the program's action plan and data collection. In order to teach the curriculum, the Country Team provided teachers with a teachers' manual with weekly curriculum and action plan. They were also tasked with maintaining the garden during holidays and school vacations. Focal teachers received NRS 2000 monthly in assistance from the project in the first year for their additional tasks in running the school garden program.

During the scaling up of the project, the focal teachers from every school will become resource persons to disseminate and train new schools in the school garden program.

### **Students**

Students from classes 6 and 7 were enrolled in the VGtS school garden program during the first phase of the project. The students took part in the program's lessons and school garden activities. These activities included, but were not limited to setting up the garden, making the garden beds, sowing the seeds, taking care of and watering the vegetables. Each student received a student booklet with weekly lessons on gardening, nutrition and WASH. At the end of the booklet is a diary section where the students kept a record of their weekly garden activities and lessons learned.

Students are encouraged to promote vegetable gardening, nutrition principles and WASH techniques in their homes.

## Field Staff and Extension Workers

### Field Staff

Two field staff worked with the Country Team to engage in regular school visits, monitor the project's progress, provide technical assistance to teachers and collect research data. The field staff consisted of a technical officer and a junior officer and were hired only during the first phase of the project.

### Community Leader

#### Community Leader

Community leaders from different political parties were involved during the project implementation time in the schools. Regular interaction with the community leaders created good motivation in the communities and schools.

### Parents

Parents were invited to take an active part in school garden activities and promotional events with their children. Parents were encouraged to grow their own gardens and increase their family's vegetable consumption. Newly set up home gardens were monitored and supervised by the focal teacher and agricultural extension workers.



# PROCESS



**R** Collection of research data in project schools

## **PREPARATIONS**

Several important preparations were necessary prior to implementation of the school garden program in schools.

### **Plan Project**

A project planning workshop was held with country representatives, the donor, and the International Research Team consisting of scientists from partner research institutes. During this workshop, the project's objectives and strategies were discussed and the initial plan of the project was set in place. The roles and responsibilities of the attending members were defined. This included assembling the project country team.

### **Assemble Country Team**

The World Vegetable Center worked with Nepal government authorities to nominate and invite Country Team members, including a country manager and a focal member from the Ministry of Education, Ministry of Agriculture and Ministry of Health.

### **Train Country Team**

The Country Team was trained on the objectives and strategies of the project by the World Vegetable Center, Swiss Tropical and Public Health Institute and University of Freiburg. The 4-weeks training at World Vegetable Center headquarters in Shanhua, Taiwan, included current school garden approaches, hands-on garden management, nutrition education, WASH and health topics, and communication and promotion strategies. During this period, regular Country Team meetings were held to develop the Country Action Plan.

The training of trainers manual titled, “**Vegetables Go to School: Improving Nutrition by Agricultural Diversification**” was used as a guide throughout the training. Topics included:

- School Vegetable Garden Design and Realization
- Saving Your Own Vegetable Seeds
- School Gardens and Nutrition
- School Vegetable Garden and Synergies with Water, Sanitation, Hygiene and Health
- Communication Strategies for School Vegetable Gardens
- What Is the Impact of Our School Vegetable Garden?
- Collaborative Data Management and Data Sharing

## **Develop Country Action Plan**

The country action plan was developed by the Country Team with assistance from the World Vegetable Center. The action plan was a blueprint for the implementation of the VGtS school garden program in the country. This included the project approach, timeline, activities and roles and responsibilities related to the project.

The project was initially planned for three phases, with the first phase being a pilot phase for implementing and fine-tuning the program in 10 schools for scaling up and collecting research data for scientific evidence.

## **Identify Stakeholders**

Stakeholders are individuals or groups which are directly or indirectly affected by or those who can influence the project.

Stakeholders identified by the project were:

- Legislators and Policy-Makers
- National, District and Community offices in: Health, Education and Agriculture
- Other local offices and community leaders such as Chairman of the Village Development Committee
- Local NGOs
- Local community clubs and associations related to the project
- Local media
- Schools
- Students
- Family of students
- Other community members
- National and international research organizations

## **Organize Inception Workshop**

The project organized an Inception Workshop to engage the stakeholders and rally their support for the project. The one-day workshop was held at National Agriculture Research Institute (NARC) in Khumaltar, Kathmandu. The workshop aimed to: 1) highlight government plans, policies and strategies on school-based health, nutrition and agricultural programs to frontline implementers of VGtS, and 2) share concepts, objectives and implementation strategies for VGtS among stakeholders.

## Identify Schools, Head Teacher, and Focal Teachers



Dolakha and Ramechhap districts were chosen as the districts to implement the school garden program during the pilot phase. The project identified the pilot schools for the school garden program following the criteria:

- Public School
- At least 150 students enrolled
- Secondary level up to grade 8
- School had no existing or previous garden programs
- Geography:
  1. Rural location
  2. Within an hour walking distance from the main access road
  3. Not located in areas of commercial vegetable production.

- At least 300 square meters of spare land for school garden
- Stable water source for irrigation (at least available 8 months in a year)
- Willingness of head and focal teacher to join the program

Out of 100 pre-screened qualified schools from the Dolakha and Ramechhap districts, 30 schools were chosen for the VGtS school garden program. The schools were divided into three groups, composed of 10 schools per group. The first group implemented the program in Year 1 of the project while the other two groups remained control schools. The program was implemented in the second group in Year 2, and the third group in Year 3. Data were collected from all 30 schools throughout the pilot period.

## Develop VGtS Curriculum

The project created a Nepali curriculum and action plan for VGtS to guide stakeholders in the implementation and maintenance of the school garden program. The curriculum was designed for 6<sup>th</sup> and 7<sup>th</sup> graders and consisted of 23 weeks of modules on gardening activities nutrition and WASH.

The curriculum and action plan were published in two booklets, one for the teachers and one for the students.

## Develop Other Materials

Other materials developed by the project include:

**Pre-intervention and Post-Intervention Surveys** to assess students' knowledge, attitude and practice towards gardening, healthy eating and WASH practices and the impact of the school garden program.

**Teacher Training Materials** in Nepalese on the topics of gardening, nutrition and WASH.

***Vegetables and Nutrition for Schools in Nepal*** was developed by the World Vegetable Center and Country Team members as a nutrition teaching material for schools. The material aids teachers in teaching students simple and useful nutrition concepts. The material is focused on helping students make healthy food choices by understanding the importance of nutrition, current nutritional problems in Nepal, good nutrition and balanced diets, specific nutritional needs of different family members, and the health benefits of vegetables. In addition, the material provides photos, nutritional content and recipes for common vegetables to encourage planting and eating vegetables.

