



World Vegetable Center

Vegetables Go to School **BHUTAN**

School Vegetable Gardens: Linking Nutrition, Health and Communities



Project Documentation

Vegetables Go to School
BHUTAN

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

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Abbreviations

CoRRB – Council for RNR Research of Bhutan

FAT – Focal Agriculture Teacher

SAC – School Agriculture Club

SAP – School Agriculture Program (Bhutan)

RNR – Renewable Natural Resources (Comprise of three sectors, Agriculture, Forest and Livestock)

VeGoTs – Vegetable Go to School for Bhutan

VGtS – Vegetables Go to School Project

WASH – Water, Sanitation and Hygiene

Measurements

100 dismal = 1 acre



EXECUTIVE SUMMARY

This report documents the preparation, implementation, findings, and recommendations of the Vegetables Go to School (VGtS) (known as VeGoTs in Bhutan) school garden program in Bhutan. For the purpose of this report, the project will be referred to as VGtS.

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

Summary of School Garden Program

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

In the pilot phase, 35 schools participated in the project. The VGtS school garden program has a two-pronged approach: classroom curriculum and school garden. The VGtS school curriculum teaches students good gardening practices; nutrition education; and water, sanitation and hygiene (WASH). The school garden incorporates hands-on gardening activities and demonstrations to enhance the learning experience for students.

The program builds on Bhutan's existing School Agriculture Program (SAP) by adding the nutrition and WASH components of the curriculum and promoting interaction with the local community.

The VGtS school garden program impacts the lives of students' families and communities 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

The Vegetables Go to School garden program significantly increased students':

- **Awareness of fruit and vegetables** ($p < 0.01$)
- **Agricultural knowledge** ($p < 0.05$)
- **Healthy food preferences** ($p < 0.05$)
- **Likelihood of vegetable consumption** ($p < 0.05$).

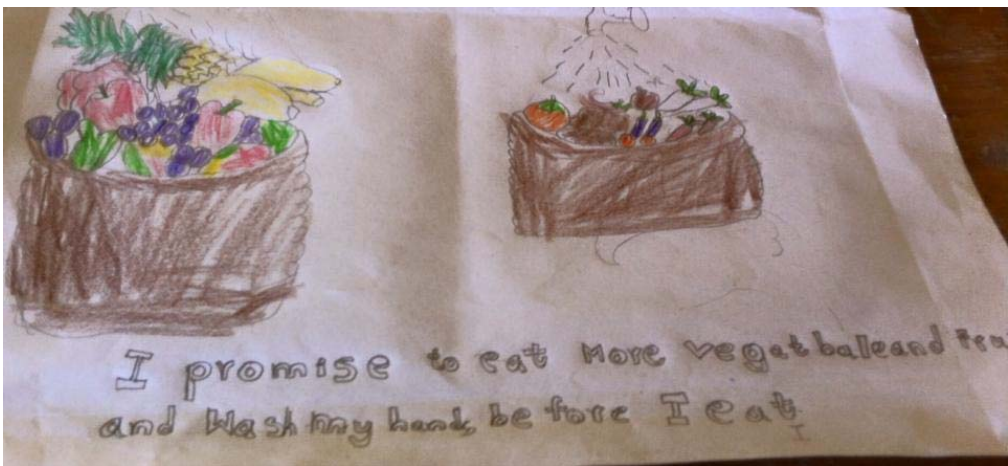
However, due to the short time span of the project, improvement in students' nutrition statuses (height-for-age z-scores) was not observed. A longer term follow-up assessment may be able to detect more changes in the nutritional status.

Other observations include:

- There was no significant increase in the number of different vegetables or fruits that children consumed.
- Children with parents working on a farm are more likely to consume vegetables.
- Children with home vegetable gardens significantly affected their preferences for healthy foods ($p < 0.10$).
- School feeding contributes to greater dietary diversity ($p < 0.05$), but there was no significant interaction between the feeding program and the school garden program.
- The effect of the school garden on dietary diversity was larger for boarding schools than for non-boarding schools.
- Age had a negative effect on height-for-age z-scores ($p < 0.01$) (it must be noted that this indicator is not ideal for older students because of unequal growth during adolescence).

Key Recommendations

- **The school garden program is an effective educational program** aimed at improving students' nutritional and health awareness and increasing vegetable consumption.
- **Collaboration between the Ministries of Agriculture, Education and Health is key to the program's success** and should continue to supervise the school garden program. Coordination and communication between the ministries should be transparent and well-integrated.
- **Additional funds should be allocated for the program, to ensure the benefits of VGtS can continue.**
- **The school garden program should increase parents' awareness and knowledge of nutrition** given its influence on children's eating behavior.
- **Vegetable availability needs to be addressed in parallel to raising children's vegetable demand.** This needs to be addressed at the household and at the community level.
- **The VGtS school garden program should be incorporated into the School Agriculture Program (SAP) and national curriculum and scaled up nationally.**
- **School staff should be given incentives** to motivate their participation in the school garden program. Focal agriculture teachers are important resource persons for training new teachers on the program during scaling up.



INTRODUCTION

Mountainous Bhutan is a predominantly agrarian country where agriculture contributes to the livelihoods of 60% of the population, and 16.8% of the nation's GDP. However, Bhutan relies heavily on neighboring countries for food imports. Therefore, integrated subsistence farming approaches and agricultural education are implemented to achieve food self-sufficiency and nutritional security.

