



Leveraging Nutrition Outcomes in Schools

A synthesis of
school feeding, school gardening and
nutrition education experiences



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Foreword

Schools play an important role as a place of learning. Often they are also a central part of the community, involving regular interactions between students, parents, teachers, and community members. It has also been demonstrated that schools offer a unique opportunity as a platform to deliver school and community interventions aimed at improving nutrition and health outcomes.

Even though an important focus on health and nutrition is the first 1,000 days from pregnancy to a child's second birthday, it is also recognized that the first two decades of life have critical milestones of development, such as the period of puberty, a time during which nutrient requirements increase. It is also clear that during the growth period, children are affected by different forms of malnutrition, ranging from undernutrition to over-weight and obesity.

Schools offer an opportunity to prevent and manage these various forms of malnutrition. Schools can emphasize the need for healthy diet and lifestyle among school age children to ensure adequate nutrition and health as well as cognitive and social development. Studies show that healthy and balanced diet is associated with improved performance at school. This in turn translates to the economic growth of the community and the wellbeing of the next generations.

Among the interventions that used schools as an entry point include school meals, school gardens and nutrition education. School feeding has been demonstrated as a means to alleviate short-term hunger and boost children's learning capabilities, especially at-risk students such as girls. School gardens have the potential to complement school feeding programmes and enhance their long-term impact. Nutrition education on the other hand ensures that the right messages are communicated for a life-long practices for a healthy diet and lifestyle. Schools and teachers also play an important role in connecting with the community and local food production.

We are pleased that this workshop on synthesizing lessons and experiences from school feeding and school gardening programs provided an opportunity for researchers from Asia, Africa and Latin America to exchange experiences, results and lessons. In addition to the exchange of information among the participants, discussions during the workshop, captured in this report, would be relevant to larger audience interested in the topic of leveraging nutrition outcomes through schools as a platform. The information will also be valuable to the IDRC's program on Agriculture and Food Security which is interested in practical innovations for more efficient and sustainable agriculture for food security, better income, and nutrition.

Since many governments are trying to improve the implementation of school feeding and school garden programs, we hope this workshop report offers insights that contribute to technical guidance for sustainable and cost-effective school based food security and nutrition programs.

We would like to take this opportunity to thank the International Institute of Rural Reconstruction for hosting the workshop and synthesizing this report.



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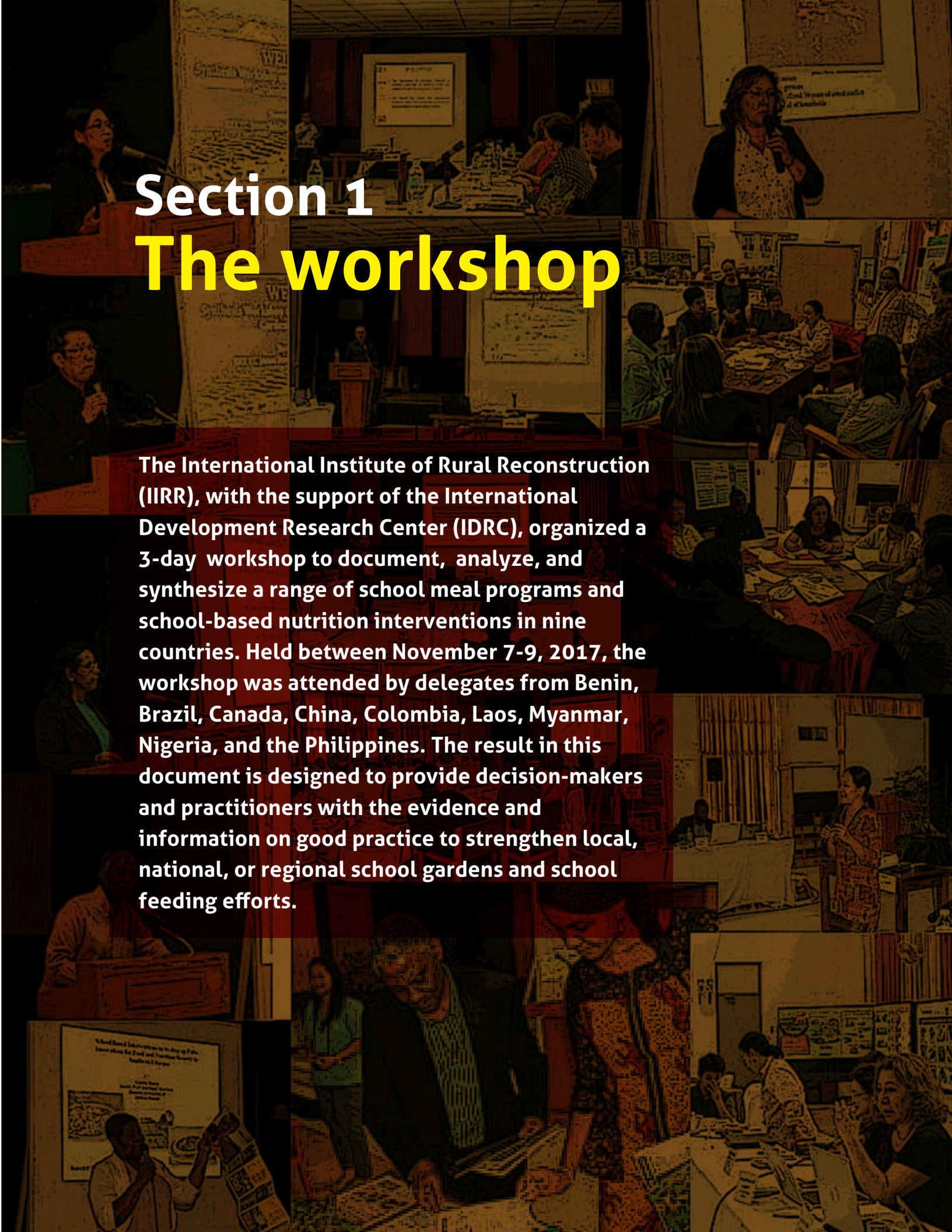
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Section 1

The workshop

The International Institute of Rural Reconstruction (IIRR), with the support of the International Development Research Center (IDRC), organized a 3-day workshop to document, analyze, and synthesize a range of school meal programs and school-based nutrition interventions in nine countries. Held between November 7-9, 2017, the workshop was attended by delegates from Benin, Brazil, Canada, China, Colombia, Laos, Myanmar, Nigeria, and the Philippines. The result in this document is designed to provide decision-makers and practitioners with the evidence and information on good practice to strengthen local, national, or regional school gardens and school feeding efforts.

Rationale

There are different school meal and school garden program models being implemented in different parts of the world. These are either managed by governments (centralized or decentralized) or by the private sector. In some countries, these initiatives are linked to a broader agriculture program. Fresh produce, such as vegetables and fruits, are procured from local farmers. In other places, school gardens were established to promote educational activities and healthy eating habits and supply food to the school lunch program.

In a recent publication of World Bank's Global School Feeding Source Book¹, it was emphasized that while school feeding may look simple, it is actually a complex intervention that involves a range of stakeholders operating at various levels across different sectors. It has policy implications and requires trade-offs in the design, targets, modalities for feeding, and costs. Many governments are still trying to improve the implementation of school feeding and school garden programs in their countries. They identify the need for technical guidance and support towards sustainable and cost-effective programs. Several agriculture and food security (AFS) projects have been studying school feeding programs as the main intervention, or part of a larger food security intervention. Examples include feeding programs in the Philippines, China, the Caribbean Community (CARICOM), and Colombia.

At this workshop, a breadth of experiences generated from school feeding programs in nine countries is presented. The knowledge, evidence, and good practices from these initiatives will hopefully contribute in strengthening local and national school feeding efforts. It will also help explore opportunities and constraints in implementing school based food security programs in countries like Myanmar, which considers implementing such programs.

Objectives

The overall objective of this synthesis workshop was to document and analyze a range of school meal programs, to provide decision-makers and practitioners with the knowledge, evidence and good practice to strengthen local, national or regional school feeding efforts.

Specifically, the workshop aimed to:

1. Share experiences in the AFS projects and selected external projects;
2. Learn from an ongoing school nutrition program through a field visit; and
3. Document and analyze the following:

1 Drake, Lesley; Woolnough, Alice; Burbano, Carmen; Bundy, Donald. 2016. Global School Feeding Sourcebook : Lessons from 14 Countries. London: Imperial College Press. © Lesley Drake. <https://openknowledge.worldbank.org/handle/10986/24418> License: CC BY-NC

- Best practices and lessons learned;
- linkages with local food production;
- relevance of school gardens as platforms for food security interventions;
- status of policy support in implementing school feeding programs; and
- opportunities and barriers

Participants

The workshop was attended by 23 delegates from Benin, Brazil, Canada, China, Colombia, Laos, Myanmar, Nigeria, and the Philippines. Most of them were partners of IDRC-supported projects while others also have successful experiences on gardening and feeding. Participants from Myanmar, Laos, and some from the Philippines were representatives from the Parliament of Lower House, partners of the International Rice Research Institute engaged in Climate Smart Villages, and the Department of Social Welfare and Development, respectively. These special invitees were invited to learn from other countries' experiences on how to set up and/or improve school garden and feeding programs in their countries. The rest of the participants were directors, program managers/coordinators, implementors, and professors from government agencies, international organizations, NGOs, and the academe who played significant roles in developing, establishing, implementing, and improving school garden and feeding programs in their countries. They were invited to share models and experiences they had implementing their school garden and feeding initiatives.



Overview of the workshop activities

The 3-day workshop commenced on 7 November, Tuesday and was held at the campus of the International Institute of Rural Reconstruction (IIRR) in Silang, Cavite, Philippines. The participants were officially welcomed by Emilita Monville-Oro, the Philippine Program Country Director of IIRR. Afterwards, the exhibit area, which was set up for delegates to showcase their school garden and school feeding programs, was opened to all guests. Information and educational materials were given out and the participants were able to network and get a glimpse of the initiatives that will be presented in the next three days. To set the tone of the workshop, Annie Wesley of the International Development Research Center (IDRC), Mario Capanzana of the Food and Nutrition Institute of the Philippines' Department of Science and Technology (FNRI-DOST), Julian Gonsalves of IIRR, and Corazon Barba of the University of the Philippines (UP) discussed the issues and challenges of food and nutrition security globally and regionally and the initiatives developed to address these. School gardening and feeding programs were some of the models developed by organizations and governments to support food security and nutrition in countries, which was the focus of this workshop.

School gardening and feeding program models and experiences from Brazil, India, China, Ethiopia, Nigeria, and Benin were presented during the first day. Najla Barbosa of FAO Brazil shared how their Sustainable School Feeding Program strengthened the school feeding programs in Latin America and the Caribbean. IDRC representative Dr. Annie Wesley presented the Mid-Day Meal Program of India, which aims to eradicate hunger and poverty among children in the country. Zhao Chen of the China Development



Research Foundation (CDRF) discussed the results of the studies they conducted on China's school meal program, which is an initiative of the government. Carol Henry of the University of Saskatchewan talked about the studies they conducted on school nutrition interventions in Ethiopia, which promotes pulse-based feeding practices among school children. Jacinta Uramah of The Green Generation in Nigeria and Gouda Abdoul-Ibrachi of the Association for Research and Promotion in Benin presented the strategies and initiatives they developed to build the interest of students in producing and consuming nutritious foods.



After the presentations, participants visited the Bio Intensive Garden of IIRR and wherein they learned about key principles behind the Bio-Intensive Gardens which IIRR has promoted. An opportunity to study the importance of Agro-biodiversity was provided.

The following day, models and experiences from Colombia, the Caribbean, and the Philippines were highlighted. Teresa Vasquez of the Universidad Nacional de Colombia and Kate Sinclair of McGill University shared how their More Nutritious Potatoes Project contributed to the food security of vulnerable communities in Colombia. Leroy Phillip of McGill University discussed the findings of a research they conducted on a school feeding program in the Eastern Caribbean Island of St. Kitts-Nevis, which adopted the “farm to fork” approach. Rizalino Rosales of the Bureau of Learner Support Services of the Philippines’ Department of Education, Imelda Angeles-Agdeppa of FNRI-DOST, and Emelita Monville Oro of IIRR presented the School Based Feeding Program and the School Gardening Program in public schools in the Philippines and how the Integrated School Nutrition Model improved the functioning of the countries’ school garden and feeding programs.

After the presentations, participants were taken on a field trip where they visited one of IIRR’s lighthouse schools. They learned from the school principals and teachers about their best practices and the learnings in implementing the Integrated School Nutrition Model. Delegates were able to see the school garden, feeding center, and some of the nutrition education materials developed for the students and their parents/guardians.

On the third day, participants shared their reflections from the school visit and from all the presentations. A synthesis activity was finally conducted. Participants were divided



into two groups based on the nature of their projects. The first group discussed the link of the school feeding program to local food production, and the second group looked into the link between the school feeding program and school gardening. After they presented their synthesized ideas to the plenary, participants reflected on their entire workshop experience through a human drawing exercise. A large human figure was drawn. On the head part, participants wrote down the new concepts and learnings they gathered from the presentations and field visits. On the heart section, they wrote down the feelings from the entire workshop experience invoked on them. And on the hands and legs portion of the diagram, the participants wrote down the actions they will take when they return to their home countries/organizations.





At the end of the workshop, the delegates visited the office of the Food and Nutrition Research Institute – Department of Science and Technology in Manila

Setting the tone: Summary of opening remarks

IIRR's Philippine Country Director Emilita Monville Oro welcomed the participants to IIRR's campus in Cavite, Philippines where the workshop was held. She highlighted the recently released Global Nutrition Report, which found that while malnutrition rates are falling globally, it is not declining fast enough to achieve the sustainable development goals (SDGs) by 2030. While 155 million children under 5 years old do not weigh enough for their height, there are also 2 billion people who are obese or overweight. Ms. Oro underscored the growing interest of governments, agriculture sector, and civil society organizations in mainstreaming and scaling up nutrition. Therefore, she emphasized the importance of generating evidences that are relevant and can effectively influence policies. She encouraged all the workshop participants to share their experiences, reflect on, and analyse their work to generate new understanding that will further their efforts to end malnutrition.

Director Rizalino Rosales of the Bureau of Learning Support Services of the Philippines' Department of Education also welcomed the participants to the workshop. He found it a great and appropriate platform to analyse and learn from effective school-based feeding services from other countries. He shared the trip taken by DepEd and FNRI, under the hospices of IIRR, to Myanmar where they were able to see emerging nutrition trends and challenges in both countries and discuss ways to address issues. From that trip, he saw that despite differences in countries, issues and challenges may still be the same and he inferred that participants may discover the same thing in the workshop. He looks forward to a dynamic, interesting, and productive changes of experiences in the workshop.



After the welcome remarks, participants were given an opportunity to view the exhibit materials set up by all delegates. The materials shown and distributed were related to the projects the presenters gave during the workshop.

Food and nutrition security: Issues, challenges, and initiatives

Annie Wesley, Agriculture and Food Security Senior Program Specialist of IDRC, presented a broad overview of IDRC's programming for delegates to see where their projects would fit in the broader agenda of IDRC. She focused on IDRC's Agriculture and Food Security Projects, which supports the development, testing and scaling up of innovations to improve the food and nutritional security of the poorest. IDRC believes that research and innovation hold the keys to progress in developing countries. Ms. Wesley emphasized that IDRC only supports research that are geared towards development and policy. They ensure that researches they support informs and influences policy because otherwise it cannot be implemented. Therefore, they need research that are excellent and innovative; use inspired "on the ground" solutions with farmers and along the value chain; finds last mile solutions for women and the poor to boost nutrition and incomes; connects producers to markets; makes a difference at scale

– builds partnerships and leadership for today and tomorrow; works with SMEs and the private sector as well as extension services; and are inclusive and sustainable. Ms. Wesley also reiterated gender as the central element in IDRC's programs. It has a gender-sensitive approach because of studies that show empowered women translate to better outcomes for her family and children in terms of health and nutrition.

Dr. Mario Capanzana, Director of the Food and Nutrition Research Institute (FNRI) in the Philippines, shared nutrition trends and different intervention programs being implemented in the ASEAN region. He pointed out that despite economic progress in some developing countries in Asia, the double burden of undernutrition and overnutrition still exists. He also highlighted the gradual decrease of stunting in the region, which leads to diminished cognitive and physical development, reduced productive capacity, and poor health. Dr. Capanzana reiterated that a country's education and economic status are closely linked to its health status. Better nutrition and health among school-age children is a strategic element to develop a community because better nourished children stay in school longer, learn more, and become healthier and more productive.

Dr. Capanzana shared the different school-based intervention programs in Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Singapore, the Philippines, and Vietnam. He noted that a success factor in the intervention programs are the effective collaboration and integration of different stakeholders and advocates on nutrition solutions. A big challenge he observed in these programs is sustainability.




Dr. Julian Gonsalves, Senior Program Adviser of IIRR, looked at nutrition through an agriculture lens. He argued that agricultural productivity by itself does not necessarily contribute to better nutrition, as evident from four decades of a green revolution where hot spots of malnutrition prevails. Research also show that degradation of soils and landscapes reduces the nutritional value of food and soil ecosystem and agro-biodiversity should be preserved. He asserted that climate change will accelerate degradation that will result to more pest infestations. In turn, farmers would use more pesticides and herbicides, which have adverse effects on the immune system of malnourished children. Climate change will also reduce productivity and quality of food produce.

He also underscored the importance of targeting smallholder farmers who produce 70% of the world's food. Since they are working on smaller farming areas, it is easier to manipulate the micro-climate above and below ground. It can reduce impacts of climate change, improve soil fertility and water conservation, and deliver nutritionally better-quality crops. He challenged the delegates to be nutrition-sensitive in their agriculture projects and have nutrition-specific interventions that address the underlying causes of malnutrition.

Dr. Corazon Barba, Professor Emeritus at the Institute of Human Nutrition and Food in the University of the Philippines and Nutrition Consultant of the United Nations World Food Programme-Philippines, responded to the three presentations by highlighting six important points generated from it. First, research should be translated to benefit



people, especially those who are poor and stressed like smallholder farmers. Second, evidence-based policies are important. Third, she argued that with gender sensitivity as a central element in nutrition programs, men should not be excluded in the process. Fourth, wealth does not assure better nutrition. Overnutrition is mostly an issue among the rich, showing that wealth does not exclude anyone from having hidden hunger or undernourishment. Fifth, increase in food production and availability does not guarantee good nutrition. She challenged delegates to ensure that their agriculture programs are nutrition sensitive. And sixth, she stressed sustainability by asking how will programs be sustained and scaled up? When doing pilot studies, the amount of inputs given are more than what is given in the real setting. Therefore, she argued the importance of conducting a process documentation to see the number of things that went to a particular research or project and foresee how that will generate in a real setting.



Section 2

Workshop Synthesis

A. Introduction to the workshop synthesis

This Workshop Synthesis is mainly based on the presentations, discussions and project documents provided by the participants during the Workshop. The primary goal of this Section is to summarize the dimensions of the projects/programs presented and derive from the experiences a first-level analysis of emerging themes and lessons on how agriculture can help improve nutrition among children in school. Where relevant, these are linked to knowledge cited in current literature.

The Workshop was held within weeks of the release of the latest editions of two important publications on nutrition: The State of Food Security¹ and Nutrition in the World and the Global Nutrition Report². Both highlight a worrisome nutrition scenario across the globe: countries are experiencing multiple forms of malnutrition. Where children are concerned, there is opportunity and urgent call to make to make nutrition interventions work better so that all children grow healthy and reach their development potentials.

Meanwhile, there has been greater understanding in recent years on how agriculture can be more than a means of providing not just any food but nutritious food and healthy diets while ensuring healthy soils and ecosystems.

The first Subsection of the Workshop Synthesis: *School as Platforms for Nutrition Interventions* deals with nutrition initiatives using the school's key role in children's lives and as a strategic link between the child, his/her family and his/her community. The main function of schools is education but since children spend a good number of their critical formative years in school, it makes sense to use the school as a platform for nutrition interventions. This section discusses three school-level nutrition interventions: School Feeding, School Gardens and Nutrition Education.

- School Feeding programs are a major mechanism being used by many countries to improve the nutritional status of children. At the Workshop, 5 presentations featured School Feeding: China, India, Brazil/FAO-Brazil, CARICOM, Philippines and Ethiopia.
- School Gardens can support school feeding or can be stand-alone school activities; either way, School Gardens also present great potential to improve nutrition as a small-scale diversified production system. Three presentations were related to School Gardens: Brazil/FAO-Brazil, Nigeria-Benin and Philippines.
- Nutrition Education is regarded as a foundational nutrition initiative, particularly when the aim is to promote healthy behaviors in the long-term. Nutrition Education approaches either at the levels of schools or of communities or both are featured in all the cases.

¹ FAO, IFAD, UNICEF, WFP, and WHO. 2017. The State of Food Security and Nutrition in the World, 2017. Building resilience for peace and food security. Rome, FAO.

² Development Initiative, 2017. Global Nutrition Report, 2017: Nourishing the SDGs. Bristol, UK: Development Initiatives.

The second Subsection of the Synthesis: Expanding the School Platform towards Nutrition-Sensitive Food Systems presents a wider perspective of the school within a larger food system. Although concisely discussed, this point of view is important because a supportive food system will sustain the gains from school-based interventions. The food system looks at agricultural production to consumption. A very important link to the school is the Local Food Production happening in the larger community. Apart from the production side, there is still need to make the different elements of the food system responsive to nutritional needs. For example, the growing epidemic of obesity which will eventually burden health systems can be traced to food processing, advertising and the lack of policy to control the pricing and distribution of nutrient-dense, ultra-processed foods. Already the negative effects on health are being seen among children. There are other ways to make this food system work in favor of nutrition, and the IDRC/CIFSRF projects provide examples of more nutrition-sensitive innovations.

Finally, the third Section: Enabling Environment deals with facilitating factors which must be in place so that the links between agriculture and the child at school can be manifested in better nutritional outcomes through more effective interventions.

B. Schools as platforms for nutrition interventions

Schools offer a unique platform from which multiple benefits can be realized for children, their schools and communities. Schools can

- provide social protection,
- prevent and manage malnutrition issues,
- foster “life-long healthy-eating” habits,
- address health, hygiene, and sanitation issues affecting wellbeing,
- influence agricultural production systems to deliver diverse and nutritious foods, and
- stimulate community development and economic empowerment (1).

Schools have distinct features that allow them to deliver on these benefits:

1. Schools can capture students at critical periods of child development. For the child to attain his growth and development potential, good health and nutrition should be ensured in the first two decades of life. Good health requires a life cycle approach to interventions, starting in utero. Previously the emphasis of interventions was on the first 1,000 days. New evidence shows that the first two decades of life contain critical phases of development and growth, such as the pubertal growth period (“the second growth spurt”), a period when nutrient requirements increase (2). The 7,000 days after a child’s second birthday are now seen as continued opportunities to help children attain optimum development (3). Thus, promoting good health and nutrition before and during school age is essential to effective growth and development.
2. Research has shown that the infrastructure already in place in the educational system can present a more cost-effective route to deliver simple health interventions and health promotion than the health system itself (4). Because schools, particularly primary levels, are present even in remote or rural areas, they can reach children on a large scale (5). Schools have teams of personnel with qualifications to develop students’ knowledge, skills and attitudes on a variety of content. Low-income countries typically have more teachers than nurses and more schools than clinics (6). There is, therefore, potential to reach children who are more vulnerable, including those who are already affected by one or more forms of malnutrition.
3. It has been noted that “Schools are a particularly effective platform for health and nutrition because the effects of school- based interventions can be optimized by exploiting the role of the school as a teaching and learning institution.” (7). As an institution, a school can put in place and enforce policies, systems and practices towards improved health (for example, rules on handwashing).
4. Children enter schools at an age when their food habits are being formed, when they are open to new ideas and they learn good practices and new skills effortlessly (8).
5. Schools are critical links to homes and communities, besides being natural conduits for learning and generating knowledge. As schools can influence parents, teachers and the larger community, cascading benefits can be realized with well-designed

school-level initiatives. Children who have been involved in their school nutrition activities can influence their families and siblings, potentially decreasing the number of children entering schools already malnourished. Involving families in their children's nutrition education and engendering community participation through activities such as school gardens and school feeding can spread the message and benefits to a wider range of people (9).

Given the changing and emerging challenges in global and local nutritional landscapes, models need to introduce, allow and evolve and be adaptive. Overall, the role of schools in improving the health and nutritional status of children must be reassessed and reinforced (10).

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C. School-based nutrition interventions

1. School feeding

Featured in Cases: Brazil/FAO-Brazil, CARICOM, China, Ethiopia, India, Philippines

Around 368M children across the globe receive school meals each day in programs run by national governments, international and/or local organizations. Annual investments in school feeding programs amount to some US\$75B (1). School feeding programs were regarded as social protection measures targeting mainly education outcomes: encouraging enrolment, retention, attendance and learning performance.

Multi-faceted contributions

There has been increased recognition and evidence that school meals can contribute to multi-faceted improvements both short-term and beyond the school years in such areas as nutrition, health, agriculture, gender equality (reaching future mothers and fathers) and poverty reduction. Improvements in human capital can fuel both individual and human productivity which drive social and economic growth (2).

The cases presented in the Workshop reflect this broadened range of objectives and the various levels of coverage for which the school meal programs have been designed (Figure 1).

Three cases (Brazil/FAO-Brazil, Philippines and Ethiopia) link education, nutrition and agriculture through school meals, although the project coverages are at different scales. There are at least 2 sectors targeted for all the cases, highlighting the need for inter-sectoral approaches.

While supportive policy is regarded by all as fundamental to school feeding programs, FAO-Brazil is unique in articulating the need to strengthen public policies as an explicit objective in national programs within the LAC region.

India and Brazil/FAO-Brazil emphasize the universal right to food, and along with CARICOM, feature universal coverage for primary schools while China, Philippines and Ethiopia provide school meals for targeted populations. There is a clear poverty-reduction dimension to the India and China cases; in the latter, it is targeted at rural areas where the poorest Chinese reside. These targeted coverages emphasize the important social protection function of school meals. School feeding can be safety nets for children who are hard-to-reach and are the most vulnerable, for example: orphans; from very poor households; affected by crisis or conflict (India and Ethiopia-droughts); severely malnourished (Philippines), marginalized castes (India) and "left-behind children" (those in rural areas with 1 or 2 parents migrating to the cities for work, China). These children have higher risks of dropping-out of school. In these instances, school feeding is seen to play a role in decreasing negative coping mechanisms that may affect health, food security and livelihoods (3).

Case	Coverage	Focus of Objectives			
		Education	Nutrition	Agriculture	Other
Brazil/ FAO-Brazil	Universal: primary schools	●	●	●	Based on universal “human right to food” Strengthening public policies
CARICOM	Universal: primary schools	●	●		
China	Geographic: primary and junior middle schools under the Rural Compulsary Education Program	●	●		Poverty reduction
Ethiopia	Geographic: 72 primary schools under the WFP school feeding in the Southern Nations, Nationalities, and Peoples’ Region (SNNPRS)	●	●	●	Create job opportunities for women
India	Universal: Grades 1-8 in all government and government- assisted primary schools	●	●		Based on Supreme Court decree of universal right to food for “every child in every government- assisted primary schools with a prepared mid day meal” Promoting gender and caste equality Poverty reduction
Philippines	Targeted: wasted and severely wasted in 57 public primary schools in Region 4A	●	●	●	

Figure 1: Coverage and focus of objectives of school feeding programs.

The nutritional focus for Brazil/FAO-Brazil and CARICOM is on overweight and obesity issues which are meanwhile emerging concerns for China and the Philippines. Majority of the cases have stunting, wasting and/or micronutrient deficiency as the forms of malnutrition being addressed. Since many children enter school already suffering from one or more forms of malnutrition, school feeding programs provide opportunity for some recovery, taking advantage of the 7,000 days after a child’s second birthday which are now regarded as additional time to help children reach optimal development.¹

¹ See Section: Schools as Platforms for Nutrition Interventions

Malnutrition includes the prevalence among preschoolers of micronutrient deficiencies which can be managed during school. For example, various methods of food fortification can be implemented as in India and the Philippines, including menus rich in specific micronutrients using local vegetables.

Many countries like India have large populations of school-aged children who are not attending or have never attended schools. Meals are effective incentives for parents to send their children to school, encouraging girls and boys to be at school during stages of critical growth and development (4).

In several settings, there are more barriers for girls to attend school; hence gender equality supporting universal primary education can be a goal of school feeding programs such as the case of India.

Beyond the direct benefits to children and within schools, school feeding programs can improve food security and local economies through work opportunities or when linked to local food production (for example, Brazil/FAO-Brazil, CARICOM and Ethiopia). Moreover, a school can model healthy meals and practices that can be imitated at home and in communities, capitalizing on its position as a strategic link between households and the larger community; Ethiopia presents an example (Box 1).

Box 1: Evidence of school feeding ripple effects to homes (Ethiopia Case)

Assessing pulse-based strategies in schools, a retrospective cohort study on the effects of a School Feeding Program on dietary diversity, nutritional status and class attendance of students aged 10-14 years found:

- The pulse and legumes intake of the beneficiary households was higher compared with the non-beneficiaries based on a Food Frequency Questionnaire.
- Using 24-hour recall, the mean Diet Diversity Score (DDS) among school feeding program non-beneficiaries was significantly lower than the beneficiaries.

Program design and M&E

Most of the cases featured were developed based on research, fine-tuned to local conditions and informed by emerging knowledge and gaps. In India, for instance, the program underwent several adjustments in terms of coverage, levels of subsidies and food norms. In the FAO-Brazil project, each country's school feeding program was based on a situational analysis on existing conditions, structures and local contexts. There is no single model for all as concluded in earlier reviews. Localized systems allow responsiveness to specific contexts where more uniform mechanisms may be logistically difficult or aligned to local preferences and food availability.

M&E enables continuing refinement and accountability of school feeding programs but remains a challenge for many initiatives both large and small scale. While Philippines has noted that a simple system of tracking outcomes and documentation at school levels is needed, the level of complexity of the system will depend on the objectives, indicators and the users of the information. China has developed a technology-based open access platform for data collection, analysis and quick feedback to schools, government officials and the general public. This is considered to be the "first trial in any country that provides school meals" (5).

Implementation strategies

There is a range in implementation approaches used. Where flexibility is allowed, schools create adaptive and even innovative strategies depending on their circumstances. Moreover, this flexibility promotes collaborations with local governments or the private sector, taking advantage of resources made available by these partners while creating pathways for larger community efforts towards sustainable production systems and better nutrition.

Funding and local counterparts

Although school feeding can be mainly sponsored by central governments, there are many opportunities to engage local governments, private partners, international organizations, sub-national education systems and local communities as sources of support; in many cases, such partnerships have been essential to effective feeding initiatives.

Among the cases, funding generally comes from central governments with provisions for local government counterparts. Fulfilling budget counterparts may be challenging, as in the case of China where about a quarter of the counties were unable to provide the required budgets for operating expenses and wages of school canteen workers. In India, there is a typical 60-40 cost sharing arrangement between the central government and States and subsidies from the former are higher for poorest or very remote areas. However, delays in release of funds due to multiple funding levels occur. Budgets may be augmented by local partner institutions – and may be in the form of cash, or kind, or labor. In the Philippines, school feeding can be led and funded by the Department of Education, LGUs, private companies or partnerships among them. Such partnerships are often necessary because the amounts provided by the national and local agencies are frequently inadequate to run the programs.

Supply chain

Procurement

The sources of food may be imported or domestic (national or sub-national). India's program obtains grains from the central government purchased at the district level while States have the flexibility to purchase the other food ingredients from local sources. China likewise has centralized bidding at the provincial or county levels and schools have the option of buying from specified or school-chosen sellers. There is a growing trend to promote healthier diets which favor local food production. The CARICOM project in fact aims to veer away from procuring imported food that are energy-dense and of low nutritional value for its national school lunches.