The topics include:

- Introduction to Good Nutrition (Nutrition in Nepal)
- Healthy Diet for Nepalese People
- Good Nutrition for Nepalese People
- Nutrition Through Life
- Health Benefits of Vegetables
- Names and Photos of Common Vegetables
- Vegetable Planting Calendar
- Nutritional Information of Vegetables
- Vegetable Recipes
- Promotion

***We Grow Vegetables, We Eat Vegetables! Communication Strategies for School Vegetable Gardens*** is a communications toolkit developed by World Vegetable Center for school garden implementers. The toolkit is a practical step-by-step guide to develop a communication strategy to effectively promote school gardens and engage the participation and interests of students.

Topics include:

- How is your school garden growing?
- To set a goal, begin at the end
- A-U-D-I-E-N-C-E
- Develop your message
- Awareness
- Incentives
- Share your experience!
- Plan a strategy
- Sample strategy
- Take the Healthy Pledge
- Classroom posters

## **Teacher Training and Workshops**

A series of training workshops were organized by the project to fully equip teachers with knowledge and skills for implementing the school garden program in their schools.

## **Orientation Workshop for Teachers' Training**

The 4-days Orientation Workshop trained school staff on the program's objectives, the school garden approach and the topics covered by the program. This included both knowledge-based information and hands-on practice on gardening, nutrition and WASH. Apart from lecture-type training, participants practiced gardening techniques in the field and cooked nutritious vegetable dishes. The workshop was held every year to train teachers from new schools implementing the program.

The workshop was facilitated and taught by Country Team members and topic specialists. Training materials used were either developed by the project or other available materials were also used. The participants of the workshop included:

- Head teacher
- Focal teacher
- Chairperson of the School Management Committee

## **Workshop on Data Collection**

Three separate workshops were held to train focal teachers on data collection for the project's research component. The research timeline and administration of the student surveys were discussed.

## **Workshop on Implementation of Curriculum and Student Action Plan**

A workshop was organized to orient focal teachers on how to implement the 23-weeks curriculum and action plan for the program. Issues on garden implementation, both technical and financial were discussed. The required input for each participating school was also finalized at this point.

## **Appreciation Letters and Prize Distribution**

To motivate schools to continue participating in the project, appreciation letters were distributed to head teachers and the focal teachers. At the end of each school year, schools were assessed on their school garden and student performance. Schools with the highest scores received a cash prize and certificates in the project's year-end review and celebration. The review and celebration was attended by the head teachers and focal teachers of the project schools.

## **SCHOOL GARDEN PROGRAM**

### **School Vegetable Garden**

#### **School Garden Principles**

The garden design followed basic principles:

1. Maximize usage of locally available resources for building the garden, and nutrient and pest management
2. Prioritize planting locally-adapted and nutrient-rich vegetables
3. Plant a variety of vegetables, including different colors of vegetables to maximize health benefits
4. Grow vegetables year-round
5. Minimize soil-born problems through proper crop rotation
6. Manage the garden with organic methods and good agricultural practices

## List of Vegetables Selected for Nepal's VGtS school gardens

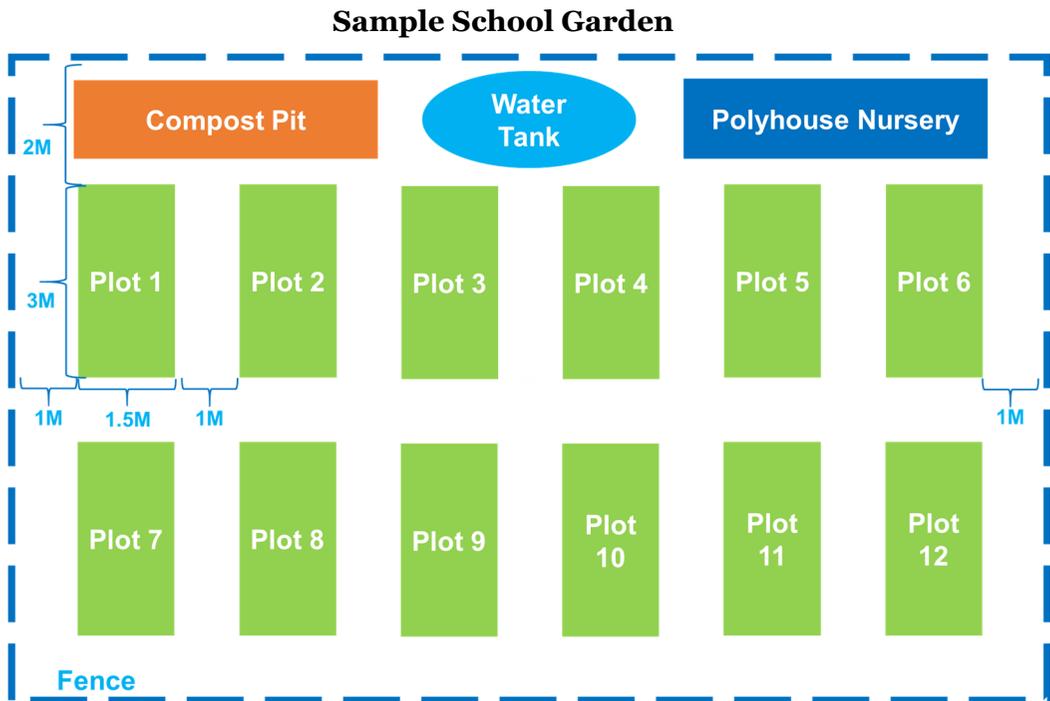
Vegetable Name	Reason for selection
Carrot	Source of vitamin A, acceptability
Cabbage	Source of minerals, easy to grow
Spinach	Source of minerals, early harvest
Radish	Multipurpose recipe, accepted widely
Garden pea	Source of protein, nitrogen fixing crop
Kangkong (Water Spinach)	New crop, green vegetable for warm season
Pumpkin/Summer Squash	Source of vitamin A, locally adapted
Bitter Gourd	Medicinal value, locally adapted
Bean	Source of protein, nitrogen fixing crop
Yard-long bean	Source of protein, nitrogen fixing crop
Vegetable Soybean	Source of protein, nitrogen fixing crop
Hot chili	Source of vitamin C, spice crop
Okra	Source of calcium, rainy season crop
Tomato	Source of $\beta$ -carotene, vitamin C
Eggplant	Source of minerals
Asparagus	Source of iron, minerals and vitamins, new crop in rural areas

### Garden Size

The purpose of the school garden is educational and not commercial, so the garden size should be manageable for students. However, each school's garden varies in size depending on land availability, and distance from irrigation facilities and other resources.

