

Case study 7

Diversifying diets: using agricultural biodiversity to improve nutrition and health in Asia

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Background

Malnutrition, including micronutrient deficiencies, is a serious public health problem among women and children throughout Asia. Underweight among preschool children in Bangladesh, Cambodia, Nepal and the Philippines is 41 per cent, 36 per cent, 39 per cent and 21 per cent respectively (NIPORT, 2009; NIS, 2011; MOHP, 2012; NSO, 2009). Anaemia and vitamin A deficiencies are also widespread, with anaemia affecting over half of children between 6 and 59 months and pregnant women in these countries (WHO, 2012). Hunger and malnutrition have consequences for survival, cognitive function, physical capacity, resistance to disease, quality of life (Victora et al., 2008) and lifetime earnings (Hoddinott et al., 2008), while low dietary diversity is associated with both poverty and stunting (Black et al., 2008).

Helen Keller International's Homestead Food Production (HFP) programme was developed in Bangladesh and later expanded to Cambodia, Nepal and the Philippines to diversify household-level agricultural production as a means to diversify dietary intake. The model introduced new varieties while preserving and promoting indigenous varieties of plants as well as poultry and livestock, emphasizing a wide range of production in order to maximize success under varying biotic, edaphic and climatic conditions; reduce the risk of loss due to pests, disease, and climate change and variability; and optimize the nutritional status of household members through consumption of a broader spectrum of macro and micronutrients and phytochemicals. Recognizing the importance of diversified agro-ecosystems, the design intentionally promotes and supports growing a variety of species year round.

The benefits of agricultural biodiversity: why, what

While the primary objective of the HFP programme is to improve food security and nutrition by promoting more diversified diets, there are clear mutually reinforcing benefits between agricultural biodiversity and human nutrition.

Helen Keller International's (HKI) first pilot home gardening programme was launched in Bangladesh in 1988 after a national blindness survey showed that households with kitchen gardens were less likely to comprise night-blind children (a clinical sign of vitamin A deficiency – VAD). The objective of the first HFP programme was thus to reduce VAD in women and children by increasing production and consumption of nutrient-rich fruits and vegetables. Within two years of the intervention, over 90 per cent of the families targeted by the pilot study were producing vegetables and fruits high in vitamin A, including carrots, spinach, amaranth and papaya year round, with vegetable consumption in the target households increasing from 5.8 to 7.5 kg per week, compared with a modest increase of 5.1 to 5.4 kg among control households. Soon after, when a study in Indonesia (de Pee et al., 1998) showed low bioavailability of beta-carotene in some plant sources, HKI integrated small animal husbandry into the model. The model has been scaled up in Bangladesh and expanded to Cambodia, Nepal, the Philippines and Indonesia. More recent surveys in the Barisal division of Bangladesh confirm the uptake findings with the practice of improved (diverse, year-round) homestead food production increasing from < 1 to 89 per cent of households between 2004 and 2009. The volume of production and the number of varieties in participating households was also found to increase, with improved home gardens producing on average 45 varieties of vegetables compared with 10 in households with traditional gardens (Talukder et al., 2010).

To diversify production systems, the HFP programme encourages the conservation of indigenous varieties of fruits and vegetables (de Pee et al., 2010), particularly underutilized species, and the introduction of micronutrient-rich species from similar agro-ecosystems to complement and improve increased intake of a wide range of nutrients. Improved local breeds of poultry are promoted as animal-source foods in addition to fish. In Asia, HKI promotes more than ten infrequently cultivated indigenous varieties of vegetables and fruits. These include varieties of mint (*Mentha* sp.), black arum (*Xanthosoma atrovirens*), kangkong (*Ipomoea aquatica*), pigeon pea (*Cajanus cajan*), drumsticks (*Moringa oleifera*), helencha (*Enhydra fluctuans*), Thankuni pata (*Centella asiatica*), neem (*Azadirachta indica*), basil (*Ocimum* sp.), country bean (*Lablab niger*), cowpea (*Vigna* sp.), taro (*Colocasia esculenta*), and coriander (*Coriandrum sativum*). Some of these are leguminous plants promoted to enhance soil nitrogen; others act as organic insect repellents. Because they are locally adapted, these plants do not require significant labour or other inputs, yet contribute to a healthy agro-ecosystem as well as nutritional diversity.