Preparation and delivery

In a decentralized model, preparation can be done on-site by hired cooks-helpers and paid women self-help groups or by volunteers. An external organization cooks and delivers meals in the centralized model. For large-scale programs feeding millions of

children daily like the China and India cases, hired cooks-helpers/groups and implementing partners such as the NGO Akshya Patra are necessary for efficient delivery mechanisms. The absence of a designated personnel to manage the feeding centers in the Philippine case affects the implementation of school feeding. A Philippine school teacher will typically be feeding coordinator and it is an additional task not formally compensated. The teacher is aided by community volunteers such as the Barangay (village) Health Workers and parents, thus highlighting the trade-offs to be made with community participation.

Consumption

All the cases provide nutritional intervention through school lunches for 120-200 days of the school year. Philippines' limited duration is mainly due to funding constraints. China's decision is based on research that lunch and specifically lunch cooked in the school canteen is the best scheme in terms of costs and nutritional adequacy as compared to the catering and snack/breakfast options.

Role of mid-level staff

In several cases, mid-level officials such as school principals and school administrators (Philippines, Brazil/FAO-Brazil) as well as county leaders (China) were found to be key in the successful implementation of school feeding interventions.

Nutritional guidelines

While demonstrating varying degrees of flexibility, all the cases indicate the use of some nutritional guidelines developed from research as a basis for standardizing school meals. National dietary guidelines should establish required quantities and diversity of foods, nutrient contents and food safety while recognizing cultural acceptability and local food availability. Many countries may also need to strengthen their national policies on the consumption of highly processed, nutrient-dense or sugary foods given these current dietary trends as pointed out in the CARICOM case.

Schools need to ensure that nutrient requirements are based on age, sex, and local food cultures, as well as the special needs of vulnerable groups, such as those affected by infectious diseases or those who are already malnourished (6). For example, in the case of the LAC countries of the FAO-Brazil project where obesity is the health concern, providing rice and other carbohydrates as part of meals may worsen the malnutrition problem.

Complementary initiatives

There is evidence reported elsewhere and in the cases that school meals linked with complementary initiatives such as deworming (Philippines), micronutrient supplementation (India, Philippines) and nutrition education can positively affect micronutrient status, adolescent girls' dietary adequacy and even obesity prevention (7).

As an example, the integrated approach to nutrition interventions in schools results in better nutritional outcomes i.e. GarNESupp of the Philippines which feature complementarity of nutrition-specific and nutrition-sensitive programs. Part of China's school feeding program are after-school exercises which resulted in higher than national averages in physical fitness.

Involving communities

There are many ways by which the community is engaged in school feeding programs (Figure 2) and the benefits flow both ways. School feeding can increase incomes by creating employment opportunities for caterers, cooks, helpers etc and through predictable demand for local farmers. In many cases, knowledge and skills are enhanced in agricultural technology innovations, food preparation, food safety and other aspects of the value chain; capacities in forming and managing cooperatives and associations can also be strengthened. Integrating nutrition education approaches can increase potential for developing healthy eating habits within communities.

Conversely, community involvement can foster ownership and responsibility especially for poor people when they are able to contribute in kind or labor, countering dole-out mentalities. Moreover, the local ownership and social capital that are built around these partnerships are essential to scaling-up and sustainability of feeding programs.

Case	Examples of community participation
Brazil/FAO-Brazil	<ul style="list-style-type: none"> Mandated purchase of produce from family or smallholder farmers and associations/cooperatives Volunteer cooks (usually mothers) for all countries except Costa Rica, Dominican Republic and Brazil (hired cooks)
CARICOM	<ul style="list-style-type: none"> Local purchase from project-organized farmers
China	<ul style="list-style-type: none"> Option to purchase from local farmers Hiring of cooks-helpers (3.5M to date) Opportunities for local caterers
Ethiopia	<ul style="list-style-type: none"> Self-help Women will be hired as cooks after getting organized, trained and certified on cooking and basic hygiene Will create market for smallholder's farmers via backward linkage.
India	<ul style="list-style-type: none"> Gram Panchayat, Village Education Committee, School Management and Development Committee or Parent-Teacher Associations regularly help schools ensure efficient cooking, proper serving and keeping environments clean Mothers Groups help children in hand-washing before and after meals Women self-help groups prepare meals Hiring of cooks-helpers (2.5M in 2016-2017)
Philippines	<ul style="list-style-type: none"> Volunteer parents/mothers/community officers or members help in meal preparation and other feeding activities Donations for ingredients or infrastructure Opportunities for local caterers

Figure 2. Community participation in school feeding programs

Looking ahead

School feeding is underutilized as a vehicle for achieving outcomes on a number of levels and in some cases aggravating nutrition and health issues if not well designed and properly monitored. In 2012, about a third of primary-school and lower-year secondary-school students worldwide were provided food or meals at school. However, only some 12% of children attending school in low-income countries received school meals, compared with 37% of students in upper-middle-income countries (8). In addition, more than 80% of such programs in low-income countries are currently funded by external donors (9); this means that where it is needed most, school feeding faces a huge challenge in institutionalization and sustainability.

School feeding goes beyond the walls of the school; it is a cross-sectoral policy of guaranteeing rights and social protection affecting education, health and social development indicators (Brazil/FAO-Brazil). Thus, school feeding programs can provide an integrated framework with multiple impacts across agriculture, education, health and nutrition (10). While it was noted in 2015 that “relatively few governments have yet adopted the kind of cross-sectorial design that allows for gains in several domains across the food system simultaneously” (11), the cases presented in the workshop indicate that more countries and projects have taken up this challenge.

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2. School gardens

Featured in Cases: Brazil/FAO-Brazil, Nigeria-Benin, Philippines

While school gardens have a long history, they have not been consistently perceived as relevant adjuncts to schools. Box 1 lists some common negative attitudes related to school gardens, and these perceptions have affected the implementation of already programmed school garden initiatives as in the Philippine Case where agriculture subjects in the curriculum were for some time deprioritized. These negative perceptions have in general diluted the important link between agriculture and nutrition as shown in Nigeria-Benin.

Box 1: Some negative attitudes about school gardens

- School gardens are designed to keep people in poorly paid agricultural jobs.
- Garden work is a punishment; it is not for enjoyment, learning or reward.
- Our children are being exploited.
- Home-grown vegetables are not valuable food.
- Gardening is dirty.

Source: A new deal for school gardens, FAO 2010. <http://www.fao.org/docrep/013/i1689e/i1689e00.pdf>

With current worldwide needs to ensure food security, better nutrition, environmental protection and secure livelihoods, school gardens are now being perceived to play an important role in addressing these challenges (1). Moreover, there is a growing body of experience and evidence to support this potential (Box 2).

School gardens represent a scale of production through which diversified and sustainable intensification practices can be applied. These practices aim to increase availability and affordability of diverse foods while preserving the natural resource base (2). Diversified systems of production provide multiple benefits and better serve nutrition objectives.

There are a number of technological innovations presented in the Workshop which support both agricultural productivity and environmental sustainability (for example, Colombia, CARICOM)¹; specifically for school gardens, these are the Bio-intensive Gardening (BIG) approach of the Philippines and the micro-fertilizer dosing plus water management techniques of Nigeria-Benin. Philippines and Nigeria-Benin also use crops and varieties that are well-adapted to local conditions as ecosystem-based strategies.

With conscious and deliberate decisions on what and how to grow, school gardens can support nutrition through:

¹ See Subsection: Towards Nutrition-Sensitive Agriculture and Food Systems: IDRC/CFSRF Project Innovations

Box 2: Multiple benefits of school gardens

Educational benefits

- School Gardens significantly increase science achievement scores.
 - Klemmer, C. D., T. M. Waliczek, and J. M. Zajicek. 2005. Growing minds: The effect of a school gardening program on the science achievement of elementary students. *HortTechnology* 15(3):448-452.
 - Smith, L. L., and C. E. Motsenbocker. 2005. Impact of hands-on science through school gardening in Louisiana public elementary schools. *HortTechnology* 15(3):439-443.
- Contribute to communication of knowledge and emotions, while developing skills that will help them be more successful in school.
 - Miller, D. L. The Seeds of Learning: Young Children Develop Important Skills Through Their Gardening Activities at a Midwestern Early Education Program. *Applied Environmental Education & Communication* 6(1):49-66.
- Have a positive impact on student achievement and behavior.
 - Blair, D. (2009). The child in the garden: an evaluative review of the benefits of school gardening. *Journal of Environmental Education* 40(2), 15-38.

Benefits for teachers, schools, and communities

- School Gardens Improve life skills, including working with groups and self-understanding.
 - Robinson, C.W., and J. M. Zajicek. 2005. Growing minds: the effects of a one-year school garden program on six constructs of life skills of elementary school children. *HortTechnology* 15(3):453-457.
- School Gardens Improve social skills and behavior.
 - DeMarco, L., P. D. Relf, and A. McDaniel. 1999. Integrating gardening into the elementary school curriculum. *HortTechnology* 9(2):276-281.
- Instill appreciation and respect for nature that lasts into adulthood.
 - Lohr, V.I. and C.H. Pearson-Mims. 2005. Children's active and passive interactions with plants influence their attitudes and actions toward trees and gardening as adults. *HortTechnology*. 15(3): 472-476.

Health and nutrition benefits

- Improve nutrition knowledge and vegetable preferences.
 - Morris, J.L. and Zidenberg-Cherr, S. 2002. Garden-based nutrition curriculum improves fourth-grade school children's knowledge of nutrition and preferences for some vegetables. *Journal of the American Dietetic Association* 102(1): 91-93.
- School Gardens Increase fruit and vegetable consumption in adolescents.
 - McAleese, J.D., and L.L. Rankin. 2007. Garden-Based Nutrition Education Affects Fruit and Vegetable Consumption in Sixth-Grade Adolescents. *Journal of the American Dietetic Association*. 107 (4): 662-665.
- Students who participate in school gardens report eating healthier snacks.
 - Koch, S., T. M. Waliczek, and J.M. Zajicek. 2006. The Effect of Summer Garden Program on the Nutritional Knowledge, Attitudes and Behaviors of Children. *HortTechnology* 16 (4): 620-625.

Source: Cynthia Nielsen. North Carolina Cooperative Extension. Benefits of a School Garden <https://guilford.ces.ncsu.edu/sgn/benefit/>

- Increasing biodiversity. By featuring a wide range of crops and recognizing that various crops and various varieties/cultivars of the same crop contain different nutrient levels, (intra and interspecies) biodiversity promotes diversity in diets plus nutrient adequacy.
- Focusing on fruits and vegetables which are important parts of healthy diets and the prevention of micro-nutrient deficiencies and diet-related lifestyle diseases. In the Philippine case, for example, school meals using Bio-Intensive Garden (BIG) produce improved nutritional status and reduced anemia rates of students.
- Improving access to healthy foods. Small-scale diversified systems of production such as school gardens can increase direct access to nutritious foods which can be expensive or inaccessible especially for poor children or children in remote communities (3).
- Freshness of produce. Decreasing risk of food and nutrient loss as well as enhancing overall food quality, when used in school meals (Philippines) or brought home by students for household consumption (Nigeria-Benin).
- Promoting food safety through specific technologies. For example, Philippines' BIG features use of organic fertilizers in place of chemicals thereby reducing health hazards to students. Effects of chemical fertilizers are exacerbated among malnourished children.

A school garden has other functions which reinforce its important role in improving nutritional outcomes among children:

- School gardens are unique educational strategies that allow experiential, hands-on, real-life learning about food production, nature and the environment, food consumption, post-harvest activities and their interrelationships. When crop selection and agricultural practices focus not only on yields but on diversity, nutrient content, climate resilience and environmental sustainability, school gardens are well-placed to show how these elements can promote proper nutrition through ways that combine theory and practice.

School gardens must be accompanied by a nutrition education framework: gardening provides the real-life experience to back up nutrition education while nutrition education supports the impact of food production on dietary habits (4). It has been noted that there is a growing disconnection of children and adults from sources of food and food production and that the relationship between growing food and nutrition is not automatically understood. This is the rationale for Brazil/FAO-Brazil's strategy of using the school and its gardens to generate learning about food and all of its dimensions. Through school gardens, children learn to grow a variety of nutrient-rich foods (vegetables, fruits, legumes, etc.) which are often missing in their diets.

- School gardens can be powerful tools for environmental consciousness, raising awareness for environmental protection and soil conservation. Children develop a broader understanding of the natural world, learning about responsibilities and impacts of agricultural practices they undertake at a small-scale.
- A garden also provides many options for physical activities such as digging and planting which are important for a healthy lifestyle.

- The Nigeria-Benin case highlights the livelihood opportunities of gardens: their Young Vegetable Scientists' Clubs (YVSCs) sell part of their produce of indigenous vegetables to generate income to maintain the gardens, in the process building agri-business skills among the club members and promoting awareness and consumption of healthy, fresh food in wider communities. In agriculture-dependent economies, these skills are important for ensuring food security.
- Gardens in schools can be a source of fresh produce for school feeding, improving school meals with micronutrient-dense vegetables, fruits and other harvests. School meals using garden produce promote children's preference and consumption of a variety of foods, especially locally-adapted varieties. Diversity in crops produced should lead to more diverse school diets. Through school meals using garden harvests, students learn how crops they grow can be prepared and cooked, making it possible for them to share that knowledge with parents to drive healthier home consumption.
- Most school gardens are cultivated on small plots and therefore can be easily imitated by families or communities. School gardens provide models for home and community gardens, encouraging nutrition, food security and environmental initiatives in wider, out-of-school settings.
- Gardens can serve as repositories for the conservation and reintroduction of native/ local varieties of legumes, green leafy vegetables, fruits, roots, tubers and other nutritionally-rich crops. This was exemplified by the gardens in the 3 cases, with the dimension of reviving, conserving and propagating indigenous and locally-adapted varieties in a Crop Museum featured in the bio-intensive gardens of the Philippine case.

The specific objectives for establishing school gardens in the 3 cases differ although all show some nutrition orientation. In the Philippine case, the primary goal is to bring to agriculture a sensitivity to nutrition while Nigeria-Benin highlights among young people the value and role of agriculture in society and as a livelihood or career option. In Brazil/FAO-Brazil, school gardens are part of a comprehensive nutrition education program where project components within and outside of the schools converge on a consistent message about nutritious diets and healthy habits.

Implementation approaches

Local governments

Local governments should be involved, as in Brazil/FAO-Brazil, because they are engaged in the pilot Sustainable Schools where school gardens are an integral component. The Philippine government's Gulayan sa Paaralan (GPP/"Vegetable Gardens for Schools") which is being enhanced by the Philippine project endorses partnerships between the schools and local governments at the provincial, city/municipal levels in its national guidelines and the actual levels of engagement vary. Where they are strong,

they foster ownership and social capital since local governments are key stakeholders in the community. At the very least such collaborations can influence policies at the local level to pave the way for strengthened sustainable land management and nutrition awareness in their territories. With devolution/decentralization of ministerial functions at sub-national levels, coordination across sectors is theoretically facilitated. In all Cases, it is important to secure the buy-in of local chief executives.

Team approach

A team approach/collective action in managing the gardens is good practice. The relatively new Philippine guidelines stipulate that the school GPP Coordinator who is usually an Agriculture teacher shall work together with the school feeding coordinator in preparing the school food production and feeding plans, bringing focus to the link between garden produce and quality of school meals. Moreover, the support of school principals and administrators was found to be a critical facilitating factor in garden implementation.

Outside of schools, the involvement of parents, community and other stakeholders in the gardens is also sought, as in the Brazil/FAO-Brazil experiences. Social cohesion and cross-generational learning are fostered when parents and the larger community are involved. As apparent in the Brazil/FAO-Brazil and even in the Colombia Case which used the whole community as its “schools”, such social development skills especially in intergenerational exchange usually involving traditional crops and practices need to be brought to focus in children’s learning and nutrition, in addition to the typical emphasis on academic skills in schools.

Farmers as partners

Bringing in farmers as partners in school gardens also develops social capital and allows for mutual learning and exchange. Such partnerships reflect valuing the role of farmers, supporting the objective of the Nigeria-Benin YVSCs. Farmers from the community can demonstrate local, traditional farming practices and traditional uses of crops. School gardens and farmers’ plots can be linked as parts of larger ecosystems, and can provide both students and farmers better understanding of healthy diets and their relationships to agricultural practices. School gardens can thus become platforms for more robust nutrition education strategies.

Scale-up and sustainability

The Philippine, Nigeria-Benin and FAO-Brazil projects were all designed with a view towards sustainability and scale-up. Lighthouse Schools of the Philippines and the Sustainable Schools of Brazil/FAO-Brazil with their school gardens are intended/aspire for national implementation and thus are working on the ground to develop/“perfect” their models, allowing schools to help others while at the same time directing project efforts at strengthening or developing national policies. In the Philippines, each school garden developed as a Crop Museum is strategically located as a seed bank and nursery source of planting materials for nearby schools and communities.

Many gardens end up being unsustainable, hence in the Philippine Case factors likely to affect garden sustainability were carefully analyzed before project implementation (5). In the Case of FAO-Brazil, the collective community learning of parents, students and teachers continuously inform ways on how Sustainable Schools can be implemented by the LAC governments as a nationwide strategy.

Case experiences show that sustainability of school gardens can be built in a number of ways:

1. Choice of technology

The technology itself used in the gardens contributes to sustainability since time, expertise and resources are necessary for long-term functionality. In the Philippine Case, BIG standards of crop production promote sustainable agricultural practices such as emphasis on indigenous species due to genetic capacity to adapt, low external inputs, seed conservation and crop diversity. In Nigeria-Benin, low external inputs by way of fertilizer micro-dosing and water management techniques make it easier for the school and students to maintain the gardens in the long-term.

2. Targeting children, their families, the schools and the community

As an educational tool for improving nutrition and health, school gardens must target children, families, schools and communities who all should make the connection between growing food and good diets through “a positive image of a garden as a source of good health and learning” (6). As emphasized in the Brazil/FAO-Brazil Case, there are learning and supportive roles based on clear, shared goals for school children, teachers, cooks, food sellers, school principals and administrators, Parent-Teacher Associations, local governments, businesses, farmers, and community organizations (7).

3. Integration in school curriculum

Placing school gardens in the school curriculum is generally viewed as essential to successful gardens. Gardens can be part of subjects like Agriculture or Science as in the Philippine and Brazil/FAO-Brazil Cases, which also strive to use them as a general learning resource for other academic subjects not traditionally associated with gardens such as math and social sciences. School gardens can also be part of extra-curricular activities such as the garden clubs of Nigeria-Benin. What is important is for gardens to have “well-established, multifunctional roles in the school’s life” (8).

4. Development of guidelines and policies at different levels

5. Use of produce as incentives or for income-generation

In Nigeria-Benin, teachers and students get a share of the produce which can serve as incentives especially for the teachers who do not get additional compensation for garden time. Such incentives can be offered as well to parents and other volunteers and built into the system so that garden activities such as holiday/summer break maintenance can be carried out. In Nigeria-Benin, part of the harvests is sold and proceeds are used by students for the gardens and other school projects, while agribusiness skills are developed, for instance, through maintaining accounts that are regularly checked. Selling produce can also provide income for maintaining gardens after project phase-out.

6. Integrated and complementary activities

Agro-ecological gardening approaches such as the BIG, combined with various capacity-building activities, advocacy, intensive mentoring and monitoring of key people, and distribution of IEC materials are seen as a viable way to revive, restore, and eventually sustain school gardens while also linking them with ongoing school-based supplementary feeding programs (Philippines).

Challenges in managing school gardens

1. Availability of land and other land issues pose obstacles in establishing and maintaining school gardens.
2. Curriculum integration can be challenged by overcrowding and increased teachers' workload.
3. Gardens as extra-curricular activities need careful balance between academic and non-academic goals.
4. Compensation for teachers who manage gardens as additional task can be an issue.
5. Poor garden security results to damage or loss of crops.
6. In certain Cases such as the Philippines and even in some developed countries, use of school gardens as a learning resource is still weak.

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3. Nutrition education

Featured in cases: All

Nutrition education is increasingly recognized as an essential catalyst for effective nutrition and food security interventions because well-designed approaches help ensure that increased food production and incomes translate to healthier diets and better nutritional status (1). Poor nutrition can often be linked to mistaken notions, misdirected attitudes and lack of skills related to food; nutrition education is seen to remedy or fill these gaps. Figure 3 shows the approaches used by the cases to deliver nutrition education to various stakeholders.

Figure 3: Nutrition education initiatives presented in the cases

1. Brazil

- 1.1 School feeding law mandates that all children must receive nutrition education.
- 1.2 Holistic approach (awareness on the food system and how it contributes to good health) with 3 pillars:
 - a) Universal access to adequate and quality food which is available continuously
 - Provide food – quality and continuity. “What we offer as food speaks higher than when we talk about food in schools.”
 - Clear and consistent message of “healthy food” from source, storage, preparation and consumption
 - b) Access to knowledge building on food in all its dimensions
 - Integrate in subjects other science or home economics (e.g. math, history, geography, geometry, languages) or in school-based activities e.g. school garden
 - Teachers and other actors need preparation/training.
 - c) Promoting change in eating habits
 - Access to information on options - healthy or unhealthy food and why
 - Structural provisions that provide information on the standards of healthy food: qualifications of food handlers, kitchen/kitchen utensils, food preparation and storage and the way of cooking
 - Adequate food in designated place which is conducive to doing the proper behavior
- 1.3 School feeding programs need guidelines, manuals, communication tools which are reproduced and used for sustainability.

2. CARICOM

- 2.1 In Saint Kitts-Nevis: a Joint Communications Committee set up by government to enhance public awareness on the issues and work being done to tackle obesity in primary schools
- 2.2 In Trinidad and Tobago:
 - a) Classroom activities conducted by dietitians or trained teachers on nutrition topics including healthy snacking, nutrition label reading and portion control
 - b) Lesson plans developed for parents/caregivers on buying and choosing the right foods and other nutrition topics
 - c) Skills training conducted such as food service and safety, best practices for hygienic delivery for catering staff

3. China

- 3.1 China Development and Research Foundation work with National Nutrition Improvement Program for knowledge communication and promotion in rural areas engages various partners like the Mars Group. Recommends linking up of Ministry of Education with rural hospital staff for this task

continued to the next page

Figure 1: Nutrition education initiatives....continued

4. Colombia

- 4.1 Community-based capacity building – Individuals or base groups, e.g. families, join the Family Agricultural Communitarian Schools where they learn from professional facilitators about human nutrition among others using participatory methods and collective learning and action. They value indigenous knowledge as demonstrated in the revival and promotion of indigenous recipes through inter-generational ancestral culinary courses. Other activities include: field days, fairs, markets, community action planning and other inter-generational fora
- 4.2 Nutrition education integrated in the Shagras for Life, a community-maintained micro-production system
- 4.3 Education and communication program to sensitize consumers on the advantages of yellow potatoes and where to access/purchase

5. Ethiopia

- 5.1 Nutrition education for pulse consumption using multiple modes:
 - a) One-on-one: Mobilized agents of change (mothers/women, health extension staff) to sell pulse-based products, use pulses in their family diet; home visits to provide nutrition information, skills training and recipe demonstrations
 - b) Social media – interactive radio and mobile programs that reach 135,000 farmers in listening groups
 - c) Link with students sponsored by the project to design IEC materials including contextualization of messages
 - d) Peer-led nutrition education among adolescent students
 - e) Students in school feeding program will undergo nutrition education through schools' mini-media systems
- 5.2 Research
 - a) to assess impact of the 10-year nutrition education interventions
 - b) on peer-led pulse-based nutrition intervention on the KAP and nutritional status of students

6. India

- 6.1 Various state-level initiatives

7. Nigeria/Benin

- 7.1 Nutrition education through student clubs (Young Vegetable Scientists Club) and the clubs' school gardens. Targets all interested students aged 12-18 years old

8. Philippines

- 8.1 Integrated school nutrition model has three components, one of which is Nutrition Education for students, parents/care providers and teachers to promote the importance of nutrient-dense food and good eating habits. Nutrition Education is also linked with the two other components of the model, School Garden (BIG) and Supplementary Feeding.
- 8.2 Enhancement and development of modules for students, parents/care providers and teachers and distribution of IEC materials (recipe books, posters) to parents/care providers and teachers
- 8.3 Training of:
 - a) teachers for integration of nutrition concepts in daily lesson plans and for conducting nutrition information sessions with parents during parent-teacher conferences
 - b) parents of school feeding beneficiaries
- 8.4 Curriculum mapping with Department of Education to identify gaps in integration
- 8.5 Use of bio-intensive gardens as educational resource
- 8.6 Research on effects of nutrition education on KAPs of children and parents

The range of approaches shows the multiple modes that can be used for nutrition education:

- **Targets:** can be students, mothers, farmers, consumers
- **Agents of change:** can be trained teachers or nutrition professionals, peers, professional facilitators, rural hospital staff, government extension workers, trained mothers, a government Joint Communications Committee

Box 2: Case evidence of the effects of nutrition education

Ethiopia

A study used randomized control trials with baselines to examine the effects of peer-led pulse-based nutrition education on 10-14 year old students' KAPs and nutritional status:

- The mean DDS was significantly improved after a six month intervention in the intervention group which also showed significant differences in knowledge, attitude and practice mean scores about pulse preparation and consumption.
- At endline, the prevalence of wasting was significantly reduced for the intervention group while there were no significant differences in stunting prevalence between the 2 groups.

Philippines

Among children:

- Increased knowledge (65.3% to 76.2%) and attitude (78.2% to 89.1%) of children on the importance of having home gardens and improved attitude towards consumption of variety of foods (74.1% to 84.4%).
- Improved recognition of the negative effects of worm infestation (42.8% to 47.6%).
- Among parents:
- Improved parental knowledge on the importance of consumption of fruits and vegetables to prevent sickness (93.9% to 100%), serving breakfast for children (42.4% to 78.8%), having home gardens (78.8% to 93.9%), and the negative consequence of worm infestation (33.3% to 60.6%).
- A more positive attitude (63.6% to 93.9%) and practice (27.3% to 87.9%) on proper preparation and serving of fruits and vegetables; and improved attitude (51.5% to 66.7%) and practice (51.5% to 93.9%) on the purchase of fortified foods for children.
- Significantly increased baseline-to-endline mean scores concerning lessons in: constraints and challenges in sustaining nutrition in home settings; proper nutrition guidelines and nutrition practices; encouraging children to eat vegetables; vegetable preparation and cooking; food fortification; and personal hygiene and health.

- **Media:** can be more traditional like brochures, posters, radios, workshops/sessions, school lessons, parent-teacher conferences; newer media like mobile/cellular phones, mini-media systems, social media; school gardens; community mechanisms like Family Agriculture Communitarian Schools and Shagras for Life.

Box 2 lists some research findings from the cases on effects of nutrition education on KAPs and nutritional outcomes.

There is also recognition that information dissemination or knowledge sharing alone has a limited role in promoting health-seeking behaviors or nutritional outcomes. Most projects are looking for long-term behavioral change in habits and practices. A meta-analysis of over 300 studies shows that nutrition education is more likely to be effective when it focuses on behavior/action rather than on knowledge alone (2).

Developing more effective nutrition education initiatives

Based on the presentations and evidence elsewhere, there are several considerations when developing nutrition education initiatives particularly in schools:

1. Elements such as the quality and quantity of food offered in school feeding as well as methods and standards for purchasing/sourcing, storing, preparing and eating the food are more powerful in conveying the message of good nutrition and in promoting healthier eating habits than just talking or providing information about healthy foods, as seen in Brazil/FAO-Brazil's holistic approach to nutrition education.
2. When schools are used as a platform for nutritional outcomes, there should be a strong nutrition education component in the program design right from the beginning.
3. When combined with nutrition education, school meals can directly improve students' health and nutrition while helping develop their good eating habits (3). Well-designed nutrition education reinforces gains achieved in the school feeding programs—contributing to sustainability of healthy eating habits (Philippines).
4. It is important to learn about the different dimensions of food (agricultural, health, social, economic, psychological, etc.) (Brazil/FAO-Brazil) and therefore explore all avenues to promote food learning and nutrition education in schools, including through gardens and academic subjects not traditionally associated with food or nutrition. Moreover, there needs to be national level involvement on policy for curriculum integration based on the nutrition education approaches that are warranted.
5. There is huge opportunity to facilitate nutrition education activities not just for students but for other actors involved in school feeding programs or nutrition interventions. These include cooks, kitchen helpers, the private sector or the multiple levels of government staff running the programs. For example, the large number of personnel involved in the Mid Day Meal Scheme of India can be provided further education on why the children are getting this food, the benefits of proper meals, etc.
6. At the very least, there should be engagement among students, teachers and parents to promote the message that good diets and healthy practices lead to good health. In the case of crops from school gardens and smallholder farmers, the message emphasizes good diets resulting from diversity in foods, fresh produce and sound and sustainable agricultural practices.
7. Nutrition education should also target farmers. This closes the loop from production to consumption.
8. Most of the evaluation studies in the cases are looking at changes in KAP. When designing evaluation to assess the impact of nutrition education on nutritional outcomes, there is a need for clear indicators, a theory of change and methodologies ensuring firm evidence. Schools are uniquely positioned to promote healthy eating behaviors and attitudes among students but long-term changes in habits and impacts on nutritional status are not straightforward and the most appropriate pathways must be investigated and tested.

9. According to Contento (2008), there are 3 essential components to nutrition education. Each component needs to be based on appropriate theory and research.

- A motivational component: aims to increase awareness and enhance motivation by addressing beliefs, attitudes through effective communication strategies.
- An action component: aims to facilitate people's ability to take action through goal setting and cognitive self-regulation skills.
- An environmental component, where nutrition educators work with policymakers and others to promote environmental supports for action (4).

Three overlapping trends in nutrition education are thus identified in the literature: information-dissemination, behavioral change, and behavior-oriented nutrition/health promotion (5).

10. Highlighted as a major gap in the CARICOM experience is the need for increased public/consumer awareness on nutrition issues at different levels and sectors of society – not only in the region but globally, making the case for a health promotion approach: the policy environment, community action and health service support.

11. The cases emphasize the importance of an integrated health-promoting environment because nutritional outcomes do not just depend on the food consumed but result from an interplay of the food production system, the environmental system, the health system, and the system of individual and household decision-making (6).

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D. Expanding the school platform towards nutrition-sensitive food systems

Schools all over the world are strategically positioned to deliver nutrition interventions – via school feeding programs, school gardens and nutrition education. As schools are embedded within communities, there is a potential for gains of school-based nutrition interventions to spill over to the child’s household and her/his bigger community especially where community participation is strong. School nutrition programs are also embedded within food systems (Box 1) that may extend outside the immediate community. To a large extent, this food system influences what children ultimately consume and consequently, their nutrition status. The need to integrate health and nutrition interventions with agriculture has been recognized.

Box 1: The food system

The High Level Panel of Experts (HLPE) adopted the following definition of a food system:

“A food system gathers all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socio-economic and environmental outcomes” (HLPE, 2014a).

Source: http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE_Reports/HLPE-Report-12_EN.pdf

Despite the many benefits of school-based nutrition interventions, such programs have their limitations in terms of time, location, population coverage and funding. Sustaining the gains of school feeding projects requires creating an environment that will support healthy food options. The food system approach allows us to identify multiple areas of intervention in order to make the production, processing, distribution, preparation and consumption of food more nutrition-sensitive.

This section catalogues how the different cases have impacted on different aspects of the food system with the view of aiding nutrition consumption of school children. Local food production, a component of the local food system is discussed separately in view of its programmatic link to the school feeding projects.