Generally, the garden plots were 3 meters by 1.5 meters with 1 meter of space between each plot. The fence surrounding them was 1 meter along 3 sides and

2 meters in the front where the compost pit and the water tank were located. For schools with terraced land areas, the plot sizes were adjusted. Other gardening setups such as container gardens were also encouraged to diversify ways of producing vegetables.



### **New Vegetables: Kangkong and Asparagus**

Kangkong and asparagus were introduced to school gardens for their rich vitamins and minerals content. Kangkong was chosen as a nutritious crop to grow during the rainy season. The project supplied kangkong and asparagus seeds to schools and World Vegetable Center provided production technologies for these two vegetables.

### **Preparing and Managing the Soil**

The project used chemical fertilizers as a starter solution to the production of

the seedlings. Once the seedlings started growing, organic fertilizers were used to maintain them. Some examples of these organic fertilizers were compost, vermin-compost, Bokashi, cattle urine, bio-fertilizers, effective microorganisms, forest leaf litter and mustard oil cake.

### **Input Supplies**

The project provided school gardens with:

- Cost-effective fencing
- Irrigation system
- Plastic pots, plastic sheets and nursery trays
- Composting and liquid manure preparation

### **Seed Management**

The Nepal Agricultural Research Council (NARC) provided the initial seeds for self-pollinating crops (e.g. soybean, garden pea, tomato, hot chili and yard long bean) through the project. NARC encouraged students to produce and conserve their own seeds for the upcoming years. The seeds of cross-pollinated crops were obtained from a reliable market source.

### **Pest Management**

To prevent and control damages from pest infestations, workers on the gardens used locally available resources like botanical pesticides, insect traps, plant extracts, trap crops, sex pheromone and entomopathogenic fungi (e.g. *Metarhizium*). Insects were also manually removed from the garden beds. To manage diseases, bio-fungicides were applied regularly on the vegetables with crop rotation techniques. Weeds were controlled through the use of plastic mulching.

### **2015 Nepal Earthquake**

On April 25, 2015, a 7.9 magnitude earthquake hit Nepal. The effect of the

earthquake was felt by everyone in the community, including Dolokha and Ramechhap districts where the VGtS project schools were located. Thousands were injured and thousands more died. School buildings and school gardens were destroyed, thereby putting a standstill on the project.

School buildings were restored first before any work on the school gardens could be continued. The project provided extra support in disaster areas prioritizing in disaster relief and restoration.

On May 24, 2015, the Country Team organized and finalized additional activities for the schools. These activities focused on addressing WASH and nutrition in the wake of the health issues after the earthquake. The project distributed dustbins, dust keepers, buckets, phenyls and filters to help the participants maintain proper sanitation in their own homes and areas. We also distributed soya bean, sunflower oil, salt packets and dry chick pea to supplement the people's food provision. These efforts by VGtS were highly appreciated by the recipients for their support during the crisis.

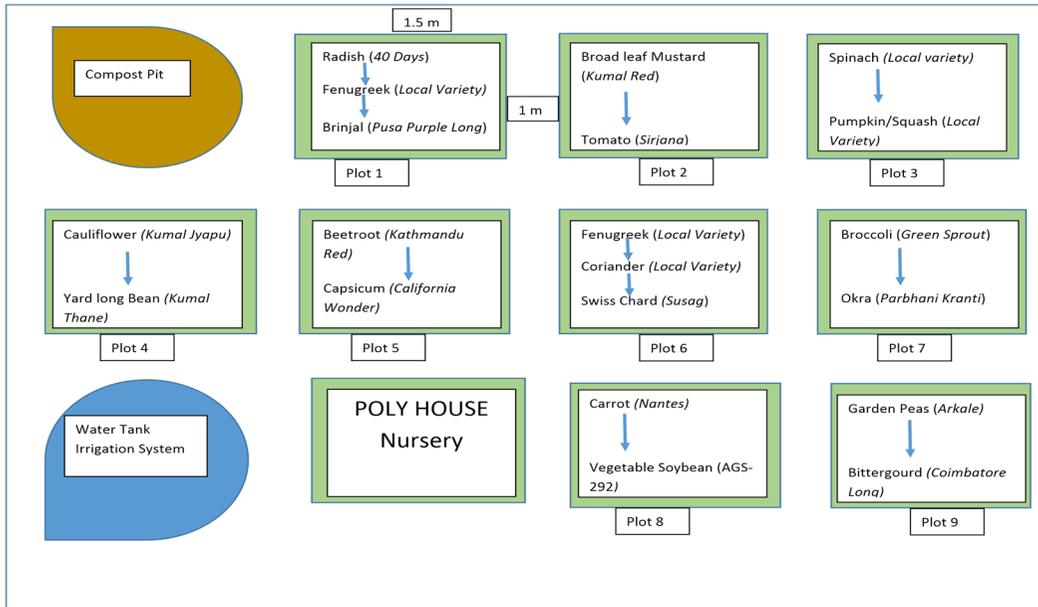
The project also invited representatives from the Department of Education, Department of Health Service and NARC to orient the members of the community and students on the importance of proper sanitation and nutrition.

After pressing concerns related to the earthquake were addressed, the school garden program carried on. Vegetable gardens for nutritional education were established in 20 more intervention schools, following the original action plan. Similar to the first 10 schools, the same technical support and financial assistance were given to the 20 schools.