Malnutrition in Bhutan is most severe among children and pregnant women. 34.9% of preschool children are stunted, 10.4% are underweight and 4.7% are wasted (Zangmo, de Onis, & Dorji, 2012). 22% and 80% of preschool children have Vitamin A and iron deficiency, respectively (WHO, 2008, 2009). Among pregnant women, 17% and 50% are deficient in Vitamin A and iron.

Schools are powerful mechanisms for educating the next generation on healthy eating and food choices, which will last to adulthood. Moreover, teaching students to produce food can increase their agricultural skills and improve their ability for self-sustenance. Bhutan introduced the School Agriculture Program (SAP) in 2000 to address these needs.

The SAP plays a pivotal role in contributing to the food and nutrition security of school children. Each year, the government establishes SAP in 15 to 20 schools with the plan to cover all 553 schools in the country. SAP is currently active in half of Bhutan's schools. The objectives of the program are to:

- Contribute to food production and supplement school children's meals;
- Educate and train school children towards additional employment opportunities in the Renewable National Resources (RNR) sector;

- Encourage school children to participate in commercial farming as a means of livelihood in adulthood.

Vegetables Go to School (VGtS) is a new multidisciplinary, school-based project implemented in Bhutan, Burkina Faso, Indonesia and Nepal. In Bhutan, the project is known as VeGoTs. For the purpose of this report, the project will be referred to as VGtS. The project was developed by a team from the Bhutan government and a team of international researchers from the World Vegetable Center, Swiss Tropical and Public Health Institute and the University of Freiburg University, and funded by the Swiss Agency for Development and Cooperation. The project aims to collaborate with the SAP in addressing malnutrition among Bhutanese 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 following main objectives:

- 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 and incorporation in the national School Agriculture Program

This report documents the preparation and implementation of the VGtS school garden program in Bhutan, 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 that 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 a school to motivate positive change in the community. Governments and non-profit organizations are leveraging on 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.

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

The program follows a two-pronged approach: classroom curriculum and school garden.

Curriculum

The VGtS school curriculum teaches students:

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



These three core components are incorporated to 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.

Good and safe **gardening** practices give students the knowledge and ability to grow their own foods. Students learn how to establish their gardens, make beds, install irrigation, sow and transplant seedlings, compost and nourish the vegetables, 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

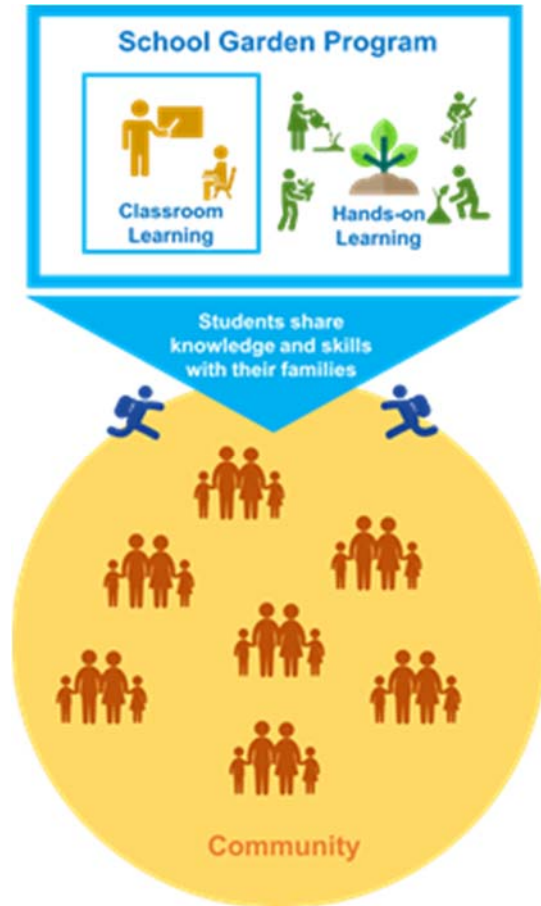
The VGtS school garden program incorporates hands-on gardening activities and demonstrations to enhance the learning experience for students. Each school establishes and maintains an on-site school garden growing diverse vegetables during the school year.

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 can 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. A home garden can feed the family without spending money on purchasing vegetables at the market. Surplus 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.

Building on the Bhutan School Agriculture Program

The SAP was implemented in 2000, and by the time VGtS began in 2013, Bhutan already had 13 years of experience in establishing school gardens. There are currently 553 schools from primary to the higher secondary level in Bhutan; about half have SAP and 315 have school feeding programs. However, the impact of SAP was not known. Therefore, the VGtS project collaborates with Bhutan's SAP to:

- Cover 35 additional schools (in schools without SAP)
- Teach nutrition and health concepts and practice alongside agricultural education
- Provide scientific evidence on the impacts of the school gardening program

The VGtS project was included in the 11th Five Year Plan of Bhutan for the School Agriculture Program (MOAF, 2013).



WHO IS INVOLVED?

Who Is Involved?	Main Roles
Country Team	<ul style="list-style-type: none"> • Oversee all aspects of the project in the country
International Research Team	<ul style="list-style-type: none"> • Provide technical assistance and works with Country Team on research protocols
School Team	<ul style="list-style-type: none"> • School principal gives directions and overall management of the project activities in the school

	<ul style="list-style-type: none"> • Focal Agriculture Teacher (FAT) oversees all aspects of the school garden program in the school • Students in the School Agriculture Club (SAC) are the direct beneficiaries of the program
Agricultural Extension Officers	<ul style="list-style-type: none"> • Government agricultural extension officers provide technical assistance to the FAT
Community	<ul style="list-style-type: none"> • Community leaders are the main authority of community initiatives • Parents interact with school garden program through students and FAT. They are the indirect beneficiaries of the program.

