

## Research and innovation

The Global Forum on Agricultural Research (GFAR) brings together all those working to strengthen and transform agricultural research for development around the world. As part of this role, GFAR is working with New Agriculturist to showcase and raise awareness of important initiatives and their outcomes, to update and inspire others.



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## Nutrition

One billion people in the world do not have enough food to eat and many more are affected by vitamin and mineral deficiencies. Undernutrition irreversibly damages cognitive and physical development and causes severe stunting in children. It is also estimated that it contributes to the loss of an average of 2-3 per cent of GDP in developing countries each year. In the run up to a 'hunger summit' to drive further global action to reduce hunger and malnutrition, immediately before the G8 summit in June 2013, GFAR draws attention to work in Bangladesh, India and Vietnam that is addressing nutrition and health challenges.

### Organic sack gardening in Bangladesh

In Bangladesh, 500 people with limited access to land are supplementing their food and income by growing vegetables in sacks. In addition to enabling families to consume vegetables more regularly, sack gardening has also empowered women, who most often organise and take care of the gardens.

### Making mountain communities nutritionally secure

To help smallholders in India's central Himalayan mountain region attain food and nutrition security and increase their net incomes from sustainable livelihoods, the Institute of Himalayan Environmental Research and Education is working with agricultural communities to promote agricultural biodiversity and add value to and provide markets for smallholder produce.

### Protecting Vietnamese street food

Informal street food contributes to food security and to national economic growth but the selling of food without proper sanitary measures raises food safety concerns. In Vietnam, one NGO has launched a campaign to encourage vendors to implement good practices to protect consumers.

## Organic sack gardening in Bangladesh

Living in Vabanipur village in Bangladesh's Malulavi Bazaar District, Ainob Bibi has struggled to feed her four children. Without land, and living close to Hakaluki Haor - a large wetland area in eastern Bangladesh that is flooded for five to six months of the year - Bibi could not grow vegetables or other crops. After hearing about a new 'sack gardening' technology from the NGO Friends in Village Development Bangladesh (FIVDB), Bibi started with five sacks containing green spinach seedlings. After only 20 days she harvested six kilos, harvesting another five kilos a week later. Today she also grows naga chilli, which she can sell. By growing different vegetables, Bibi is able to supply her own family and earn money. As a result, a number of her neighbours have also taken up the practice.



By growing different vegetables, Ainob Bibi is able to supply her own family and earn money ©FIVDB

### Maximising space

Vegetables are an essential source of nutrition for a sound and healthy body, but in Bangladesh two out of every three children born are underweight due to malnutrition; millions also suffer from night blindness, each year vitamin A deficiency (VAD) affecting 300,000 people. Malnutrition also reduces a person's ability to do sustained work. In Kenya and Uganda, the French NGO Solidarités developed 'sack gardening' where tall, earth-filled sacks sprout kale, spinach, herbs and onions from the tops and sides. In 2010, with help from Solidarités, the 'garden-in-a-sack' concept was introduced in Sylhet, Maulvi Bazar, Brahmanbaria and Dhaka districts by FIVDB.

In Bangladesh, most poor people, like Bibi, don't have enough land to cultivate vegetables conventionally. Sack gardening does not require much space and vegetables can be grown according to demand and taste. The bags are also easy to move, which is important for families living on 'char' lands (flood prone areas) and riverbanks, who are often forced to move as villages are inundated.



Sack gardening does not require much space ©FIVDB

Costing roughly US\$3 to prepare each sack, FIVDB has calculated that to guarantee a regular supply of vegetables for a household of four to five people, eight to ten sacks are required. FIVDB found that short-cycle, indigenous, leafy vegetables such as amaranth, kangkong (water spinach) and Indian spinach grew well, particularly in the sides of the sack, with very few disease problems. The leafy vegetables are very nutritious and are an important contributor to household food security. Another benefit is that these vegetables are grown without the use of any inorganic fertilisers. In contrast, chemicals are often used on fruit and vegetables during transport and storage, while waste water is often used in urban markets to keep vegetables looking fresh.

### Economic empowerment

In 2011, another woman, Parveen, began growing brinjal (aubergine), tomato and naga chilli in the top of her sacks and green spinach, kangkong and coriander leaf in the sides. With three sacks she found that she could eat vegetables at least once a week. In 2012, she had five sacks, enabling her to provide vegetables to her family two to three times a week. She was also able to sell some in the local market, earning 2,000 Taka (US\$25). This additional income enabled her to cover some basic needs and contribute to her children's education. Parveen has now expanded her garden to seven sacks, which is the maximum she can fit in the land available to her.

In addition to enabling families to consume vegetables more regularly, sack gardening has also empowered women, who most often organise and take care of the gardens. Women are able to contribute to the economic stability of their families through increased income and make sure that their children consume nutritious food. It has also been found that households with sack gardens, who are saving money they would have spent purchasing vegetables, can afford to consume more vegetables than before.