# Vegetables Go to School Year 1 Garden Design

Altitude: 600m to 2200 m above sea level

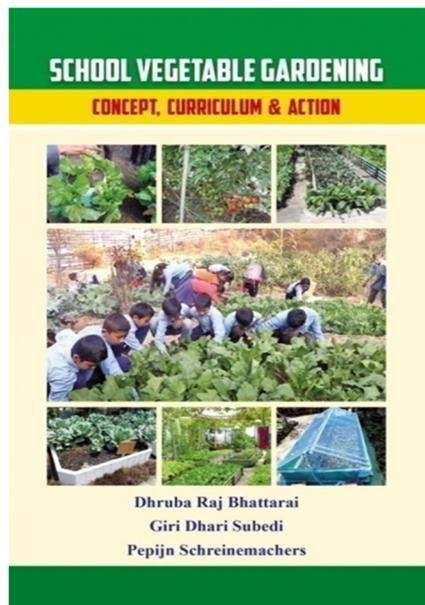
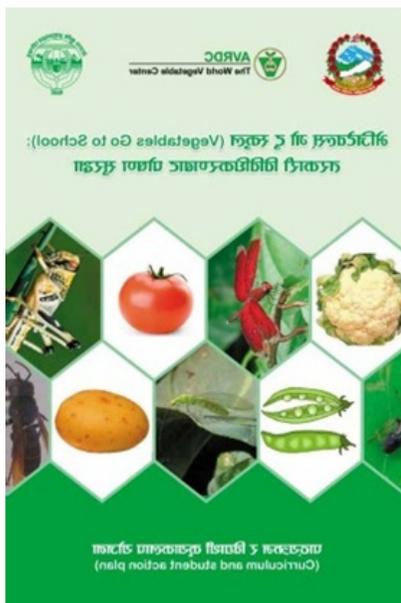


## VGtS Planting Schedule in Nepal (Academic Year 2014-2015)

Plot	Aug 2014	Sept 2014	Oct 2014	Nov 2014	Dec 2014	Jan 2015	Feb 2015	Mar 2015	Apr 2015
1		Radish ( <i>40 days</i> )		Fenugreek ( <i>Local Variety</i> )		Brinja ( <i>Pusa Purple Long</i> )			
2		Broad Leaf Mustard ( <i>Kumal Red</i> )				Tomato ( <i>Sirjana</i> )			
3		Spinach ( <i>Local Variety</i> )				Pumpkin/Squash ( <i>Local Variety</i> )			
4		Cauliflower ( <i>Kumal Jyapu</i> )				Yard Long Bean ( <i>Kumal Thane</i> )			
5		Beetroot ( <i>Kathmandu Red</i> )				Capsicum ( <i>California Wonder</i> )			
6		Fenugreek ( <i>Local Variety</i> )		Coriander ( <i>Local Variety</i> )		Swiss Chard ( <i>Susag</i> )			
7		Broccoli ( <i>Green Sprout</i> )				Okra ( <i>Parbhani Kranti</i> )			
8		Carrot ( <i>Nantes</i> )				Vegetable Soybean ( <i>AGS-292</i> )			
9		Garden Peas ( <i>Arkale</i> )				Bitter gourd ( <i>Coimbatore Long</i> )			
10	POLYHOUSE (NURSERY)								

## Curriculum – Gardening, Nutrition and Health and WASH

Students followed the 23-weeks school garden program curriculum and action plan. The same curriculum was taught two times in the school year using different crops for each planting season. Each lesson is designed with interactive exercises and games, and correlates to the week’s garden activities. Students recorded their learnings and planting progress in the student diary at the end of the curriculum booklet.



The topics include:

Week 1: Plant Structure and Function

Week 2: Planning Your Garden

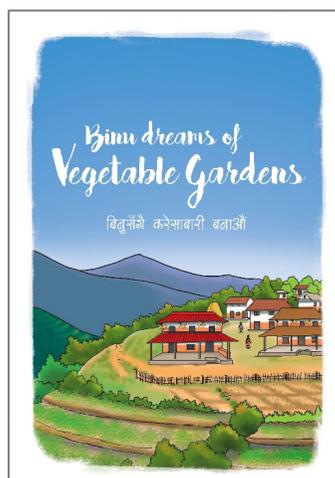
Week 3: Where Will You Grow the Plants? (Soil and Soil Structure) Part I

Week 4: Where Will You Grow the Plants? Part II

Week 5: Size of the Garden

Week 6: Transplanting  
Week 7: Composting  
Week 8: How to Make Compost  
Week 9: Introduction to Nutrition  
Week 10: Food Groups  
Week 11: Carbohydrates, Proteins, Fats, Vitamins and Minerals  
Week 12: Irrigation and Other Cultural Practices  
Week 13: Integrated Pest Management  
Week 14: Biological Control with Natural Enemies  
Week 15: Sanitation and Hygiene Part I  
Week 16: Sanitation and Hygiene Part II  
Week 17: Harvesting  
Week 18: Saving Seeds  
Week 19: Seedling Preparation for Second Season  
Week 20: Food Preparation and Safe Use of Vegetables  
Week 21-22: Guest Lecturers for Workshops in Nutrition and WASH  
Week 23: Quiz Contest and Prize

***Binuh Dreams of a Garden*** is a cartoon book developed by Swiss Tropical and Public Health Institute in both Nepali and English to teach students fun lessons on WASH. This book is used in addition to the curriculum in teaching WASH concepts. The book is about Binuh, a student in a school with a vegetable garden. She learns that to benefit from the vegetable garden, it is important to follow proper sanitation and waste management at home.



Binuh also realizes her friend Deepak became sick because of worms inside of him due to poor sanitation. Binuh and Deepak begin planting their own vegetables and always remember to wash their hands after working in the

garden and before eating. The story closes with Binuh and Deepak's garden being successful and Binuh's mother cooking the vegetables she harvested from the garden. Binuh's garden encourages neighboring children to plant their own vegetables and follow proper sanitation practices.

## **Linking with Other School Nutrition and Health Initiatives**

The school garden program strengthens the national school curriculum by contributing to topics taught in science, health and occupation classes such as vegetable cultivation. The program's focus on incorporating gardening, nutrition and WASH concepts made the topics in the curriculum more effective and easier for students to understand.

The program is also associated with various national government programs by contributing to the country's current and future goals in nutrition, education and agriculture. The national programs include:

- National Nutrition Policy and Strategy (MoHP 2004)
- National School Health and Nutrition Strategy (MoES and MoHP 2006)
- Multi-sector Nutrition Plan For 2013 to 2017 (NPC 2012)
- Agriculture Development Strategy (MoAD 2014)

The school garden program works with feeding programs of schools. Some schools in Nepal had school feeding programs supported either by government or non-government initiatives. Vegetables from the school garden were harvested to supply the feeding of students. Through both programs, students consume more vegetables in their diet.

## Promotions

### School Promotions

Apart from the curriculum booklets and cartoon books, each school promoted home gardening, eating vegetables and WASH to the student body. Promotions included:

- Promotional materials such as free pencil cases with a nutrition message were given to students
- Some schools cooked the harvested vegetables for their feeding programs
- Schools without feeding programs gave the harvested vegetables to the students to enjoy with their family
- Schools distributed seeds to students and their families to establish home gardens

### Public Promotion

#### Media

- The project produced a 12-minute documentary video of the school garden program in Dolokha and Ramechhap. The video documented



the positive impacts of the school garden program on students and the community. It was broadcast by Nepal Television (NTV) nationwide. The viewers responded positively and several schools contacted the project for more information on how to start school gardens.