Bhutan Country Team

The core group of the VGtS project and moving the school garden program forward in Bhutan is the Country Team. The Bhutan Country Team consists of a Country Manager from the Council of Renewable Resources Bhutan (CoRRB) and one focal member from each government ministry:

- Ministry of Agriculture and Forests
- Ministry of Education
- Ministry of Health

This model follows the original SAP set up of coordination between two agencies, CoRRB of Ministry of Agriculture and Forests and Department of School Education (DSE) from Ministry of Education. However, VGtS involved an additional member from the Ministry of Health to deal with aspects of the project related to nutrition and health.

The team is involved project implementation, pulling together the country's resources and rallying government support for the school garden program. In addition to these key tasks, they are responsible for multi-sector activities including developing the country action plan, preparing school garden curriculum and teaching materials, implementing the project across the country, training teachers, monitoring the project's progress and holding regular meetings on project-related activities. They work closely with teachers involved in the project who reported to the Country Team on their activities and progress. Likewise, the Country Team reported their progress back to their respective government departments to discuss the project's goals and directions and determine relevant training support and resources from the different departments.

Country Team members meet formally twice a year, at the beginning and end of the year, to discuss progress and plan for the coming year. The action plan for the academic year is also determined at the beginning of the year. Schools are asked to report to the Country Team on their funding requests for the year. Team members budget for the year and divide responsibilities for training, workshops, and seminars. Throughout the year, team members communicate through social platforms such as WeChat and Facebook. Financial decisions are made by the country manager with approval from the chief and director general of CoRRB.

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 to develop the initial country action plan for the

school garden program. The one-month training was organized prior to the start of the project and was led by the World Vegetable Center in Shanhua, Taiwan. The research team worked with the country team to develop study protocols and analyze data for technical and scientific publishing. The team provided curriculum materials, nutrition and WASH teaching materials, and community strategies for the promotion of school 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

Principal

The school principal 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 are approved by the principal, including nominating the FAT for teaching and maintaining school garden activities.

Focal Agriculture Teacher

The Focal Agriculture Teacher (FAT) selected in each project school was trained on basics of integrated farming concepts and provided with continual training throughout the year. The FAT takes on two main roles:

1. Planning and implementation of activities/reporting
2. Monitoring and evaluation of planned activities

The FAT teaches the school garden lessons and hands-on gardening to

students in the Agriculture Club. He or she is also tasked with promoting healthy eating in the school, maintaining the garden, collecting scientific data and reporting school garden progress to the Country Team, and teaching home gardening to the parents of the students. The FAT is the point of contact between the school and outside agencies related to development of renewable resources in the school.

FATs receive a stipend for school garden responsibilities. The school garden program is evaluated by the Country Team for the annual VGtS award. Each year, first, second and third prize winners are awarded cash prizes for the school and students on World Food Day.

Students

Students play active roles in running the school garden program. School garden activities are carried out by a group of students enrolled in the School Agriculture Club. Club members take part in the gardening, nutrition and WASH activities organized by the school. They not only receive education, but are responsible for sharing their learning with their House Masters and teaching fellow students in their regular class and boarding house. Students in the School Agriculture Club are also awarded with merit certificates and Renewable Resources medals for the two best students of each school. Students are encouraged to promote vegetable gardening, nutrition principles and WASH techniques in their homes.

Agriculture Extension Officers

In every Dzongkhag (district) there are District Officers and each district is subdivided into Gewogs (Sub-districts) where government agriculture extension officers are based. They provide timely technical assistance in agriculture to the school FAT and the community in implementing project activities.

Community

Community Leaders

Community leaders are the main authority for local initiatives in the community at village and Gewogs level. They provide decision-making, approval, support and resources for local activities. Local leaders were encouraged to participate and lend their support to all major VGtS activities. In fact, public gatherings for VGtS meetings and field days are possible only with the approval by local leaders. One of the local leaders from a progressive district attended an exchange visit to the Nepal VGtS program.

Parents

Parents are invited to take an active part in school garden activities and promotional events with their children. Parents are given seeds from the VGtS project and encouraged to grow their own gardens to increase their family's vegetable consumption. Newly set up home gardens are monitored and supervised by the FAT and extension workers.



PROCESS



R Collection of research data in project schools

PREPARATION

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 Bhutan 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 Forests, 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 35 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 Policymakers
- National, District and Community offices in Education and Agriculture
- Other local offices and community leaders such as village headman
- Local NGOs
- Local community clubs and associations related to the project
- Local media
- Schools and school staff (Principal and focal agriculture teachers)
- Students
- Family of students
- Other community members
- National and international research organizations

Briefing for Policymakers

Prior to project implementation, the Country Team had meetings with policymakers to brief them on project activities and rally their support for the project. These policymakers included directors from the ministries of Agriculture and Forests, Education, and Health, and school principals and teachers.

Identify Schools, Head Teacher, and Focal Teachers

The project identified the pilot schools for the VGtS school garden program following the criteria:

- Interest and commitment of school principal, parents, and community
- School that can designate a science teacher as focal agriculture teacher
- Focal agriculture teacher need to continue work at the same school for at least another 3 years
- School without prior School Agriculture Program

- Minimum of 30 dismals (100 dismal = 1 acre) of arable land or possibility of leasing community's land for school garden
- Stable source of irrigation water
- Climatically suitable for growing at least 10 vegetables in a season
- Preferably feeding schools with at least a meal in a day

Develop School Curriculum

The project created a Bhutanese VGtS school garden curriculum to guide FATs and students in the implementation and maintenance of the school garden program. Details of the school curriculum are under the "School Garden Program" section of this report.