1. Local food production and school feeding

Featured in Cases: Brazil/FAO-Brazil, CARICOM

School feeding programs can source food ingredients from anywhere in the world. An increasing number of organizations and governments, however, recognize the value of linking smallholder farms to school meals. Depending on the contexts, capacity of farmers and levels of community participation, there have been different approaches used to develop this link (1). Countries are looking to source food locally not only to improve meals and the overall school feeding program, but to boost local economies and provide opportunities for poverty reduction among smallholder communities. Five hundred million small farms across the world, largely still rainfed, provide up to 80% of food consumption in most of the developing world; investing in smallholder farmers is a significant way to improve food security and nutrition for the poorest, as well as to increase food production for local and global markets (2).

Purchasing part or all of the school feeding ingredients locally is also referred to as “Home Grown School Feeding” (HGSF-Box 2).

Box 2: HGSF constitutes a school feeding model that provides safe, diverse and nutritious food, sourced locally from smallholders, to children in schools.

“Sourced locally from smallholders” means that HGSF programmes:

- maximize benefits for smallholder farmers, by linking schools to local production;
- strengthen the capacities of smallholder farmers and communities;
- promote a sense of ownership among communities and farmers involved.

“Safe, diverse and nutritious food” means that HGSF programmes:

- promote quality and safety standards for fresh and local foods;
- support crop and dietary diversification and healthy eating habits;
- promote food and nutrition education including behavioural change.

Source: <http://documents.wfp.org/stellent/groups/public/documents/resources/wfp290721.pdf>

Positive contributions of linking-up with LFP

At school level

Sourcing food from local producers shorten supply chains. Apart from reducing carbon footprint, a shorter supply chain minimizes costs of school feeding, guarantees freshness of ingredients and reduces the need for processing of the food product, the use of preservatives and other costly post-harvest handling facilities. Procurement systems can be simplified/facilitated by the proximity of sources. In addition, the traceability of food sources increases access to information on the conditions of production, thereby helping schools make healthier and better choices.

Purchasing produce from the vicinity is also likely to promote the use of local, traditional, neglected and underutilized foods which cater to the local palate, preferences, dietary habits and food culture. It may also ensure diversity of food sources as well as diversity in the types of food for school children. Through local purchasing, the relationships between schools and the local community are fostered and community participation in the nutrition program is enhanced. LFP promotes cohesion towards a common goal as relationships are built between schools and farmers who typically are parents, grandparents or relatives of school children.

In local farming communities

By offering predictable demand, school feeding projects have the potential to improve food security and the economic lives of local farmers by motivating increases in production. If required, schools may also encourage diversity of crops which has the benefit of increasing ecological resilience. Demand may also trigger the production of healthier and safer food. Nutritious crops can also improve the food intake of producer households.

Increases in farm production may result in the expansion of markets and an increase in the demand for other services including credit, provision of technology and other inputs. In the long run, enhanced local farm production may boil down to local economic development and smallholder farmers' integration into markets (3). Since many smallholder farms are operated by women, support for such farms is likely to contribute to the enhancement of women's income and women's welfare. Increase in women-farmers' incomes may in turn bring about better food, health and nutrition for the family and help bolster social equity especially where women have reasonable control over resources.

Implementation and challenges

The link between school feeding and local food production in Brazil is facilitated by the school feeding law which mandates the purchase of at least 30% of food from local farmers. Since such a law is central to school feeding, much of their work in LAC focuses on influencing policy and capacity building for stakeholders at all levels. The lesson learned in Brazil is that a procurement law can pass more easily if linked to a specific school feeding policy rather than to a general health or nutrition law.

The Brazil Experience: 3 Main features of the School Feeding Law

- Within schools, nutritious food must be offered, not just any food.
- At least 30% of food must be bought from local farmers.
- All children must receive nutrition education.

Lacking an appropriate policy framework, CARICOM focused on social work with communities and institutions – building community arrangements, social capital, institutional support and the linkages among the different ministries. It was pointed out that the partnership among ministries of agriculture, health and education in an integrated effort to improve nutrition is considered a milestone in the region. The CARICOM case prescribed the purchase from local farmers on a project scale, building a model that resulted to a possible review of the national procurement law.

Farmers' capacity to ensure adequate supply in accordance with a contract proved to be one of the hurdles of the projects. Farmers, it was found, are not readily given to making contracts. Further, farmers are not organized to meet market demands. The Brazil case saw the need to simplify the procurement process, making it smallholder farmer-friendly. Procurement manuals were prepared with the participation of farmers. CARICOM, on the other hand, strengthened production capacity of farmers, introducing appropriate agricultural technology. Further, Brazil/Brazil-FAO exerted efforts to coordinate with local governments to organize farmers or strengthen associations and cooperatives for technical input as well as marketing.

The resistance from the private sector is an expected consequence of the school feeding procurement policy, as smallholder farmers pose unwelcome competition. Participants to the workshop found that in such cases, the role of government to formulate laws favoring smallholder farmers and the political will to see the policy through are necessary. When there is pressure from divergent interest groups, it is the government that must decide based on costs and benefits which are not only monetary. The government must put children's health or education as a national priority.

Project implementers/schools, on the other had find that conducting business with the private sector is a much easier process. In some cases (e.g. Paraguay) the transition to local food purchase necessitated an intermediary arrangement where private sector suppliers were also mandated to buy at least 30% of stocks/produce from family farmers.

Making LFP work better

For LFP to effectively contribute to the improvement of the nutritional status of children, some preconditions need attention.

First, local farmers' capacities may have to be enhanced or consolidated, considering the challenges that they face in agricultural production. Set within the context of a mode of production that is predominantly intensive, chemical input-dependent and crop-specific, farmer suppliers for school feeding projects may not be able to guarantee food safety nor support diet diversity. Farm productivity may also be hampered by agronomic conditions such as soil quality, water supply, pest and diseases, and the supply of seeds and planting materials. Furthermore, where smallholder farmers are involved, producing the right quantity of ingredients at the right time could prove to be a challenge.

Capacity-building on farming technologies that require minimal external inputs could reduce production costs and help guarantee food safety. The BIG used in the school covered by the Philippine case could be one such technology. In this case, the school garden can be maximized as learning venue and model for local small holder farmers to emulate. CARICOM likewise introduced a set of technologies to support the production of vegetables for school feeding.

Biodiversity in farms needs to be supported and in some cases, re-introduced. These may involve sourcing seeds and planting materials, especially those of local, traditional,

neglected and underutilized crops and ensuring constant supply of these planting materials. Knowledge and skills in seed production and seed storage would be useful. Setting up community seed custodians (as in the case of Colombia) or community seed banks (like the Philippines' Crop Museums) would help sustain agricultural biodiversity and enhance farm resilience, especially under changing climate conditions.

Farmers also need to be sensitized to the nutritional value of crops to help them make choices that favor healthy diets. While production of local, traditional, neglected and underutilized crops favors farm resilience, the nutritional value of these crops also need to be understood in order maximize their utility in addressing macro and micronutrient needs of school children. In some cases, agronomic biofortification of crops (Nigeria and CARICOM) or the introduction of better and more nutritious crop varieties (Colombia) may be necessary.

Meeting the school demand in terms of volume and time necessitates some level of discipline and production planning at the level of the individual farm and/or the community. Some system of aggregating produce from individual farmers may also be necessary. As earlier noted, farmers are not readily given to making contracts. In some cases such as India and China, buyers (schools or project implementers) are given the flexibility to choose suppliers. To maximize the value of the local food production system, training farmers to respond to demand via production planning and coordination of production across farms may be a worthy investment. Forming cooperatives is also an option but requires capital and a rigorous process which smallholder farmers may not be able to meet easily as the Colombia case discovered with the Rural Entrepreneurs' Nuclei. Support in this regard would be helpful (Brazil/FAO-Brazil). When the system for meeting school demand has been set in place, small farm holders may be in a better position to sell their produce in the bigger market.

Skills in postharvest handling, processing, packaging and storage will reduce losses and add value to the farm produce. These would ensure supply for the schools and aid in marketing as the goods will be available and retain its quality for a longer period. Techniques for retaining nutritional value have to be built in. Overall, sourcing school feeding ingredients from local food producers brings with it many benefits. The local food production system may, in time, adjust to the school demands for quantity, freshness, quality, safety, diversity and nutritional value. Capacity building interventions will speed up the adjustment to these standards. It will further prepare small holder farmers for integration in the formal market system.

Given the need to capacitate farmers, a mechanism to involve the agriculture, health and education sectors is warranted. LFP therefore demands integration of sectors because health is needed to monitor the quality of food; agriculture is needed to capacitate farmers with technologies and organize them into cooperatives or other viable groups; and education is needed to manage the purchase for school children. While time is needed for farmers to meet the specific demands of school feeding, LFP goes beyond creating a market; it builds the foundation for sustained improvements in nutrition in the community.

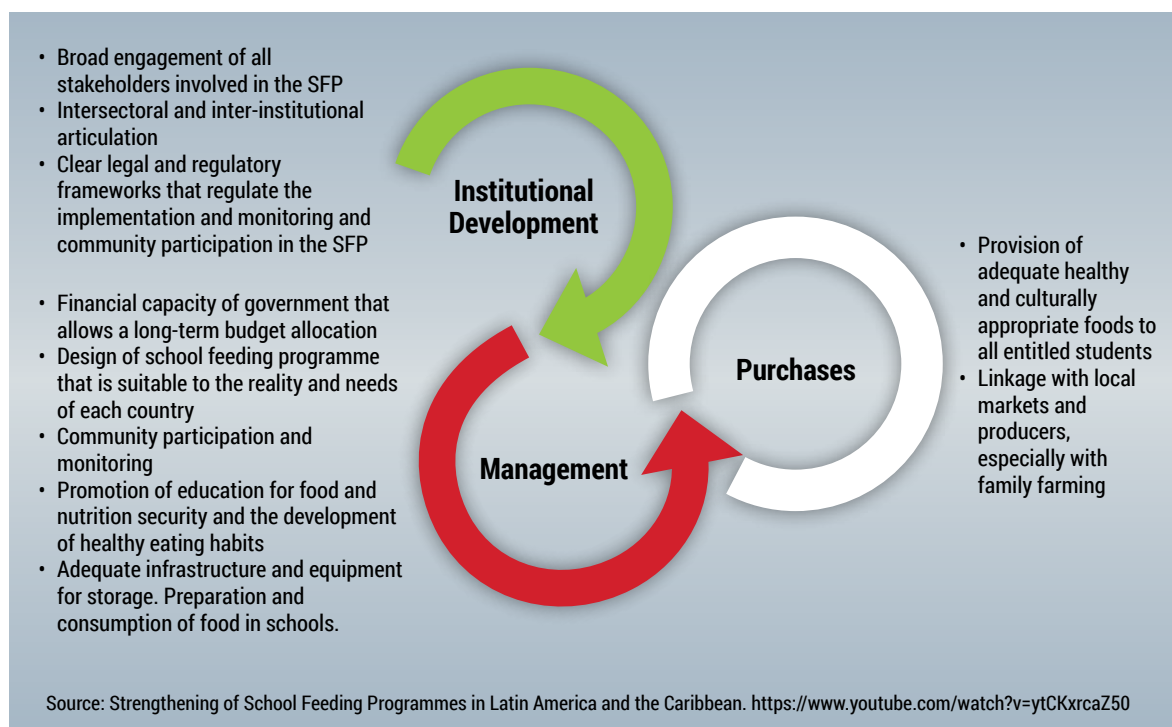


Figure 4: Elements of sustainability in school feeding program linked with local food production

Brazil/FAO-Brazil summarized the elements of sustainable school feeding programs linked to local food production in Figure 4. Identified by a forum of experts from governments, academe, international organizations and civil society, the elements highlight essential practices encompassed by institutional development, management and purchases.

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2. Towards nutrition-sensitive agriculture and food systems: IDRC/CFSRF project innovations

The school as a micro food system is embedded within a larger food system, consisting of the processes involved from food production to consumption. While school-based nutrition interventions have enormous value, they are limited by time, space and resources. To sustain the gains of any school nutrition program, the larger food system should also provide a health-enabling environment.

The food system landscape

While large advances have been achieved in various aspects of food production, handling, storage and distribution, much still needs to be done in making these processes responsive to the nutritional needs of the population in general and of children in particular. In fact, some of the innovations in the food system have aggravated rather than resolved nutritional issues.

Increased agricultural production brought along with it specialized production of a limited number of crops that severely reduced agricultural biodiversity. Mono-cropping simplifies the diets of food consumers including farmers, threatens ecosystem resilience and depletes the nutritional content of the soil which in turn affects the nutritional value of food. The prevalence of micronutrient deficiencies can be traced to inadequate consumption of fruits and vegetables which have become expensive and the heavy intake of cereals and other less expensive carbo-dense staples. Globally, the food system is not producing adequate amounts of nutritious foods partially due to the emphasis given to yield rather than nutritional value.

The need to guarantee agricultural yield has resulted in heavy reliance on chemical/synthetic inputs, putting farmers' and consumers' health at risk and furthers environmental degradation. Chemical-tainted food aggravates the condition of already malnourished children.

In spite of improvements in agriculture, post-harvest losses remain high especially among smallholder farmers. It is estimated that some 1.3 billion tons of food produced for human consumption is lost annually (1). Reducing post-harvest losses can increase the amount of food available worldwide. Innovations in this regard have helped reduce losses, secure food supply even off-season and in distant areas while preserving quality and freshness. Ultra-processing, however, has stripped food of its nutritional value and reliance on additives has resulted to low nutrient, energy dense, fatty, sugary and salty food – key factors to obesity, overweight and increased incidence of non-communicable diseases. In addition, advertising has played a key role in influencing consumer preference for ultra-processed foods.

Food price policies including food taxes and subsidies affect the affordability of food. In most places in the world, policies are not designed to ensure that healthier and

nutritious food and less healthy food are more expensive. Poor households generally have limited healthy food choices due to high prices and low incomes. On the other hand, lower food prices impact smallholder farmers.

The trading food across vast geographic areas contributes to ensuring the availability of food, food security, access to diverse food choices, improved nutrition, stabilization of food prices and the regulation of shocks due to market fluctuations. It has, however, also increased access to cheaper, low- nutrient food products, brought about food monopolies and compounded the risk of marginalizing smallholder farmers.

The changing market landscape is one in which the supermarket and fast food centers co-exist with traditional suppliers. Traditional retailers more likely supply nutrient-rich food; however, they face numerous challenges in ensuring food safety and quality. There is need to examine modern and traditional markets to understand their positive or negative effect on nutrition.

The food system perspective allows for different entry points for introducing technological innovations and nutrition-sensitivity into the food system. The cases demonstrate varying types of interventions in different components of the food system (Figure 5).

Figure 5: Summary of project interventions along the food system (Based on FAO Framework 2)

Elements of the Food System	Areas of intervention	Specific intervention presented in the cases
Food Production	Diversification and sustainable intensification of agricultural production	<p>Ethiopia: High-yielding varieties of haricot beans and chickpeas together with their best management soil management and agronomic practices such as rhizobial inoculation, cropping sequences</p> <p>Colombia: FACs, RENs: seed custodians, family gardens Shagras</p> <p>CARICOM: Improved varieties of vegetables Drip irrigation Protected agriculture Forage conservation for small ruminants Improved varieties of vegetables Green-house cultivation</p> <p>Nigeria-Benin: Fertilizer micro-dosing and water management practices to improve indigenous vegetable production</p>
	Biodiversity for food and nutrition	<p>Colombia: Family gardens, Shagras</p>

Figure 5: Summary of project interventions.... continued

Elements of the Food System	Areas of intervention	Specific intervention presented in the cases
	Biodiversity for food and nutrition	Philippines: Bio-intensive gardening Crop museums as gene banks and custodians of agrobiodiversity heritage
	Biofortification	Ethiopia: Agronomic biofortification Colombia: Improved yellow potato varieties that yield 15% more than other varieties, are twice as resistant to late blight disease, contain double the amount of protein and have nearly 20% more iron and zinc than the most cultivated Colombian variety
Food handling, storage and processing	Nutrition-sensitive post-harvest handling, storage and processing	Ethiopia: Fine-tuning pulse-based complementary processing methods and recipes Development of extruded flours and snacks from chickpeas Colombia: traditional cooks/reviving ancestral recipes CARICOM: Simple technologies to reduce post-harvest losses Nigeria-Benin: Food fortification Processing and preservation methods using indigenous vegetables
	Food fortification	India: Food fortification (various methods) Philippines: Iron-fortified rice and iron-rich recipes using traditional vegetables
Food trade and marketing	Trade for nutrition	
	Food marketing and advertising practice	Colombia: Fairs, markets within community General consumers supermarkets Ethiopia Door-to-door retail of pulse-enhanced products in urban and farm communities
	Food price policies for promoting healthy diets Food labelling	

Figure 5: Summary of project interventions.... continued

Elements of the Food System	Areas of intervention	Specific intervention presented in the cases
Consumer demand, food preparation and preferences	Nutrition education and behavior change communication ³	<p>Ethiopia: Project-sponsored graduate students create IEC materials School-Peer-led, mini-media in WFP school feeding Outside school-use of government extension system, Farm Radio International</p> <p>Colombia: Promoting consumption of diverse diet FACs and Shagras: Nutritional education</p> <p>Brazil: School gardens as learning venues and all possible learning avenues within schools</p> <p>Philippines: BIG as learning venues</p> <p>Nigeria-Benin: YVSC School gardens as learning venues</p> <p>CARICOM Influencing demand by highlighting benefits of locally grown vs imported, nutrient-dense foods</p>
	Income generation for nutrition	<p>Nigeria-Benin: Livelihood skills and future careers in agriculture/agribusiness</p>
	Nutrition-sensitive social protection	<p>Philippines: SF for the wasted, severely wasted</p> <p>China: SF for the left-behind children</p>
	School food and nutrition	School feeding programs of China, India, Brazil, Philippines, CARICOM, Ethiopia
Cross-cutting issues	Nutrition-sensitive value chain	
	Women's empowerment and gender equality	<p>Ethiopia: Forming women's cooperatives/self-help groups for production and livelihood</p> <p>India: Inclusion of more girls in MDMS Livelihood for self-help groups</p>
	Food loss and waste prevention, reduction and management	
	Food quality, safety and hygiene	

Nutrition-sensitive interventions in the food system are commonly introduced during the production stage in the form of agricultural technology, better crop/crop varieties, diverse crops/ biodiversity. Agricultural technology is often aimed at increasing production to contribute to the availability and access to food. In some cases technology aims to produce nutrient-rich soils and crops (fertilizer micro-dosing and agronomic bio-fortification) and enhance food safety (bio-intensive gardening). Introduction of better crop/crop-varieties targets both production and nutrition quality of produce as in the case of yellow potatoes in Colombia. Efforts to improve agricultural biodiversity include re-introducing traditional vegetables and the setting-up of seed custodians or crop museums.

Introduction of these technologies are made through the school gardens or directly to local food producers who supply ingredients for school feeding projects. Colombia, on the other hand, worked directly with communities using the FACs and the Shagras as venues for learning. FACs, however, are designed for multidimensional and multi-sectoral learning. Thus, nutrition sensitive intervention may be integrated into topics on production; environmental training; formation of seed custodians, family gardens and traditional cooking; as well as the rights and roles of women in the family, productive and community spheres. Shagras, on the other hand, are micro production systems to guarantee food security, with a strong emphasis on improving dietary diversity.

In the case of the Nigeria-Benin project, the entry points for innovations were secondary school students via school gardens. Two pathways were adopted to scale up the application of the technology from the YVSCs to the school and the community: the Satellite Dissemination Approach (SDA) utilizes pathways and tools used by the countries' extension systems; the Innovative Platform Approach (IPA) on the other hand, creates a venue where different stakeholders are engaged in dialogue with the view of creating efficient and equitable linkages along the value chain. Although the implementation of the IPA experiences many challenges, the fact that it includes actors involved in the vegetable value chain (vegetable producers, input sellers, financial institutions, transporters, vegetable marketers, government ministries, food processors and industries) opens opportunities for integrating nutrition concerns and innovations within the vegetable industry of the two countries. Issues that have so far been discussed in the IPAs relate to technologies, investment and marketing. Nutrition has yet to be taken up as a major concern.

Food fortification is an important post-harvest activity that directly increases the nutritional value of food. This method was applied by the projects to enhance food for school feeding. Food preparation is another aspect of food handling that benefitted from projects' nutrition intervention. This involves the careful preparation of meal plans and recipes including traditional recipes, and the actual preparation of school meals.

Although food have the highest nutritional value when consumed fresh, food processing, storage and preservation are necessary to reduce post-harvest losses and to improve access and availability of food over time and distance. From a nutritional perspective, it is important to ensure that post-harvest processes retain as much of food nutrients as possible. Ultra-processing that strips food of nutrients and increases consumption of salt, transfat, sugar and additives should likewise be avoided.

Project interventions that impact on trade and marketing mainly worked on making nutritious food available to the local market. Strategies to achieve this include introducing the food items in fairs, the general market and supermarkets. Ethiopia's intervention involved a business entity – GUTS Agro-industry – in post-harvest processing and the Women's Cooperative in marketing, creating opportunities to increase women's income.

National procurement policies in Brazil and LAC directly impact on trade in favor of the local economy and nutritious local food consumption. Such a policy will potentially have a large positive impact on local diets in CARICOM where law on local purchase is being considered.

While none of the cases reported direct interventions in food price policies, there was some form of involvement in the supply and demand side – indirectly influencing prices. Through nutrition education, the projects hope to increase demand for nutrient-rich, healthy and safe food. Advertising per se has not been utilized for this purpose. On the policy end, a lot more can be done to make food trade, investments, food prices and advertising work in favor of promoting nutritious diets. The specifics of such policies could well be the subject of policy advocacy.

References:

- 1, 2, 3 Food and Agriculture Organization of the United Nations (FAO) (2017). *Nutrition-sensitive Agriculture and Food Systems in Practice: Options for intervention*. FAO: Rome. <http://www.fao.org/3/a-i7848e.pdf>

E. Enabling environments

Workshop participants have identified common themes that worked to facilitate school-based nutrition interventions/project implementation and those that may limit effective implementation. This section gives a rundown of these factors, beginning with policy as the most crucial element of nutrition programs.

The crucial role of policy

Policy is the central element of the environment that supports and enables nutrition interventions to meet goals and scale up for broader implementation. There are different levels at which policy may be framed and the scope covered by such policies may differ. The Brazil/FAO-Brazil case pointed out that a national policy reflects the priority that the government puts on the nutritional status of children. The Brazil/FAO-Brazil case likewise highlights the integration of various policies (School Feeding Law, Procurement Law for example) that cover different components of school nutrition programs. Thus, the policy directed not only the provision of any food but the provision of healthy food as well as the link with local food production and a holistic approach to nutrition education. Inter-sectoral approach is also built into the policy (Box 1).

Box 1: Lesson from Brazil on the link between policy and inter-sectorality

The project is based on the premise that that it is impossible to have a policy at the national level without inter-sectorality. In each country, at the very least they are working with the ministries of Agriculture, Health and Education. "Collective construction" and inter-institutional/inter-sectoral articulation (not just coordination) are emphasized.

China, on the other hand, demonstrated how central policy can ensure the availability of funds and mandate compliance to guidelines at all levels. As the Philippines case has shown, budget restrictions limit the scale of the nutrition program. Budget, after all, is the ultimate policy and reflection of government priority.

It is also important to understand the potential for policy-making at different levels of government especially in decentralized systems such as India and the Philippines. The Philippines' Local Government Code provides for policy-making at subnational levels.

Policy is a necessary but inadequate condition

While national laws provide the legal framework for school-based nutrition interventions, it is essential to formulate implementation guidelines or the implementing rules and regulations that will stipulate the structures, mechanisms and financial arrangements on the ground. Such guidelines are especially critical given the

multi-sectoral, multi-agency and multi-level nature of project implementation. Coordination among the stakeholders will be enhanced if the operational guidelines articulate specific roles and clear lines of responsibility and accountability. Guidelines, however, have to be adapted to local conditions. In India, the State is responsible for assigning the department that will take overall responsibility for the program. The roles of mid-level technical personnel such as principals, county officials and administrators are key to effective implementation. Brazil/FAO-Brazil recommends clear designation of a person/institution that will run the project. In a devolved and decentralized system such as that of the Philippines, coordination among different agencies should be facilitated by the local chief executive who is the overall head of these agencies.

Coordination among stakeholders needs to be stabilized through time and achieve some level of institutionalization to support program sustainability – veering away from ad hoc committees, systems and procedures. This is a lesson that can be picked from the Brazil/FAO-Brazil case where systems, processes and structures have become part of their way of doing things. To ensure project continuity, responsibilities and accountabilities should be assigned to particular offices rather than individuals with concurrence of the heads of offices. This is to avoid disruption of the project due to the turnover of personnel.

All the cases emphasize that government has to lead the implementation of nutrition projects and ensure its sustainability. The private sector may be tapped as partners to fill in gaps in funding and resources as in the case of the Philippines. In Ethiopia, a private company was engaged in the post-harvest processing of pulses. Implementation in India, on the other hand, is facilitated by partnership with an NGO. However, there are limits to the involvement of private sector. Businesses are likely to oppose efforts to integrate school feeding and local food production. Their involvement may also generate conflict of interest especially in a food system that tends to favor unhealthy food. The China case presenter plainly states: "No one can do things like the government."

There is a role for rewards and sanctions. Participation and performance of schools and local government units in the project need to be recognized and exemplary performance rewarded, as in the case of China's "Sunshine Counties" and Nigeria-Benin's "Best Teacher" vis-a-vis their youth clubs. There is also the option to sanction poor performance especially when the project is part of one's official duties. Clear lines of accountability indicate where rewards and recognitions lie. Appropriate compensation for project staff and workers on the ground serves to stabilize project implementation by establishing key roles and positions. The Nigeria-Benin case found a way of compensating teachers involved in school gardens by allocating to them 10% of the produce. Compensating community volunteers works both ways. On the one hand, such compensation augments the volunteers' income and motivates them to continue assisting project implementation. In China and India, cooks are paid for their services. On the other hand, volunteerism promotes social capital which itself promotes sustainability beyond project funding.

Broad-based capacity building at all levels is required to ensure that roles laid out in the guidelines are performed in accordance to standards. Capacity building may be formal or informal and as Brazil's and the Philippines' experiences found, close mentoring

personnel on site may be necessary. Furthermore the training of midlevel staff who will be the alternates of the main implementers is essential to preempt turnover issues. FAO-Brazil's experience found that capacity-building of the more permanent technical staff should not be overlooked since high level personnel often change.

Capacity building across sectors is also called for to create a nutrition-sensitive environment that supports the school-based nutrition intervention. In India, for instance, the implementation of the school based nutrition program involves selected State and community level structures such as the Departments of Education and Social Welfare, School Districts, Schools Block, the schools, the Gram Panchayat, the Village Education Committee, the School Management and Development Committee, Parent-Teacher Associations and mothers' groups. Conducting nutrition education for all these sectors will definitely make a dent in making the communities and the bureaucracy more nutrition-sensitive.

Capacity building across sectors is particularly necessary since, as the Colombian presenter laments, within the academe as an example the agricultural sector is detached from the nutritional aspect of food production while the health and nutrition sector is also alienated from knowledge about how food is produced. Already in 2015, it was pointed out that to more effectively leverage the nutrition contributions of agriculture, "investments in research, evaluation and education systems capable of integrating information from all 3 sectors" are required (1). The IDRC/CIFSRF projects presented in the Workshop are in this direction. To generate more integrated knowledge and strategies, policy and research environments which promote a more collaborative approach are needed, starting with a common language devoid of jargon plus cross-sectoral training and education programs along with clear stakeholder guidelines and responsibilities noted above (2).

Much has also been said about building knowledge from the ground to enhance implementation, inform policy formulation and pave the way to scaling up. The Sustainable Schools Initiative in FAO-Brazil's LAC are learning platforms for all stakeholders; in the Philippines the project began with 27 Lighthouse Schools in one province and later expanded to 58 schools spread over five provinces. Evidence-based policy-making is now the way forward. Evidence was found to be an effective means for legislators to craft the appropriate policy framework as in the case of China that generated data from two rural provinces before going to scale.

Box 2: Good practices from the India case experience

- Solid political and funding commitment of central government
- Strong policy and legal frameworks with defined management structures, responsibilities and procedures
- Adaptive management and policies informed by emerging knowledge and gaps
- States have scope for adaptation and innovation based on local contexts
- Involvement of accountable NGOs and private sector

Policy-making itself requires the champions within parliament, active citizen involvement and a venue for dialogues among these players. In the FAO-Brazil case, influencing policy is facilitated by a group of citizens that advocates for relevant food policies (Parliamentary Front against Hunger) and a venue for policy discussions among members of legislative bodies (the Regional Parliamentarian Forum) to push for supportive laws. FAO-Brazil also demonstrated the value of building upon and strengthening existing related policies such as the food security policy. Different nations would have varied mechanisms for participatory governance. Philippine laws, for instance, mandate public consultation in the formulation of policies. It will do well for nutrition project implementers to maximize these venues for participation in policy-making.

Continuous learning and project refinement are facilitated by the establishment of an M&E system. China and India (some States) utilized electronic platforms to facilitate the collection and sharing of information. India also guaranteed the availability of funds for its M&E system by allocating funds equivalent to 2% of the cost of food grain, transport subsidy and cooking assistance. Clear M&E responsibilities, mechanisms and standards have also been laid out at different levels.

Several good practices for nutrition and food security initiatives are exemplified by a number of the cases such as India (Box 2).

Enabling inclusiveness and gender parity

The China case presents a gender-disaggregated view of the results of its school-based nutrition intervention. Such gender-disaggregated information built into the M&E system will go far in informing program managers how the program impacts on boys and girls. In terms of designing appropriate gender-based interventions, it is also important to establish good gender-disaggregated situation analysis. Food practices, norms and traditions as well as eating habits may impact boys and girls differently. Nutrition needs and micronutrient requirements may also vary across gender. Such disparities need to be understood and if warranted, addressed by appropriate program intervention.

It is equally important to understand that gender inequities in the communities at large may predetermine differences in the way boys and girls would benefit from school-based interventions. Where access to education is restricted to boys (or girls), school-based interventions may serve to increase the disparity. Such a situation would also apply to other subgroups (such as children with disabilities, socially or economically disadvantaged children) that may for one reason or another have restricted access to formal education. A situation analysis that maps out such disadvantaged groups would serve to identify if specialized interventions are warranted.

A gender lens may also be applied to community participation. Because of traditional gender-based roles, it may be natural to assume that women will play a greater role in food preparation. In India, women self-help groups are tapped as school meal cooks. Mothers' groups were also designated the responsibility of ensuring handwashing

before and after meals. In Ethiopia, women and mothers are strategically engaged as agents of change to promote pulse consumption and healthier eating. The Ethiopia project is designed to contribute directly to women's livelihood and income. Ethiopia's engagement of women in microenterprises, as health extension workers for nutrition education or as members of women farmers' cooperatives are examples of increasing women's decision-making and access to resources. Women are the cornerstones in the nutrition-health-agriculture pathway. With increased income women tend to invest in health, education and food for the family (3).

The participation of women in the projects implies that women in the communities benefit from the capacity building activities associated with these roles. Capacity building on nutrition sensitivity could also extend to men because a) fathers may also be cooks and caregivers and b) such knowledge may bias household decision-making in favor of nutrition-sensitive purchases and investments especially where men place a key role in the control over household resources. Workshop participants found it is good practice to involve both men and women. If, for example, it is the men who decide who to sell to and what to produce, gender sensitization is necessary.

Going to scale and pathways to sustainability

All cases have mapped out their respective paths towards scaling up and sustainability although the cases differ in terms of what element of the project is to be scaled-up and sustained (Figure 6). Five of the cases refer to the school-based nutrition intervention or some of its components as the focus of scaling up. Strategies to achieve this include relevant policies, private sector engagement, provision of funding, and working with appropriate agencies at national and subnational levels. In the other cases, the main concern of scaling up and sustainability is the agricultural innovation that the project developed and tested out. In 2 instances (Ethiopia and Nigeria-Benin), the proposed path to scaling up is the food value chain or the food system. India has chosen to focus its scaling-up activities on its aims to achieve universal primary education and universal right to food.