- Nepal Television also broadcasted two interviews on the project.
- Nepal’s national newspaper, the *Kantipur Daily*, published two articles on the VGtS school garden program

The project produced the following scientific papers:

- Bhattarai, Dhruba Raj, Giri Dhari Subedi, Tej Prasad Acharya, Pepijn Schreinemachers, Ray-yu Yang, Greg Luther, Upendra Dhungana, Krishna P Poudyal, and Narayan Kaji Kashichwa. 2015. “Effect of School Vegetable Gardening on Knowledge, Willingness and Consumption of Vegetables in Mid-Hills of Nepal.” *International Journal of Horticulture* 5 (20): 1–7.
- Schreinemachers, Pepijn, Dhruba Raj Bhattarai, Giri Dhari Subedi, Tej Prasad Acharya, Hsiao-pu Chen, Ray-yu Yang, Narayan Kaji Kashichhawa, Greg Dhungana, Upendra Luther, and Mecozzi Maureen. (Submitted in 2016) “Impact of School Gardens in Nepal: A Cluster Randomized Controlled Trial.” *Journal of Development Effectiveness*.

Research findings on the project were presented at:

- 7<sup>th</sup> National Conference on Science and Technology in Kathmandu,
- Annual Vegetables Go to School Project Meeting at the University of Freiburg in Germany
- Research Phase Closing Workshop of HRD and NARC in Khumaltar, Lalitpur in Nepal
- Vegetables Go to School Consultation Workshop in Thimpu, Bhutan.

## Family and Community

Beyond the school walls, the project expands its influence by connecting to families and communities. Parents and community members are actively

involved alongside the children from establishing to helping maintain and support the school garden. This positive relationship with the community mutually benefits both school and community, leading to potential increase in:

- Awareness of the benefits of gardening, nutrition and WASH in the community
- School-community interaction
- Parents' role in students' health
- Vegetable production and consumption in the community

Students' families and the community is involved in the school garden in several ways:

### **From the Start**

Before establishing the garden, the school team invited parents and communicated with them the importance of setting up a school garden. Through these meetings, parents understand the educational, health and nutritional benefits of the garden on their children. Continuous communication with parents gathered their full support for the school garden program. Parents are also invited to participate in school garden activities open to the community.

### **Establishing the Garden**

Families and other community members helped the students set up the school garden. As the majority of parents are farmers, building the school garden becomes an opportunity to exchange agricultural knowledge and techniques. New techniques, especially in vegetable gardening were also communicated to the parents. Community authorities also supported the garden by providing manure for the compost.

### **Regular School Garden Visits, Demonstrations and Seminars**

During the school year, parents were invited to join visit the school garden. During this time, the focal teacher demonstrated new vegetable gardening techniques, how to cook nutritious meals and shared nutrition messages with the community. Students invited their parents and helped with the seminars and demonstrations. The parents were motivated to visit the school garden to observe what the children learned and how the children succeeded.

On the garden visits, parents learned new garden techniques to apply to their own home or commercial gardens. One such technique was the use of polyhouses for producing seedlings. Many parents took this new knowledge back to their farms and set up polyhouses for their production. Other new technologies include: irrigation systems, crop rotation techniques, composting and how to grow various new and local vegetables.

### **Harvest Festival**

During harvest season, all parents were invited to harvest the vegetables with the students. The festival is a day of fun for the parents and children. Everyone works together for the harvest and families bring the vegetables home to eat. Apart from the harvest, teachers and students organized gardening and cooking demonstrations, and tasting of vegetable dishes, and nutrition promotions.

### **Home Gardens**

To help improve local vegetable production and consumption, the school encouraged families to start their own home gardens. Seeds were distributed to the families to help start their gardens. Students play an active role in sharing what they have learned from the school garden program with their families. They help the family establish and maintain the home garden. Focal teachers actively monitor and provide technical assistance to families who have started home gardens.



## RESEARCH

The research protocols and assessments were developed by World Vegetable Center and the Nepal Country Team. A scientific paper detailing the VGtS research methods and results for school gardens in Nepal was submitted to the *Journal of Development Effectiveness* (Schreinemachers et al., n.d.). The following results are based on the scientific paper.

During the first year of the project, the study measured five main outcome indicators (Table 1) of students before and after participation in the VGtS school garden program.

## Outcome Indicators

**Table 1. Outcome indicators used in the study**

Indicator level	Explanation	Testing method
A. Awareness	School girls and boys become aware of fruits and vegetables. They can recall different kinds and tell the names.	1. Ability to identify fruits and vegetables from a photo
B. Knowledge	School girls and boys know that different foods can help the body perform different functions. They also know some basics about sustainable agricultural production systems.	2. Food-nutrient association 3. Food-job association 4. Insect pests and natural enemies 5. Crop rotations
C. Preferences, attitudes	School girls and boys not only know about fruits and vegetables but also develop a desire to eat them.	6. Number of fruits and vegetable liked by the children 7. Preference for healthier snack choices
D. Dietary behavior	School girls and boys change their dietary and/or agricultural behavior.	8. Dietary diversity 9. Number of different vegetables consumed
E. Nutritional status	Long-term changes in dietary behavior could lead to improvements in nutritional status.	10. Anthropometrics (z-score)

## Baseline Information

The students' characteristics of control and intervention schools (Table 2) shows some differences between groups due to the small sample size of the first year's study.

**Table 2. Average characteristics of the sample of school children in Nepal at baseline, 2014.**

Characteristic	Control (n=846)	Intervention (n=429)	p-value	Significance
Age (years)	12.6	12.4	0.10	
Male (%)	47.0	45.9	0.74	
Female (%)	53.0	54.1	0.74	
Coming to school by foot (%)	94.8	97.2	0.35	
Walk to school for more than 30 min./day (%)	41.0	42.4	0.84	
Household size (persons)	6.0	6.0	0.76	
Vegetable garden at home? (%)	75.8	57.3	0.03	**
<i>What meals do you regularly eat together with your parent(s)?</i>				
All meals (%)	80.1	48.5	<0.01	***
Only dinner (%)	15.6	44.8	<0.01	***
We never eat together (%)	1.9	3.3	0.21	
<i>Where do your parents work?</i>				
On a farm (%)	86.4	84.1	0.71	
In own shop or business (%)	13.5	12.4	0.74	
Work for a company (%)	11.9	12.6	0.84	
Work for government (%)	9.6	11.7	0.49	
<i>Which of the following items do you have at your home?</i>				
Tap water (%)	90.1	80.2	0.08	*
Soap in the toilet (%)	72.5	61.5	0.29	
Water in the toilet (%)	81.7	81.4	0.96	
Refrigerator (%)	6.3	4.7	0.44	
Toothpaste (%)	87.0	88.1	0.83	

Notes: \*\*\*p<0.01, \*\*p<0.05, \* p<0.10.