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.

Video documents

2 series of music videos on the importance of nutritious vegetables to keep the body healthy were developed and screened several times on National Television (BBS) for general public viewing.

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

Vegetables and Nutrition for Schools in Bhutan was developed by the World Vegetable Center and Country Team members to provide 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 Bhutan, 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 Bhutan)
- Healthy Diet for Bhutanese People
- Good Nutrition for Bhutanese 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. 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 Country Team to fully equip teachers with knowledge and skills for implementing the school garden program in their schools. The workshops were taught in partnership with Country Team members, local agriculture colleges, and experts from the fields of agriculture, nutrition and health. Two specific trainings were held. One was briefing teachers, principals and district education officers about the project and school garden policies, and how to collect project data. Another training was geared towards teachers on the topics of agriculture, nutrition, and health.

The trainings involved both classroom lessons and hands-on practice. Each training session had 1-2 days in the field where teachers were tested on making garden beds, how to mulch, install irrigation and transplanting.



SCHOOL GARDEN PROGRAM

School Agriculture Club

Although agriculture is a topic taught in the students' curriculum, each school has a School Agriculture Club (SAC) for students to learn more about agriculture and apply their knowledge. The VGtS school garden program follows the same model and students in the club received both class and hands-on gardening, nutrition and WASH education. Approximately 30 to 40 students or roughly 10% of the whole school's student population voluntarily enrolled in the SAC. The classroom lessons were taught by the FAT two times a week for two hours each class, On Saturdays, the students have practical field courses in the school garden.

The SAC students were designated as Master Students who are responsible for the school garden and other agriculture-related activities in the school, such as taking care of the school livestock. The students in the school are divided into 4 houses or blocks with 30 to 100 students in each house. The

Master Students reported back to their houses and taught the other students the lessons, concepts, and skills learned from the SAC each week. They encouraged the whole school to participate in taking care of the school garden.

During major farm operations, all students from the school are encouraged to join the SAC members in the activities. Regular crop husbandry and recordkeeping are done by SAC members. Field days with other students and community members also were organized and explained by SAC members. These SAC members receive SAP certificates as merit every year.

Curriculum – Gardening, Nutrition and Health and WASH

Students of the SAC followed the VGtS program curriculum, which included lessons on gardening, nutrition and WASH. Each lesson is designed with interactive exercises and games, and correlates to the week's garden activities. Students recorded their learnings and planting progress, and were evaluated on their knowledge and participation in the class and school garden activities.

The topics included:

- Plant Structure and Function
- Planning Your Garden
- Where Will You Grow the Plants? (Soil and Soil Structure)
- Size of the Garden
- Transplanting
- Composting
- How to Make Compost
- Introduction to Nutrition
- Food Groups
- Carbohydrates, Proteins, Fats, Vitamins and Minerals

- Irrigation and Other Cultural Practices
- Integrated Pest Management
- Biological Control with Natural Enemies
- Sanitation and Hygiene
- Harvesting
- Saving Seeds
- Seedling Preparation for Second Season
- Food Preparation and Safe Use of Vegetables

Running and Sustaining the School Garden

To run a SAP in the school, the SAP guidelines require the school to have at least 30 dismal of land. Moreover, in Central Schools where the government provides hostels and 3 meals a day for the students, the school garden is mandated to meet at least 20% of the students' vegetable need.

Prior to starting the SAP, the schools plan for their SAP, including their garden size and materials for the garden and other agricultural activities such as livestock rearing. Each school nominates a science teacher to be the FAT and also assign the roles for garden caretakers, usually the FAT and school guards. The school's proposal and fund requests are submitted to the CoRRB.

In the case of the VGtS school garden program, the proposal was sent and reviewed by the Country Team. After initial financial support from the government, schools are expected to maintain and sustain their school garden in the following years.

Each school has an account for their school garden activities. The vegetables harvested from the school garden are sold and the money deposited in the account. 10% of the earnings are used on student activities such as field days and buying other foods for their meals. The vegetables are sold to the school mess at a discounted price, lower than the price at the market. The mess is

where the government supplies the school with a cook and kitchen to provide meals for the students. The government allocates funding for the school meals depending on the number of students in each school.

In non-feeding schools, the government either provides one meal a day, or no meals. Every Tuesday is “Green Day” where students are encouraged to bring vegetables to eat at school. In these schools, the vegetables from the school garden supplement the student meals and are sold to the students’ families at a discounted price.

School Promotions

To promote gardening, nutrition and WASH messages in the schools, several promotion campaigns were implemented in the VGtS schools:

- Place cards with the message, “Eat more vegetables” were given to all the students in the school. The students put their cards in a visible place and at the end of the year, the students discussed whether they met their goals of eating more vegetables.
- Sprouts, which were newly introduced in the country, were promoted in the schools. Teachers taught students how to grow sprouts from pulses and mixed the sprouts with chilli powder, garlic, and other spices to make sprout-eating delicious for the students. This dish was often cooked for the students.
- Moringa was another new vegetable introduced to the students for nutrition purposes. In the past, moringa was only eaten for its fruits and the leaves were thrown away. Schools started growing moringa and made moringa leaves them into moringa green tea and powder which is added to their curry.
- Students’ competition on nutritious vegetables
- Drawing competition on nutritious foods
- Creative projects like painting vegetable walls

- Rhymes and songs on vegetables
- Documentaries, videos and news articles

Public Promotions

Vegetables Go to School Video

A video documentary of the VGtS activities in Bhutan was promoted on national television. The documentary also included songs and rhymes and music videos related to the promotion of growing a vegetable garden and eating vegetables.