It will be noted that policy, already identified as a crucial element in sound implementation on school-based nutrition interventions, also plays an important role in the sustainability and scaling up of these projects. Brazil/FAO-Brazil summarized some of the sustaining elements of policy in Figure 7.

Other elements identified earlier (such as capacity building, community participation, social capital, institutionalized structures, systems, and processes) are also important in sustaining and scaling-up projects.

As a final note in this section, it should also be pointed out that sustainability and scaling up efforts could also be directed at the nutritional gains of the school-based nutrition interventions. As indicated by the Philippine case, project implementers would like to see improvements in the nutritional status of children and healthy eating habits sustained beyond the school. Behavioral change is one factor that can lead to such

Figure 6: Case examples of pathways to scaling-up and sustainability

Cases	Scale-up and Sustain what?	How?
FAO-Brazil	Sustainable Schools/ School Feeding	Policy
CARICOM	"farm to fork" approach to school feeding	Private sector engagement
Colombia	Adoption of yellow potato	<p>The project is partnering with private and public sector organizations for large-scale adoption and impact.</p> <p>Promotion at the national level of large-scale adoption and consumption through the Instituto Colombiano Agropecuario (Colombian Agrarian Institute), Ministry of Health and Social Protection, Colombian Family Welfare Institute, and Ministry of Agriculture and Rural Development.</p>
China	School-based nutrition initiatives	Government must play a role to create legislation, provide funds and other support for the whole system.
Ethiopia	<p>Nutrition education</p> <p>The project itself</p>	<p>Via Health Extension Workers, networks and the Health Development Army of the government's health extension Farm Radio International which uses interactive radio and mobile platforms</p> <p>Main pathway to scale-up and sustainability is to strengthen the value chain from production, processing, marketing to consumption.</p> <p>Key to sustainability is the continuous development of cooperatives and women's microenterprises.</p>
India	Universal primary education and universal right to food	The National Food Security Act 2013 which shows that the central level is considering the scheme as a national food security program rather than just a school-based intervention.
Nigeria-Benin	<p>The YVSCs</p> <p>Technology</p>	<p>Suggested in Workshop: Institutionalize through integration into the secondary school curriculum or opening some kind of elective for students who may want to pursue an agriculture course. Committed government participation with all districts of schools to institutionalize and follow up the integration of school gardens as a part of science and nutrition learning platforms.</p> <p>Through the SDA (extension system) and IPA (value chain). Facilitating continuous knowledge sharing through Innovation platforms (inclusion of key actors within the school communities) to disseminate technologies among students, their parents and the immediate community</p>
Philippines	<p>School-based intervention</p> <p>Nutritional gains</p>	<p>Working with the LSs at sub-national levels Work directed at national agencies and policymakers</p> <p>Behavioral change towards adoption of good eating habits and nutrition practices needs to be sustained outside school</p>

DIFFERENT PARADIGMS OF SCHOOL FEEDING PROGRAMMES		
	Assistance Policy - SFP	Sustainable Policy - SFP
Coverage	<ul style="list-style-type: none"> In the level of basic education and in the situation of extreme poverty or vulnerability (for the vulnerable students) 	<ul style="list-style-type: none"> All students of the public education system in all grade levels of compulsory education (everyone enrolled)
Benefits	<ul style="list-style-type: none"> A food ration like fortified cookies or fortified milk and/or a certain number of raw elements like beans, rice, corn, and oil or snacks (rations) 	<ul style="list-style-type: none"> A healthy, adequate and sufficient menu for the nutritional requirements of children, according to the local food culture, prepared and served in appropriate conditions in the school (healthy menu)
Validity	<ul style="list-style-type: none"> Temporary programmes; unsecured financing for the year; not for all days of the schoolyear or nor for the cycle of compulsory education. Depended on donations 	<ul style="list-style-type: none"> A permanent programme. Financing and coverage insured by law for all of the days in the schoolyear and for all years of public compulsory education
Origin of Products	<ul style="list-style-type: none"> Products purchased in the food or agriculture industries, domestic or foreign, and/or donated products by developed countries 	<ul style="list-style-type: none"> Products purchased preferably from local family farms, produced through good agriculture practices and from other local small producers and microenterprise, with the purpose of promoting food security and stimulating local development in the country.

DIFFERENT PARADIGMS OF SCHOOL FEEDING PROGRAMMES		
	SFP Assistance	SFP Sustainability
Manager of the programme	<ul style="list-style-type: none"> A responsible agency of the programme in the central level of the government. Often carried out by an international cooperation agency or a non-governmental organization 	<ul style="list-style-type: none"> Under the leadership of a central government entity in charge of the programme Implementation based on the mechanisms of an inter-sectoral, inter-institutional and decentralized coordination Involvement mainly of the sectors of education, health, agriculture, and social development Involvement of the different level - municipal and the state governments and the educational community of schools at the local level
Main operations	<ul style="list-style-type: none"> Essentially centralized procurement and distribution operations at the scale of non-perishable food products 	<ul style="list-style-type: none"> Essentially decentralized and participative operations of local micro-scale purchases of food Preparation of food in schools Training and technical assistance for local producers of family farming and for food handlers Food education for children and their family Monitoring and evaluating the program and the nutritional status of children, as well as their school performance

Figure 7: Brazil's lessons on policies that sustain school-based nutrition interventions.

sustained improvements. Equally important is the creation of a nutrition and health-enabling environment that supports good eating habits of children. For instance, nutrition-sensitive food production and food processing would ensure the availability of healthy and nutritious food. Trade and food price policies can help create incentives for nutritious food and disincentives for the production and sale of unhealthy ones. As an aspiration (pointed out in the Workshop), the vision of school-based nutrition programs is a world where such interventions would no longer be necessary because families and communities can already adequately provide for their children's nutritional needs.

References:

- 1, 2 Fan, S (April 2015). *How Agriculture can Improve Health and Nutrition*. <https://www.weforum.org/agenda/2015/04/how-agriculture-can-improve-health-and-nutrition/>
- 3 Gonsalves, J et al. (November 2017). *Leveraging the Nutritional Contributions of Agriculture*. IIRR: Cavite.

Section 3

The Eight Cases

Concise Case Studies were developed mainly from the presentations and project documents provided by the presenters during the Workshop. Each Case Study summarizes the context/rationale, objectives, coverage/reach of the project/program and highlights main features. The Case Studies also lists good practices, challenges/opportunities for action and lessons learned synthesized from the experiences. The eight Case Studies are provided in this section.

- **Case 1: BRAZIL** - Strengthening School Feeding in Latin America and the Caribbean
- **Case 2: CARICOM** - From "Farm to Fork" – Outcomes and lessons learnt from school feeding research in the Caribbean
- **Case 3: CHINA** - Student nutrition improvement in poor rural areas of China
- **Case 4: COLOMBIA** - Schools and scaling-up the production of more nutritious yellow potatoes in Colombia
- **Case 5: ETHIOPIA** - School-based Interventions in scaling-up pulse innovations for food and nutrition security in Southern Ethiopia
- **Case 6: INDIA** - Experiences in school-based food security interventions
- **Case 7: NIGERIA and BENIN** - Empowering secondary schools through the Young Vegetable Scientists Clubs
- **Case 8: PHILIPPINES** - Scaling-up the integrated school nutrition model: Gardening, supplementary feeding and nutrition education

1. Case: BRAZIL/FAO-BRAZIL

School feeding and School gardening: Strategies, good practices, lessons and challenges

Context

More than half of the current population in Latin America and the Caribbean (LAC) are overweight, with roughly one-quarter of the adult population considered obese; about 7% or around 4 million children under the age of 5 are also overweight. Meanwhile, the average repetition rate and drop-out rates of primary level students have fallen from 2000 but are still at about 5% and 7% respectively in 2012. These nutrition and education levels have economic implications for their countries.

Brazil, recognized for over 60 years of experience in school feeding with a pioneering legislation (Box 1), was requested by several LAC countries to assist in establishing their own programs. Within the technical cooperation framework between FAO and Brazil, the regional project “*Strengthening School Feeding Programmes in Hunger-Free Latin America and the Caribbean 2025 Initiative*” was launched in 2009.

Box 1: The Brazil experience: 3 Main features of the School Feeding Law

1. Within schools, nutritious food must be offered, not just any food.
2. At least 30% of food must be bought from local farmers.
3. All children must receive nutrition education.

Objectives

The aim is to “contribute to the development and strengthening of school feeding public policies with emphasis on the human right to food based on a supply of healthy, continuous, universal and sustainable foods in school as well as on food and nutrition education.”

Coverage

2017: 13 countries-Belize, Costa Rica, El Salvador, Granada, Guatemala, Guyana, Honduras, Jamaica, Paraguay, Peru, Dominican Republic, Saint Lucia, and Saint Vincent and the Grenadines; 3,800 schools

Design and strategies

Project design followed a 10-country study which confirmed the need to address the nutrition status in the region. Further, each country's school feeding program was based on a situational analysis on existing conditions, structures and local contexts.

Implementation revolves around four iterative and complementary strategies shown in Figure 1 based on collective, participatory and localized processes.

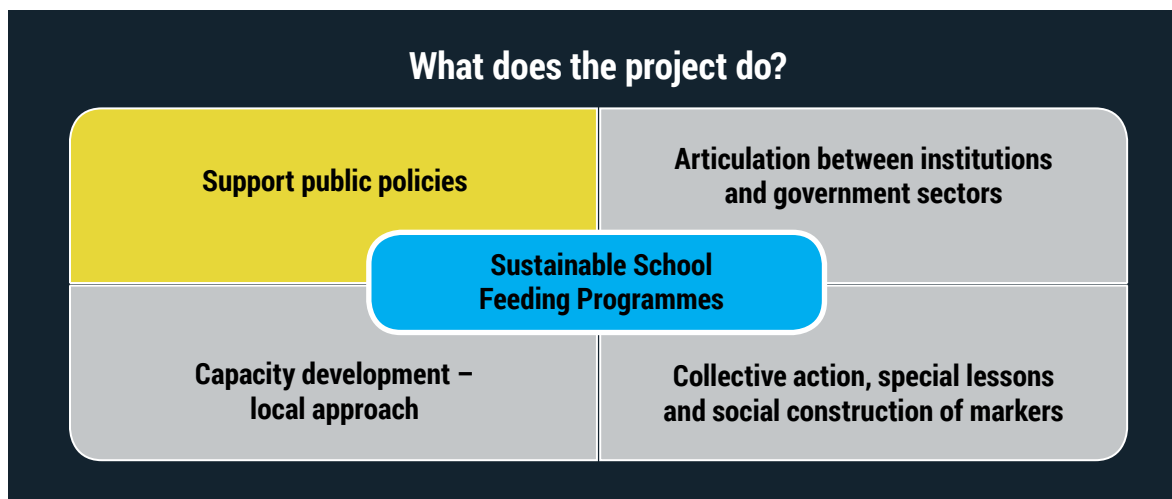


Figure 1: Four iterative and complementary strategies based on collective, participatory and localized processes.

There is solid focus on strengthening the policy environment, regulatory mechanisms and funding arrangements – structures and processes intended to be strong and active over time. This focus is evidenced, for instance, by having as an important project strategy being aware of relevant actions of high level government managers.

The role of capacity-building in the sustainability of school feeding programs and empowering stakeholders at all levels is clearly recognized. This is done not only through formal courses/seminars (including distance learning) and technical missions to Brazil and between countries of the region but also through mentoring and technical guidance for staff from schools and municipal governments.

The project strategies are anchored on the Sustainable Schools Initiative which starts with a few schools in different municipalities in each country. Sustainable Schools are the learning platform for all stakeholders from government and communities to know what it takes to implement and scale-up effective school feeding programs. In addition to setting-up inter-sectoral and interinstitutional elaboration which is a fundamental goal of the project, the Sustainable Schools components are: engaging schools and their communities; food and nutrition education through school gardens; adoption of healthy and culturally appropriate menus based on a country's research-based Nutritional Plan; improvement of school kitchens, dining areas and pantries; and direct purchase from family farming fresh and local produce for school feeding.

Nutrition education

The project takes a holistic approach to nutrition education and changing eating habits to fight obesity and malnutrition. The school needs to be a center for accessing and generating knowledge about food in all its dimensions and this knowledge should be communicated in a consistent, clear message; *“one can not talk about healthy, adequate food and offer something else.”* Moreover, this message should be promoted in all subjects and avenues possible in the school, including school gardens. School gardens are primarily a learning venue and not necessarily a source of produce for school feeding. The decision on what to do with the harvests is decided collectively by each of the school communities.

A recent (October 2017) International Congress of School Feeding Programmes – Building Pathways to Food and Nutrition Education discussed 3 axes for food and nutrition education within school feeding: providing universal and continuous access to adequate and quality food, building knowledge on the multi-dimensionality of food; and promoting healthy eating habits. *“What we offer as food is more powerful than talking about healthy foods.”*

Changing eating habits is recognized as complex, and those who seek to promote behavioral change towards healthier eating need to provide knowledge on healthy and unhealthy choices, the infrastructure for food preparation, and the different aspects of the act of eating (Figure 2).

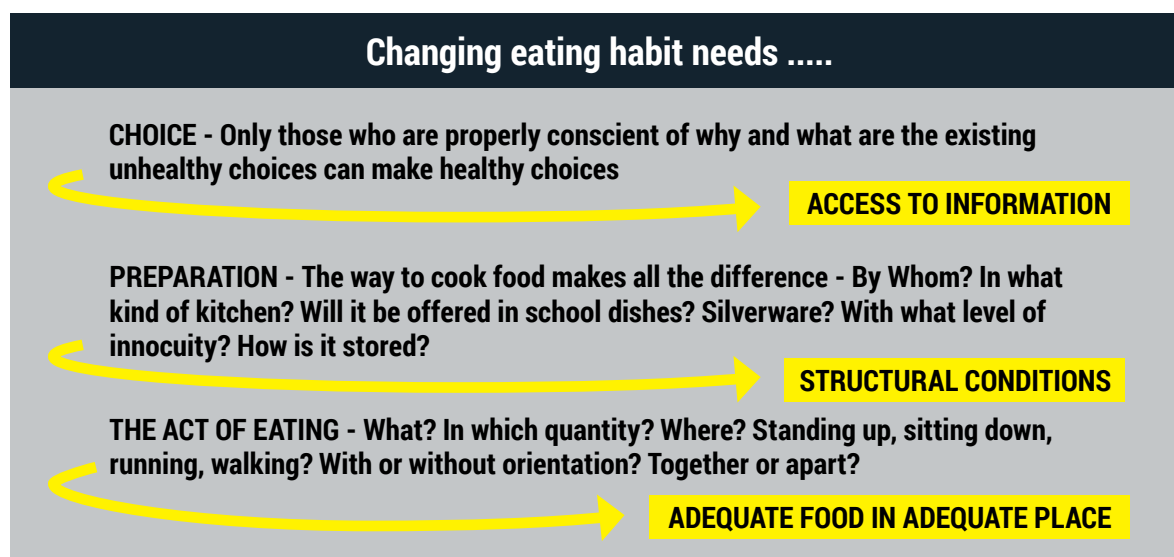


Figure 2: Infrastructure for food preparation, and the different aspects of the act of eating

Links to local food production

Using Brazil as a strong reference for local-level procurement of agricultural produce in its national school feeding program, the project promotes a similar approach to impact more people, not just students, and particularly those in rural areas where the most

vulnerable reside and where intergenerational poverty thrives. Like Brazil, local purchases have now become mandatory through laws in Honduras, Guatemala, Paraguay and Bolivia. To make this happen, the project analyzes the relevant legal frameworks; coordinates with local governments to strengthen family farmers, associations and cooperatives; and develops procurement manuals.

Funding/cost-sharing

Budgets are secured annually through specific school feeding laws and participation of local governments. In all the countries, it is the government that finances; FAO is mainly responsible for technical assistance. At the level of communities, all countries (except Costa Rica and the Dominican Republic plus Brazil) have volunteer cooks, usually mothers.

M&E/MIS

There are M&E activities in place such as evaluative workshops of the processes and project evaluations, although there is less information on mechanisms at the community level and plans for impact evaluations.

Policy support

The project finds that many countries already have policies and budgets on food security but the money is often not spent well, hence work with parliamentarians and high level ministries to strengthen existing policies is important. As of October 2017, 7 countries have already adopted or are in the advanced stage of school feeding legislation (Figure 3).

October 2017		Legislation of School Feeding Programmes in LAC		
		In process of preparation	Advanced stage	Adopted
Implementation of sustainable schools	Implemented		El Salvador Dominican Republic Costa Rica	Paraguay Honduras Guatemala Bolivia
	In process of implementation	Santa Lucia Belize Jamaica Granada, Guayana Saint Vincent		

Figure 3. The advanced stage of school feeding legislation.

Legislative work has been moved forward through advocacy partners such as the Parliamentary Front against Hunger and the ongoing institutionalization of the Regional Parliamentarian Forum composed of legislators across the region.

Institutional coordination

Technical intersectoral committees are organized in each country which oversee the management of project activities based on national and regional Operative Annual Plans which they develop.

The project is based on the premise that that it is impossible to have a policy at the national level without inter-sectorality. In each country, at the very least they are working with the ministries of Agriculture, Health and Education. "Collective construction" and inter-institutional/inter-sectoral articulation (not just coordination) are emphasized.

Scale-up and sustainability

The basic rationale of the SS is for countries to learn how to scale-up based on learnings from their real and collective experiences in managing a reference model in a few municipalities. The challenge on scaling-up is to create impact at levels both national and regional: to *"increase the number countries with new designs of sustainable school feeding programs and to expand the SS initiative to impact local school feeding policy."*

Sustainability is intended to be at the center of the project, planned from the outset and with a clear differentiation between an assistance vs. a sustainable school feeding policy (Figure 4).

A forum of experts from government, academe, international organizations and civil society was convened to identify elements of sustainability in school feeding programs. These elements are encompassed by Institutional Development, Management and Purchases (Figure 5).

Capacity building at all levels is necessary (technical/mid-level = teachers, principals etc and higher levels= ministries, secretaries, parliamentarians), as is organizing schools and communities. Apart from establishing policy and structures, technical/mid level participation is given serious attention, because high level personnel usually change.

Good practices

- Adaptive and localized program design and implementation
- Firm focus on strengthening policy environments
- Promotion of legislation on direct purchases from smallholder families
- Partnering with advocacy groups and organizing parliamentarians to promote legislation

DIFFERENT PARADIGMS OF SCHOOL FEEDING PROGRAMMES		
	Assistance Policy - SFP	Sustainable Policy - SFP
Coverage	<ul style="list-style-type: none"> In the level of basic education and in the situation of extreme poverty or vulnerability (for the vulnerable students) 	<ul style="list-style-type: none"> All students of the public education system in all grade levels of compulsory education (everyone enrolled)
Benefits	<ul style="list-style-type: none"> A food ration like fortified cookies or fortified milk and/or a certain number of raw elements like beans, rice, corn, and oil or snacks (rations) 	<ul style="list-style-type: none"> A healthy, adequate and sufficient menu for the nutritional requirements of children, according to the local food culture, prepared and served in appropriate conditions in the school (healthy menu)
Validity	<ul style="list-style-type: none"> Temporary programmes; unsecured financing for the year; not for all days of the schoolyear or nor for the cycle of compulsory education. Depended on donations 	<ul style="list-style-type: none"> A permanent programme. Financing and coverage insured by law for all of the days in the schoolyear and for all years of public compulsory education
Origin of Products	<ul style="list-style-type: none"> Products purchased in the food or agriculture industries, domestic or foreign, and/or donated products by developed countries 	<ul style="list-style-type: none"> Products purchased preferably from local family farms, produced through good agriculture practices and from other local small producers and microenterprise, with the purpose of promoting food security and stimulating local development in the country.

DIFFERENT PARADIGMS OF SCHOOL FEEDING PROGRAMMES		
	SFP Assistance	SFP Sustainability
Manager of the programme	<ul style="list-style-type: none"> A responsible agency of the programme in the central level of the government. Often carried out by an international cooperation agency or a non-governmental organization 	<ul style="list-style-type: none"> Under the leadership of a central government entity in charge of the programme Implementation based on the mechanisms of an inter-sectoral, inter-institutional and decentralized coordination Involvement mainly of the sectors of education, health, agriculture, and social development Involvement of the different level - municipal and the state governments and the educational community of schools at the local level
Main operations	<ul style="list-style-type: none"> Essentially centralized procurement and distribution operations at the scale of non-perishable food products 	<ul style="list-style-type: none"> Essentially decentralized and participative operations of local micro-scale purchases of food Preparation of food in schools Training and technical assistance for local producers of family farming and for food handlers Food education for children and their family Monitoring and evaluating the program and the nutritional status of children, as well as their school performance

Figure 4: Different paradigms of school feeding programs.

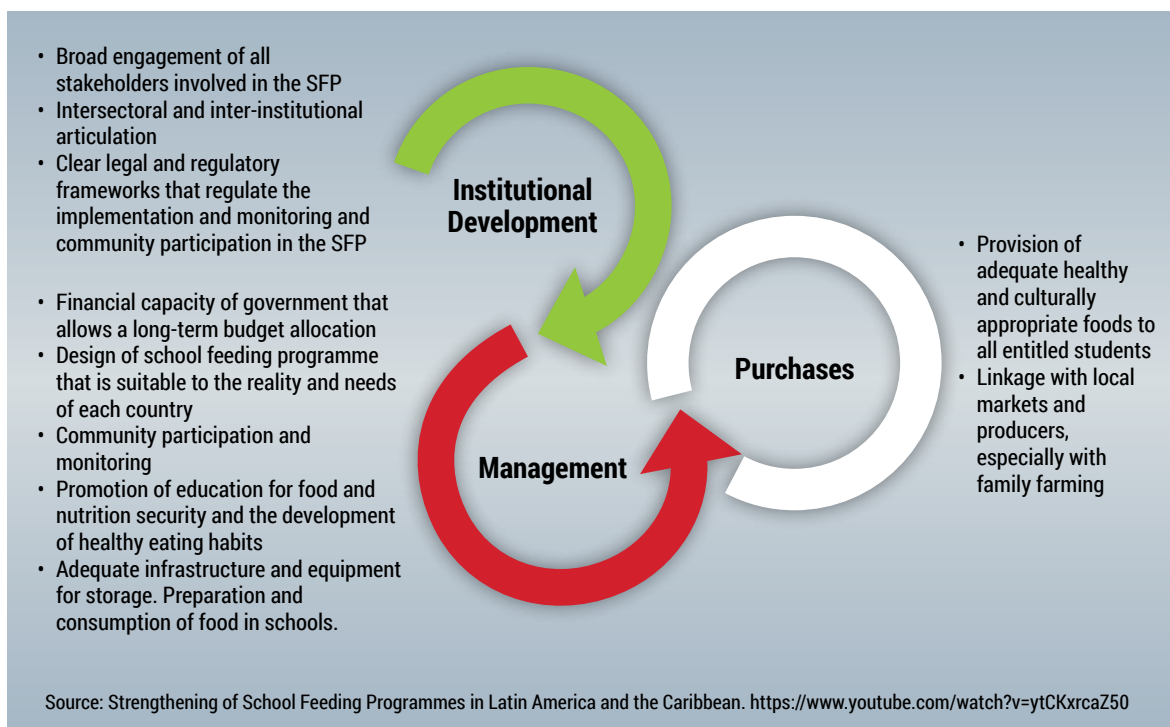


Figure 5: Strengthening of school feeding programs in Latin America and the Caribbean.

- Inter-sectoral and inter-institutional elaboration (defining structures, systems, roles and responsibilities etc), not just coordination
- Sustainability is part of program design
- Formal and informal capacity-building mechanisms at all levels, including distance learning and the importance of mid-level technical staff
- Comprehensive approach to nutrition education, including school gardens
- Process evaluations for a process-oriented project

Challenges/opportunities for action

- Requires medium to long-term visioning and investments in funding and capacity-development which build a pathway to achieving country, regional and global goals on food security and poverty (such as the SDGs)
- Scaling-up to create impact on nutritional status and other outcomes of interest at national and regional levels
- Organizing actions is expensive in the Caribbean which is the area that needs more attention
- Complicated current political situation in Brazil
- Defining impact indicators and studies to measure those impacts
- Organizing at different levels within countries, including strengthening community participation and monitoring
- Linking with other FAO themes such as food loss and waste, gender, inclusion of fish and climate change

Lessons learned

- School feeding goes beyond the walls of the school; it is a cross-sectoral policy of guaranteeing rights and social protection affecting education, health and social development indicators.
- Inter-sectorality promotes advances in national policies.
- It is important to strengthen existing policies and actions in the countries and to address all levels of government (cities, states, national level etc.).
- Sustainability means the empowerment of all key stakeholders.

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2. Case: CARICOM

From “Farm to Fork” – Outcomes and lessons learnt from school feeding research in the Caribbean

Context

Adult obesity is now considered an epidemic within the Caribbean community (CARICOM – Figure 1) and the increasing prevalence of overweight and obesity among children is thus a serious concern. The Pan American Health Organization and FAO have identified food security, obesity and its attendant non-communicable diseases (NCDs) as major problems threatening CARICOM’s human and economic development.

Physical inactivity and a “diet/nutrition transition” to consumption of (mostly imported) energy-dense processed foods, sugar sweetened beverages, and very low intake of vegetables, fruit and fiber underlie the epidemic of obesity and NCDs in the region. Food importation to CARICOM accounts for about 60- 80% of consumption, and over the past 20 years, the annual value of food imports to the region have tripled to US\$4 billion in 2010, and is projected to increase to US\$11-15 billion by 2025 (see Figure 2). This pattern of food imports not only discourages healthy eating, but limits incentives for domestic production of healthful produce, and erodes CARICOM’s capacity for “food sovereignty”.

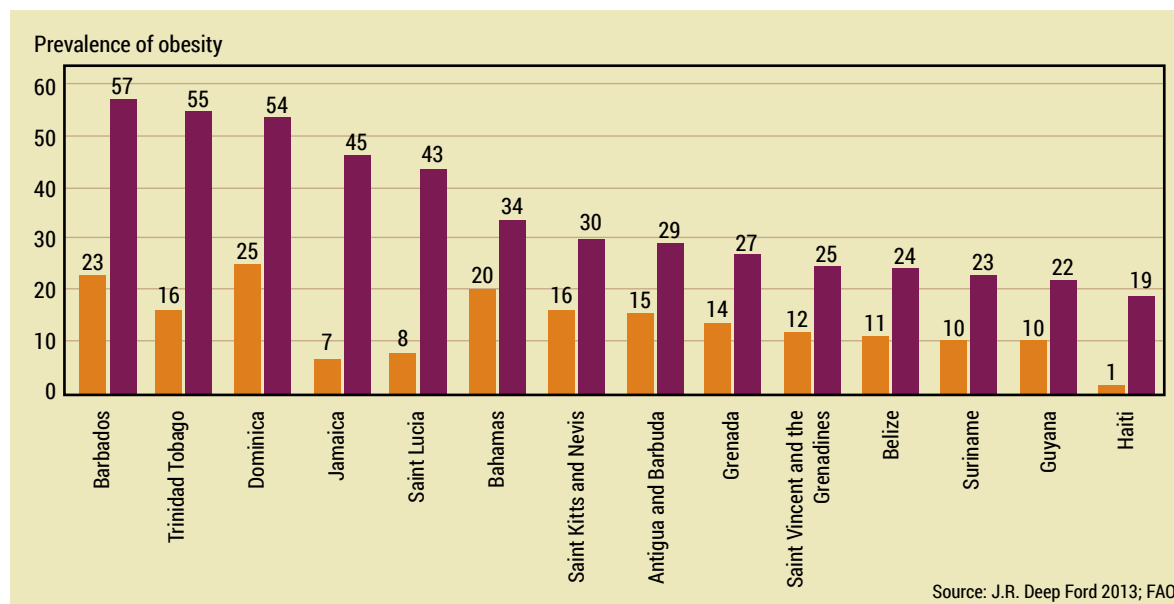


Figure 1: Prevalence of obesity in the Caribbean in > 30 years old.

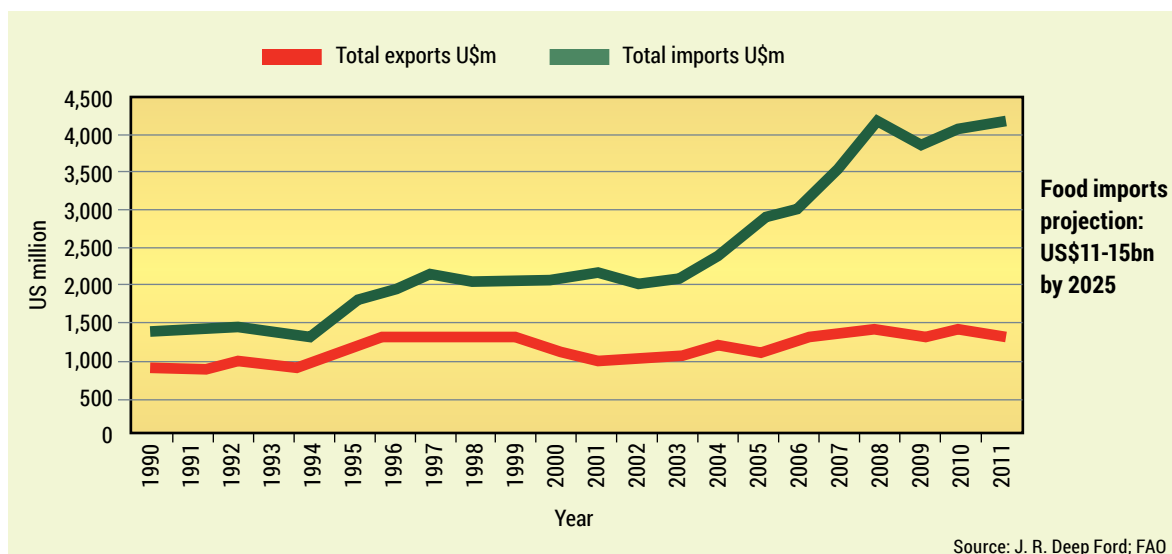


Figure 2: Trends in CARICOM agricultural trade in crops and livestock products, 1990-2011.

Objective/s

In response to concerns about food insecurity and obesity in CARICOM, an integrated school feeding research intervention was undertaken in St. Kitts- Nevis (SKN). This was part of a larger project, “Improving the Nutrition and Health of CARICOM Populations” involving 3 other countries, Trinidad, St. Lucia, and Guyana (2010-2014).¹ The action research in SKN was aimed at improving agricultural productivity and producing diversity on local small-holder farms; and through local procurement of these nutritious and diverse farm produce, use the country’s universal school lunch program as a vehicle to improve nutrition outcomes of primary school children and reduce childhood obesity.

The level of household food insecurity in SKN was estimated at 54%; food insecurity among children was estimated at 20%. Based on WHO standards, only 1% of children were stunted (height for age); 5.6% were underweight for height but 22% were overweight or obese.

Design and strategies

The SKN research project recognized that a coordinated approach involving policy, institutional changes, and enhancing the supply chain was needed to improve child nutrition and health.

⁴ The broader regional project was conducted as a collaboration between McGill University in Canada and The University of the West Indies, St. Augustine Campus, Trinidad and Tobago, in partnership with the governments of the St. Kitts and Nevis, Trinidad and Tobago, Guyana and St. Lucia, and with cooperation from the following institutions: University of Guyana; Caribbean Agricultural Research and Development Institute (CARDI); Caribbean Public Health Agency (CARPHA); University of Trinidad and Tobago; Ross University School of Veterinary Medicine, St. Kitts; GRADE in Peru and the National Agricultural Research and Extension, Guyana.