## Results

The research results (Table 3) show the following findings:

The Vegetables Go to School garden program significantly ( $p < 0.01$ ) increased students':

- **Awareness about fruit and vegetables**
- **Knowledge about agriculture, nutrition and WASH**
- **Preferences for eating fruit and vegetables** among 10 to 15 years old students in rural areas of Nepal

Due to the short one-year pre-post intervention assessment, the study did not find significant improvements in students' vegetable consumption or nutritional status. Changes in consumption and nutritional status through a food-based approach requires time and would possibly be measurable in long-term post-intervention assessments.

**Table 3. The impact of school gardens linked to complementary teaching and promotional activities about nutrition and WASH on the nutritional awareness, knowledge, preferences, eating behavior and nutritional status of 10- to 15-year-old schoolchildren in Nepal, 2014-2015, standard deviations in italics**

	Baseline (2014)			Follow-up (2015)			Impact	
	Control (n=846)	Interv. (n=429)	p-value	Control (n=846)	Interv. (n=429)	p-value	Mean	p-value
<b>Awareness:</b>								
1. Ability to identify fruit and vegetables	71.7	65.7	<0.01	69.7	89.0	<0.01	25.3	<0.01
	<i>1.2</i>	<i>1.7</i>	***	<i>1.3</i>	<i>1.8</i>	***		***
<b>Knowledge about: <sup>a</sup></b>								
2. Food-nutrient association	77.3	74.5	0.05	80.3	86.8	<0.01	9.4	<0.01
	<i>0.8</i>	<i>1.2</i>	*	<i>1.2</i>	<i>1.7</i>	***		***
3. Nutrition	68.6	59.9	<0.01	65.8	76.5	<0.01	19.4	<0.01
	<i>1.2</i>	<i>1.7</i>	***	<i>1.5</i>	<i>2.2</i>	***		***
4. Water, sanitation and hygiene	73.4	66.5	<0.01	79.8	84.7	0.02	11.8	0.01
	<i>1.3</i>	<i>1.8</i>	***	<i>1.2</i>	<i>1.7</i>			**
5. Beneficial insects and pests	69.1	66.1	0.29	54.2	66.8	<0.01	15.6	<0.01
	<i>1.6</i>	<i>2.3</i>		<i>1.2</i>	<i>1.7</i>	***		***
6. Crop rotations	43.5	43.9	0.90	51.6	78.6	<0.01	26.6	<0.01
	<i>1.8</i>	<i>2.6</i>		<i>3.2</i>	<i>4.5</i>	***		***
<b>Preferences:</b>								
7. % of fruit and vegetables liked	76.7	69.6	<0.01	74.5	81.1	<0.01	13.6	<0.01
	<i>1.0</i>	<i>1.5</i>	***	<i>1.1</i>	<i>1.6</i>	***		***
8. % of healthy snack choices	67.0	61.1	0.07	66.3	78.6	<0.01	18.2	<0.01
	<i>1.8</i>	<i>2.6</i>	*	<i>2.3</i>	<i>3.2</i>	***		***
<b>Behavior (24-hour recall):</b>								
9. % of children who had eaten vegetables	82.0	78.6	0.39	87.8	87.4	0.89	0.1	0.53 NS
10. % of children who had eaten fruit	17.7	12.1	0.32	9.2	5.8	0.13	0.0	1.00 NS
11. Food categories consumed	3.4	3.2	0.20	3.5	3.5	0.89	0.2	0.15 NS
	<i>0.1</i>	<i>0.1</i>		<i>0.1</i>	<i>0.1</i>			NS
<b>Nutritional status</b>								
1. Body height (cm)	139.7	142.6	0.19	143.7	146.5	0.12	-0.10	0.88 NS
	<i>1.2</i>	<i>1.7</i>		<i>1.0</i>	<i>1.4</i>			NS
2. Body mass index	17.6	16.4	0.11	17.9	17.0	0.07	0.30	0.34 NS
	<i>0.4</i>	<i>0.6</i>		<i>0.3</i>	<i>0.4</i>	*		NS
3. Children stunted (%) (height<2 sd)	42.2	31.0	0.13	37.6	28.4	0.20	0.05	0.51 NS
4. Children wasted (%) (BMI<2 sd)	13.7	21.0	0.13	9.0	14.0	0.02	-0.03	0.88 NS
						**		NS
5. Children overweight (%) (BMI>1 sd)	10.4	4.9	0.36	8.3	3.5	0.31	-0.03	0.87 NS
								NS

Notes: \*\*\*p<0.01, \*\*p<0.05, \* p<0.10, NS=Not significant (p≥0.10). <sup>a</sup> % of correct answers.

## BENEFITS

Validated benefits of the VGtS school garden program was reported in the impact assessment (previous section). However, several benefits were observed and may not be measurable in the short-term period. These observed present and potential benefits of the school garden program were documented from face-to-face interviews with the Country Team, head teachers, focal teachers, students and their families, and through the World Vegetable Center rapid assessment, external evaluations of the project and the impact assessment.

Beyond the school, the VGtS school garden program was seen to have **increased the number of home and commercial vegetable gardens** and **increased vegetable production** in the community.

The following are the detailed observed and potential benefits of the program on students, schools, families and community.