World Food Day

On World Food Day, which is October 16th of every year, the government organizes a celebration to promote sustainable food production and healthy eating, these includes events to promote school gardening, such as award ceremonies for schools in the SAP. A special VeGoTs (VGtS) award was given to schools in the VGtS garden program. First, second and third prizes were awarded to schools with the best performances in the program. The celebration is attended by His Majesty and royal family along with cabinet ministers and international guests. World Food Day is a highly publicized event with coverage over local and international news.

Linking with Other School Nutrition and Health Initiatives

The VGtS school garden program strengthens the national school curriculum by contributing to topics taught in science, health and agriculture. The program's focus on incorporating gardening, nutrition and WASH concepts made the topics in the curriculum more effective and synthesized, and easier to understand for the students.

The VGtS program is part of the RNR Sector 11th Five Year Plan under the School Agriculture Program by establishing 35 additional schools with a school gardens, and strengthening the SAP curriculum with nutrition and WASH education (MOAF, 2013). Thus, the VGtS program actively contributes to Bhutan's current and future goals in nutrition, education and agriculture.

Moreover, the VGtS program works with school feeding to supply at least 20% of the vegetables in the students' meals at school. Through this partnership, students are able to consumer more quantity and diversity of vegetables.

Family and Community

Beyond the school walls, the project expands its influence by connecting 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 a 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

The school interacts with students' families and community in several ways:

Home Garden

Through the project, the school gave students seeds to bring home. The parents were encouraged to establish their own home gardens and grow vegetables organically. Producing and consuming their own vegetables

ensures affordable food sources for the family with little or no pesticides and harmful chemical substances.

Eat More Vegetables – Nutrition Message

At the beginning of the school year, students were given place cards with the slogan, “Eat more vegetables.” The students committed to this goal and took the place cards home and to the community to spread the message. During the year, students shared nutrition messages learned at school with their families and in the community, and encouraged them to eat more vegetables. At the end of the year, students asked them whether their messages successfully reminded them to eat vegetables and make healthier food choices.

Farmers at School

Experienced farmers from the community were invited to the school to help students with the school garden. The school garden has become a hub where local farmers, the FAT, students, and agricultural extension officers can exchange agricultural technologies, and nutrition and health messages.



RESEARCH

The research protocols and assessments were developed by the World Vegetable Center and the Bhutan Country team. A scientific paper detailing the VGtS research methods and results for school gardens in Bhutan was submitted to the journal *Food Security* (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 Vegetables Go to 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 Bhutan at baseline, 2015.

Characteristic	Control (n=233)	Treatment (n=235)	p-value	Significance
Age (years)	11.9	11.6	0.37	
Female (%)	57.1	45.5	0.04	**
Walk to school for more than 30 min./day (%)	39.5	34.0	0.64	
Household size (persons)	5.2	5.5	0.69	
Vegetable garden at home? (%)	91.0	86.8	0.41	
Eat all meals together with parents (%)	23.6	34.0	0.47	
Only eat dinner together with parents (%)	60.9	58.3	0.87	
Parents are farmers (%)	73.0	78.7	0.56	
Boarding school (%)	36.9	12.8	0.30	
School with feeding program (%)	80.7	65.1	0.31	
School in rural area (%)	88.4	65.1	0.30	

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

Results

The research results (Tables 3 and 4) show the following findings:

The Vegetables Go to School garden program significantly increased students':

- **Fruits and vegetable awareness** ($p < 0.01$)
- **Agricultural knowledge** ($p < 0.05$)
- **Healthy food preferences** ($p < 0.05$)
- **Likelihood of vegetable consumption** ($p < 0.05$).

There was a significant increase in the food and nutrition knowledge and dietary diversity between baseline and end line, but it was not statistically different for the control and treatment groups. However, due to the short span of the project, improvement in students' nutrition statuses (height-for-age z-scores) was not observed. A longer term follow-up assessment may be able to detect more changes in the nutritional status.

Other observations:

- Children with parents working on a farm are more likely to consume vegetables.
- Children with home vegetable gardens significantly affected their preferences for healthy foods ($p < 0.10$).
- School feeding contributes to greater dietary diversity ($p < 0.05$), but there was no significant interaction between the feeding program and the school garden program
- The effect of the school garden on dietary diversity was larger for boarding schools than for non-boarding schools.

- Age had a negative effect on height-for-age z-scores ($p < 0.01$) (it must be noted that this indicator is not ideal for older students because of unequal growth during adolescence).

Based on the results from 18 schools and 468 schoolchildren in Bhutan, school garden interventions in combination with nutritional education and promotional activities can enhance children's awareness about vegetables and their knowledge about sustainable agriculture and increase the likelihood that children include vegetables in their diet. The results of this study would need further research including replication in other countries and analysis of cost-effectiveness.

Table 3. Pre-and post-intervention levels of outcome indicators used to measure the impact of the school garden intervention on 9-15 year old schoolchildren in Bhutan, 2015, standard deviations in parentheses.