The benefits of agricultural biodiversity: how

HKI promotes the HFP model by establishing demonstration plots on local farms to showcase low-cost, low-risk cultivation practices to households interested in making the transition from traditional to more diversified vegetable, fruit and animal production. Farmers with adequate land and a

demonstrated commitment to the project are selected by community leaders and trained by HKI to set up and run Village Model Farms (VMF) that provide training and demonstrations on improved agricultural techniques, technologies and poultry production activities for households participating in the programme (typically between 20–40 households per VMF). Furthermore, the VMF are used as production centres, providing targeted households with low-cost quality seeds, seedlings, saplings of locally available fruit, shade and multipurpose trees and local or improved breeds of chicks. Model farmers are trained to provide technical training on seed production and storage to ensure sustainable cultivation in subsequent planting seasons. Because of their important role in household food preparation, women are the main targets for training and technical assistance, while community support for women's leadership is carefully cultivated.

Nutrition education, based on the Essential Nutrition Actions (ENA)¹ framework, is also a fundamental component of the HFP model. Trained health staff and volunteers working at the village level lead nutrition education discussions and provide counselling to support mothers to adopt healthier practices, including the consumption of nutritious foods from the HFP during pregnancy and lactation, optimal breastfeeding and complementary feeding for infants and young children. Other elements of the behaviour change communications strategy include cooking demonstrations, engagement of fathers and grandmothers, community mobilization events and mass media messages to reinforce knowledge and support changes in community norms around nutrition. These multi-channel communication strategies reinforce awareness and adoption of improved nutrition practices.

Local community-based organizations (CBOs) are fundamental to the sustainability of the programme, as are government and non-governmental agents from agricultural, health and other sectors who are mobilized to disseminate key messages and reinforce improved practices. Group marketing strategies have helped small producers to access markets, increasing household income and livelihood options. This, in turn, helps to perpetuate the use of improved practices. Sharing, collaboration, community mobilization, mutual support and building on local organizations are also critical. Personnel from these local structures are trained to lead the initial implementation and are prepared to provide additional inputs and technical advice to help sustain the work in the communities after external support is withdrawn.

The benefits of agricultural biodiversity: health impacts

Substantive evidence exists on the role of the HFP model in contributing to improved household food security and nutrition status (Bushamuka et al. 2005). Pooled data from across the four countries in Asia, where the programme has the longest history, showed decreases in anaemia prevalence among children aged from 6 to 59 months in all programme communities, including significant differences in Bangladesh and the Philippines, and

Box C7.1 Sona Chaudhary, age 40, Nepal



Figure C7.1 Village model farmer in Nepal. Photo: ©Helen Keller International/George Figdor

Sona Chaudhary is a village model farmer living in a joint family made up by her husband, two brothers-in-law, two sisters-in-law, a grandson and a granddaughter. Her husband, a day labourer, is rarely home, so she has to manage many household responsibilities herself.

Sona and her family were selected to manage the village model farm as she met the minimum land requirements, was respected by the women in her village, and expressed a willingness to share knowledge and provide assistance to others. Sona received an intensive three-day training from HKI's USAID-funded AAMA project (*aama* means mother in Nepali) covering organic agriculture, planning for year-round diversified production and mentoring others in newly acquired skills.

Sona reports that prior to training received by HKI her family had very limited knowledge of vegetable production and animal husbandry, as well as of the production and application of compost manure. Her household's home garden covered an area of 65m², grew six crops – dark green leafy vegetables [DGLV] amaranth and taro; orange-fleshed pumpkin; potato, chilli and onions – and production did not meet her family's consumption needs. The family had one hen and one rooster that were allowed to graze freely with no protective coop, at high risk of predators and disease.

Through her participation in the project, Sona's garden has expanded to 1,000 m² and now produces six varieties of DGLV, including mustard leaf and spinach, carrots and mangos, in addition to pumpkin, cauliflower,

cabbage, garlic, radish, green beans, broccoli and eggplant. Vegetable production is now year round. Poultry numbers have risen to 24. The fowl are well protected by a coop and are systematically vaccinated thanks to improved links with government extension services. Sona produces fertilizer from compost, pesticides using organic compounds from the garden and has been able to afford an electric pump for irrigation. Income from surplus production has also allowed her to invest in her children's education as well as in health care.