### Students

#### Observed Benefits

- Knowledge and skills in gardening, nutrition and WASH
- Awareness about fruits and vegetables
- Preferences for eating fruits and vegetables
- Awareness and care for environment
- Confidence and belief in their ability to contribute not only to their family's food security but to that of the country
- Better engagement in school activities
- Sense of responsibility as models and teachers on gardening, nutrition and WASH at home and in the community

## **Long-Term and Potential Benefits**

- Increased vegetable consumption
- Agricultural skills for future employment opportunities
- Ability to produce food and contribute to local and national food and nutrition security
- Ability to make healthy eating and lifestyle choices throughout adulthood
- Teach their children on gardening, nutrition and WASH concepts

## **Schools**

### **Observed Benefits**

- Increased school capacity to implement school garden program:
  - Established garden facilities
  - Trained school staff
  - Productive use of school land
- Enhanced quality of education through hands-on learning program
- Increased interaction with families and the community
- Increased importance of school in the community as a resource center for sharing new agricultural technologies, and nutrition and health messages
- Greening of school environment

### **Long-Term and Potential Benefits**

- Recognition for higher quality of education in the school board

## Families

### Observed Benefits

- Approximately 60-65% of students' families started their own home gardens
- More children-parent interaction and bond due to engagement in school garden and home garden activities
- Increased home vegetable production and consumption (for families with home gardens)
- Confidence in vegetable gardening gained from seeing the success of children's school garden

### Long-Term and Potential Benefits

- Increased local vegetable production and consumption
- Income-generation from selling vegetables in local and distant markets
- Household food and nutrition security leading to improved nutritional status

## Community

### Observed Benefits

- Exchange of new farming technologies
- Neighboring community members are motivated to grow vegetables because of the school garden
- Increased home gardens and vegetable production near intervention schools

- Some farmers switched to vegetable farming from staple crop production
- Increased awareness, knowledge and preference for vegetables

### **Long-Term and Potential Benefits**

- Diversification of agricultural production
- Increased local vegetable production
- New products and market opportunities
- Increased consumption of diversified food products
- Improved nutritional status



## CHALLENGES & KEYS TO SUCCESS

### Challenges

Several challenges were met by the school garden program. The following is a highlight of the main challenges:

1. School gardens established on **leased lands** had problems sustaining the garden once the financial support for the rent money stopped. Leasing land is not a viable option for schools with limited space. An alternative is to use space-saving gardening methods such as container or vertical gardening.
2. **Low water availability** during dry seasons and for schools located far from water sources limited irrigation for vegetable production. Access to a stable water source is necessary for the school garden program. Water-saving technologies such as drip irrigation and water harvesting during the rainy season are possible solutions.
3. Providing **continual incentive** for school staff after the project is completed is a challenge. Aside from receiving harvested vegetables, letters of appreciation and participating in the school garden competitions, there were no other incentives to motivate school staff to continue the school gardening program. Even when students and teachers were determined, maintaining the school garden was an additional job for them. A sustainable solution is to include the school garden program in the national curriculum and allocate incentives for school staff.
4. It was difficult to communicate **the importance of research** to the schools and the community despite their interest in the subject. To emphasize the importance of research, there was regular communication between the Country Team and the teachers.

## Keys to Success

Several factors contributed to the success of the school garden program:

- The multi-ministry participation in the school garden program was vital in mobilizing resources and support for the program from the Education, Health and Agriculture ministries.
- Smooth coordination and cooperation of multi-ministry Country Team in organizing and overseeing the project.
- Good international partnership with research institutes to assess and generate valid data for the project.
- Regular communication with head teachers and focal teachers through meetings, on-site visits and mobile messaging platforms for monitoring program progress.
- Motivated head teacher for supporting the school garden program.
- Motivated focal teacher in running and teaching the program to the students.
- Students taking initiative to participate in the program and share what they have learned with the family.
- Supportive parents who participated in garden activities and demonstrations, and willing to initiate their home gardens.
- Supportive local government authorities in providing resources for the school garden. District Education Office and village development committee supported school gardens by providing water supply facilities.

## Success Stories

When VGtS went to the school districts the first time, the teachers liked the idea because it was a different approach to mitigating malnutrition and health

concerns. The gardens became an inspiration inside and outside of school walls.

***“What’s good for school is good for the home.”***

Prahtima Adhikari, a schoolgirl from Sanhke Lower Secondary School, said that working on the school garden made her happy. She enjoyed weeding and removing unwanted plants and insects around the garden and other gardening activities with her classmates. She even brought home seeds that were supplied to them to grow them in her backyard so that they could have vegetables at home. When asked if her parents thought that the gardens distracted her from her academic work, Prahtima smiled and shook her head. She then replied, “No. They said to me, you are doing good work”.

***“Now, I can eat and earn.”***

Devaka Giri, a farmer in Ramechhap, said that she and the other farmers would not have done vegetable cultivation if it were not for the schools. But they saw the schools’ poly-houses and told themselves that they could make one too. Today, she finds vegetable cultivation advantageous because it provides her a means to earn money for her household.

***“If the students can, so can I.”***

For Ramhari Giri, a farmer in Ramechhap, the inspiration to start his own vegetable garden did not spring from the idea of nutrition. Instead, he saw how the students were enjoying the activity so much that he became excited at the thought of having his own garden. When the school gardens became lush and green, he realized that this was made possible by the work that the students had put into the plots. This escalated his confidence and he started growing vegetables. In the end, Ramhari realized that good vegetable production could be achieved if people would put effort into it. Specifically, his words were, “If we work, we can achieve it. Now the land is fully used for vegetable cultivation.”

Prahtima, Devaka and Ramhari are only some of the people who believe in the positive impact of school gardening. We have heard countless stories of people attesting to how these school gardens changed their lives. As parents join harvest festivals organized by the schools, they learn more about gardening techniques, and their interest in the activity grows. As students continue to successfully grow their green and flourishing gardens, parents also start to invest efforts into the same project at home. The poly-houses, which are evident in many home backyards, stand witness to this healthy change. The gardens have become essential and the vegetables have become indispensable not only in these rural homes but also in the markets.

## RECOMMENDATIONS

Based on the quantitative and qualitative findings gathered from the Vegetables Go to School project, the project team has the following recommendations:

- **The school garden program is an effective educational program** aimed at improving students' nutritional and health awareness and potential practice.
- **The school garden program should be modified and scaled up nationally** and incorporated into the National Curriculum.
- **Collaboration between the Ministries of Agriculture, Education and Health is key to the program's success** and should continue its cooperation in future school garden programs.
- **School staff should be given incentives** to motivate their participation in the school garden program. Focal teachers are important resource persons for training new teachers on the program during scaling up.
- **A national home garden program is a necessary complement to the school garden program to improve household nutrition.** Government support for agricultural extension and training for home gardeners is needed to sustain the program.
- **The school garden and home garden research data should be monitored and included in the National Nutrition Surveillance System** for continual monitoring and improvements on the programs.
- **To increase vegetable consumption, school gardening program and home gardening activities should be conducted**

**simultaneously.** School vegetable gardening along with home gardening activities are necessary and should be practiced through all schools of Nepal.