Outcome indicators	Baseline data				Endline data			
	C	T	T-C	Sign.	C	T	T-C	Sign.
Awareness								
% of fruit and vegetables correctly named	46.5 (4.4)	28.1 (4.5)	-18.4	<0.01 ***	74.5 (3.9)	75.9 (3.9)	1.4	0.81
Knowledge								
% of correct answers on sustainable agriculture	55.5 (2.8)	50.9 (2.8)	-4.6	0.26	56.8 (3.6)	67.3 (3.7)	10.5	0.06 *
% of correct answers on food, nutrition & WASH	61.8 (3.6)	69.3 (3.7)	7.5	0.16	76.4 (2.2)	77.8 (2.2)	1.4	0.67
Preferences								
% of fruit and vegetables liked	68.2 (2.0)	61.8 (2.0)	-6.4	0.03 **	69.5 (2.9)	72.7 (2.9)	3.2	0.44
Eating Behavior (24h)								
% of children who ate vegetables	90.1	80.0	-10.1	0.28	92.7	95.3	2.6	0.61
% of children who ate fruits	5.2	8.1	2.9	0.50	23.6	26.0	2.4	0.85
Number of different vegetables eaten	2.0	1.7	0.3	0.99	2.5	2.4	-0.1	1.00
Number of different fruits eaten	0.1	0.1	0.0	0.77	0.3	0.4	0.1	1.00
Nutritional status								
Height-for-age	-1.4	-1.1	0.3	0.39	-1.0	-0.8	0.2	0.58

z-score ¹	(0.3)	(0.3)	(0.3)	(0.3)
Observations (n)	233	235	233	235

Notes: C=Control; T=Treatment; Diff=Difference; Sign.=Significance level.

***p<0.01, **p<0.05, * p<0.10.

Table 4. Impact of the school garden intervention on 9-15 year old schoolchildren in Bhutan, 2015, standard errors in parentheses.

A. Intermediary outcomes

	Awareness (% of fruit and vegetables correctly named)	Knowledge (% of correct answers) Sustainable agriculture	Food, nutrition and WASH	Healthy preferences (% of fruit and vegetables liked)
Average treatment effect (T × v)	19.67*** (6.55)	15.07** (6.85)	-6.21 (4.22)	9.62** (3.92)
Treatment (T)	-17.01*** (5.73)	-4.57 (3.83)	8.26 (5.04)	-5.79** (2.29)
Endline (v)	27.69*** (4.07)	1.18 (3.54)	14.60*** (3.05)	1.02 (1.77)
Age (years)	1.55* (0.84)	-0.23 (0.49)	0.23 (0.50)	0.27 (0.43)
Female ^a	4.45** (1.93)	-2.15* (1.03)	-2.33** (1.09)	-3.49* (1.90)
Home garden ^a	6.29 (3.92)	2.66 (2.40)	1.37 (1.73)	3.68* (1.97)
Parents are farmers ^a	0.58 (2.52)	0.49 (1.56)	-0.02 (1.59)	2.04 (1.61)
School feeding	-0.50	-2.58	0.17	2.25

program ^a	(2.86)	(2.06)	(1.96)	(1.89)
Rural area ^a	1.54	2.81	3.70**	2.50
	(2.73)	(2.40)	(1.75)	(1.74)
Constant term	18.48	56.29***	55.71***	58.09***
	(11.45)	(7.33)	(5.72)	(6.07)
Observations (n)	936	936	936	936
R-squared	0.53	0.16	0.24	0.09

B. Primary outcomes

	% of children consuming vegetables	% of children consuming fruits	Number of different vegetables consumed	Number of different fruits consumed	Height-for-age z-score
Average treatment effect (T × v)	0.71** (0.35)	-0.17 (0.36)	0.09 (-0.26)	-0.44 (-0.66)	-0.11 (0.32)
Treatment (T)	-0.42 (0.39)	0.23 (0.38)	-0.12 (-0.24)	0.54 (-0.76)	0.18 (0.30)
Endline (v)	0.15 (0.26)	0.94*** (0.20)	0.21 (-0.19)	1.77*** (-0.40)	0.40* (0.23)
Age (years)	0.07 (0.05)	0.05 (0.05)	0.05** (-0.02)	0.06 (-0.06)	-0.18*** (0.06)
Female ^a	0.07 (0.12)	0.10 (0.18)	0.06 (-0.05)	0.25 (-0.30)	0.25** (0.11)
Home garden ^a	-0.15 (0.19)	0.39 (0.30)	0.23*** (-0.08)	1.03** (-0.52)	0.34 (0.24)
Parents are farmers ^a	0.34** (0.15)	-0.32* (0.17)	-0.01 (-0.08)	-0.49** (-0.22)	-0.24* (0.13)
School feeding program ^a	0.31 (0.43)	0.36* (0.20)	0.1 (-0.14)	0.35 (-0.33)	-0.39 (0.35)
Rural area ^a	0.17 (0.46)	-0.45* (0.27)	-0.08 (-0.15)	-0.49 (-0.49)	-0.38 (0.30)
Constant term	-0.01 (0.86)	-2.32*** (0.60)	-0.10 (-0.40)	-4.27*** (-1.00)	1.14 (0.69)
Observations (n)	936	936	936	936	919
R-squared ^b	0.10	0.11	0.02	0.02	0.15

Notes: ^a Binary variables. ^b For % of children consuming vegetables or fruits this shows McFadden's pseudo R-squared.



BENEFITS

Validated benefits of the VGtS school garden program were 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 through 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.

Through the VGtS project, 35 schools have established school gardens and taught a comprehensive gardening, nutrition and WASH curriculum to the students.

The VGtS program enhances the existing SAP by:

- **Focusing on nutrition education and WASH**, which was not present in the original SAP. This intense curriculum was clear and easy to learn for students and teachers. With the additional education on nutrition and WASH, the students are better equipped to make healthy eating and sanitation choices, which promotes better nutrition and health.
- **Developing an enriched curriculum on vegetable gardening, nutrition and WASH.**
- **Facilitating the collaboration of 3 sectors in the school garden program.** With the addition of the Ministry of Health to the multi-ministry program (originally Ministry of Education and Ministry of Agriculture and Forests), the Country Team can rally support from the different ministries.