Free lunches are provided to about 3,200 primary school children by the Ministry of Education and are produced in a central School Meals Center. Imported food is widely offered, with little fruits and vegetables. Sugary drinks are usually part of the meals.

The overall project developed a “Farm to Fork” model with 3 pillars: improving children’s diets by increased fruits and vegetables in school lunches; purchase from local farmers to supply the school meals; and equipping smallholder farmers with agricultural innovations for increased and year-round food production (Figure 3). As shown in the figure, a social science component through a better understanding of technology adoption, social capital, policy and institutions and gender equity was proven to be fundamental and promoted the collective action and innovations called for in the project. Therefore, in addition to technological innovations, much social work was carried out among the key stakeholders (understanding the motivation of farmers and parents for example) and was found to be critical for effective school feeding programs.

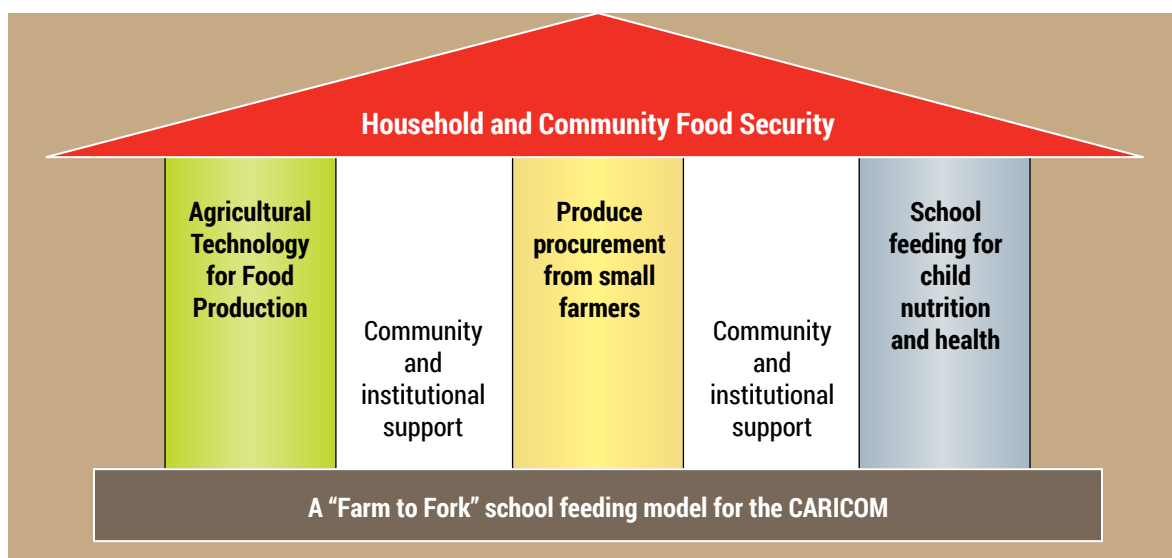


Figure 3: “Farm to Fork” school feeding model for the CARICOM

Agricultural innovations

Strengthened collaboration among institutions facilitated the introduction of a number of agricultural technologies (Figure 4) such as drip irrigation. The water balance model developed allowed farmers to irrigate according to crop requirements, avoiding the former practice of overwatering. Other innovations tested were improved varieties of tomatoes, sweet pepper and pumpkin, use of locally-made compost for greenhouse cultivation, establishment and cultivation of drought-tolerant forages for small ruminants and a range of simple interventions to reduce post-harvest losses.



Figure 4: Agricultural technologies for diet diversity and quality

Institutional changes and local food procurement

Considered to be a first in the CARICOM, a partnership was formed among the Ministries of Education, Health and Agriculture of SKN in an integrated effort to improve the nutrition and health of primary school children. The ministries further collaborated with regional and international institutions in this effort. A Joint Communications Committee was also established by the government to increase public awareness on the issues and work being done on obesity in primary schools.

The partnership among the 3 ministries was formalized through a memorandum of understanding which covers several nutrition interventions in schools and a policy linking healthy eating in schools to procurement from local farmers. A national policy on procurement of local produce for public institutions is under study. In the meantime, the project organized the farmers to meet the demands of school feeding.

A systematic approach to home-grown sourcing for school feeding was warranted since there was no designated coordinator for local produce and farmers were not readily given into making contracts. Moreover, working with local farmers takes much effort and coordination. For its part, the private sector lacks incentives to import nutritious food or to promote local ingredients.

School feeding

Lunch menus were carefully revised and tested for nutritional quality and acceptability by children, with the latter criterion informing further refinements in the menus. The menus were intended to provide 1/3 of a child's energy needs as well as Vitamin A, iron and other nutrients.

The original menu consisted of 3 imported vegetables: carrots, onions and potatoes. Due to the project, locally grown varieties of these vegetables became available as well as local tomatoes, cucumbers, string beans, sweet potatoes, cabbage and watermelon. Based on more diverse ingredients, new lunch menus were developed for the intervention group (Figure 5).

Menu	Day 1	Day 2	Day 3	Day 3	Day 3
Control	<ul style="list-style-type: none"> • "Cook-up" (rice, chicken, carrots, onions) • Sugary drinks 	<ul style="list-style-type: none"> • Spaghetti and turkey • Sugary drink 	<ul style="list-style-type: none"> • "Cook-up" • Sugary drink 	<ul style="list-style-type: none"> • Chicken soup • Sugary drink 	<ul style="list-style-type: none"> • Bread & cheese • Sugary drink
Test menu	<ul style="list-style-type: none"> • Curried mutton • Steamed white rice • Steamed carrots & string beans • Mixed fresh fruit 	<ul style="list-style-type: none"> • Oven fried chicken • Seasoned sweet potatoes • Tossed salad (lettuce, tomatoes, cucumber) • Papaya/banana 	<ul style="list-style-type: none"> • Stewed turkey wings • Rice and pink beans • Carrot & raisin salad • Watermelon 	<ul style="list-style-type: none"> • Minced meat in tomato sauce • Spaghetti with mixed vegetables • Lemonade/tamarind drink 	<ul style="list-style-type: none"> • Vegetable pizza (Sweet pepper, tomato, carrots, corn, onions) • Carrot-milk drink

Figure 5: Lunch menu changes

Nutrition education

In Trinidad (no nutrition education was undertaken in SKN), registered dietitians and /or teachers trained by dietitians conducted classroom activities covering the 6 Caribbean Food Groups, balanced diets and portion sizes, healthy snacking, nutrition label reading, physical activity, home gardening, food safety, hygiene and cooking methods. Lesson plans were developed for parents/caregivers on balanced diets and portion control, healthy snacking, buying and choosing the right foods and managing food costs.

The core activities of the "Farm to Fork" model are summarized in Figure 6.

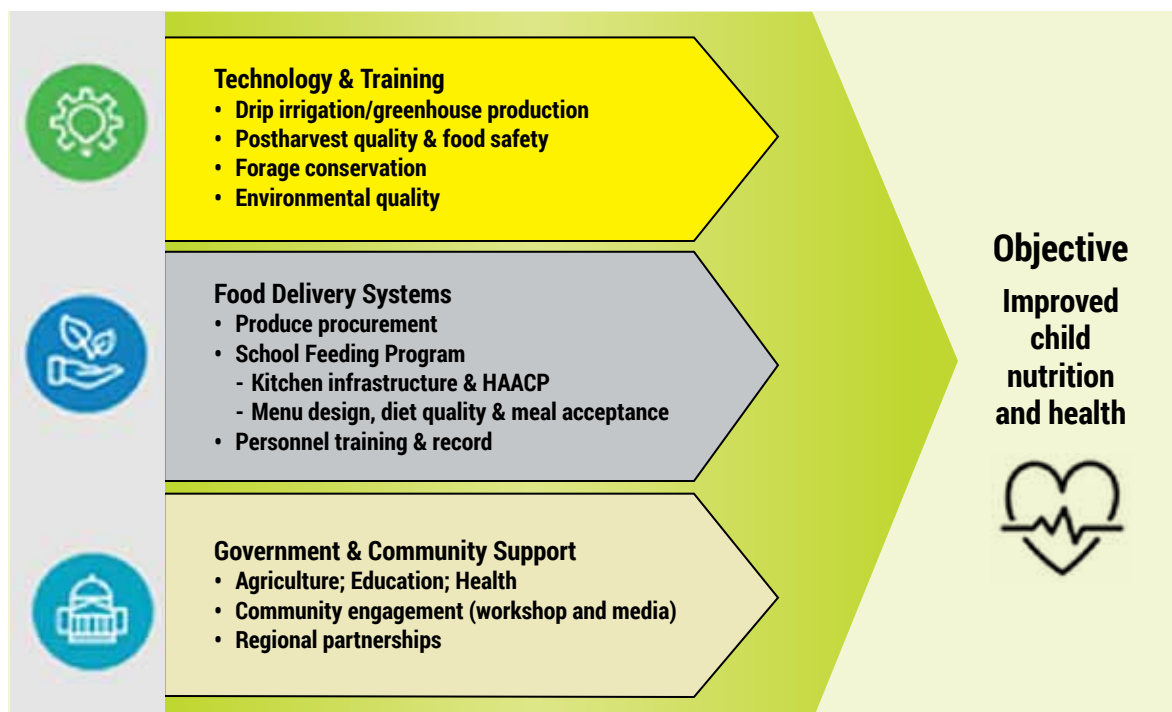


Figure 6: “Farm to Fork” activities towards better child child nutrition and health

Key outcomes

Enhanced agricultural productivity and diversity of local produce for school feeding

- Local farmers substantially increased vegetable and fruit crop productivity and diversity, and supplied school lunches with over 20 tons of 11 different locally-farmed vegetables and fruits for over 800 primary school children over a 15-month period. Prior to the project, less than 7% of the school lunch meals were prepared with local produce; with emphasis on local procurement, interventions supplied up to 90% of fresh produce needs for the school lunches.
- Within a 2-year period, drip irrigation increased yields of tomatoes from 18 to 32 metric tons/ha, string beans from 3 to 10 metric tons/ha and pumpkin from 17 to 25 metric tons/ha. Moreover, vegetables could be produced year-round, including the dry season, thus ensuring steady supply to schools.
- Drip irrigation scheduling and irrigation treatments also improved water use efficiency by 20%.
- Local farmers increased the cropping area under drip irrigation by 32% (from 1.84 ha to 2.43 ha).
- Studies on environmental sustainability and food safety revealed no unacceptable food safety practices associated with the technological interventions introduced by the project.

Improved child nutrition through school lunch interventions

- The experimental additional portions of fruits and vegetables (already at a low level of intake) added to the school lunch menu resulted in a doubling of children's consumption of vegetables (0.60 vs 0.34 servings per day); fruit consumption was not improved, probably due to challenges with domestic production and availability of fruits from local farmers.
- The proportion of children accepting to consume fruit and vegetables in the intervention schools ranged from 34% for carrots, 59% for string beans, 70% for tomatoes to 85% for watermelon.
- Over the 18-month study period, rates of overweight and obesity among children increased from about 22% at baseline to about 30% at endpoint, but BMIs were unaffected by the change in lunch menu. Heavier children experienced the greatest excess weight gain, indicating the need for solutions to obesity at a nearly age. Over 90% of the parents/caregivers (mainly women) in the study were found to be overweight or obese.

Enhanced knowledge and skills

- Institutional and human capacity building is considered by the project as a major achievement, with over 2000 local and regional individuals benefitted, including about 700 field personnel and farmers who gained skills and knowledge training through over 30 workshops and training events. Catering staff were provided skills training in food service and safety and best practices were developed for hygienic delivery of meals.
- Over 210 knowledge and communication outputs were produced for use by local and regional stakeholders.

Good practices

- Building social capital among farmers and institutions proved key to promoting technology adoption, collective action, and innovation.

Challenges/opportunities for action

- New and simple technologies to reduce post-harvest losses (currently up to 60%) across the supply chain were identified; further improvements in crop productivity could be achieved through the adoption of improved crop varieties and adoption of greenhouse crop production.
- Overall, barriers to tackling childhood obesity and food and nutrition insecurity in CARICOM include limited community engagement and knowledge sharing among stakeholders which counter trust and relationship-building and collective action to improve local food systems
- Project research showed low levels of technology adoption and innovation among small holder farmers; additional constraints to development of local nutrition-and-

health sensitive food systems in CARICOM include a systemic lack of farmers' access to finance and markets.

- Scaling of the "Farm to Fork" approach to school feeding in CARICOM would require private sector engagement and gender balance in agriculture to ensure entrepreneurship and innovation within local food and health systems.

Lessons learned

- School feeding programs are an underutilized vehicle for improving nutrition outcomes and healthy eating among children in CARICOM and can provide viable market opportunities for smallholder farms.
- Improvements in coordination of produce procurement, in market efficiencies and in supply chain integration for local small-holder farmers could lead to enhanced availability and access to a diverse and healthy diet through school feeding programs in CARICOM.
- Bringing about dietary and behavior change to improve child nutrition and health outcomes is a significant challenge in the Caribbean, but such change is only possible through strong institutional commitment and collaboration among ministries of Agriculture, Education, and Health.
- The project showed convincing evidence that institutional collaboration and support for local farmers could lead to transformative changes in the availability of healthful and safe local produce for a diversified diet for local consumers.

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3. Case study: CHINA

Student nutrition improvement in poor rural areas of China

Context

China recognizes that the nutritional status of children affects their life-time health, impacting their productivity (being the future labor force) and ultimately the socio-economic development of the country.

In 2012, childhood malnutrition rate was 12.2%; prevalence of overweight and obesity among adolescents was 9.6% and 6.4%, respectively; and the deficiency of trace elements was very common (CDRF 1).

However, nutritional status varies greatly between urban and rural areas where poverty is high. Data from 1987 put prevalence of undernourished children at between 6% and 27% in urban areas and 12% to 47% in rural areas (2). Recent data show that the risk of underweight and stunting is 3-4 times higher for children in rural areas than for their city counterparts (3).

In 2006, China Development and Research Foundation (CDRF) started a social experiment in 2 rural provinces, building kitchens and providing lunch to 2,000 boarding school students while books and clothes were given to another 500. CDRF is a public foundation initiated by the Development Research Center of the State Council, with work focusing on policy research and advocacy. The resulting report and recommendations were submitted to the central government which first allocated 10B Yuan subsidies to rural boarding school students; in 2011, the National Nutrition Improvement Program for Rural Compulsory Education Students (NIP) was launched, targeting primary and junior middle school children, typically 6-15 years old. CDRF's current involvement in the NIP is summarized in Box 1.

Box 1: CDRF's current work in the NIP

1. Cohort study and cost-benefits study
2. School canteen improvement and nutrition supplementation improvement
3. School meal food supplier analysis and support of local farmers
4. Relevant research on school meals, for example, food waste, food knowledge and education, etc.
5. Knowledge communication and promotion in rural areas

Objective/s

The goals of NIP are to improve malnutrition situations in rural regions, improve students' nutritional status, and enhance education quality (4). It is considered to be a "poverty-reduction-through-education" initiative (5).

Coverage

2016: 699 counties (834 by 2017); 36 million students; 134,000 rural schools

Project/program design and implementation strategies

CDRF provided evidence which promoted the formulation of the national policy, and its research and M&E continuously refine program design and implementation. The design and implementation of the program is government-led.

At the start of the program, there were different feeding models: a snack such as biscuits or breakfast/ lunch provided by a school canteen, a qualified caterer or individual/family caterer. Assessments determined that lunch provided by canteens was the best scheme in terms of costs and nutritional adequacy as compared to the catering or snack/ breakfast options; this model is now being endorsed by the government.

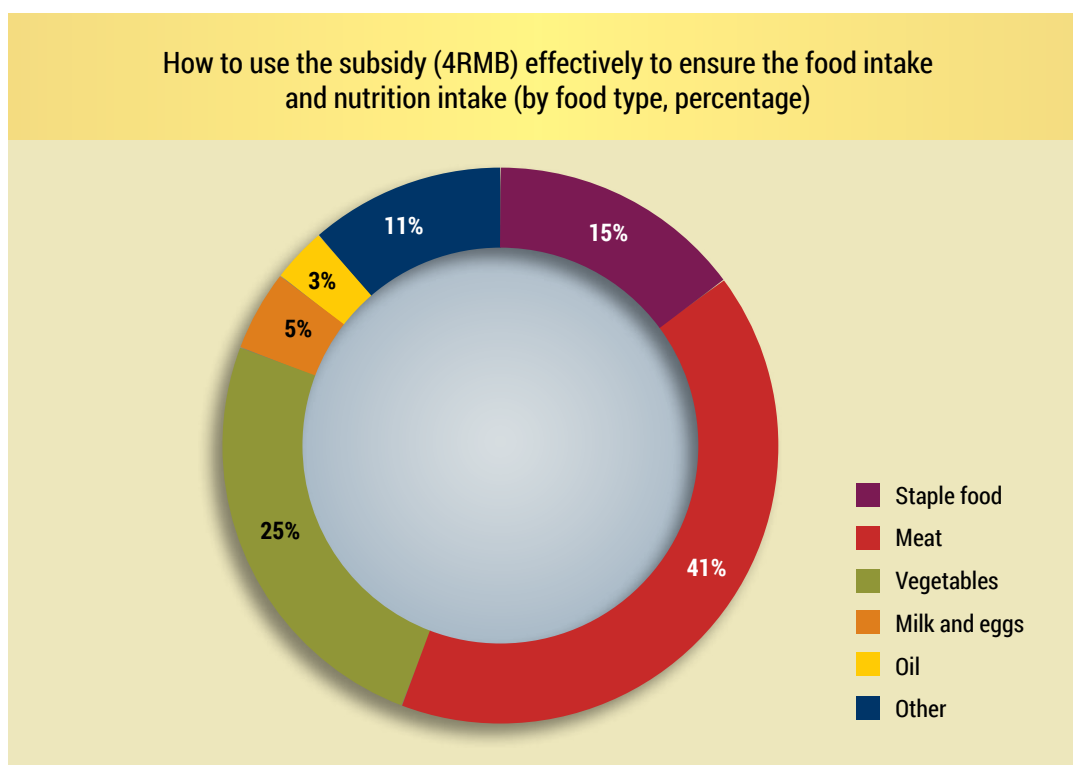


Figure 1: Standardizing meals: What 4 Yuan meals should contain

Localized management still needs improvement as some counties have not developed relevant standards, leading to a wide range in feeding models, food types, purchase prices and recipes.

CDRF work has shown that the main drivers for improved nutritional status are change of lifestyle (from 2 to 3 meals/day) and increased meat consumption (at least 50g) which was also taken up as a policy suggestion by the central government. Based on research, a guide was developed to ensure proper food and nutrition intake using the 4 Yuan subsidy (Figure 1).

Nutrition education

For the nutrition “*knowledge communication and promotion in rural areas*” component of their work in NIP, CDRF collaborates with big companies such as the Mars Group to assist in knowledge dissemination especially through parents and guardians. CDRF is looking at the possibility of the Ministry of Education (MOE) using rural hospital staff to visit families. The strong coordination between the two is a definite advantage for this task.

Linkages with local food production and local economy

The option to purchase from local farmers is open. The data shows that for schools with canteens, close to 60% procure from specified or school-chosen sellers vs. centralized provincial or county-level procurement. In the specified or school-chosen sellers options, the money directly goes to local agricultural producers. CDRF conducts these school meal food supplier analyses and organizes local farmers to support local food production. Canteens also provide employment to local workers, with the program hiring some 3.5M cooks.

Funding and cost-sharing

Allocating 19 billion Yuan each year, the central government provides food subsidies at 4 Yuans/student/day for 180-200 days in a school year. Funds are also budgeted for school canteens considered essential for school feeding. Local governments are expected to pay the operating expenses and staff wages of school canteens.

M&E/MIS

The program’s M&E system is particularly noteworthy. In 2015, the MOE’s Student Nutrition Office engaged CDRF to set-up the NIP’s Data Platform to carry out third-party big data M&E, considered as the “first trial in any country that provides school meals.” Complementing CDRF’s traditional research methods, the technological platform allows for a new approach to monitor and evaluate social protection initiatives; standardize policy implementation; and develop or fine-tune policies based on empirical evidence. The platform supports the MOE’s focus on “nutritional security and fund safety” for NIP.

Currently covering 13 provinces, 100 counties, 9,300 schools, 4 million students, and 12 million basic data, the platform features a public real-time display and 2-hour feedback to schools, county governments and provincial government departments.

A comprehensive range of data is collected pertaining to families (socio-economic status, diet, nutrition knowledge); students (biochemical indicators, height, weight, diseases, absenteeism, performance in academic subjects and physical fitness); fund use; procurement and even characteristics of leaders of top performing counties and photo images of school canteens. Data is provided by staff from departments such as education, health control, poverty alleviation and statistics. Various relationships among the variables are analyzed for quick and open sharing on the internet which prompts stakeholders to take necessary actions.

The system includes a school meal app where teachers upload data on food intake, ingredients, prices, menu and total food expenditures (Box 2).

Some key findings:

- The program has benefited vulnerable students: more than 80% are “left-behind children” (with 1 or 2 migrant parents) and 16% from families targeted by government poverty alleviation programs.

Box 2: Data upload via teachers' mobile phones



School Meal APP data upload

- Close to a quarter of counties do not provide funding support for operating expenses or canteen staff wages from county-level government budgets.
- Although improved from 2015, only 52% of the schools have meals which meet national recommended standards for calorie, protein, fat and two micronutrients. There are low intakes for calcium, Vitamin A and protein while salt content and oil are high.
- With 95% of counties completing construction of canteens, half of these counties are now offering the recommended canteen-prepared lunch.
- Monitoring prices is seen as important for ensuring efficiency of fund management; food safety; and correct food and nutritional intake. The purchase price of staple food in 70% of the counties is equal or below the wholesale price released by the Ministry of Agriculture for the same period.
- Physical fitness as measured by Vital Capacity increased for boys and girls to levels higher than national averages due to sufficient food and after-school exercise.
- Academic performance for both genders in Chinese, Math and English subjects have improved although still lower than urban counterparts.
- Malnutrition rate has dropped from 18.5% in 2012 to 15.4% in 2016, but is still higher than the national average of 12% among 6-15 years old children in 2012. There is a similar catch-up in heights to national averages, but remain shorter by some 3.6 cms.
- Overweight and obesity rates among rural students increased from 2012 to 7.8% in 2016, although lower than the national average prevalence of 15.5%.

That counties and schools have shown better performance in indicators such as food quality and quantity, procurement and fund management since the platform was established indicates that this type of technological supervision is working.

Policy support

China has a strict policy system identified as key to success of the program. The system includes implementation and supervision arrangements as well as responsibilities at different levels embodied in guidelines and other policy documents.

The NIP is among a set of policies and regulations demonstrating China's attention to child nutrition and poverty challenges in the country. For example, the National Program for Child Development in Poverty-Stricken Areas (2014-2020) set the goal of reducing the prevalence of malnutrition among poor rural students to below 10% by 2020.

Institutional coordination

There is strong institutional collaboration at different levels. At the national level, NIP is coordinated by the MOE supported by many national government agencies. The NIP requires ministry-level cooperation among key departments within the central government. In design and implementation of NIP, 15 ministries and national committees were involved, with collaborative mechanisms and responsibilities defined in the NIP Detailed Plan.

Mirroring the strong national level coordination, local governments have set up special offices for implementation with staff not only from the education and health departments but include agriculture, industry and commerce, inspection, food and drug administration and food safety coordination agencies plus the Communist Youth League and the All-China Women's Federation.

Scale-up and sustainability

To ensure sustainability, government must play a role: to create legislation, provide funds and other support for the whole system.

Good practices

- Use of empirical evidence to formulate and refine policy, program design and implementation
- Policy through legislation, guidelines for implementation and supervision, collaborative mechanisms and responsibilities at different levels
- Use of a technological platform to complement traditional methods of M&E for supervising a large-scale program
- Publicly accessible and updated data/information, real-time display with quick feedback
- Multi-sectoral and inter-agency coordination from national to local levels
- Gender-disaggregated data for nutrition and educational outcomes
- Reliable, interactive partnership between government officials and implementing partners, for example, the close links between government and CDRF

Challenges/opportunities for action

- Scale-up of NIP and its Data Platform to full coverage of target counties
- Standardization of program components in remote settings
- Formulate clearer cost-sharing mechanisms for local governments based on local capacities
- Standardize and consolidate data from other sectors working in poverty-reduction to determine specific and total contributions
- Make funding more responsive to price fluctuations since price determines food safety and food/nutrition intake
- Establish pre-primary school nutritional interventions to complete a child nutrition security system
- Conduct studies to address increased levels of obesity and overweight

Lessons learned

- Nutrition interventions for students are essential for capacity development of

children, especially the poor.

- Strong government policy system and financial support are keys to addressing the rural-urban nutrition gap.
- Governments should take responsibility for school feeding programs because “*No one can do things like the government.*”
- Open data and information-sharing environment: ensure different stakeholders can access the right information.

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4. Case: COLOMBIA

Schools and scaling-up the production of more nutritious yellow potatoes in Colombia

Potatoes are grown in different regions in Colombia and are the fourth most consumed food in the country. However, the crop is prone to late blight disease, affecting yields and incomes.

Over 43% of Colombians are considered food insecure, with hidden hunger affecting more than half of the population. Among children under 5, 43% have zinc and Vitamin A deficiencies and 32% lack iron.

In the South's poor Narino province, potatoes are the main source of food and cash, where they are grown by small-scale farmers. Narino's communities are especially vulnerable, having suffered 50 years of armed conflict and many households are headed by women. There is also high food insecurity among this Andean population.

Through farmers working with researchers from Colombia's National University and Canada's McGill University and University of New Brunswick, 3 new potato cultivars adapted from local varieties were developed in the project's first phase. These new varieties give 15% higher yields, are more disease-resistant, are of good tuber quality and have better nutritional contents (twice the protein, 20% more iron and zinc, higher dietary fibers and phenols) than the main commercially grown potatoes.

The second, current phase aims to scale-up the production and consumption of the more nutritious yellow potatoes to alleviate the food insecurity situation in Colombia, developing and assessing a comprehensive scaling-up model to replace at least 50% of the total yellow potato production and expecting to reach over 1.5M consumers by the end of 2018.

The 2 phases of this participatory action research project and their components are depicted in Figure 1.

Beyond the technical innovations on improved potato varieties, there is a strong social component using the Family Agricultural Communitarian Schools (FACs) and Shagras. It is noteworthy that multi-stakeholder platforms are being engaged early on particularly at the community level—important for scaling-up. Reviving ancestral recipes and family-centered work build social cohesion and add a distinct feature to the participatory action research.

The FACS is a community-based capacity-building approach using groups of community members organized by a team of trained facilitators. These multi-disciplinary teams include professionals expected to share their knowledge on Production, Human Nutrition, Gender Equity, Entrepreneurship, Rural Development and Environmental

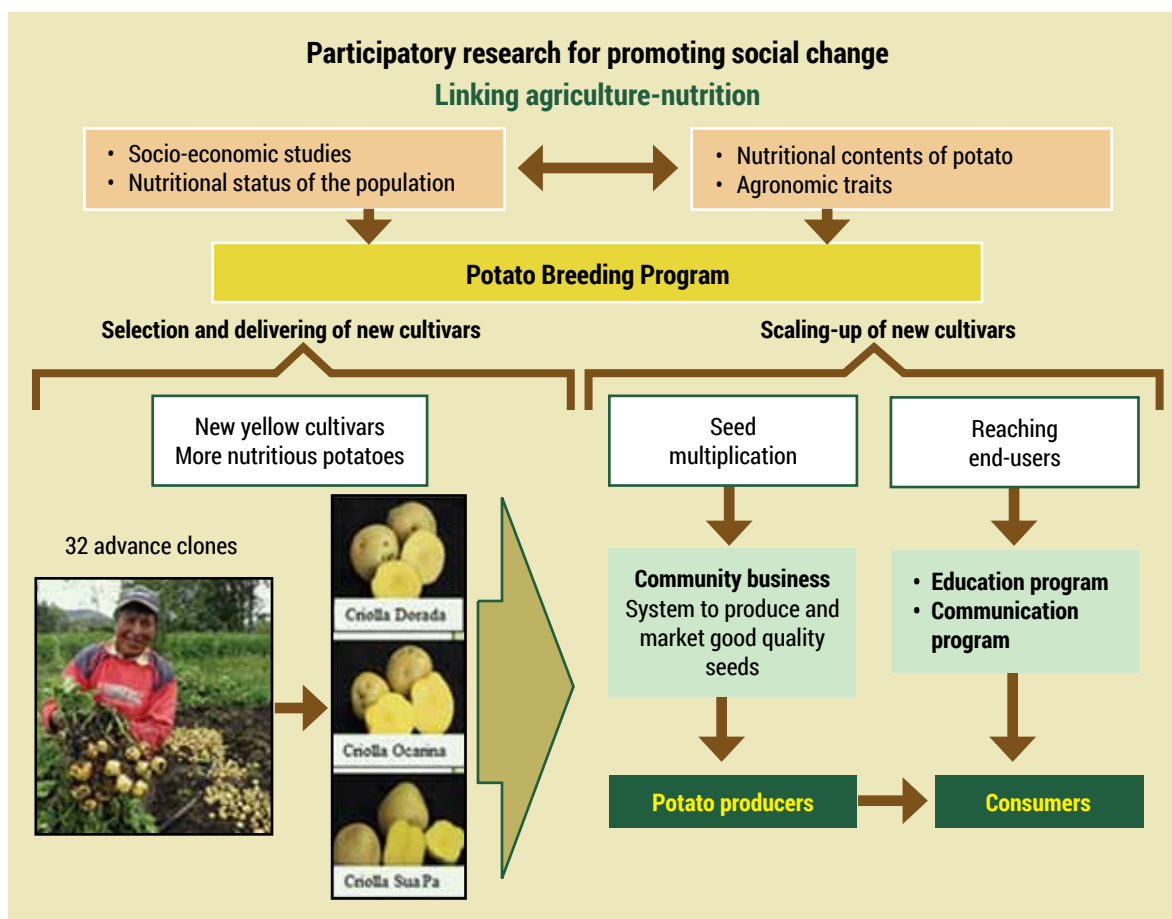


Figure 1. The 2 phases of this participatory action research project and their components.

Sustainability. Participants are interested and committed individuals or base groups such as families. Participatory methods, valuing indigenous knowledge, learning by doing, strengthening family capacities and collective learning and action are emphasized. The FACSs link other actors and networks of support for complementarity of services in addressing learning objectives.

Family Agriculture Communitarian Schools are multi-sectoral and multi-dimensional learning platforms, integrating agricultural research and production; environmental training; networks of seed custodians, family gardens and traditional cooks; as well as the rights and roles of women in the family, productive and community spheres. Activities include face-to-face sessions, field days, fairs, markets, inter-generational fora and community action planning. The collective revival of ancestral indigenous recipes among families and communities has become an important part of the food security pathway (Figure 2).

The Shagras for Life was launched as a complementary educational approach to the FACSs to put into practice and refine learnings from the community schools. Shagras are micro-production systems maintained by families or communities, integrating crops such as potatoes, vegetables, fruits and medicinal plants with small species such as chicken, rabbits and guinea pigs. Shagras are not new to the communities but have been



Figure 2. Family Agriculture Communitarian Schools: Intergenerational Ancestral Culinar Course

revived in the project as a system to guarantee food security, with a strong emphasis on improving dietary diversity.

Activities in the Shagras are summarized in Figure 3 and Figure 4. Early studies show that after 9 months of implementation, Shagras improved the DDS of households.

Setting-up the system of good quality of seeds has been a challenge. The project is collaborating with the relevant government agency and the approach taken by the project has been through the Rural Entrepreneurs Nuclei (REN) which are associations of small-scale farmers focused on the production and distribution of quality seeds. The RENs closely collaborate with researchers but are organized as community business enterprises so that the farmers know they have to invest time and money to develop the technical and management systems. Currently there are 6 such RENs spread in south, central and north Colombia. Some are more advanced than the others and it has not been easy to get people to join.