## SCALING STRATEGY & COSTS

Based on the experience and evidence for impact generated in phase I of the VGtS project, the Country Team has developed a plan for extending the school garden program to a larger number of schools. The plan includes a brief description of the scaling strategy and an estimation of the costs.

### Scaling Strategy

#### Objectives

To improve nutrition security in Nepal through school gardening initiatives with close participation of local communities.

#### Targets

300 public schools in Nepal will be targeted for changing the diet intake behavior of the children to improve the nutritional status.

## Theory of Change

With increased awareness and knowledge on nutrition, the attitude of children will be changed towards eating nutritional vegetables and fruits, and they will promote the production and consumption of diverse type of nutrient dense vegetables in their families and communities along with good health practices. The final outcome will be better nutritional status for school children including their families.

With 300 schools implementing the school garden program, we expect at least 100 students from each school enrolled in the program. From these 100 students, at least 60% will establish home gardens with their families. Thus, the potential impacts include:

Target Level	Target and Scaling Estimation	Estimated Final Beneficiaries
School	300 schools	<b>300 school garden programs</b> established and sustained
Students	100 students (enrolled in the program in each school per year) x 300 schools	<b>30,000 students</b> per year impacted by the school garden program
Household	100 students x 60% (who will establish home gardens) x 300 schools	<b>18,000 home gardens</b> established per year
Community	2-3 parents day and promotion events per school per year for each community x 100 community members x 300 schools	<b>75,000 community members</b> per year from 300 communities impacted by school gardens demonstration and nutritional promotion

## Intervention Design

The first intervention component will be a school garden for the cultivation of

nutrient-dense vegetables by the school children under the guidance of teachers and with the support of parents and the local community.

The second component will be the curriculum to teach school children about gardening, nutrition and WASH. The curriculum was developed for 23 weeks.

The third component will be the promotion activities to reinforce the lessons learned and to strengthen impact. The activities will be poster displays and the distribution of handouts about nutritious food and hand washing.

School children will replicate the garden at home and to share the lessons learned with their family members. Vegetables seed will be distributed to the children for this purpose. Teachers and Country Team will visit the children's homes to observe their home gardens.

### **Sustainability**

Through the interventions, school children will be expected to be actively involved in school gardens, which in combination with teaching lessons and hands-on practice will stimulate their awareness about vegetables, strengthen their knowledge about the importance of vegetables for their health, and promote their preference for eating them. Children's home garden will be sustainable and make a greater contribution to their household's supply.

### **Scaling Approach**

This concept will be transferred to the communities in many ways. After seeing the cultivation of vegetables in school gardens, parents will be motivated to do so. Their confidence will be escalated. Furthermore, seeds of different vegetables will be provided to the students to establish home gardens. It will be helpful to link school vegetable garden to the surrounding communities. Furthermore, the documented information will be broadcasted through the Nepal Television and local media.

## **Monitoring and Evaluation**

- Baseline line and end line survey report
- Impact study report
- Vegetable consumption statistics
- Nutrition status report of school children and households in the community

## **Program Costs**

The cost of establishing the school garden program in 300 schools in Nepal is **405,000 USD**. The cost per school is **1350 USD**.

This investment would establish 300 school garden programs and potentially impact 300 communities and benefit 30,000 students and 75,000 community members with gardening, nutrition and WASH education and practice, and establish 18,000 home gardens in Nepal.

The purpose of the program is to improve students' nutrition and health through school gardening and home vegetable production and consumption. Costs of the program include program administration, training of teachers, development of teaching and promotional materials and cost of setting up and maintaining the school garden.

## **Cost Estimation**

The VGtS project estimated the costs of the implementing the school garden program in 300 schools in Nepal (Table 1). Costs include both actual costs such as value of seed and garden tools, but also opportunity costs such as the value of land used for the garden, and the cost of time spent by teachers, children and parents.

Opportunity costs are defined as the loss of potential gain from other alternatives when one alternative is chosen. For instance, if children had not spent their time on gardening, they could have benefitted from learning other subjects. Valuing the opportunity costs is not always possible and assumptions must be made (Table 4).

**Table 4. The annual cost of scaling the school garden program per project activity**

Activity (frequency)	Cost	Explanation
<b>Activities conducted for the program as whole in cost per year:</b>		
1.	Development of curriculum for training of school teachers	5000 Expenditures on developing/improving the training course for school teachers. Exclude the actual training, which is listed under [5] below.
2.	Development of training and promotional materials for school children	6000 Expenditures on developing/improving teaching materials and promotional activities for school children. Exclude the actual printing and dissemination, which is listed under [6] below.
3.	Project administration (annual)	65000 Expenditures on regular project management including report preparation, communication with stakeholders, project meetings, budget management, staff recruitment, etc. 45000 USD is for vehicles (2

Activity (frequency)	Cost	Explanation	
		motorcycles and 1 automobile) for field visits.	
<b>Activities conducted per school in average cost per school per year:<sup>1</sup></b>			
4.	School selection (once per school)	5000	Expenditures on selecting schools to be included in the project, screening them for suitability, informing them about the project and getting approval of principal and other stakeholders.
5.	Training of school teachers and principals (first year and then every year)	8000	Expenditures on conducting the training course, including the preparation of training materials, transport, food and lodging.
6.	Supply of garden inputs (every year)	150000	Value of annual input expenses on seeds, water, electricity, and other inputs. Include land rental fees if paid. Also include the value of labor time spent on purchasing these inputs.
7.	Investments in school garden and related facilities (first year and then every year)	150000	Expenditures on items used for more than one year, including hand hoes, watering buckets, fences, and other long-term improvements of the school garden or related facilities such as WASH infrastructure (washing basins,

	Activity (frequency)	Cost	Explanation
			closed latrines, etc.).
8.	Dissemination of training and promotional materials (every year)	6000	Expenditures on printing and disseminating of training and promotional materials to the schools.
9.	Project monitoring and evaluation (every year)	5000	Expenditures on monitoring the progress by following up with teachers and principals by phone and through personal visits.
10	Other activities	5000	Any other expenses not included in the above.
11	Total	405,000	The sum of [1] to [10].

*Note:* 1 Multiplying this by the number of schools reached would give the total budget per year.

The estimated opportunity costs of this program are:

- Additional 4 hours of time spent on the school garden program each week for the focal teachers.

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