- **Introducing new vegetables and gardening technologies.** The new vegetables include moringa leaves, amaranth, sprouts and soybeans.
- **Involving students' parents in gardening.** Through the VGtS program, parents who previously did not participate in school activities became a vital part of the school garden program. Parents helped maintain the school garden with their children and were encouraged to establish their home gardens. More families are willing to grow their own food and have a better understanding of the benefits of eating vegetables.
- **Creating a link between the school and the community.** With the school in the central part of the community, the rest of the community is exposed to new concepts, messages and activities practices in the school.
- **Finding research-based evidence on the impact of the school garden program.** The 3-year VGtS project provided a scientific research component, which gathered important information on the impact of school gardens on the knowledge, behaviour and practices of students related to agriculture, nutrition and health education.

One of the main targets for the SAP in Bhutan is to achieve happiness for the citizens through good health. However, it is too early to see those results, which would require a longer period. It may take 10 to 15 years to see change in a person's happiness level.

Specific benefits of the VGtS in different groups include:

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
- Ability to 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 district

Families

Observed Benefits

- Increased establishment of home gardens in the community
- More children-parent interaction and bonding 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

Government

Observed Benefits

- Coordination of multi-ministry school garden program
- Rallying support from three government ministries

- Additional curriculum material and enriched school garden model for the SAP
- Scientific research protocols and results for school garden program

Long-Term and Potential Benefits

- Integration of VGtS program benefits with SAP to form an enriched program for students





CHALLENGES & KEYS TO SUCCESS

Challenges

Several challenges were met by the VGtS school garden program:

1. **Monitoring of the schools** was a challenge due to the geographical locations of the schools being spread out and far from the CoRRB and DoA office. The monitoring became decentralized as some schools were authorized to do their own monitoring due to lack of manpower and limited government budget for transportation. For smooth and accurate monitoring, district level cooperation is necessary.
2. **Continual incentive for teachers** to supervise the program is difficult since FATs need to commit extra hours and efforts to run the additional activity. Apart from financial support in the first year of the program, teachers' rewards are fresh vegetables and contributing to students' happiness. Other sustainable incentives should be explored as a token of appreciation for the teachers.
3. **Sustainability of the VGtS program** is a main concern as schools received financial support to establish the school garden, organize activities in agriculture, nutrition and WASH, and distribute seeds to the students' families. However, after the project finishes and school garden programs will operate with government funding, financial support and activities need to be reduced to accommodate the budget.
4. **Proper fencing** is important and often lacking for schools. Wild animals cause problems by damaging the school garden. Therefore, funding for resources to build a fence is necessary for the garden to thrive.

Keys to Success

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

- The multi-ministry participation in the school garden program is vital in mobilizing resources and support for the program from the Agriculture and Forests, Education, Health and ministries.
- Government support for the program and willingness to implement a new approach in school gardening gave validity to the program.
- Good international partnership with research institutes to assess and generate valid data for the project.
- Regular communication of Country Team 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 agriculture 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 school garden activities and willing to initiate their home gardens.
- Supportive local government authorities in providing resources for the school garden.
- Road access is crucial in transporting any materials to the schools.

Success Stories

Overall, the VGtS school garden program was successful in 90% of the enrolled schools. Each school started to produce and consume fresh vegetables from the garden. Students are also processing vegetables for the winter. One school in a remote region of the country started producing moringa powder and teas to enhance the nutritional value of their meals.

In feeding schools, 20% of the vegetables for students' meals came from the garden. All schools supplemented student meals with vegetables from the school garden, thus resulting in increased consumption of vegetables.

The campaign in which students brought home place cards with the message, "Eat more vegetables" gained positive feedback. Parents and community members actively asked the students "Why we should eat more vegetables?" Students were able to explain and teach them about the benefits of vegetables. Due to this campaign and the school garden activities, more families were willing to start their own gardens.

The parents wanted to grow vegetables because they didn't have much vegetables. Seeds and vegetable gardening training were given to the parents by the focal agriculture teachers, students and agriculture extension officers. While the parents used to buy vegetables, they now grow them and even supply vegetables to the school. Previously, vegetables were often imported and bought from border communities near India. Now the schools buy vegetables from local farmers and can be assured of good quality and safe vegetables for the students.

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 increasing vegetable consumption.
- **Collaboration between the Ministries of Agriculture, Education and Health is key to the program's success** and should continue to supervise the school garden program. Coordination and communication between the ministries should be transparent and well-integrated.
- **Additional funds should be allocated for the program, to ensure the benefits of VGtS can continue.**
- **The school garden program should increase parents' awareness and knowledge of nutrition** given its influence on children's eating behavior.
- **Vegetable availability needs to be addressed in parallel to raising children's vegetable demand.** This needs to be addressed at the household and at the community level.
- **The VGtS school garden program should be incorporated into the School Agriculture Program (SAP) and national curriculum and scaled up nationally.**
- **School staff should be given incentives** to motivate their participation in the school garden program. Focal agriculture teachers are

important resource persons for training new teachers on the program during scaling up.

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 and expansion strategy for the integration of Agriculture, Health and School Feeding program in Bhutan. It also provides a holistic estimation of the costs.

Scaling Strategy

Objectives

- To supplement students' diets with nutritious and diverse vegetables in feeding schools and improve their nutrition and health
- To provide integrated holistic education on food and nutrition and hygiene and sanitation
- To provide agriculture based education for self-employment skills of educated youths.