Sona is grateful for the confidence and leadership skills she gained through the training, which has enabled her to hold meetings with other women farmers, to share knowledge and techniques for improved homestead food production and nutritional practices.

greater differences in programme compared with control communities, even though intergroup differences were not statistically significant (Talukder et al., 2010). Surveys in Bangladesh also documented increases in dietary diversity (measured as consumption of at least three food groups² on at least three of the previous seven days) from 34 to 62 per cent among women and from 43 to 86 per cent among children aged 6–59 months. Similar outcomes were achieved in other settings, including Cambodia and Nepal. Research is currently under way in Nepal to test the impact of the intervention on child growth. At the same time, a review by the International Food Policy Research Institute of HKI's nearly 20 years of support for HFP intervention in Bangladesh recognized that the programme improved food security for nearly 5 million vulnerable people in diverse agro-ecological zones, increasing both the variety and quantity of production (Iannotti et al., 2009). Evidence from Cambodia indicates that household consumption of dark green leafy vegetables, orange vegetables and fruits, overall household dietary diversity scores and egg consumption among children increased significantly more in intervention households from baseline to end line compared with controls. Pooled analysis of data from Bangladesh and Cambodia suggests that among households with improved gardens, children consumed a mean of 13 types of vegetables compared with only four where cultivation was traditional, and the frequency of vegetable consumption was 1.6 times higher (Talukder et al., 2010).

HKI has recently begun to translate this model of biodiverse household production to sub-Saharan Africa, with an initiative under way in Burkina Faso and another planned in Tanzania. The arid climate, poor soils, and migratory labour demands on staple crop production in the Sahel pose significant challenges to the approach. Nevertheless, while year-round production may not be possible, evidence to date shows that diversified agriculture production and consumption is possible and equally critical in these settings.



Figure C7.2 Village model farmer and son in Cambodia. Photo: ©Helen Keller International/Wendy Lee

Scale-up efforts and challenges

In Asia the positive impact of the HFP intervention on food security, dietary intake and nutritional status of household members has captured the attention of governments and development partners who have begun to scale-up efforts to other food insecure areas. In Bangladesh, where over 1 million households (approximately 5 million people) benefited from HFP interventions, the Government has provided additional funding to the programme and implemented the HFP model through government extension services. Efforts to scale-up the approach under relevant national agricultural strategies, nutritional and food security strategies, policies and programmes are also being pursued in Nepal and Cambodia. The model in Nepal was initially implemented on a small scale. In 2008, the United States Agency for International Development (USAID) supported a new phase to incorporate ENA as the nutrition education approach and to refine, replicate and evaluate the model in two districts of the Far Western Region. Based on initial promise, USAID provided further support to expand to two additional districts and also to allow the government and development partners to undertake multi-sectoral planning. More recently, an effort has begun to extend the model to food insecure areas in 20 more districts.

In Cambodia, the programme has covered 12 (out of 75) of the most food insecure districts within five provinces and is currently being replicated in an additional province, along with testing the added value of mixed pisciculture in the model. The Council of Agricultural and Rural Development under the Council of Ministers is seeking to replicate this programme in other food insecure provinces, while the Commune Councils now include the approach

in their annual development plans and are directly involved in monitoring and evaluation. In the Philippines, Local Government Units have provided funding to expand the HFP practices to additional households and provinces, while in Indonesia the programme is in the pilot phase.

Current challenges to scale-up include establishing reliable input supplies; addressing soil infertility; lack of water and the need for site-specific irrigation systems; developing adequate management skills and support systems (with a multiplicity of partner NGOs); establishing on-going programme monitoring to identify and correct problems early (and transferring these tools to local partners); and promoting optimal maternal and young child nutritional intake through behaviour change communications. In addition, in Bangladesh in particular, understanding the multifactorial contributors to undernutrition and the local social and cultural constraints faced by women has been critical (Talukder et al. 2000).