The project is partnering with private and public sector organizations for large-scale adoption and impact. Private entities, in particular, will help in marketing the new varieties. Promotion at the national level of large-scale adoption and consumption will be sought by working with the Instituto Colombiano Agropecuario (Colombian Agrarian Institute), Ministry of Health and Social Protection, Colombian Family Welfare Institute, and Ministry of Agriculture and Rural Development.



Figure 3. Shagras for Life

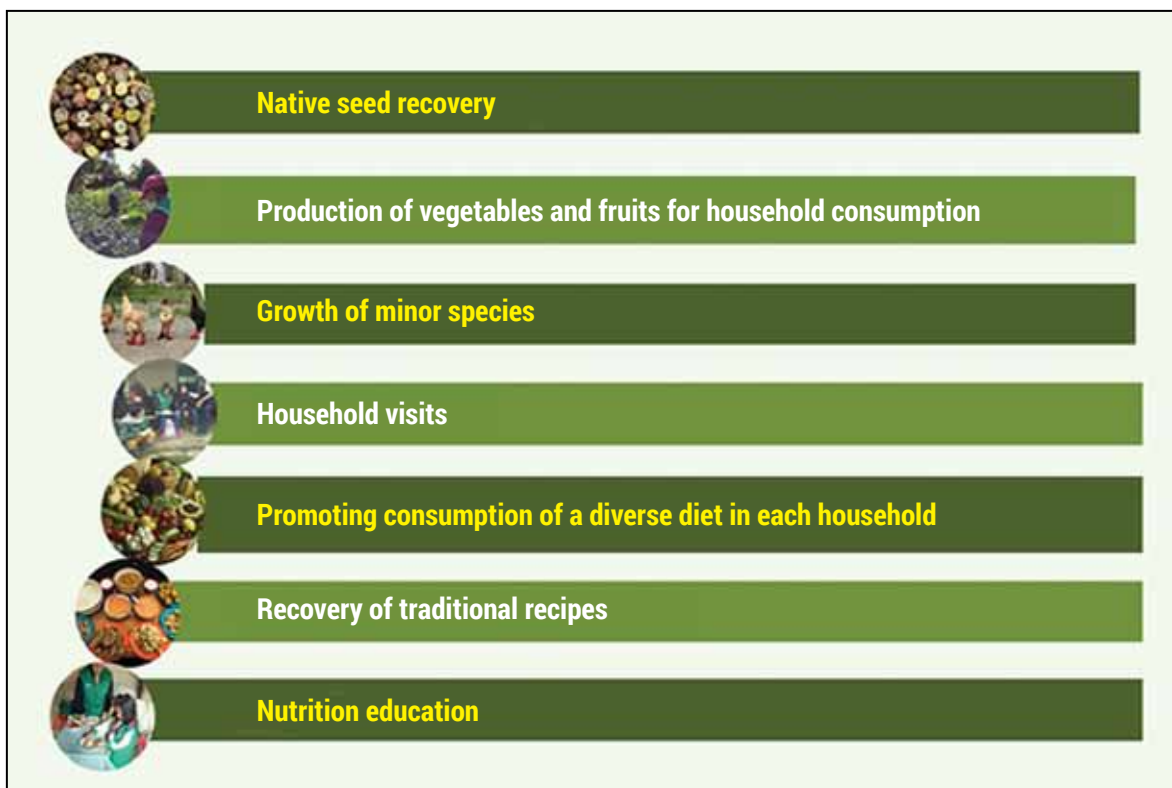


Figure 4. Shagras for Life: Integrating Agriculture Nutrition

In terms of scaling-up with the potato varieties, 20% of cultivated areas have so far been replaced.

There is interesting potential to integrate with Colombia's National School Feeding Program where the government can purchase potatoes from local farmers, possibly starting in a few schools. The evidences on improved nutritional status can leverage adoption and policy. However, while it is mandatory for the government to purchase at least 25% from local farmers, in reality it is easier to buy from big producers as local purchases entail complicated procedures. Hence, a strong recommendation for government to refine its policy on local purchase is needed.

Good practices

- Intersectoral, multi-dimensional platform to promote innovations both technological and social
- Valuing traditional practices including food preparation and cultural forms of interaction
- Shagras for Life as a communal educational and food security intervention

Challenges/opportunities for action

- Establishing system of good seed supply
- Studying nutritional contents of ancestral recipes
- Linking with the national School Feeding Program with a review of its mandatory local purchase
- Risk of impact dilution if the project loses focus due to multi-dimensional and multi-scalar features
- Risk of recurrence of armed conflict

Lessons learned

- Linking nutrition and agriculture education is a good strategy to improve food security and nutrition.

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5. Case: ETHIOPIA

School-based interventions in scaling-up pulse innovations for food and nutrition security in Southern Ethiopia

Context

Since 1997, the University of Saskatchewan (UofS) in Canada and the Hawassa University (HU) in Ethiopia have collaborated on a series of projects to improve agriculture production, nutrition and food security in Ethiopia through research and capacity-building interventions for stakeholders such as farmers as well as current and future implementers, managers and policy-makers in agriculture and health. There has been a focus on sustainable agricultural practices and enhancing nutrition with pulse crops (specifically beans and chickpeas) which are important alternate sources of protein, micronutrients and income for smallholder farmers in the country. Next to cereal, pulses are the second most important component of the Ethiopian diet, yet yields are low due to unavailability of good seeds, low soil fertility and poor land management among other factors.

Ethiopia's nutrition and food security issues are multiple. It is among the world's countries with highest prevalence of protein-calorie malnutrition and micronutrient deficiencies, with 38% of the population underweight and 11% wasted. Close to half of all children under 5 are stunted and malnutrition has been associated with school-age children with special needs, the rates of which are again among the highest in the world. Moreover, during 2015-2016 the country suffered the worst drought in 50 years, with 18M of its 77M people needing aid, prompting the government to provide food assistance to millions of affected students.

Objective/s

The project's general objective is to catalyze large-scale positive change in food and nutrition security in southern Ethiopia by scaling up pulse-crop innovations, specifically:

- to develop sustainable pulse production and associated seed production and delivery systems in 15 districts of the Southern Nations, Nationalities, and Peoples' Region (SNNPRS);
- to identify, test and promote various scaling-up/out approaches and incentives for wider impact;

- to expand use of pulses in household-level food preparation and commercial production of pulse-cereal complementary foods;
- to create capacity and improve women farmers' access and control over resource to enhance their participation, productivity, income and nutritional status;
- to develop and facilitate tailored communication strategies and innovation platforms for policy action in scaling-up of pulse innovations.

Coverage

70,000 farm households in the SNNPRS

Design and strategies

Earlier work has shown that innovations developed by the project in pulse crop agriculture have in general improved farmers' productivity. Moreover, promoting the consumption of pulses has enhanced the nutritional status of children and their mothers in Southern Ethiopia. The current project is designed to scale-up these initiatives.

The project uses an integrated approach based on the entire value chain from production to consumption and its nutrition effects. The project's agricultural innovations include introduction of high-yielding varieties, soil management practices and agronomic biofortification using applicable participatory research methods while nutrition interventions involve nutrition education, skills training and behavior change communication, mainly targeted to female farmers. Figure 1 lists initiatives of the project's pulse-centered strategy.

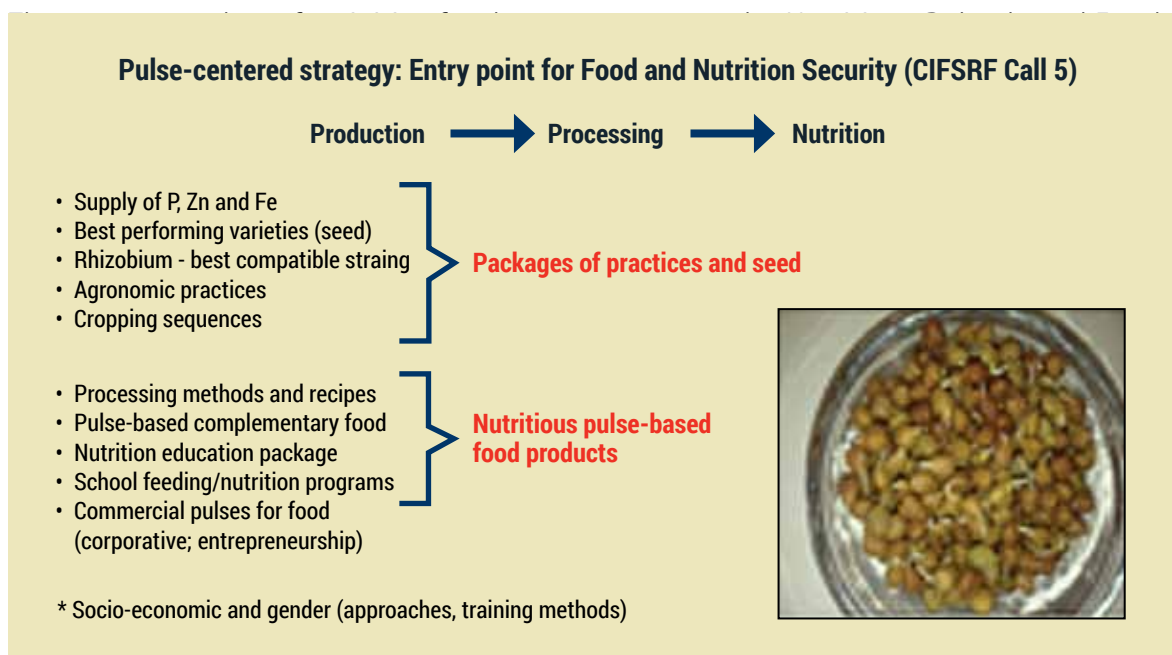


Figure 1: Initiatives of the project's pulse-centered strategy.

Products (Figure 2). Women and mothers are strategically engaged as agents of change to promote pulse consumption and healthier eating, through a number of avenues: in their own homes, through selling pulse-based products, as health extension staff and through school feeding.

A Business Case was piloted to promote entrepreneurship among women and expand consumption of pulses and pulse-based products. In 2016, commercial-scale extruded snacks and flours were prepared at GUTS Agro-Industry, a business entity. The recipes were developed in a previous pilot for chickpea-cereal blends. Sample products were prepared for commercial distribution while the recipes were registered with the Ministry of Health's Food, Medicine and Health Care Administration and Control Authority by the HU-UofS.

Women Cooperatives were trained on business plan preparation with the support of the Bureau of Women and Children, Bureau of Agriculture, Bureau of Small and Micro-Enterprise Development, and GUTS Agro Industry. These cooperatives were organized from volunteer low-income, unemployed women. They are selling door-to-door the pulse-based food products to farm and urban consumers with a minimum 10% margin of profit. The women have weekly targets and are provided with backstopping in business and market development. Since product launch in early 2017, to date the groups are now on their second-round order.

Meeting Mothers and Children's Nutritional Needs

Food Processing

- Formulation and sensory acceptability of pulse mixed with traditional cereal-based breads (e.g., chickpea added to local flours)

Home Pulse-food Preparation

- Improving the bioavailability through roasting, boiling, soaking, fermentation and germination)
- Reduces phytate and other anti-nutritional factors
- Germination brought back as a household practice
- Experimenting with pulses integrated into traditional foods such as the tradition cereal-based porridge, possesse

Women Entrepreneurship and Family Income

- Microfinance - women with bicycles going door-to-door in semi-urban and farm areas selling pulse food products - Guts Argo Industries (new collaboration)

School Feeding - WFP Collaboration

- Incorporating pulses and pulse-based food products from Guts Argo Industries in menus
- Training and employing self-help women as cooks




Figure 2: Activities for the component on the Nutritious Pulse-based Food Products

The project works with schools by testing pulse-based strategies within school feeding programs. School feeding is administered by the UN World Food Program in collaboration with the Regional Bureau of Education. Seventy two (72) primary schools in southern Ethiopia receive meals for children aged 10 and below through this program. Using the school feeding platform, the project aims to: (a) improve nutritional status and reduce school drop-outs of children below the age of 10; (b) create job opportunities for women, and (c) create market for smallholder's farmers via backward linkage.

Self-help Women will be organized, trained and certified on cooking and basic hygiene. WFP and the Regional Bureau of Education are expected to hire the women as cooks at USD\$ 1.5 per day. The project is also working with WFP on enhancing the menus with freshly-cooked meals using pulse-based ingredients, adapting traditional recipes and adding pulse-based products from GUTS Agro Industries.

The pulses for the School Feeding program and commercial processing will be procured from the region's unions and cooperatives established through the project—linking agriculture, processing, marketing and consumption in the supply chain.

There were 2 studies conducted to assess pulse-based strategies in schools: The first is a retrospective cohort study on the effects of a School Feeding Program on dietary diversity, nutritional status and class attendance of students aged 10-14 years.

Key findings are:

- The pulse and legumes intake of the beneficiary households was higher compared with the non-beneficiaries based on a Food Frequency Questionnaire.
- Using 24-hour recall, the mean Diet Diversity Score (DDS) among school feeding program non-beneficiaries was significantly lower than the beneficiaries.
- As measured by anthropometric tests, body-mass index for age and height for age Z scores of the beneficiaries were higher than their counterparts.
- The mean days of school absences for non-beneficiaries was significantly higher, with hunger as the main reason for absence for this group while domestic work was the main reason for the beneficiaries' school absence.

The study also noted challenges faced by the School Feeding Program: low community participation, storage and transportation problems and that the program had activities that took students away from educational time.

The second study used randomized control trials with baselines to examine the effects of peer-led pulse-based nutrition education on 10-14 year old students' KAPs and nutritional status. The mean DDS was significantly improved after a six month intervention in the intervention group which also showed significant differences in knowledge, attitude and practice mean scores about pulse preparation and consumption. At endline, the prevalence of wasting was significantly reduced for the intervention group while there were no significant differences in stunting prevalence between the 2 groups.

Nutrition education

Multiple modes are being used for scale and impact:

- Health Extension Workers, 1-5 networks and the Health Development Army of the government's health extension system were tapped where model moms visit homes to provide information on nutrition and pulses, pulse-based recipe demonstrations and skills training programs.
- The project also partnered with Farm Radio International which uses interactive radio and mobile platforms to promote the improved agricultural technologies and create awareness on consumption of pulses and pulse-based products, reaching 135,000 farmers in community listening groups.
- Peer-led nutrition education involves leaders among adolescent students identified to facilitate sessions on nutrition, healthy eating habits and pulses.
- Students in the school feeding program will undergo nutrition education through the school's mini-media systems.
- Project-sponsored graduate students including Agriculture and Health professionals design IEC materials as part of their assignments.

Policy support

Policy makers such as the Heads/Deputy Heads of regional Bureaus of Agriculture, Women and Children Affairs, Research Institutes, Managers of Seed Enterprise and the Farmers' Cooperative Federation are members of the Steering Committee. At local and international levels, the project has been asked to share results including at the policy fora for national and regional pulse platforms. There is clearer policy uptake for the agricultural practices of the project; for the others, influence on policy appears to be meanwhile at the stages of information-sharing and assessment.

In terms of work on school feeding and on promotion of pulse consumption, there are policies in place where strategies from project's school interventions could contribute. The updated National School Feeding Program is to be integrated with the national education system and is part of the newly developed National School Health Nutrition Strategy, making school feeding applicable to all schools (Box 1).

Box 1: School feeding? A national priority

- Ethiopia's national feeding program is part of the newly developed National School Health Nutrition Strategy
- The new national school feeding program integrated with the national education system; applicable to all schools (private or public in towns or rural areas)
- Builds on the previous school feeding program; targeting especially schools where students are vulnerable to malnutrition and food shortage
- Part of global efforts to achieve education for all

The school feeding program has also presented the opportunity to support local food production through the WFP's Purchase for Progress and the African Union's endorsement of home grown school feeding approach (Box 2).

Box 2: Home grown school feeding approach

- In January 2016, after a study visit organized by the WFP Centre to see first-hand the Brazilian school feeding program, the Heads of States of the African Union recommended the home-grown school feeding approach to be included in the Continental Education Strategy for Africa 2016-2025
- The WFP school feeding program with which the project is partnering is using the Purchase for Progress approach (P4P) through "which WFP – which itself has pledged to source 10 percent of its food purchases from smallholder farmers – encourages national governments and the private sector to buy food in ways that benefit smallholders." (1)

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The 2016 edition of the National Nutrition Program, meantime, emphasizes the strengthening of nutrition-sensitive interventions across sectors, and includes the objective to "increase year-round availability, access to and consumption of pulses" (Figure 3)

Institutional coordination

There is strong multi-disciplinary, inter-sectoral approach, bringing in actors from Agriculture, Health, academe and private sectors. Having the government on board with the National Nutrition Program is an important step in institutionalization, where the project can advocate for influence through evidence.

Scale-up and sustainability

The project's main pathway to scale-up and sustainability is to strengthen the value chain from production, processing, marketing to consumption. Key to sustainability is the continuous development of cooperatives and women's microenterprises.



Figure 3: Implementation of nutrition-sensitive interventions across sectors.

Good practices

- Integrated approach using the entire value chain
- Strategic use of mothers as agents of change
- Multiple modes of nutrition education
- Use of farmer clusters in seed production
- Developing the skills and resource base of women
- Research on impacts of nutrition education on nutrition outcomes

Challenges/opportunities for action

- Climate change effects such as droughts and floods
- Turn-over of staff
- Sustainability of cooperatives

Lessons learned

- Schools are uniquely positioned to promote healthy eating behaviors among students, their families and communities. However, the impacts of nutrition education in and outside of schools on nutritional outcomes are not straightforward and theories of change for the most appropriate pathways must be developed and tested.

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6. Case: INDIA

Experiences in school-based food security interventions

Context

India, the second most populous country in the world, is a leading exporter of wheat and rice. Yet in 2012, a quarter of its population was considered among the world's poorest and hungry and more than a third of the world's 146 M undernourished children come from India (2006). The country also has had to contend with substantial numbers of out-of-school children, although the adult literacy rate has improved to 74% in 2011.

Started as small experiments in a few States, the National Program of Nutritional Support to Primary Education was launched in 1995. Covering Grades 1-5, the Mid Day Meal Scheme (MDMS) traces its precedents to British and French efforts in the 1920's and to projects run by several States starting in the 1960s. In October 2007, the scheme included upper primary students of Grades 6-8, becoming the National Programme of Mid Day Meals in Schools.

Objectives

In its launch, the scheme's aim was to *"boost universalization of primary education by increasing enrolment, retention and attendance while simultaneously impacting on nutrition of students in primary classes."* In 2001, India's Supreme Court recognized the right to food for *"every child in every Government and Government assisted Primary Schools with a prepared mid day meal."* This decision and subsequent updating of the program have broadened coverage to include those in the most disadvantaged areas and those among the Scheduled Castes and Tribes. Hence, the objectives of promoting gender and caste equality as well as eradicating poverty have become attached to the scheme.

Coverage

1995-96: 34M students; 2016-2017: close to 100M students, covering over 1M schools

Design and strategies

The program is centrally-sponsored, with the national government providing grains and subsidies for transportation, costs of cooking such as utensils and cook-helper honoraria; and kitchen sheds.

Program design is adaptive, undergoing several adjustments in coverage (extended to upper primary levels, included students of Government, Government-aided, local body schools, Alternate and Innovative Education Centres under the Education Guarantee Scheme); levels of subsidies; and food norms. Special category States have been allotted higher transportation subsidies, and meals are provided to drought-stricken areas during summer. Payments of grains which have previously been purchased centrally from the Food Corporation of India (the national government agency responsible for distribution of foodgrains throughout the country) have also been transferred to the Districts to enable the central and State governments to focus on implementation and monitoring. The national government also recently (August 2017) issued a notification recommending use of iron-rich foods and food fortification through a number of possible ways (Box 1).

National guidelines seek to standardize implementation, setting meal costs and required food types/nutrients (Figure 1).

Yet States are provided flexibility in management, leading to a range of implementation mechanisms and meals served. Each State can decide how to spend allotted funds based on local tastes and tradition (Figure 2).

The flexibility allows the States to design ways of complementing and improving the program (Figure 3).

The State of Bihar (where 23 children died of pesticide-laden meals) has introduced interactive voice response using mobile phones for monitoring and web-based instant feedback from schools and stakeholders. There is also a Complaints/Grievance system for parents.

Box 1: Multiple approaches to food fortification

- Fortified flour - for the preparation of chapati and poori (flat bread types)
- Dehydrated green leafy vegetables powder to menus to further improve their micronutrient content
- Double fortified salt containing iron and iodine to be used in the meal preparation
- Micronutrient premix sachets can be added during the final stages of preparation in rice and pulse preparations and curries



Approach used may be different based on the State implementing

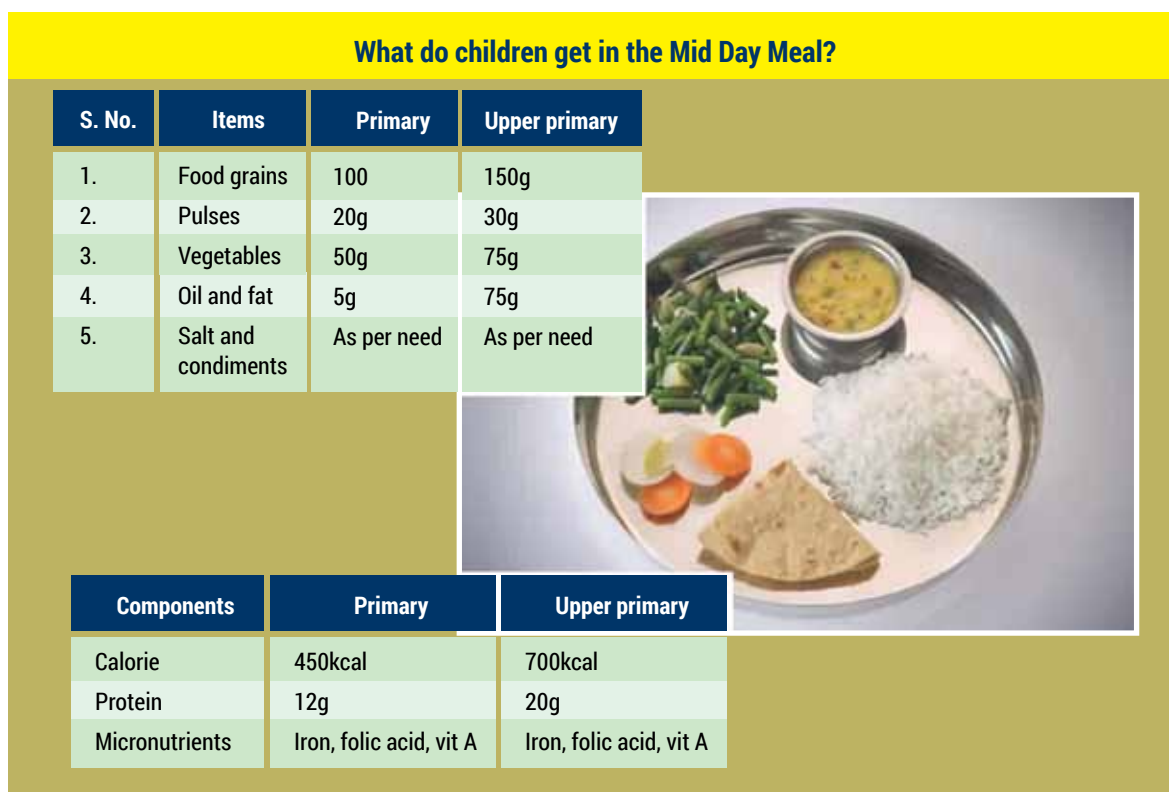


Figure 1: National guidelines to standardize implementation

Examples of cooked meals: Decided by each State	
States	Cooked foods served in MDMP
• Andhra Pradesh	Rice-sambar, rasam, tamarind/tomato rice, Pongal
• Delhi	Mixed vegetables Pulao, dal/sambar rice, rajman rice, choley rice, aloo-poori, choley-poori, black channa pulao
• Gujarat	Dal dhokli, khichdi, vegetable pulao, handyo, upma
• Haryana	Dalai, khichdi
• Karnataka	Sweet-pongali, rice-sambar, roti-sabzi, bisibele bhath, upma, chitaraana (lemon rice)
• Rajasthan	Ghooghri, dalia, sattu, lapsi
• Tamil Nadu	Tamarind rice, sambar rice, dadhojjanam, pongal, coconut rice, haiwa/shira

Some States include either egg, milk or fruits daily or occasionally

Figure 2: States management and implementation mechanism for meals served.



Enhancing the MDMS:

- **Andhra Pradesh:** Routine health check-up once in two months with timely immunizations
- **Jarkhand:** School health and sanitation education
- **Karnataka:** Supply of Vitamin A, iron tablets and deworming tablets

Figure 3. Complementing and improving the program.

District purchasing agencies buy food grains from the FCI; the grains are then stored at warehouses before delivery to government Fair Price Shops and distribution by implementing agencies to schools or centralized kitchens. Other food commodities such as vegetables, fruits and eggs are purchased through various means per State.

Meals are either cooked on-site by trained cooks-helpers or women self-help groups in the decentralized model; or an external organization cooks and delivers the meals to schools, mostly through public-private partnerships (PPPs) in the centralized model. For example, the NGO Akshaya Patra serves more than 1M meals per day across 8 States. According to the guidelines, no teacher should be assigned MDMS tasks that would disrupt schoolwork. PPPs, meanwhile, are encouraged by the government in a system where private sector partners deposit money to an NGO which receives the balance from the State and central government portions; accounts are checked by the government.

Each State assigns one of its departments such as Education or Social Welfare as the nodal department to take overall responsibility for program implementation and there are nodal officers at the District, block and school levels. The development of menus is the responsibility of district nodal departments. The Gram Panchayat, the Village Education Committee, the School Management and Development Committee or Parent-Teacher Associations are responsible for the program at school levels, ensuring efficient cooking, proper serving and cleanliness. Mothers' Groups help children in hand-washing before and after meals.

There are initiatives in some States on nutrition education, school gardens and promotion of local food production. Jarkhand State, for example, supports the formation of self-help groups of farmers who grow vegetables and supply to nearby schools. In Assam State, school kitchen gardens have been developed to add fruits and vegetables

to the meals. However, these initiatives have yet to be institutionalized in national policies. In terms of employing local cooks-helpers, more than 2.5M were hired in 2016-2017.

Funding/cost-sharing

With current costs per child at Primary level: Rs. 4.58 (~7 ¢ US) and Upper primary level: Rs 6.85 (~10 ¢ US), the national budget allocation for MDMS has surged from US\$1.1 billion in 2007–08 to US\$2.1 billion in 2013–14. Lunches are generally provided for 200 days/year. Central and State governments share the costs, with the center providing 60 percent and the States 40 percent; poorest areas like the Northern Eastern and Himalayan States have lower cost-sharing requirements. Private sector and international organizations can augment the funds or the meals themselves.

M&E/MIS

Since 2004, budget has been clearly allocated for M&E, at 2% of the cost of foodgrains, transport subsidy and cooking assistance. Monitoring mechanisms are at every level (Figure 4) and schools are required to display information such as quality of food grains received, other ingredients purchased, number of students served, daily menu and community members involved. There are also studies and reviews conducted by government bodies and third parties.

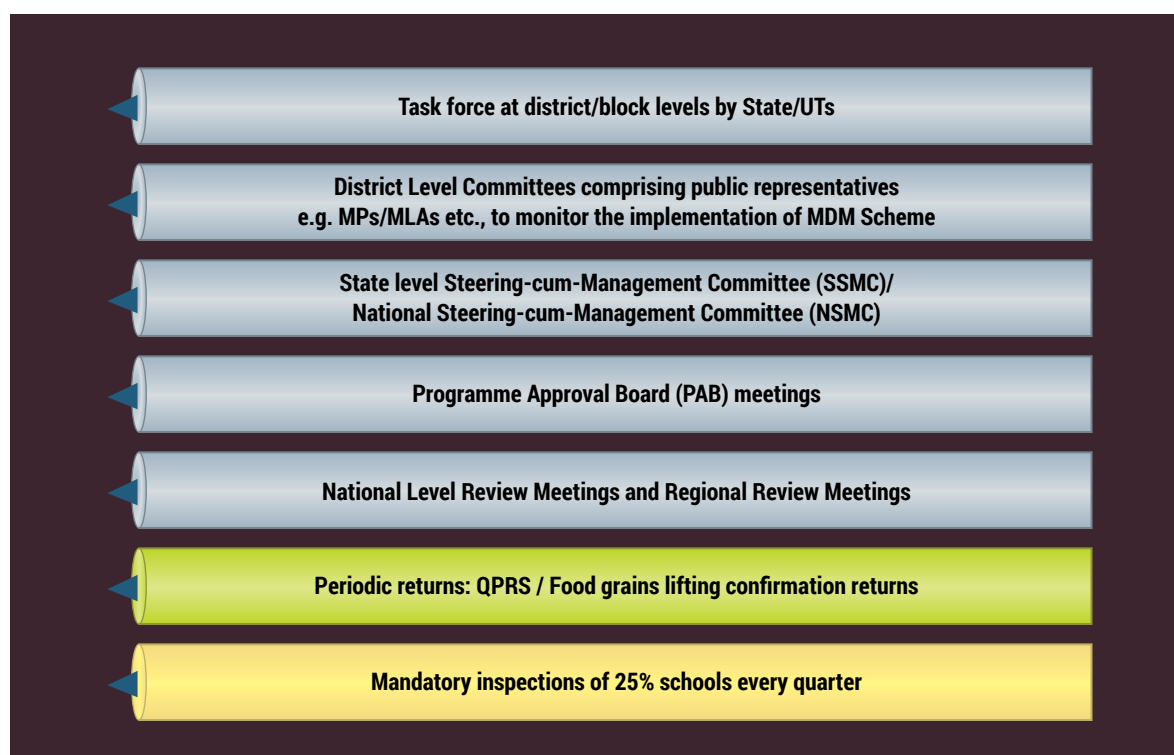


Figure 4. Monitoring mechanisms at every level.

Findings show that the scheme is attracting to school children from disadvantaged sections (especially girls, Dalits and Adivasis) and improving school enrollment, retention and attendance. In terms of nutritional status, the overall outlook is that there is deficiency in protein and micronutrient intake which might be due to low intake of pulses, milk and green leafy vegetables and fruits. Some studies also point out that school feeding has become a substitute rather than a supplement for home meals.

Policy support

Since inception, strong political commitment has been shown by the government. The regulatory frameworks for the MDMS are contained in regularly updated orders of the Supreme Court and several National Guidelines. The government has demonstrated that it is willing to modify and adapt to emerging knowledge and gaps.

Institutional coordination

The Department of School Education and Literacy under the Ministry of Human Resource Development has the overall responsibility for the program. Management structures at different levels are defined. A National Steering and Monitoring Committee composed of several departments and sectors has corresponding committees at the State, District and block levels. Each committee monitors the nodal officer at its level. However, it has been noted that intersectoral coordination is weak.

Scale-up and sustainability

In promoting universal primary education, the scheme has evolved into a mechanism for the universal right to food, with all Indian children being entitled to hot-cooked lunches.

The government has demonstrated determination to achieve the objectives and full coverage of the MDMS. The initiative is now covered by the National Food Security Act 2013 which shows that the central level is considering the scheme as a national food security program rather than just a school-based intervention.