### Soil and seeds

The main challenges communities face in implementing sack gardening has been access to soil and seeds, and in *haor* (marshy) areas, which are frequently flooded, sack gardeners have to ensure that they collect enough soil before the rainy season. An additional constraint is that the average life-span of a sack is 9-12 months. Nutrients in the soil are also used up so production drops after a couple of months. To overcome this limitation, FIVDB is looking into the effectiveness of applying liquid fertilisers and exploring alternative low-cost bags that are more durable.

Around 500 households are now practising this technology, which is also becoming popular in urban areas. Mass media is playing an important role in disseminating information about the technology and the benefits of sack gardening on rooftops and in vacant spaces. FIVDB is working towards expanding the technology into other areas of Bangladesh, including slum areas in cities and in schools, to encourage children to become learn more about agriculture.

Written by Dr Shaikh Tanveer Hossain, FIVDB



Sack gardening has also empowered women, who most often organise and take care of the gardens  
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## Making mountain communities nutritionally secure

For rural communities in India's central Himalayan mountain region, nutrition is dependent on local production and incomes. In Garhwal and Kumaon Himalayas, smallholders working on terraced farms cut into mountainsides, have traditionally grown a wide range of produce for household consumption with small surpluses for sale. While isolated in the daunting mountain topography, with poor access to roads and transport, mountain farmers do benefit from varying altitudes and aspects with different soils, sunlight received and water availability, which allows them to grow a diverse selection of crops such as rice, wheat, millet, spices, amaranth, medicinal herbs and tropical and temperate fruit.



INHERE works with agricultural communities to promote agricultural biodiversity  
©INHERE

Specialisation and economies of scale are often stressed in modern agriculture.

Scientists in research stations focus their efforts on one or a few crops identified as 'important', having commercial or consumption value. Farmers in the Himalayas are caught between the attraction of using results of new research to increase their productivity and incomes, and the need to provide varied nutritional diets for their families while preserving the fertility of their soil. Uncertain weather is another dimension, adding further confusion. To help smallholders attain food and nutrition security and increase their net incomes from sustainable livelihoods, the Institute of Himalayan Environmental Research and Education (INHERE) works with agricultural communities to promote agricultural biodiversity, and add value to and provide markets for smallholder produce.

### In harmony with nature

INHERE has been collecting good quality traditional seeds for multiplication, encouraging and facilitating farmers in different villages to exchange seed and promote local crops which have often been marginalised in favour of hybrid seeds. Crops such as jhungra or foxtail millet, red rice and groundnuts - which had been abandoned by farmers but are now being recognised as drought resistant - have been reintroduced. New pigeonpea, millet and maize seeds, recommended by research organisations, have also been distributed for testing by farmers.



Women carry out most agricultural activities  
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INHERE also reaches out to mobilise and organise farming communities. Women carry out most agricultural activities, with men largely responsible for ploughing and marketing of produce. INHERE, therefore, has identified better agricultural tools for women - including small handhoes, sickles and winnowers - which are in the process of being tested and improved. Women have also been supported in the marketing of their produce. To further reduce drudgery and increase net incomes, the NGO has also been working with communities to group-purchase threshing machines.

### Adding value

Another way to boost incomes is through aggregating surplus production and adding value. The INHERE Aajeevika Utthan Samiti community-based organisation collects surpluses from smallholders for aggregation and processing. Three processing units have been established by Aajeevika Utthan Samiti: one unit takes care of cereals, pulses and spices, which are cleaned, sorted, graded, roasted and powdered, where required; the second unit processes fruits and vegetables into pickles, preserves, cooking pastes, fruit concentrates and ready-to-serve drinks; and the third processes medicinal herbs into local healthcare products. All of the produce is packaged and sold across the country under the brandname, *Himalayan Fresh*, and is certified as organic.

The units are now self-sustaining, generating local employment and income for over 3,000 mountain farmers from 120 villages. These units have provided farmers with a markets, but more importantly have given them bargaining power with traders who used to exploit the absence of local markets. This has enabled farmers to increase their price: in some cases (e.g. turmeric) by up to tenfold. Much of this additional income has gone directly to women. In addition, INHERE has organised farmer interest groups and has facilitated joint marketing of fresh vegetables in local markets through local retail groups.

### Partnership

To boost the impact of research for smallscale farmers, INHERE has been working to actively link research institutions and scientists to farmers. The Vivekananda Parvatiya Krishi Anusandhan Sansthan (VPKAS), an institution mandated to study mountain farming by the Indian Council of Agriculture Research, examined the nutrient values of mountain crops and their importance in diets. INHERE found that local knowledge, reinforced by science, gained more credence and was accepted more readily. More readily available knowledge about traditional varieties is enabling revival for some crops such as foxtail millet and black sesame that had been lost, especially for those that are high yielding and have greater climate risk resilience.