Targets

Schools to be targeted have not received any SAP support to date (an estimated 276 schools have not yet received SAP support in Bhutan). Central Schools are targeted for immediate support to enrich nutrition and WASH education, and supplement the school feeding program. The priority will be focused on schools with feeding programs in rural areas.

Theory of Change

School gardening, nutrition and WASH will be integrated in the regular SAP

of the Bhutan government. With increased awareness and knowledge on nutrition, students will gain a positive attitude and preference, and consume more fruits and vegetables. Moreover, WASH knowledge and practice will help students have healthy hygiene and sanitation practices important for health and maximizing nutritional benefits of foods. When nutrition and WASH education complements the agriculture education of SAP, students will be able to choose and grow nutrient-dense foods. Students are encouraged to share their learning and start home gardens with family and as an outcome, household and community nutritional status will be improved.

With an estimated 276 schools left to implement the SAP, we expect at least 30 students from each school enrolled in the program. From these 30 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	276 schools	276 school garden programs established and sustained
Students	30 students (enrolled in the program in each school per year) x 276 schools	11,232 students impacted by the school garden program
Household	30 students x 60% (who will establish home gardens) x 276 schools	4968 home gardens established
Community	2-3 parents day and promotion events per school per year for each community x 30 community members x 276 schools	20,700 community members from 276 communities impacted by school gardens demonstration and nutritional promotion

Intervention Design

The first intervention is to include nutrition and WASH lessons in the existing SAP. The teachers of Agriculture, Wash and Health, and Mess staff will be trained to collaborate together to develop an action plan for their school. Fruits and vegetables grown from the school garden will supplement students' diets through school feeding. To aid schools in designing their school garden, model school gardens with nutrient dense and diverse vegetables will be established. The model garden will include all garden facilities such as compost pit, irrigation, fencing and nursery. Schools having larger areas will be encouraged to establish seasonal fruit orchards. There are possibilities for integrating small-scale livestock such as poultry for eggs and pigs for pork. These small animals are important for nutrition and are an integral part of subsistence farming, as their manure can be composted to enrich the soil.

The second intervention is to encourage students' families to start home gardens. Teachers and students will demonstrate gardening techniques and technologies to parents, and help them establish their home gardens. Teachers will then supervise the home gardens with regular visits.

Sustainability

The program will be sustained through government funding and income generated from the school garden. The fruits, vegetables and products from livestock from the school garden/SAP are bought by the School Mess, where the government provides a stipend for feeding students. The generated revenue will be used to continue garden activities in the schools without any additional funding.

Scaling Approach

20 schools will establish the SAP with nutrition and WASH components each year. Training for the teachers will be done in the first year of the SAP. In the first year, each school will be provided with all financial support such as input

costs, garden fencing materials and irrigation facilities. In subsequent years, schools will be responsible for sustaining their gardens. Every year, an evaluation of the school gardens will be done and prizes awarded to the top three schools.

Monitoring and Evaluation

- Annual action plan will be submitted to the SAP headquarters
- School visits for will be made for field monitoring and technical assistance
- Annual progress report will be submitted by schools to SAP headquarters
- Progress of school gardens will be compiled and an annual report produced for the government

Program Costs

The cost of establishing the school garden program in the remaining schools without SAP in Bhutan (approximately 276 schools) is **USD 1,628,400**. The cost per school is **USD 5900**.

This investment would establish approximately 276 SAPs and potentially impact 276 communities and benefit 11,232 students and 20,700 community members with gardening, nutrition and WASH education and practice, and establish 4,968 home gardens in Bhutan.

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 Bhutan (Table 5). 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 5. The annual cost of scaling the school garden program per project activity

Activity (frequency)	Cost (USD)	Explanation
<i>Activities conducted for the program as whole in cost per school per year:</i>		
1. Development of curriculum for training of school teachers (every ... years)	500	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 (every ... years)	800	Expenditures on developing/improving teaching materials and promotional activities for school children. Exclude the actual printing and dissemination, which is listed under [6] below.

Activity (frequency)	Cost (USD)	Explanation
3. Project administration (annual)	1000	Expenditures on regular project management including report preparation, communication with stakeholders, project meetings, budget management, staff recruitment, etc.
<i>Activities conducted per school in average cost per school per year:¹</i>		
4. School selection (once per school)	NA	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 ... years)	1200	Expenditures on conducting the training course, including the preparation of training materials, transport, food and lodging.
6. Supply of garden inputs (every 1 year)	700	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 ... years)	100	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, closed latrines, etc.).
8. Dissemination of training and	100	Expenditures on printing and dissemination of training and

Activity (frequency)	Cost (USD)	Explanation
promotional materials (every 1 year)		promotional materials to the schools.
9. Project monitoring and evaluation (every 1 year)	1000	Expenditures on monitoring the progress by following-up with teachers and principals by phone and through personal visits.
10. Other activities	500	Any other expenses not included in the above. (Awards and incentives to top schools and teachers)
11. Total	5900 per school 1,628,400 in total (estimated for 276 schools)	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 SAP each week for the focal teachers. In an academic year (10 months), each focal teacher spends an additional 160 hours on the SAP.
- Students spend 3 hours on the SAP each week. In an academic year (10 months, each student spends 120 hours on the SAP. Since it is mandatory for all students to participate in at least one school club of interest, it is not an opportunity cost.
- Parents helped with establishing the school garden, which took 6 hours for two days. In total, one parent spends 12 hours on the SAP only once, at the beginning of the program.



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