Good practices

- Solid political and funding commitment of central government
- Strong policy and legal frameworks with defined management structures, responsibilities and procedures
- Adaptive management and policies informed by emerging knowledge and gaps
- States have scope for adaptation and innovation based on local contexts
- Involvement of accountable NGOs and private sector

Challenges/opportunities for action

- Delays in release of funds due to multiple funding levels
- Risk of corruption and fund mismanagement
- Poor quality and nutritional content of meals
- Inadequate school infrastructure for cooking and feeding
- Enhancing checks and balances along the supply chain especially in difficult areas
- Improving intersectoral coordination to enable integration of components such as health check-ups, water and sanitation, health and nutrition education and pre-primary interventions
- Better tracking of indicators, including identification of common indicators for all schools
- Opportunity to integrate nutrition education for the different levels of numerous government staff involved in the MDMS, not just for students

Lessons learned

- MDMS is a platform for other health and nutrition programs.
- Some States are doing better than others, hence it is important to learn from what worked and did not.

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7. Case: NIGERIA and BENIN

Empowering secondary schools through the Young Vegetable Scientists Clubs

Context

Indigenous vegetables are important to poor farming households in West Africa but there is low and unsystematic production due to weak technical knowledge, acute soil infertility and problems with land degradation. The project “**Synergizing Fertilizer Micro-Dosing and Indigenous Vegetable Production and Utilization in West Africa**” aims to consolidate and scale-up cost-saving fertilizer applications and improved water management innovations developed and tested on indigenous vegetables by 2 earlier projects, the Canada Indigenous Vegetables Project and the Integrated Nutrient and Water Management in the Sahel. Towards the overall aim of improving food and economic security of poor farmers, the project intends to further refine and deploy the innovations in fertilizer micro-dosing, water management, value addition and seed production for growing indigenous vegetables; test 2 models of scaling the technologies: Innovation Platform and the Satellite Dissemination Approach (Box 1); and promote policy advocacy for the integration of the successful scale-up model into local, regional and national food security programs in West Africa.

Satellite Dissemination Approach (SDA) Innovation Platform Approach (IPA)
Linear extension model where a set of innovations are disseminated through the extension system

Methods include participatory research and development, Farmer-field Schools, demonstration trials, and Multi-stakeholder platform for consensus building primarily intended to improve coordination along the value chain

Box 1: Two scaling-up models being tested

Satellite Dissemination Approach (SDA)	Innovation Platform Approach (IPA)
Linear extension model where a set of innovations are disseminated through the extension system	Multi-stakeholder platform for consensus building primarily intended to improve coordination along the value chain
Methods include participatory research and development, Farmer-field Schools, demonstration trials	Platform includes vegetable producers, marketers, transporters, processors, government agency representatives and financial institutions

Platform includes vegetable producers, marketers, transporters, processors, government agency representatives, and financial institutions

The Young Vegetable Scientists Club (YVSC), featuring the cultivation of a school garden, is a component within the above project.

Objectives

YVSC aims to:

- Promote the interest of the students studying agriculture, by empowering them with inputs and skills necessary
- Ensure harvests belong to the students and their school and is expected to be disposed in the best way possible
- To boost production, postharvest, marketing and nutrition education using vegetables through young students and show them how valuable they can become in the agricultural food value chain.
- To inspire them to take conscious efforts to seek careers in agriculture and be positioned to tackle challenges of (our) national food security
- To breed a generation of Young Vegetable Scientists and create green champions for the future.

Coverage

To date in 2017:

Country	Number of schools	YVSC members		Total no. of students	No. of teachers trained		Total no. of teachers	Funds raised from sales	USD
		Male	Female		Male	Female			
Nigeria	136	38500	33,402	71902	476	405	881	N73800	\$2108
Benin	57	17793	12364	30157	47	29	76	CFA 1,221,000	\$2197
	193	56293	45766	102029	523	434	957		\$4305

In many countries, being a farmer is associated with hard work and low income. Among students in the Nigeria-Benin Case, farming and gardens have a negative connotation, with work on gardens seen as punishment or restricted to weeding. Young people are averse to careers in agriculture and there is low participation of those below 35 years old in the agricultural value chain. Outdated curricula are still being used to teach agriculture in schools and there were no sessions on practical agriculture. There were previously little or no school gardens and farm tools in schools in both countries, and produce mainly went to the teachers.

The YVSC is a creative way of broadening their awareness of the value of agriculture and a promising platform to develop capacities of local future scientists and agribusiness entrepreneurs.

The procedures in setting up and managing the clubs are summarized in Figure 1:

- Approval secured from government to involve the schools in the project
- Series of meetings with the school administration, following approval, to establish and finalize modalities for project operations
- Production of YVSC training manual
- Training of teachers on school-by-school basis
- Donation of farming inputs to schools
- Monitoring visits
- Regular workshop involving teachers and students
- School farm and revenues records
- Reward excellence among teachers and students based on academic and school garden performance

Figure 1: Getting the clubs up and running

The club targets secondary school students aged 12-18 years. Membership is voluntary and is open to all interested students, not just agriculture majors. Through the gardens, the club incorporates nutrition education and marketing aspects in addition to production practices such as low-cost irrigation, fertilizer micro-dosing, use of organic fertilizers and biological derivatives as pesticide. The gardens are currently being used as sites for nutrition education and practical education.

The gardens focus on spinach, pumpkin and eggplants due to their economic advantage, acceptability and nutritious content. The overall project also developed products from indigenous vegetables to improve nutritional value of basic households meals like bread (with vegetables called Green Bread), cookies (sprinkled), flours for easy application into porridges, stews and even soups. In Benin, a vegetable soft drink has been formulated and ready for commercialization.

Thirty percent of the produce is divided among the students, 10% go to the teachers and 60% are sold. Proceeds of sales go to the school's account for maintaining the club's operations especially after the project ends or are used for other school projects like repairing a classroom window. Although it is a potential avenue to develop micro-enterprise/agri-business skills, strengthening the balance and integration with school workload can enhance the activity.

Mothers of students are excited to buy from the school because they are proud of their children accomplishment. Additional 30% given to students increases students dietary diversity with students reports from school stating increase in consumption at home (due to new recipes their mothers learn at Innovation platforms) and in school (for schools with feeding programs).

M&E

The expected outcomes are summarized in Figure 2. These are being measured by one-on-one interviews with teachers and students, physical inspection of school gardens, checking of school garden records, and questionnaire dissemination during site visits.



Figure 2: YVSC expected outcomes

Policy support

Presentations for policy makers are being prepared by the project for possible take-up of project innovations and lessons in order to strengthen each country's national school feeding program. Systematic evaluations of outcomes—especially impacts—of the clubs will provide good leverage.

Scale-up and sustainability

Sustainability is a challenge as teachers have questioned their participation without remuneration, although somewhat mitigated by the awards system and by the 10% produce share for teachers. Also, there has been a teachers' strike, attributed to the poor economy, which resulted in long-term closure of schools in Southwest, Nigeria. The farms are grazed by nomadic cattle owners while produce are stolen due to poor security. These are considerations for the long-term operation of the clubs.

A possibility for institutionalizing the clubs is through integration into the secondary school curriculum or opening some kind of elective for students who may want to pursue an agriculture course. Moreover, there is scope for uptake of the gardens as general learning tools for all subjects.

The scale-up of the technologies to the schools itself used the SDA model. Based on project experiences so far, the IPA model can set-up a multi-stakeholder platform that can bring together all actors who can drive change in the schools, although it may take more time than the SDA. SDA model, on the other hand, is a more direct approach to transferring technologies, is more structured with planned outputs and has limited number of stakeholders involved in the project.

Good practices

- Approval from government gives a form of legitimacy that facilitates work in schools.
- Valuing the youth sector's potential contribution in the agriculture value chain and food security pathways through current and future roles

Challenges/opportunities for action

- Club sustainability vis-à-vis the risks such as government bureaucracy, low teacher motivation, unsecured plots
- More defined integration into school feeding, home consumption and school curriculum
- Balance with school workload

Lessons learned

- Youth can be tapped to play an important role in food security initiatives that have clearly defined objectives, strategies and ways of measuring outcomes
- School gardens are excellent learning platforms for teaching science, agriculture, and entrepreneurship education

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8. Case: PHILIPPINES

Scaling-up the integrated school nutrition model: Gardening, supplementary feeding and nutrition education

Context

In the 2015 updating of its latest National Nutrition Survey (1), the government's Food and Nutrition Research Institute - Department of Science and Technology (FNRI-DOST) reports worrying trends on the burden of malnutrition among 0-19 year olds in the Philippines. First, data shows that (except for 1 data point=29.9% for the 5-10 year olds) across all age groups from 0-19, the rates of stunting have not fallen below 30% from 2003 to 2015 (Figures 1-3).

Second, for school-age children, 2015 wasting rates are at 8.4% and 12.5% for the 5-10 year and 10-19 year age brackets respectively (Figures 6-7) and have not significantly changed since 2008. Third, overweight/obesity, meanwhile, is on the rise for these

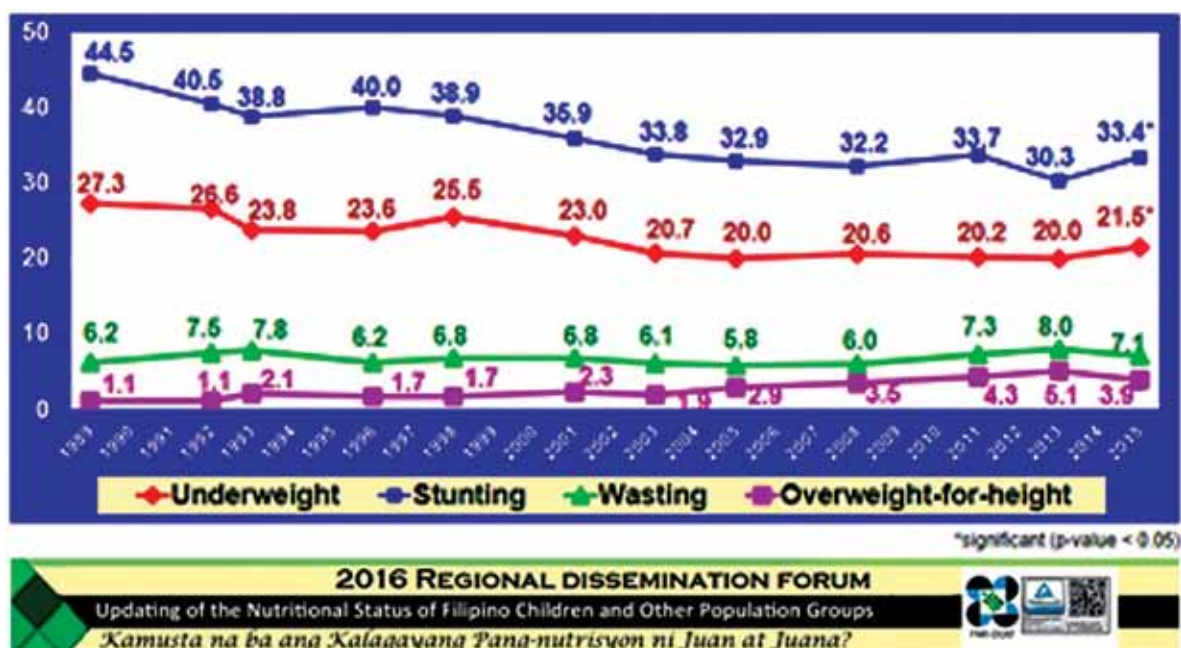


Figure 1. Trends in the prevalence of malnutrition among children, less than 5 years old: Philippines, 1989-2015

¹ Excluding the 2013 data point for 5-10 years old which is 29.9% or almost 30%

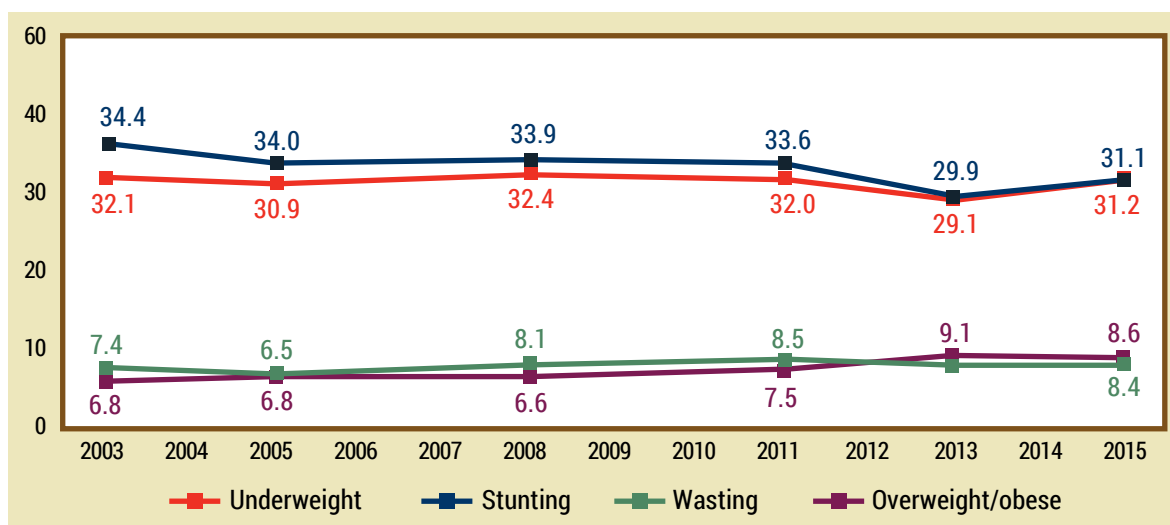


Figure 2. Trends in the prevalence of malnutrition among children, 5-10 years old: Philippines, 2003-2015

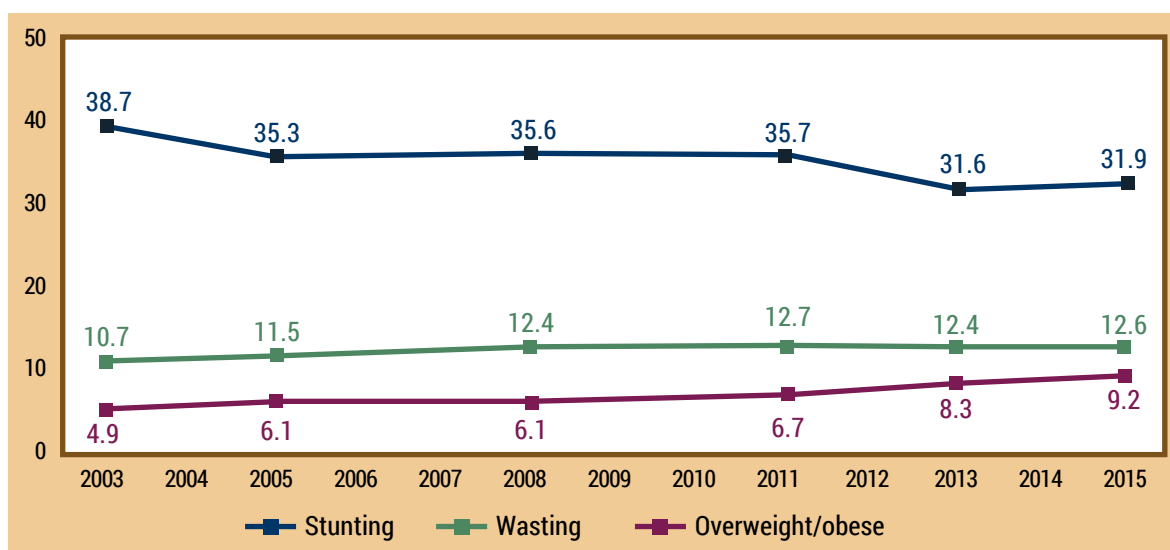


Figure 3. Trends in the prevalence of malnutrition among children, 10-19 years old: Philippines, 2003-2015

school-age groups. Fourth, there are differences according to place of residence and wealth quintile: prevalence of stunting and underweight were higher in rural areas and among the poorer quintiles while overweight rates were higher among urban residents and the richest quintile.

Translated to monetary costs, 2013 estimates put economic losses in the country due to child undernutrition at PhP 328B or about 2.84% of the GDP (Figure 6).

In terms of micronutrient deficiencies, the four major deficiency disorders among Filipino children are protein-energy malnutrition, iodine deficiency disorder, vitamin A

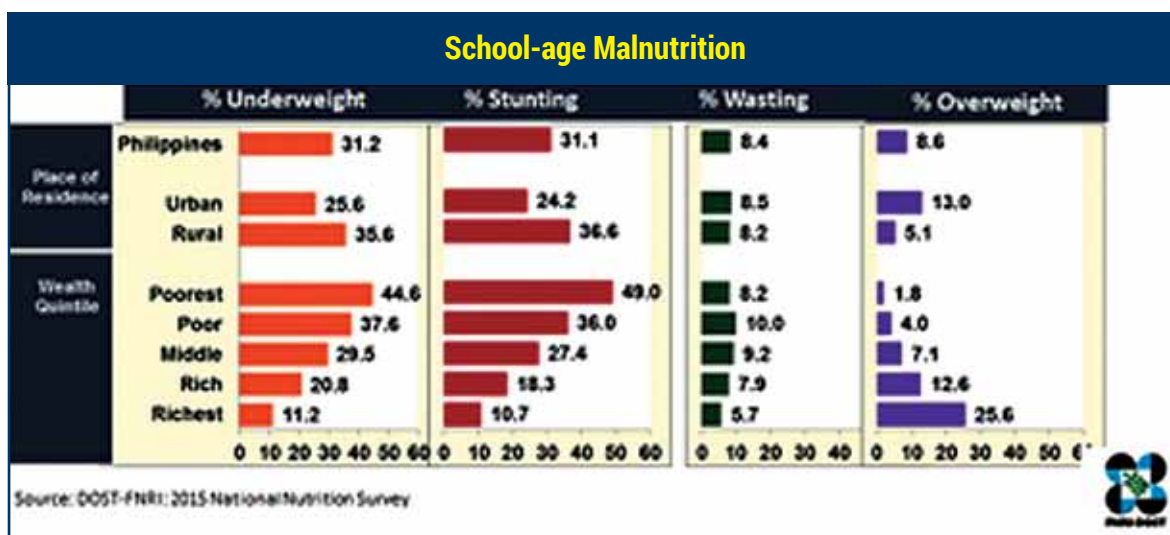


Figure 4. Prevalence of malnutrition among children, 5-10 years old by place of residence and wealth quintile: Philippines, 2003-2015

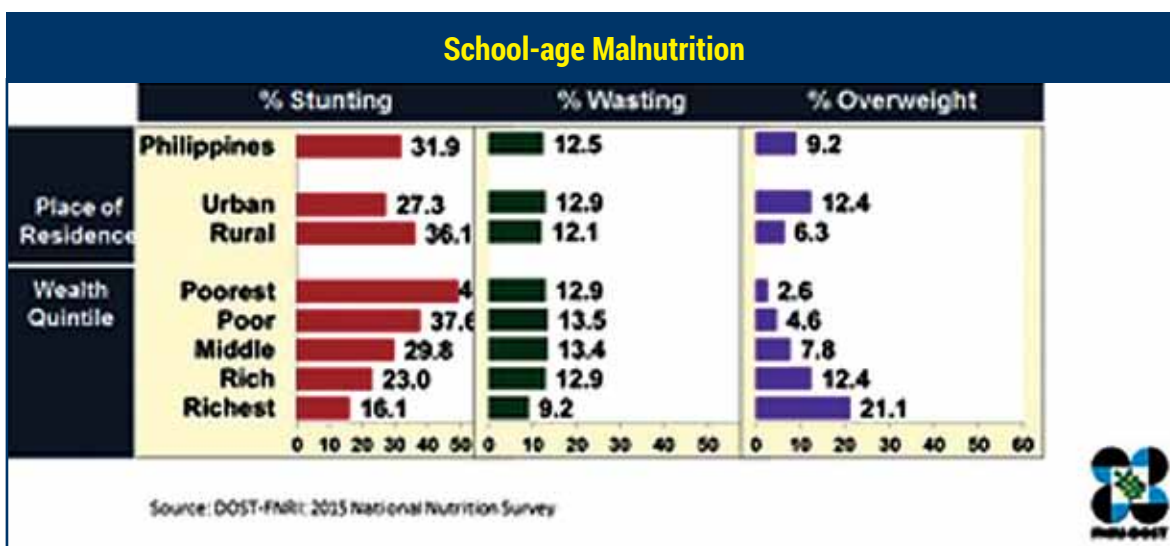


Figure 5. Prevalence of malnutrition among children, 10-19 years old by place of residence and wealth quintile: Philippines, 2015

deficiency and iron deficiency. Iron deficiency (manifested as iron deficiency anemia) is the most common form of malnutrition in the Filipino population, especially in children. (2) While FNRI reports an overall significant decrease in the prevalence of anemia among Filipinos from 19.5% in 2008 to 11.2% in 2013, the most at risk groups were infants 6 months to 11 months old: four out of 10 infants (40.5%) were anemic and are still considered as a “severe” public health problem. One out of 4 (24.6%) pregnant women was anemic and the problem is considered as “moderate” public health significance (3), a factor which may contribute to the infant mortality rate, one of the highest in Southeast Asia (4).

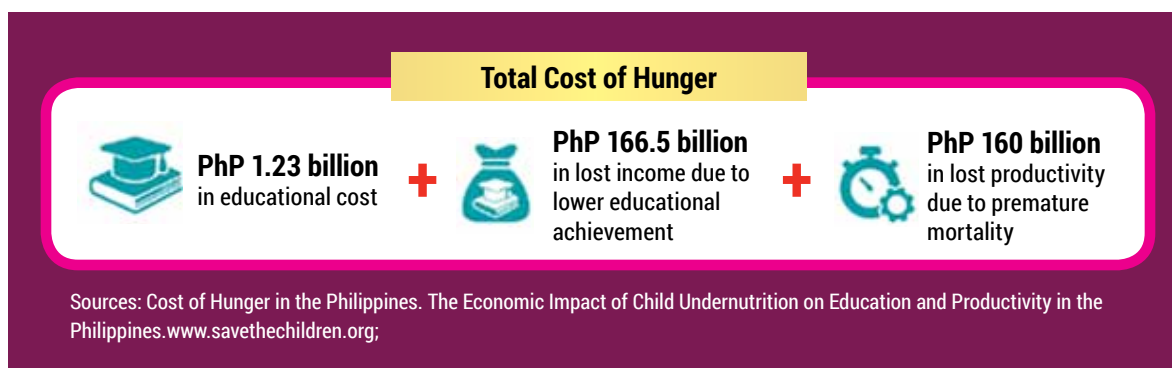


Figure 6. Total cost of hunger in the Philippines.

The Department of Education, Culture and Sports (DepEd) currently has a School Health and Nutrition Program meant to address these malnutrition problems. In particular, one of the program's key areas – Nutrition Support to Learners – consists of 3 components: a School-Based Feeding Program (SBFP), Gulayan sa Paaralan Program (GPP – “Vegetable Gardens in Schools”) and Nutrition Education.

The SBFP provides hot lunches for 120 out of the 200 total school days to Kindergarten up to Grade 6 pupils identified by schools as wasted or severely wasted. Using standardized recipes with locally produced/grown ingredients, the meals are intended to provide each student 300 supplementary calories/day.

The GPP, meanwhile, was mandated for all public elementary and secondary schools. GPP evolved from earlier school garden programs, all iterations demonstrating varying degrees of success. Within the schools tasked to operate the gardens, the main challenges were lack of dedicated school garden budget and lack of technical capacities to address the country's long periods of drought and rainfall. Currently, the DepEd's GPP is under its National Greening Program which aims to contribute to poverty reduction, food security, and climate change adaptation and mitigation.

With its main partners the DepEd and FNRI, the International Institute of Rural Reconstruction (IIRR) undertook a project aimed at enhancing the school feeding, school garden and nutrition education components of the DepEd program; moreover, the project intended to strengthen the integration among these three components. The Integrated School Nutrition Model Project or GarNESupp covers 2 Phases (Figure 7): Integrated Approach to Address Food and Nutrition Security in the Philippines (Phase 1) and Improving Food and Nutrition Security in the Philippines through School Interventions (Phase 2).

Design and strategies

The project was designed with a view towards sustainability and scaling-up: before program implementation, factors likely to affect garden sustainability and the links between school gardens and school feeding programs were carefully analyzed (6).

The project works to enhance the 3 components of DepEd's existing Nutrition Support to Learners by focusing on activities shown in Figure 8.

The purposive strengthening of the integration among school gardens, school feeding and nutrition education entails activities shown in Figure 9.

The main platforms for the integrated school nutrition model are public elementary schools identified as Lighthouse Schools (LSs), referencing their role as centers of learning and hubs of initiatives around agriculture, nutrition and the environment. A Lighthouse School is a designated action research site on integrated school nutrition (decentralized and location-specific). Serving as central nodes for the envisioned scale-up, Lighthouse Schools have been deliberately chosen for their strategic locations in their school districts to serve as models and to facilitate exchange of information, seeds and materials with other surrounding schools.

	Years undertaken	Research agenda	Geographic coverage	Partners
Phase 1	2012-2015	Model Development	Cavite province, 27 Lighthouse Schools	FNRI-DOST DepED
Phase 2	2016-2018 (ongoing)	Fine tuning of model Scaling-up	Region 4A with 5 provinces, 20 school divisions, 58 Lighthouse Schools, (to date) 237 Crop museums	FNRI-DOST, DepED, Dep't. of Agriculture, National Nutrition Council, CSOs/NGOs

Figure 7: Project overview

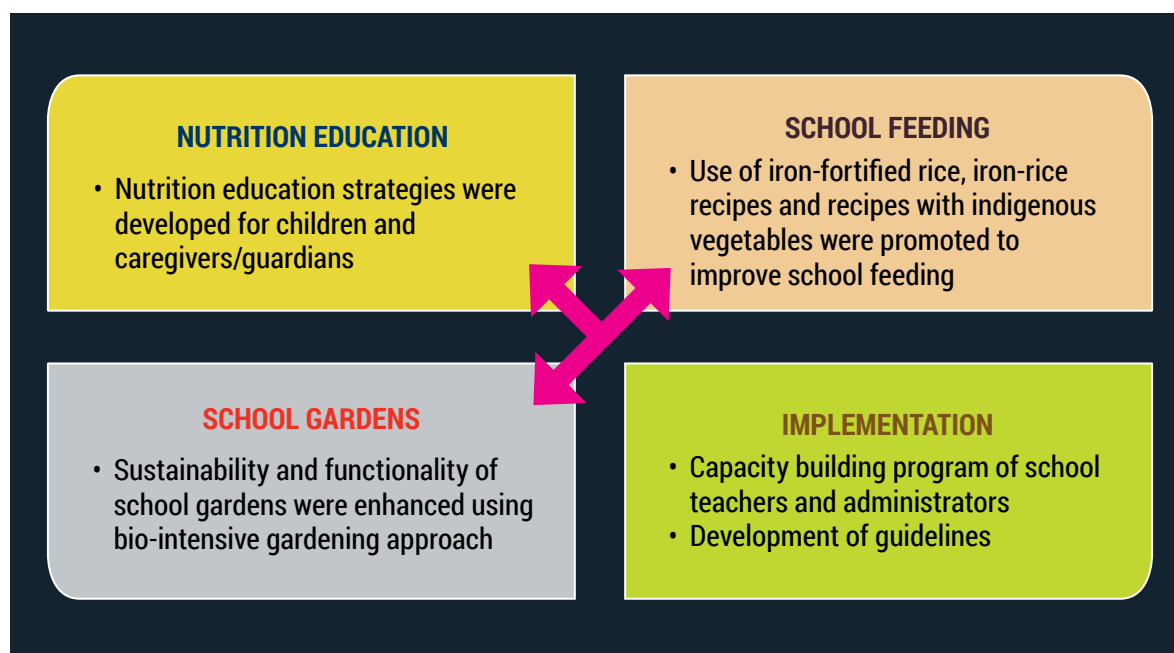


Figure 8. Enhancing program components

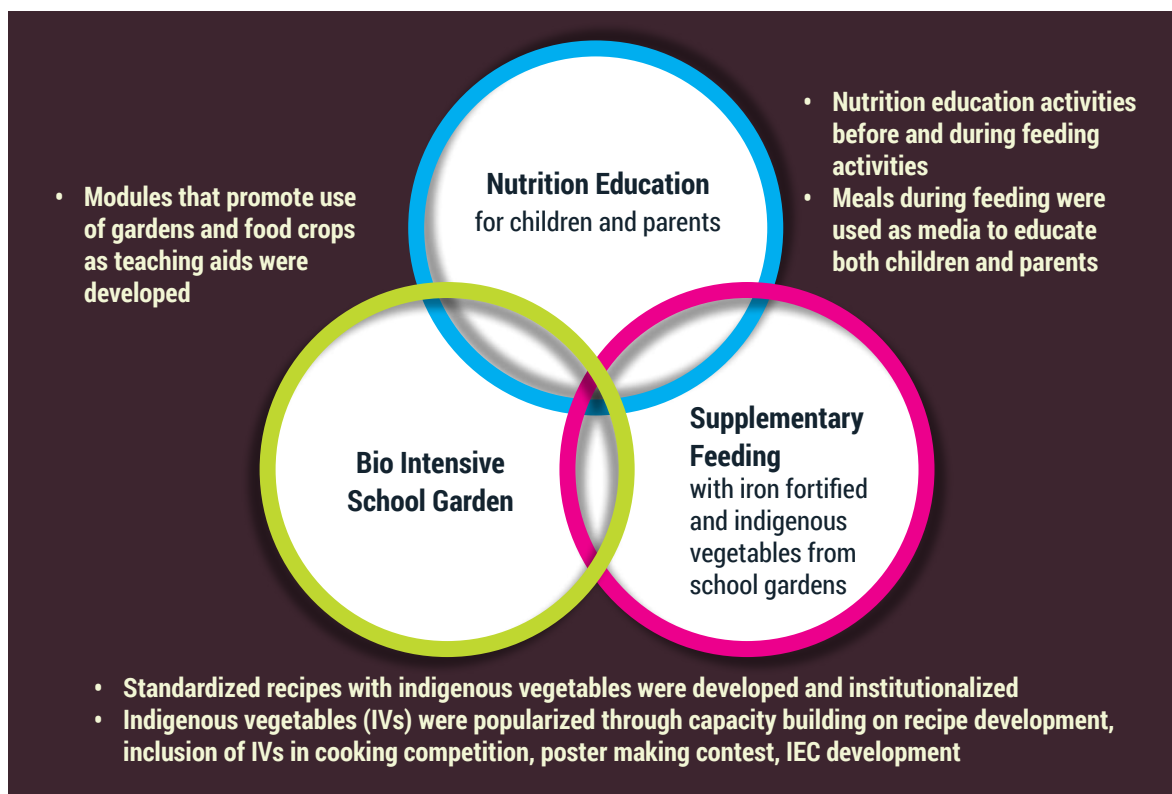


Figure 9. Linking program components

Supplementary feeding

DepEd's regular SBFP is based on a 120-day feeding period, having emanated from other programs on the under 5 and is 80 days short of the regular school year. Further, while a school year is from June to April, funding constraints cause the feeding to typically start in August and end in February/March. When out of the feeding program, beneficiary students were found to markedly revert or regress in nutritional status. Part of the project's Phase 2 work is investigating if and how a 200-day feeding will make a difference through additional meals provided during the summer break using 2 schools as research Cases. However, motivating the students to show up has been challenging.

The Dep-Ed's SBFP guidelines list different modalities to fund and/or deliver meals:

1. DepEd-led where a teacher is designated as Feeding Coordinator; some contractual cooks or helpers are hired and cooking is done in the school kitchen; for 500-1000 target students clustered together, catering services may be hired
2. LGU-led
3. Private company-led
4. Mixed models

The range in delivery mechanisms allows flexibility for schools to make adaptations depending on their circumstances. Moreover, this flexibility promotes collaborations with local governments or the private sector, taking advantage of resources made

available by these partners while creating pathways for larger community efforts towards sustainable production systems and better nutrition.

The fund allocation per eligible student is Php 18.00 (16.00 for food and 2.00 for operational expenses) for the School Year 2016-2017. Parents, teachers, LGUs and private sector entities occasionally augment these funds. From the 2018 DepEd budget of Php613B, Php5.1B is earmarked for SBFP as in the previous year.