VPKAS examined the nutrient values of mountain crops and their importance in diets  
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INHERE, VPKAS and farmer groups are now working together to validate a range of traditional and improved seeds: differences in altitude, aspect and water availability makes site specific validation important. Farmers are also comparing the performance of their traditional seed with new seed. In some cases the traditional seeds have done better than newly released varieties, possibly because they are better adapted to the local climate and unpredictable weather.

The work of INHERE is now linked to the Prolinnova network, which promotes local innovation and farmer-led innovation. INHERE is working to promote local innovation and farmer-led experimentation, focusing on food and nutrition security. New crops, such as gram, pigeon pea and cluster beans have been identified for the area. INHERE is sharing its experiences with colleagues in Asia and Africa and would like to do so with colleagues around the world.

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## Protecting Vietnamese street food



In Hanoi's Old Quarter, streets are packed with stalls where people can buy traditional meals  
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Since 1986, when economic reforms (Đổi mới) were initiated, Vietnam has experienced rapid economic growth and today 24 per cent of jobs are in the informal economy. Informal street-vended foods (or street food) contribute to food security and to national economic growth by providing a regular source of income for millions of sellers, local producers and processors. It has been estimated that there are around 2,000 street food vendors just in Hanoi's Old Quarter.

Streets are densely packed with stalls where people can buy traditional meals, such as *Phở* (rice noodle soup with beef or chicken), *Bánh Cuốn* (steamed crepe containing ground pork), *Gỏi Cuốn* (fresh spring roll) and *Bún Chả* (grilled pork and cool noodles). Street food preserves local

food cultures: since it provides inexpensive and ready-to-eat food, it can be defined as 'traditional fast food'.

### Merging nutrition and safety

From a health viewpoint, a major advantage of street food is its role in nutritional security. Indeed, due to its daily, easy and widespread accessibility and diversified supply of meals, it represents an inexpensive means of meeting basic nutritional needs. A study among Vietnamese adolescents shows that street foods contributed 42 per cent of fruit and vegetables, 23 per cent of sodium and 21 per cent of energy, vitamin A, iron and zinc consumed per day.

The nutritional benefits of street food are undisputed, but the selling of food without proper sanitary measures raises serious concerns about the health of urban populations. According to statistics from the Vietnamese Ministry of Health, from 2004 to 2009, more than 1,000 food poisoning outbreaks occurred, involving both microbiological and chemical (pesticide) agents. Of these outbreaks, 26,500 people were affected and 298 people died.

### From farm to fork

Food safety has to be guaranteed from 'farm to fork'. Following outbreaks of avian flu (1997 to 2003), Hazard Analysis and Critical Control Point (HACCP) principles were established in Vietnam to help food businesses handle and produce food safely. In 2011, Vietnam enacted a Food Safety Law which outlined obligations of organisations and individuals in assuring food safety during the production and trading of foods, including street food. In December 2012, a circular was issued which specified food safety regulations specifically for food and street food establishments. Together with the new regulations, communication initiatives with food operators have fostered the culture and value of safely handling foods and preventing contamination.

To help provide 'sustainable food safety', the non-profit organisation, Network for Nutrition and Food Safety and Wholesomeness (NOODLES), promotes nutrition and food safety in developing countries by spreading up-to-date, understandable information to promote good practices, i.e. methods that have been proven to protect against targeted risks.



The nutritional benefits of street food are undisputed  
©NOODLES

### Sustainable food safety

Besides acute outbreaks, prolonged exposure to chemical contaminants in particular, may have long-term effects on health. Street food is susceptible to chemical/toxicological contamination at various stages. For instance, certain types of processing may expose street foods to carcinogenic contaminants, such as polycyclic aromatic hydrocarbons (mainly from smoking or grilling) and acrylamide (from frying starch-rich foods). Inappropriate or worn food containers and kitchen utensils may lead to hazardous metals leaching into the food (e.g., aluminium, copper), improper storage of raw and cooked foods may favour the generation of mycotoxins, and displaying food may expose it to heavy metals or dioxins in urban dust.



NOODLES is encouraging Vietnamese street food vendors to implement good practices  
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In Vietnam, NOODLES has launched a campaign in collaboration with the Italian National Institute of Health and the Vietnamese National Institute of Veterinary Research of the Ministry of Agriculture and Rural Development to protect street food consumers from being exposed to hazardous food contaminants. Specifically, street food is closely linked to street life and habits, and NOODLES is working in Hanoi's Old Quarter as a model area to identify the most critical contamination risks, address *ad hoc* good practices and promote HACCP principles. NOODLES is also building the capacity of street food vendors through dissemination of street food-targeted information materials and supporting the implementation of a HACCP manual to manage food safety on the street.

The aim is to encourage Vietnamese street food vendors to implement good practices, such as use of gloves and masks to prevent microbiological risks, and selection and use of cooking utensils and storage of food to prevent chemical risks. The next step will be to expand the campaign to other areas with a high density of street food vending sites in Vietnam.

### Links

- NOODLES (<http://www.noodlesonlus.org>)

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