Stakeholder involvement

Local government, CBO and community engagement and leadership are crucial to the success and sustainability of the HFP programme, as is collaboration involving not only the health and agriculture sectors, but also local development, education, women's development, and water and sanitation. In Bangladesh alone, HKI has forged relationships with more than 150 diverse local NGOs who co-finance activities and build community ownership. In Nepal, planning includes all relevant government sectors. Moreover health agents are included in agricultural training programmes while nutrition education is provided to agricultural extension agents to help encourage integrated approaches and build mutual appreciation of the benefits of diversification.

In all settings HKI engages local, provincial and district authorities in the planning and supervision of the programme. Local agriculture and health authorities and government representatives facilitate HFP activities at the local level, while steering/advisory committees ensure engagement at the district and provincial levels. At the national level, in some countries, coordinating councils have been successfully established. External support from bilateral donors and the private sector has also provided vital resources.

Policy impact

In Nepal, the success of the model and HKI's engagement in national policy have led to policy impact at the national level. The new phase of the programme aims to strengthen the capacity of the ministries of health, agriculture and planning to conduct coordinated, multi-sectoral planning that link agriculture to nutrition and health outcomes and implementation of programmes that strengthen small-holder agriculture, livelihoods, food security, nutrition and health. The project is working at district, regional and national levels to harmonize efforts of donors investing in agriculture and nutrition in Nepal. This broader, integrated vision

Box C7.2 Local NGO partner Prey Veng, Cambodia

One of HKI's key NGO partners in Cambodia is the Organization to Develop Our Village (ODOV), an independent, non-profit, community-based organization that has been operating in the country since 1995 and working in Prey Veng province since 2004. Criteria for partnering with HKI include at least two years on-the-ground experience in target regions, experience supporting income-generating activities, ability for modest cost-sharing in project implementation, and willingness to integrate homestead food production into the organization's core community development strategies (rather than implementing it as a free-standing activity).

Even before its partnership with HKI, ODOV's mission was to implement integrated community development programmes to improve the living standards of vulnerable households through improved food security, health and nutrition, community finance, income generation through off-farm promotion, school gardening, and commune council administration and reform activities. ODOV has collaborated with HKI since the end of 2009 to implement a homestead food production programme (HFPP) in 300 selected villages in three districts of Prey Veng, which currently reaches 3,300 households. HKI provided technical and management training to ODOV staff to strengthen their capacity to assume long-term responsibility for supporting and expanding the programme after HKI involvement, which generally ends at a day-to-day level after three years. Technical training covers homestead food production as well as nutrition education (using the Essential Nutrition Actions framework), while institutional strengthening covers financial management, programme management, monitoring and evaluation. Local partners are engaged from the very start in strategic planning, situational analysis, and baseline data collection to ensure their ownership of programmes and contributions to crafting local approaches and sustainable systems. About half of ODOV's full complement of 25 staff has supported implementation of HFP in Prey Veng.

As the project was coming to a close at the end of 2011, HKI conducted a rapid organizational assessment of ODOV. The NGO has mobilized resources from other donors to expand the HFP approach to neighbouring villages, and HFP is now an integral element of ODOV's core programme.

should support the scale-up of programmes like HFP that promote ecological approaches to production, biodiversity, dietary diversity and improved human and agricultural health. Leaders in Bangladesh, Cambodia and the Philippines have also incorporated the approach into annual development plans to improve agricultural production and nutrition. In Cambodia, the government is working with donors to mobilize additional resources for expansion of the model.

Key lessons learned

- Small-scale, diversified agriculture can be highly productive, sustainable, improve livelihoods, nutritional status and well-being in multiple ways, while promoting good stewardship of natural resources.
- Women play a necessary and key role in HFP as they translate inputs and technical training into improved household nutrition.
- Strong partnerships with a range of local community-based organizations ensure that HFP builds on and enhances local practices, is compatible with socio-cultural norms, and engages existing structures.
- A clearly defined, but flexible programme model facilitates successful replication to other food insecure areas with varying agro-ecological zones and cultural situations.
- Strong monitoring and evaluation systems and feedback loops allow effective use of data to inform and improve HFP programming.

Notes

- 1 <http://www.hki.org/reducing-malnutrition/essential-nutrition-actions/>, accessed July 2012.
- 2 Dark green leafy vegetables, pulses, animal-source foods, fruits, and other vegetables.

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