In Phase 1, FNRI actively worked with schools to develop 15 menus using indigenous vegetables harvested from the BIGs, including even those initially unpalatable to students. Snack recipes were also prepared to provide healthier options for students, teachers and parents. In Phase 2, FNRI is formulating recipes using iron-rich vegetables for schools with no access to iron-fortified rice.

Bio-intensive Gardening (BIG)

Each LS features a garden which uses the Bio-intensive Gardening technology, an agro-ecological approach that makes best use of available natural resources instead of relying on chemical inputs (6). For over 30 years, IIRR has developed, tested and simplified its BIG technology which promotes alternative food production systems viable even for small land areas. Thus, BIG is suitable for schools and poor households, carrying the potential to address malnutrition at these levels.

Practices include deep-dug, raised beds; minimal tillage; green trees as fertilizers; mixed cultivation (intra and inter species diversity) and companion, succession, and multi-canopy cropping in a “closed-loop, diverse system” (7).

BIG lists a number of benefits (Box 1).

Ideally, each school garden should be developed as a Crop Museum (CM). With the current distribution of LSs, one CM in each school district is targeted. Crop Museums therefore serve as viewing-learning venues for nutritious and climate-hardy, locally adapted crops and as nursery sources of planting materials for nearby schools and

Box 1: BIG benefits

- **Environmentally-friendly.** By using only organic fertilizers like nitrogen-fixing plants or natural pesticides and through multi-cropping, BIG builds soil health.
- **Adaptive to local conditions.** BIG uses locally available materials (indigenous seeds, crops).
- **Low cost.** Does not require use of chemical inputs like fertilizers or pesticides; uses recycled seeds or other plant materials; promotes water conservation
- **Intensive planting and year-round harvesting.** A variety of vegetables and crops can be grown in a small area, allowing for year-round harvests.
- **Contributes to household income.** Excess food crops can be sold to generate income.
- **Dietary diversity and reduced chemical residues** if used for school feeding
- **Experiential learning.** Using BIG practices, school gardens can teach students, teachers and even parents sustainable crop production systems and valuing the environment. (8)

communities. Decentralizing seed saving and planting materials this way promotes garden sustainability.

Mixed cultivation, low external inputs and the use of local seeds further contribute to sustainability of the gardens. Conservation of local indigenous plant species is particularly emphasized because although no longer as popular among farmer-sellers, these crops are hardy and climate-resilient (9).

Currently, a school garden's produce is being used for free in its school meals. The project is studying whether the feeding program can instead buy the produce to generate income to sustain the gardens or to purchase fruits which are not included in the SBSF budgets.

The Agriculture teacher and students maintain the gardens, and schools try to engage local governments and parents in school gardening. It is also worth noting that while a teacher is not formally compensated for working as Feeding Coordinator, many parent-volunteers help in the meal preparation and other feeding activities. Parents are requested to provide feeding utensils for their children. There also donations from community members for purchase of ingredients or building the feeding centers and other infrastructure. These partnerships foster local ownership and social capital essential to scaling-up and sustainability.

Nutrition education

Various IEC materials for students, teachers and parents/caregivers were developed as part of the Nutrition Education component of the project. Teachers were trained by IIRR to integrate relevant content into their lesson plans. Efforts have also been directed at maximizing the potential of the school gardens as an educational tool for academic subjects as well as for promoting healthy diets, although use of the gardens as a learning venue is still weak. IEC materials such as recipe books and posters are distributed to parents/caregivers; those with children receiving supplementary school feeding are invited to attend nutrition modules and learning workshops in the schools.

Phase 2 has been focusing on

- better integration by teachers of nutrition topics into daily lessons
- training teachers on conducting nutrition information sessions with parents during parent-teacher conferences
- helping schools use their gardens as learning tools for academic subjects not customarily related to agriculture such as math and languages
- exploring larger education campaigns during Nutrition Education Month in July (10).

M&E

There is strong awareness by the Project Management Team (PMT composed of key staff from IIRR, DepEd and FNRI) of the value of research and M&E in tracking outcomes and in policy advocacy.

Sentinel Schools (2 schools in Phase 1 and 3 schools in Phase 2) have been identified to serve as main research points for intensive data-collection. General indicators are being tracked for all LSs. Participatory writeshops with key stakeholders have also been organized to document lessons and best practices. The PMT regularly meets to review progress, milestones and challenges (11).

Results for Phase 1 (2012-2015) are summarized in Figure 10.

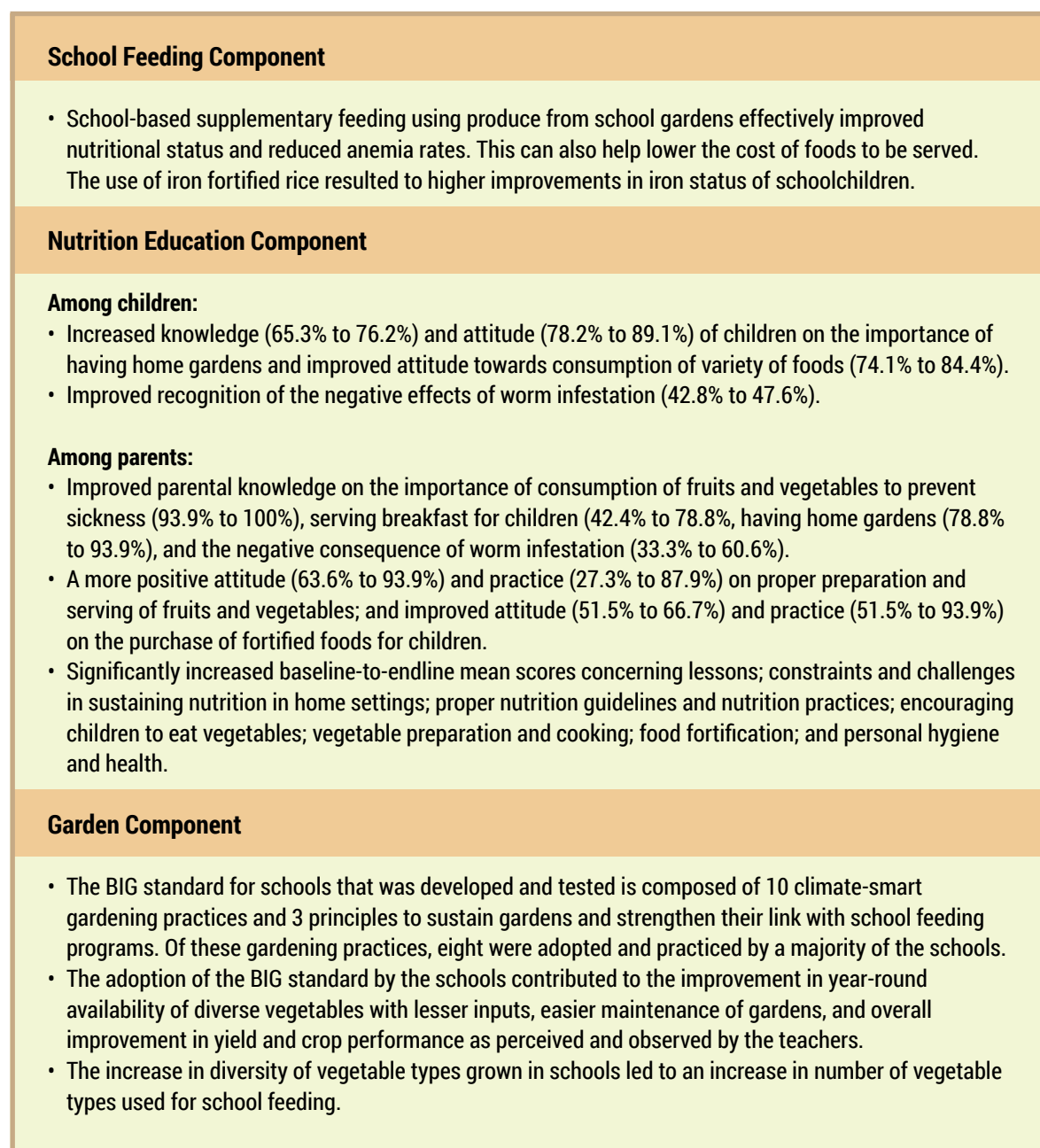


Figure 10: Phase 1 research results

- Adoption and implementation of
 - bio-intensive gardening approach
 - enhanced school-based feeding guideline
 - nutrition education strategies
- Contribution of gardens to feeding and learning
- Output of a 200 sq meter school garden - the savings generated and number of children that can benefit from the produce
- Effects of extended feeding to nutritional status of children
- Modalities of school feeding during school break
- Sustainability mechanisms
- Ways in which the multi-scalar approach facilitates scaling-out/up of nutrition/food security programs

Figure 11: Phase 2 areas for evidence-building

Figure 11 lists the priority areas of research/M&E in Phase 2 which is focused towards institutionalization and scaling-up.

Results are shared through research journals, with key stakeholders and as recommendations to policy-makers.

Policy support

Several legislators have been interested in promoting nutrition-relevant policies but bills on universal school feeding and related legislative frameworks have yet to be passed. A significant policy step was taken within DepEd when it issued in December 2016 the Memorandum No. 223, s.2016: Strengthening the implementation of the Gulayan sa Paaralan Program in public elementary and secondary schools nationwide and accompanying Guidelines on the Implementation of the GPP for Schools with the general objective of promoting *“food security in schools and communities through self-help food production activities and values among learners, and appreciation of agriculture as a life support system.”* In the memorandum for nationwide implementation, BIG and CMs are clearly recognized, as well as the role of IIRR’s expertise in conducting necessary trainings and capacity-building. For example, the document lists:

- “Schools are encouraged to adopt the “crop museum” technology approved by IIRR. This will promote crop diversification and improve sufficiency on the supply of seeds and seedlings.”
- “DepEd shall coordinate with DA-RFU and IIRR in the conduct of trainings. A standardized training module shall be adopted in all regions that will cover topics on vegetable production, urban/container and backyard gardening, organic fertilizer, and seed production and storage. ”

In terms of advocacy with legislators, it was helpful to frame the model as an investment in children’s health and futures, beyond a mere expenditure or budget allocation. “Champions” among senators who were promoting similar platforms were also actively sought by the project leads.

Scale-up and sustainability

Two approaches for scaling-up are being used: the first involves working with the LSs at sub-national levels while the second is directed at national agencies and policymakers. Figure 12 depicts the multi-scalar approach being carried out.

Phase 2 began expansion of the model as envisioned, increasing the initial 27 to 40 LSs in Cavite province and adding 18 more distributed throughout the other 4 provinces of Region 4A.

The LSs and their gardens/CMs naturally facilitate relationships and networking between schools and the larger communities, helping to sustain the program.

The Private Sector, LGUs and CSOs are engaged not only through dissemination of IEC materials but through conferences/dialogues/consultation meetings as well as field visits to LSs to allow them to view actual operationalization of the model. Visits to Sentinel Schools in particular feature results of the focused research being undertaken which can bolster buy-in for partnerships.

At the national level, scaling-up efforts are aimed towards institutionalization of the GarNESupp model by increased programming investments and broadening policy frameworks. Therefore, the project partners and school implementers have devoted proactive efforts toward multi-stakeholder dialogues and advocacy with other key decision-makers within the DepEd, national agencies and bilateral and multilateral donors (Figure 13).

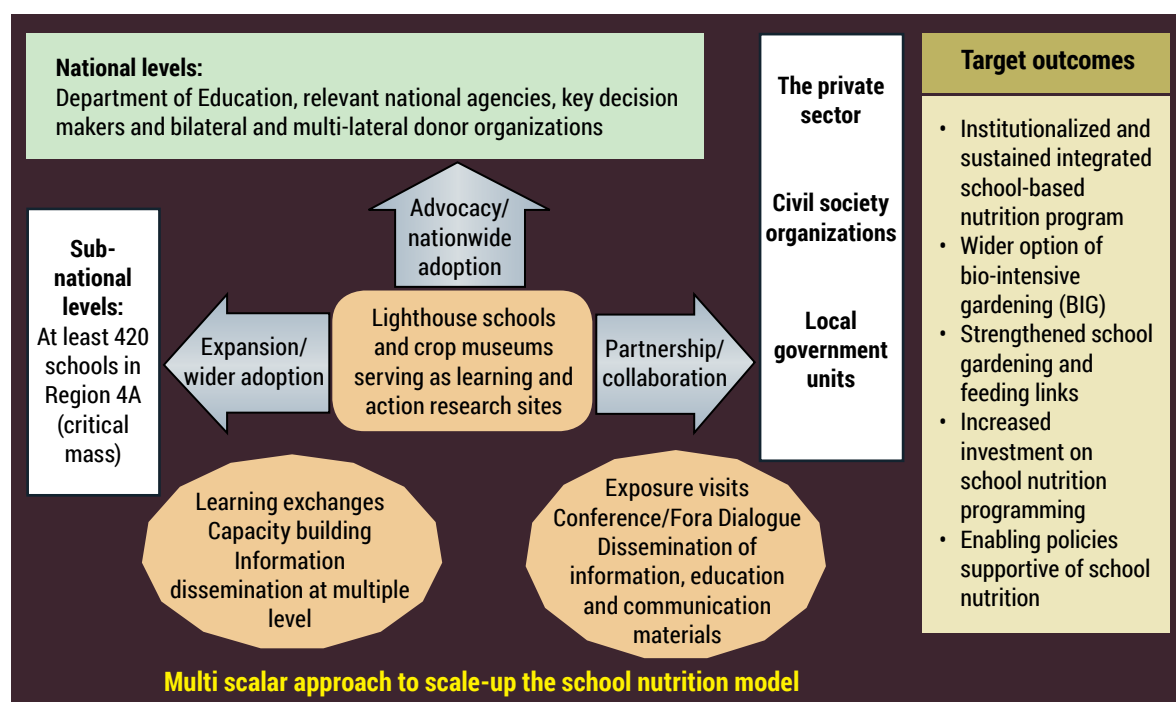


Figure 12. Scaling up approach and target outcomes.

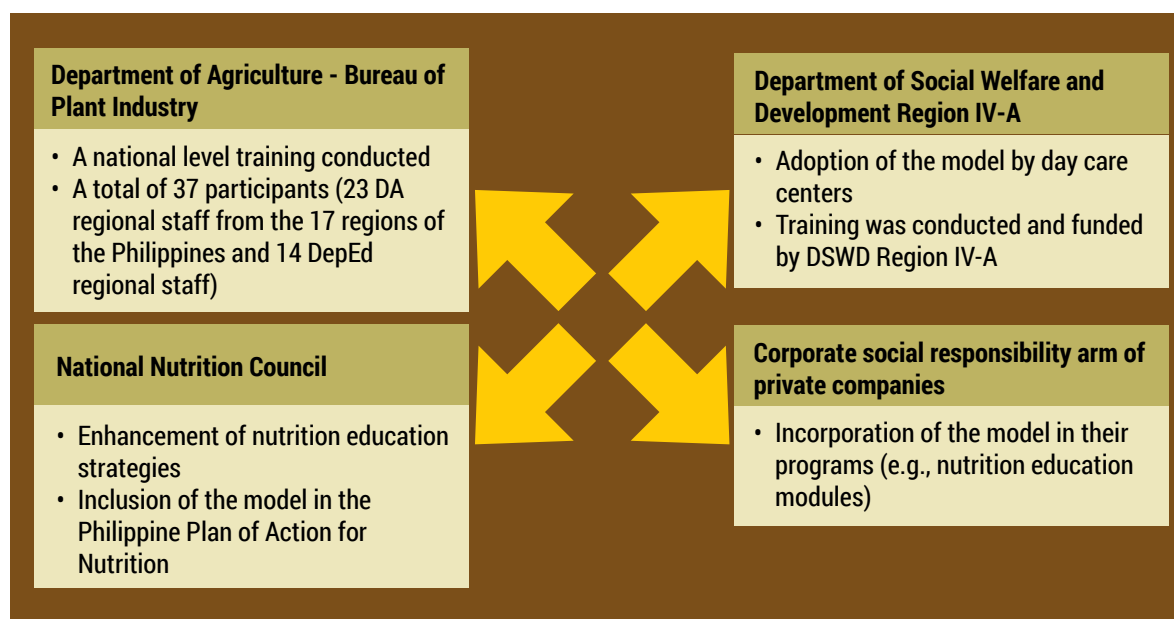


Figure 13. Dialogue with various agencies for partnership and advocacy.

The national-level training of Department of Agriculture Bureau of Plant Industries (DA-BPI) representatives from all 17 regions of the Philippines was an important opportunity to share the integrated model with local implementers of school gardens because this bureau was designated as the focal team within the DA responsible for providing support to the GPP.

Other encouraging developments are the incorporation of the model by the Department of Social Welfare and Development's Region 4A into its day-care program and in the Philippine Plan of Action for Nutrition of the National Nutrition Council.

The project team has also used international conferences/meetings and social media (Facebook) to increase awareness on nutrition issues, heighten project visibility and support advocacy efforts.

The project necessitates a multi-mode capacity building for different levels which includes formal training of school staff and less formal mechanisms such as learning exchanges between schools, field visits and intensive mentoring. An important practice learned early on was that it was critical to ensure the support of local school administrators such as principals and division superintendents for the model to gain traction within the schools.

Good practices/facilitating factors

- School gardening program is a DepEd national program.
- Agriculture is part of the curriculum (grades 4-6).
- A growing number of legislators are advocating for increased investment (budget allocation) in nutrition /school feeding program.
- Strong partnership with relevant government agencies.

Challenges/opportunities for action

- Implementation of school feeding is affected by absence of designated personnel to manage the feeding center.
- Use of school gardens as learning venue is still weak.
- Agriculture being a minor learning area was for a time deprioritized.
- Different levels of interest among school-level and division level staff.
- Documentation (school-level) and tracking of outcomes is still a challenge – simple system is needed

Lessons learned

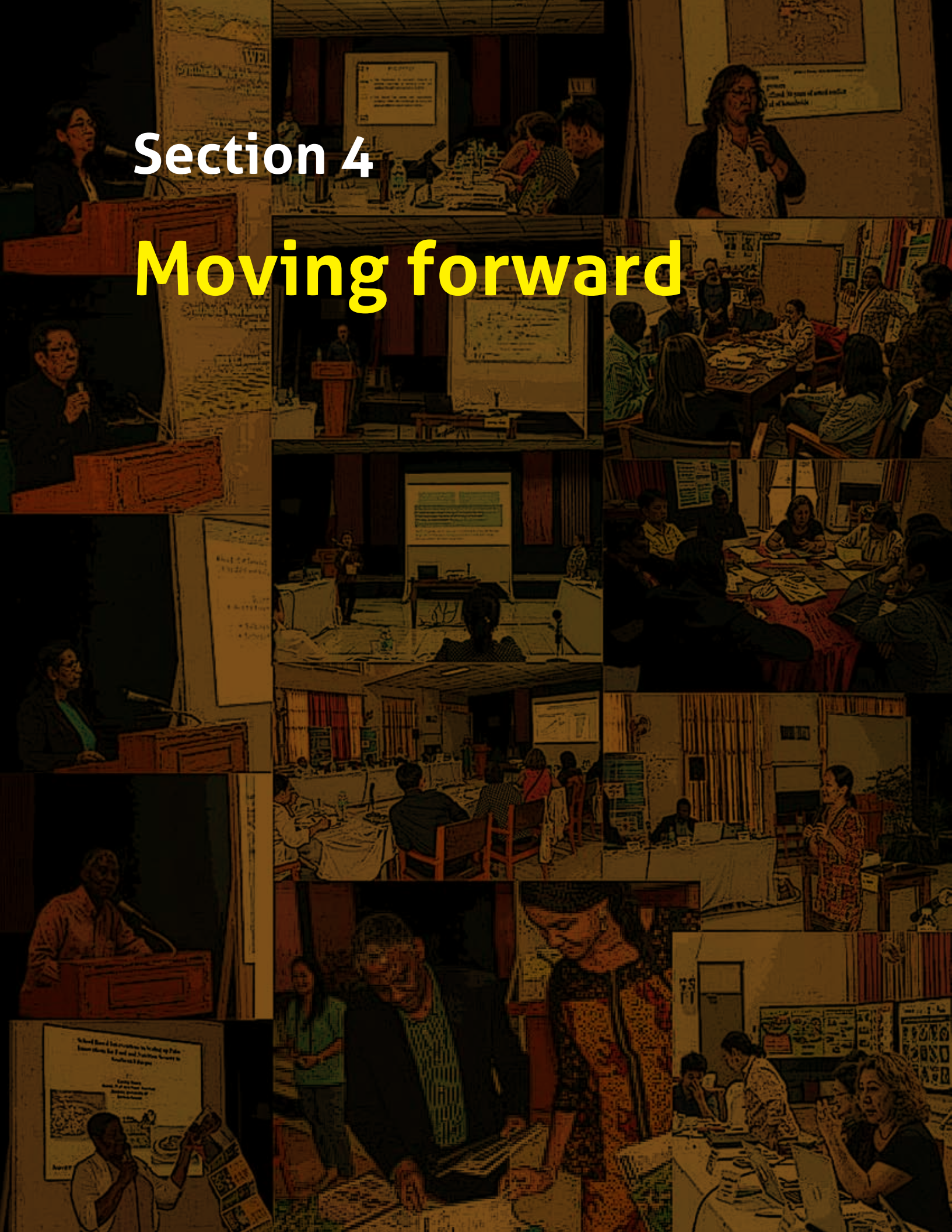
- Integrated approach to nutrition interventions in schools results to better nutritional outcomes. i.e. GarNESupp, complementarity of Nutrition specific and Nutrition sensitive programs
- To sustain nutritional gains, behavioral change towards adoption of good eating habits and nutrition practices needs to be achieved. Campaigns draw excitement but long term, institutionalized, creative and tailor-fit nutrition education programs i.e. integration in the curriculum, learning by doing approaches to nutrition education for parents, are warranted.
- Agro-ecological gardening approaches such as the BIG, combined with various capacity-building activities, advocacy, intensive mentoring and monitoring of key people, and distribution of IEC materials are seen as a viable way to revive, restore, and eventually sustain school gardens while also linking them with ongoing school-based supplementary feeding programs.
- Gardens can serve as repositories for the conservation and reintroduction of native/ local varieties of legumes, green leafy vegetables, root and tuber crops, and others that are nutritionally rich for supplementary feeding and home use.
- Using schools as platforms for integrated nutrition interventions is both effective and innovative.
- Evidence-based advocacy facilitates upscaling. Benefits/results generated from research serve as basis for buy-in of key stakeholders.
- Model schools / “Lighthouse Schools” can be effective focal points for out-scaling provided that they have guidelines / tools to refer to and capacities are built.
- Partnerships, relationship building, persistence, visibility are ingredients of scaling-up

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Section 4

Moving forward



Moving Forward

This publication, *Leveraging nutrition outcomes in schools*, resulted from a synthesis of school feeding and school gardening case studies from eight countries sponsored by the International Development Research Center, Ottawa, Canada. There is a growing consensus that schools are effective platforms for demonstrating the relevance of nutrition sensitive food systems. School can help nurture and develop healthy diets, lifestyle changes and lifelong healthy habits, and consumer behaviours.

There is now a recognition of the multi-sectoral nature of school nutrition. This implies the engagement of inter sectoral and multi-disciplinary approaches that transcend health, nutrition, agriculture, and environment dimensions. Of equal importance in successful school nutrition intervention is the role of improved coordination and partnerships.

The persistence of poverty and malnutrition in many parts of the world is a great problem for governments, politicians and the citizenry. The double burden of malnutrition (chronic under nutrition and diet associated diseases and obesity) has drawn the development community together. There is a new momentum for nutrition in recent years. The development community is challenged by this new recognition of the importance of school platforms, requiring that it come up with innovations, to establish evidence and to develop tools, expertise and capacity for model building.

Economists and nutritionists are making the distinction between nutrition-specific (which has received the most attention and much of the resources) and nutrition-sensitive programming. A complementary intervention like school feeding and school gardening proves to deliver better nutrition outcomes. The need for dedicated and tailored strategies for these different pathways is now better understood.

There is now evidence of the value of efforts at the school level, and, of the links with homes and communities. Connections and links with gardens, home gardens and farm based sourcing of commodities are helping enhance the quality and sustainability of school nutrition interventions.

Children and adults need to make the right choices and modify dietary practices, while making the necessary life style changes at an early age. Nutrition education, food education and environmental education are the critical weak elements, without which sustainability of good practices might not be assured. Better nutrition for school kids, complemented by better nutrition in the homes will improve school attendance and educational achievement, help change behaviours that lead to better life styles and in the long run break inter-generational poverty and associated debilities.

This compilation and synthesis has relied on cases: real examples of efforts to operationalize ideas and concepts from across the main regions of the world: Africa, Latin America, Southeast Asia, South Asia, The Caribbean and China. Valuable lessons have been derived and generalization drawn. Hopefully these efforts will inspire other programs/initiatives to document, share and advocate for better school based nutrition interventions. New opportunities await health and well-nourished school children. Indeed schools have that special opportunity for enabling these changes.



Emilita Monville Oro

Country Director, Philippine Program
International Institute of Rural Reconstruction

Annex



Detailed Program of Activities

November 7 - 9, 2017

November 7, 2017 (Tuesday)

Time	Activity
6:30 AM - 7:30 AM	Breakfast
7:30 AM -8:30 AM	Depart from Taal Vista hotel to workshop venue (Yen Center)
8:30 AM -9:30 AM	Registration Setting of Booths for the Market! Market!
9:30 AM-10:00 AM	Opening program Welcome Remarks: <i>Emily Monville Oro, Country Director, Philippine Program, International Institute of Rural Reconstruction (IIRR)</i>
	Message from the Department of Education
10:00 AM -10:30 AM	Performance from the Sisters of Mary Girstown Handbell ringers "Market! Market!"
10: 30 AM -11:00 AM	Introductory activities - Getting to Know You! - Levelling of Expectations - Workshop Overview <i>Irish Baguilat, Program Manager, Food and Nutrition Security, IIRR</i>
11:00 AM – 12:00 AM	Setting the Tone: Food and Nutrition Security: Issues, Challenges and Initiatives Panel discussion Food and Nutrition Security and IDRCP rogramming <i>Annie Wesley, Senior Program Specialist, Agriculture and Food Security, International Development Research Centre, (IDRC) Ottawa, Canada</i> Asia's Perspective on School Nutrition <i>Mario Capanzana, Director, Food and Nutrition Research Institute, Department of Science and Technology (FNRI-DOST)</i> Climate Change Adaptation: Leveraging Nutrition Contribution of Agriculture <i>Julian Gonsalves, Senior Program Adviser, International Institute of Rural Reconstruction (IIRR)</i> Reactor <i>Corazon Barba, Professor Emeritus of the Institute of Human Nutrition and Food, University of the Philippines Los Banos, and a Nutrition Consultant of the United Nations World Food Programme-Philippines</i>

Time	Activity
12:00 NOON – 1:00 PM	Lunch
	Sharing of models and experiences – PART 1 Moderator: Maria Corazon Dumlao
1:00 PM -1:30 PM	Brazil experiences in Strengthening of School Feeding Programmes in Latin America and Caribbean <i>Najla Veloso, Project Coordinator, FAO - Brazil</i>
1:30 PM -2:00 PM	India experiences on School Based Food Security Interventions <i>Annie Wesley, Senior Program Specialist, Agriculture and Food Security, (IDRC) Canada</i>
2:00 PM -2:30 PM	Nutrition and Food Security in Rural China: Experiences from School Feeding System <i>Zhao Chen, Deputy Director for the Center for Child Development, China Development Research Foundation</i>
2:30PM – 3:00 PM	Discussions
3:00 PM – 3:15 PM	Break
	Sharing of models and experiences – PART 2 Moderator: Imelda A. Agdeppa
3:15 PM -3:45 PM	Ethiopia: School based interventions in Scaling-up Pulse Innovations for Food and Nutrition Security in Southern Ethiopia <i>Carol J. Henry,; Associate Professor/Assistant Dean Nutrition and Dietetics, College of Pharmacy and Nutrition; University of Saskatchewan</i>
3:45 PM -4:20 PM	Nigeria and Benin: Empowering secondary schools, through the Young Vegetables Scientist Club <i>Jacinta Ifeyinwa Uramah, Director, The Green Generation, Nigeria</i> GOUDA Abdoul-Ibrachi, Executive Director (Project Manager), Association for Research and Promotion in Fisheries Integrated NGO (AR2PI NGO), Benin
4:20 PM -5:15 PM	Discussion
5:15 PM -6:00 PM	Visit to IIRR's Bio-intensive Garden
6:00 PM -8:00 PM	Welcome dinner and socials

November 8, 2017 (Wednesday)

Time	Activity
6:30 AM - 7:30 AM	Breakfast
7:30 AM	Depart from Taal Vista hotel to workshop venue (Yen Center)
8:30 AM - 9:00 AM	Preliminaries: Recap of Day 1 Sharing of models and experiences – PART 3 Moderator: Jerome Montemayor
9:00 AM - 9:30 AM	Colombia: Scaling up the Production of More Nutritious Yellow Potatoes in Colombia <i>Teresa Mosquera, Facultad de Agronomia, Universidad Nacional de Colombia</i> <i>Kate Sinclair, Plant Science Department, McGill University; Ste. Anne de Bellevue, Quebec, Canada</i>
9:30 AM - 10:00 AM	From Farm to Fork: Solution Approach to Improving the Nutrition in the Caribbean Community and Health of CARICOM Populations - School Based Interventions <i>Leroy Phillip, Associate Professor (retired), Department of Animal Science, McGill University MacDonald Campus; Ste-Anne-de-Bellevue, Quebec, Canada</i>
10:00 AM - 10:15 AM	Break
10:15 AM - 11:45 AM	Philippines: Scaling Up the Integrated School Nutrition Model: Gardening, Supplementary Feeding and Nutrition Education <i>Rizalino Jose T. Rosales, Director, Bureau of Learner Support Services, Department of Education, Pasay City, Philippines</i> <i>Imelda Angeles-Agdeppa, Assistant Scientist, Food and Nutrition Research Institute-Department of Science and Technology(FNRI-DOST) , Taguig City, Philippines</i> <i>Emilita Monville, RN, MPH, Country Director, Philippine Program, International Institute of Rural Reconstruction (IIRR), Silang, Cavite, Philippines</i>
11:45 AM - 12:15 PM	Discussions
12:15 PM - 1:00 PM	Lunch
1:00 PM - 4:00 PM (1-hour travel, we will pass through 2 cities namely Dasmarinas city and Gen. Trias City)	Field visit to one of the lighthouse schools: Integrated school nutrition model - Bio intensive school garden, supplementary feeding, nutrition education Name of school: Julugan Elementary School, Tanza, Cavite Visit to school garden, feeding center and exhibit area Sharing from the Department of Education
4:00 PM - 5:00 PM	Travel back to Tagaytay
5:00 PM - 8:00 PM	Dinner out in Tagaytay

November 9, 2017 (Thursday)

Time	Activity
6:30 AM - 7:30 AM	Breakfast
7:30 AM - 8:00 AM	Depart from Taal Vista hotel to workshop venue (Yen Center)
8:00 AM – 9:00 AM	Preliminaries Recap of Day 2 Feedback on the field visit
9:00 AM -11:00AM	Reflection and synthesis Participant Reflection Workshop Synthesis <i>Dr. Corazon, Barba</i> Wrap up and evaluation
11:00 AM -12:00 AM	Closing program
12:00 AM-1:00 AM	Lunch
1:00 PM– 3:30 PM (1-1.5 travel time)	Travel to Manila: Visit to Food and Nutrition Research Institute – Department of Science and Technology
3:30 PM onwards	Free time Overnight in Somerset Olympia-Makati

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Synthesis Workshop: November 7 – 9, 2017

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